



Online Guide

WinRunner® 7.0 User's Guide



 Books
Online

 Find

 Find
Again

 Help




 Top of
Chapter


 Back


Contents Summary


Welcome to WinRunner	27
PART I: STARTING THE TESTING PROCESS	
Chapter 1: Introduction	35
Chapter 2: WinRunner at a Glance	45
PART II: UNDERSTANDING THE GUI MAP	
Chapter 3: Understanding How WinRunner Identifies GUI Objects	58
Chapter 4: Understanding the GUI Map	70
Chapter 5: Working in the Global GUI Map File Mode	87
Chapter 6: Working in the GUI Map File per Test Mode	120
Chapter 7: Editing the GUI Map	128
Chapter 8: Merging GUI Map Files	160
Chapter 9: Configuring the GUI Map	178
Chapter 10: Learning Virtual Objects	211
PART III: CREATING TESTS	
Chapter 11: Creating Tests	221
Chapter 12: Checking GUI Objects	265
Chapter 13: Working with ActiveX and Visual Basic Controls	341

 Books Online


 Find

 Find Again

 Help



 Top of Chapter

 Back

Chapter 14: Checking Web Pages	370
Chapter 15: Checking PowerBuilder Applications.....	425
Chapter 16: Checking Table Contents.....	441
Chapter 17: Checking Databases.....	462
Chapter 18: Checking Bitmaps	551
Chapter 19: Checking Text	561
Chapter 20: Creating Data-Driven Tests	584
Chapter 21: Synchronizing the Test Run	660
Chapter 22: Handling Unexpected Events and Errors...	679
Chapter 23: Using Regular Expressions	710

PART IV: PROGRAMMING WITH TSL

Chapter 24: Enhancing Your Test Scripts with Programming	721
Chapter 25: Generating Functions.....	743
Chapter 26: Calling Tests.....	759
Chapter 27: Creating User-Defined Functions	778
Chapter 28: Creating Compiled Modules	792
Chapter 29: Calling Functions from External Libraries.	805
Chapter 30: Creating Dialog Boxes for Interactive Input	816



PART V: RUNNING TESTS

Chapter 31: Running Tests	831
Chapter 32: Analyzing Test Results	862
Chapter 33: Running Batch Tests	907
Chapter 34: Running Tests from the Command Line	916

PART VI: DEBUGGING TESTS


Chapter 35: Debugging Test Scripts	944
Chapter 36: Using Breakpoints	951
Chapter 37: Monitoring Variables	965


PART VII: CONFIGURING WINRUNNER


Chapter 38: Customizing WinRunner's User Interface ..	977
Chapter 39: Customizing the Test Script Editor	1012
Chapter 40: Setting Global Testing Options	1027
Chapter 41: Setting Testing Options from a Test Script	1090
Chapter 42: Customizing the Function Generator	1134
Chapter 43: Initializing Special Configurations	1158

PART VIII: WORKING WITH TESTSUITE


Chapter 44: Managing the Testing Process	1163
Chapter 45: Testing Systems Under Load	1213
Chapter 46: Reporting Defects	1228
Index	1243


 **Books Online**

 **Find**

 **Find Again**

 **Help**



 **Top of Chapter**


 **Back**

Table of Contents

Welcome to WinRunner	27
Using this Guide	28
WinRunner Documentation Set	30
Online Resources	31
Typographical Conventions	33

PART I: STARTING THE TESTING PROCESS

Chapter 1: Introduction	35
WinRunner Testing Modes	36
The WinRunner Testing Process	38
Sample Applications	41
Working with TestSuite	43
Chapter 2: WinRunner at a Glance	45
Starting WinRunner	46
The Main WinRunner Window	48
The Test Window	50
Using WinRunner Commands	51
Loading WinRunner Add-Ins	55









PART II: UNDERSTANDING THE GUI MAP


Chapter 3: Understanding How WinRunner Identifies GUI Objects	58
About Identifying GUI Objects	59
How a Test Identifies GUI Objects	62
Physical Descriptions	63
Logical Names.....	65
The GUI Map.....	66
Setting the Window Context	69
Chapter 4: Understanding the GUI Map	70
About the GUI Map.....	71
Viewing GUI Object Properties.....	73
Teaching WinRunner the GUI of Your Application	81
Finding an Object or Window in the GUI Map	82
General Guidelines for Working with GUI Map Files	83
Deciding Which GUI Map File Mode to Use	84
Chapter 5: Working in the Global GUI Map File Mode	87
About the Global GUI Map File Mode.....	88
Sharing a GUI Map File among Tests	91
Teaching WinRunner the GUI of Your Application	93
Saving the GUI Map	107
Loading the GUI Map File.....	111
Guidelines for Working in the Global GUI Map File Mode.....	118



Chapter 6: Working in the GUI Map File per Test Mode	
Test Mode	120
About the GUI Map File per Test Mode.....	121
Specifying the GUI Map File per Test Mode.....	123
Working in the GUI Map File per Test Mode	126
Guidelines for Working in the GUI Map File per Test Mode	127
Chapter 7: Editing the GUI Map	128
About Editing the GUI Map.....	129
The Run Wizard.....	131
The GUI Map Editor.....	134
Modifying Logical Names and Physical Descriptions	139
How WinRunner Handles Varying Window Labels.....	143
Using Regular Expressions in the Physical Description	147
Copying and Moving Objects between Files	149
Finding an Object in a GUI Map File	152
Finding an Object in Multiple GUI Map Files	153
Manually Adding an Object to a GUI Map File	154
Deleting an Object from a GUI Map File.....	155
Clearing a GUI Map File.....	156
Filtering Displayed Objects.....	157
Saving Changes to the GUI Map.....	159

 Books Online
 Find
 Find Again
 Help

 Top of Chapter
 Back

Chapter 8: Merging GUI Map Files	160
About Merging GUI Map Files	161
Preparing to Merge GUI Map Files.....	163
Resolving Conflicts while Automatically Merging GUI Map Files ...	167
Merging GUI Map Files Manually	172
Changing to the GUI Map File per Test Mode.....	177
Chapter 9: Configuring the GUI Map	178
About Configuring the GUI Map	179
Understanding the Default GUI Map Configuration.....	181
Mapping a Custom Object to a Standard Class	183
Configuring a Standard or Custom Class	188
Creating a Permanent GUI Map Configuration.....	196
Deleting a Custom Class	199
The Class Property.....	200
All Properties	202
Default Properties Learned.....	208
Properties for Visual Basic Objects	209
Properties for PowerBuilder Objects	210

 Books Online
 Find
 Find Again
 Help

 Top of Chapter
 Back

Chapter 10: Learning Virtual Objects	211
About Learning Virtual Objects.....	212
Defining a Virtual Object.....	214
Understanding a Virtual Object's Physical Description.....	219

PART III: CREATING TESTS

Chapter 11: Creating Tests.....	221
About Creating Tests.....	222
The WinRunner Test Window.....	224
Context Sensitive Recording	225
Solving Common Context Sensitive Recording Problems.....	230
Analog Recording.....	233
Checkpoints.....	235
Data-Driven Tests.....	236
Synchronization Points.....	237
Planning a Test.....	238
Documenting Test Information	239
Associating Add-ins with a Test.....	243
Recording a Test	245
Activating Test Creation Commands Using Softkeys	249
Programming a Test.....	252
Editing a Test.....	253
Managing Test Files	255



Chapter 12: Checking GUI Objects	265
About Checking GUI Objects.....	266
Checking a Single Property Value.....	269
Checking a Single Object	272
Checking Two or More Objects in a Window.....	277
Checking All Objects in a Window.....	280
Understanding GUI Checkpoint Statements.....	284
Using an Existing GUI Checklist in a GUI Checkpoint.....	287
Modifying GUI Checklists	290
Understanding the GUI Checkpoint Dialog Boxes.....	299
Property Checks and Default Checks.....	315
Specifying Arguments for Property Checks.....	324
Editing the Expected Value of a Property.....	335
Modifying the Expected Results of a GUI Checkpoint.....	338



Chapter 13: Working with ActiveX and Visual Basic Controls	341
About Working with ActiveX and Visual Basic Controls	342
Choosing Appropriate Support for Visual Basic Applications	344
Viewing ActiveX and Visual Basic Control Properties	347
Retrieving and Setting the Values of ActiveX and Visual Basic Control Properties.....	352
Activating an ActiveX Control Method	358
Working with Visual Basic Label Controls	359
Checking Sub-Objects of ActiveX and Visual Basic Controls.....	364
Using TSL Table Functions with ActiveX Controls	368



Chapter 14: Checking Web Pages	370
About Checking Web Pages.....	371
Checking Standard Frame Properties	372
Checking the Object Count in Frames.....	375
Checking the Structure of Frames, Tables, and Cells.....	378
Checking the Content of Frames, Cells, Links, or Images	381
Checking the Number of Columns and Rows in a Table.....	384
Checking the URL of Links	387
Checking Source or Type of Images and Image Links.....	390
Checking Color or Font of Text Links	393
Checking Broken Links.....	396
Checking the Content of Tables	401
Checking Links and Images in a Frame	404
Understanding the Edit Check Dialog Box	407
Checking Text.....	419
Chapter 15: Checking PowerBuilder Applications.....	425
About Checking PowerBuilder Applications	426
Checking Properties of DropDown Objects	427
Checking Properties of DataWindows	432
Checking Properties of Objects within DataWindows.....	436
Working with Computed Columns in DataWindows	440



Chapter 16: Checking Table Contents.....	441
About Checking Table Contents.....	442
Checking Table Contents with Default Checks	445
Checking Table Contents while Specifying Checks	447
Understanding the Edit Check Dialog Box	451
Chapter 17: Checking Databases.....	462
About Checking Databases	463
Creating a Runtime Database Record Checkpoint.....	468
Creating a Default Check on a Database	480
Creating a Custom Check on a Database	485
Messages in the Database Checkpoint Dialog Boxes	490
Working with the Database Checkpoint Wizard	491
Understanding the Edit Check Dialog Box	504
Modifying a Standard Database Checkpoint	514
Modifying the Expected Results of a Standard Database Checkpoint.....	529
Parameterizing Standard Database Checkpoints.....	533
Specifying a Database.....	540
Using TSL Functions to Work with a Database	544



Chapter 18: Checking Bitmaps	551
About Checking Bitmaps	552
Checking Window and Object Bitmaps	556
Checking Area Bitmaps	559
Chapter 19: Checking Text	561
About Checking Text	562
Reading Text	564
Searching for Text	570
Comparing Text	577
Teaching Fonts to WinRunner	578



Chapter 20: Creating Data-Driven Tests.....	584
About Creating Data-Driven Tests.....	585
The Data-Driven Testing Process	586
Creating a Basic Test for Conversion.....	587
Converting a Test to a Data-Driven Test.....	591
Preparing the Data Table	610
Importing Data from a Database	622
Running and Analyzing Data-Driven Tests.....	635
Assigning the Main Data Table for a Test	637
Using Data-Driven Checkpoints and Bitmap Synchronization Points.....	639
Using TSL Functions with Data-Driven Tests.....	647
Guidelines for Creating a Data-Driven Test.....	657
Chapter 21: Synchronizing the Test Run	660
About Synchronizing the Test Run	661
Waiting for Objects and Windows.....	664
Waiting for Property Values of Objects and Windows	666
Waiting for Bitmaps of Objects and Windows.....	672
Waiting for Bitmaps of Screen Areas.....	675
Tips for Synchronizing Tests	678



Chapter 22: Handling Unexpected Events and Errors	679
About Handling Unexpected Events and Errors	680
Handling Pop-Up Exceptions.....	682
Handling TSL Exceptions	690
Handling Object Exceptions	696
Activating and Deactivating Exception Handling	703
Handling Web Exceptions	704
Chapter 23: Using Regular Expressions	710
About Regular Expressions	711
When to Use Regular Expressions.....	712
Regular Expression Syntax	716

 **Books Online**
 **Find**
 **Find Again**
 **Help**

 **Top of Chapter**
 **Back**

PART IV: PROGRAMMING WITH TSL

Chapter 24: Enhancing Your Test Scripts with Programming	721
About Enhancing Your Test Scripts with Programming.....	722
Statements	724
Comments and White Space.....	725
Constants and Variables	727
Performing Calculations	728
Creating Stress Conditions.....	730
Decision-Making	733
Sending Messages to the Test Results Window	737
Starting Applications from a Test Script	738
Defining Test Steps	739
Comparing Two Files.....	741
Chapter 25: Generating Functions	743
About Generating Functions.....	744
Generating a Function for a GUI Object.....	747
Selecting a Function from a List	752
Assigning Argument Values	754
Modifying the Default Function in a Category.....	757



Chapter 26: Calling Tests	759
About Calling Tests	760
Using the Call Statement.....	762
Returning to the Calling Test.....	764
Setting the Search Path.....	767
Defining Test Parameters.....	769
Chapter 27: Creating User-Defined Functions.....	778
About Creating User-Defined Functions.....	779
Function Syntax.....	781
Return Statements.....	783
Variable, Constant, and Array Declarations	784
Example of a User-Defined Function.....	791
Chapter 28: Creating Compiled Modules	792
About Creating Compiled Modules.....	793
Contents of a Compiled Module	795
Creating a Compiled Module	796
Loading and Unloading a Compiled Module.....	799
Example of a Compiled Module.....	804



Chapter 29: Calling Functions from External Libraries	805
About Calling Functions from External Libraries	806
Dynamically Loading External Libraries	808
Declaring External Functions in TSL	810
Windows API Examples	814
Chapter 30: Creating Dialog Boxes for Interactive Input.....	816
About Creating Dialog Boxes for Interactive Input.....	817
Creating an Input Dialog Box.....	819
Creating a List Dialog Box	821
Creating a Custom Dialog Box	823
Creating a Browse Dialog Box.....	826
Creating a Password Dialog Box.....	828

 **Books Online**
 **Find**
 **Find Again**
 **Help**

 **Top of Chapter**
 **Back**

PART V: RUNNING TESTS

Chapter 31: Running Tests	831
About Running Tests	832
WinRunner Test Run Modes	834
WinRunner Run Commands.....	839
Choosing Run Commands Using Softkeys	843
Running a Test to Check Your Application.....	845
Running a Test to Debug Your Test Script.....	847
Running a Test to Update Expected Results.....	849
Controlling the Test Run with Testing Options	854
Reviewing Current Test Settings	855
Solving Common Test Run Problems	858



Chapter 32: Analyzing Test Results	862
About Analyzing Test Results.....	863
The Test Results Window.....	864
Viewing the Results of a Test Run	870
Viewing Checkpoint Results.....	876
Analyzing the Results of a Property Check	877
Analyzing the Results of a GUI Checkpoint.....	878
Analyzing the Results of a GUI Checkpoint on Table Contents	882
Analyzing the Expected Results of a GUI Checkpoint on Table Contents.....	887
Analyzing the Results of a Bitmap Checkpoint.....	892
Analyzing the Results of a Database Checkpoint.....	893
Analyzing the Expected Results of a Content Check in a Database Checkpoint.....	896
Updating the Expected Results of a Checkpoint	901
Viewing the Results of a File Comparison.....	903
Reporting Defects Detected During a Test Run	906
Chapter 33: Running Batch Tests	907
About Running Batch Tests	908
Creating a Batch Test.....	910
Running a Batch Test.....	912
Storing Batch Test Results	913
Viewing Batch Test Results.....	915



Chapter 34: Running Tests from the Command Line	916
About Running Tests from the Command Line	917
Using the Windows Command Line	919
Command Line Options.....	921

PART VI: DEBUGGING TESTS

Chapter 35: Debugging Test Scripts	944
About Debugging Test Scripts.....	945
Running a Single Line of a Test Script	947
Running a Section of a Test Script.....	948
Pausing a Test Run.....	949
Chapter 36: Using Breakpoints	951
About Breakpoints	952
Breakpoint Types.....	954
Setting Break at Location Breakpoints	956
Setting Break in Function Breakpoints	959
Modifying Breakpoints	962
Deleting Breakpoints	964



Chapter 37: Monitoring Variables	965
About Monitoring Variables	966
Adding Variables to the Watch List.....	969
Viewing Variables in the Watch List	971
Modifying Variables in the Watch List.....	973
Assigning a Value to a Variable in the Watch List	974
Deleting Variables from the Watch List	975

PART VII: CONFIGURING WINRUNNER

Chapter 38: Customizing WinRunner’s User Interface	977
About Customizing WinRunner’s User Interface	978
Customizing the User Toolbar	979
Using the User Toolbar.....	1003
Configuring WinRunner Softkeys	1006
Chapter 39: Customizing the Test Script Editor	1012
About Customizing the Test Script Editor.....	1013
Setting Display Options	1014
Personalizing Editing Commands.....	1024

 **Books Online**
 **Find**
 **Find Again**
 **Help**

 **Top of Chapter**
 **Back**

Chapter 40: Setting Global Testing Options	1027
About Setting Global Testing Options	1028
Setting Global Testing Options from the General Options Dialog Box.....	1029
Global Testing Options	1031
Choosing Appropriate Timeout and Delay Settings.....	1086
Chapter 41: Setting Testing Options from a Test Script	1090
About Setting Testing Options from a Test Script	1091
Setting Testing Options with setvar	1092
Retrieving Testing Options with getvar	1094
Controlling the Test Run with setvar and getvar.....	1097
Test Script Testing Options	1098
Chapter 42: Customizing the Function Generator	1134
About Customizing the Function Generator	1135
Adding a Category to the Function Generator.....	1136
Adding a Function to the Function Generator.....	1138
Associating a Function with a Category	1151
Adding a Subcategory to a Category.....	1154
Setting a Default Function for a Category	1156



Chapter 43: Initializing Special Configurations	1158
About Initializing Special Configurations	1159
Creating Startup Tests.....	1160
Sample Startup Test.....	1161

PART VIII: WORKING WITH TESTSUITE

Chapter 44: Managing the Testing Process.....	1163
About Managing the Testing Process.....	1164
Integrating the Testing Process.....	1169
Accessing WinRunner Tests from TestDirector 7.0i.....	1171
Connecting to and Disconnecting from a Project	1174
Saving Tests to a Project.....	1181
Opening Tests in a Project	1184
Managing Test Versions in WinRunner (TestDirector 6.0 only).....	1188
Saving GUI Map Files to a Project	1194
Opening GUI Map Files in a Project.....	1197
Running Tests in a Test Set	1199
Running Tests on Remote Hosts.....	1201
Viewing Test Results from a Project.....	1202
Using TSL Functions with TestDirector	1205
Command Line Options for Working with TestDirector	1209

 Books Online
 Find
 Find Again
 Help

 Top of Chapter
 Back

Chapter 45: Testing Systems Under Load	1213
About Testing Systems Under Load	1214
Emulating Multiple Users	1215
Virtual User (Vuser) Technology	1216
Developing and Running Scenarios	1217
Creating GUI Vuser Scripts	1219
Measuring Server Performance	1220
Synchronizing Virtual User Transactions	1222
Creating a Rendezvous Point	1223
A Sample Vuser Script	1225
Chapter 46: Reporting Defects	1228
About Reporting Defects	1229
Using the Add Defect Dialog Box (TestDirector 7.0i)	1230
Using the Web Defect Manager (TestDirector 6.0)	1234
Using the Remote Defect Reporter (TestDirector 6.0)	1238
Index	1243



Welcome to WinRunner

Welcome to WinRunner, Mercury Interactive's enterprise functional testing tool for Microsoft Windows applications. With WinRunner you can quickly create and run sophisticated automated tests on your application.



Using this Guide

This guide describes the main concepts behind automated software testing. It provides step-by-step instructions to help you create, debug, and run tests, and to report defects detected during the testing process.

This guide contains 8 parts:

Part I: Starting the Testing Process

Provides an overview of WinRunner and the main stages of the testing process.

Part II: Understanding the GUI Map

Describes Context Sensitive testing and the importance of the GUI map for creating adaptable and reusable test scripts.

Part III: Creating Tests

Describes how to create test scripts, insert checkpoints, assign parameters, use regular expressions, and handle unexpected events that occur during a test run.

Part IV: Programming with TSL

Describes how to enhance your test scripts using variables, control-flow statements, arrays, user-defined and external functions, WinRunner's visual programming tools, and interactive input during a test run.



Part V: Running Tests

Describes how to run tests, including batch tests, both from within WinRunner and from the command line, and analyze test results.

Part VI: Debugging Tests

Describes how to control test runs to identify and isolate bugs in test scripts, by using breakpoints and monitoring variables during the test run.

Part VII: Configuring WinRunner

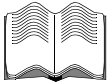
Describes how to customize WinRunner's user interface, test script editor and the Function Generator. You can also change WinRunner's default settings, both globally and per test, and initialize special configurations to adapt WinRunner to your testing environment.

Part VIII: Working with TestSuite

Describes how to report defects detected in your application and how WinRunner interacts with TestDirector and LoadRunner.



WinRunner Documentation Set



In addition to this guide, WinRunner comes with a complete set of documentation:

WinRunner Installation Guide describes how to install WinRunner on a single computer or a network.

WinRunner Tutorial teaches you basic WinRunner skills and shows you how to start testing your application.

WinRunner Customization Guide explains how to customize WinRunner to meet the special testing requirements of your application.

TSL Reference Guide describes Test Script Language (TSL) and the functions it contains.



Online Resources

WinRunner includes the following online resources:

Read Me First provides last-minute news and information about WinRunner.

What's New in WinRunner describes the newest features in the latest versions of WinRunner.

Books Online displays the complete documentation set in PDF format. Online books can be read and printed using Adobe Acrobat Reader 4.0, which is included in the installation package. Check Mercury Interactive's Customer Support Web site for updates to WinRunner online books.

WinRunner Context-Sensitive Help provides immediate answers to questions that arise as you work with WinRunner. It describes menu commands and dialog boxes, and shows you how to perform WinRunner tasks. Check Mercury Interactive's Customer Support Web site for updates to WinRunner help files.

TSL Online Reference describes Test Script Language (TSL), the functions it contains, and examples of how to use the functions. Check Mercury Interactive's Customer Support Web site for updates to the *TSL Online Reference*.

WinRunner Sample Tests includes utilities and sample tests with accompanying explanations. Check Mercury Interactive's Customer Support Web site for updates to WinRunner sample tests.



Technical Support Online uses your default Web browser to open Mercury Interactive's Customer Support Web site. The URL for this Web site is <http://support.mercuryinteractive.com>.

Support Information presents Mercury Interactive's home page, its Customer Support Web site, and a list of Mercury Interactive's offices around the world.

Mercury Interactive on the Web uses your default web browser to open Mercury Interactive's home page. This site provides you with the most up-to-date information on Mercury Interactive, its products and services. This includes new software releases, seminars and trade shows, customer support, training, and more. The URL for this Web site is <http://www.mercuryinteractive.com>.



Typographical Conventions

This book uses the following typographical conventions:

1, 2, 3	Bold numbers indicate steps in a procedure.
•	Bullets indicate options and features.
>	The greater than sign separates menu levels (for example, File > Open).
Bold	Bold text indicates function names.
<i>Italics</i>	<i>Italic</i> text indicates variable names.
Helvetica	The Helvetica font is used for examples and statements that are to be typed in literally.
[]	Square brackets enclose optional parameters.
{ }	Curly brackets indicate that one of the enclosed values must be assigned to the current parameter.
...	In a line of syntax, an ellipsis indicates that more items of the same format may be included. In a program example, an ellipsis is used to indicate lines of a program that were intentionally omitted.
	A vertical bar indicates that either of the two options separated by the bar should be selected.



Starting the Testing Process



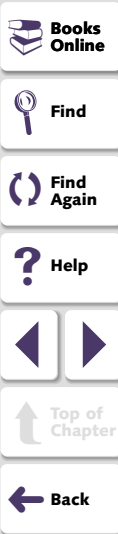
Starting the Testing Process

Introduction

Welcome to WinRunner, Mercury Interactive's enterprise functional testing tool for Microsoft Windows applications. This guide provides detailed descriptions of WinRunner's features and automated testing procedures.

Recent advances in client/server software tools enable developers to build applications quickly and with increased functionality. Quality Assurance departments must cope with software that has dramatically improved, but is increasingly complex to test. Each code change, enhancement, defect fix, or platform port necessitates retesting the entire application to ensure a quality release. Manual testing can no longer keep pace in this dynamic development environment.

WinRunner helps you automate the testing process, from test development to execution. You create adaptable and reusable test scripts that challenge the functionality of your application. Prior to a software release, you can run these tests in a single overnight run—enabling you to detect defects and ensure superior software quality.



WinRunner Testing Modes

WinRunner facilitates easy test creation by recording how you work on your application. As you point and click GUI (Graphical User Interface) objects in your application, WinRunner generates a test script in the C-like Test Script Language (TSL). You can further enhance your test scripts with manual programming. WinRunner includes the Function Generator, which helps you quickly and easily add functions to your recorded tests.

WinRunner includes two modes for recording tests:

Context Sensitive

Context Sensitive mode records your actions on the application being tested in terms of the GUI objects you select (such as windows, lists, and buttons), while ignoring the physical location of the object on the screen. Every time you perform an operation on the application being tested, a TSL statement describing the object selected and the action performed is generated in the test script.

As you record, WinRunner writes a unique description of each selected object to a GUI map. The GUI map consists of files maintained separately from your test scripts. If the user interface of your application changes, you have to update only the GUI map, instead of hundreds of tests. This allows you to easily reuse your Context Sensitive test scripts on future versions of your application.



To run a test, you simply play back the test script. WinRunner emulates a user by moving the mouse pointer over your application, selecting objects, and entering keyboard input. WinRunner reads the object descriptions in the GUI map and then searches in the application being tested for objects matching these descriptions. It can locate objects in a window even if their placement has changed.

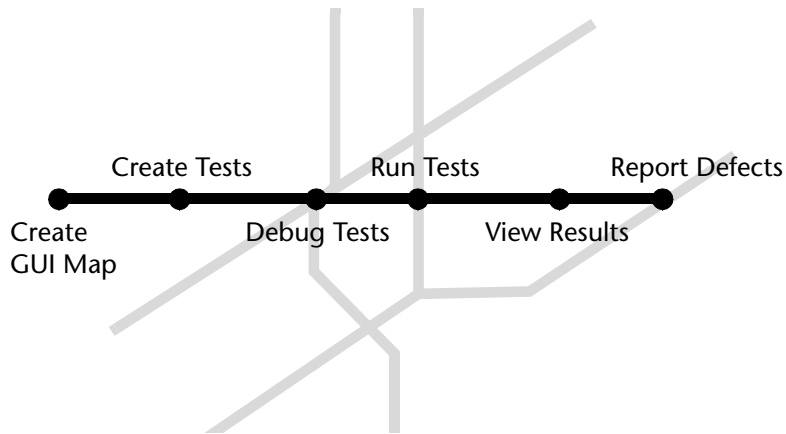
Analog

Analog mode records mouse clicks, keyboard input, and the exact x- and y-coordinates traveled by the mouse. When the test is run, WinRunner retraces the mouse tracks. Use Analog mode when exact mouse coordinates are important to your test, such as when testing a drawing application.



The WinRunner Testing Process

Testing with *WinRunner* involves six main stages:



Create the GUI Map

The first stage is to create the GUI map so WinRunner can recognize the GUI objects in the application being tested. Use the RapidTest Script wizard to review the user interface of your application and systematically add descriptions of every GUI object to the GUI map. Alternatively, you can add descriptions of individual objects to the GUI map by clicking objects while recording a test.



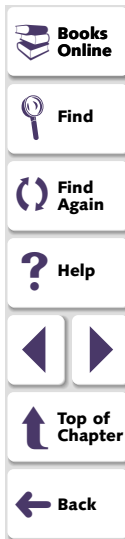
Note that when you work in *GUI Map per Test* mode, you can skip this step. For additional information, see Chapter 3, [Understanding How WinRunner Identifies GUI Objects](#).

Create Tests

Next, you create test scripts by recording, programming, or a combination of both. While recording tests, insert checkpoints where you want to check the response of the application being tested. You can insert checkpoints that check GUI objects, bitmaps, and databases. During this process, WinRunner captures data and saves it as *expected results*—the expected response of the application being tested.

Debug Tests

You run tests in Debug mode to make sure they run smoothly. You can set breakpoints, monitor variables, and control how tests are run to identify and isolate defects. Test results are saved in the debug folder, which you can discard once you've finished debugging the test.



Run Tests

You run tests in Verify mode to test your application. Each time WinRunner encounters a checkpoint in the test script, it compares the current data of the application being tested to the expected data captured earlier. If any mismatches are found, WinRunner captures them as *actual results*.

View Results

You determine the success or failure of the tests. Following each test run, WinRunner displays the results in a report. The report details all the major events that occurred during the run, such as checkpoints, error messages, system messages, or user messages.

If mismatches are detected at checkpoints during the test run, you can view the expected results and the actual results from the Test Results window. In cases of bitmap mismatches, you can also view a bitmap that displays only the difference between the expected and actual results.

Report Defects

If a test run fails due to a defect in the application being tested, you can report information about the defect directly from the Test Results window. This information is sent via e-mail to the quality assurance manager, who tracks the defect until it is fixed.



Sample Applications

Many examples in this book use the sample Flight Reservation application provided with WinRunner. Note that this application is Year 2000 compliant.

Starting the Sample Application

You can start this application by choosing **Start > Programs > WinRunner > Sample Applications** and then choosing the version of the flight application you want to open: Flight 1A or Flight 1B.

Multiple Versions of the Sample Application

The sample Flight Reservation application comes in two versions: Flight 1A and Flight 1B. Flight 1A is a fully working application, while Flight 1B has some “bugs” built into it. These versions are used together in the *WinRunner Tutorial* to simulate the development process, in which the performance of one version of an application is compared with that of another. You can use the examples in this guide with either Flight 1A or Flight 1B.

When WinRunner is installed with Visual Basic support, Visual Basic versions of Flight 1A and Flight 1B applications are installed in addition to the regular sample applications.



Logging In

When you start the sample Flight Reservation application, the Login dialog box opens. You must log in to start the application. To log in, enter a name of at least four characters and password. The password is “Mercury” and is not case sensitive.

Sample Web Application

WinRunner also includes a sample flight reservation application for the Web. The URL for this Web site is *http://MercuryTours.mercuryinteractive.com*. You can also start this application by choosing **Start > Programs > WinRunner > Sample Applications > Mercury Tours site**.



Working with TestSuite

WinRunner works with other TestSuite tools to provide an integrated solution for all phases of the testing process: test planning, test development, GUI and load testing, defect tracking, and client load testing for multi-user systems.

TestDirector

TestDirector is Mercury Interactive's software test management tool. It helps quality assurance personnel plan and organize the testing process. With TestDirector you can create a database of manual and automated tests, build test cycles, run tests, and report and track defects. You can also create reports and graphs to help review the progress of planning tests, running tests, and tracking defects before a software release.

When you work with WinRunner, you can choose to save your tests directly to your TestDirector database. You can also run tests in WinRunner and then use TestDirector to review the overall results of a testing cycle.



LoadRunner

LoadRunner is Mercury Interactive's testing tool for client/server applications. Using LoadRunner, you can emulate an environment in which many users are simultaneously engaged in a single server application. Instead of human users, it substitutes virtual users that run automated tests on the application being tested. You can test an application's performance "under load" by simultaneously activating virtual users on multiple host computers.



Starting the Testing Process WinRunner at a Glance

This chapter explains how to start WinRunner and introduces the WinRunner window.

This chapter describes:

- **Starting WinRunner**
- **The Main WinRunner Window**
- **The Test Window**
- **Using WinRunner Commands**
- **Loading WinRunner Add-Ins**



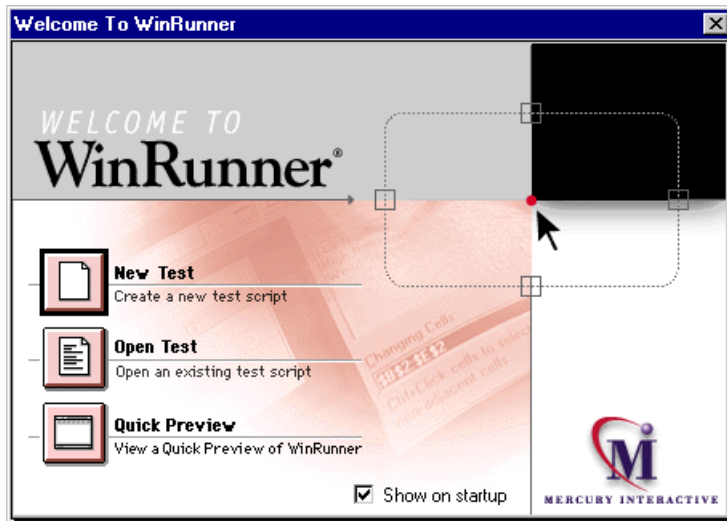
Starting WinRunner



To start WinRunner, click **Start > Programs > WinRunner > WinRunner**. After several seconds, the WinRunner window opens. Note that the WinRunner Record/Run Engine icon appears in the status area of the Windows taskbar. This engine establishes and maintains the connection between WinRunner and the application being tested.



The first time you start WinRunner, the **Welcome to WinRunner** window opens. You can choose to create a new test, open an existing test, or view a Quick Preview of WinRunner.



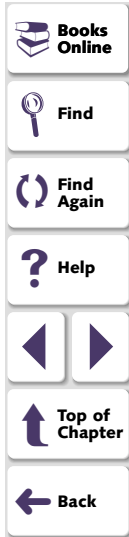
If you do not want this window to appear the next time you start WinRunner, clear the **Show on Startup** check box. To show the **Welcome to WinRunner** window upon startup from within WinRunner, choose **Settings > General Options**, click the **Environment** tab, and select the **Show Welcome Screen** check box.



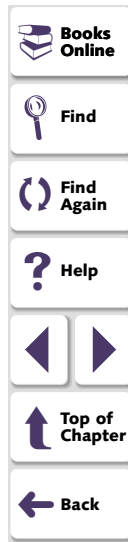
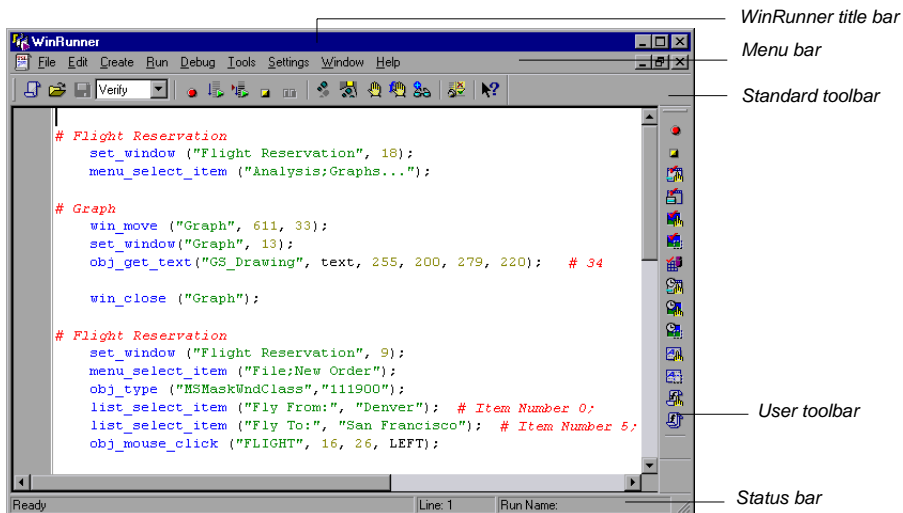
The Main WinRunner Window

The main WinRunner window contains the following key elements:

- *WinRunner title bar*
- *Menu bar*, with drop-down menus of WinRunner commands
- *Standard toolbar*, with buttons of commands commonly used when running a test
- *User toolbar*, with commands commonly used while creating a test



- *Status bar*, with information on the current command, the line number of the insertion point, and the name of the current results folder



The Test Window

You create and run WinRunner tests in the test window. It contains the following key elements:

- *Test window title bar*, with the name of the open test
- *Test script*, with statements generated by recording and/or programming in TSL, Mercury Interactive's Test Script Language
- *Execution arrow*, which indicates the line of the test script being executed (to move the marker to any line in the script, click the mouse in the left window margin next to the line)
- *Insertion point*, which indicates where you can insert or edit text

```

C:\QA\Test 1*
set_window ("Flight Reservation", 21);
obj_type ("MSMaskWndClass", "022799");
list_select_item ("Fly From:", "Frankfurt"); # Item Number 1;
list_select_item ("Fly To:", "London"); # Item Number 1;
obj_mouse_click ("#32770", 114, 204, LEFT);
obj_mouse_click ("FLIGHT", 69, 38, LEFT);
set_window ("Flights Table", 1);
list_activate_item ("Flight", "13556 FRA 10:24 AM LON 11
set_window ("Flight Reservation", 7);
edit_set ("Name:", "John Smith");
button_press ("Insert Order");
obj_check_gui("Insert Order", "list1.ckl", "gui1", 19);
obj_check_bitmap("Insert Done...", "Img1", 5);
  
```

Test window title bar

Execution arrow

Insertion point

Test script



Using WinRunner Commands

You can select WinRunner commands from the menu bar or from a toolbar. Certain WinRunner commands can also be executed by pressing softkeys.

Choosing Commands on a Menu

You can choose all WinRunner commands from the menu bar.

Clicking Commands on a Toolbar

You can execute some WinRunner commands by clicking buttons on the toolbars. WinRunner has two built-in toolbars: the *Standard toolbar* and the *User toolbar*. You can customize the *User toolbar* with the commands you use most frequently.

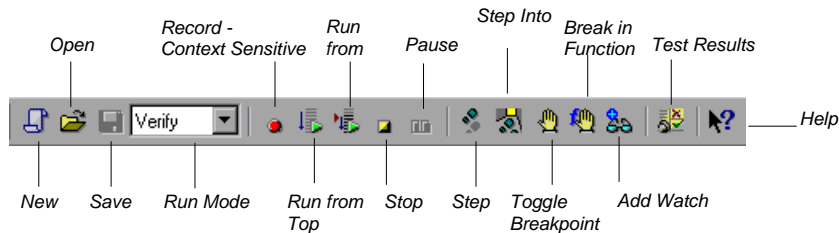
Creating a Floating Toolbar

You can change a toolbar to a floating toolbar. This enables you to minimize WinRunner while maintaining access to the commands on a floating toolbar, so you can work freely with the application being tested.



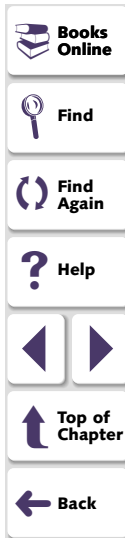
The Standard Toolbar

The Standard toolbar contains buttons for the commands used in running a test. It also contains buttons for opening and saving test scripts, viewing test reports, and accessing help. The default location of the Standard toolbar is docked below the WinRunner menu bar. For more information about the Standard toolbar, see Chapter 31, [Running Tests](#). The following buttons appear on the Standard toolbar:

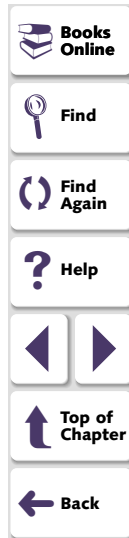
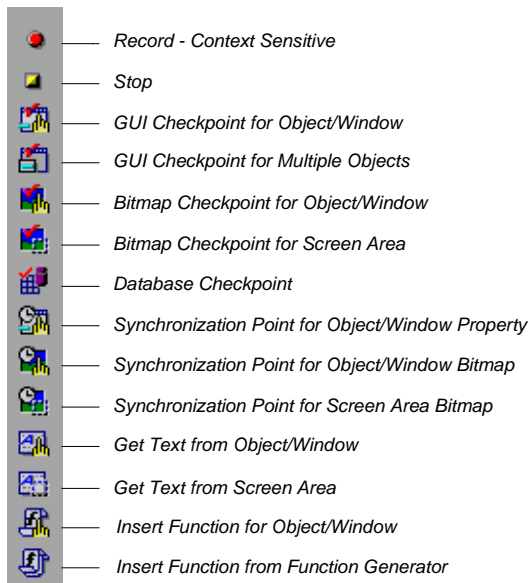


The User Toolbar

The User toolbar contains buttons for commands used when creating tests. By default, the User toolbar is hidden. To display the User toolbar, select it on the Window menu. When it is displayed, its default position is docked at the right edge of the WinRunner window. For information about creating tests, see Part III, [Creating Tests](#).



The User toolbar is a customizable toolbar. You can add or remove buttons to facilitate access to commands commonly used for an application being tested. For information on customizing the User toolbar, see [Customizing the User Toolbar](#) on page 979. The following buttons appear by default on the User toolbar:



Executing Commands Using Softkeys

You can execute some WinRunner commands by pressing softkeys. WinRunner reads input from softkeys even when the WinRunner window is not the active window on your screen, or when it is minimized.

Softkey assignments are configurable. If the application being tested uses a default softkey that is preconfigured for WinRunner, you can redefine it using WinRunner's softkey configuration utility.

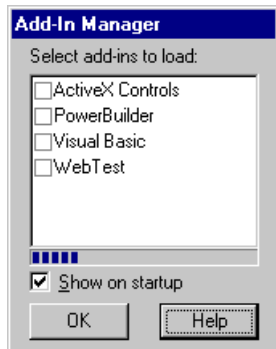
For a list of default WinRunner softkey configurations and information about redefining WinRunner softkeys, see [Configuring WinRunner Softkeys](#) on page 1006.



Loading WinRunner Add-Ins

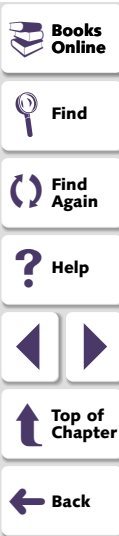
If you installed add-ins such as WebTest (support for Web sites), support for Visual Basic, PowerBuilder, or ActiveX controls while installing WinRunner or afterward, you can specify which add-ins to load at the beginning of each WinRunner session.

When you start WinRunner, the **Add-In Manager** dialog box opens. It displays a list of all installed add-ins for WinRunner. You can select which add-ins to load for the current session of WinRunner. If you do not make a change within a certain amount of time, the window closes. The progress bar displays how much time is left before the window closes.



The first time WinRunner is started, by default, no add-ins are selected. At the beginning of each subsequent WinRunner session, your selection from the previous session is the default setting. Once you make a change to the list, the timer stops running, and you must click **OK** to close the dialog box.

You can determine whether to display the **Add-In Manager** dialog box and, if so, for how long using the **Display the Add-In Manager dialog** option in the Environment tab of the General Options dialog box. For information on working with the General Options dialog box, see Chapter 40, **Setting Global Testing Options**. You can also specify these options using the `-addins` and `-addins_select_timeout` command line options. For information on working with command line options, see Chapter 34, **Running Tests from the Command Line**.



Understanding the GUI Map



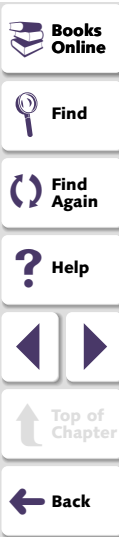
Understanding the GUI Map

Understanding How WinRunner Identifies GUI Objects

This chapter introduces Context Sensitive testing and explains how WinRunner identifies the Graphical User Interface (GUI) objects in your application.

This chapter describes:

- **How a Test Identifies GUI Objects**
- **Physical Descriptions**
- **Logical Names**
- **The GUI Map**
- **Setting the Window Context**



About Identifying GUI Objects

When you work in Context Sensitive mode, you can test your application as the user sees it—in terms of GUI objects—such as windows, menus, buttons, and lists. Each object has a defined set of properties that determines its behavior and appearance. WinRunner learns these properties and uses them to identify and locate GUI objects during a test run. Note that in Context Sensitive mode, WinRunner does not need to know the physical location of a GUI object to identify it.

You can use the GUI Spy to view the properties of any GUI object on your desktop, to see how WinRunner identifies it. For additional information on viewing the properties of GUI objects and teaching them to WinRunner, see Chapter 4, [Understanding the GUI Map](#).

WinRunner stores the information it learns in a *GUI map*. When WinRunner runs a test, it uses the GUI map to locate objects: It reads an object's description in the GUI map and then looks for an object with the same properties in the application being tested. You can view the GUI map in order to gain a comprehensive picture of the objects in your application.



The GUI map is actually the sum of one or more *GUI map files*. There are two modes for organizing GUI map files:

- You can create a GUI map file for your entire application, or for each window in your application. Multiple tests can reference a common GUI map file. This is the default mode in WinRunner. For experienced WinRunner users, this is the most efficient way to work. For more information about working in the *Global GUI Map File* mode, see Chapter 5, **Working in the Global GUI Map File Mode**.
- WinRunner can automatically create a GUI map file for each test you create. You do not need to worry about creating, saving, and loading GUI map files. If you are new to WinRunner, this is the simplest way to work. For more information about working in the *GUI Map File per Test* mode, see Chapter 6, **Working in the GUI Map File per Test Mode**.

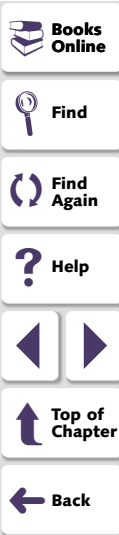
At any stage in the testing process, you can switch from the *GUI Map File per Test* mode to the *Global GUI Map File* mode. For additional information, see Chapter 8, **Merging GUI Map Files**.

As the user interface of your application changes, you can continue to use tests you developed previously. You simply add, delete, or edit object descriptions in the GUI map so that WinRunner can continue to find the objects in your modified application. For more information, see Chapter 7, **Editing the GUI Map**.



You can specify which properties WinRunner uses to identify a specific class of object. You can also teach WinRunner to identify custom objects, and to map these objects to a standard class of objects. For additional information, see Chapter 9, [Configuring the GUI Map](#).

You can also teach WinRunner to recognize any bitmap in a window as a GUI object by defining the bitmap as a virtual object. For additional information, see Chapter 10, [Learning Virtual Objects](#).



How a Test Identifies GUI Objects

You create tests by recording or programming *test scripts*. A test script consists of statements in Mercury Interactive's test script language (TSL). Each TSL statement represents mouse and keyboard input to the application being tested. For more information, see Chapter 11, [Creating Tests](#).

WinRunner uses a *logical name* to identify each object: for example "Print" for a Print dialog box, or "OK" for an OK button. The logical name is actually a nickname for the object's *physical description*. The physical description contains a list of the object's physical properties: the Print dialog box, for example, is identified as a window with the label "Print". The logical name and the physical description together ensure that each GUI object has its own unique identification.



Physical Descriptions

Test Script

```

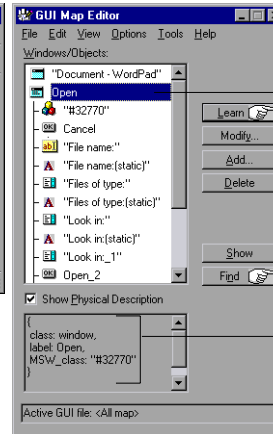
WinRunner - [Noname2]
File Edit Create Run Debug Tools Settings Window Help
Verify
# Document - WordPad
win_activate ("Document - WordPad");
set_window ("Document - WordPad", 2);
menu_select_item ("File:Open... Ctrl+O");

# Open
set_window ("Open", 7);
list_select_item ("Look in: 1", "ReadMe.doc"); # Item Number 0:
button_press ("Open_2");
    
```

logical name

- 1 WinRunner reads the logical name in the test script and refers to the GUI map
- 2 WinRunner matches the logical name with the physical description

GUI Map



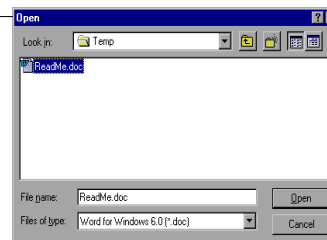
logical name

physical description

- 3 WinRunner uses the physical description to find an object in the application

"Open" window label

Application Being Tested



- Books Online
- Find
- Find Again
- Help
-
- Top of Chapter
- Back

WinRunner identifies each GUI object in the application being tested by its *physical description*: a list of physical properties and their assigned values. These property–value pairs appear in the following format in the GUI map:

{property1:value1, property2:value2, property3:value3, ...}

For example, the description of the “Open” window contains two properties: class and label. In this case the class property has the value *window*, while the label property has the value *Open*:

`{class:window, label:Open}`

The class property indicates the object’s type. Each object belongs to a different class, according to its functionality: window, push button, list, radio button, menu, etc.

Each class has a set of default properties that WinRunner learns. For a detailed description of all properties, see Chapter 9, [Configuring the GUI Map](#).

Note that WinRunner always learns an object’s physical description in the context of the window in which it appears. This creates a unique physical description for each object. For more information, see [Setting the Window Context](#) on page 69.



Logical Names

In the test script, WinRunner does not use the full physical description for an object. Instead, it assigns a short name to each object: the *logical name*.

An object's logical name is determined by its class. In most cases, the logical name is the label that appears on an object: for a button, the logical name is its label, such as OK or Cancel; for a window, it is the text in the window's title bar; and for a list, the logical name is the text appearing next to or above the list.

For a static text object, the logical name is a combination of the text and the string "(static)". For example, the logical name of the static text "File Name" is: "File Name (static)".

In certain cases, several GUI objects in the same window are assigned the same logical name, plus a location selector (for example: LogicalName_1, LogicalName_2). The purpose of the selector property is to create a unique name for the object.



The GUI Map

You can view the contents of the GUI map at any time by choosing **Tools > GUI Map Editor**. The GUI map is actually the sum of one or more GUI map files. In the GUI Map Editor, you can view either the contents of the entire GUI map or the contents of individual GUI map files. GUI objects are grouped according to the window in which they appear in the application. For additional information on the GUI Map Editor, see Chapter 7, [Editing the GUI Map](#).

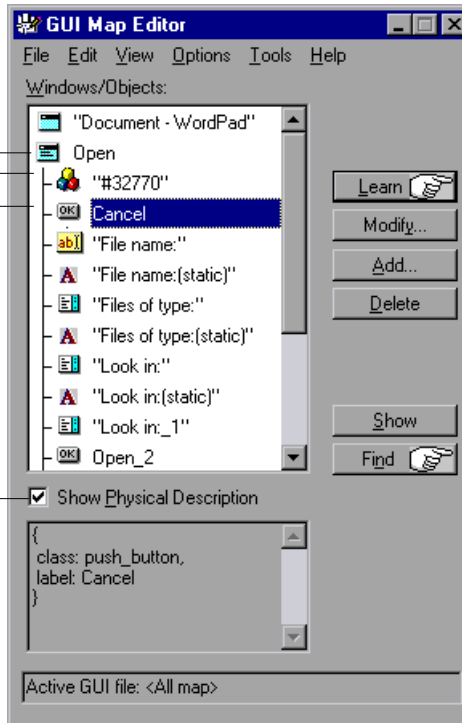


This view shows the contents of the entire GUI map.

Window

Objects within the window

Click to expand dialog box and display the physical description of the selected object or window



The GUI map file contains the logical names and physical descriptions of GUI objects.



There are two modes for organizing GUI map files:

- *Global GUI Map File* mode: You can create a GUI map file for your entire application, or for each window in your application. Different tests can reference a common GUI map file. For more information, see Chapter 5, [Working in the Global GUI Map File Mode](#).
- *GUI Map File per Test* mode: WinRunner automatically creates a GUI map file that corresponds to each test you create. For more information, see Chapter 6, [Working in the GUI Map File per Test Mode](#).

For a discussion of the relative advantages and disadvantages of each mode, see [Deciding Which GUI Map File Mode to Use](#) on page 84.



Setting the Window Context

WinRunner learns and performs operations on objects in the context of the window in which they appear. When you record a test, WinRunner automatically inserts a **set_window** statement into the test script each time the active window changes and an operation is performed on a GUI object. All objects are then identified in the context of that window. For example:

```
set_window ("Print", 12);  
button_press ("OK");
```

The **set_window** statement indicates that the Print window is the active window. The OK button is learned within the context of this window.

If you program a test manually, you need to enter the **set_window** statement when the active window changes. When editing a script, take care not to delete necessary **set_window** statements.



Understanding the GUI Map

Understanding the GUI Map

This chapter explains how WinRunner identifies the Graphical User Interface (GUI) of your application and how to work with GUI map files.

This chapter describes:

- **Viewing GUI Object Properties**
- **Teaching WinRunner the GUI of Your Application**
- **Finding an Object or Window in the GUI Map**
- **General Guidelines for Working with GUI Map Files**
- **Deciding Which GUI Map File Mode to Use**



About the GUI Map

When WinRunner runs tests, it simulates a human user by moving the mouse cursor over the application, clicking GUI objects and entering keyboard input. Like a human user, WinRunner must learn the GUI of an application in order to work with it.

WinRunner does this by learning the GUI objects of an application and their properties. You can use the GUI Spy to view the properties of any GUI object on your desktop, to see how WinRunner identifies it.

WinRunner can learn the GUI of your application in the following ways:

- by using the RapidTest Script wizard to learn the properties of all GUI objects in every window in your application
- by recording in your application to learn the properties of all GUI objects on which you record
- by using the GUI Map Editor to learn the properties of an individual GUI object, window, or all GUI objects in a window

If the GUI of your application changes during the software development process, you can use the GUI Map Editor to learn individual windows and objects in order to update the GUI map.



Before you start teaching WinRunner the GUI of your application, you should consider how you want to organize your GUI map files:

- In the *GUI Map File per Test* mode, WinRunner automatically creates a new GUI map file for every new test you create.
- In the *Global GUI Map File* mode, you can use a single GUI map for a group of tests.

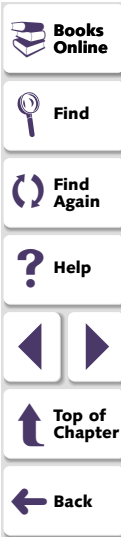
The considerations for deciding which mode to use are discussed at the end of this chapter.



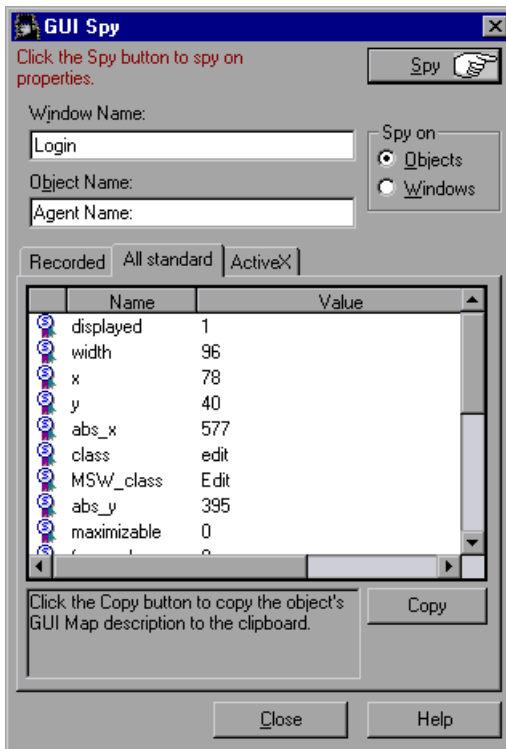
Viewing GUI Object Properties

When WinRunner learns the description of a GUI object, it looks at the object's physical properties. Each GUI object has many properties, such as “class,” “label,” “width,” “height,” “handle,” and “enabled”. WinRunner, however, learns only a selected set of these properties in order to uniquely distinguish the object from all other objects in the application.

Before you create the GUI map for an application, or before adding a GUI object to the GUI map, you may want to view the properties of the GUI object. Using the GUI Spy, you can view the properties of any GUI object on your desktop. You use the Spy pointer to point to an object, and the GUI Spy displays the properties and their values in the GUI Spy dialog box. You can choose to view all the properties of an object, or only the selected set of properties that WinRunner learns.



In the following example, pointing to the Agent Name edit box in the Login window of the sample flight application displays the **All standard** tab in the GUI Spy as follows:



Tip: You can resize the GUI Spy to view the entire contents at once.

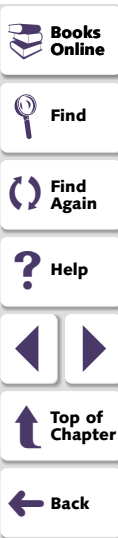
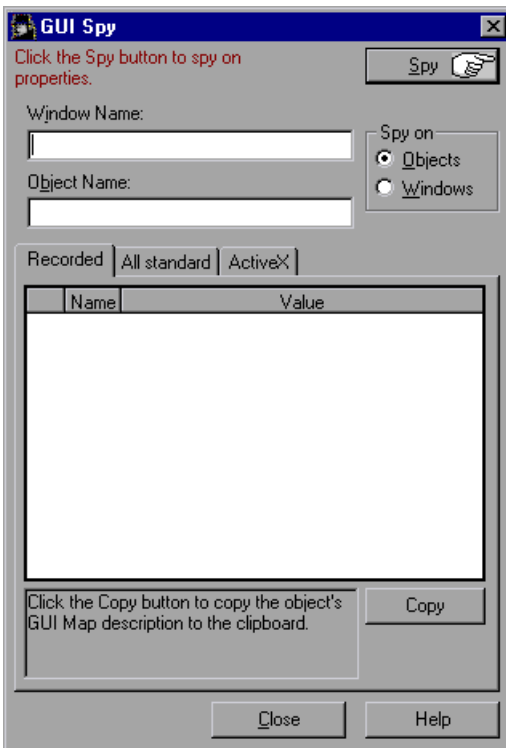
Note: The ActiveX tab is displayed only if the ActiveX Add-in is installed and loaded.

Note: You can modify the set of properties that WinRunner learns for a specific object class using the GUI Map Configuration dialog box. For more information on GUI Map Configuration, refer to Chapter 9, [Configuring the GUI Map](#).



To spy on a GUI object:

- 1 Choose **Tools > GUI Spy** to open the GUI Spy dialog box.



By default, the GUI Spy displays the Recorded tab, which enables you to view the properties of standard GUI objects that WinRunner records.

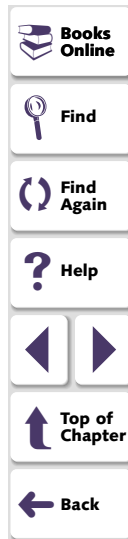
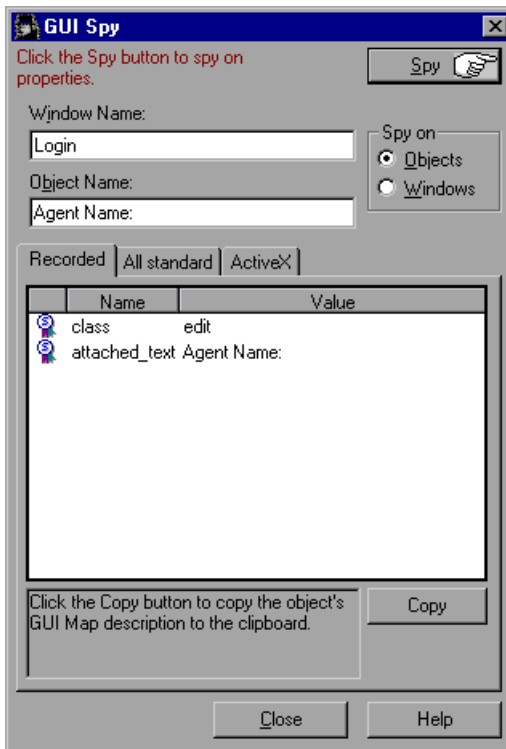
Tip: To view the properties of a window, click **Windows** in the **Spy on** box.

- To view all properties of standard windows and objects, click the **All standard** tab.
 - To view all properties and methods of ActiveX controls, click the **ActiveX** tab (only if the ActiveX Add-in is installed and loaded).
- 2** Click **Spy** and point to an object on the screen. The object is highlighted and the active window name, object name, and object description (properties and their values) appear in the appropriate fields.

Note that as you move the pointer over other objects, each one is highlighted in turn and its description appears in the Description pane.



In the following example, pointing to the Agent Name edit box in the Login window of the sample flight application displays the **Recorded** tab in the GUI Spy as follows:



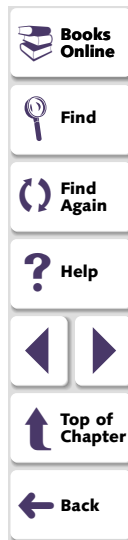
- 3 To capture an object description in the GUI Spy dialog box, point to the desired object and press the STOP softkey. (The default softkey combination is Ctrl Left + F3.)
- In the **Recorded** and **All standard** tabs, you can click the **Copy** button to copy the physical description of the object to the Clipboard.

Clicking Copy in the previous example pastes the following physical description to the Clipboard:

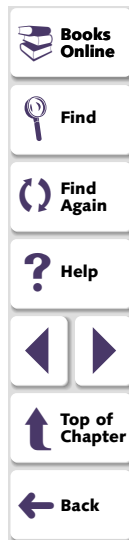
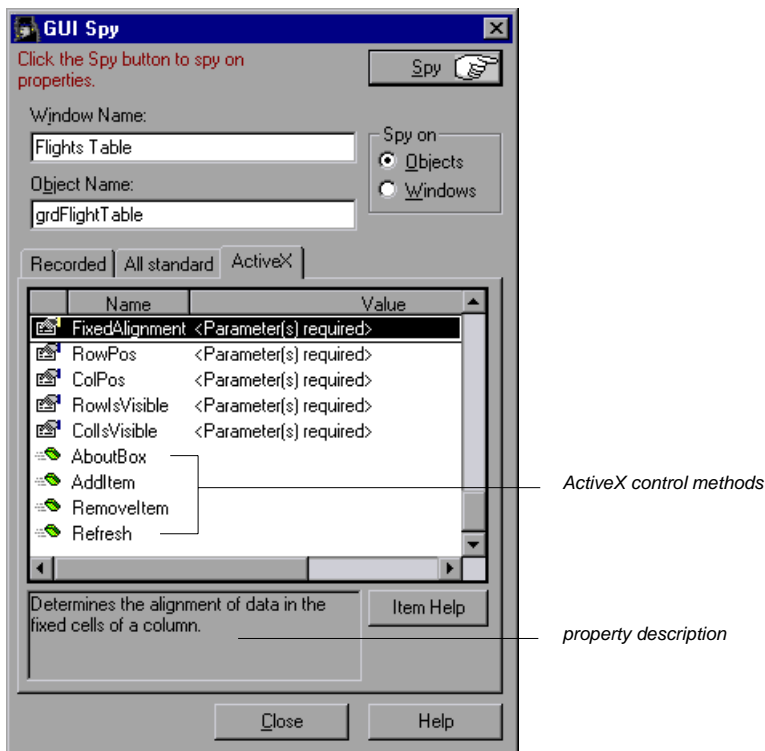
```
{class: "edit", attached_text: "Agent Name:", tag: "Agent Name:"}
```

- In the **ActiveX** tab, when you highlight a property, then if a description has been included for this property, it is displayed in the gray pane at the bottom.

If a help file has been installed for this ActiveX control, then clicking **Item Help** displays it.



In the following example, pointing to the “Flights Table” in the Visual Basic sample flight application, pressing the STOP softkey and highlighting the FixedAlignment property, displays the **ActiveX** tab in the GUI Spy as follows:



4 Click **Close** to close the GUI Spy.

Teaching WinRunner the GUI of Your Application

Like a human user, WinRunner must learn the GUI of an application in order to work with it.

When you work in the *GUI Map File per Test* mode, you do not need to take any special steps to teach WinRunner the GUI of your application. WinRunner automatically learns the GUI of your application while you record.

When you work in the *Global GUI Map File* mode, you need to teach WinRunner the information it needs about the properties of GUI objects. WinRunner can learn this information in the following ways:

- using the RapidTest Script wizard to learn the properties of all GUI objects in every window in your application
- recording in your application to learn the properties of all GUI objects on which you record
- clicking the Learn button in the GUI Map Editor to learn the properties of an individual GUI object, window, or all GUI objects in a window

Note: When you work in the *GUI Map File per Test* mode, the RapidTest Script wizard is disabled.

For additional information on how to teach WinRunner the GUI of your application in the ways described above, see Chapter 5, [Working in the Global GUI Map File Mode](#).



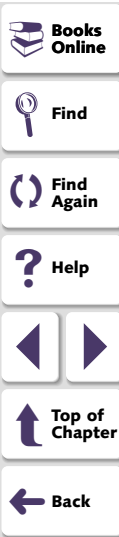
Finding an Object or Window in the GUI Map

When the cursor is on a statement in your test script that references a GUI object or window, you can right-click and select **Find in GUI Map**.

WinRunner finds and highlights the specified object or window in the GUI map or GUI map file and in the application, if it is open.

Note: Selecting GUI Maps or GUI Files on the View menu in the GUI Map Editor determines whether WinRunner locates the object in the GUI map or in a GUI map file.

- If the GUI map file containing the window is loaded, and the specified window is open, then WinRunner opens the GUI Map Editor and highlights the window in the GUI map and in the application.
- If the GUI map file containing the object is loaded, and the window containing the specified object is open, then WinRunner opens the GUI Map Editor and highlights the object in the GUI map and in the application.
- If the GUI map file containing the object or window is loaded, but the application containing the object or window is not open, then WinRunner opens the GUI Map Editor and highlights the object in the GUI map.



General Guidelines for Working with GUI Map Files

Consider the following guidelines when working with GUI map files:

- A single GUI map file cannot contain two windows with the same logical name.
- A single window in a GUI map file cannot contain two objects with the same logical name.
- In the GUI Map Editor, you can use the Options > Filter command to open the Filters dialog box and filter the objects in the GUI map by logical name, physical description, or class. For more information, see [Filtering Displayed Objects](#) on page 157.



Deciding Which GUI Map File Mode to Use

When you plan and create tests, you must consider how you want to work with GUI maps. You can work with one GUI map file for each test or a common GUI map file for multiple tests.

- If you are new to WinRunner or to testing, you may want to consider working in the *GUI Map File Per Test* mode. In this mode, a GUI map file is created automatically every time you create a new test. The GUI map file that corresponds to your test is automatically saved whenever you save your test and automatically loaded whenever you open your test.
- If you are familiar with WinRunner or with testing, it is probably most efficient to work in the *Global GUI Map File* mode. This is the default mode in WinRunner. All tests created in WinRunner 6.02 or lower were created in this mode. Note that whenever you work with a test created in WinRunner 6.02 or lower, you must work in this mode.

The following table lists the relative advantages and disadvantages of working in each mode:



	GUI Map File per Test	Global GUI Map File
Method	<p>WinRunner learns the GUI of your application as you record and automatically saves this information in a GUI map file that corresponds to each test. When you open the test, WinRunner automatically loads the corresponding GUI map file.</p>	<p>Before you record, have WinRunner learn your application by clicking the Learn button in the GUI Map Editor and clicking your application window. You repeat this process for all windows in the application. You save the GUI map file for each window or set of windows as a separate GUI map file. When you run your test, you load the GUI map file. When the application changes, you update the GUI map files.</p>
Advantages	<ol style="list-style-type: none"> 1. Each test has its own GUI map file. 2. This is the simplest mode for inexperienced testers or WinRunner users who may forget to save or load GUI map files. 3. It is easy to maintain and update an individual test. 	<ol style="list-style-type: none"> 1. If an object or window description changes, you only have to modify one GUI map file for all tests referencing that file to run properly. 2. It is easy to maintain and update a suite of tests efficiently.
Disadvantages	<p>Whenever the GUI of your application changes, you need to update the GUI map file for each test separately in order for your tests to run properly.</p>	<p>You need to remember to save and load the GUI map file, or to add statements that load the GUI map file to your startup test or to your other tests.</p>
Recommendation	<p>This is the preferred method if you are an inexperienced tester or WinRunner user or if the GUI of your application is not expected to change.</p>	<p>This is the preferred method for experienced WinRunner users and other testers or if the GUI of your application may change.</p>



Note: Sometimes the logical name of an object is not descriptive. If you use the GUI Map Editor to learn your application before you record, then you can modify the name of the object in the GUI map to a descriptive name by highlighting the object and clicking the Modify button. When WinRunner records on your application, the new name will appear in the test script. For more information on modifying the logical name of an object, see [Modifying Logical Names and Physical Descriptions](#) on page 139.

For additional guidelines on working in the Global GUI Map File mode, see [Guidelines for Working in the Global GUI Map File Mode](#) on page 118.



Understanding the GUI Map

Working in the Global GUI Map File Mode

This chapter explains how to save the information in your GUI map when you work in the *Global GUI Map File* mode. This is the default mode in WinRunner. If you want to work in the simpler *GUI Map File per Test* mode, you can skip this chapter and proceed to Chapter 6, [Working in the GUI Map File per Test Mode](#).

Note: You must use this mode when working with tests created in WinRunner version 6.02 or lower.

This chapter describes:

- [Sharing a GUI Map File among Tests](#)
- [Teaching WinRunner the GUI of Your Application](#)
- [Saving the GUI Map](#)
- [Loading the GUI Map File](#)
- [Guidelines for Working in the Global GUI Map File Mode](#)



About the Global GUI Map File Mode

The most efficient way to work in WinRunner is to organize tests into groups when you design your test suite. Each test in the group should test the same GUI objects in your application. Therefore, these tests should reference the information about GUI objects in a common repository. When a GUI object in your application changes, you need to update the information only in the relevant GUI map file, instead of updating it in every test. When you work in the manner described above, you are working in the *Global GUI Map File* mode.

It is possible that one test within a test-group will test certain GUI objects within a window, while another test within the same group will test some of those objects and additional ones within the same window. Therefore, if you teach WinRunner the GUI of your application only by recording, your GUI map file may not contain a comprehensive list of all the objects in the window. It is best for WinRunner to learn the GUI of your application comprehensively before you start recording your tests.



WinRunner can learn the GUI of your application in several ways. Usually, you use the RapidTest Script wizard before you start to test in order to learn all the GUI objects in your application at once. This ensures that WinRunner has a complete, well-structured basis for all your Context Sensitive tests. The descriptions of GUI objects are saved in GUI map files. Since all test users can share these files, there is no need for each user to individually relearn the GUI.

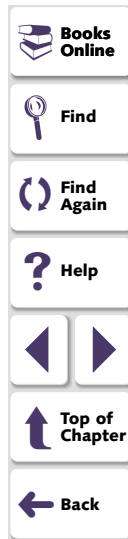
If the GUI of your application changes during the software development process, you can use the GUI Map Editor to learn individual windows and objects in order to update the GUI map. You can also use the GUI Map Editor to learn individual windows or objects. You can also learn objects while recording: you simply start to record a test and WinRunner learns the properties of each GUI object you use in your application. This approach is fast and enables a beginning user to create test scripts immediately. This is an unsystematic method, however, and should not be used as a substitute for the RapidTest Script wizard if you plan to develop comprehensive test suites.

Note that since GUI map files are independent of tests, they are not saved automatically when you close a test. You must save the GUI map file whenever you modify it with changes you want to keep.



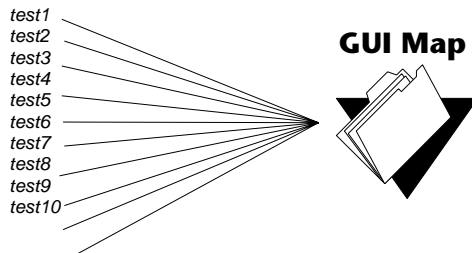
Similarly, since GUI map files are independent of tests, they are not automatically loaded when you open a test. Therefore, you must load the appropriate GUI map files before you run tests. WinRunner uses these files to help locate the objects in the application being tested. It is most efficient to insert a **GUI_load** statement into your startup test. When you start WinRunner, it automatically runs the startup test and loads the specified GUI map files. For more information on startup tests, see Chapter 43, **Initializing Special Configurations**. Alternatively, you can insert a **GUI_load** statement into individual tests, or use the GUI Map Editor to load GUI map files manually.

Note: When you are working in the *Global GUI Map File* mode, then if you call a test created in the *GUI Map File per Test* mode that references GUI objects, the test may not run properly.



Sharing a GUI Map File among Tests

When you design your test suite so that a single GUI map file is shared by multiple tests, you can easily keep up with changes made to the user interface of the application being tested. Instead of editing your entire suite of tests, you only have to update the relevant object descriptions in the GUI map.



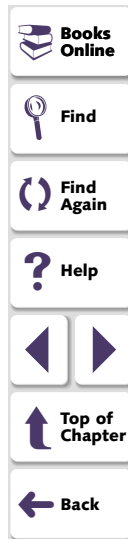
For example, suppose the Open button in the Open dialog box is changed to an OK button. You do not have to edit every test script that uses this Open button. Instead, you can modify the Open button's physical description in the GUI map, as shown in the example below. The value of the label property for the button is changed from Open to OK:

Open button: {class:push_button, label:OK}



During a test run, when WinRunner encounters the logical name “Open” in the Open dialog box in the test script, it searches for a push button with the label “OK”.

You can use the GUI Map Editor to modify the logical names and physical descriptions of GUI objects at any time during the testing process. In addition, you can use the Run wizard to update the GUI map during a test run. The Run wizard opens automatically if WinRunner cannot locate an object in the application while it runs a test. See Chapter 7, [Editing the GUI Map](#), for more information.



Teaching WinRunner the GUI of Your Application

WinRunner must learn the information about the GUI objects in your application in order to add it to the GUI map file. WinRunner can learn the information it needs about the properties of GUI objects in the following ways:

- using the RapidTest Script wizard to teach WinRunner the properties of all GUI objects in every window in your application
- recording in your application to teach WinRunner the properties of all GUI objects on which you record
- using the GUI Map Editor to teach WinRunner the properties of an individual GUI object, window, or all GUI objects in a window

Teaching WinRunner the GUI with the RapidTest Script Wizard

You can use the RapidTest Script wizard before you start to test in order to teach WinRunner all the GUI objects in your application at once. This ensures that WinRunner has a complete, well-structured basis for all your Context Sensitive tests. The descriptions of GUI objects are saved in GUI map files. Since all test users can share these files, there is no need for each user to individually relearn the GUI.



Note: You can use the RapidTest Script wizard only when you work in the *GUI Map File per Test Group* mode (the default mode, which is described in this chapter). All tests created in WinRunner version 6.02 or lower are in this mode.

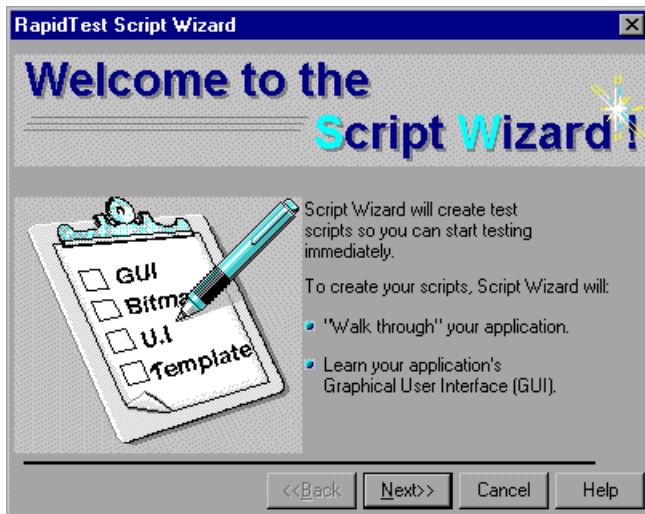
The simplest and most thorough way for WinRunner to learn your application is by using the RapidTest Script wizard. The RapidTest Script wizard enables WinRunner to learn all windows and objects in your application being tested at once. The wizard systematically opens each window in your application and learns the properties of the GUI objects it contains. WinRunner provides additional methods for learning the properties of individual objects.

WinRunner then saves the information in a GUI map file. WinRunner also creates a startup script which includes a **GUI_load** command that loads this GUI map file. For information on startup tests, see Chapter 43, **Initializing Special Configurations**.



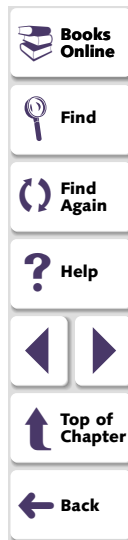
To teach WinRunner your application using the RapidTest Script wizard:

- 1 Click **RapidTest Script Wizard** in the WinRunner Welcome screen when you start WinRunner or Choose **Create > RapidTest Script Wizard** at any time. The RapidTest Script wizard welcome screen opens.

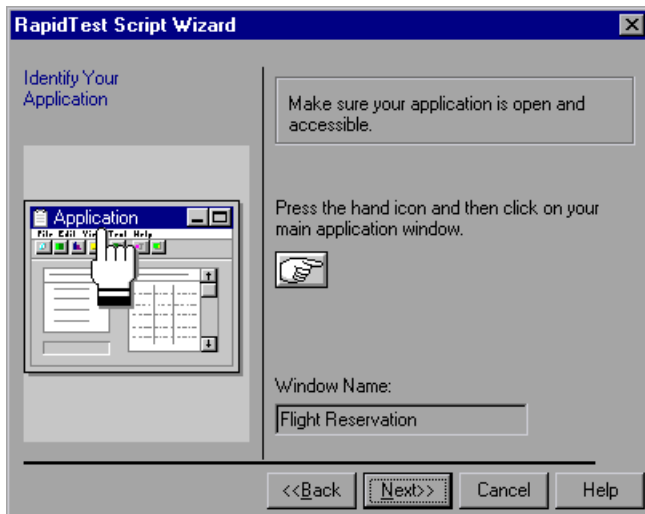


Click **Next**.

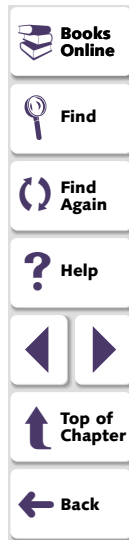
Note: The RapidTest Script Wizard option is not available when you load the WebTest Add-in or certain other add-ins. Please refer to your add-in documentation to see whether the RapidTest Script wizard is available when your add-in is loaded.



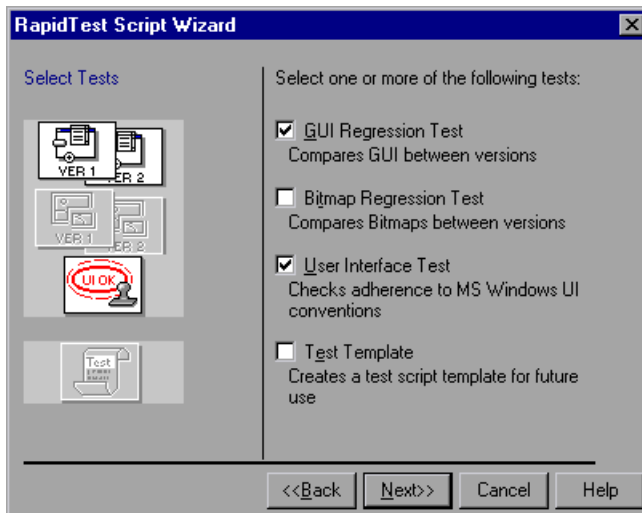
2 The **Identify Your Application** screen opens.



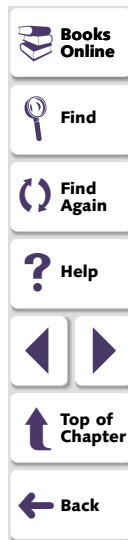
Click the pointing hand, and then click your application in order to identify it for the Script wizard. The name of the window you clicked appears in the Window Name box. Click **Next**.



- 3 The **Select Tests** screen opens.



- 4 Select the type(s) of test(s) you want WinRunner to create for you. When the Script Wizard finishes walking through your application, the tests you select are displayed in the WinRunner window.



You can choose any of the following tests:

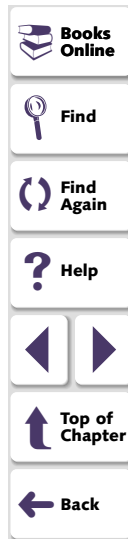
- **GUI Regression Test (gui)** - This test enables you to compare the state of GUI objects in different versions of your application. For example, it can check whether a button is enabled or disabled.

To create a GUI Regression test, the wizard captures default information about each GUI object in your application. When you run the test on your application, WinRunner compares the captured state of GUI objects to their current state, and reports any mismatches.

- **Bitmap Regression Test** - This test enables you to compare bitmap images of your application in different versions of your application. Select this test if you are testing an application that does not contain GUI objects.

To create a Bitmap Regression test, the wizard captures a bitmap image of each window in your application. When you run the test, WinRunner compares the captured window images to the current windows, and reports any mismatches.

- **User Interface Test** - This test determines whether your application adheres to Microsoft Windows standards. It checks that:
 - GUI objects are aligned in windows
 - All defined text is visible on a GUI object
 - Labels on GUI objects are capitalized
 - Each label includes an underlined letter (mnemonics)
 - Each window includes an OK button, a Cancel button, and a system menu



When you run this test, WinRunner searches the user interface of your application and reports each case that does not adhere to Microsoft Windows standards.

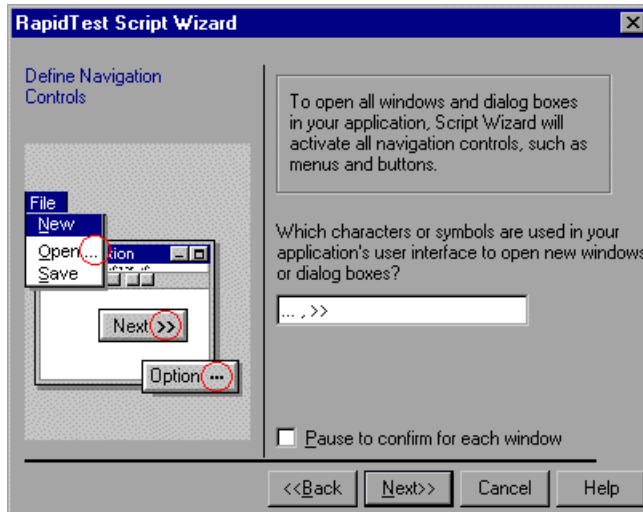
- **Test Template** - This test provides a basic framework of an automated test that navigates your application. It opens and closes each window, leaving space for you to add code (through recording or programming) that checks the window.

Tip: Even if you do not want to create any of the tests described above, you can still use the Script wizard to learn the GUI of your application.

Click **Next**.

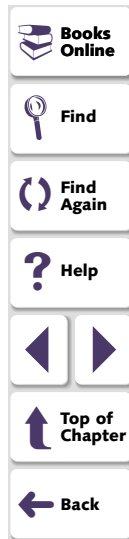


5 The **Define Navigation Controls** screen opens.

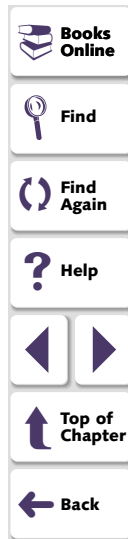


Enter the characters that represent navigation controls in your application. If you want the RapidTest Script wizard to pause in each window in your application, so that you can confirm which objects will be activated to open additional windows, select the **Pause to confirm for each window** check box.

Click **Next**.



- 6 Choose **Express** or **Comprehensive** learning flow. Click **Learn**. WinRunner begins to systematically learn your application, one window at a time. This may take several minutes depending on the complexity of your application.
- 7 Choose **Yes** or **No** to tell WinRunner whether or not you want WinRunner to automatically activate this application whenever you invoke WinRunner.
Click **Next**.
- 8 Enter the full path and file name where you want your startup script and GUI Map file to be stored, or accept the defaults.
Click **Next**.
- 9 Enter the full path and file name where you want your test files to be stored, or accept the defaults.
Click **Next**.
- 10 Click **OK** to close the RapidTest Script wizard. The test(s) that were created based on the application that WinRunner learned are displayed in the WinRunner window.



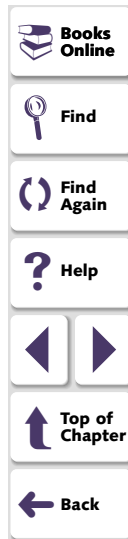
Teaching WinRunner the GUI by Recording

WinRunner can also learn objects while recording in Context Sensitive mode (the default mode) in your application: you simply start to record a test and WinRunner learns the properties of each GUI object you use in your application. This approach is fast and enables a beginning user to create test scripts immediately. This is an unsystematic method, however, and should not be used as a substitute for the RapidTest Script wizard or the GUI Map Editor if you plan to develop comprehensive test suites. For information on recording in Context Sensitive mode, see Chapter 11, [Creating Tests](#).

When you record a test, WinRunner first checks whether the objects you select are in the GUI map. If they are not in the GUI map, WinRunner learns the objects.

WinRunner adds the information it learned to the temporary GUI map file. To save the information in the temporary GUI map file, you must save this file before exiting WinRunner. For additional information on saving the GUI map, see [Saving the GUI Map](#) on page 107.

Tip: If you do not want WinRunner to add the information it learns to the temporary GUI map file, you can instruct WinRunner not to load the temporary GUI map file in the Environment tab of the General Options dialog box. For more information, see Chapter 40, [Setting Global Testing Options](#).



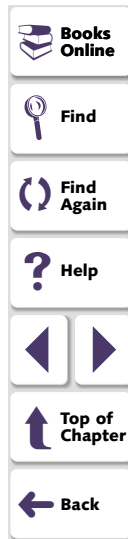
In general, you should use recording as a learning tool for small, temporary tests only. Use the RapidTest Script wizard or the GUI Map Editor to learn the entire GUI of your application.

Teaching WinRunner the GUI Using the GUI Map Editor

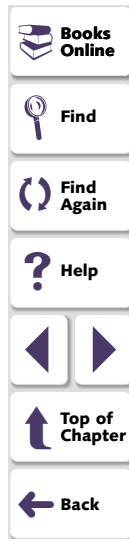
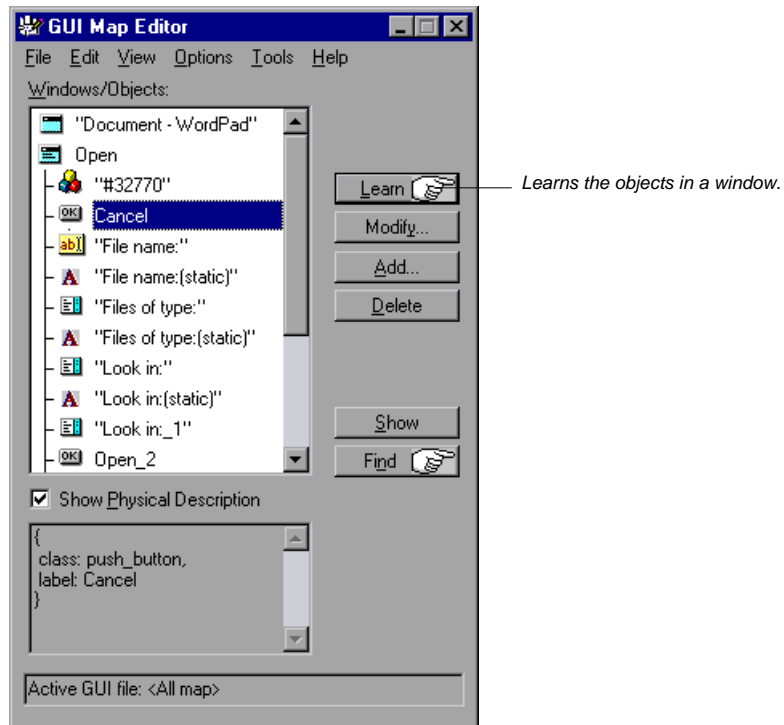
WinRunner can use the GUI Map Editor to learn an individual object or window, or all objects in a window.

To teach GUI objects to WinRunner using the GUI Map Editor:

- 1 Choose **Tools > GUI Map Editor**. The GUI Map Editor opens.



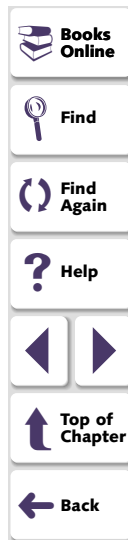
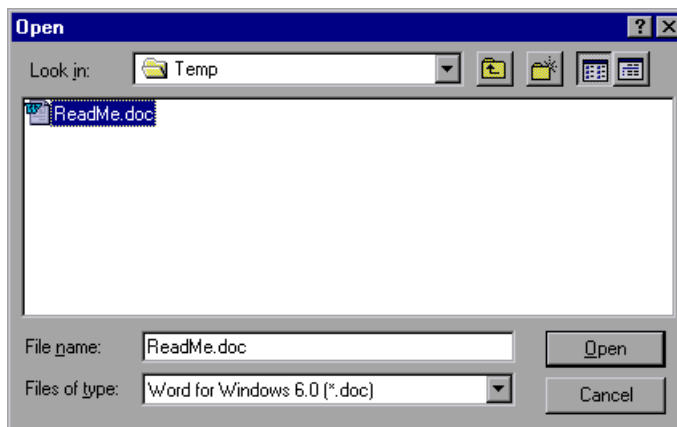
Click **Learn**. The mouse pointer becomes a pointing hand.



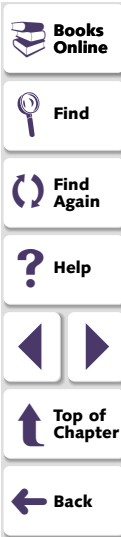
- To learn all the objects in a window, click the title bar of the window. When prompted to learn all the objects in the window, click **Yes** (the default).
- To learn only a window, click the title bar of the window. When prompted to learn all the objects in the window, click **No**.
- To learn an object, click the object.

(To cancel the operation, click the right mouse button.)

Place the pointing hand on the object to learn and click the left mouse button. To learn all the objects in a window, place the pointing hand over the window's title bar and click with the left mouse button. WinRunner places the information about the GUI objects it learns in the active GUI map file:



WinRunner adds the information it learned to the temporary GUI map file. To keep the information in the temporary GUI map file, you must save it before exiting WinRunner. For additional information on saving the GUI map, see Chapter 5, [Working in the Global GUI Map File Mode](#).



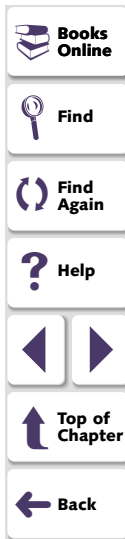
Saving the GUI Map

When you learn GUI objects by recording, the object descriptions are added to the temporary GUI map file. The temporary file is always open, so that any objects it contains are recognized by WinRunner. When you start WinRunner, the temporary file is loaded with the contents of the last testing session.

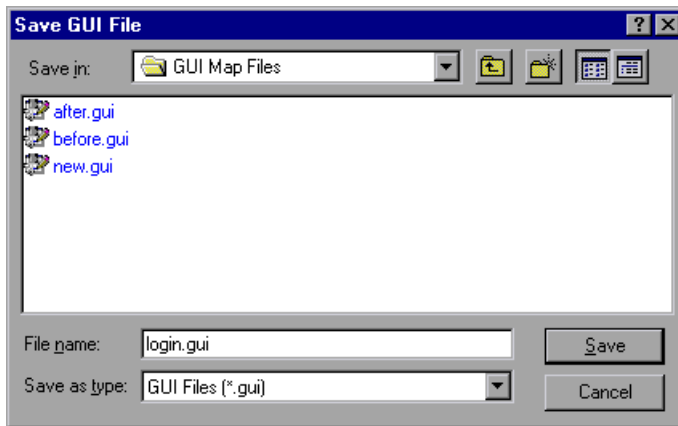
To avoid overwriting valuable GUI information during a new recording session, you should save the temporary GUI map file in a permanent GUI map file.

To save the contents of the temporary GUI map file to a permanent GUI map file:

- 1 Choose **Tools > GUI Map Editor**. The GUI Map Editor opens.
- 2 Choose **View > GUI Files**.
- 3 Make sure the *<Temporary>* file is displayed in the GUI File list. An asterisk (*) preceding the file name indicates the GUI map file was changed. The asterisk disappears when the file is saved.

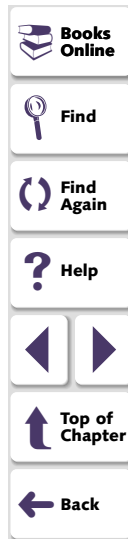


- 4 In the GUI Map Editor, choose **File > Save** to open the Save GUI File dialog box.



- 5 Click a folder. Type in a new file name or click an existing file.
- 6 Click **Save**. The saved GUI map file is loaded and appears in the GUI Map Editor.

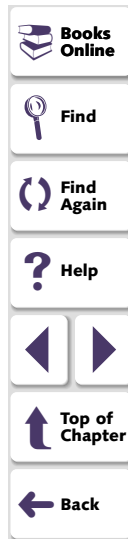
You can also move objects from the temporary file to an existing GUI map file. For details, see [Copying and Moving Objects between Files](#) on page 149.



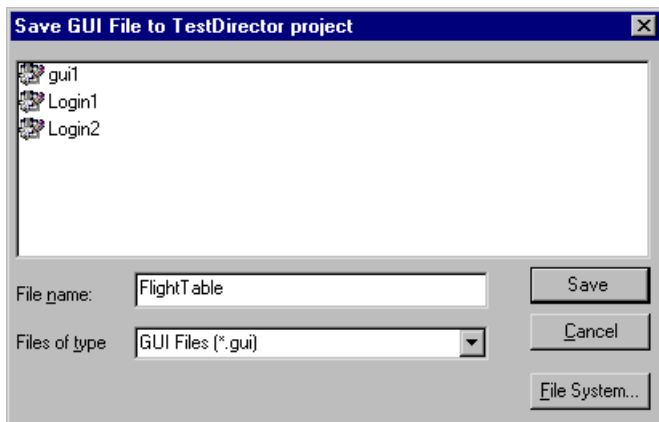
To save the contents of a GUI map file to a TestDirector database:

Note: You can only save GUI map files to a TestDirector database if you are working with TestDirector. For additional information, see Chapter 44, [Managing the Testing Process](#).

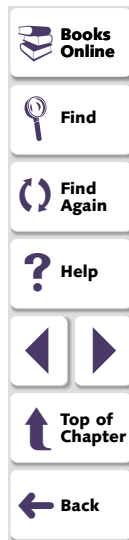
- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 Make sure the *<Temporary>* file is displayed in the GUI File list. An asterisk (*) next to the file name indicates the GUI map file was changed. The asterisk disappears when the file is saved.
- 4 In the GUI Map Editor, choose **File > Save**.



The Save GUI File to TestDirector Project dialog box opens.



- 5 In the **File Name** text box, enter a name for the GUI map file. Use a descriptive name that will help you easily identify it later.
- 6 Click **Save** to save the GUI map file to a TestDirector database and to close the dialog box.



Loading the GUI Map File

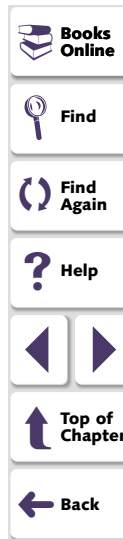
When WinRunner learns the objects in an application, it stores the information in a GUI map file. In order for WinRunner to use a GUI map file to locate objects in your application, you must *load* it into the GUI map. You must load the appropriate GUI map files before you run tests on your application being tested.

You can load GUI map files in one of two ways:

- using the **GUI_load** function
- from the GUI Map Editor

You can view a loaded GUI map file in the GUI Map Editor. A loaded file is indicated by the letter “L” and a number preceding the file name. You can also open the GUI map file for editing without loading it.

Note: If you are working in the *GUI Map File per Test* mode, you should not manually load or unload GUI map files.



Loading GUI Map Files Using the GUI_load Function

The **GUI_load** statement loads any GUI map file you specify. Although the GUI map may contain one or more GUI map files, you can load only one GUI map file at a time. To load several files, use a separate statement for each. You can insert the **GUI_load** statement at the beginning of any test, but it is preferable to place it in your startup test. In this way, GUI map files are loaded automatically each time you start WinRunner. For more information, see Chapter 43, [Initializing Special Configurations](#).

To load a file using GUI_load:

- 1 Choose **File > Open** to open the test from which you want to load the file.
- 2 In the test script, type the **GUI_load** statement as follows, or click the **GUI_load** function in the Function Generator and browse to or type in the file path:

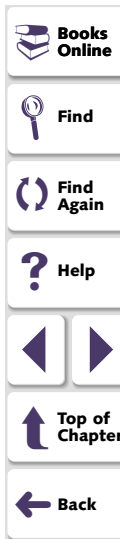
```
GUI_load ("file_name_full_path");
```

For example:

```
GUI_load ("c:\\qa\\flights.gui");
```

See Chapter 25, [Generating Functions](#), for information on how to use the Function Generator.

- 3 Run the test to load the file. See Chapter 31, [Running Tests](#), for more information.



Note: If you only want to edit the GUI map file, you can use the **GUI_open** function to open a GUI map file for editing, without loading it. You can use the **GUI_close** function to close an open GUI map file. See Chapter 7, [Editing the GUI Map](#), for information about editing the GUI map file. You can use the **GUI_unload** and **GUI_unload_all** functions to unload loaded GUI map files. For information on working with TSL functions, see Chapter 24, [Enhancing Your Test Scripts with Programming](#). For more information about specific TSL functions and examples of usage, refer to the *TSL Online Reference*.

Loading GUI Map Files Using the GUI Map Editor

You can load a GUI map file manually, using the GUI Map Editor.

To load a GUI map file using the GUI Map Editor:

- 1 Choose **Tools > GUI Map Editor**. The GUI Map Editor opens.
- 2 Choose **View > GUI Files**.
- 3 Choose **File > Open**.



- 4 In the **Open GUI File** dialog box, select a GUI map file.



Note that by default, the file is loaded into the GUI map. If you only want to edit the GUI map file, click **Open for Editing Only**. See Chapter 7, **Editing the GUI Map**, for information about editing the GUI map file.

- 5 Click **Open**. The GUI map file is added to the GUI file list. The letter “L” and a number preceding the file name indicates that the file has been loaded.



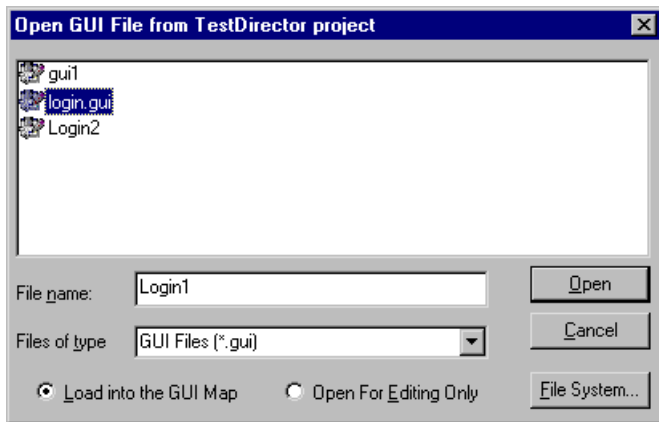
To load a GUI map file from a TestDirector database using the GUI Map Editor:

Note: You can only load GUI map files from a TestDirector database if you are working with TestDirector. For additional information, see Chapter 44, [Managing the Testing Process](#).

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **File > Open**.

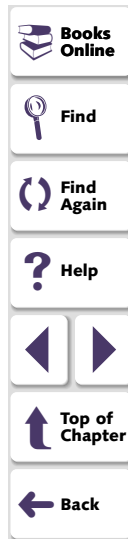


The Open GUI File from TestDirector Project dialog box opens. All the GUI map files that have been saved to the open database are listed in the dialog box.



- 3 Select a GUI map file from the list of GUI map files in the open database. The name of the GUI map file appears in the **File Name** text box.

To load the GUI map file into the GUI Map Editor, make sure the **Load into the GUI Map** default setting is selected. Alternatively, if you only want to edit the GUI map file, click **Open for Editing Only**. For more information, see Chapter 7, [Editing the GUI Map](#).



- 4 Click **Open** to open the GUI map file. The GUI map file is added to the GUI file list. The letter “L” indicates that the file is loaded.

Note: For more information on loading GUI map files from a TestDirector database, see Chapter 44, [Managing the Testing Process](#).



Guidelines for Working in the Global GUI Map File Mode

Consider the following guidelines when working in the *Global GUI Map File* mode:

- To improve performance, use smaller GUI map files for testing your application instead of one larger file. You can divide your application's user interface into different GUI map files by window or in another logical manner.
- Sometimes the logical name of an object is not descriptive. If you use the GUI Map Editor to learn your application before you record, then you can modify the logical name of the object in the GUI map to a descriptive name by highlighting the object and clicking the Modify button. When WinRunner records on your application, the new name will appear in the test script. If you recorded your test before changing the logical name of the object in the GUI map, make sure to update the logical name of the object accordingly in your test script before you run your test. For more information on modifying the logical name of an object, see [Modifying Logical Names and Physical Descriptions](#) on page 139.
- Do not store information that WinRunner learns about the GUI of an application in the temporary GUI map file, since this information is not automatically saved when you close WinRunner. Unless you are creating a small, temporary test that you do not intend to reuse, you should save the GUI map from the GUI Map Editor (by choosing File > Save) before closing your test.



Tip: You can instruct WinRunner not to load the temporary GUI map file in the Environment tab of the General Options dialog box. For more information on this option, see Chapter 40, [Setting Global Testing Options](#).

- When WinRunner learns the GUI of your application by recording, it learns only those objects upon which you perform operations; it does not learn all the objects in your application. Therefore, unless you are creating a small, temporary test that you do not intend to reuse, it is best for WinRunner to learn the GUI of an application from the RapidTest Script wizard or the Learn button in the GUI Map Editor before you start recording than for WinRunner to learn your application once you start recording.
- Consider appointing one tester a “GUI Map Administrator,” with responsibility for updating the GUI maps when the GUI of your application changes.

For additional guidelines for working with GUI maps, see [General Guidelines for Working with GUI Map Files](#) on page 83.



Understanding the GUI Map

Working in the GUI Map File per Test Mode

This chapter explains how to work in the *GUI Map File per Test* mode. This mode is recommended if you are new to testing or to WinRunner. It is very easy to use: You do not need to understand how to create, save, or load GUI map files.

Note: This feature is available for tests created in WinRunner version 7.0 or higher only. You cannot use this mode for tests created in WinRunner version 6.02 or lower.

This chapter describes:

- [Specifying the GUI Map File per Test Mode](#)
- [Working in the GUI Map File per Test Mode](#)
- [Guidelines for Working in the GUI Map File per Test Mode](#)



About the GUI Map File per Test Mode

When you work in the *GUI Map File per Test* mode, you do not need to teach WinRunner the GUI of your application or save or load GUI map files (as discussed in Chapter 5, [Working in the Global GUI Map File Mode](#)), since WinRunner does this for you automatically.

In the *GUI Map File per Test* mode, WinRunner creates a new GUI map file whenever you create a new test. WinRunner saves the test's GUI map file whenever you save the test. When you open the test, WinRunner automatically loads the GUI map file associated with the test.

Note that some WinRunner features are not available when you work in this mode:

- The RapidTest Script wizard is disabled. For information about this wizard, see Chapter 5, [Working in the Global GUI Map File Mode](#).
- The option to reload the (last) temporary GUI map file when starting WinRunner (the **Load temporary GUI map file** check box in the Environment tab of the General Options dialog box) is disabled. For additional information about this option, see Chapter 40, [Setting Global Testing Options](#).
- The *myinit* startup test that loads GUI map files when starting WinRunner does not load GUI map files. For information about startup tests, see Chapter 43, [Initializing Special Configurations](#).



- Compiled modules do not load GUI map files. If a compiled module references GUI objects, then those objects must also be referenced in the test that loads the compiled module. For additional information, see Chapter 28, [Creating Compiled Modules](#).
- If a called test that was created in the *GUI Map File per Test* mode references GUI objects, it may not run properly in the *Global GUI Map File* mode.

You choose to work in the *GUI Map File per Test* mode by specifying this option in the Environment tab of the General Options dialog box.

When you become more familiar with WinRunner, you may want to consider working in the *Global GUI Map File* mode. In order to change from working in the *GUI Map File per Test* mode to working in the *Global GUI Map File* mode, you must merge the GUI map files associated with each test into GUI map files that are common to a test-group. You can use the GUI Map File Merge Tool to merge GUI map files. For additional information on merging GUI map files and changing to the *Global GUI Map File* mode, see Chapter 8, [Merging GUI Map Files](#).



Specifying the GUI Map File per Test Mode

In order to work in the *GUI Map File per Test* mode, you must specify this option in the Environment tab of the General Options dialog box.

To work in the *GUI Map File per Test* mode:

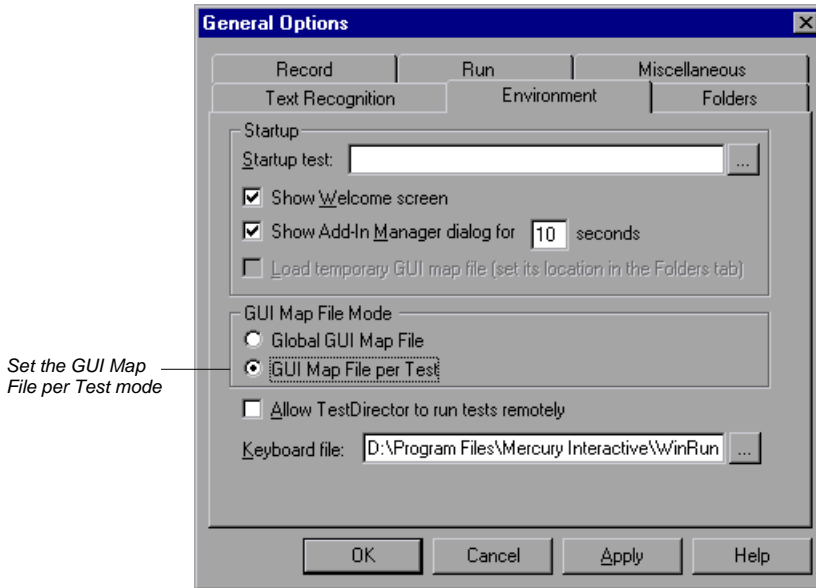
- 1 Choose **Settings > General Options**.

The General Options dialog box opens.

- 2 Click the **Environment** tab.

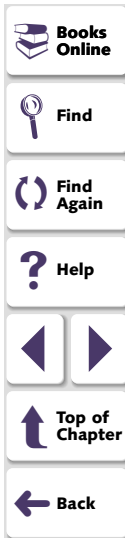


- In the GUI Map File Mode box, click **GUI Map File per Test**.



- Click **OK** to close the dialog box.

Note that the **Load temporary GUI map file** is automatically disabled.



- 5 When you close WinRunner, you will be prompted to save changes made to the configuration. Click **Yes**.

Note: In order for this change to take effect, you must restart WinRunner.

For additional information on the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#).



Working in the GUI Map File per Test Mode

Every time you create a new test, WinRunner automatically creates a new GUI map file for the test. Whenever you save the test, WinRunner saves the corresponding GUI map file. The GUI map file is saved in the same folder as the test. Moving a test to a new location also moves the GUI map file associated with the test.

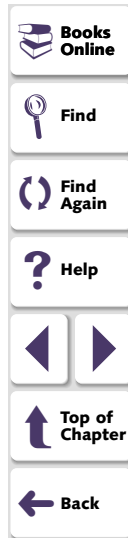
WinRunner learns the GUI of your application by recording. If the GUI of your application changes, you can update the GUI map file for each test using the GUI Map Editor. You do not need to load or save the GUI map file.

To update a GUI map file:

- 1 Open the test for which you want to update the GUI map file.
- 2 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 3 Edit the open GUI map file, as described in Chapter 7, [Editing the GUI Map](#).

Note: If you change the logical name of an object in your GUI map file, you must update your test script accordingly. For additional information, see [Modifying Logical Names and Physical Descriptions](#) on page 139.

- 4 When you are done, choose **File > Exit** to close the GUI Map Editor.



Guidelines for Working in the GUI Map File per Test Mode

Consider the following guidelines when working in the *GUI Map File per Test* mode:

- Do not save your changes to a GUI map file from the GUI Map Editor. Your changes are saved automatically when you save your test.
- Do not manually load or unload GUI map files while working in the *GUI Map File per Test* mode. The GUI map file for each test is automatically loaded when you open your test.

For additional guidelines for working with GUI maps, see [General Guidelines for Working with GUI Map Files](#) on page 83.



Understanding the GUI Map

Editing the GUI Map

This chapter explains how to extend the life of your tests by modifying descriptions of objects in the GUI map.

This chapter describes:

- **The Run Wizard**
- **The GUI Map Editor**
- **Modifying Logical Names and Physical Descriptions**
- **How WinRunner Handles Varying Window Labels**
- **Using Regular Expressions in the Physical Description**
- **Copying and Moving Objects between Files**
- **Finding an Object in a GUI Map File**
- **Finding an Object in Multiple GUI Map Files**
- **Manually Adding an Object to a GUI Map File**
- **Deleting an Object from a GUI Map File**
- **Clearing a GUI Map File**
- **Filtering Displayed Objects**
- **Saving Changes to the GUI Map**



About Editing the GUI Map

WinRunner uses the GUI map to identify and locate GUI objects in your application. If the GUI of your application changes, you must update object descriptions in the GUI map so you can continue to use existing tests.

You can update the GUI map in two ways:

- during a test run, using the Run wizard
- at any time during the testing process, using the GUI Map Editor

The Run wizard opens automatically during a test run if WinRunner cannot locate an object in the application being tested. It guides you through the process of identifying the object and updating its description in the GUI map. This ensures that WinRunner will find the object in subsequent test runs.

You can also:

- manually edit the GUI map using the GUI Map Editor
- modify the logical names and physical descriptions of objects, add new descriptions, and remove obsolete descriptions
- move or copy descriptions from one GUI map file to another



Before you can update the GUI map, the appropriate GUI map files must be loaded. You can load files by using the **GUI_load** statement in a test script or by choosing **File > Open** in the GUI Map Editor. See Chapter 5, **Working in the Global GUI Map File Mode**, for more information.

Note: If you are working in the *GUI Map File per Test* mode, you should not manually load or unload GUI map files.

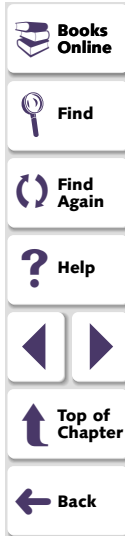


The Run Wizard

The Run wizard detects changes in the GUI of your application that interfere with the test run. During a test run, the Run wizard automatically opens when WinRunner cannot locate an object. The Run wizard prompts you to point to the object in your application, determines why the object cannot be found, and then offers a solution. For example, the Run wizard may suggest loading an appropriate GUI map file. In most cases, a new description is automatically added to the GUI map or the existing description is modified. When this process is completed, the test run continues. (In future test runs, WinRunner can successfully locate the object.)

For example, suppose you run a test in which you click the Network button in an Open window in your application. This portion of your script may appear as follows:

```
set_window ("Open");  
button_press ("Network");
```

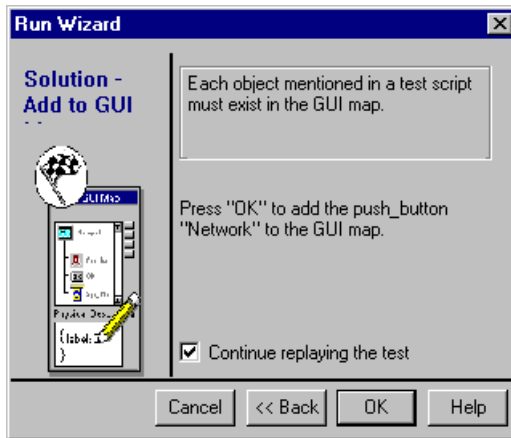


If the Network button is not in the GUI map, the Run wizard opens and describes the problem.





Click the Hand button in the wizard and point to the Network button. The Run wizard suggests a solution.



When you click OK, the Network object description is automatically added to the GUI map and WinRunner resumes the test. The next time you run the test, WinRunner will be able to identify the Network button.

In some cases, the Run wizard edits the test script, rather than the GUI map. For example, if WinRunner cannot locate an object because the appropriate window is inactive, the Run wizard inserts a **set_window** statement in the test script.



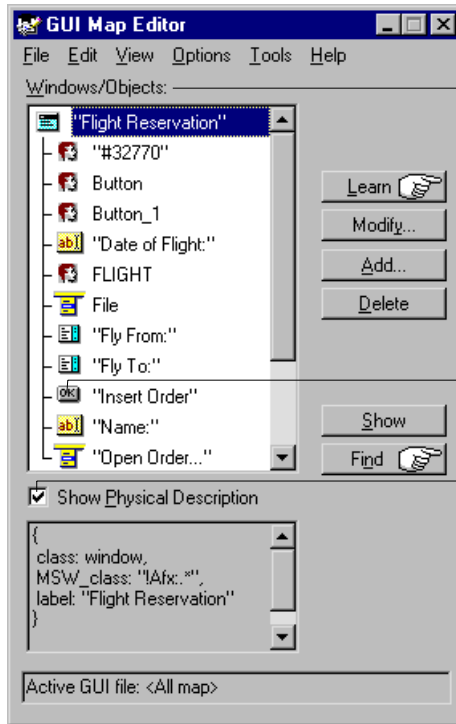
The GUI Map Editor

You can edit the GUI map at any time using the GUI Map Editor. To open the GUI Map Editor, choose **Tools > GUI Map Editor**.

There are two views in the GUI Map Editor, which enable you to display the contents of either:

- the entire GUI map
- an individual GUI map file





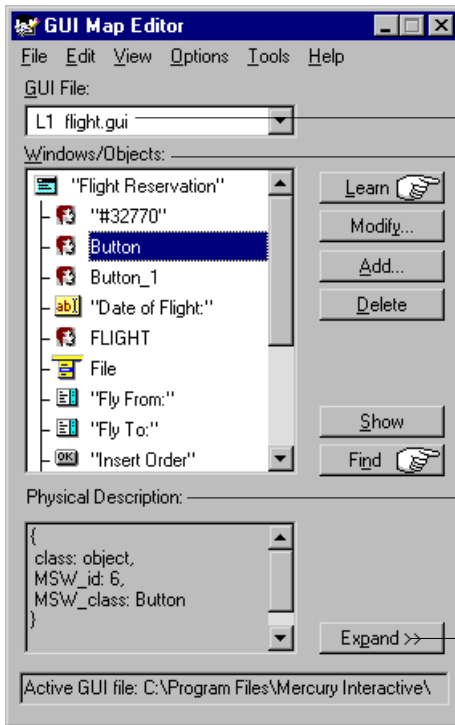
Displays all windows and objects in the GUI map.

Objects within windows are indented.

When selected, displays the physical description of the selected object or window.



When viewing the contents of specific GUI map files, you can expand the GUI Map Editor to view two GUI map files simultaneously. This enables you to easily copy or move descriptions between files. To view the contents of individual GUI map files, choose **View > GUI Files**.



Lists the open GUI map files.

Shows the windows and objects in the selected GUI map file.

Displays the physical description of the selected window or object.

Expands the dialog box so you can view the contents of two GUI map files.

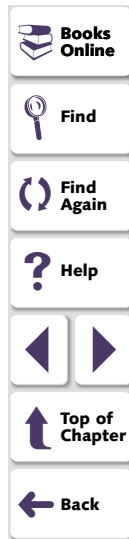


In the GUI Map Editor, objects are displayed in a tree under the icon of the window in which they appear. When you double-click a window name or icon in the tree, you can view all the objects it contains. To concurrently view all the objects in the tree, choose **View > Expand Objects Tree**. To view windows only, choose **View > Collapse Objects Tree**.

When you view the entire GUI map, you can select the **Show Physical Description** check box to display the physical description of any object you select in the **Windows/Objects** list. When you view the contents of a single GUI map file, the GUI Map Editor automatically displays the physical description.

Suppose the WordPad window is in your GUI map file. If you select **Show Physical Description** and click the WordPad window name or icon in the window list, the following physical description is displayed in the middle pane of the GUI Map Editor:

```
{  
class: window,  
label: "Document - WordPad",  
MSW_class: WordPadClass  
}
```



Note: If you modify the logical name of an object in the GUI map, you must also modify the logical name of the object in the test script, so that WinRunner will be able to locate the object in the GUI map.

Note: If the value of a property contains any spaces or special characters, that value must be enclosed by quotation marks.



Modifying Logical Names and Physical Descriptions

You can modify the logical name or the physical description of an object in a GUI map file using the GUI Map Editor.

Changing the logical name of an object is useful when the assigned logical name is not sufficiently descriptive or is too long. For example, suppose WinRunner assigns the logical name “Employee Address” (static) to a static text object. You can change the name to “Address” to make test scripts easier to read.

Changing the physical description is necessary when the property value of an object changes. For example, suppose the label of a button is changed from “Insert” to “Add”. You can modify the value of the label property in the physical description of the Insert button as shown below:

```
Insert button:{class:push_button, label:Add}
```

During a test run, when WinRunner encounters the logical name “Insert” in a test script, it searches for the button with the label “Add”.

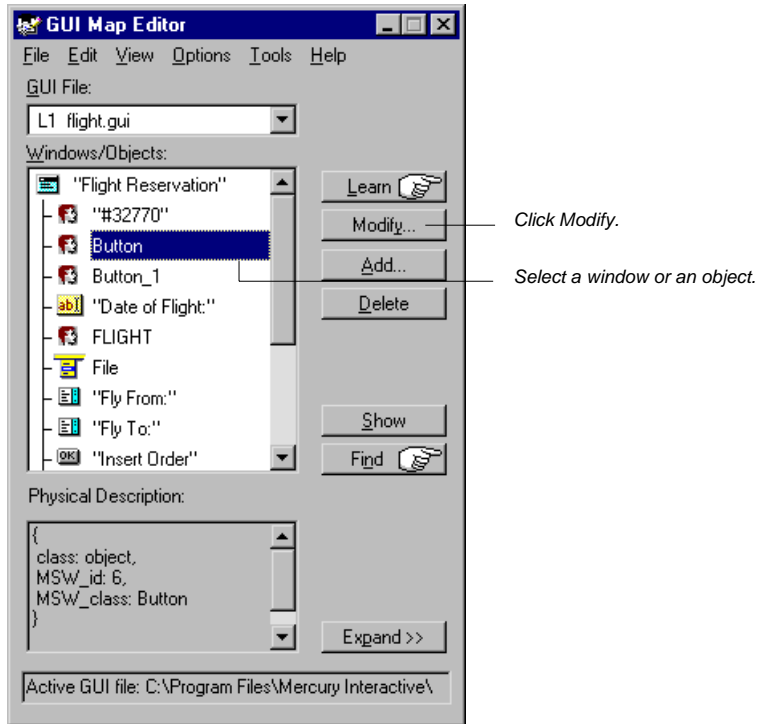


To modify an object's logical name or physical description in a GUI map file:

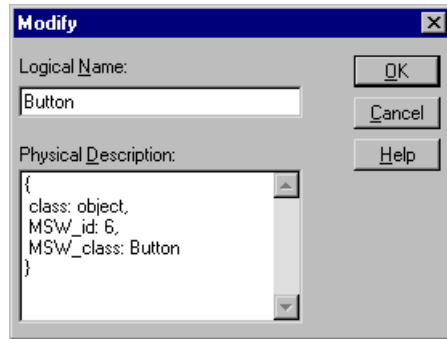
- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 If the appropriate GUI map file is not already loaded, choose **File > Open** to open the file.
- 4 To see the objects in a window, double-click the window name in the **Windows/Objects** field. Note that objects within a window are indented.



- 5 Select the name of the object or window to modify.



- Click **Modify** to open the Modify dialog box.



- Edit the logical name or physical description as desired and click **OK**. The change appears immediately in the GUI map file.



How WinRunner Handles Varying Window Labels

Windows often have varying labels. For example, the main window in a text application might display a file name as well as the application name in the title bar.

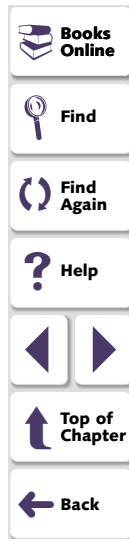
If WinRunner cannot recognize a window because its name changed after WinRunner learned it, the Run wizard opens and prompts you to identify the window in question. Once you identify the window, WinRunner realizes the window has a varying label, and it modifies the window's physical description accordingly.

For example, suppose you record a test on the main window of Microsoft Word in Windows 95. WinRunner learns the following physical description:

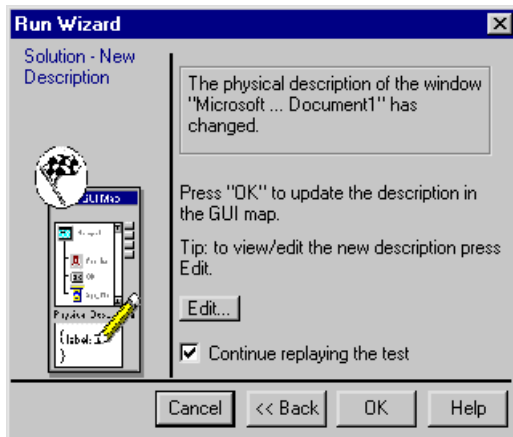
```
{  
  class: window,  
  label: "Microsoft Word - Document1",  
  MSW_class: OpusApp  
}
```



Suppose you run your test when Document 2 is open in Microsoft Word. When WinRunner cannot find the window, the Run wizard opens:



You click the Hand button and click the appropriate Microsoft Word window, so that WinRunner will learn it. You are prompted to instruct WinRunner to update the window's description in the GUI map.



If you click Edit, you can see that WinRunner has modified the window's physical description to include regular expressions:

```
{  
class: window,  
label: "!Microsoft Word - Document.*",  
MSW_class: OpusApp  
}
```

(To continue running the test, you click OK.)

These regular expressions enable WinRunner to recognize the Microsoft Word window regardless of the name appearing after the “_Document” window title.



Using Regular Expressions in the Physical Description

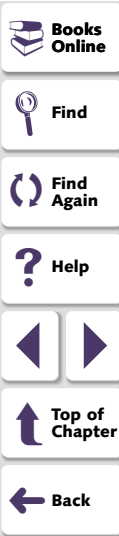
WinRunner uses two “hidden” properties in order to use a regular expression in an object’s physical description. These properties are **regexp_label** and **regexp_MSW_class**.

The **regexp_label** property is used for windows only. It operates “behind the scenes” to insert a regular expression into a window’s label description. Note that when using WinRunner for Windows 95, this property is not obligatory, and therefore it is neither recorded nor learned.

The **regexp_MSW_class** property inserts a regular expression into an object’s MSW_class. It is obligatory for all types of windows and for the object class object.

Adding a Regular Expression

You can add the *regexp_label* and the *regexp_MSW_class* properties to the GUI configuration for a class as needed. You would add a regular expression in this way when either the label or the MSW class of objects in your application has characters in common that can safely be ignored.



Suppressing a Regular Expression

You can suppress the use of a regular expression in the physical description of a window. Suppose the label of all the windows in your application begins with “AAA Wingnuts —”. For WinRunner to distinguish between the windows, you could replace the *regexp_label* property in the list of obligatory learned properties for windows in your application with the label property. See Chapter 9, [Configuring the GUI Map](#), for more information.

For more information about regular expressions, see Chapter 23, [Using Regular Expressions](#).



Copying and Moving Objects between Files

You can update GUI map files by copying or moving the description of GUI objects from one GUI map file to another. Note that you can only copy objects from a GUI file that you have opened for editing only, that is, from a file you have not loaded.

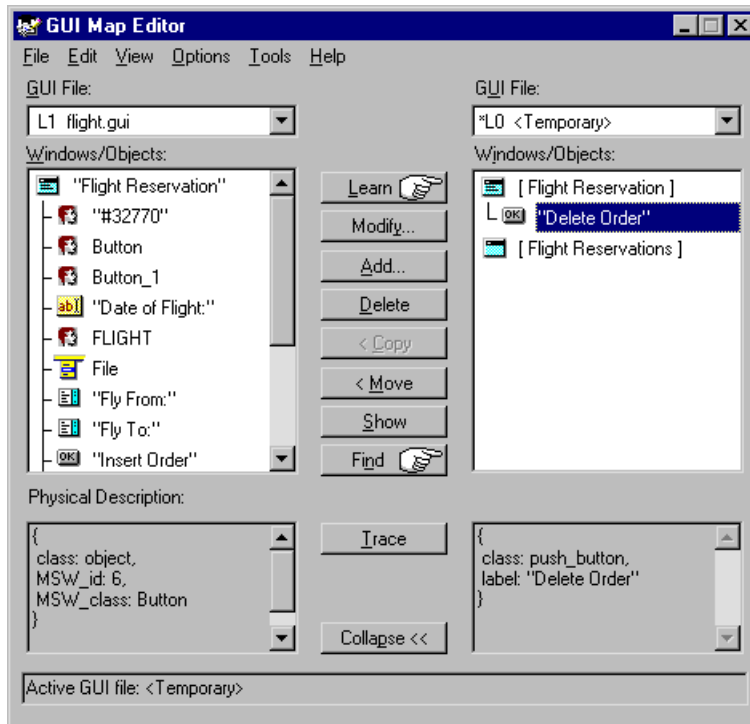
Note: If you are working in the *GUI Map File per Test* mode, you should not manually open GUI map files or copy or move objects between files.

To copy or move objects between two GUI map files:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.

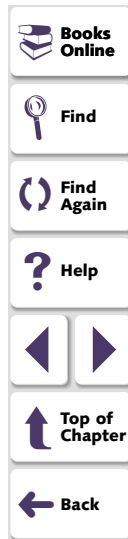


- Click **Expand** in the GUI Map Editor. The dialog box expands to display two GUI map files simultaneously.



- 4 View a different GUI map file on each side of the dialog box by clicking the file names in the **GUI File** lists.
- 5 In one file, select the objects you want to copy or move. Use the Shift key and/or Control key to select multiple objects. To select all objects in a GUI map file, choose **Edit > Select All**.
- 6 Click **Copy** or **Move**.
- 7 To restore the GUI Map Editor to its original size, click **Collapse**.

Note: If you add new windows from a loaded GUI map file to the temporary GUI map file, then when you save the temporary GUI map file, the New Windows dialog box opens. You are prompted to add the new windows to the loaded GUI map file or save them in a new GUI map file. For additional information, refer to the online *WinRunner Help*.



Finding an Object in a GUI Map File

You can easily find the description of a specific object in a GUI map file by pointing to the object in the application being tested.

To find an object in a GUI map file:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 Choose **File > Open** to load the GUI map file.
- 4 Click **Find**. The mouse pointer turns into a pointing hand.
- 5 Click the object in the application being tested. The object is highlighted in the GUI map file.



Finding an Object in Multiple GUI Map Files

If an object is described in more than one GUI map file, you can quickly locate all the object descriptions using the Trace button in the GUI Map Editor. This is particularly useful if you want WinRunner to learn a new description of an object and want to find and delete older descriptions in other GUI map files.

To find an object in multiple GUI map files:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 Click **File > Open** to open the GUI map files in which the object description might appear.

Select the GUI map file you want to open and click **Open for Editing Only**. Click **OK**.

- 4 Display the contents of the file with the most recent description of the object by displaying the GUI map file in the GUI File box.
- 5 Select the object in the **Windows/Objects** box.
- 6 Click **Expand** to expand the GUI Map Editor dialog box.
- 7 Click **Trace**. The GUI map file in which the object is found is displayed on the other side of the dialog box, and the object is highlighted.

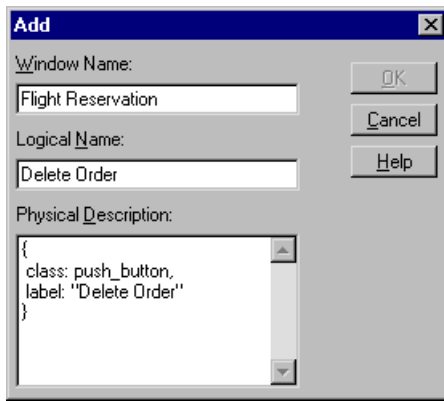


Manually Adding an Object to a GUI Map File

You can manually add an object to a GUI map file by copying the description of another object, and then editing it as needed.

To manually add an object to a GUI map file:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 Choose **File > Open** to open the appropriate GUI map file.
- 4 Select the object to use as the basis for editing.
- 5 Click **Add** to open the Add dialog box.



- 6 Edit the appropriate fields and click **OK**. The object is added to the GUI map file.



Deleting an Object from a GUI Map File

If an object description is no longer needed, you can delete it from the GUI map file.

To delete an object from a GUI map file:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 Choose **File > Open** in the GUI Map Editor to open the appropriate GUI map file.
- 4 Select the object to be deleted. If you want to delete more than one object, use the Shift key and/or Control key to make your selection.
- 5 Click **Delete**.
- 6 Choose **File > Save** to save the changes to the GUI map file.

To delete all objects from a GUI map file:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 Choose **File > Open** in the GUI Map Editor to open the appropriate GUI map file.
- 4 Choose **Edit > Clear All**.



Clearing a GUI Map File

You can quickly clear the entire contents of the temporary GUI map file or any other GUI map file.

To delete the entire contents of a GUI map file:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **View > GUI Files**.
- 3 Open the appropriate GUI map file.
- 4 Display the GUI map file at the top of the GUI File list.
- 5 Choose **Edit > Clear All**.



Filtering Displayed Objects

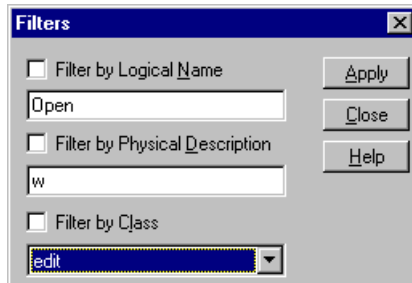
You can filter the list of objects displayed in the GUI Map Editor by using any of the following filters:

- *Logical name* displays only objects with the specified logical name (e.g. “Open”) or substring (e.g. “Op”).
- *Physical description* displays only objects matching the specified physical description. Use any substring belonging to the physical description. (For example, specifying “w” displays only objects containing a “w” in their physical description.)
- *Class* displays only objects of the specified class, such as all the push buttons.



To apply a filter:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 Choose **Options > Filters** to open the Filters dialog box.



- 3 Select the type of filter you want by selecting a check box and entering the appropriate information.
- 4 Click **Apply**. The GUI Map Editor displays objects according to the filter applied.



Saving Changes to the GUI Map

If you edit the logical names and physical descriptions of objects in the GUI map or modified the objects or windows within a GUI map file, you must save your changes in the GUI Map Editor before ending the testing session and exiting WinRunner.

Note: If you are working in the *GUI Map File per Test* mode, you should not manually save changes to the GUI map. Your changes are saved automatically with your test.

To save changes to the GUI map, do one of the following:

- Choose **File > Save** in the GUI Map Editor to save changes in the appropriate GUI map file.
- Choose **File > Save As** to save the changes in a new GUI map file.

Note: If you add new windows from a loaded GUI map file to the temporary GUI map file, then when you save the temporary GUI map file, the New Windows dialog box opens. You are prompted to add the new windows to the loaded GUI map file or save them in a new GUI map file. For additional information, refer to the online *WinRunner Help*.



Understanding the GUI Map

Merging GUI Map Files

This chapter explains how to merge GUI map files. This is especially useful if you have been working in the *GUI Map File per Test* mode and want to start working in the *Global GUI Map File* mode. It is also useful if you want to combine GUI map files while working in the *Global GUI Map File* mode.

This chapter describes:

- **Preparing to Merge GUI Map Files**
- **Resolving Conflicts while Automatically Merging GUI Map Files**
- **Merging GUI Map Files Manually**
- **Changing to the GUI Map File per Test Mode**



About Merging GUI Map Files

When you work in the *GUI Map File per Test* mode, WinRunner automatically creates, saves, and loads a GUI map file with each test you create. This is the simplest way for beginners to work in WinRunner. It is not the most efficient, however. When you become more familiar with WinRunner, you may want to change to working in the *Global GUI Map File* mode. This mode is more efficient, as it enables you to save information about the GUI of your application in a GUI map that is referenced by several tests. When your application changes, instead of updating each test individually, you can merely update the GUI map that is referenced by an entire group of tests.

The GUI Map File Merge Tool enables you to merge multiple GUI map files into a single GUI map file. Before you can merge GUI map files, you must specify at least two source GUI map files to merge and at least one GUI map file as a target file. The target GUI map file can be an existing file or a new (empty) file.

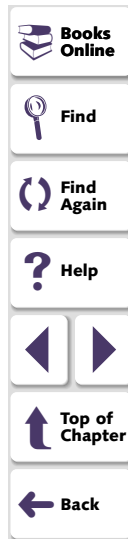


You can work with this tool in either automatic or manual mode.

- When you work in automatic mode, the merge tool merges the files automatically. If there are conflicts between the merged files, the conflicts are highlighted and you are prompted to resolve them.
- When you work in manual mode, you must add GUI objects to the target file manually. The merge tool does not highlight conflicts between the files.

In both modes, the merge tool prevents you from creating conflicts while merging the files.

Once you merge GUI map files, you must also change the GUI map file mode, and modify your tests or your startup test to load the appropriate GUI map files.



Preparing to Merge GUI Map Files

Before you can merge GUI map files, you must decide in which mode to merge your files and specify the source files and the target file.

To start merging GUI map files:

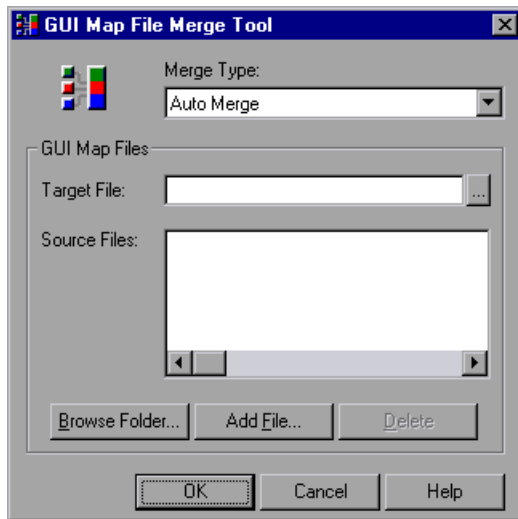
- 1 Choose **Tools > Merge GUI Map Files**.

A WinRunner message box informs you that all open GUI maps will be closed and all unsaved changes will be discarded.

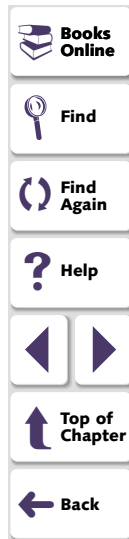
- To continue, click **OK**.
- To save changes to open GUI maps, click **Cancel** and save the GUI maps using the GUI Map Editor. For information on saving GUI map files, see [Saving Changes to the GUI Map](#) on page 159. Once you have saved changes to the open GUI map files, start again at step 1.



The GUI Map File Merge Tool opens, enabling you to select the merge type and specify the target files and source file.



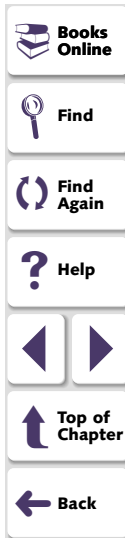
- 2 In the **Merge Type** box, accept **Auto Merge** or select **Manual Merge**.
 - **Auto Merge** merges the files automatically. If there are conflicts between the merged files, the conflicts are highlighted and you are prompted to resolve them.
 - **Manual Merge** enables you to manually add GUI objects from the source files to the target file. The merge tool does not highlight conflicts between the files.



- 3 To specify the target GUI map file, click the browse button opposite the **Target File** box. The Save GUI File dialog box opens.
 - To select an existing GUI map file, browse to the file and highlight it so that it is displayed in the File name box. When prompted, click **OK** to replace the file.
 - To create a new (empty) GUI map file, browse to the desired folder and enter the name of a new file in the **File name** box.
- 4 Specify the source GUI map files.
 - To add all the GUI map files in a folder to the list of source files, click the **Browse Folder** button. The Set Folder dialog box opens. Browse to the desired folder and click **OK**. All the GUI map files in the folder are added to the list of source files.
 - To add a single GUI map file to the list of source files, click the **Add File** button. The Open GUI File dialog box opens. Browse to the desired file and highlight it so that it is displayed in the File name box and click **OK**.
 - To delete a source file from the list, highlight a GUI map file in the **Source Files** box and click **Delete**.



- 5 Click **OK** to close the dialog box.
 - If you chose **Auto Merge** and the source GUI map files are merged successfully without conflicts, a message confirms the merge.
 - If you chose **Auto Merge** and there are conflicts among the source GUI map files being merged, a WinRunner message box warns of the problem. When you click OK to close the message box, the GUI Map File Auto Merge Tool opens. For additional information, see [Resolving Conflicts while Automatically Merging GUI Map Files](#) on page 167.
 - If you chose **Manual Merge**, the GUI Map File Manual Merge Tool opens. For additional information, see [Merging GUI Map Files Manually](#) on page 172.



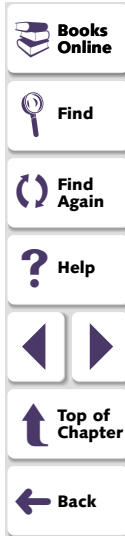
Resolving Conflicts while Automatically Merging GUI Map Files

If you chose the **Auto Merge** option in the GUI Map File Merge Tool and there were no conflicts between files, then a message confirms the merge.

When you merge GUI map files automatically, conflicts occur under the following circumstances:

- Two windows have the same name but different physical descriptions.
- Two objects in the same window have the same name but different physical descriptions.

The following example demonstrates automatically merging two conflicting source files (*before.gui* and *after.gui*) into a new target file (*new.gui*).



The GUI Map File Auto Merge Tool opens after clicking OK in the GUI Map File Merge Tool, as described in [Preparing to Merge GUI Map Files](#) on page 163. It enables you to resolve conflicts and prevents you from creating new conflicts in the target file.

The screenshot shows the 'GUI Map File Auto Merge Tool' dialog box. At the top, it states 'There are 1 files left to be resolved.' and 'Conflict no. 1 out of 2 conflicts.' Below this are buttons for 'Prev. File', 'Next File', 'Prev. Conflict', and 'Next Conflict'. The dialog is split into two panes: 'Conflicting Source File: before.gui' and 'Target File: new.gui'. Both panes show a tree view of GUI objects. In both, the 'Agent Name:' object is highlighted in red. The source file has a description of 'class: edit, attached_text: "Agent Name:"', while the target file has 'class: edit, attached_text: "Agent:"'. A 'Description' field at the bottom shows the conflict: 'Two objects with the same name and different descriptions under the same window.' Buttons for 'Use Target', 'Use Source', 'Modify...', and 'Modify & Copy...' are available between the panes. At the bottom are 'Close' and 'Help' buttons.

Logical name of conflicting object

Logical name of conflicting object

Physical description of conflicting object

Physical description of conflicting object

Description of conflict

Books Online

Find

Find Again

Help

Top of Chapter

Back

The conflicting objects are highlighted in red and the description of the conflict appears in a pane at the bottom of the dialog box. The files conflict because in both GUI map files, there is an object under the same window with the same name and different descriptions. (The windows and objects from the *after.gui* source file were copied to the *new.gui* target file without conflicts, since the *new.gui* file was initially empty.) The names of the conflicting objects are displayed in red. The source files are merged in the order in which they appear in the GUI Map File Merge Tool, as described in [Preparing to Merge GUI Map Files](#) on page 163.

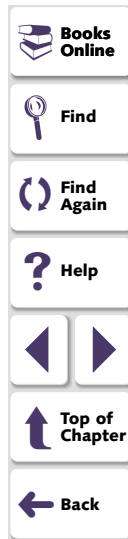
To view the physical description of the conflicting objects or windows, click **Description**.

Each highlighted conflict can be resolved by clicking any of the following buttons. Note that these buttons are enabled only when the conflicting object/window is highlighted in both panes:



Conflict Resolution Option	Description
Use Target	Resolves the conflict by using the name and physical description of the object/window in the target GUI map file.
Use Source	Resolves the conflict by using the name and physical description of the object/window in the source GUI map file.
Modify	Resolves the conflict by suggesting a regular expression (if possible) for the physical description of the object/window in the target GUI map file that will describe both the target and the source object/window accurately. You can modify this description.
Modify & Copy	Resolves the conflict by enabling you to edit the physical description of the object/window in the source GUI map file in order to paste it into the target GUI map file. Note: Your changes to the physical description are not saved in the source GUI map file.

Tip: If there are multiple conflicting source files, you can click **Prev. File** or **Next File** to switch between current GUI map files.



Tip: If there are multiple conflicting objects within a single source file, you can click **Prev. Conflict** or **Next Conflict** to switch between highlighted conflicts. If you use your mouse to highlight a non-conflicting object in the target file (e.g. to see its physical description) and no conflict is highlighted in the target file, you can click **Prev. Conflict** to highlight the conflicting object.

Once all conflicts between the current source file and the target file have been resolved, the source file is automatically closed and the next conflicting source file is opened. Once all conflicts between GUI map files have been resolved, the remaining source file and the target file are closed, and the GUI Map File Auto Merge Tool closes.

Tip: Sometimes, all the conflicts in the current source file have been resolved as a result of resolving conflicts in other source files. When this happens, the Remove File button is displayed. Click this button to remove the current source file from the list of source GUI map files.

Note: Changes to the target GUI map file are saved automatically.



Merging GUI Map Files Manually

When you merge GUI map files manually, you merge each target file with the source file. The merge tool prevents you from creating conflicts while merging the files.

When you merge GUI map files manually, the target GUI map file cannot contain any of the following:

- Two windows with the same name but different physical descriptions.
- Two windows with the same name and the same physical descriptions (identical windows).
- Two objects in the same window with the same name but different physical descriptions.
- Two objects in the same window with the same name and the same physical descriptions (identical objects).



In the following example, the entire contents of the *after.gui* source file was copied to the *new.gui* target file, and there are conflicts between the *before.gui* source file and the target file:

The screenshot shows the 'GUI Map File Manual Merge Tool' window. At the top, it states 'There are 1 files left to be resolved.' and 'Manual merge mode.' The window is divided into two main panes: 'Source File: before.gui' and 'Target File: new.gui'. Each pane shows a tree view of GUI elements. The 'Cancel' button is selected in both panes. Below the tree view, the physical description for the selected element is shown. For the 'Cancel' button in the source file, the description is '{ class: push_button, label: Cancel }'. For the 'Cancel' button in the target file, the description is '{ class: push_button, label: No }'. This difference in the 'label' property creates a conflict. The tool provides buttons for 'Copy', 'Delete', 'Modify...', 'Modify & Copy...', and 'Description >'. On the right side of the window, there is a vertical toolbar with buttons for 'Books Online', 'Find', 'Find Again', 'Help', navigation arrows, 'Top of Chapter', and 'Back'. Labels 'Logical name' and 'Physical description' are placed on the left and right sides of the window, pointing to the respective parts of the GUI element tree and description boxes.

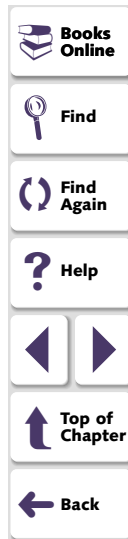
Note that in the above example, the highlighted objects in both panes have identical logical names but different descriptions. Therefore, they cannot both exist “as is” in the merged file.

To merge GUI map files manually:

- 1 Follow the procedure described in [Preparing to Merge GUI Map Files](#) on page 163 and choose **Manual Merge** as the merge type. After you specify the source and target files and click **OK**, the GUI Map File Manual Merge Tool opens.

The contents of the source file and target file are displayed.

- 2 Locate the windows or objects to merge.
 - You can double-click windows to see the objects in the window.
 - If there are multiple source files, you can click **Prev. File** or **Next File** to switch between current GUI map files.
 - To view the physical description of the highlighted objects or windows, click **Description**.



3 Merge the files, using the following merge options:

Merge Option	Description
Copy (enabled only when an object/window in the current source file is highlighted)	Copies the highlighted object/window in source file to the highlighted window or to the parent window of the highlighted object in the target file. Note: Copying a window also copies all objects within that window.
Delete (enabled only when an object/window in the target file is highlighted)	Deletes the highlighted object/window from the target GUI map file. Note: Deleting a window also deletes all objects within that window.
Modify (enabled only when an object/window in the target file is highlighted)	Opens the Modify dialog box, where you can modify the logical name and/or physical description of the highlighted object/window in the target file.
Modify & Copy (enabled only when an object/window in the current source file is highlighted)	Opens the Modify dialog box, where you can modify the logical name and/or physical description of the highlighted object/window from the source file and copy it to the highlighted window or to the parent window of the highlighted object in the target file. Note: Your changes to the physical description are not saved in the source GUI map file.



Tips: If you have finished merging a source file, you can click **Remove File** to remove it from the list of source files to merge.

If there are multiple source files, you can click **Prev. File** or **Next File** to switch between current GUI map files.

Note: Your changes to the target GUI map file are saved automatically.



Changing to the GUI Map File per Test Mode

When you want to change from working in the *GUI Map File per Test* mode to the *Global GUI Map File* mode, the most complicated preparatory work is merging the GUI map files, as described earlier in this chapter.

In addition, you must also make the following changes:

- You should modify your tests or your startup test to load the GUI map files. For information on loading GUI map files, see [Loading the GUI Map File](#) on page 111.
- You must click **Global GUI Map File** in the **GUI Map File Mode** box in the Environment tab of the General Options dialog box.

When you close WinRunner, you will be prompted to save changes made to the configuration. Click **Yes**.

Note: In order for this change to take effect, you must restart WinRunner.

For additional information on the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#).

- You should remember to save changes you make to GUI map files once you switch GUI map file modes. For additional information, see [Saving the GUI Map](#) on page 107.



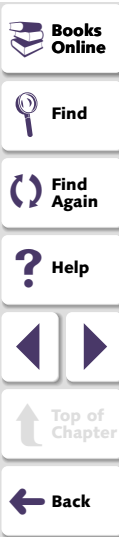
Understanding the GUI Map

Configuring the GUI Map

This chapter explains how to change the way WinRunner identifies GUI objects during Context Sensitive testing.

This chapter describes:

- **Understanding the Default GUI Map Configuration**
- **Mapping a Custom Object to a Standard Class**
- **Configuring a Standard or Custom Class**
- **Creating a Permanent GUI Map Configuration**
- **Deleting a Custom Class**
- **The Class Property**
- **All Properties**
- **Default Properties Learned**



About Configuring the GUI Map

Each GUI object in the application being tested is defined by multiple properties, such as class, label, MSW_class, MSW_id, x (coordinate), y (coordinate), width, and height. WinRunner uses these properties to identify GUI objects in your application during Context Sensitive testing.

When WinRunner learns the description of a GUI object, it does not learn all its properties. Instead, it learns the minimum number of properties to provide a unique identification of the object. For each object class (such as push_button, list, window, or menu), WinRunner learns a default set of properties: its GUI map configuration.

For example, a standard push button is defined by 26 properties, such as MSW_class, label, text, nchildren, x, y, height, class, focused, enabled. In most cases, however, WinRunner needs only the *class* and *label* properties to create a unique identification for the push button.

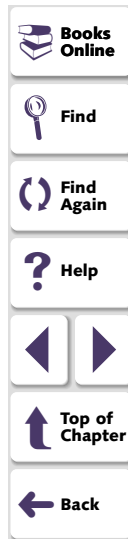
Many applications also contain custom GUI objects. A custom object is any object not belonging to one of the standard classes used by WinRunner. These objects are therefore assigned to the generic “object” class. When WinRunner records an operation on a custom object, it generates **obj_mouse_** statements in the test script.



If a custom object is similar to a standard object, you can map it to one of the standard classes. You can also configure the properties WinRunner uses to identify a custom object during Context Sensitive testing. The mapping and the configuration you set are valid only for the current WinRunner session. To make the mapping and the configuration permanent, you must add configuration statements to your startup test script. Each time you start WinRunner, the startup test activates this configuration.

Note: If your application contains owner-drawn custom buttons, you can map them all to one of the standard button classes instead of mapping each button separately. You do this by either choosing a standard button class in the Record Owner-Drawn Buttons box in the Record tab in the General Options dialog box or setting the *rec_owner_drawn* testing option with the **setvar** function from within a test script. For more information on the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#). For more information on setting testing options with the **setvar** function, see Chapter 41, [Setting Testing Options from a Test Script](#).

Object properties vary in their degree of portability. Some are non-portable (unique to a specific platform), such as *MSW_class* or *MSW_id*. Some are semi-portable (supported by multiple platforms, but with a value likely to change), such as *handle*, or *Toolkit_class*. Others are fully portable (such as *label*, *attached_text*, *enabled*, *focused* or *parent*).



Understanding the Default GUI Map Configuration

For each class, WinRunner learns a set of default properties. Each default property is classified “obligatory” or “optional”. (For a list of the default properties, see [All Properties](#) on page 202.)

- An *obligatory* property is always learned (if it exists).
- An *optional* property is used only if the obligatory properties do not provide unique identification of an object. These optional properties are stored in a list. WinRunner selects the minimum number of properties from this list that are necessary to identify the object. It begins with the first property in the list, and continues, if necessary, to add properties to the description until it obtains unique identification for the object.

If you use the GUI Spy to view the default properties of an OK button, you can see that WinRunner learns the class and label properties. The physical description of this button is therefore:

```
{class:push_button, label:"OK"}
```



In cases where the obligatory and optional properties do not uniquely identify an object, WinRunner uses a *selector*. For example, if there are two OK buttons with the same MSW_id in a single window, WinRunner would use a selector to differentiate between them. Two types of selectors are available:

- A *location* selector uses the spatial position of objects.
- An *index* selector uses a unique number to identify the object in a window.

The *location* selector uses the spatial order of objects within the window, from the top left to the bottom right corners, to differentiate among objects with the same description.

The *index* selector uses numbers assigned at the time of creation of objects to identify the object in a window. Use this selector if the location of objects with the same description may change within a window. See [Configuring a Standard or Custom Class](#) on page 188 for more information.

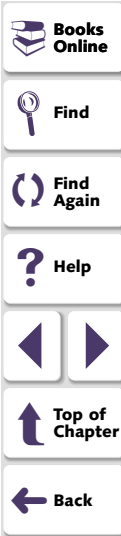


Mapping a Custom Object to a Standard Class

A custom object is any GUI object not belonging to one of the standard classes used by WinRunner. WinRunner learns such objects under the generic “object” class. WinRunner records operations on custom objects using **obj_mouse_** statements.

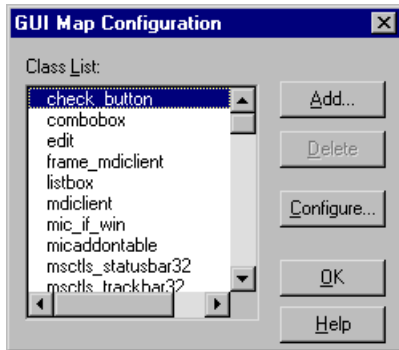
Using the GUI Map Configuration dialog box, you can teach WinRunner a custom object and map it to a standard class. For example, if your application has a custom button that WinRunner cannot identify, clicking this button is recorded as **obj_mouse_click**. You can teach WinRunner the “Borbtn” custom class and map it to the standard **push_button** class. Then, when you click the button, the operation is recorded as **button_press**.

Note that a custom object should be mapped only to a standard class with comparable behavior. For example, you cannot map a custom push button to the edit class.



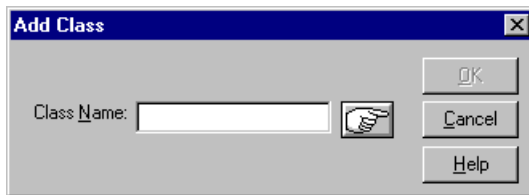
To map a custom object to a standard class:

- 1 Choose **Tools > GUI Map Configuration** to open the GUI Map Configuration dialog box.

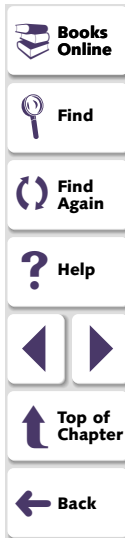


The Class List displays all standard and custom classes identified by WinRunner.

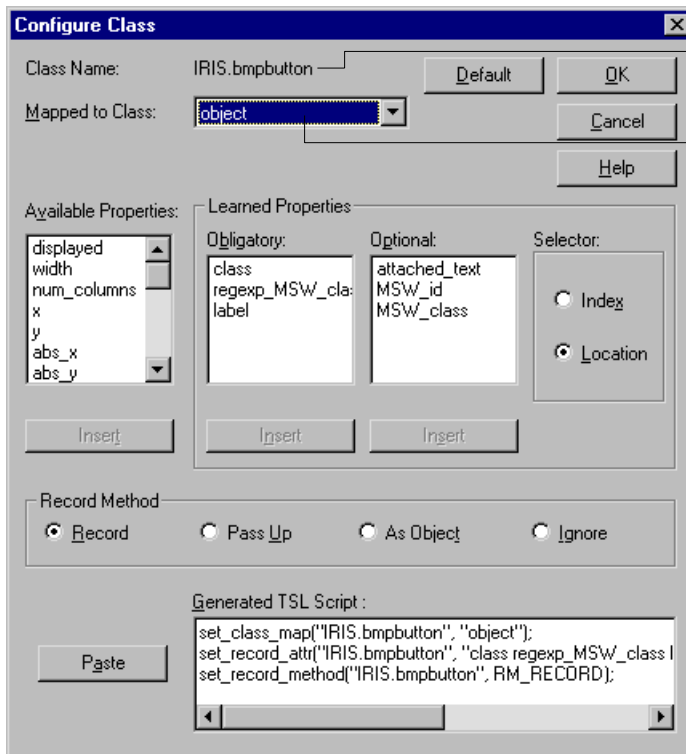
- 2 Click **Add** to open the Add Class dialog box.



- 3 Click the pointing hand and then click the object whose class you want to add. The name of the custom object appears in the Class Name box. Note that this name is the value of the object's `MSW_class` property.
- 4 Click **OK** to close the dialog box. The new class appears highlighted at the bottom of the Class List in the GUI Map Configuration dialog box, preceded by the letter "U" (user-defined).



- 5 Click **Configure** to open the Configure Class dialog box.



The custom class you are mapping

The list of standard classes



The Mapped to Class box displays the object class. The object class is the class that WinRunner uses by default for all custom objects.

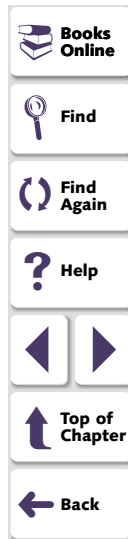
- 6 From the **Mapped to Class** list, click the standard class to which you want to map the custom class. Remember that you should map the custom class only to a standard class of comparable behavior.

Once you choose a standard class, the dialog box displays the GUI map configuration for that class.

You can also modify the GUI map configuration of the custom class (the properties learned, the selector, or the record method). For details, see [Configuring a Standard or Custom Class](#) on page 188.

- 7 Click **OK** to complete the configuration.

Note that the configuration is valid only for the current testing session. To make the configuration permanent, you should paste the TSL statements into a startup test script. See [Creating a Permanent GUI Map Configuration](#) on page 196 for more information.



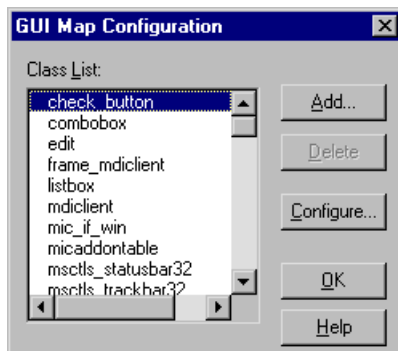
Configuring a Standard or Custom Class

For any of the standard or custom classes, you can modify the following:

- the properties learned
- the selector
- the recording method

To configure a standard or custom class:

- 1 Choose **Tools > GUI Map Configuration** to open the GUI Map Configuration dialog box.



The Class List contains all standard classes, as well as any custom classes you add.



- Click the class you want to configure and click **Configure**. The Configure Class dialog box opens.

The screenshot shows the 'Configure Class' dialog box with the following details:

- Class Name:** check_button
- Mapped to Class:** check_button
- Available Properties:** A list containing 'displayed', 'width', 'num_columns', 'x', 'y', 'abs_x', and 'MSW_class'. 'displayed' is selected.
- Learned Properties:**
 - Obligatory:** class, label
 - Optional:** MSW_id
 - Selector:** Location, Index
- Record Method:** Record, Pass Up, As Object, Ignore
- Generated TSL Script:**

```
set_record_attr("check_button", "class label", "MSW_id", "loc
set_record_method("check_button", RM_RECORD);
```

Annotations on the right side of the dialog:

- Class you want to configure (points to the Class Name field)
- Selector for the class (points to the Selector section)
- Obligatory and Optional properties learned for the class (points to the Obligatory and Optional sections)
- All available properties (points to the Available Properties list)
- Record method for the class (points to the Record Method section)

- Books Online
- Find
- Find Again
- Help
-
- Top of Chapter
- Back

The Class Name field at the top of the dialog box displays the name of the class to configure.

- 3 Modify the learned properties, the selector, or the recording method as desired. See [Configuring Learned Properties](#) on page 190, [Configuring the Selector](#) on page 194, and [Configuring the Recording Method](#) on page 195 for details.

- 4 Click **OK**.

Note that the configuration is valid only for the current testing session. To make the configuration permanent, you should paste the TSL statements into a startup test script. See [Creating a Permanent GUI Map Configuration](#) on page 196 for more information.

- 5 Click **OK** in the GUI Map Configuration dialog box.

Configuring Learned Properties

The Learned Properties area of the Configure Class dialog box allows you to configure which properties are recorded and learned for a class. You do this by moving properties from one list to another within the dialog box in order to specify whether they are obligatory, optional, or available. Each property can appear in only one of the lists.

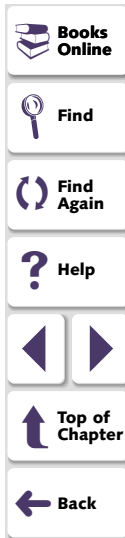


- The Obligatory list contains properties always learned (provided that they are valid for the specific object).
- The Optional list contains properties used only if the obligatory properties do not provide a unique identification for an object. WinRunner selects the minimum number of properties needed to identify the object, beginning with the first property in the list.
- The Available Properties list contains all remaining properties not in either of the other two lists.

When the dialog box is displayed, the Obligatory and Optional lists display the properties learned for the class appearing in the Class Name field.

To modify the property configuration:

- 1 Click a property to move from any of the lists. Then click **Insert** under the target list. For example:
 - To move the *MSW_class* property from the Obligatory list to the Optional list, click it in the Obligatory list, then click **Insert** under the **Optional** list.
 - To remove a property so that it is not learned, click it in the Obligatory or Optional list, then click Insert under the Available Properties list.
- 2 To modify the order of properties within a list (particularly important in the Optional list), click one or more properties and click Insert under the same list. The properties are moved to the bottom of the list.



- 3 Click **OK** to save the changes.

Note that not all properties apply to all classes. The following table lists each property and the classes to which it can be applied.

Property	Classes
abs_x	All classes
abs_y	All classes
active	All classes
attached_text	combobox, edit, listbox, scrollbar
class	All classes
displayed	All classes
enabled	All classes
focused	All classes
handle	All classes
height	All classes
label	check_button, push_button, radio_button, static_text, window
maximizable	calendar, window
minimizable	calendar, window



Property	Classes
MSW_class	All classes
MSW_id	All classes, except window
nchildren	All classes
obj_col_name	edit
owner	mdiclient, window
pb_name	check_button, combobox, edit, list, push_button, radio_button, scroll, window (object)
regexp_label	All classes with labels
regexp_MSWclass	All classes
text	All classes
value	calendar, check_button, combobox, edit, listbox, radio_button, scrollbar, static_text
vb_name	All classes
virtual	list, push_button, radio_button, table, object (virtual objects only)
width	All classes
x	All classes
y	All classes

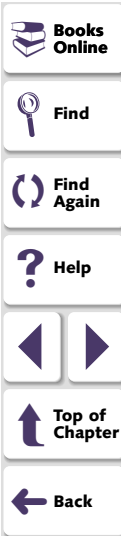


Configuring the Selector

In cases where both obligatory and optional properties cannot uniquely identify an object, WinRunner applies one of two selectors: *location* or *index*.

A location selector performs the selection process based on the position of objects within the window: from top to bottom and from left to right. An index selector performs a selection according to a unique number assigned to an object by the application developer. For an example of how selectors are used, see [Understanding the Default GUI Map Configuration](#) on page 181.

By default, WinRunner uses a location selector for all classes. To change the selector, click the appropriate radio button.



Configuring the Recording Method

By setting the recording method you can determine how WinRunner records operations on objects belonging to the same class. Three recording methods are available:

- *Record* instructs WinRunner to record all operations performed on a GUI object. This is the default record method for all classes. (The only exception is the static class (static text), for which the default is *Pass Up*.)
- *Pass Up* instructs WinRunner to record an operation performed on this class as an operation performed on the element containing the object. Usually this element is a window, and the operation is recorded as **win_mouse_click**.
- *As Object* instructs WinRunner to record all operations performed on a GUI object as though its class were “object” class.
- *Ignore* instructs WinRunner to disregard all operations performed on the class.

To modify the recording method, click the appropriate radio button.



Creating a Permanent GUI Map Configuration

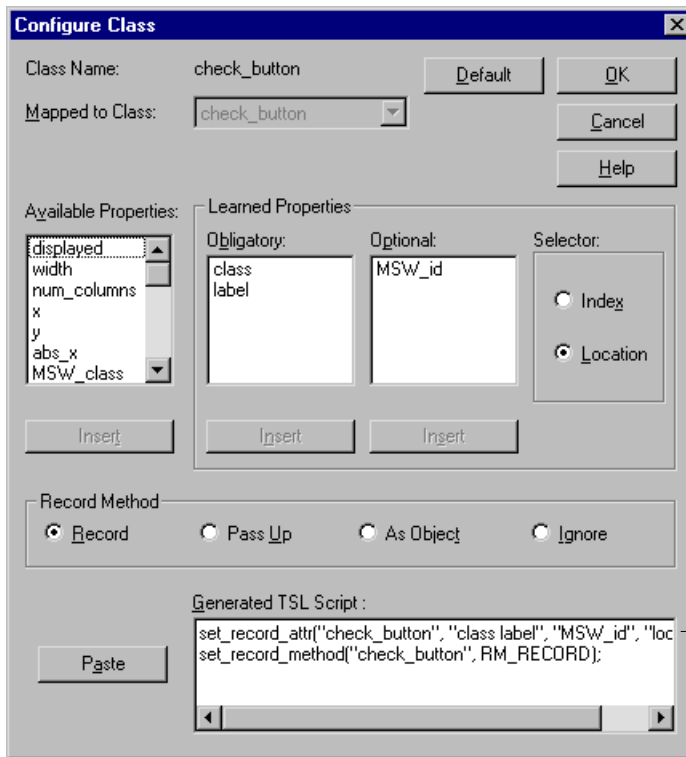
By generating TSL statements describing the configuration you set and inserting them into a startup test, you can ensure that WinRunner always uses the correct GUI map configuration for your standard and custom object classes.

To create a permanent GUI map configuration for a class:

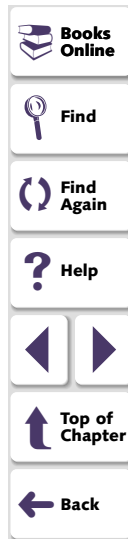
- 1 Choose **Tools > GUI Map Configuration** to open the GUI Map Configuration dialog box.
- 2 Click a class and click **Configure**. The Configure Class dialog box opens.



- 3 Set the desired configuration for the class. Note that in the bottom pane of the dialog box, WinRunner automatically generates the appropriate TSL statements for the configuration.



TSL statements describing the GUI map configuration

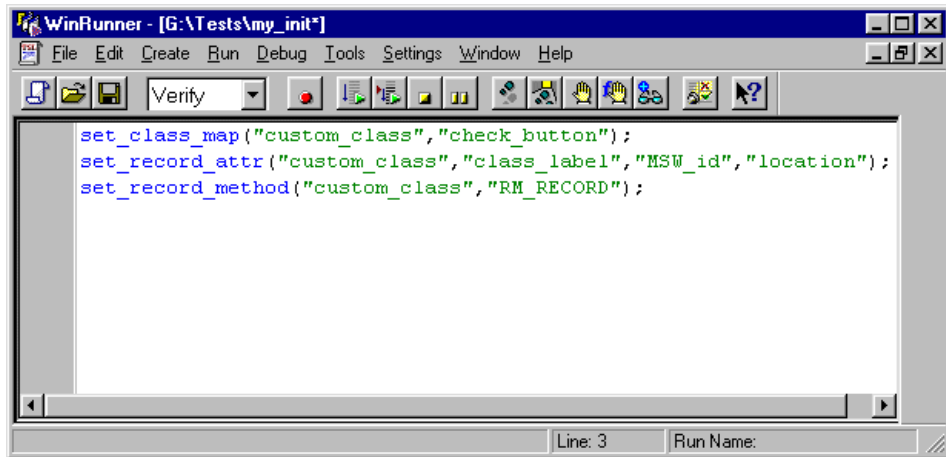


- 4 Paste the TSL statements into a startup test using the **Paste** button.

For example, assume that in the WinRunner configuration file *wrun.ini* (located in your Windows folder), your startup test is defined as follows:

```
[WrEnv]
XR_TSL_INIT = GS:\tests\my_init
```

You would open the *my_init* test in the WinRunner window and paste in the generated TSL lines.



For more information on startup tests, see Chapter 43, **Initializing Special Configurations**. For more information on the TSL functions defining a custom GUI map configuration (**set_class_map**, **set_record_attr**, and **set_record_method**), refer to the *TSL Online Reference*.



Deleting a Custom Class

You can delete only custom object classes. The standard classes used by WinRunner cannot be deleted.

To delete a custom class:

- 1 Choose **Tools > GUI Map Configuration** to open the GUI Map Configuration dialog box.
- 2 Click the class you want to delete from the Class list.
- 3 Click **Delete**.



The Class Property

The class property is the primary property that WinRunner uses to identify the class of a GUI object. WinRunner categorizes GUI objects according to the following classes:

Class	Description
calendar	A standard calendar object that belongs to the <i>CDateTimeCtrl</i> or <i>CMonthCalCtrl</i> MSW_class.
check_button	A check box
edit	An edit field
frame_mdiclient	Enables WinRunner to treat a window as an mdiclient object.
list	A list box. This can be a regular list or a combo box.
menu_item	A menu item
mdiclient	An mdiclient object
mic_if_win	Enables WinRunner to defer all record and run operations on any object within this window to the mic_if library. Refer to the <i>WinRunner Customization Guide</i> for more information.
object	Any object not included in one of the classes described in this table.
push_button	A push (command) button



Class	Description
radio_button	A radio (option) button
scroll	A scroll bar or slider
spin	A spin object
static_text	Display-only text not part of any GUI object
status_bar	A status bar on a window
tab	A tab item
toolbar	A toolbar object
window	Any application window, dialog box, or form, including MDI windows.



All Properties

The following tables list all properties used by WinRunner in Context Sensitive testing. Properties are listed by their portability levels: portable, semi-portable, and non-portable.

Note for XRunner users: You cannot use GUI map files created in XRunner in WinRunner test scripts. You must create new GUI map files in WinRunner. For information on running XRunner test scripts recorded in Analog mode, see Chapter 11, [Creating Tests](#). For information on using GUI checkpoints created in XRunner in WinRunner test scripts, see Chapter 12, [Checking GUI Objects](#). For information on using bitmap checkpoints created in XRunner in WinRunner test scripts, see Chapter 18, [Checking Bitmaps](#).



Portable Properties

Property	Description
abs_x	The x-coordinate of the top left corner of an object, relative to the origin (upper left corner) of the screen display.
abs_y	The y-coordinate of the top left corner of an object, relative to the origin (upper left corner) of the screen display.
attached_text	The static text located near the object.
class	See The Class Property on page 200.
class_index	An index number that identifies an object, relative to the position of other objects from the same class in the window (Java add-in only).
count	The number of menu items contained in a menu.
displayed	A Boolean value indicating whether the object is displayed: 1 if visible on screen, 0 if not.
enabled	A Boolean value indicating whether the object can be selected or activated: 1 if enabled, 0 if not.
focused	A Boolean value indicating whether keyboard input will be directed to this object: 1 if object has keyboard focus, 0 if not.
height	Height of object in pixels.
html_url	A URL (WebTest only).



Property	Description
label	The text that appears on the object, such as a button label.
maximizable	A Boolean value indicating whether a window can be maximized: 1 if the window can be maximized, 0 if not.
minimizable	A Boolean value indicating whether a window can be minimized: 1 if the window can be minimized, 0 if not.
module_name	The name of an executable file which created the specified window.
nchildren	The number of children the object has: the total number of descendants of the object.
NSTBTitle	The title of a toolbar in a browser (WebTest only).
NSTitle	The title of a browser (WebTest only).
num_columns	A table object in Terminal Emulator applications only.
num_rows	A table object in Terminal Emulator applications only.
parent	The logical name of the parent of the object.
part_value	The name of a radio button or a check box in a group (WebTest only).
position	The position (top to bottom) of a menu item within the menu (the first item is at position 0).



Property	Description
submenu	A Boolean value indicating whether a menu item has a submenu: 1 if menu has submenu, 0 if not.
value	<p>Different for each class:</p> <p>Radio and check buttons: 1 if the button is checked, 0 if not.</p> <p>Menu items: 1 if the menu is checked, 0 if not.</p> <p>List objects: indicates the text string of the selected item.</p> <p>Edit/Static objects: indicates the text field contents.</p> <p>Scroll objects: indicates the scroll position.</p> <p>All other classes: the value property is a null string.</p>
width	Width of object in pixels.
x	The x-coordinate of the top left corner of an object, relative to the window origin.
y	The y-coordinate of the top left corner of an object, relative to the window origin.



Semi-Portable Properties

Property	Description
handle	A run-time pointer to the object: the HWND handle.
TOOLKIT_class	The value of the specified toolkit class. The value of this property is the same as the value of the MSW_class in Windows, or the X_class in Motif.

Non-Portable Microsoft Windows Properties

Property	Description
active	A Boolean value indicating whether this is the top-level window associated with the input focus.
MSW_class	The Microsoft Windows class.
MSW_id	The Microsoft Windows ID.
obj_col_name	A concatenation of the DataWindow and column names. For edit field objects in WinRunner with PowerBuilder add-in support, indicates the name of the column.
owner	(For windows), the application (executable) name to which the window belongs.



Property	Description
pb_name	A text string assigned to PowerBuilder objects by the developer. (The property applies only to WinRunner with PowerBuilder add-in support.)
regexp_label	The text string and regular expression that enables WinRunner to identify an object with a varying label.
regexp_MSW_class	The Microsoft Windows class combined with a regular expression. Enables WinRunner to identify objects with a varying MSW_class.
systemenu	A Boolean value indicating whether a menu item is part of a system menu.
text	The visible text in an object or window.
vb_name	A text string assigned to Visual Basic objects by the developer (the <i>name</i> property). (The property applies only to WinRunner with Visual Basic add-in support.)



Default Properties Learned

The following table lists the default properties learned for each class. (The default properties apply to all methods of learning: the RapidTest Script Wizard, the GUI Map Editor, and recording.)

Class	Obligatory Properties	Optional Properties	Selector
All buttons	class, label	MSW_id	location
list, edit, scroll, combobox	class, attached_text	MSW_id	location
frame_mdiclient	class, regexp_MSWclass, regexp_label	label, MSW_class	location
menu_item	class, label, sysmenu	position	location
object	class, regexp_MSWclass, label	attached_text, MSW_id, MSW_class	location
mdiclient	class, label	regexp_MSWclass, MSW_class	
static_text	class, MSW_id	label	location
window	class, regexp_MSWclass, label	attached_text, MSW_id, MSW_class	location



Properties for Visual Basic Objects

The `label` and `vb_name` properties are obligatory properties: they are learned for all classes of Visual Basic objects. For more information on testing Visual Basic objects, see Chapter 13, [Working with ActiveX and Visual Basic Controls](#).

Note: To test Visual Basic applications, you must install Visual Basic support. For more information, refer to your *WinRunner Installation Guide*.



Properties for PowerBuilder Objects

The following table lists the standard object classes and the properties learned for each PowerBuilder object.

Class	Obligatory Properties	Optional Properties	Selector
all buttons	class, pb_name	label, MSW_id	location
list, scroll, combobox	class, pb_name	attached_text, MSW_id	location
edit	class, pb_name, obj_col_name	attached_text, MSW_id	location
object	class, pb_name	label, attached_text, MSW_id, MSW_class	location
window	class, pb_name	label, MSW_id	location

Note: In order to test PowerBuilder applications, you must install PowerBuilder support. For more information, refer to your *WinRunner Installation Guide*.

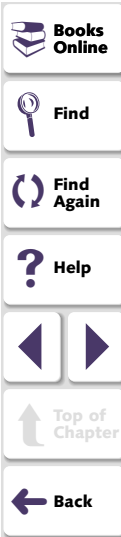


Learning Virtual Objects

You can teach WinRunner to recognize any bitmap in a window as a GUI object by defining the bitmap as a *virtual object*.

This chapter describes:

- **Defining a Virtual Object**
- **Understanding a Virtual Object's Physical Description**

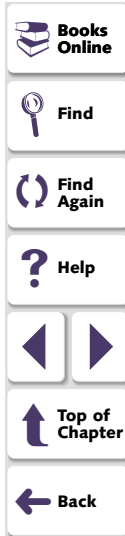


About Learning Virtual Objects

Your application may contain bitmaps that look and behave like GUI objects. WinRunner records operations on these bitmaps using **win_mouse_click** statements. By defining a bitmap as a *virtual object*, you can instruct WinRunner to treat it like a GUI object such as a push button, when you record and run tests. This makes your test scripts easier to read and understand.

For example, suppose you record a test on the Windows 95/Windows NT Calculator application in which you click buttons to perform a calculation. Since WinRunner cannot recognize the calculator buttons as GUI objects, by default it creates a test script similar to the following:

```
set_window("Calculator");  
win_mouse_click ("Calculator", 87, 175);  
win_mouse_click ("Calculator", 204, 200);  
win_mouse_click ("Calculator", 121, 163);  
win_mouse_click ("Calculator", 242, 201);
```



This test script is difficult to understand. If, instead, you define the calculator buttons as virtual objects and associate them with the push button class, WinRunner records a script similar to the following:

```
set_window ("Calculator");  
button_press("seven");  
button_press("plus");  
button_press("four");  
button_press("equal");
```

You can create virtual push buttons, radio buttons, check buttons, lists, or tables, according to the bitmap's behavior in your application. If none of these is suitable, you can map a virtual object to the general object class.

You define a bitmap as a virtual object using the Virtual Object wizard. The wizard prompts you to select the standard class with which you want to associate the new object. Then you use a crosshairs pointer to define the area of the object. Finally, you choose a logical name for the object. WinRunner adds the virtual object's logical name and physical description to the GUI map.

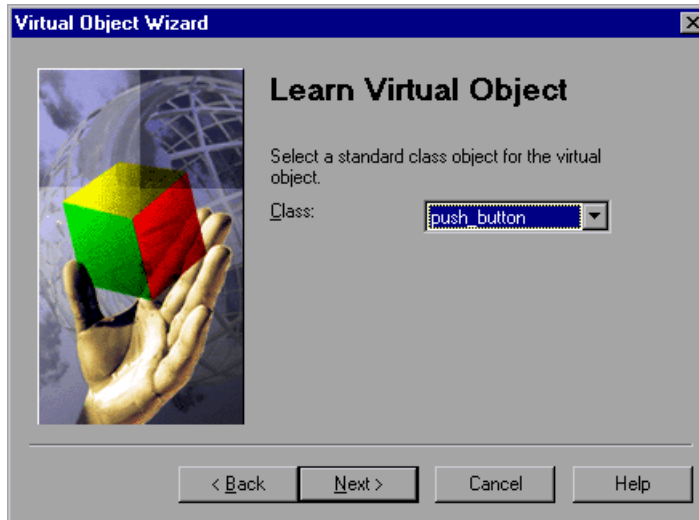


Defining a Virtual Object

Using the Virtual Object wizard, you can assign a bitmap to a standard object class, define the coordinates of that object, and assign it a logical name.

To define a virtual object using the Virtual Object wizard:

- 1 Choose **Tools > Virtual Object Wizard**. The Virtual Object wizard opens. Click **Next**.
- 2 In the Class list, select a class for the new virtual object.



If you select the list class, select the number of visible rows that are displayed in the window. For a table class, select the number of visible rows and columns.

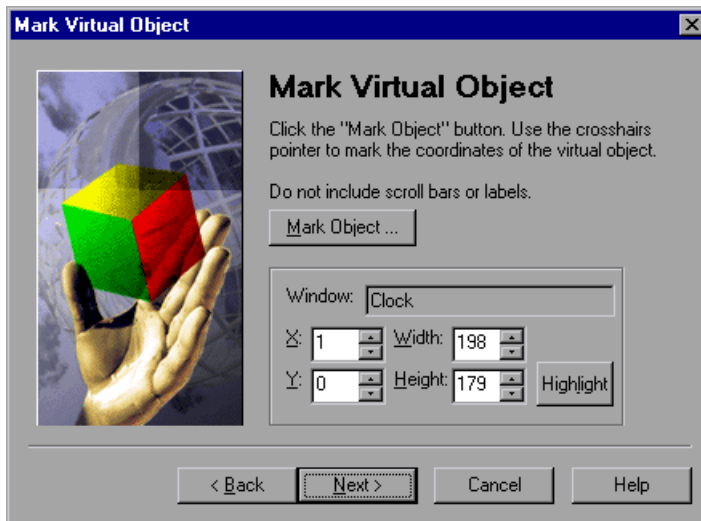
Click **Next**.

- 3 Click **Mark Object**. Use the crosshairs pointer to select the area of the virtual object. You can use the arrow keys to make precise adjustments to the area you define with the crosshairs.

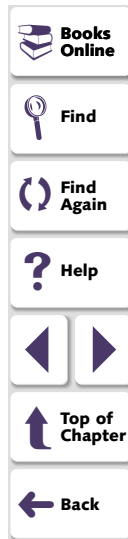
Note: The virtual object should not overlap GUI objects in your application (except for those belonging to the generic “object” class, or to a class configured to be recorded as “object”). If a virtual object overlaps a GUI object, WinRunner may not record or execute tests properly on the GUI object.



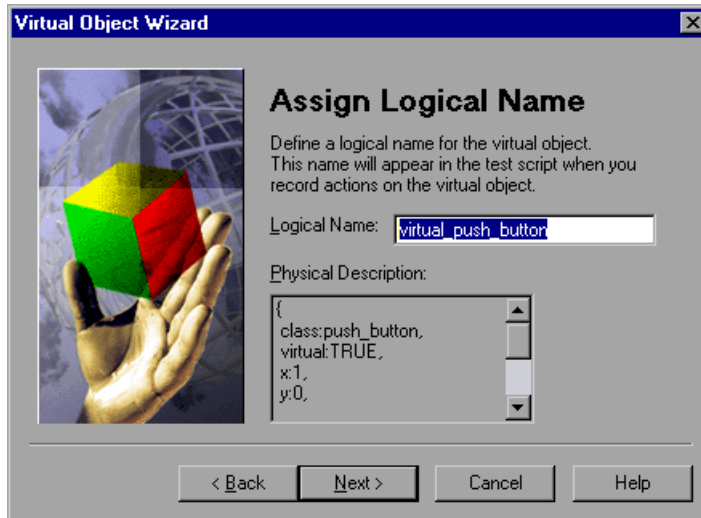
Press Enter or click the right mouse button to display the virtual object's coordinates in the wizard.



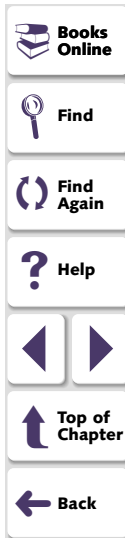
If the object marked is visible on the screen, you can click the Highlight button to view it. Click **Next**.



- Assign a logical name to the virtual object. This is the name that appears in the test script when you record on the virtual object. If the object contains text that WinRunner can read, the wizard suggests using this text for the logical name. Otherwise, WinRunner suggests *virtual_object*, *virtual_push_button*, *virtual_list*, etc.

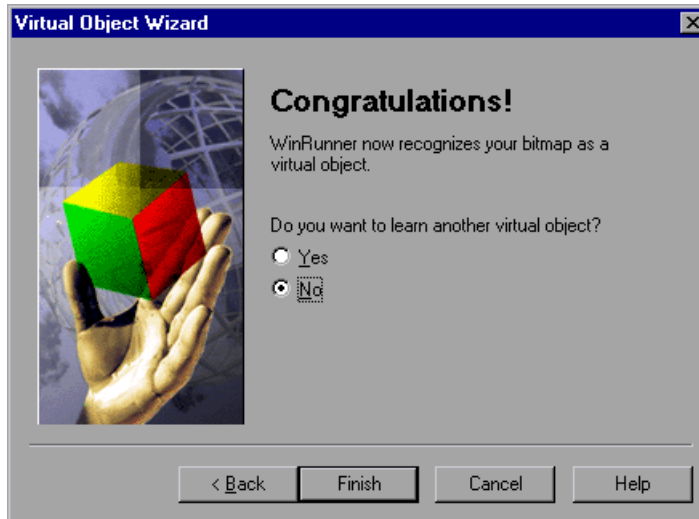


You can accept the wizard's suggestion or type in a different name. WinRunner checks that there are no other objects in the GUI map with the same name before confirming your choice. Click **Next**.

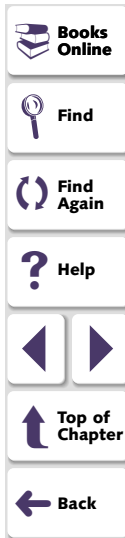


5 Finish learning the virtual object:

- If you want to learn another virtual object, click **Yes**. Click **Next**.
- To close the wizard, click **Finish**.



When you exit the wizard, WinRunner adds the object's logical name and physical description to the GUI map. The next time that you record operations on the virtual object, WinRunner generates TSL statements instead of **win_mouse_click** statements.



Understanding a Virtual Object's Physical Description

When you create a virtual object, WinRunner adds its physical description to the GUI map. The physical description of a virtual object does not contain the *label* property found in the physical description of “real” GUI objects. Instead it contains a special property, *virtual*. Its function is to identify virtual objects, and its value is always TRUE.

Since WinRunner identifies a virtual object according to its size and its position within a window, the x, y, width, and height properties are always found in a virtual object's physical description.

For example, the physical description of a *virtual_push_button* includes the following properties:

```
{
  class: push_button,
  virtual: TRUE,
  x: 82,
  y: 121,
  width: 48,
  height: 28,
}
```

If these properties are changed or deleted, WinRunner cannot recognize the virtual object. If you move or resize an object, you must use the wizard to create a new virtual object.



Creating Tests



Creating Tests

Creating Tests

Using recording, programming, or a combination of both, you can create automated tests quickly.

This chapter describes:

- **The WinRunner Test Window**
- **Context Sensitive Recording**
- **Solving Common Context Sensitive Recording Problems**
- **Analog Recording**
- **Checkpoints**
- **Data-Driven Tests**
- **Synchronization Points**
- **Planning a Test**
- **Documenting Test Information**
- **Associating Add-ins with a Test**
- **Recording a Test**
- **Activating Test Creation Commands Using Softkeys**
- **Programming a Test**
- **Editing a Test**
- **Managing Test Files**



About Creating Tests

You can create tests using both recording and programming. Usually, you start by recording a basic *test script*. As you record, each operation you perform generates a statement in Mercury Interactive's Test Script Language (TSL). These statements appear as a test script in a test window. You can then enhance your recorded test script, either by typing in additional TSL functions and programming elements or by using WinRunner's visual programming tool, the Function Generator.

Two modes are available for recording tests:

- *Context Sensitive* records the operations you perform on your application by identifying Graphical User Interface (GUI) objects.
- *Analog* records keyboard input, mouse clicks, and the precise x- and y-coordinates traveled by the mouse pointer across the screen.

You can add GUI, bitmap, text, and database checkpoints, as well as synchronization points to your test script. Checkpoints enable you to check your application by comparing its current behavior to its behavior in a previous version. Synchronization points solve timing and window location problems that may occur during a test run.

You can create a data-driven tests, which are tests driven by data stored in an internal table.



To create a test script, you perform the following main steps:

- 1** Decide on the functionality you want to test. Determine the checkpoints and synchronization points you need in the test script.
- 2** Document general information about the test in the Test Properties dialog box.
- 3** Choose a Record mode (*Context Sensitive* or *Analog*) and record the test on your application.
- 4** Assign a test name and save the test in the file system or in your TestDirector project.



The WinRunner Test Window

You develop and run WinRunner tests in the test window, which contains the following elements:

- *Test window title bar*, which displays the name of the open test
- *Test script*, which consists of statements generated by recording and/or programming in TSL, Mercury Interactive's Test Script Language
- *Execution arrow*, which indicates the line of the test script being executed (to move the marker to any line in the script, click the mouse in the left window margin next to the line)
- *Insertion point*, which indicates where you can insert or edit text

The screenshot shows a window titled "G:\QA\Test_1" containing a test script. The script is as follows:

```

set_window ("Flight Reservation", 5);
obj_mouse_click ("Button", 17, 7, LEFT);
obj_type ("MSMaskWndClass","121299");
list_select_item ("Fly From:", "Frankfurt"); # Item Number 1;
list_select_item ("Fly To:", "Los Angeles"); # Item Number 2;
obj_mouse_click ("FLIGHT", 35, 37, LEFT);
set_window ("Flights Table", 2);|
list_select_item ("Flight", "20331 FRA 09:12 AM LAX 04:23 PM AA $112.20"); #
button_press ("OK");
set_window ("Flight Reservation", 4);
edit_set ("Name:", "John Smith");
button_set ("First", ON);
button_press ("Insert Order");
  
```

Annotations in the image point to specific elements:

- Test window title bar:** Points to the title bar text "G:\QA\Test_1".
- Execution arrow:** Points to a yellow arrow in the left margin next to the first line of code.
- Insertion point:** Points to the vertical bar at the end of the line: `set_window ("Flights Table", 2);|`.
- Test script:** Points to the main body of the script.



Context Sensitive Recording

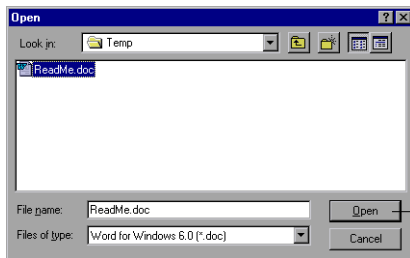
Context Sensitive mode records the operations you perform on your application in terms of its GUI objects. As you record, WinRunner identifies each GUI object you click (such as a window, button, or list), and the type of operation performed (such as drag, click, or select).

For example, if you click the Open button in an Open dialog box, WinRunner records the following:

```
button_press ("Open");
```

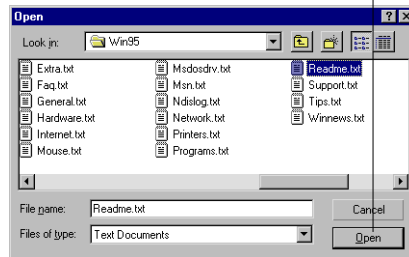




When it runs the test, WinRunner looks for the Open dialog box and the Open button represented in the test script. If, in subsequent runs of the test, the button is in a different location in the Open dialog box, WinRunner is still able to find it.



In version 1, the Open button is above the Cancel button.

In version 2, the Open button is below the Cancel button.



-  **Books Online**
-  **Find**
-  **Find Again**
-  **Help**
- 
-  **Top of Chapter**
-  **Back**

Use Context Sensitive mode to test your application by operating on its user interface. For example, WinRunner can perform GUI operations (such as button clicks and menu or list selections), and then check the outcome by observing the state of different GUI objects (the state of a check box, the contents of a text box, the selected item in a list, etc.).

Remember that Context Sensitive tests work in conjunction with the GUI map and GUI map files. We strongly recommend that you read the “Understanding the GUI Map” section of this guide before you start recording.

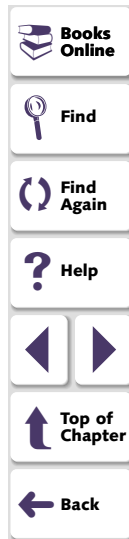
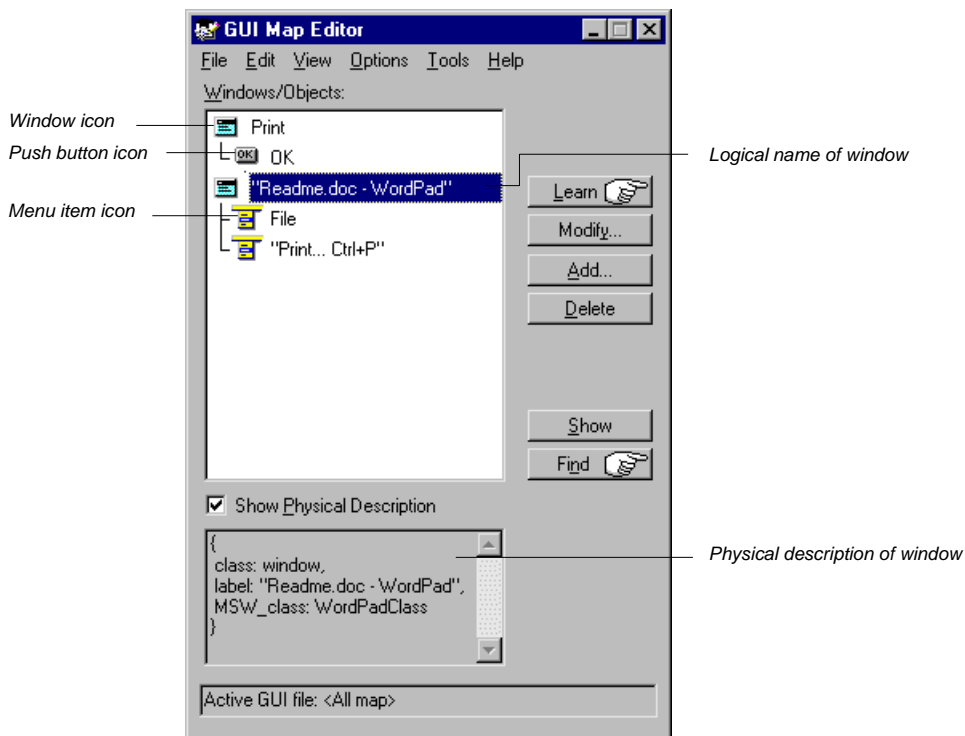
The following example illustrates the connection between the test script and the GUI map. It also demonstrates the connection between the logical name and the physical description. Assume that you record a test in which you print a readme file by choosing the Print command on the File menu to open the Print dialog box, and then clicking the OK button. The test script might look like this:

```
# Activate the Readme.doc - WordPad window.  
win_activate ("Readme.doc - WordPad");  
  
# Direct the Readme.doc - WordPad window to receive input.  
set_window ("Readme.doc - WordPad", 10);  
  
# Choose File > Print.  
menu_select_item ("File;Print... Ctrl+P");  
  
# Direct the Print window to receive input.  
set_window ("Print", 10);  
  
# Click the OK button.  
button_press ("OK");
```

WinRunner learns the actual description—the list of properties and their values—for each object involved and writes this description in the GUI map.



When you open the GUI map and highlight an object, you can view the physical description. In the following example, the Readme.doc window is highlighted in the GUI map:



WinRunner writes the following descriptions for the other window and objects in the GUI map:

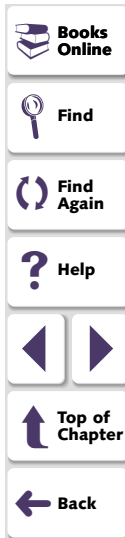
File menu: {class:menu_item, label:File, parent:None}

Print command: {class: menu_item, label: "Print... Ctrl+P", parent: File}

Print window: {class>window, label:Print}

OK button: {class:push_button, label:OK}

(To see these descriptions, you would highlight the windows or objects in the GUI map, and the physical description appears below.) WinRunner also assigns a logical name to each object. As WinRunner runs the test, it reads the logical name of each object in the test script and refers to its physical description in the GUI map. WinRunner then uses this description to find the object in the application being tested.



Solving Common Context Sensitive Recording Problems

This section discusses common problems that can occur while creating Context Sensitive tests.

WinRunner Does Not Record the Appropriate TSL Statements for Your Object

You record on an object, but WinRunner does not record the appropriate TSL statements for the object class. Instead, WinRunner records **obj_mouse** statements. This occurs when WinRunner does not recognize the class to which your object belongs, and therefore it assigns it to the generic “object” class. There are several possible causes and solutions:

Possible Causes	Possible Solutions
Add-in support for the object is not loaded.	You must install and load add-in support for the required object. For example, for HTML objects, you must load the WebTest add-in. For information on loading add-in support, see Loading WinRunner Add-Ins on page 55.



Possible Causes	Possible Solutions
<p>The object is a custom class object.</p>	<p>If a custom object is similar to a standard object, you can map the custom class to a standard class, as described in Mapping a Custom Object to a Standard Class on page 183.</p>
	<p>You can add a custom GUI object class. For more information on creating custom GUI object classes and checking custom objects, refer to the <i>WinRunner Customization Guide</i>. You can also create GUI checks for custom objects. For information on checking GUI objects, see Chapter 5, Working in the Global GUI Map File Mode.</p>
	<p>You can create custom record and execution functions. If your object changes, you can modify your functions instead of updating all your test scripts. For more information on creating custom record and execution functions, refer to the <i>WinRunner Customization Guide</i>.</p>



WinRunner Cannot Read Text from HTML Pages in Your Application

There are several possible causes and solutions:

Possible Causes	Possible Solutions
The WebTest add-in is not loaded.	You must install and load add-in support for Web objects. For information on loading add-in support, see Loading WinRunner Add-Ins on page 55.
WinRunner does not identify the text as originating in an HTML frame or table.	Use the Create > Get Text > From Selection (Web only) command to retrieve text from an HTML page. For a frame, WinRunner inserts a web_frame_get_text statement. For any other GUI object class, WinRunner inserts a web_obj_get_text statement.
	Use the Create > Get Text > Web Text Checkpoint command to check whether a specified text string exists in an HTML page. For a frame, WinRunner inserts a web_frame_text_exists statement. For any other GUI object class, WinRunner inserts a web_obj_text_exists statement.

For more information, see Chapter 14, [Checking Web Pages](#), or the *TSL Online Reference*.

For more information on solving Context Sensitive testing problems, refer to WinRunner context-sensitive help.

Books Online

Find

Find Again

Help

Top of Chapter

Back

Analog Recording

Analog mode records keyboard input, mouse clicks, and the exact path traveled by your mouse. For example, if you choose the Open command from the File menu in your application, WinRunner records the movements of the mouse pointer on the screen. When *WinRunner* executes the test, the mouse pointer retraces the coordinates.

In your test script, the menu selection described above might look like this:

```
# mouse track
move_locator_track (1);

# left mouse button press
mtype ("<T110><kLeft>-");

# mouse track
move_locator_track (2);

# left mouse button release
mtype ("<kLeft>+");
```

Use Analog mode when exact mouse movements are an integral part of the test, such as in a drawing application. Note that you can switch to and from Analog mode during a Context Sensitive recording session.



Note: for XRunner users: You cannot run test scripts in WinRunner that were recorded in XRunner in Analog mode. The portions of XRunner test scripts recorded in Analog mode must be rerecorded in WinRunner before running them in WinRunner. For information on configuring GUI maps created in XRunner for WinRunner, see Chapter 9, [Configuring the GUI Map](#). For information on using GUI checkpoints created in XRunner in WinRunner test scripts, see Chapter 12, [Checking GUI Objects](#). For information on using bitmap checkpoints created in XRunner in WinRunner test scripts, see Chapter 18, [Checking Bitmaps](#).



Checkpoints

Checkpoints allow you to compare the current behavior of the application being tested to its behavior in an earlier version.

You can add four types of checkpoints to your test scripts:

- GUI checkpoints verify information about GUI objects. For example, you can check that a button is enabled or see which item is selected in a list. See Chapter 12, [Checking GUI Objects](#), for more information.
- Bitmap checkpoints take a “snapshot” of a window or area of your application and compare this to an image captured in an earlier version. See Chapter 18, [Checking Bitmaps](#), for more information.
- Text checkpoints read text in GUI objects and in bitmaps and enable you to verify their contents. See Chapter 19, [Checking Text](#), for more information.
- Database checkpoints check the contents and the number of rows and columns of a result set, which is based on a query you create on your database. See Chapter 17, [Checking Databases](#), for more information.



Data-Driven Tests

When you test your application, you may want to check how it performs the same operations with multiple sets of data. You can create a *data-driven* test with a loop that runs ten times: each time the loop runs, it is driven by a different set of data. In order for WinRunner to use data to drive the test, you must link the data to the test script which it drives. This is called *parameterizing* your test. The data is stored in a *data table*. You can perform these operations manually, or you can use the DataDriver Wizard to parameterize your test and store the data in a data table. For additional information, see Chapter 20, [Creating Data-Driven Tests](#).



Synchronization Points

Synchronization points enable you to solve anticipated timing problems between the test and your application. For example, if you create a test that opens a database application, you can add a synchronization point that causes the test to wait until the database records are loaded on the screen.

For Analog testing, you can also use a synchronization point to ensure that WinRunner repositions a window at a specific location. When you run a test, the mouse cursor travels along exact coordinates. Repositioning the window enables the mouse pointer to make contact with the correct elements in the window. See Chapter 21, [Synchronizing the Test Run](#), for more information.



Planning a Test

Plan a test carefully before you begin recording or programming. Following are some points to consider:

- Determine the functionality you are about to test. It is better to design short, specialized tests that check specific functions of the application, than long tests that perform multiple tasks.
- Decide on the types of checkpoints and synchronization points you want to use in the test.
- If you plan to use recording, decide which parts of your test should use the Analog recording mode and which parts should use the Context Sensitive mode.
- Determine the types of programming elements (such as loops, arrays, and user-defined functions) that you want to add to the recorded test script.



Documenting Test Information

Before creating a test, you can document information about the test in the General and Description tabs of the Test Properties dialog box. You can enter the name of the test author, the type of functionality tested, a detailed description of the test, and a reference to the relevant functional specifications document.

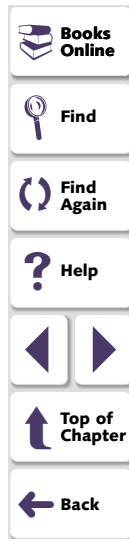
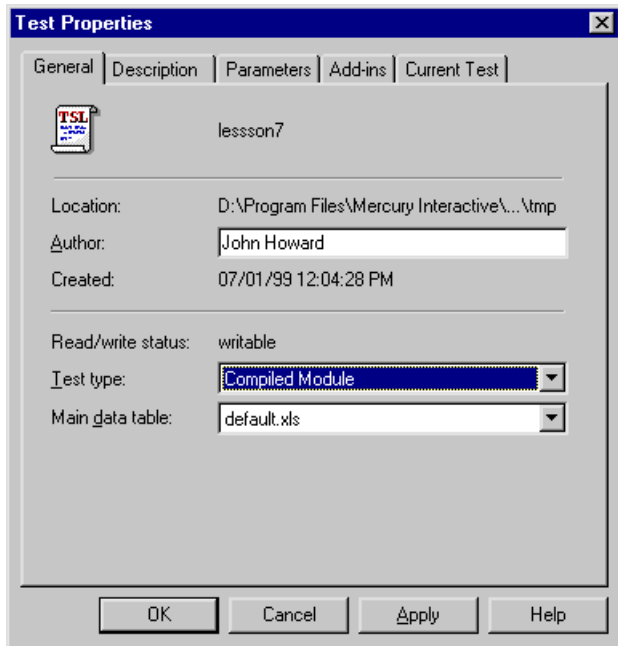
You can also use the Test Properties dialog box to define which add-ins to load for the test, assign the main data table for a test, define parameters for a test, designate a test as a compiled module, and to review current information about the test. These functions are described in this chapter and chapters 1, 1, 1, and 1 respectively.

To document test information:


- 1 Choose **File > Test Properties** to open the Test Properties dialog box.





2 Click the **General** tab.

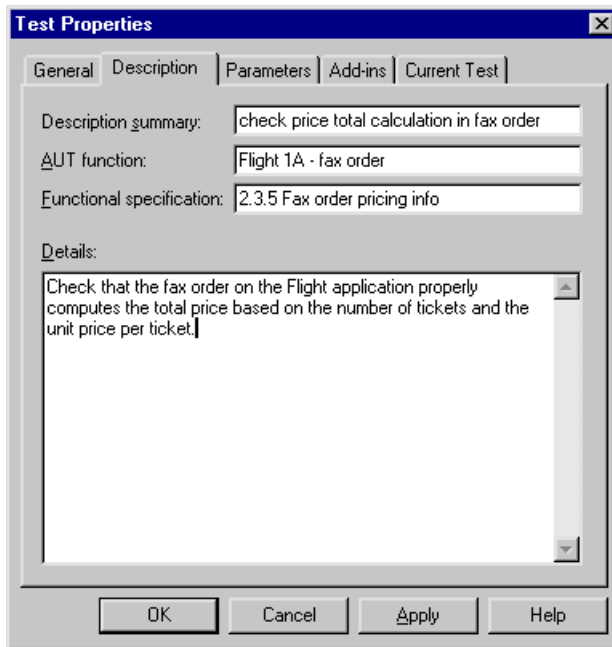


This tab displays the following information:

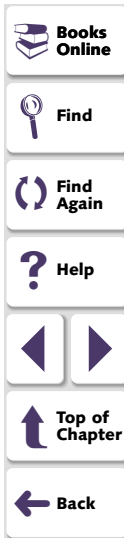
Option	Description
	Displays the name of the test.
Location	Displays the test's location within the TestDirector tree if the test is stored in TestDirector. Otherwise, this field displays the test's location within the file system.
Author	Displays the test author's name.
Created	Displays the date and time that the test was created.
Read/write status	Indicates whether the test is read-only (either the test directory or the script is marked as read only in the file system) or writable. If the test is read-only, all editable property fields in the Test Properties dialog box are disabled.
Test type	Indicates whether the test is a Main Test or a Compiled Module. For more information about compiled modules, see Creating a Compiled Module on page 796.
Main data table	Displays the main data table for the test. For more information, see Assigning the Main Data Table for a Test on page 637.

 **Books Online**
 **Find**
 **Find Again**
 **Help**

 **Top of Chapter**
 **Back**

- 3 Enter your name in the **Author** field.
- 4 Click the **Description** tab.

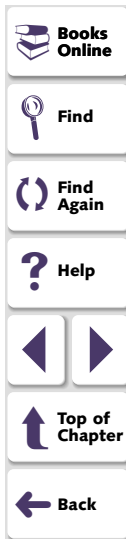
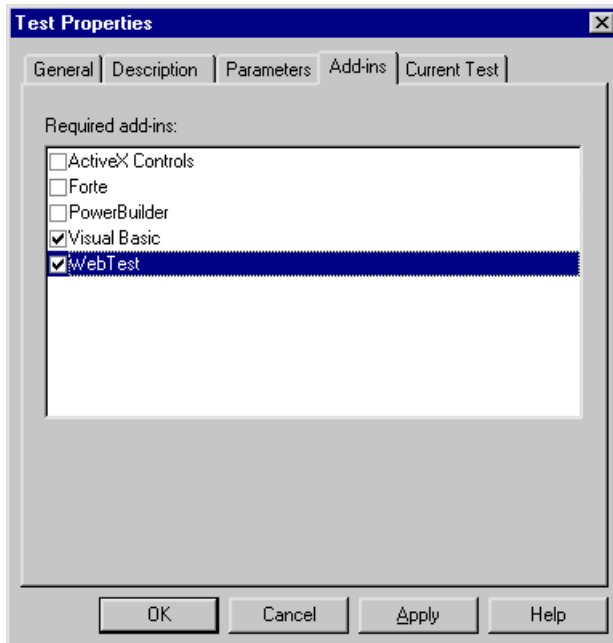


- 5 Add information about the test including a short summary, description of the application function(s) you are testing, reference to the functional specifications for the application and a detailed description of the test.
- 6 Click **OK** to save the test information and close the dialog box.



Associating Add-ins with a Test

You can indicate the WinRunner add-ins that are required for a test by selecting them in the Add-ins tab of the Test Properties dialog box.



The Add-ins tab contains one check box for each add-in you currently have installed. This information reminds you or others which add-ins to load in order to successfully run this test.

To associate add-ins with a test:

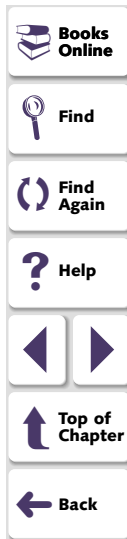
- 1 Choose **File > Test Properties** to open the Test Properties dialog box.
- 2 Click the **Add-ins** tab.
- 3 Select the add-in(s) that are required for this test.

Running Tests with Add-ins from TestDirector

In addition to providing information for people running your test from WinRunner, the Add-ins tab instructs TestDirector to load the selected Add-ins when it runs WinRunner tests.

When you run a test from TestDirector, TestDirector will load the add-ins selected in the Add-ins tab for the test. If WinRunner is already open, but does not have the required add-ins loaded, TestDirector closes and re-opens WinRunner with the proper add-ins. If one or more of the required add-ins are not installed, TestDirector displays a “Cannot open test.” error message.

For more information about running WinRunner tests from TestDirector, refer to the *TestDirector User’s Guide*.



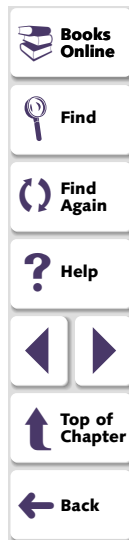
Recording a Test

Consider the following guidelines when recording a test:

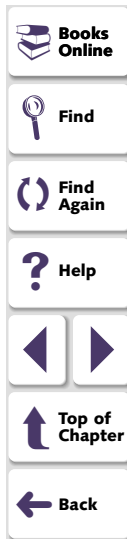
- Before you start to record, close all applications not required for the test.
- Use an **invoke_application** statement to open the application you are testing. For information on working with TSL functions, see Chapter 24, **Enhancing Your Test Scripts with Programming**. For more information about the **invoke_application** function and an example of usage, refer to the *TSL Online Reference*.
- Before you record on objects within a window, click the title bar of the window to record a **win_activate** statement. This activates the window. For information on working with TSL functions, see Chapter 24, **Enhancing Your Test Scripts with Programming**. For more information about the **win_activate** function and an example of usage, refer to the *TSL Online Reference*.
- Create your test so that it “cleans up” after itself. When the test is completed, the environment should resemble the pre-test conditions. (For example, if the test started with the application window closed, then the test should also close the window and not minimize it to an icon.)



- When you record a test, you can minimize WinRunner and turn the User toolbar into a floating toolbar. This enables you to record on a full screen of your application, while maintaining access to important menu commands. To minimize WinRunner and work from the floating User toolbar: undock the User toolbar from the WinRunner window, start recording, and minimize WinRunner. The User toolbar stays on top of all other applications. Note that you can customize the User toolbar with the menu commands you use most frequently when creating a test. For additional information, see Chapter 38, **Customizing WinRunner's User Interface**.
- When recording, use mouse clicks rather than the Tab key to move within a window in the application being tested.
- When recording in Analog mode, use softkeys rather than the WinRunner menus or toolbars to insert checkpoints.
- When recording in Analog mode, avoid typing ahead. For example, when you want to open a window, wait until it is completely redrawn before continuing. In addition, avoid holding down a mouse button when this results in a repeated action (for example, using the scroll bar to move the screen display). Doing so can initiate a time-sensitive operation that cannot be precisely recreated. Instead, use discrete, multiple clicks to achieve the same results.



- WinRunner supports recording and running tests on applications with RTL-style window properties. RTL-style window properties include right-to-left menu order and typing, a left scroll bar, and attached text at the top right corner of GUI objects. WinRunner supports pressing the CTRL and SHIFT keys together or the ALT and SHIFT keys together to change language and direction when typing. The default setting for attached text supports recording and running tests on applications with RTL-style windows. For more information on attached text options, see Chapter 40, [Setting Global Testing Options](#), and Chapter 41, [Setting Testing Options from a Test Script](#).
- WinRunner supports recording and running tests on applications with drop-down and menu-like toolbars, which are used in Microsoft Internet Explorer 4.0 and Windows 98. Although menu-like toolbars may look exactly like menus, they are of a different class, and WinRunner records them differently. When an item is selected from a drop-down or a menu-like toolbar, WinRunner records a **toolbar_select_item** statement. (This function resembles the **menu_select_item** function, which records selecting menu commands on menus.) For more information, refer to the *TSL Online Reference*.
- If the test folder or the test script file is marked as read-only in the file system, you cannot perform any WinRunner operations which change the test script or the expected results folder.



To record a test:

1 Choose either **Create > Record–Context Sensitive** or **Create > Record–Analog** or click the **Record–Context Sensitive** button.

2 Perform the test as planned using the keyboard and mouse.

Insert checkpoints and synchronization points as needed by choosing the appropriate commands from the User toolbar or from the Create menu: GUI Checkpoint, Bitmap Checkpoint, Database Checkpoint, or Synchronization Point.



3 To stop recording, click **Create > Stop Recording** or click **Stop**.



Activating Test Creation Commands Using Softkeys

You can activate several of WinRunner’s commands using softkeys. WinRunner reads input from softkeys even when the WinRunner window is not the active window on your screen, or when it is minimized. Note that you can configure the softkeys. For more information, see Chapter 38, [Customizing WinRunner’s User Interface](#).

The following table lists the default softkey configurations for test creation:

Command	Default Softkey Combination	Function
RECORD	F2	Starts test recording. While recording, this softkey toggles between the Context Sensitive and Analog modes.
CHECK GUI FOR SINGLE PROPERTY	Alt Right + F12	Checks a single property of a GUI object.
CHECK GUI FOR OBJECT/WINDOW	Ctrl Right + F12	Creates a GUI checkpoint for an object or a window.
CHECK GUI FOR MULTIPLE OBJECTS	F12	Opens the Create GUI Checkpoint dialog box.
CHECK BITMAP OF OBJECT/WINDOW	Ctrl Left + F12	Captures an object or a window bitmap.

Books Online

Find

Find Again

Help

Top of Chapter

Back

Command	Default Softkey Combination	Function
CHECK BITMAP OF SCREEN AREA	Alt Left + F12	Captures an area bitmap.
CHECK DATABASE (DEFAULT)	Ctrl Right + F9	Creates a check on the entire contents of a database.
CHECK DATABASE (CUSTOM)	Alt Right + F9	Checks the number of columns, rows and specified information of a database.
SYNCHRONIZE OBJECT/WINDOW PROPERTY	Ctrl Right + F10	Instructs WinRunner to wait for a property of an object or a window to have an expected value.
SYNCHRONIZE BITMAP OF OBJECT/WINDOW	Ctrl Left + F11	Instructs WinRunner to wait for a specific object or window bitmap to appear.
SYNCHRONIZE BITMAP OF SCREEN AREA	Alt Left + F11	Instructs WinRunner to wait for a specific area bitmap to appear.
GET TEXT FROM OBJECT/WINDOW	F11	Captures text in an object or a window.
GET TEXT FROM WINDOW AREA	Alt Right + F11	Captures text in a specified area and adds an obj_get_text statement to the test script.



Command	Default Softkey Combination	Function
GET TEXT FROM SCREEN AREA	Ctrl Right + F11	Captures text in a specified area and adds a get_text statement to the test script.
INSERT FUNCTION FOR OBJECT/WINDOW	F8	Inserts a TSL function for a GUI object.
INSERT FUNCTION FROM FUNCTION GENERATOR	F7	Opens the Function Generator dialog box.
STOP	Ctrl Left + F3	Stops test recording.
MOVE LOCATOR	Alt Left + F6	Records a move_locator_abs statement with the current position (in pixels) of the screen pointer.



Programming a Test

You can use programming to create an entire test script, or to enhance your recorded tests. WinRunner contains a visual programming tool, the Function Generator, which provides a quick and error-free way to add TSL functions to your test scripts. To generate a function call, simply point to an object in your application or select a function from a list. For more information, see Chapter 25, [Generating Functions](#).

You can also add general purpose programming features such as variables, control-flow statements, arrays, and user-defined functions to your test scripts. You may type these elements directly into your test scripts. For more information on creating test scripts with programming, see the “Programming with TSL” section of this guide.



Editing a Test

To make changes to a test script, use the commands in the Edit menu or the corresponding toolbar buttons. The following commands are available:

Edit Command	Description
Undo	Cancels the last editing operation.
Redo	Reverses the last Undo operation.
Cut	Deletes the selected text from the test script and places it onto the Clipboard.
Copy	Makes a copy of the selected text and places it onto the Clipboard.
Paste	Pastes the text on the Clipboard at the insertion point.
Delete	Deletes the selected text.
Select All	Selects all the text in the active test window.
Comment	Converts the selected line(s) of text to a comment by adding a '#' sign at the beginning of the line. The commented text is also converted to italicized, red text.
Uncomment	Converts the selected, commented line(s) of text into executable code by removing the '#' sign from the beginning of the line. The text is also converted to plain, black text.



Edit Command	Description
Increase Indent	Moves the selected line(s) of text one tab stop to the right. Note that you can change the tab stop size in the Editor Options dialog box. For more information, see page 1014.
Decrease Indent	Moves the selected line(s) of text one tab stop to the left. Note that you can change the tab stop size in the Editor Options dialog box. For more information, see page 1014.
Find	Finds the specified characters in the active test window.
Find Next	Finds the next occurrence of the specified characters.
Find Previous	Finds the previous occurrence of the specified characters.
Replace	Finds and replaces the specified characters with new characters.
Go To	Moves the insertion point to the specified line in the test script.



Managing Test Files

You use the commands in the File menu to create, open, save, print, and close test files.

Note: When you open a file that is not read-only, the file is locked, so that it cannot be opened by anyone else.

Creating a New Test



Choose **File > New** or click **New**. A new window opens, titled *Noname*, and followed by a numeral (for example, *Noname7*). You are ready to start recording or programming a test script.

Saving a Test

The following options are available for saving tests:

- Save changes to a previously saved test by choosing **File > Save** or by clicking **Save**.
- Save two or more open tests simultaneously by choosing **File > Save All**.
- Save a new test script by choosing **File > Save As** or by clicking **Save**.



To save a test to the file system:



- 1 On the **File** menu, choose a **Save** command or click **Save**, as described above. The Save Test dialog box opens.



- 2 In the **Save in** box, click the location where you want to save the test.
- 3 Enter the name of the test in the **File name** box.
- 4 Click **Save** to save the test.

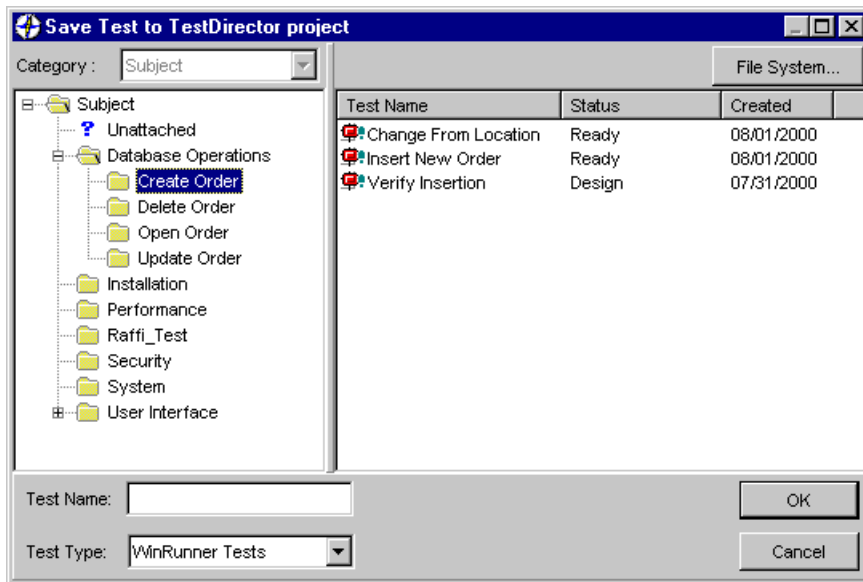


To save a test to a TestDirector project:

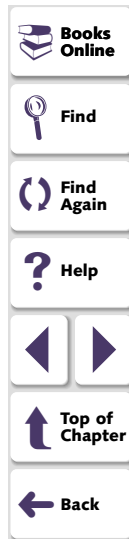
Note: You can only save a test to a TestDirector database if you are working with TestDirector. For additional information, see Chapter 44, [Managing the Testing Process](#).



- 1 On the **File** menu, choose a **Save** command or click **Save**, as described above. If you are connected to a TestDirector project, the Save Test to TestDirector Project dialog box opens.



Note that the **Save Test to TestDirector Project** dialog box opens only when WinRunner is connected to a TestDirector project.



- 2 Select the relevant subject in the test plan tree. To expand the tree and view a sublevel, double-click a closed folder. To collapse a sublevel, double-click an open folder.
- 3 In the **Test Name** text box, enter a name for the test. Use a descriptive name that will help you easily identify the test.
- 4 Click **OK** to save the test and close the dialog box.

Note: You can click the File System button to open the Save Test dialog box and save a test in the file system.

The next time you start TestDirector, the new test will appear in the TestDirector's test plan tree. Refer to the *TestDirector User's Guide* for more information.

For more information on saving tests to a TestDirector project, see Chapter 44, [Managing the Testing Process](#).



Opening an Existing Test

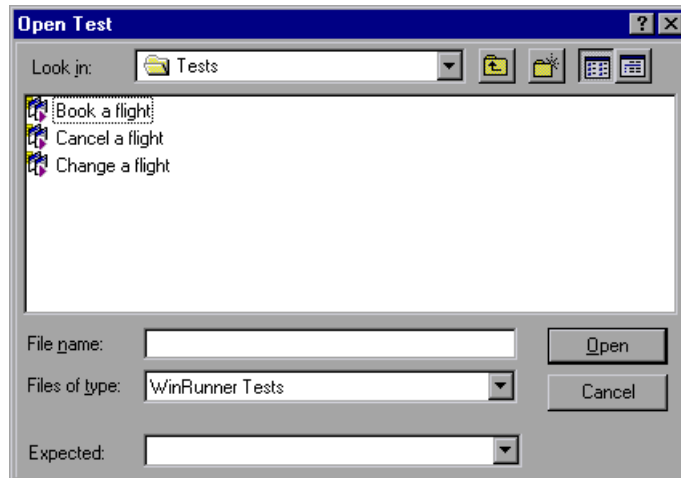
To open an existing test, choose **File > Open** or click **Open**.

Note: No more than 100 tests may be open at the same time.

To open a test from the file system:



- 1 Choose **File > Open** or click **Open** to open the Open Test dialog box.



- 2 In the **Look in** box, click the location of the test you want to open.
- 3 In the **File name** box, click the name of the test to open.
- 4 If the test has more than one set of expected results, click the folder you want to use on the **Expected** list. The default folder is called *exp*.
- 5 Click **Open** to open the test.

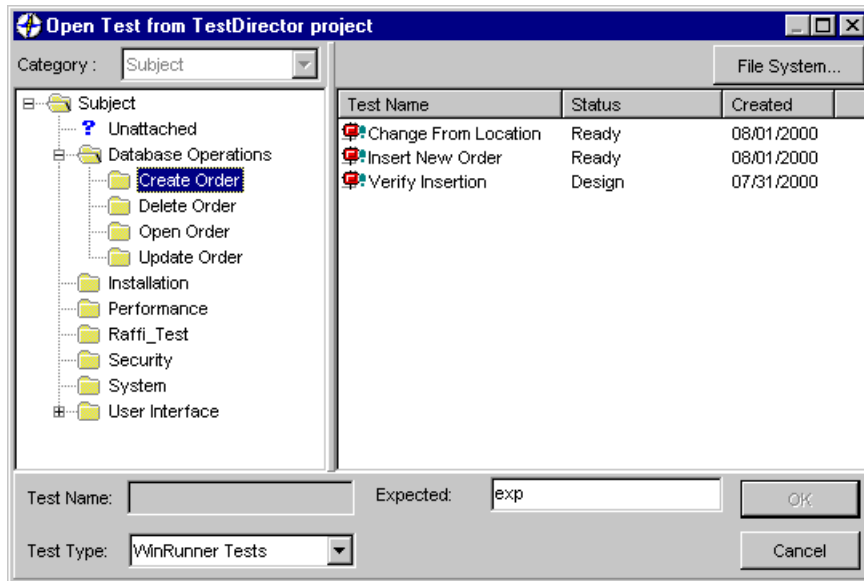
To open a test from a TestDirector project:

Note: You can only open a test from a TestDirector database if you are working with TestDirector. For additional information, see Chapter 44, [Managing the Testing Process](#).





- 1 Choose **File > Open** or click **Open**. If you are connected to a TestDirector project, the Open Test from TestDirector Project dialog box opens and displays the test plan tree.



Note that the **Open Test from TestDirector Project** dialog box opens only when WinRunner is connected to a TestDirector project.



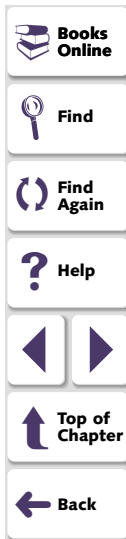
- 2 Click the relevant subject in the test plan tree. To expand the tree and view sublevels, double-click closed folders. To collapse the tree, double-click open folders.

Note that when you select a subject, the tests that belong to the subject appear in the Test Name list.

- 3 Select a test in the **Test Name** list. The test appears in the read-only **Test Name** box.
- 4 If desired, enter an expected results folder for the test in the **Expected** box. (Otherwise, the default folder is used.)
- 5 Click **OK** to open the test. The test opens in a window in WinRunner. Note that the test window's title bar shows the full subject path.

Note: You can click the File System button to open the Open Test dialog box and open a test from the file system.

For more information on opening tests in a TestDirector project, see Chapter 44, [Managing the Testing Process](#).



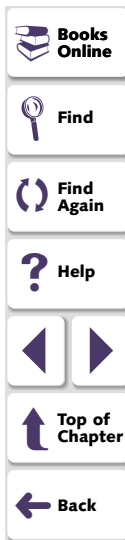
Printing a Test

To print a test script, choose **File > Print** to open the Print dialog box.

- Choose the print options you want.
- Click **OK** to print.

Closing a Test

- To close the current test, choose **File > Close**.
- To simultaneously close two or more open tests, choose **Window > Close All**.



Creating Tests

Checking GUI Objects

By adding GUI checkpoints to your test scripts, you can compare the behavior of GUI objects in different versions of your application.

This chapter describes:

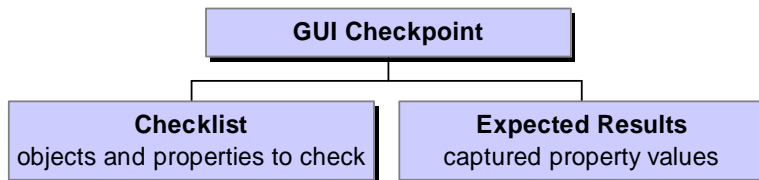
- **Checking a Single Property Value**
- **Checking a Single Object**
- **Checking Two or More Objects in a Window**
- **Checking All Objects in a Window**
- **Understanding GUI Checkpoint Statements**
- **Using an Existing GUI Checklist in a GUI Checkpoint**
- **Modifying GUI Checklists**
- **Understanding the GUI Checkpoint Dialog Boxes**
- **Property Checks and Default Checks**
- **Specifying Arguments for Property Checks**
- **Editing the Expected Value of a Property**
- **Modifying the Expected Results of a GUI Checkpoint**



About Checking GUI Objects

You can use GUI checkpoints in your test scripts to help you examine GUI objects in your application and detect defects. For example, you can check that when a specific dialog box opens, the OK, Cancel, and Help buttons are enabled.

You point to GUI objects and choose the properties you want WinRunner to check. You can check the default properties recommended by WinRunner, or you can specify which properties to check. Information about the GUI objects and the selected properties is saved in a *checklist*. WinRunner then captures the current property values for the GUI objects and saves this information as *expected results*. A GUI *checkpoint* is automatically inserted into the test script. This checkpoint appears in your test script as an **obj_check_gui** or a **win_check_gui** statement.



When you run the test, the GUI checkpoint compares the current state of the GUI objects in the application being tested to the expected results. If the expected results and the current results do not match, the GUI checkpoint fails. The results of the checkpoint can be viewed in the Test Results window. For more information, see Chapter 32, [Analyzing Test Results](#).

Note that any GUI object you check that is not already in the GUI map is added automatically to the temporary GUI map file. See Chapter 3, [Understanding How WinRunner Identifies GUI Objects](#), for additional information.

You can use a regular expression to create a GUI checkpoint on an edit object or a static text object with a variable name. For additional information, see Chapter 23, [Using Regular Expressions](#).

WinRunner provides special built-in support for ActiveX control, Visual Basic, and PowerBuilder application development environments. When you load the appropriate add-in support, WinRunner recognizes these controls, and treats them as it treats standard GUI objects. You can create GUI checkpoints for these objects as you would create them for standard GUI objects. WinRunner provides additional special built-in support for checking ActiveX and Visual Basic sub-objects. For additional information, see Chapter 13, [Working with ActiveX and Visual Basic Controls](#). For information on WinRunner support for PowerBuilder, see Chapter 15, [Checking PowerBuilder Applications](#).



You can also create GUI checkpoints that check the contents and properties of tables. For information, see Chapter 16, [Checking Table Contents](#).

Note for XRunner users: You cannot use GUI checkpoints created in XRunner when you run test scripts in WinRunner. You must recreate the GUI checkpoints in WinRunner.

For information on using GUI maps created in XRunner, see Chapter 9, [Configuring the GUI Map](#). For information on using test scripts recorded in XRunner in Analog mode, see Chapter 11, [Creating Tests](#). For information on using bitmap checkpoints created in XRunner, see Chapter 18, [Checking Bitmaps](#).



Checking a Single Property Value

You can check a single property of a GUI object. For example, you can check whether a button is enabled or disabled or whether an item in a list is selected. To create a GUI checkpoint for a property value, use the Check Property dialog box to add one of the following functions to the test script:

button_check_info	scroll_check_info
edit_check_info	static_check_info
list_check_info	win_check_info
obj_check_info	

For information about working with these functions, refer to the *TSL Online Reference*.

To create a GUI checkpoint for a property value:

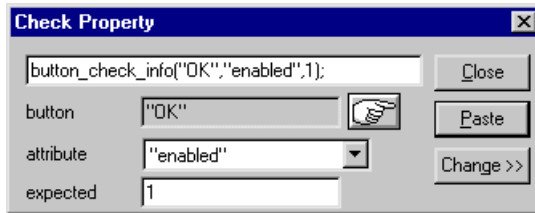
- 1 Choose **Create > GUI Checkpoint > For Single Property**. If you are recording in Analog mode, press the CHECK GUI FOR SINGLE PROPERTY softkey in order to avoid extraneous mouse movements.

The WinRunner window is minimized, the mouse pointer becomes a pointing hand, and a help window opens on the screen.



2 Click an object.

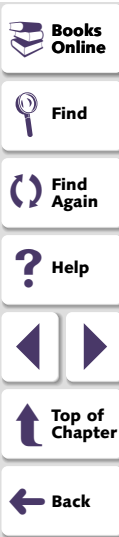
The Check Property dialog box opens and shows the default function for the selected object. WinRunner automatically assigns argument values to the function.



3 You can modify the arguments for the property check.

- To modify assigned argument values, choose a value from the **Attribute** list. The expected value is updated in the Expected text box.
- To choose a different object, click the pointing hand and then click an object in your application. WinRunner automatically assigns new argument values to the function.

Note that if you click an object that is not compatible with the selected function, a message states that the current function cannot be applied to the selected object. Click OK to clear the message, and then click Close to close the Check Property dialog box. Repeat steps 1 and 2.



- 4 Click **Paste** to paste the statement into your test script.

The function is pasted into the script at the insertion point. The Check Property dialog box closes.

Note: To change to another function for the object, click Change. The Function Generator dialog box opens and displays a list of functions. For more information on using the Function Generator, see Chapter 25, [Generating Functions](#).



Checking a Single Object

You can create a GUI checkpoint to check a single object in the application being tested. You can either check the object with its default properties or you can specify which properties to check.

Each standard object class has a set of default checks. For a complete list of standard objects, the properties you can check, and default checks, see [Property Checks and Default Checks](#) on page 315.

Note: You can set the default checks for an object using the `gui_ver_set_default_checks` function. For more information, refer to the *TSL Online Reference* and the *WinRunner Customization Guide*.



Creating a GUI Checkpoint using the Default Checks

You can create a GUI checkpoint that performs a default check on the property recommended by WinRunner. For example, if you create a GUI checkpoint that checks a push button, the default check verifies that the push button is enabled.

To create a GUI checkpoint using default checks:



- 1 Choose **Create > GUI Checkpoint > For Object/Window**, or click the **GUI Checkpoint for Object/Window** button on the User toolbar. If you are recording in Analog mode, press the CHECK GUI FOR OBJECT/WINDOW softkey in order to avoid extraneous mouse movements. Note that you can press the CHECK GUI FOR OBJECT/WINDOW softkey in Context Sensitive mode as well.

The WinRunner window is minimized, the mouse pointer becomes a pointing hand, and a help window opens on the screen.

- 2 Click an object.
- 3 WinRunner captures the current value of the property of the GUI object being checked and stores it in the test's expected results folder. The WinRunner window is restored and a GUI checkpoint is inserted in the test script as an **obj_check_gui** statement. For more information, see [Understanding GUI Checkpoint Statements](#) on page 284.



Creating a GUI Checkpoint by Specifying which Properties to Check

You can specify which properties to check for an object. For example, if you create a checkpoint that checks a push button, you can choose to verify that it is in focus, instead of enabled.

To create a GUI checkpoint by specifying which properties to check:

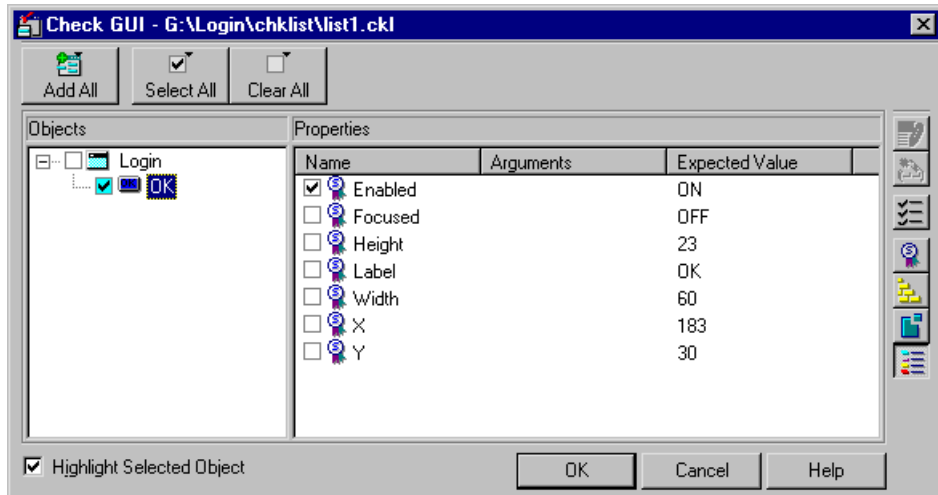


- 1 Choose **Create > GUI Checkpoint > For Object/Window**, or click the **GUI Checkpoint for Object/Window** button on the User toolbar. If you are recording in Analog mode, press the CHECK GUI FOR OBJECT/WINDOW softkey in order to avoid extraneous mouse movements. Note that you can press the CHECK GUI FOR OBJECT/WINDOW softkey in Context Sensitive mode as well.

The WinRunner window is minimized, the mouse pointer becomes a pointing hand, and a help window opens on the screen.



- 2 Double-click the object or window. The Check GUI dialog box opens.



- 3 Click an object name in the **Objects** pane. The **Properties** pane lists all the properties for the selected object.
- 4 Select the properties you want to check.



- To edit the expected value of a property, first select it. Next, either click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. For more information, see [Editing the Expected Value of a Property](#) on page 335.





- To add a check in which you specify arguments, first select the property for which you want to specify arguments. Next, either click the **Specify Arguments** button, or double-click in the **Arguments** column. Note that if an ellipsis (three dots) appears in the Arguments column, then you must specify arguments for a check on this property. (You do not need to specify arguments if a default argument is specified.) When checking standard objects, you only specify arguments for certain properties of edit and static text objects. You also specify arguments for checks on certain properties of nonstandard objects. For more information, see [Specifying Arguments for Property Checks](#) on page 324.
- To change the viewing options for the properties of an object, use the Show Properties buttons. For more information, see [The Check GUI Dialog Box](#) on page 302.

5 Click **OK** to close the Check GUI dialog box.

WinRunner captures the GUI information and stores it in the test's expected results folder. The WinRunner window is restored and a GUI checkpoint is inserted in the test script as an **obj_check_gui** or a **win_check_gui** statement. For more information, see [Understanding GUI Checkpoint Statements](#) on page 284.

For more information on the Check GUI dialog box, see [Understanding the GUI Checkpoint Dialog Boxes](#) on page 299.



Checking Two or More Objects in a Window

You can use a GUI checkpoint to check two or more objects in a window. For a complete list of standard objects and the properties you can check, see [Property Checks and Default Checks](#) on page 315.

To create a GUI checkpoint for two or more objects:



- 1 Choose **Create > GUI Checkpoint > For Multiple Objects** or click the **GUI Checkpoint for Multiple Objects** button on the User toolbar. If you are recording in Analog mode, press the CHECK GUI FOR MULTIPLE OBJECTS softkey in order to avoid extraneous mouse movements. The Create GUI Checkpoint dialog box opens.

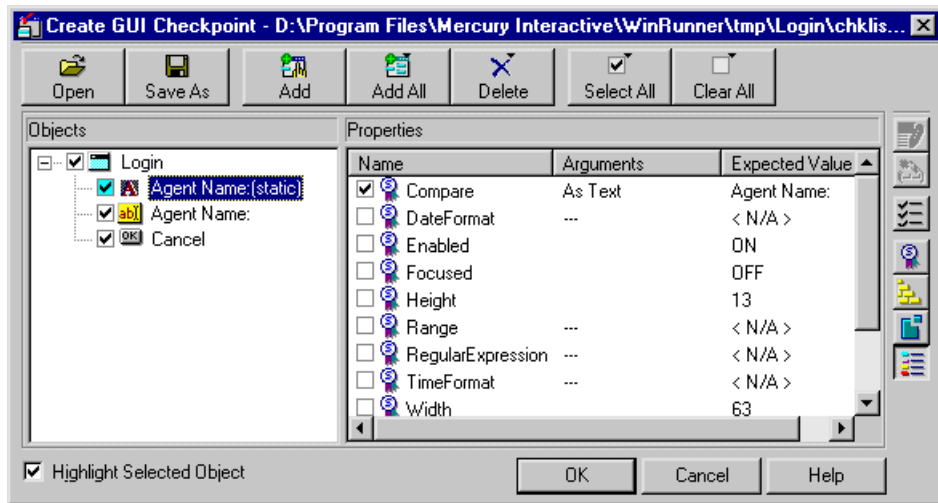


- 2 Click the **Add** button. The mouse pointer becomes a pointing hand and a help window opens.
- 3 To add an object, click it once. If you click a window title bar or menu bar, a help window prompts you to check all the objects in the window. For more information on checking all objects in a window, see [Checking All Objects in a Window](#) on page 280.
- 4 The pointing hand remains active. You can continue to choose objects by repeating step 3 above for each object you want to check.

Note: You cannot insert objects from different windows into a single checkpoint.

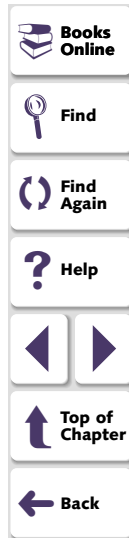


- Click the right mouse button to stop the selection process and to restore the mouse pointer to its original shape. The Create GUI Checkpoint dialog box reopens.



- The Objects pane contains the name of the window and objects included in the GUI checkpoint. To specify which objects to check, click an object name in the **Objects** pane.

The Properties pane lists all the properties of the object. The default properties are selected.





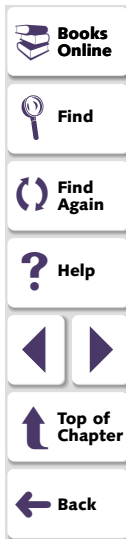
- To edit the expected value of a property, first select it. Next, either click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. For more information, see [Editing the Expected Value of a Property](#) on page 335.



- To add a check in which you specify arguments, first select the property for which you want to specify arguments. Next, either click the **Specify Arguments** button, or double-click in the **Arguments** column. Note that if an ellipsis appears in the Arguments column, then you must specify arguments for a check on this property. (You do not need to specify arguments if a default argument is specified.) When checking standard objects, you only specify arguments for certain properties of edit and static text objects. You also specify arguments for checks on certain properties of nonstandard objects. For more information, see [Specifying Arguments for Property Checks](#) on page 324.
- To change the viewing options for the properties of an object, use the Show Properties buttons. For more information, see [The Create GUI Checkpoint Dialog Box](#) on page 306.

- 7 To save the checklist and close the Create GUI Checkpoint dialog box, click **OK**. WinRunner captures the current property values of the selected GUI objects and stores it in the expected results folder. A **win_check_gui** statement is inserted in the test script. For more information, see [Understanding GUI Checkpoint Statements](#) on page 284.

For more information on the Create GUI Checkpoint dialog box, see [Understanding the GUI Checkpoint Dialog Boxes](#) on page 299.



Checking All Objects in a Window

You can create a GUI checkpoint to perform default checks on all GUI objects in a window. Alternatively, you can specify which checks to perform on all GUI objects in a window.

Each standard object class has a set of default checks. For a complete list of standard objects, the properties you can check, and default checks, see [Property Checks and Default Checks](#) on page 315.

Note: You can set the default checks for an object using the `gui_ver_set_default_checks` function. For more information, refer to the *TSL Online Reference* and the *WinRunner Customization Guide*.



Checking All Objects in a Window using Default Checks

You can create a GUI checkpoint that checks the default property of every GUI object in a window.

To create a GUI checkpoint that performs a default check on every GUI object in a window:



- 1 Choose **Create > GUI Checkpoint > For Object/Window**, or click the **GUI Checkpoint for Object/Window** button on the User toolbar. If you are recording in Analog mode, press the CHECK GUI FOR OBJECT/WINDOW softkey in order to avoid extraneous mouse movements. Note that you can press the CHECK GUI FOR OBJECT/WINDOW softkey in Context Sensitive mode as well.

The WinRunner window is minimized, the mouse pointer turns into a pointing hand, and a help window opens.

- 2 Click the title bar or the menu bar of the window you want to check.

The Add All dialog box opens.



- 3 Select **Objects** or **Menus** or both to indicate the types of objects to include in the checklist. When you select only Objects (the default setting), all objects in the window except for menus are included in the checklist. To include menus in the checklist, select Menus.
- 4 Click **OK** to close the dialog box.

WinRunner captures the expected property values of the GUI objects and/or menu items and stores this information in the test's expected results folder. The WinRunner window is restored and a **win_check_gui** statement is inserted in the test script.



Specifying which Checks to Perform on All Objects in a Window

You can use a GUI checkpoint to specify which checks to perform on all GUI objects in a window.

To create a GUI checkpoint in which you specify which checks to perform on all GUI objects in a window:



- 1 Choose **Create > GUI Checkpoint > For Object/Window**, or click the **GUI Checkpoint for Object/Window** button on the User toolbar. If you are recording in Analog mode, press the CHECK GUI FOR OBJECT/WINDOW softkey in order to avoid extraneous mouse movements. Note that you can press the CHECK GUI FOR OBJECT/WINDOW softkey in Context Sensitive mode as well.

The WinRunner window is minimized, the mouse pointer turns into a pointing hand, and a help window opens.

- 2 Double-click the title bar or the menu bar of the window you want to check.

WinRunner generates a new checklist containing all the objects in the window. This may take a few seconds.

The Check GUI dialog box opens.

- 3 Specify which checks to perform, and click **OK** to close the dialog box. For more information, see [The Check GUI Dialog Box](#) on page 302.

WinRunner captures the GUI information and stores it in the test's expected results folder. The WinRunner window is restored and a **win_check_gui** statement is inserted in the test script.



Understanding GUI Checkpoint Statements

A GUI checkpoint for a single object appears in your script as an **obj_check_gui** statement. A GUI checkpoint that checks more than one object in a window appears in your script as a **win_check_gui** statement. Both the **obj_check_gui** and **win_check_gui** statements are always associated with a *checklist* and store expected results in a *expected results file*.

- A *checklist* lists the objects and properties that need to be checked. For an **obj_check_gui** statement, the checklist lists only one object. For a **win_check_gui** statement, a checklist contains a list of all objects to be checked in a window. When you create a GUI checkpoint, you can create a new checklist or use an existing checklist. For information on using an existing checklist, see [Using an Existing GUI Checklist in a GUI Checkpoint](#) on page 287.
- An *expected results file* contains the expected property values for each object in the checklist. These property values are captured when you create a checkpoint, and can later be updated manually or by running the test in Update mode. For more information, see [Running a Test to Update Expected Results](#) on page 849. Each time you run the test, the expected property values are compared to the current property values of the objects.

The **obj_check_gui** function has the following syntax:

```
obj_check_gui ( object, checklist, expected results file, time );
```



The *object* is the logical name of the GUI object. The *checklist* is the name of the checklist defining the objects and properties to check. The *expected results file* is the name of the file that stores the expected property values. The *time* is the interval marking the maximum delay between the previous input event and the capture of the current property values, in seconds. This interval is added to the *timeout_msec* testing option during the test run. For more information on the *timeout_msec* testing option, see Chapter 41, [Setting Testing Options from a Test Script](#).

For example, if you click the OK button in the Login window in the Flight application, the resulting statement might be:

```
obj_check_gui ("OK", "list1.ckl", "gui1", 1);
```

The **win_check_gui** function has the following syntax:

```
win_check_gui ( window, checklist, expected results file, time );
```

The *window* is the logical name of the GUI window. The *checklist* is the name of the checklist defining the objects and properties to check. The *expected results file* is the name of the file that stores the expected property values. The *time* is the interval marking the maximum delay between the previous input event and the capture of the current property values, in seconds. This interval is added to the *timeout_msec* testing option during the test run. For more information on the *timeout_msec* testing option, see Chapter 41, [Setting Testing Options from a Test Script](#).



For example, if you click the title bar of the Login window in the sample Flight application, the resulting statement might be:

```
win_check_gui ("Login", "list1.ckl", "gui1", 1);
```

Note that WinRunner names the first checklist in the test *list1.ckl* and the first expected results file *gui1*. For more information on the **obj_check_gui** and **win_check_gui** functions, refer to the *TSL Online Reference*.



Using an Existing GUI Checklist in a GUI Checkpoint

You can create a GUI checkpoint using an existing GUI checklist. This is useful when you want to use a GUI checklist to create new GUI checkpoints, either in your current test or in a different test. For example, you may want to check the same properties of certain objects at several different points during your test. These object properties may have different expected values, depending on when you check them.

Although you can create a new GUI checklist whenever you create a new GUI checkpoint, it is expedient to “reuse” a GUI checklist in as many checkpoints as possible. Using a single GUI checklist in many GUI checkpoints facilitates the testing process by reducing the time and effort involved in maintaining the GUI checkpoints in your test.

In order for WinRunner to locate the objects to check in your application, you must load the appropriate GUI map file before you run the test.

For information about loading GUI map files, see [Loading the GUI Map File](#) on page 111.

Note: If you want a checklist to be available to more than one test, you must save it in a shared folder. For information on saving a GUI checklist in a shared folder, see [Saving a GUI Checklist in a Shared Folder](#) on page 291.



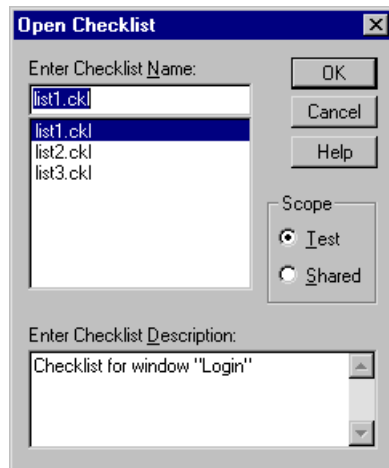
To use an existing GUI checklist in a GUI checkpoint:



- 1 Choose **Create > GUI Checkpoint > For Multiple Objects** or click the **GUI Checkpoint for Multiple Objects** button on the User toolbar.

The Create GUI Checkpoint dialog box opens.

- 2 Click **Open**. The Open Checklist dialog box opens.
- 3 To see checklists in the Shared folder, click **Shared**.

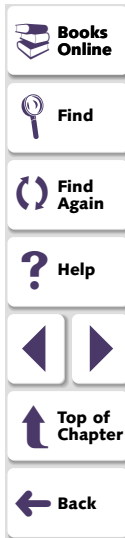


- 4 Select a checklist and click **OK**.

The Open Checklist dialog box closes and the selected list appears in the Create GUI Checkpoint dialog box.

- 5 Open the window in the application being tested that contains the objects shown in the checklist (if it is not already open).
- 6 Click **OK**.

WinRunner captures the current property values and a **win_check_gui** statement is inserted into your test script.



Modifying GUI Checklists

You can make changes to a checklist you created for a GUI checkpoint. Note that a checklist includes only the objects and properties that need to be checked. It does not include the expected results for the values of those properties.

You can:

- make a checklist available to other users by saving it in a shared folder
- edit a checklist

Note: In addition to modifying GUI checklists, you can also modify the expected results of GUI checkpoints. For more information, see [Modifying the Expected Results of a GUI Checkpoint](#) on page 338.



Saving a GUI Checklist in a Shared Folder

By default, checklists for GUI checkpoints are stored in the folder of the current test. You can specify that a checklist be placed in a shared folder to enable wider access, so that you can use a checklist in multiple tests.

The default folder in which WinRunner stores your shared checklists is *WinRunner installation folder/chklist*. To choose a different folder, you can use the Shared Checklists box in the Folders tab of the General Options dialog box. For more information, see Chapter 40, [Setting Global Testing Options](#).

To save a GUI checklist in a shared folder:

- 1 Choose **Create > Edit GUI Checklist**.

The Open Checklist dialog box opens. Note that GUI checklists have the .ckl extension, while database checklists have the .cdl extension. For information on database checklists, see [Modifying a Standard Database Checkpoint](#) on page 514.

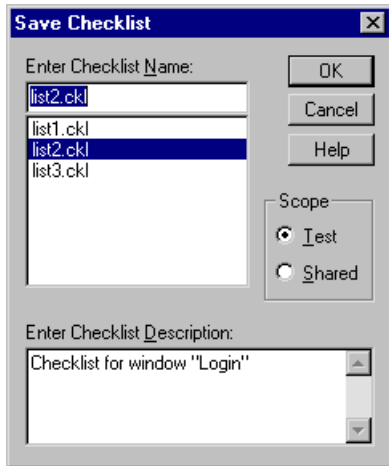
- 2 Select a GUI checklist and click **OK**.

The Open Checklist dialog box closes. The Edit GUI Checklist dialog box displays the selected checklist.

- 3 Save the checklist by clicking **Save As**.



The Save Checklist dialog box opens.



- 4 Under **Scope**, click **Shared**.

Type in a name for the shared checklist. Click **OK** to save the checklist and close the dialog box.

- 5 Click **OK** to close the Edit GUI Checklist dialog box.



Editing GUI Checklists

You can edit an existing GUI checklist. Note that a GUI checklist includes only the objects and the properties to be checked. It does not include the expected results for the values of those properties.

You may want to edit a GUI checklist if you add a checkpoint for a window that already has a checklist.

When you edit a GUI checklist, you can:

- change which objects in a window to check
- change which properties of an object to check
- change the arguments for an existing property check
- specify the arguments for a new property check

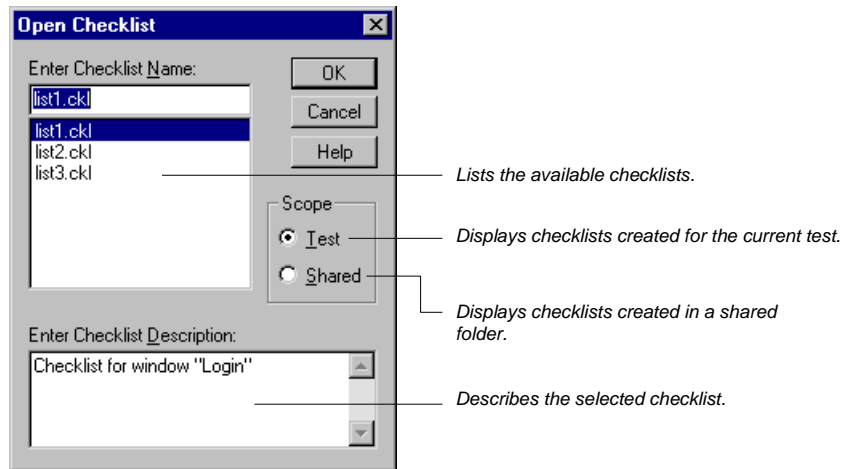
Note that before you start working, the objects in the checklist must be loaded into the GUI map. For information about loading the GUI map, see [Loading the GUI Map File](#) on page 111.



To edit an existing GUI checklist:

- 1 Choose **Create > Edit GUI Checklist**. The Open Checklist dialog box opens.
- 2 A list of checklists for the current test is displayed. If you want to see checklists in a shared folder, click **Shared**.

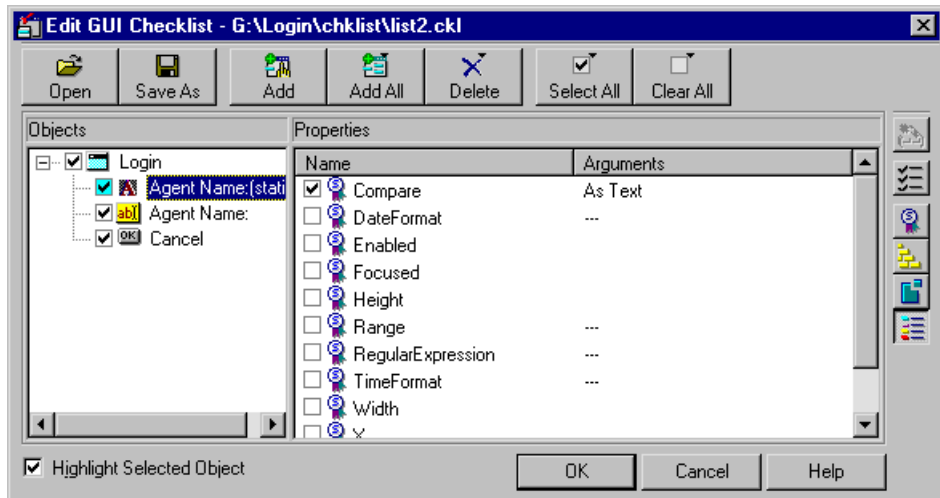
For more information on sharing GUI checklists, see [Saving a GUI Checklist in a Shared Folder](#) on page 291.



- 3 Select a GUI checklist.
- 4 Click **OK**.

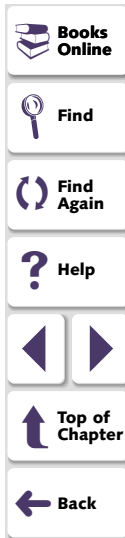


The Open Checklist dialog box closes. The Edit GUI Checklist dialog box opens and displays the selected checklist.



- To see a list of the properties to check for a specific object, click the object name in the **Objects** pane. The **Properties** pane lists all the properties for the selected object. To change the viewing options for the properties for an object, use the Show Properties buttons. For more information, see [The Edit GUI Checklist Dialog Box](#) on page 310.

- To check additional properties of an object, select the object in the **Objects** pane. In the **Properties** pane, select the properties to be checked.





- To delete an object from the checklist, select the object in the **Objects** pane. Click the **Delete** button and then select the **Object** option.



- To add an object to the checklist, make sure the relevant window is open in the application being tested. Click the **Add** button. The mouse pointer becomes a pointing hand and a help window opens.

Click each object that you want to include in your checklist. Click the right mouse button to stop the selection process. The Edit GUI Checklist dialog box reopens.

In the **Properties** pane, select the properties you want to check or accept the default checks.

Note: You cannot insert objects from different windows into a single checklist.



- To add all objects or menus in a window to the checklist, make sure the window of the application you are testing is active. Click the **Add All** button and select **Objects** or **Menus**.

Note: If the edited checklist is part of an **obj_check_gui** statement, do not add additional objects to it, as by definition this statement is for a single object only.





- To add a check in which you specify arguments, first select the property for which you want to specify arguments. Next, either click the **Specify Arguments** button, or double-click in the **Arguments** column. Note that if an ellipsis appears in the Arguments column, then you must specify arguments for a check on this property. (You do not need to specify arguments if a default argument is specified.) When checking standard objects, you only specify arguments for certain properties of edit and static text objects. You also specify arguments for checks on certain properties of nonstandard objects. For more information, see [Specifying Arguments for Property Checks](#) on page 324.

6 Save the checklist in one of the following ways:

- To save the checklist under its existing name, click **OK** to close the Edit GUI Checklist dialog box. A WinRunner message prompts you to overwrite the existing checklist. Click **OK**.
- To save the checklist under a different name, click the **Save As** button. The Save Checklist dialog box opens. Type a new name or use the default name. Click **OK**. Note that if you do not click the Save As button, WinRunner automatically saves the checklist under its default name when you click OK to close the Edit GUI Checklist dialog box.



A new GUI checkpoint statement is *not* inserted in your test script.

For more information on the Edit GUI Checklist dialog box, see [Understanding the GUI Checkpoint Dialog Boxes](#) on page 299.

Note: Before you run your test in Verify run mode, you must update the expected results to match the changes you made in the checklist. To update the expected results, run your test in Update run mode. For more information on running a test in Update run mode, see [WinRunner Test Run Modes](#) on page 834.



Understanding the GUI Checkpoint Dialog Boxes

When creating a GUI checkpoint to check your GUI objects, you can specify the objects and properties to check, create new checklists, and modify existing checklists. Three dialog boxes are used to create and maintain your GUI checkpoints: the *Check GUI* dialog box, the *Create GUI Checkpoint* dialog box, and the *Edit GUI Checklist* dialog box.

Note that by default, the toolbar at the top of each GUI Checkpoint dialog box displays large buttons with text. You can choose to see dialog boxes with smaller buttons without titles. Examples of both kinds of buttons are illustrated below.



Large Add All button



Small Add All button

To display the GUI Checkpoint dialog boxes with small buttons:

- 1 Click the top-left corner of the dialog box.
- 2 Clear the **Large Buttons** option.



Messages in the GUI Checkpoint Dialog Boxes

The following messages may appear in the GUI Checkpoint dialog boxes:

Message	Meaning	Dialog Box	Location
Complex Value	The expected or actual value of the selected property check is too complex to display in the column. This message often appears for content checks on tables.	Check GUI , Create GUI Checkpoint, GUI Checkpoint Results* (see note below)	Properties pane, Expected Value column or Actual Value column
N/A	The expected value of the selected property check was not captured: either arguments need to be specified before this check can have an expected value, or the expected value of this check is captured only once this check is added to the checkpoint.	Check GUI , Create GUI Checkpoint, GUI Checkpoint Results* (see note below)	Properties pane, Expected Value column
Cannot Capture	The expected or actual value of the selected property could not be captured.	Check GUI , Create GUI Checkpoint, GUI Checkpoint Results* (see note below)	Properties pane, Expected Value column or Actual Value



Message	Meaning	Dialog Box	Location
No properties are available for this object	The specified object did not have any properties.	Check GUI , Create GUI Checkpoint, Edit GUI Checklist	Properties pane
No properties were captured for this object	When this checkpoint was created, no property checks were selected for this object.	GUI Checkpoint Results* (see note below)	Properties pane

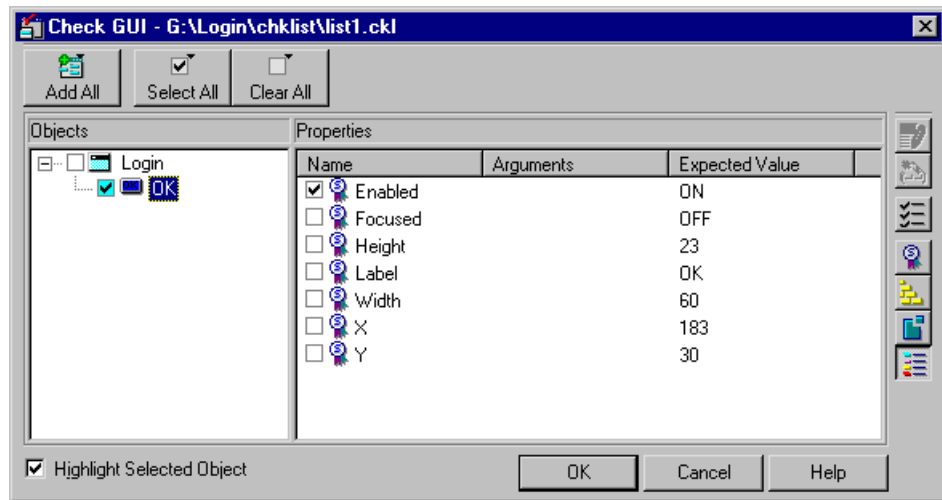
Note: For information on the GUI Checkpoint Results dialog box, see [Modifying the Expected Results of a GUI Checkpoint](#) on page 338 or Chapter 32, [Analyzing Test Results](#).



The Check GUI Dialog Box



You can use the Check GUI dialog box to create a GUI checkpoint with the checks you specify for a single object or a window. This dialog box opens when you choose **Create > GUI Checkpoint > For Object/Window** or click the **GUI Checkpoint for Object/Window** button on the User toolbar, and double-click an object or a window.





The **Objects** pane contains the name of the window and objects that will be included in the GUI checkpoint. The **Properties** pane lists all the properties of a selected object. A checkmark indicates that the item is selected and is included in the checkpoint.







When you select an object in the Objects pane, the **Highlight Selected Object** option highlights the actual GUI object if the object is visible on the screen.

Note: When arguments have not been specified for a property check that requires arguments, <N/A> appears in the **Expected Value** column for that check. The arguments specified for a check determine its expected value, and therefore the expected value is not available until the arguments are specified.




The Check GUI dialog box includes the following options:

Button	Description
	Add All adds all objects or menus in a window to your checklist.
	Select All selects all objects, properties, or objects of a given class in the Check GUI dialog box. If you want to select all objects of a given class, the Classes of Objects dialog box opens. Specify the class of objects to select.



Button	Description
	<p>Clear All clears all objects, properties, or objects of a given class in the Check GUI dialog box. If you want to clear all objects of a given class, the Classes of Objects dialog box opens. Specify the class of objects to clear.</p>
	<p>Property List calls the <i>ui_function</i> parameter that is defined only for classes customized using the gui_ver_add_class function. Note that this button appears only if at least one object in the Objects pane belongs to a class for which the <i>ui_function</i> parameter has been defined using the gui_ver_add_class function. For additional information, refer to the <i>WinRunner Customization Guide</i>.</p>
	<p>Edit Expected Value enables you to edit the expected value of the selected property. For more information, see Editing the Expected Value of a Property on page 335.</p>
	<p>Specify Arguments enables you to specify the arguments for a check on the selected property. For more information, see Specifying Arguments for Property Checks on page 324.</p>
	<p>Show Selected Properties Only displays only properties whose check boxes are selected. (Toggles between viewing all properties and viewing selected properties only.) By default, all properties are shown.</p>
	<p>Show Standard Properties Only displays only standard properties.</p>



Button	Description
	<p>Show Nonstandard Properties Only displays only nonstandard properties, such as Visual Basic, PowerBuilder, and ActiveX control properties.</p>
	<p>Show User Properties Only displays only user-defined property checks. To create user-defined property checks, refer to the <i>WinRunner Customization Guide</i>.</p>
	<p>Show All Properties displays all properties, including standard, nonstandard, and user-defined properties.</p>

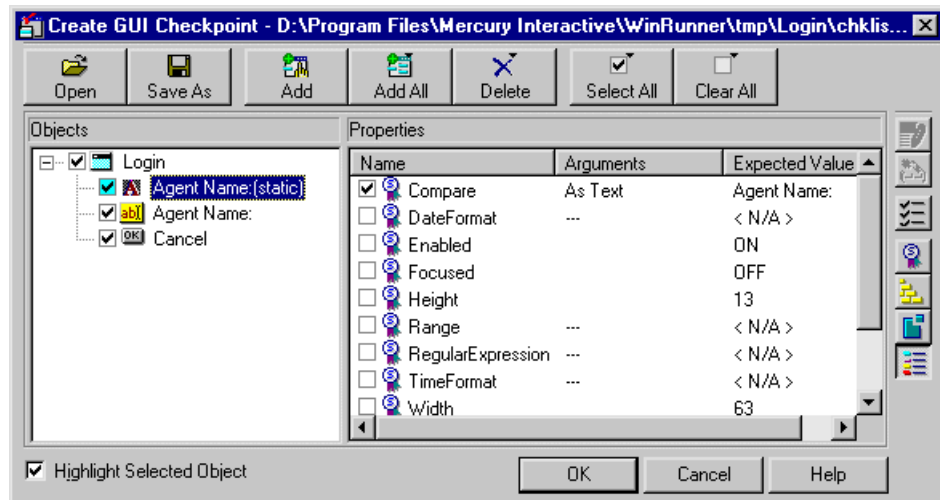
When you click OK to close the dialog box, WinRunner captures the current property values and stores them in the test's expected results folder. The WinRunner window is restored and a GUI checkpoint is inserted in the test script as an **obj_check_gui** or a **win_check_gui** statement.



The Create GUI Checkpoint Dialog Box



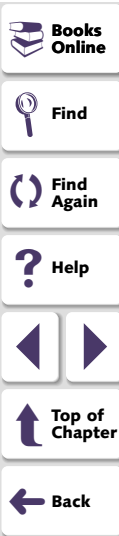
You can use the Create GUI Checkpoint dialog box to create a GUI checklist with default checks for multiple objects or by specifying which properties to check. To open the Create GUI Checkpoint dialog box, choose **Create > GUI Checkpoint > For Multiple Objects** or click the **GUI Checkpoint for Multiple Objects** button on the User toolbar.









The **Objects** pane contains the name of the window and objects that will be included in the GUI checkpoint. The **Properties** pane lists all the properties of a selected object. A checkmark indicates that the item is selected and is included in the checkpoint.

When you select an object from the Objects pane, the **Highlight Selected Object** option highlights the actual GUI object if the object is visible on the screen.







Note: When arguments have not been specified for a property check that requires arguments, <N/A> appears in the **Expected Value** column for that check. The arguments specified for a check determine its expected value, and therefore the expected value is not available until the arguments are specified.






The Create GUI Checkpoint dialog box includes the following options:

Button	Description
	<p>Open opens an existing GUI checklist.</p>
	<p>Save As saves the open GUI checklist to a different name. Note that if you do not click the Save As button, WinRunner automatically saves the checklist under its default name when you click OK to close the Create GUI Checkpoint dialog box. The Save As option is particularly useful for saving a checklist to the “shared checklist” folder.</p>
	<p>Add adds an object to your GUI checklist.</p>
	<p>Add All adds all objects or menus in a window to your GUI checklist.</p>
	<p>Delete deletes an object, or all of the objects that appear in the GUI checklist.</p>
	<p>Select All selects all objects, properties, or objects of a given class in the Create GUI Checkpoint dialog box. If you want to select all objects of a given class, the Classes of Objects dialog box opens. Specify the class of objects to select.</p>



Button	Description
	<p>Clear All clears all objects, properties, or objects of a given class in the Create GUI Checkpoint dialog box. If you want to clear all objects of a given class, the Classes of Objects dialog box opens. Specify the class of objects to clear.</p>
	<p>Property List calls the <i>ui_function</i> parameter that is defined only for classes customized using the gui_ver_add_class function. Note that this button appears only if at least one object in the Objects pane belongs to a class for which the <i>ui_function</i> parameter has been defined using the gui_ver_add_class function. For additional information, refer to the <i>WinRunner Customization Guide</i>.</p>
	<p>Edit Expected Value enables you to edit the expected value of the selected property. For more information, see Editing the Expected Value of a Property on page 335.</p>
	<p>Specify Arguments enables you to specify the arguments for a check on the selected property. For more information, see Specifying Arguments for Property Checks on page 324.</p>
	<p>Show Selected Properties Only displays only properties whose check boxes are selected. (Toggles between viewing all properties and viewing selected properties only.) By default, all properties are shown.</p>
	<p>Show Standard Properties Only displays only standard properties.</p>



Button	Description
	<p>Show Nonstandard Properties Only displays only nonstandard properties, such as Visual Basic, PowerBuilder, and ActiveX control properties.</p>
	<p>Show User Properties Only displays only user-defined property checks. To create user-defined property checks, refer to the <i>WinRunner Customization Guide</i>.</p>
	<p>Show All Properties displays all properties, including standard, nonstandard, and user-defined properties.</p>

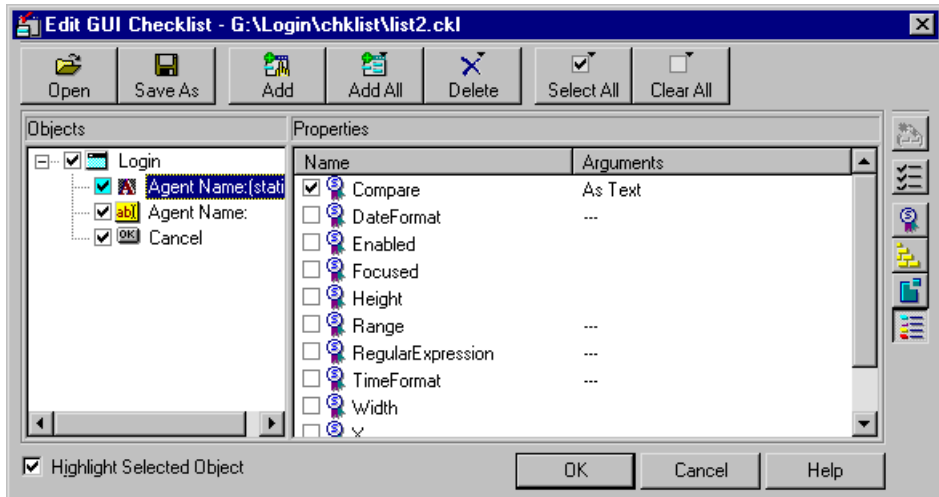
When you click OK to close the dialog box, WinRunner saves your changes, captures the current property values, and stores them in the test's expected results folder. The WinRunner window is restored and a GUI checkpoint is inserted in the test script as a **win_check_gui** statement.

The Edit GUI Checklist Dialog Box

You can use the Edit GUI Checklist dialog box to modify your checklist. A checklist contains a list of objects and properties. It does not capture the current values for those properties. Consequently you cannot edit the expected values of an object's properties in this dialog box.

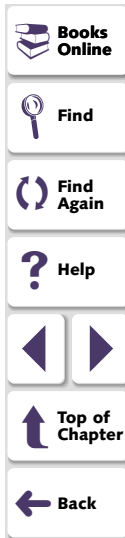


To open the Edit GUI Checklist dialog box, choose **Create > Edit GUI Checklist**.









The **Objects** pane contains the name of the window and objects that are included in the checklist. The **Properties** pane lists all the properties for a selected object. A checkmark indicates that the item is selected and will be checked in checkpoints that use this checklist.







When you select an object from the Objects pane, the **Highlight Selected Object** option highlights the actual GUI object if the object is visible on the screen.





The Edit GUI Checklist dialog box includes the following options:

Button	Description
	<p>Open opens an existing GUI checklist.</p>
	<p>Save As saves your GUI checklist to another location. Note that if you do not click the Save As button, WinRunner will automatically save the checklist under its default name when you click OK to close the Edit GUI Checklist dialog box. This option is particularly useful for saving a checklist to the “shared checklist” folder.</p>
	<p>Add adds an object to your GUI checklist.</p>
	<p>Add All adds all objects or all menus in a window to your GUI checklist.</p>
	<p>Delete deletes the specified object, or all objects that appear in the GUI checklist.</p>
	<p>Select All selects all objects, properties, or objects of a given class in the Edit GUI Checklist dialog box. If you want to select all objects of a given class, the Classes of Objects dialog box opens. Specify the class of objects to select.</p>



Button	Description
	<p>Clear All clears all objects, properties, or objects of a given class in the Edit GUI Checklist dialog box. If you want to clear all objects of a given class, the Classes of Objects dialog box opens. Specify the class of objects to clear.</p>
	<p>Property List calls the <i>ui_function</i> parameter that is defined only for classes customized using the gui_ver_add_class function. Note that this button appears only if at least one object in the Objects pane belongs to a class for which the <i>ui_function</i> parameter has been defined using the gui_ver_add_class function. For additional information, refer to the <i>WinRunner Customization Guide</i>.</p>
	<p>Specify Arguments enables you to specify the arguments for a check on the selected property. For more information, see Specifying Arguments for Property Checks on page 324.</p>
	<p>Show Selected Properties Only displays only properties whose check boxes are selected. (Toggles between viewing all properties and viewing selected properties only.) By default, selected properties are shown.</p>
	<p>Show Standard Properties Only displays only standard properties.</p>
	<p>Show Nonstandard Properties Only displays only nonstandard properties, such as Visual Basic, PowerBuilder, and ActiveX control properties.</p>



Button	Description
	<p>Show User Properties Only displays only user-defined property checks. To create user-defined property checks, refer to the <i>WinRunner Customization Guide</i>.</p>
	<p>Show All Properties displays all properties, including standard, nonstandard, and user-defined properties.</p>

When you click OK to close the dialog box, WinRunner prompts you to overwrite your checklist. Note that when you overwrite a checklist, any expected results captured earlier in checkpoints using the edited checklist remain unchanged.

A new GUI checkpoint statement is *not* inserted in your test script.

Note: Before you run your test in Verify run mode, you must update the expected results to match the changes you made in the checklist. To update the expected results, run your test in Update run mode. For more information on running a test in Update run mode, see [WinRunner Test Run Modes](#) on page 834.



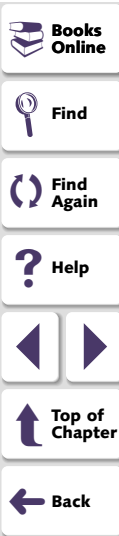
Property Checks and Default Checks

When you create a GUI checkpoint, you can determine the types of checks to perform on GUI objects in your application. For each object class, WinRunner recommends a default check. For example, if you select a push button, the default check determines whether the push button is enabled. Alternatively, you can specify in a dialog box which properties of an object to check. For example, you can choose to check a push button's width, height, label, and position in a window (x- and y-coordinates).

To use the *default check*, you choose a **Create > GUI Checkpoint** command. Click a window or an object in your application. WinRunner automatically captures information about the window or object and inserts a GUI checkpoint into the test script.

To specify which properties to check for an object, you choose a **Create > GUI Checkpoint** command. Double-click a window or an object. In the Check GUI dialog box, choose the properties you want WinRunner to check. Click OK to save the checks and close the dialog box. WinRunner captures information about the GUI object and inserts a GUI checkpoint into the test script.

The following sections show the types of checks available for different object classes.



Calendar Class

You can check the following properties for a calendar class object:

Enabled: Checks whether the calendar can be selected.

Focused: Checks whether keyboard input will be directed to the calendar.

Height: Checks the calendar's height in pixels.

Selection: The selected date in the calendar (default check).

Width: Checks the calendar's width in pixels.

X: Checks the x-coordinate of the top left corner of the calendar, relative to the window.

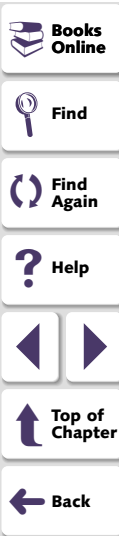
Y: Checks the y-coordinate of the top left corner of the calendar, relative to the window.

Check_button Class and Radio_button Class

You can check the following properties for a check box (an object of check_button class) or a radio button:

Enabled: Checks whether the button can be selected.

Focused: Checks whether keyboard input will be directed to this button.



Height: Checks the button's height in pixels.

Label: Checks the button's label.

State: Checks the button's state (on or off) (default check).

Width: Checks the button's width in pixels.

X: Checks the x-coordinate of the top left corner of the button, relative to the window.

Y: Checks the y-coordinate of the top left corner of the button, relative to the window.

Edit Class and Static Text Class

You can check the properties below for edit class and static_text class objects.

Checks on any of these five properties (Compare, DateFormat, Range, RegularExpression, and TimeFormat) require you to specify arguments. For information on specifying arguments for property checks, see [Specifying Arguments for Property Checks](#) on page 324.



Compare: Checks the contents of the object (default check). This check has arguments. You can specify the following arguments:

- a case-sensitive check on the contents as text (default setting)
- a case-insensitive check on the contents as text
- numeric check on the contents

DateFormat: Checks that the contents of the object are in the specified date format. You must specify arguments (a date format) for this check. WinRunner supports a wide range of date formats. For a complete list of available date formats, see [Date Formats](#) on page 327.

Enabled: Checks whether the object can be selected.

Focused: Checks whether keyboard input will be directed to this object.

Height: Checks the object's height in pixels.

Range: Checks that the contents of the object are within the specified range. You must specify arguments (the upper and lower limits for the range) for this check.

RegularExpression: Checks that the string in the object meets the requirements of the regular expression. You must specify arguments (the string) for this check. Note that you do not need to precede the regular expression with an exclamation point. For more information, see Chapter 23, [Using Regular Expressions](#).



TimeFormat: Checks that the contents of the object are in the specified time format. You must specify arguments (a time format) for this check. WinRunner supports the time formats shown below, with an example for each format.

hh.mm.ss	10.20.56
hh:mm:ss	10:20:56
hh:mm:ss ZZ	10:20:56 AM

Width: Checks the text object's width in pixels.

X: Checks the x-coordinate of the top left corner of the object, relative to the window.

Y: Checks the y-coordinate of the top left corner of the object, relative to the window.

List Class

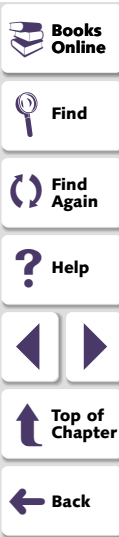
You can check the following properties for a list object:

Content: Checks the contents of the entire list.

Enabled: Checks whether an entry in the list can be selected.

Focused: Checks whether keyboard input will be directed to this list.

Height: Checks the list's height in pixels.



ItemsCount: Checks the number of items in the list.

Selection: Checks the current list selection (default check).

Width: Checks the list's width in pixels.

X: Check the x-coordinate of the top left corner of the list, relative to the window.

Y: Check the y-coordinate of the top left corner of the list, relative to the window.

Menu_item Class

Menus cannot be accessed directly, by clicking them. To include a menu in a GUI checkpoint, click the window title bar or the menu bar. The **Add All** dialog box opens. Select the **Menus** option. All menus in the window are added to the checklist. Each menu item is listed separately.

You can check the following properties for menu items:

HasSubMenu: Checks whether a menu item has a submenu.

ItemEnabled: Checks whether the menu is enabled (default check).

ItemPosition: Checks the position of each item in the menu.

SubMenusCount: Counts the number of items in the submenu.



Object Class

You can check the following properties for an object that is not mapped to a standard object class:

Enabled: Checks whether the object can be selected.

Focused: Checks whether keyboard input will be directed to this object.

Height: Checks the object's height in pixels (default check).

Width: Checks the object's width in pixels (default check).

X: Checks the x-coordinate of the top left corner of the GUI object, relative to the window (default check).

Y: Checks the y-coordinate of the top left corner of the GUI object, relative to the window (default check).

Push_button Class

You can check the following properties for a push button:

Enabled: Checks whether the button can be selected (default check).

Focused: Checks whether keyboard input will be directed to this button.

Height: Checks the button's height in pixels.



Label: Checks the button's label.

Width: Checks the button's width in pixels.

X: Checks the x-coordinate of the top left corner of the button, relative to the window.

Y: Checks the y-coordinate of the top left corner of the button, relative to the window.

Scroll Class

You can check the following properties for a scrollbar:

Enabled: Checks whether the scrollbar can be selected.

Focused: Checks whether keyboard input will be directed to this scrollbar.

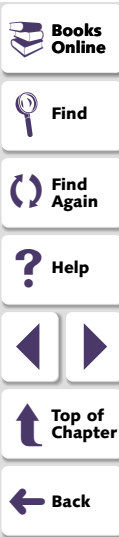
Height: Checks the scrollbar's height in pixels.

Position: Checks the current position of the scroll thumb within the scrollbar (default check).

Width: Checks the scrollbar's width in pixels.

X: Checks the x-coordinate of the top left corner of the scrollbar, relative to the window.

Y: Checks the y-coordinate of the top left corner of the scrollbar, relative to the window.



Window Class

You can check the following properties for a window:

CountObjects: Counts the number of GUI objects in the window (default check).

Enabled: Checks whether the window can be selected.

Focused: Checks whether keyboard input will be directed to this window.

Height: Checks the window's height in pixels.

Label: Checks the window's label.

Maximizable: Checks whether the window can be maximized.

Maximized: Checks whether the window is maximized.

Minimizable: Checks whether the window can be minimized.

Minimized: Checks whether the window is minimized.

Resizable: Checks whether the window can be resized.

SystemMenu: Checks whether the window has a system menu.

Width: Checks the window's width in pixels.

X: Checks the x-coordinate of the top left corner of the window.

Y: Checks the y-coordinate of the top left corner of the window.



Specifying Arguments for Property Checks

You can perform many different property checks on objects. If you want to perform the property checks listed below on edit class and static_text class objects, you must specify arguments for those checks:

- Compare
- DateFormat
- Range
- RegularExpression
- TimeFormat

To specify arguments for a property check on an edit class or static_text class object:

- 1 Make sure that one of the GUI Checkpoint dialog boxes containing the object for whose property you want to specify arguments is open. If necessary, choose **Create > GUI Checkpoint > For Multiple Objects** or **Create > Edit GUI Checklist** to open the relevant dialog box.
- 2 In the **Objects** pane of the dialog box, select the object to check.
- 3 In the **Properties** pane of the dialog box, select the desired property check.



4 Do one of the following:



- Click the **Specify Arguments** button.
- Double-click the default argument (for the Compare check) or the ellipsis in the corresponding **Arguments** column (for the other checks).
- Right-click with the mouse and choose **Specify Arguments** from the pop-up menu.

A dialog box for the selected property check opens.

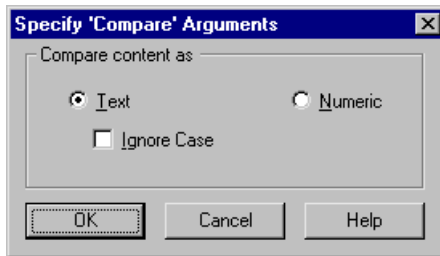
Note: When you select the check box beside a property check for which you need to specify arguments, the dialog box for the selected property check opens automatically.

- 5 Specify the arguments in the dialog box that opens. For example, for a Date Format check, specify the date format. For information on specifying arguments for a particular property check, see the relevant section below.
- 6 Click **OK** to close the dialog box for specifying arguments.
- 7 When you are done, click **OK** to close the GUI Checkpoint dialog box that is open.



Compare Property Check

Checks the contents of the edit class or static_text class object (default check).
Opens the **Specify 'Compare' Arguments** dialog box.



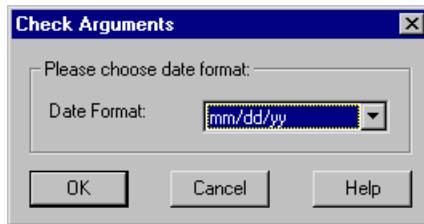
- Click **Text** to check the contents as text (default setting).
- To ignore the case when checking text, select the **Ignore Case** check box.
- Click **Numeric** to check the contents as a number.

Note that the default argument setting for the Compare property check is a case-sensitive comparison of the object as text.



DateFormat Property Check

Checks that the contents of the edit or static_text class object are in the specified date format. To specify a date format, select it from the drop-down list in the Check Arguments dialog box.



Date Formats

WinRunner supports the following date formats, shown with an example for each:

mm/dd/yy	09/24/99
dd/mm/yy	24/09/99
dd/mm/yyyy	24/09/1999
yy/dd/mm	99/24/09
dd.mm.yy	24.09.99
dd.mm.yyyy	24.09.1999
dd-mm-yy	24-09-99



dd-mm-yyyy	24-09-1999
yyyy-mm-dd	1999-09-24
Day, Month dd, yyyy	Friday (or Fri), September (or Sept) 24, 1999
dd Month yyyy	24 September 1999
Day dd Month yyyy	Friday (or Fri) 24 September (or Sept) 1999

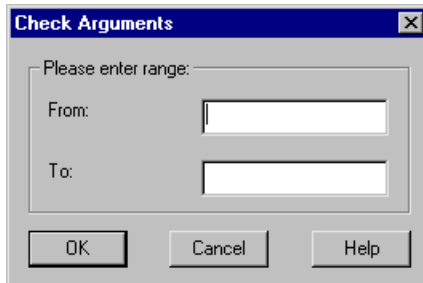
Note: When the day or month begins with a zero (such as 09 for September), the 0 is not required for a successful format check.



Range Property Check

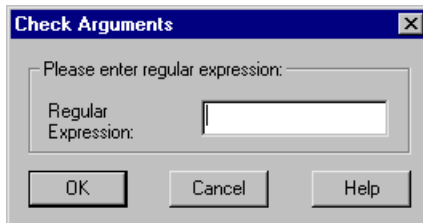
Checks that the contents of the edit class or static_text class object are within the specified range. In the Check Arguments dialog box, specify the lower limit in the top edit field, and the upper limit in the bottom edit field.

Note: Any currency sign preceding the number is removed prior to making the comparison for this check.



RegularExpression Property Check

Checks that the string in the edit class or static_text class object meets the requirements of the regular expression. In the Check Arguments dialog box, enter a string into the Regular Expression box. You do not need to precede the regular expression with an exclamation point. For more information, see Chapter 23, [Using Regular Expressions](#).

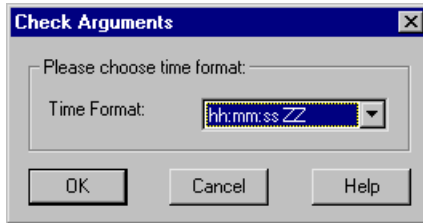


Note: Two “\” characters (“\\”) are interpreted as a single “\” character.



TimeFormat Property Check

Checks that the contents of the edit class or static_text class object are in the specified time format. To specify the time format, select it from the drop-down list in the Check Arguments dialog box.



WinRunner supports the following time formats, shown with an example for each:

Time Formats

hh.mm.ss	10.20.56
hh:mm:ss	10:20:56
hh:mm:ss ZZ	10:20:56 AM



Closing the GUI Checkpoint Dialog Boxes

If you select property checks that requires arguments without specifying the actual arguments for them, and then click OK to close the dialog box, you are prompted to specify the arguments.

Specifying Arguments for One Property Check

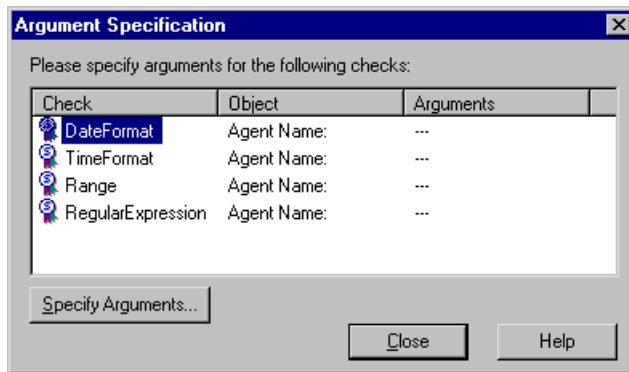
If you click OK to close a GUI checkpoint dialog box when you have selected a check on a property that requires arguments, without first specifying arguments for that property check, the Check Arguments dialog box for that property check opens.

Specifying Arguments for Multiple Property Checks

If you select check boxes for multiple property checks that need arguments, and you did not specify arguments, then when you try to close to open dialog box, the Argument Specification dialog box opens. This dialog box enables you to specify arguments for the relevant property checks.



In the example below, the user clicked OK to close the Create GUI Checkpoint dialog before specifying arguments for the Date Format, Time Format, Range and RegularExpression property checks on the “Departure Time:” edit object in the sample Flights application:



The *property check* appears in the **Check** column. The *logical name* of the object appears in the **Object** column. An ellipsis appears in the **Arguments** column to indicate that the arguments for the property check have not been specified.



To specify arguments from the Argument Specification dialog box:

- 1 In the **Check** column, select a property check.
- 2 Click the **Specify Arguments** button. Alternatively, double-click the property check.
- 3 The dialog box for specifying arguments for that property check opens.
- 4 Specify the arguments for the property check, as described above.
- 5 Click **OK** to close the dialog box for specifying arguments.
- 6 Repeat the above steps until arguments appear in the **Arguments** column for all property checks.
- 7 Once arguments are specified for all property checks in the dialog box, click **Close** to close it and return to the GUI Checkpoint dialog box that is open.
- 8 Click **OK** to close the GUI Checkpoint dialog box that is open.



Editing the Expected Value of a Property

When you create a GUI checkpoint, WinRunner captures the current property values for the objects you check. These current values are saved as *expected values* in the *expected results folder*.

When you run your test, WinRunner captures these property values again. It compares the new values captured during the test with the expected values that were stored in the test's expected results folder.

Suppose that you want to change the value of a property after it has been captured in a GUI checkpoint but before you run your test script. You can simply edit the expected value of this property in the Check GUI dialog box or the Create GUI Checkpoint dialog box.

Note that you cannot edit expected property values in the Edit GUI Checklist dialog box: When you open the Edit GUI Checklist dialog box, WinRunner does not capture current values. Therefore, this dialog box does not display expected values that can be edited.

Note: If you want to edit the expected value for a property check that is already part of a GUI checkpoint, you must change the expected results of the GUI checkpoint. For more information, see [Modifying the Expected Results of a GUI Checkpoint](#) on page 338.



To edit the expected value of an object:

- 1 If the Check GUI dialog box or the Create GUI Checkpoint dialog box is not already open, choose **Create > GUI Checkpoint > For Multiple Objects** to open the **Create GUI Checkpoint** dialog box and click **Open** to open the checklist in which to edit the expected value. Note that the Check GUI dialog box opens only when you create a new GUI checkpoint.
- 2 In the **Objects** pane, select an object.
- 3 In the **Properties** pane, select the property whose expected value you want to edit.
- 4 Do one of the following:

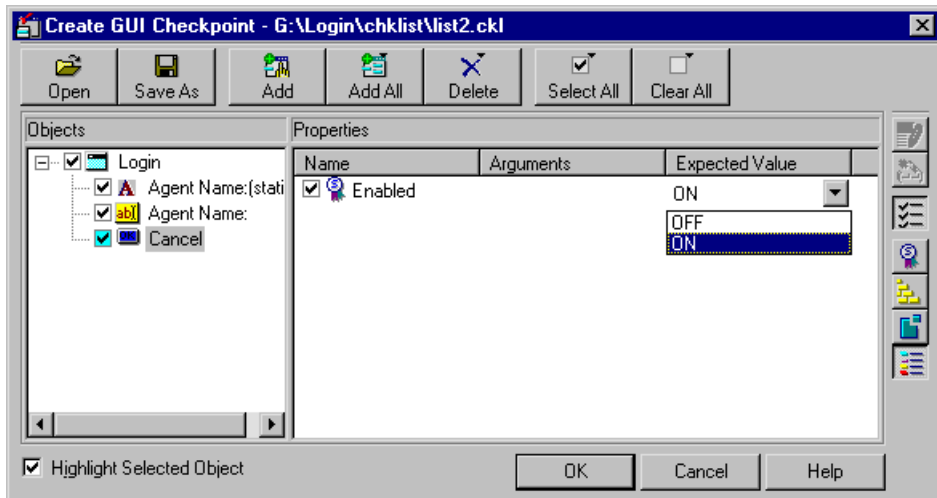


- Click the **Edit Expected Value** button.
- Double-click the existing expected value (the current value).
- Right-click with the mouse and choose **Edit Expected Value** from the pop-up menu.

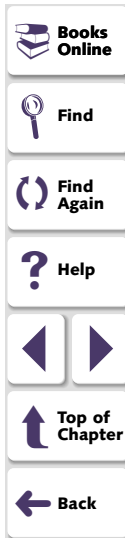
Depending on the property, an edit field, an edit box, a list box, a spin box, or a new dialog box opens.



For example, when you edit the expected value of the **Enabled** property for a push_button class object, a list box opens:



- 5 Edit the expected value of the property, as desired.
- 6 Click **OK** to close the dialog box.



Modifying the Expected Results of a GUI Checkpoint

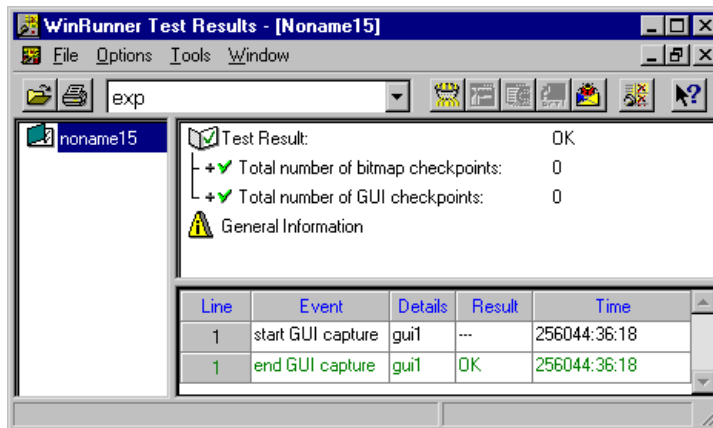
You can modify the expected results of an existing GUI checkpoint by changing the expected value of a property check within the checkpoint. You can make this change before or after you run your test script.

To modify the expected results for an existing GUI checkpoint:



- 1 Choose **Tools > Test Results** or click **Test Results**.

The WinRunner Test Results window opens.



- 2 In the **Results** box, choose your expected results folder (by default, “exp”).



- In the test log, locate the GUI checkpoint by looking for entries that list “end GUI capture” in the **Event** column. Note that the line number in the test script appears in the **Line** column of the test log.

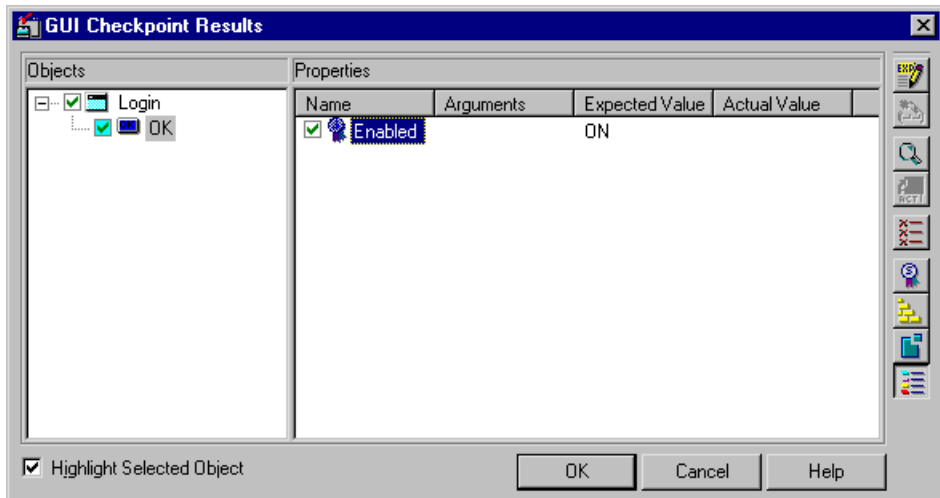


Note: You can use the **Show TSL** button to open the test script to the highlighted line number.



- Double-click the desired “end GUI capture” entry, or click this entry and click **Display**.

The GUI Checkpoint Results dialog box opens.





- 5 Select the property check whose expected results you want to modify. Click the **Edit expected value** button. In the **Expected Value** column, modify the value, as desired. Click **OK** to close the dialog box.

Note: You can also modify the expected value of a property check while creating a GUI checkpoint. For more information, see [Editing the Expected Value of a Property](#) on page 335.

Note: You can also modify the expected value of a GUI checkpoint to the actual value after a test run. For more information, see [Updating the Expected Results of a Checkpoint](#) on page 901.



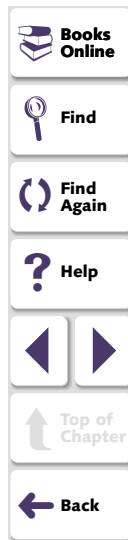
Creating Tests

Working with ActiveX and Visual Basic Controls

WinRunner supports Context Sensitive testing on ActiveX controls (also called OLE or OCX controls) and Visual Basic controls in Visual Basic applications.

This chapter describes:

- **Choosing Appropriate Support for Visual Basic Applications**
- **Viewing ActiveX and Visual Basic Control Properties**
- **Retrieving and Setting the Values of ActiveX and Visual Basic Control Properties**
- **Activating an ActiveX Control Method**
- **Working with Visual Basic Label Controls**
- **Checking Sub-Objects of ActiveX and Visual Basic Controls**
- **Using TSL Table Functions with ActiveX Controls**



About Working with ActiveX and Visual Basic Controls

Many applications include ActiveX and Visual Basic controls developed by third-party organizations. WinRunner can record and run Context Sensitive operations on these controls, as well as check their properties.

WinRunner provides two types of support for ActiveX and Visual Basic controls within a Visual Basic application. You can either:

- compile a WinRunner agent into your application, and install and load add-in support for Visual Basic controls
- install and load add-in support for ActiveX and Visual Basic controls

When you work with the appropriate support, WinRunner recognizes ActiveX and Visual Basic controls, and treats them as it treats standard GUI objects. You can check the properties of ActiveX and Visual Basic controls as you check the properties of any standard GUI object. For more information, see Chapter 12, [Checking GUI Objects](#).

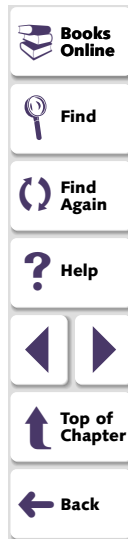
At any time, you can view the current values of the properties of an ActiveX or a Visual Basic control using the ActiveX Properties Viewer. In addition, you can retrieve and set the values of properties for ActiveX controls and Visual Basic label controls using TSL functions. You can also use a TSL function to activate an ActiveX control method.



Note: You must start WinRunner before launching the application containing ActiveX controls.

WinRunner provides special built-in support for checking Visual Basic label controls and the contents or properties of ActiveX controls that are tables. For information on which TSL table functions are supported for specific ActiveX controls, see [Using TSL Table Functions with ActiveX Controls](#) on page 368. For information on checking the contents of an ActiveX table control, see Chapter 16, [Checking Table Contents](#).

This chapter provides step-by-step instructions for checking ActiveX Control properties.



Choosing Appropriate Support for Visual Basic Applications

WinRunner provides two types of support for ActiveX and Visual Basic controls within a Visual Basic application. You can either:

- compile a WinRunner agent into your application, and install and load add-in support for Visual Basic controls
- install and load add-in support for ActiveX and Visual Basic controls

Before you test a Visual Basic application, it is best to add the WinRunner agent to your application, compile them together, and install the Visual Basic add-in from the WinRunner setup program, and load it from the Add-In Manager. If this is not possible, install and load both the ActiveX and Visual Basic add-ins from the WinRunner setup program, and load them both from the Add-In Manager. The different levels of support are described below.

Working with the WinRunner Agent and Visual Basic Add-In Support

You can add a WinRunner agent, called *WinRunnerAddIn.Connect*, to your application and compile them together. The agent is in the *vbdev* folder on the WinRunner CD-ROM. For information on how to install and compile the agent, refer to the *readme.wri* file in the same folder. You can install add-in support for Visual Basic applications when you install WinRunner. For additional information, refer to your *WinRunner Installation Guide*. You can choose which installed add-ins to load for each session of WinRunner. For additional information, see [Loading WinRunner Add-Ins](#) on page 55.



When you add the WinRunner agent to your application and compile them together, you can:

- record and run tests with operations on ActiveX and standard Visual Basic controls
- uniquely identify names of internal ActiveX and Visual Basic controls
- create GUI checkpoints which check the properties of standard Visual Basic controls
- use the **ActiveX_get_info** and **ActiveX_set_info** TSL functions with ActiveX and Visual Basic controls



Working with ActiveX and Visual Basic Add-In Support without the WinRunner Agent

You can install add-in support for ActiveX and Visual Basic applications when you install WinRunner. For additional information, refer to your *WinRunner Installation Guide*. You can choose which installed add-ins to load for each session of WinRunner. For additional information, see [Loading WinRunner Add-Ins](#) on page 55.

When you install and load the ActiveX and Visual Basic add-ins without using the WinRunner agent, you can:

- record and run tests with operations on ActiveX and standard Visual Basic controls
- use the **ActiveX_get_info** and **ActiveX_set_info** TSL functions with ActiveX controls only



Viewing ActiveX and Visual Basic Control Properties

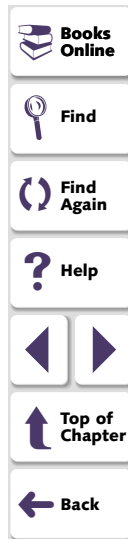
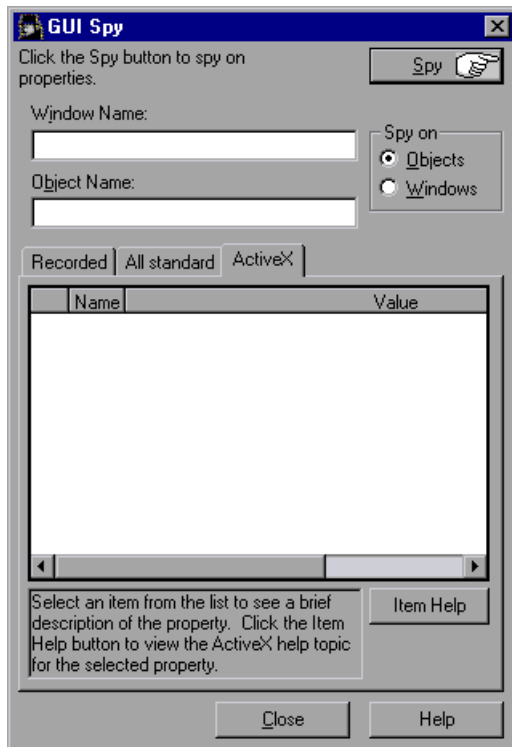
You use the ActiveX tab of the GUI Spy to see the properties, property values, and methods for an ActiveX control. You open the GUI Spy from the Tools menu. Note that in order for the GUI Spy to work on ActiveX controls, you must load the ActiveX add-in when you start WinRunner. You may also view ActiveX and Visual Basic control properties using the GUI checkpoint dialog boxes. For information on using the GUI checkpoint dialog boxes, see Chapter 12, [Checking GUI Objects](#).

To view the properties of an ActiveX or a Visual Basic control:

- 1 Choose **Tools > GUI Spy** to open the GUI Spy dialog box.



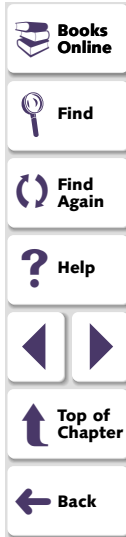
2 Click the **ActiveX** tab.



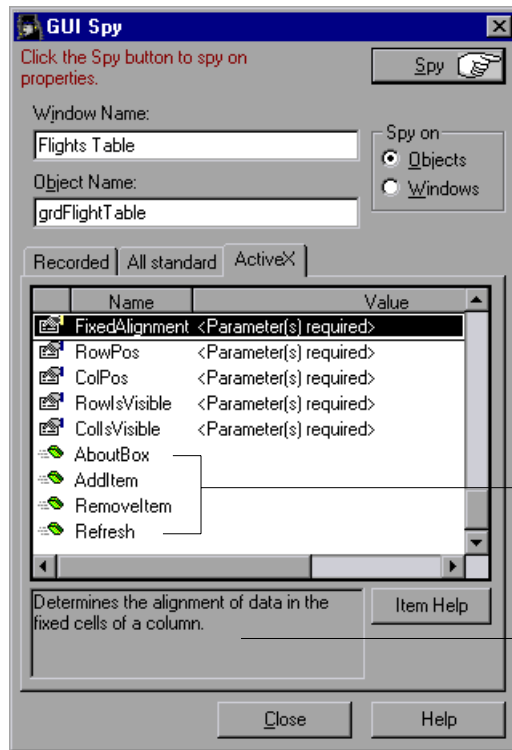
- 3 Click **Spy** and point to an ActiveX or Visual Basic control.

The control is highlighted and the active window name, object name, and object description (properties and their values) appear in the appropriate fields. Note that as you move the pointer over other objects, each one is highlighted in turn and its description appears in the Description pane.

- 4 To capture an object description in the GUI Spy dialog box, point to the desired object and press the STOP softkey. (The default softkey combination is Ctrl Left + F3.)



In the following example, pointing to the “Flights Table” in the Visual Basic sample flight application, pressing the STOP softkey, and highlighting the FixedAlignment property, displays the **ActiveX** tab in the GUI Spy as follows:



ActiveX control methods

property description



If a help file has been installed for this ActiveX control, then clicking **Item Help** displays it.

When you highlight a property, then if a description has been included for this property, it is displayed in the gray pane at the bottom.

- 5 Click **Close** to close the GUI Spy.

Note: When “Object Reference” appears in the Value column, it refers to the object’s sub-objects and their properties. When “Array...” appears in the Value column, this indicates either an array of type or a two-dimensional array. You can use the **ActiveX_get_info** function to retrieve these values. For information on the **ActiveX_get_info** function, see [Retrieving the Value of an ActiveX or Visual Basic Control Property](#) on page 352 or refer to the *TSL Online Reference*.



Retrieving and Setting the Values of ActiveX and Visual Basic Control Properties

The **ActiveX_get_info** and **ActiveX_set_info** TSL functions enable you to retrieve and set the values of properties for ActiveX and Visual Basic controls in your application. You can insert these functions into your test script using the Function Generator. For information on using the Function Generator, see Chapter 25, [Generating Functions](#).

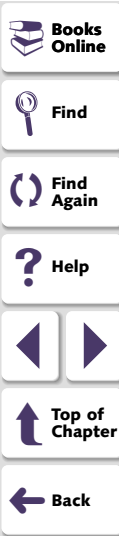
Tip: You can view the properties of an ActiveX control property from the ActiveX tab of the GUI Spy. For additional information, see [Viewing ActiveX and Visual Basic Control Properties](#) on page 347.

Retrieving the Value of an ActiveX or Visual Basic Control Property

Use the **ActiveX_get_info** function to retrieve the value of any ActiveX or Visual Basic control property. The property can have no parameters or a one or two-dimensional array. Properties can also be nested.

For an ActiveX property without parameters, the syntax is as follows:

ActiveX_get_info (*ObjectName*, *PropertyName*, *OutValue* [, *IsWindow*]);



For an ActiveX property that is a one-dimensional array, the syntax is as follows:

```
ActiveX_get_info ( ObjectName, PropertyName ( X ) , OutValue
    [ , IsWindow ] );
```

For an ActiveX property that is a two-dimensional array, the syntax is as follows:

```
ActiveX_get_info ( ObjectName, PropertyName ( X, Y ) , OutValue
    [ , IsWindow ] );
```

ObjectName The name of the ActiveX/Visual Basic control.

PropertyName Any ActiveX/Visual Basic control property.

Tip: You can use the ActiveX tab in the GUI Spy to view the properties of an ActiveX control.

OutValue The output variable that stores the property value.

IsWindow An indication of whether the operation is performed on a window. If it is, set this parameter to TRUE.



Note: The *IsWindow* parameter should be used only when this function is applied to a Visual Basic form to get its property or a property of its sub-object. In order to get a property of a label control you should set this parameter to TRUE. For information on retrieving label control properties, see [Working with Visual Basic Label Controls](#) on page 359.

Note: To get the value of nested properties, you can use any combination of indexed or non-indexed properties separated by a dot. For example:

```
ActiveX_get_info("Grid", "Cell(10,14).Text", Text);
```

Setting the Value of an ActiveX or Visual Basic Control Property

Use the **ActiveX_set_info** function to set the value for any ActiveX or Visual Basic control property. The property can have no parameters or a one or two-dimensional array. Properties can also be nested.



For an ActiveX property without parameters, the syntax is as follows:

```
ActiveX_set_info ( ObjectName, PropertyName, Value [ , Type
    [ , IsWindow ] ] );
```

For an ActiveX property that is a one-dimensional array, the syntax is as follows:

```
ActiveX_set_info ( ObjectName, PropertyName ( X ) , Value [ , Type
    [ , IsWindow ] ] );
```

For an ActiveX property that is a two-dimensional array, the syntax is as follows:

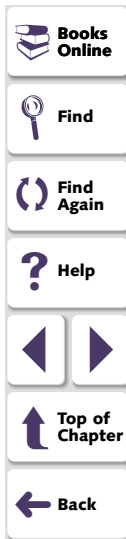
```
ActiveX_set_info ( ObjectName, PropertyName ( X, Y ) , Value [ , Type
    [ , IsWindow ] ] );
```

ObjectName The name of the ActiveX/Visual Basic control.

PropertyName Any ActiveX/Visual Basic control property.

Tip: You can use the ActiveX tab in the GUI Spy to view the properties of an ActiveX control.

Value The value to be applied to the property.



Type The value type to be applied to the property. The following types are available:

VT_I2 (short)	VT_I4 (long)	VT_R4 (float)
VT_R8 (float double)	VT_DATE (date)	VT_BSTR (string)
VT_ERROR (S code)	VT_BOOL (boolean)	VT_UI1 (unsigned char)

IsWindow An indication of whether the operation is performed on a window. If it is, set this parameter to TRUE.

Note: The *IsWindow* parameter should be used only when this function is applied to a Visual Basic form to set its property or a property of its sub-object. In order to get a property of a label control you should set this parameter to TRUE. For information on setting label control properties, see [Working with Visual Basic Label Controls](#) on page 359.



Note: To set the value of nested properties, you can use any combination of indexed or non-indexed properties separated by a dot. For example:

```
ActiveX_set_info("Book", "Chapter(7).Page(2).Caption", "SomeText");
```

For more information on these functions and examples of usage, refer to the *TSL Online Reference*.



Activating an ActiveX Control Method

You use the **ActiveX_activate_method** function to invoke an ActiveX method of an ActiveX control. You can insert this function into the test script using the Function Generator. The syntax of this function is:

```
ActiveX_activate_method ( object, ActiveX_method, return_value  
    [ , parameter1,...,parameter8 ] );
```

For more information on this function, refer to the *TSL Online Reference*.



Working with Visual Basic Label Controls

WinRunner includes the following support for labels (static text controls) within Visual Basic applications:

- [Creating GUI Checkpoints](#)
- [Retrieving Label Control Names](#)
- [Retrieving Label Properties](#)
- [Setting Label Properties](#)

Note: The application should be compiled with the WinRunner agent, as described in [Choosing Appropriate Support for Visual Basic Applications](#) on page 344.



Creating GUI Checkpoints

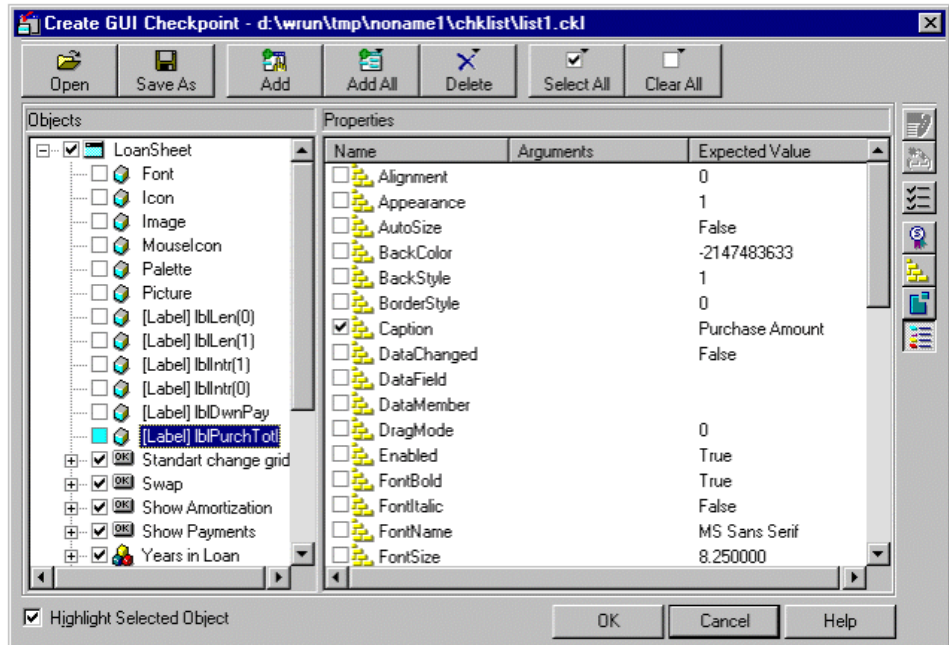
You can create GUI checkpoints on Visual Basic label controls.

To check Visual Basic Label controls:

- 1 Choose **Create > GUI Checkpoint > For Multiple Objects**. The Create GUI Checkpoint dialog box opens.
- 2 Click the **Add** button and click on the Visual Basic form containing Label controls.
- 3 The Add All dialog box opens. If you are not checking anything else in this checkpoint, you can clear the Objects check box. Click **OK**. Right-click to finish adding the objects. In the Create GUI Checkpoint dialog box, all labels are listed in the Objects pane as sub-objects of the VB form window. The names of these sub-objects are *vb_names* prefixed by the "[Label]" string.



- When you select a label control in the Object pane, its properties and their values are displayed in the Properties pane. The default check for the label control is the **Caption** property check. You can also select other property checks to perform.



Retrieving Label Control Names

You use the **vb_get_label_names** function to retrieve the list of label controls within the Visual Basic form. This function has the following syntax:

vb_get_label_names (*window*, *name_array*, *count*);

<i>window</i>	The logical name of the Visual Basic form.
<i>name_array</i>	The out parameter containing the name of the storage array.
<i>count</i>	The out parameter containing the number of elements in the array.

This function retrieves the names of all label controls in the given form window. The names are stored as subscripts of an array.

Note: The first element in the array index is numbered 1.

For more information on this function and an example of usage, refer to the *TSL Online Reference*.



Retrieving Label Properties

You use the **ActiveX_get_info** function to retrieve the property value of a label control within a Visual Basic form. This function is described in [Retrieving and Setting the Values of ActiveX and Visual Basic Control Properties](#) on page 352.

Setting Label Properties

You use the **ActiveX_set_info** function to set the property value of the label control. This function is described in [Retrieving and Setting the Values of ActiveX and Visual Basic Control Properties](#) on page 352.



Checking Sub-Objects of ActiveX and Visual Basic Controls

ActiveX and Visual Basic controls may contain sub-objects, which contain their own properties. An example of a sub-object is Font. Note that Font is a sub-object because it cannot be highlighted in the application you are testing. When you load the appropriate add-in support, you can create a GUI checkpoint that checks the properties of a sub-object using the Check GUI dialog box. For information on GUI checkpoints, see Chapter 12, [Checking GUI Objects](#).

In the example below, WinRunner checks the properties of the Font sub-object of an ActiveX table control. The example in the procedure below uses WinRunner with add-in support for Visual Basic and the Flights table in the sample Visual Basic Flights application.

To check the sub-objects of an ActiveX or a Visual Basic control:

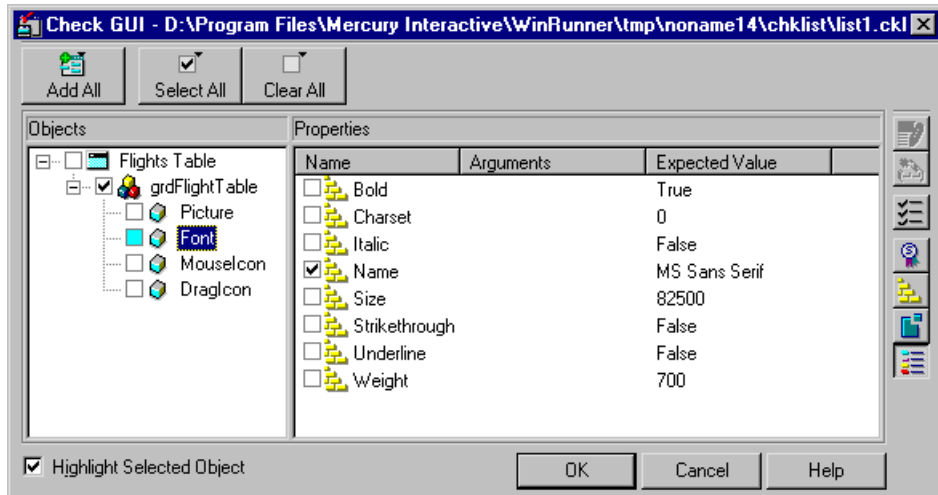


- 1 Choose **Create > GUI Checkpoint > For Object/Window** or click the **GUI Checkpoint for Object/Window** button on the User toolbar.
- 2 Double-click the control in the application you are testing.

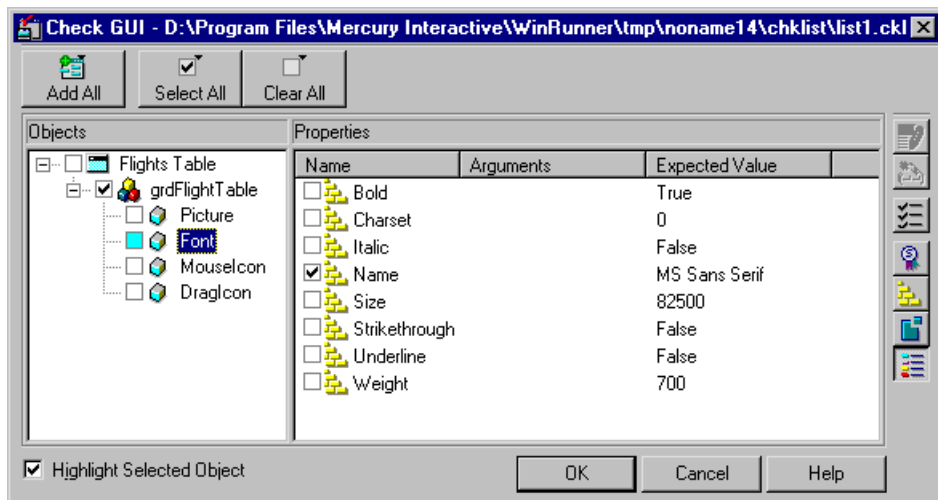
WinRunner may take a few seconds to capture information about the control.



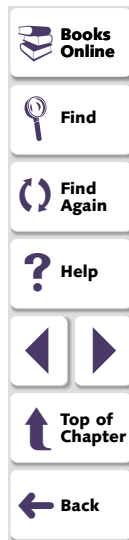
The Check GUI dialog box opens.



- In the **Objects** pane, click the Expand sign (+) beside the object to display its sub-objects, and select a sub-object to display its ActiveX control properties.

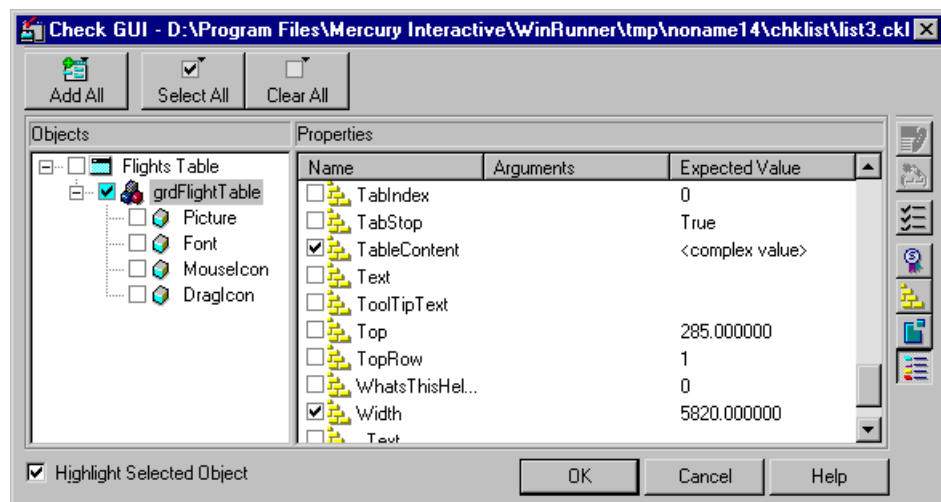


The **Objects** pane displays the object and its sub-objects. In this example, the sub-objects are displayed under the “grdFlightTable” object. The **Properties** pane displays the properties of the sub-object that is highlighted in the Objects pane. Note that each sub-object has one or more default property checks. In this example, the properties of the Font sub-object are displayed, and the Name property of the Font sub-object is selected as a default check.



Specify which sub-objects of the table to check: first, select a sub-object in the Objects pane; next, select the properties to check in the Properties pane.

Note that since this ActiveX control is a table, by default, checks are selected on the Height, Width, and Table Content properties. If you do not want to perform these checks, clear the appropriate check boxes. For information on checking table contents, see Chapter 16, [Checking Table Contents](#).



- 4 Click **OK** to close the dialog box.

An `obj_check_gui` statement is inserted into your test script. For more information on the `obj_check_gui` function, see Chapter 12, [Checking GUI Objects](#), or refer to the *TSL Online Reference*.



Using TSL Table Functions with ActiveX Controls

You can use the TSL **tbi_** functions to work with a number of ActiveX controls. WinRunner contains built-in support for the ActiveX controls and the functions in the table below. For detailed information about each function, examples of usage, and supported versions of ActiveX controls, refer to the *TSL Online Reference*.

**Books
Online****Find****Find
Again****Help****Top of
Chapter****Back**

	Data Bound Grid Control	FarPoint Spreadsheet Control	MicroHelp MH3d List Control	Microsoft Grid Control	Sheridan Data Grid Control	True DBGrid Control
tbl_activate_cell	✓	✓	✓	✓	✓	✓
tbl_activate_header	✓	✓	✓	✓	✓	✓
tbl_get_cell_data	✓	✓	✓	✓	✓	✓
tbl_get_cols_count	✓	✓	✓	✓	✓	✓
tbl_get_column_name	✓	✓	✓	✓	✓	✓
tbl_get_rows_count		✓	✓	✓	✓	✓
tbl_get_selected_cell	✓	✓	✓	✓	✓	✓
tbl_get_selected_row	✓	✓	✓		✓	✓
tbl_select_col_header	✓	✓	✓	✓	✓	✓
tbl_set_cell_data	✓	✓	✓	✓	✓	✓
tbl_set_selected_cell	✓	✓	✓	✓	✓	✓
tbl_set_selected_row	✓	✓	✓	✓		✓



Creating Tests

Checking Web Pages

Using WinRunner with the WebTest add-in, you can create checkpoints to check the functionality of Web sites.

This chapter describes:

- **Checking Standard Frame Properties**
- **Checking the Object Count in Frames**
- **Checking the Structure of Frames, Tables, and Cells**
- **Checking the Content of Frames, Cells, Links, or Images**
- **Checking the Number of Columns and Rows in a Table**
- **Checking the URL of Links**
- **Checking Source or Type of Images and Image Links**
- **Checking Color or Font of Text Links**
- **Checking Broken Links**
- **Checking the Content of Tables**
- **Checking Links and Images in a Frame**
- **Understanding the Edit Check Dialog Box**
- **Checking Text**



About Checking Web Pages

You can use GUI checkpoints in your test scripts to help you check the behavior of Web objects in your Web site. You can check frames, tables, cells, links, and images on a Web page for differences between test runs. You can define GUI checkpoints according to default properties recommended by WinRunner, or you can define custom checks by selecting other properties. For general information on GUI checkpoints, see Chapter 12, [Checking GUI Objects](#).

You can also add text checkpoints in your test scripts to read and check text in Web objects and in areas of the Web page.

Note that before you begin testing your Web site, you must first load WinRunner with the WebTest add-in. For more information, see [Loading WinRunner Add-Ins](#) on page 55.



Checking Standard Frame Properties

You can create a GUI checkpoint to check standard properties of a frame.

To check standard frame properties:

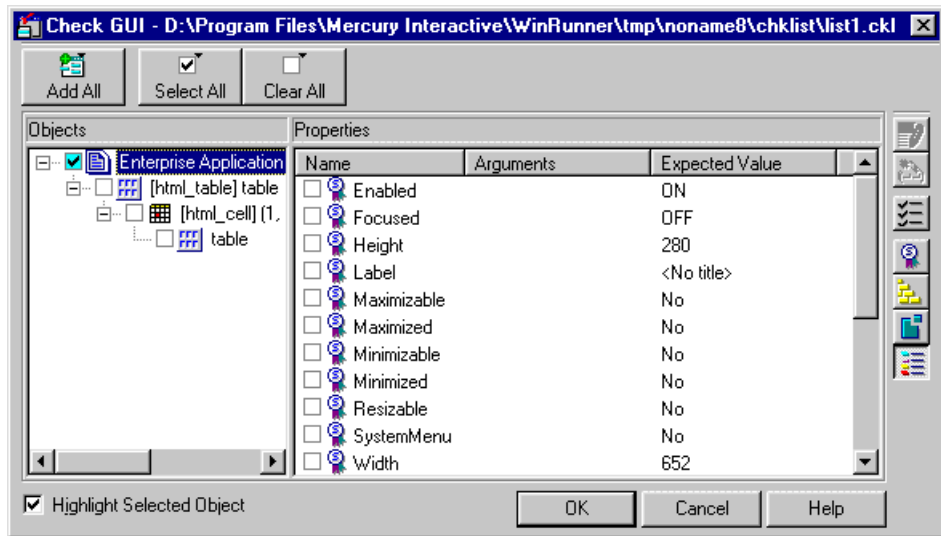


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

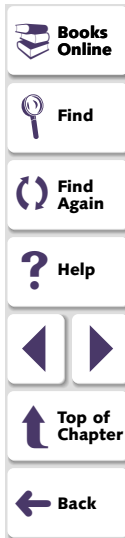
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click an object on your Web page. The Check GUI dialog box opens, and the object is highlighted.



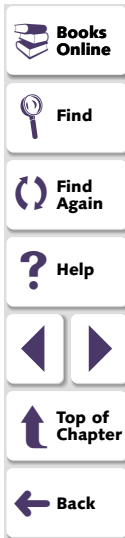
- 3 In the **Objects** column, make sure that the frame is selected.
The Properties column indicates the available standard properties and the default check for that frame.
- 4 In the **Properties** column, choose the properties you want WinRunner to check.



You can check the following standard properties:

- **Enabled** checks whether the frame can be selected.
 - **Focused** checks whether keyboard input will be directed to this frame.
 - **Label** checks the frame's label.
 - **Minimizable** and **Maximizable** check whether the frame can be minimized or maximized.
 - **Minimized** and **Maximized** check whether the frame is minimized or maximized.
 - **Resizable** checks whether the frame can be resized.
 - **SystemMenu** checks whether the frame has a system menu.
 - **Width** and **Height** check the frame's width and height, in pixels.
 - **X** and **Y** check the x and y coordinates of the top left corner of the frame.
- 5 Click **OK** to close the dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as a **win_check_gui** statement. For more information on the **win_check_gui** function, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking the Object Count in Frames

You can create a GUI checkpoint to check the number of objects in a frame.

To check the object count in a frame:

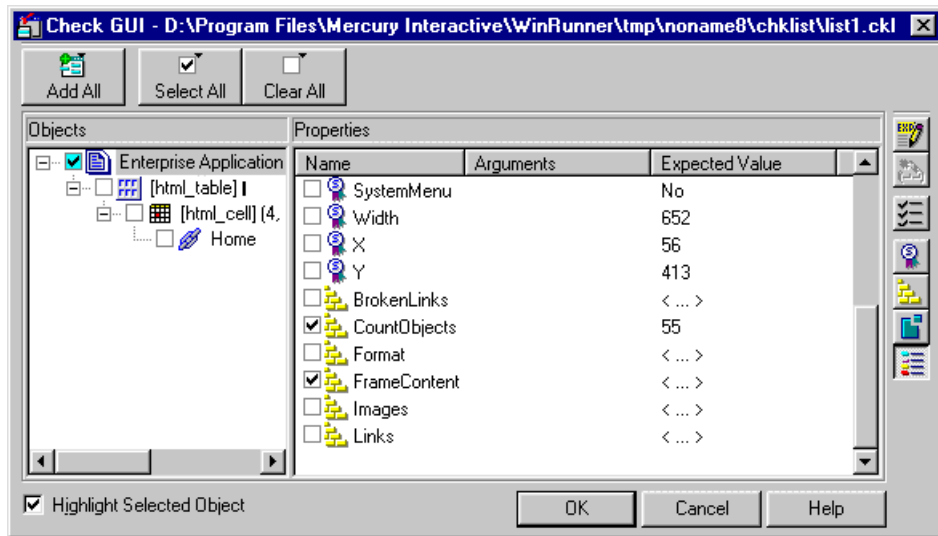


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

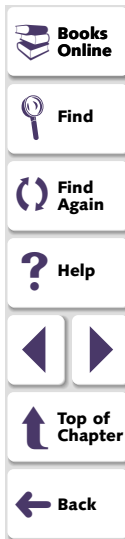
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click an object on your Web page. The **Check GUI** dialog box opens, and the object is highlighted.



- 3 In the **Objects** column, make sure that the frame is selected.
The Properties column indicates the properties available for you to check.
- 4 In the **Properties** column, select the **CountObjects** check box.



- 5 To edit the expected value of the property, highlight **CountObjects**.



Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. A spin box opens.

Enter the expected number of objects.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as a **win_check_gui** statement. For more information on the **win_check_gui** function, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking the Structure of Frames, Tables, and Cells

You can create a GUI checkpoint to check the structure of frames, tables, and cells on a Web page.

To check the structure of a frame, table, or cell:

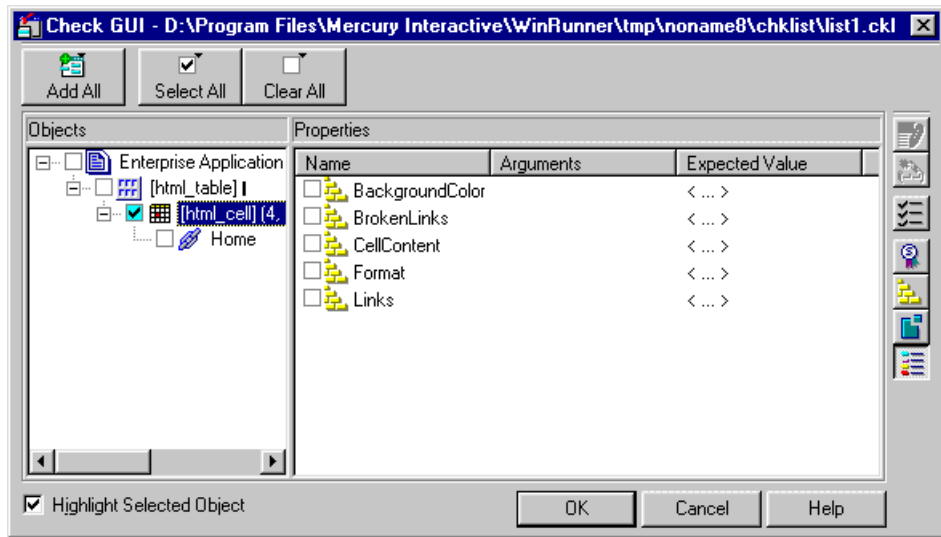


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

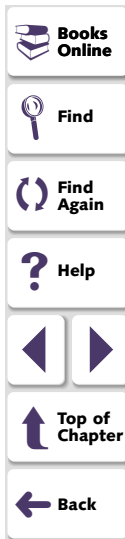
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click an object on your Web page. The Check GUI dialog box opens, and the object is highlighted.



- 3 In the **Objects** column, select an object.
The Properties column indicates the properties available for you to check.
- 4 In the **Properties** column, select the **Format** check box.



- 5 To edit the expected value of the property, highlight **Format**.



Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. A text file opens in Notepad describing the structure of the frame, table, or cell.

Modify the expected structure.

Save the text file and close Notepad.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as an **obj_check_gui** or **win_check_gui** statement. For more information on the **obj_check_gui** and **win_check_gui** functions, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking the Content of Frames, Cells, Links, or Images

You can create a GUI checkpoint to check the content of a frame, cell, text link, image link, or an image. To check the content of a table, see [Checking the Content of Tables](#) on page 401.

To check content:

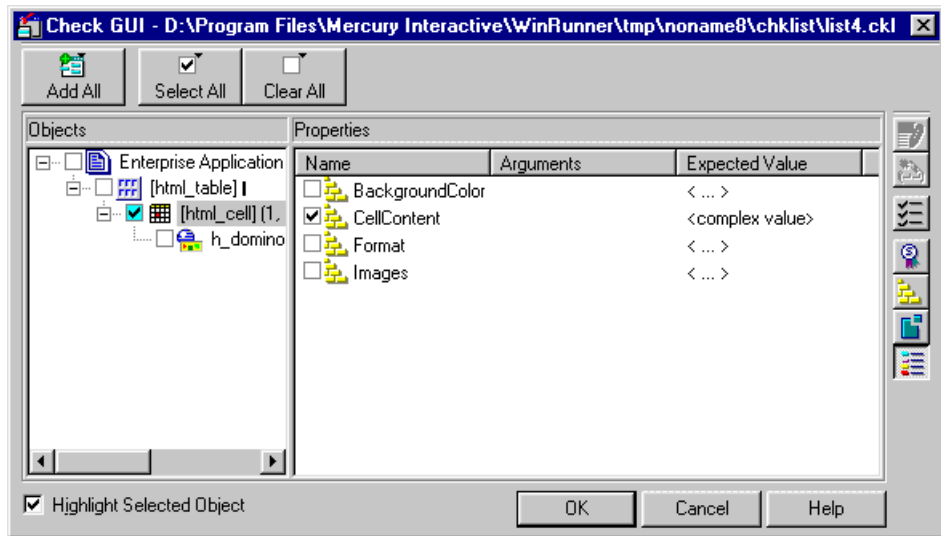


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click an object on your Web page. The Check GUI dialog box opens, and the object is highlighted.

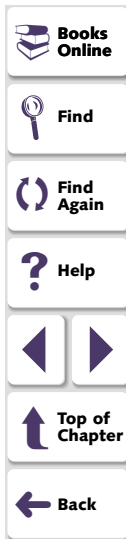



- 3 In the **Objects** column, select an object (frame, cell, text link, image link, or an image).

The Properties column indicates the properties available for you to check.

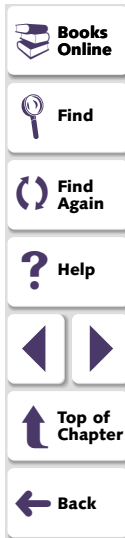
- 4 In the **Properties** column, select one of the following checks:

- If your object is a frame, select the **FrameContent** check box.



- If your object is a cell, select the **CellContent** check box.
 - If your object is a text link, select the **Text** check box.
 - If your object is an image link, select the **ImageContent** check box.
 - If your object is an image, select the **ImageContent** check box.
- 5** To edit the expected value of a the property, highlight a property.
 Note that you cannot edit the expected value of the **ImageContent** property.
-  **6** Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it.
- For the **FrameContent** property, an editor opens.
 - For the **CellContent** property, an editor opens.
 - For the **Text** property, an edit box opens.
- 7** Modify the expected value.
- 8** Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as an **obj_check_gui** or **win_check_gui** statement. For more information on the **obj_check_gui** and **win_check_gui** functions, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking the Number of Columns and Rows in a Table

You can create a GUI checkpoint to check the number of columns and rows in a table.

To check the number of columns and rows in a table:

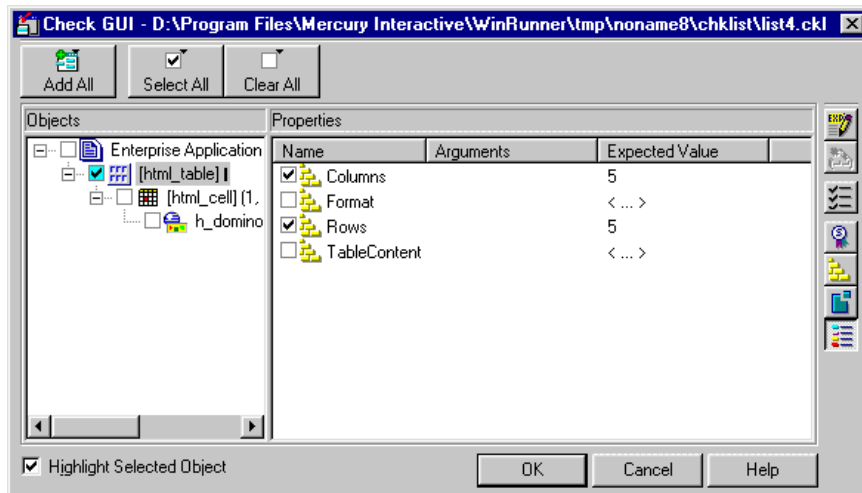


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

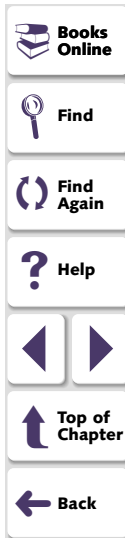
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click a table on your Web page. The Check GUI dialog box opens, and the object is highlighted.



- 3 In the **Objects** column, make sure the table is selected.
The Properties column indicates the properties available for you to check.
- 4 In the **Properties** column, select the **Columns** and/or **Rows** check box.



- 5 To edit the expected value of a property, highlight **Columns** or **Rows**.

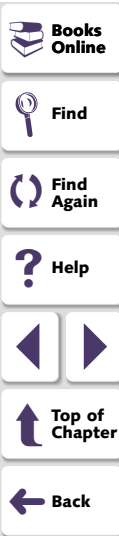


Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. A spin box opens.

Edit the expected value of the property, as desired.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as an **obj_check_gui** or **win_check_gui** statement. For more information on the **obj_check_gui** and **win_check_gui** functions, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking the URL of Links

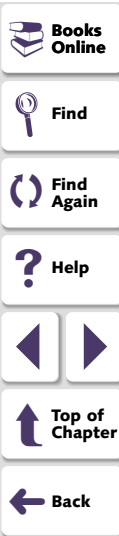
You can create a GUI checkpoint to check the URL of a text link or an image link in your Web page.

To check the URL of a link:

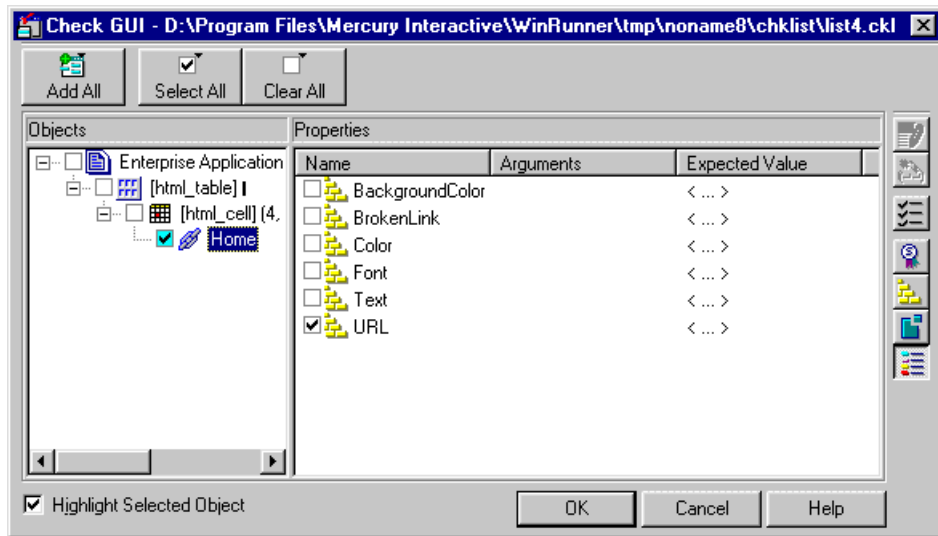


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click a text link on your Web page. The Check GUI dialog box opens, and the object is highlighted.



- 3 In the **Objects** column, make sure that link is selected.
The **Properties** column indicates the properties available for you to check.
- 4 In the **Properties** column, select **URL** to check address of the link.



- 5 To edit the expected value of the URL property, highlight **URL**.



Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. An edit box opens.

Edit the expected value.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as an **obj_check_gui** statement. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking Source or Type of Images and Image Links

You can create a GUI checkpoint to check the source and the image type of an image or an image link in your Web page.

To check the source or type of an image or an image link:

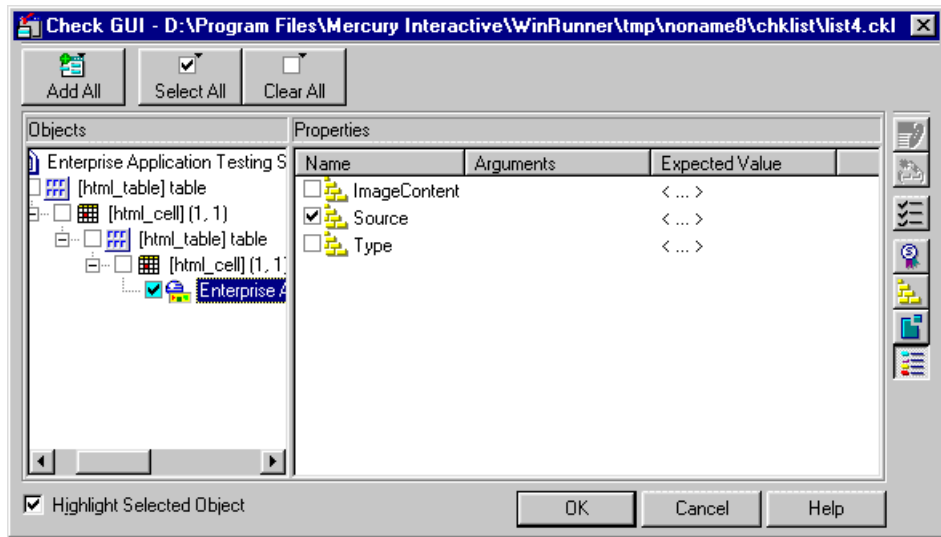


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

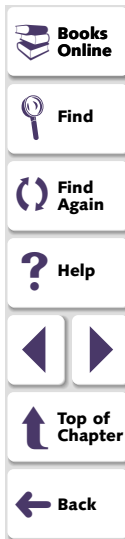
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click an image or image link on your Web page. The Check GUI dialog box opens, and the object is highlighted.



- 3 In the **Objects** column, make sure that the image or the image link is selected. The Properties column indicates the properties available for you to check.



- 4 In the Properties column, select a property check.
 - **Source** indicates the location of the image.
 - **Type** indicates whether the object is a plain image, an image link, or an image map.

- 5 To edit the expected value of the property, highlight a property.

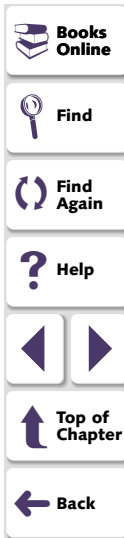


Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. An edit box opens.

Edit the expected value.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as an **obj_check_gui** statement. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference (Help > TSL Online Reference)*.



Checking Color or Font of Text Links

You can create a GUI checkpoint to check the color and font of a text link in your Web page.

To check the color or font of a text link:

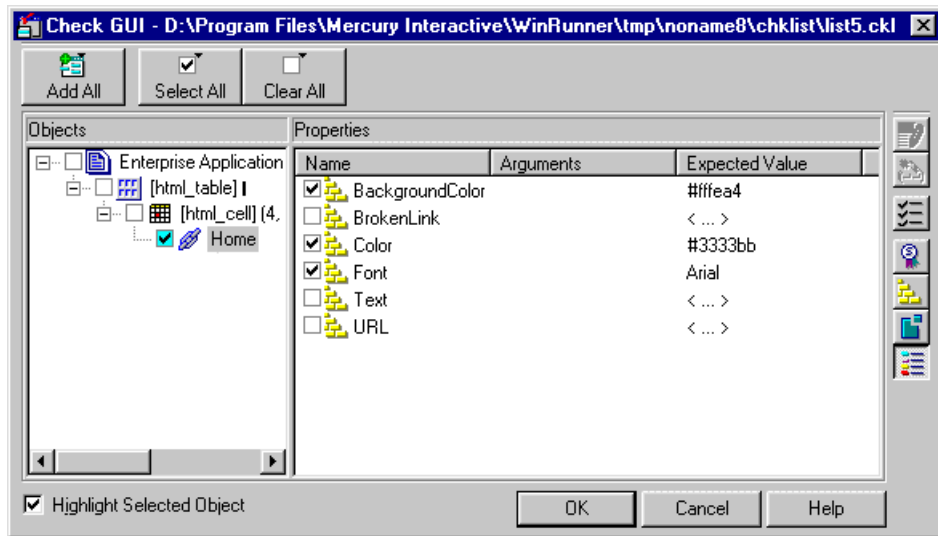


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

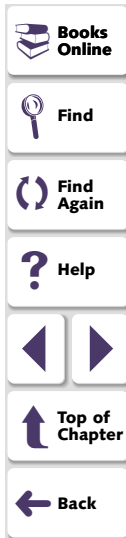
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click a text link on your Web page. The Check GUI dialog box opens, and the object is highlighted.



- 3 In the **Objects** column, make sure that the text link is selected.
The Properties column indicates the properties available for you to check.



- 4 In the Properties column, select a property check.
 - **BackgroundColor** indicates the background color of a text link.
 - **Color** indicates the foreground color of a text link.
 - **Font** indicates the font of a text link.

- 5 To edit the expected value of a property, highlight a property.

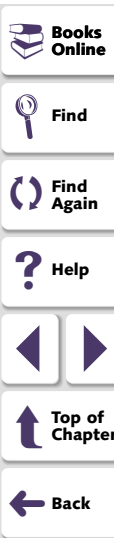


Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. A box opens.

Edit the expected value.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as an **obj_check_gui** statement. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking Broken Links

You can create a checkpoint to check whether a text link or an image link is active. You can create a checkpoint to check a single broken link or all the broken links in a frame.

To check a single broken link:

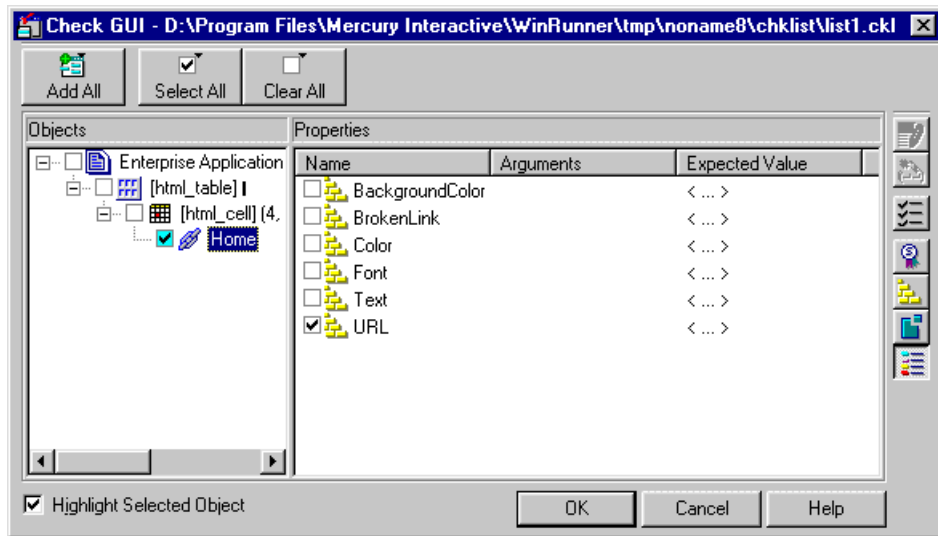


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

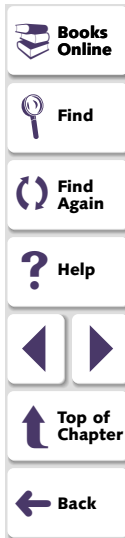
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click a link on your Web page. The Check GUI dialog box opens, and the object is highlighted.



- 3 In the **Objects** column, make sure that the link is selected.
The Properties column indicates the properties available for you to check.
- 4 In the **Properties** column, select the **BrokenLink** check box.



- 5 To edit the expected value of the property, highlight **BrokenLink**.



Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. A combo box opens.

Select **Valid** or **NotValid**. Valid indicates that the link is active, and NotValid indicates that the link is broken.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as an **obj_check_gui** or **win_check_gui** statement. For more information on the **obj_check_gui** and **win_check_gui** function, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).

To check all broken links in a frame:

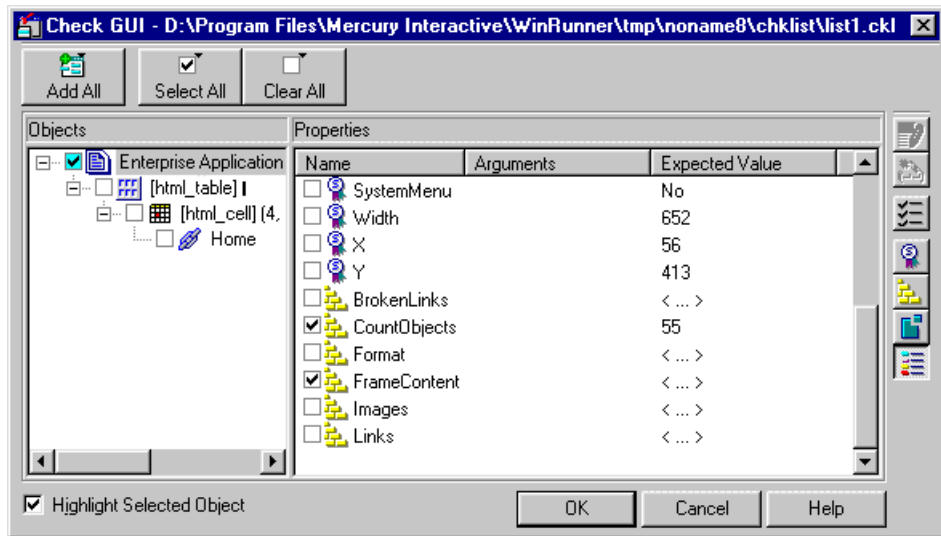


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

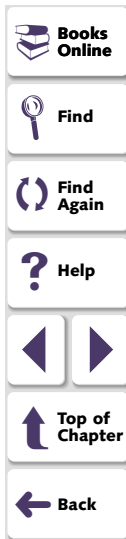
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click an object on your Web page. The Check GUI dialog box opens, and an object is highlighted.



- 3 In the **Objects** column, make sure that frame is selected.
The Properties column indicates the properties available for you to check.
- 4 In the **Properties** column, select the **BrokenLinks** check box.



- 5 To edit the expected value of the property, highlight **BrokenLinks**.



Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. The Edit Check dialog box opens.

You can specify which links to check, and which verification method and verification type to use. You can also edit the expected data. For additional information on using this dialog box, see [Understanding the Edit Check Dialog Box](#) on page 407.

When you are done, click **OK** to save and close the Edit Check dialog box. The Check GUI dialog box is restored.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as a **win_check_gui** statement. For more information on the **win_check_gui** function, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking the Content of Tables

You can create a checkpoint to check the text content of a table.

To check the content of a table:

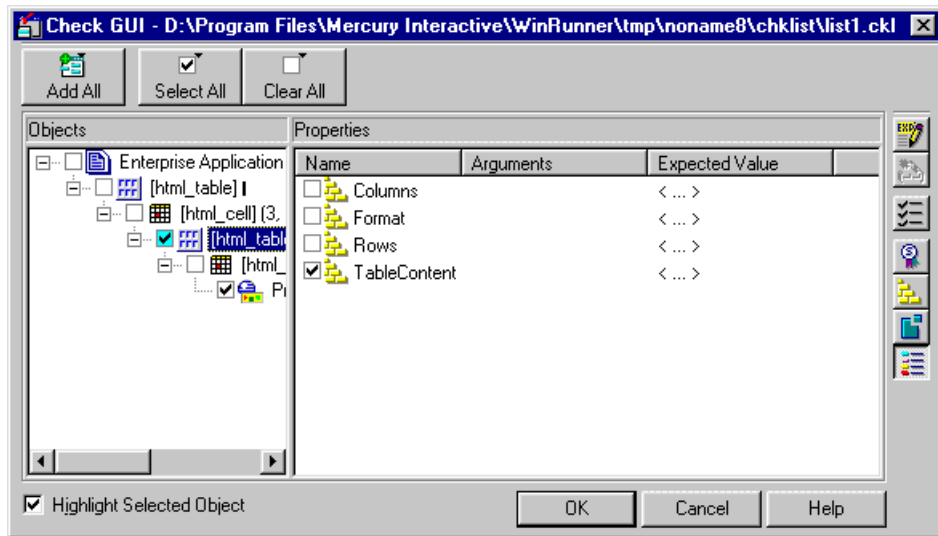


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

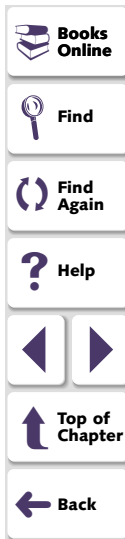
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click a table on your Web page. The Check GUI dialog box opens, and an object is highlighted.



- 3 In the **Objects** column, make sure that the table is selected.
The Properties column indicates the properties available for you to check.
- 4 In the **Properties** column, select the **TableContent** check box.



- 5 To edit the expected value of the property, highlight **TableContent**.



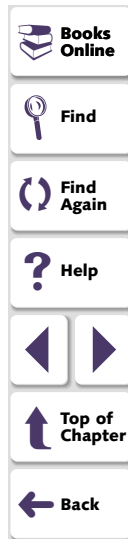
Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. The **Edit Check** dialog box opens.

You can specify which column or rows to check in the table, and which verification method and verification type to use. You can also edit the expected data. For additional information on using this dialog box, see [Understanding the Edit Check Dialog Box](#) on page 407.

When you are done, click **OK** to save and close the Edit Check dialog box. The Check GUI dialog box is restored.

- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as a **win_check_gui** statement. For more information on the **win_check_gui** function, refer to the *TSL Online Reference* (**Help > TSL Online Reference**).



Checking Links and Images in a Frame

You can create a checkpoint to check image links, text links and images in a frame.

To check links and images in a frame:

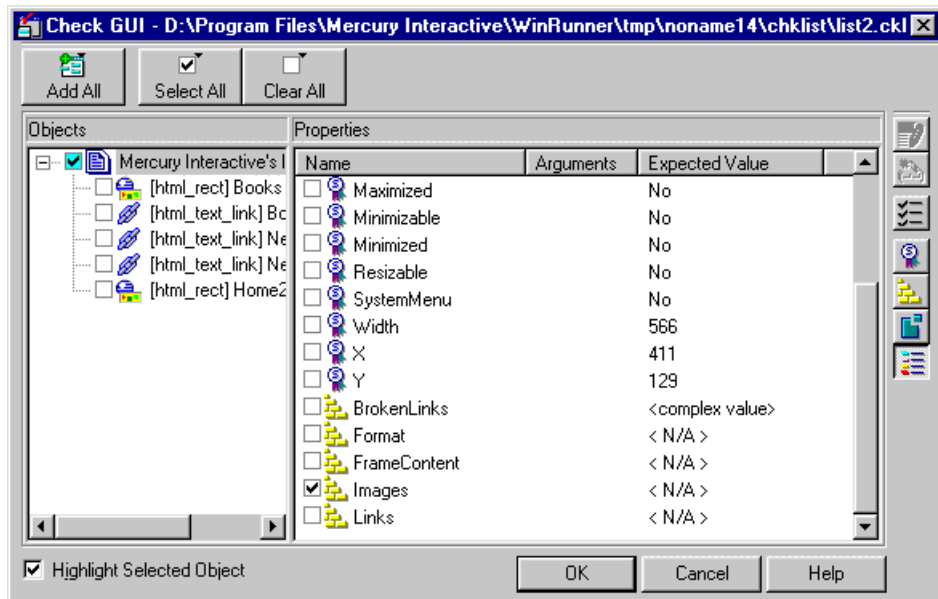


- 1 Choose **Create > GUI Checkpoint > For Object/Window**.

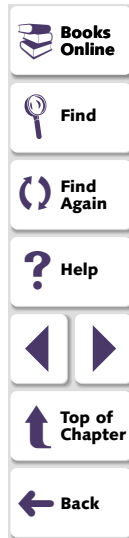
The WinRunner window is minimized to an icon, the mouse pointer turns into a pointing hand, and a help window opens.



- 2 Double-click an object on your Web page. The Check GUI dialog box opens, and an object is highlighted.



- 3 In the **Objects** column, make sure that frame object is selected.
The Properties column indicates the properties available for you to check.



- 4 In the **Properties** column, select one of the following checks:
 - To check images or image links, select the **Images** check box.
 - To check text links, select the **Links** check box.



- 5 To edit the expected value of the property, highlight **Images**.

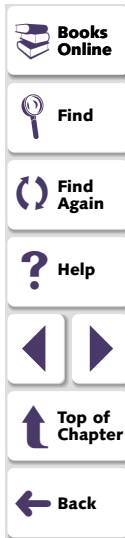
Click the **Edit Expected Value** button, or double-click the value in the **Expected Value** column to edit it. The **Edit Check** dialog box opens.

You can specify which images or links to check in the table, and which verification method and verification type to use. You can also edit the expected data. For additional information on using this dialog box, see [Understanding the Edit Check Dialog Box](#) on page 407.

When you are done, click **OK** to save and close the Edit Check dialog box. The Check GUI dialog box is restored.

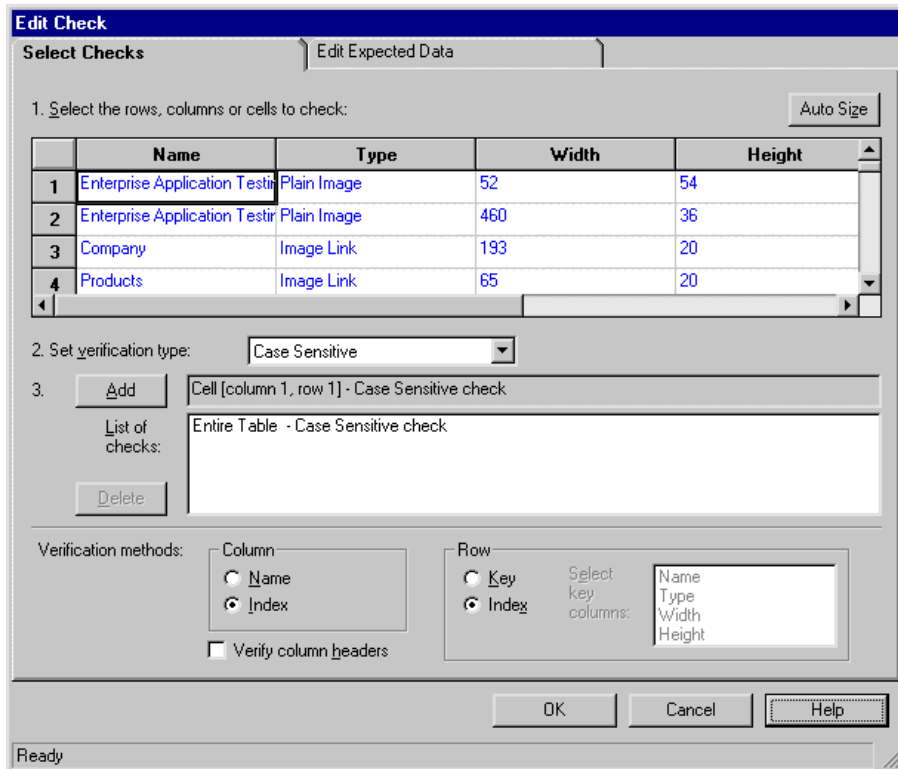
- 6 Click **OK** to close the Check GUI dialog box.

WinRunner captures the object information and stores it in the test's expected results folder. The WinRunner window is restored and a checkpoint appears in your test script as a **win_check_gui** statement. For more information on the **win_check_gui** function, refer to the *TSL Online Reference (Help > TSL Online Reference)*.



Understanding the Edit Check Dialog Box

The Edit Check dialog box enables you to specify which cells in a table to check, and which verification method and verification type to use. You can also edit the expected data for the table cells included in the check.



In the **Select Checks** tab, you can specify the information that is saved in the GUI checklist:

- which table cells to check
- the verification method
- the verification type

Note that if you are creating a check on a single-column table, the contents of the Select Checks tab of the Edit Check dialog box differ from what is shown above. For additional information, see [Specifying the Verification Method for a Single-Column Table](#) on page 413.

Specifying which Cells to Check

The **List of Checks** pane displays all the checks that will be performed, including the verification type. When the Edit Check dialog box is opened for the first time for a checkpoint, the default check is displayed:

- The default check for a multiple-column table is a case sensitive check on the entire table by column name and row index.
- The default check for a single-column table is a case sensitive check on the entire table by row position.



Note: If your table contains multiple columns with the same name, WinRunner disregards the duplicate columns and does not perform checks on them. Therefore, you should select the column index option.

If you do not wish to accept the default settings, you must delete the default check before you specify the checks to perform. Select the “Entire Table - Case Sensitive check” entry in the **List of Checks** box and click the **Delete** button. Alternatively, double-click this entry in the **List of Checks** box. A WinRunner message prompts you to delete the highlighted check. Click **Yes**.

Next, specify the checks to perform. You can choose different verification type for different selections of cells. Therefore, specify the verification type before selecting cells. For more information, see [Specifying the Verification Type](#) on page 414.

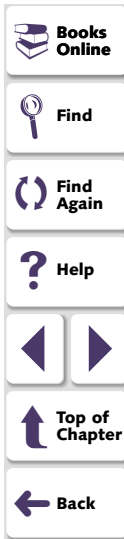


Highlight the cells on which you want to perform the content check. Next, click the **Add** button toolbar to add a check for these cells. Alternatively, you can:

- double-click a cell to check it
- double-click a row header to check all the cells in a row
- double-click a column header to check all the cells in a column
- double-click the top-left corner to check the entire table



A description of the cells to be checked appears in the **List of Checks** box.



Specifying the Verification Method

You can select the verification method to control how WinRunner identifies columns or rows within a table. The verification method applies to the entire table. Specifying the verification method is different for multiple-column and single-column tables.

Specifying the Verification Method for a Multiple-Column Table

Column

- **Name:** WinRunner looks for the selection according to the column names. A shift in the position of the columns within the table does not result in a mismatch.
- **Index:** WinRunner looks for the selection according to the index, or position, of the columns. A shift in the position of the columns within the table results in a mismatch. Select this option if your table contains multiple columns with the same name. For additional information, see the note on [page 409](#). Choosing this option enables the **Verify column headers** check box, which enables you to check column headers as well as cells.



Row

- **Key:** WinRunner looks for the rows in the selection according to the data in the key column(s) specified in the **Select key columns** list box. For example, you could tell WinRunner to identify the second row in the table on page x based on the arrival time for that row. A shift in the position of the rows does not result in a mismatch. If the key selection does not uniquely identify a row, WinRunner checks the first matching row. You can use more than one key column to uniquely identify the row.

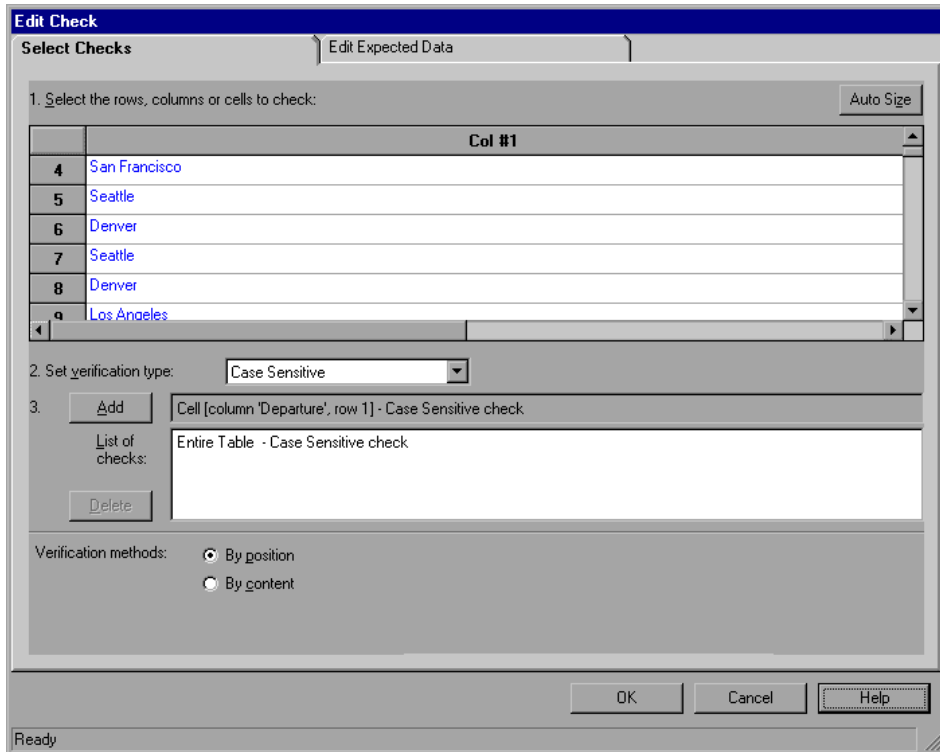
Note: If the value of a cell in one or more of the key columns changes, WinRunner will not be able to identify the corresponding row, and a check of that row will fail with a “Not Found” error. If this occurs, select a different key column or use the Index verification method.

- **Index** (default setting): WinRunner looks for the selection according to the index, or position, of the rows. A shift in the position of any of the rows results in a mismatch.



Specifying the Verification Method for a Single-Column Table

The Verification Method box in the Select Checks tab for a single-column table is different from that for a multiple-column table. The default check for a single-column table is a case sensitive check on the entire table by row position.



- **By position:** WinRunner checks the selection according to the location of the items within the column.
- **By content:** WinRunner checks the selection according to the content of the items, ignoring their location in the column.

Specifying the Verification Type

WinRunner can verify the contents of a table in several different ways. You can choose different verification types for different selections of cells.

- **Case Sensitive** (the default): WinRunner compares the text content of the selection. Any difference in case or text content between the expected and actual data results in a mismatch.
- **Case Insensitive:** WinRunner compares the text content of the selection. Only differences in text content between the expected and actual data result in a mismatch.
- **Numeric Content:** WinRunner evaluates the selected data according to numeric values. WinRunner recognizes, for example, that “2” and “2.00” are the same number.
- **Numeric Range:** WinRunner compares the selected data against a numeric range. Both the minimum and maximum values are any real number that you specify. This comparison differs from text and numeric content verification in that the actual table data is compared against the range that you defined and not against the expected results.



Note: This option causes a mismatch on any string that does not begin with a number. A string starting with 'e' is translated into a number.

- **Case Sensitive Ignore Spaces:** WinRunner checks the data in the cell according to case and content, ignoring differences in spaces. WinRunner reports any differences in case or content as a mismatch.
- **Case Insensitive Ignore Spaces:** WinRunner checks the content in the cell according to content, ignoring differences in case and spaces. WinRunner reports only differences in content as a mismatch.

Click **OK** to save your changes to both tabs of the Edit Check dialog box. The dialog box closes and the Check GUI dialog box is restored.



Editing the Expected Data



To edit the expected data in the table, click the **Edit Expected Data** tab. If you previously saved changes in the Select Checks tab, you can click **Reload Table** to reload the table selections from the checklist. A WinRunner message prompts you to reload the saved data. Click **Yes**.



Note that if you previously saved changes to the Select Checks tab, and then reopened the Edit Check dialog box, the table appears color coded in the Edit Expected Data tab. The cells included in the check appear in blue on a white background. The cells excluded from the check appear in green on a yellow background.

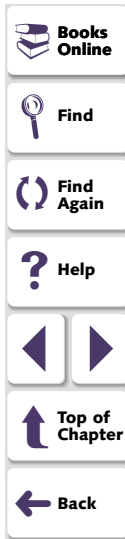
The screenshot shows the 'Edit Check' dialog box with the 'Edit Expected Data' tab selected. The dialog has a title bar 'Edit Check' and two tabs: 'Select Checks' and 'Edit Expected Data'. Below the tabs is a table with 10 rows and 8 columns. The first column is an index from 1 to 10. The other columns are labeled 'Col #1' through 'Col #8'. The data in the table is as follows:

	Col #1	Col #2	Col #3	Col #4	Col #5	Col #6	Col #7	Col #8
1	1	John Doe	1999-07-11 1	6232	1	1	test	N
2	2	Fred Smith	1999-07-12 1	4295	3	2	test	N
3	3	Mary Parker	1999-07-13 1	4194	5	3	test	N
4	4	Jon Baker	1999-07-14 1	4219	4	2	test	N
5	5	Kim Smith	1999-07-15 1	6195	6	1	test	N
6	6	Joe Shmoe	1999-07-16 1	4210	1	2	test	N
7	7	Jane Doe	1999-07-17 1	3291	9	1	test	N
8	8	Bob Johnson	1999-07-18 1	6218	2	2	test	N
9	9	Jack Barnes	1999-07-19 1	6232	1	1	test	N
10	10	Jane Hansen	1999-07-20 1	4214	2	3	test	N

At the bottom of the dialog are three buttons: 'OK', 'Cancel', and 'Help'. The status bar at the very bottom shows 'Ready'.



To edit the expected value of data in a cell, double-click inside the cell. A cursor appears in the cell. Change the contents of the cell, as desired. Click **OK** to save your changes to both tabs of the Edit Check dialog box. The dialog box closes and the Check GUI dialog box is restored.



Checking Text

You can use text checkpoints in your test scripts to read and check text in Web objects and in areas of the Web page. While creating a test, you point to an object or a frame containing text. WebTest reads the text and writes a TSL statement to the test script. You may then add simple programming elements to your test scripts to verify the contents of the text.

You can use a text checkpoint to:

- read a text string or all the text from a Web object or frame, using **web_obj_get_text** or **web_frame_get_text**
- check that a text string exists in a Web object or frame, using **web_obj_text_exists** or **web_frame_text_exists**

Reading All the Text in a Frame or an Object

You can read all the visible text in a frame or an object using **web_obj_get_text** or **web_frame_get_text**.

To read all the text in a frame or an object:



- 1 Choose **Create > Get Text > From Object/Window**.

WinRunner is minimized, the mouse pointer becomes a pointing hand, and a help window opens.



- 2 Click the Web object or the frame.

WinRunner captures the text in the object and a **web_obj_get_text** or a **web_frame_get_text** statement is inserted in your test script.

Note: When the WebTest add-in is not loaded, or when a non-Web object is selected, WinRunner generates a **win_get_text** or **obj_get_text** statement in your test script. For more information on the **_get_text** functions, refer to the *TSL Online Reference* (**Help > TSL Online Reference**). For more information on checking text in a non-Web object, see Chapter 19, **Checking Text**.

Reading a Text String from a Frame or an Object

You can read a text string from a frame or an object using the **web_obj_get_text** or **web_frame_get_text** function.

To read a text string from a frame or an object:

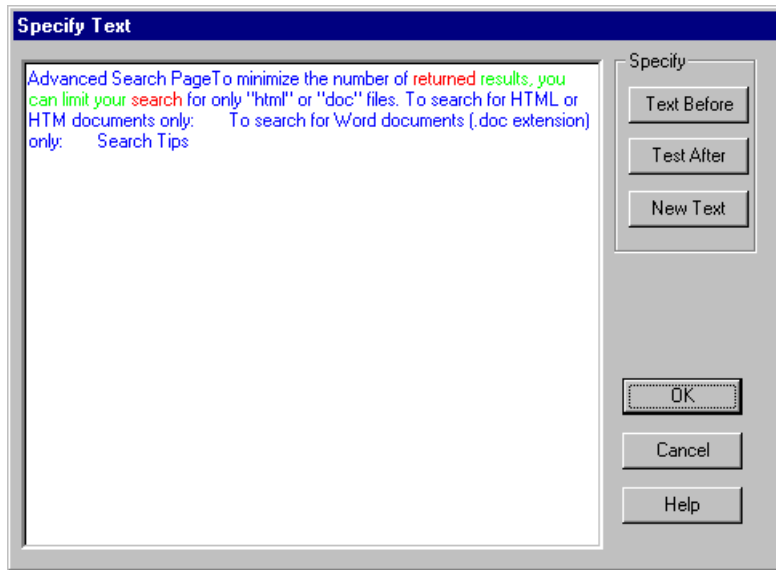
- 1 Choose **Create > Get Text > From Selection (WebTest only)**.

WinRunner is minimized, the mouse pointer becomes a pointing hand, and a Help window opens.

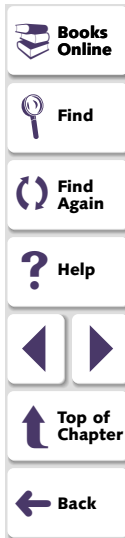
- 2 Highlight the text string to be read.



- 3 On the highlighted text string, right-click the mouse button to capture the string. The Specify Text dialog box opens.



The text string to be read is displayed in green. The red text that is displayed on the left and right of your selection, defines the bounds of the string.



4 You can modify your text selections.

- To modify your highlighted text selection, highlight a new text string and click **New Text**.

Your new text selection is displayed in green. The text that appears before and after your text string is displayed in red.

- To modify the red text string that appears to the left of your selection, highlight a new text string and click **Text Before**.
- To modify the red text string that appears to the right of your selection, highlight a new text string and click **Text After**.

5 Click **OK** to close the Specify Text dialog box.

The WinRunner window is restored and a **web_obj_get_text** or a **web_frame_get_text** statement is inserted in your test script.

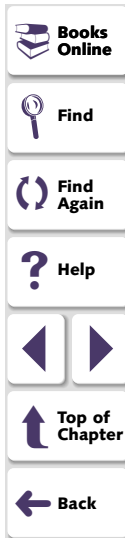
Checking that a Text String Exists in a Frame or an Object

You can check whether a text string exists in an object or a frame using **web_obj_text_exists** or **web_frame_text_exists**.

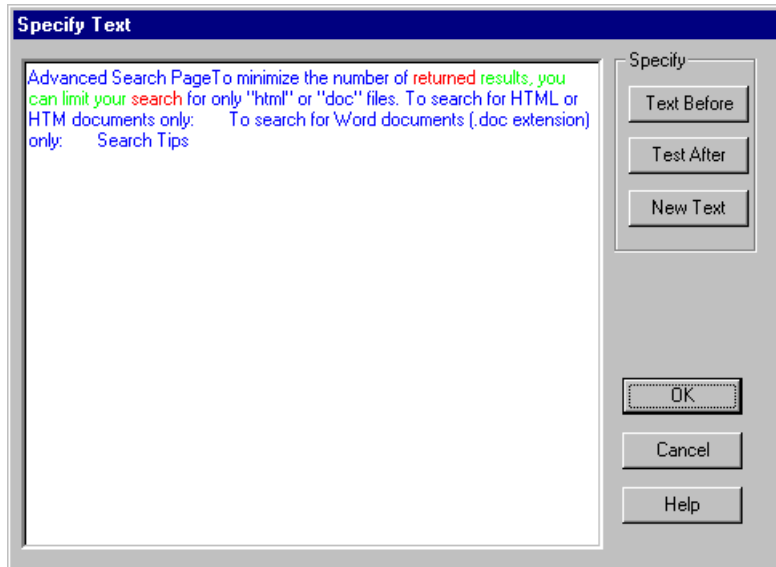
To check that a text string exists in a frame or an object:

1 Choose **Create > Get Text > Web Text Checkpoint**.

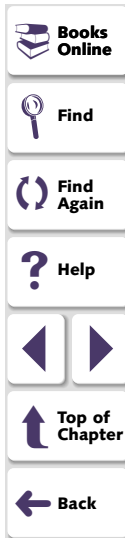
WinRunner is minimized, the mouse pointer becomes a pointing hand, and a help window opens.



- 2 Highlight the text string to be checked.
- 3 On the highlighted text string, right-click the mouse button to capture the string. The Specify Text dialog box opens.



The text string to be checked is displayed in green. The red text that is displayed on the left and right of your selection defines the bounds of the string.



4 You can modify your text selections.

- To modify your highlighted text selection, highlight a new text string and click **New Text**.

Your new text selection is displayed in green. The text that is displayed before and after your text string is displayed in red.

- To modify the red text string that is displayed to the left of your selection, highlight a new text string and click **Text Before**.
- To modify the red text string that is displayed to the right of your selection, highlight a new text string and click **Text After**.

5 Click **OK** to close the Specify Text dialog box.

The WinRunner window is restored and a **web_obj_text_exists** or a **web_frame_text_exists** statement is inserted in your test script.

Note: After you run your test, a *check text* statement is displayed in the test log of your Test Results window.



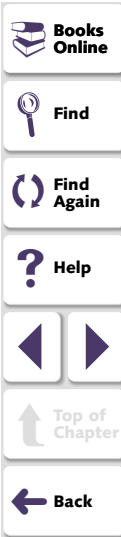
Creating Tests

Checking PowerBuilder Applications

When you work with WinRunner with added support for PowerBuilder applications, you can create GUI checkpoints to check PowerBuilder objects in your application.

This chapter describes:

- **Checking Properties of DropDown Objects**
- **Checking Properties of DataWindows**
- **Checking Properties of Objects within DataWindows**
- **Working with Computed Columns in DataWindows**



About Checking PowerBuilder Applications

You can use GUI checkpoints to check the *properties* of PowerBuilder objects in your application. When you check these properties, you can check the *contents* of PowerBuilder objects as well as their standard GUI properties. This chapter provides step-by-step instructions for checking the properties of the following PowerBuilder objects:

- DropDown objects
- DataWindows
- DataWindow columns
- DataWindow text
- DataWindow reports
- DataWindow graphs
- computed columns in a DataWindow



Checking Properties of DropDown Objects

You can create a GUI checkpoint that checks the properties, including contents, of a DropDown list or a DropDown DataWindow. You can check the same properties, including contents, for a DropDown DataWindow that you can check for a regular DataWindow. Note that before creating a GUI checkpoint on a DropDown object, you should first record a **tbl_set_selected_cell** statement in your test script. Use the CHECK GUI FOR OBJECT/WINDOW softkey to create the GUI checkpoint while recording. You create a GUI checkpoint that checks the contents of a DropDown object as you would create one for a table. For information on checking tables, see Chapter 16, [Checking Table Contents](#).

Checking Properties of a DropDown Object with Default Checks

You can create a GUI checkpoint that performs a default check on a DropDown object. A default check on a DropDown object includes a case-sensitive check on the contents of the entire object. WinRunner uses column names and the index number of rows to check the cells in the object.

You can also perform a check on a DropDown object in which you specify which checks to perform. For additional information, see [Checking Properties of a DropDown Object while Specifying which Checks to Perform](#) on page 428.



To check the properties of a DropDown object with default checks:



1 Choose **Create > Record–Context Sensitive** or click the **Record–Context Sensitive** button.

2 Click in the DropDown object to record a **tbl_set_selected_cell** statement in your test script



3 While recording, press the CHECK GUI FOR OBJECT/WINDOW softkey.

4 Click in the DropDown object once.

WinRunner captures the GUI information and stores it in the test's expected results folder. The WinRunner window is restored and an **obj_check_gui** statement is inserted into the test script. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference*.

Checking Properties of a DropDown Object while Specifying which Checks to Perform

You can create a GUI checkpoint in which you specify which checks to perform on a DropDown object. When you double-click in a DropDown object while creating a GUI checkpoint, the Check GUI dialog box opens. For example, if you are checking a DropDownListBox, you double-click the **DropDownListBoxContent** property check in the Check GUI dialog box to open the Edit Check dialog box. In the Edit Check dialog box, you can specify the scope of the content check on the object, select the verification types and method, and edit the expected value of the DataWindow contents.



To check the properties of a DropDown object while specifying which checks to perform:



1 Choose **Create > Record–Context Sensitive** or click the **Record–Context Sensitive** button.

2 Click in the DropDown object to record a **tbl_set_selected_cell** statement in your test script.

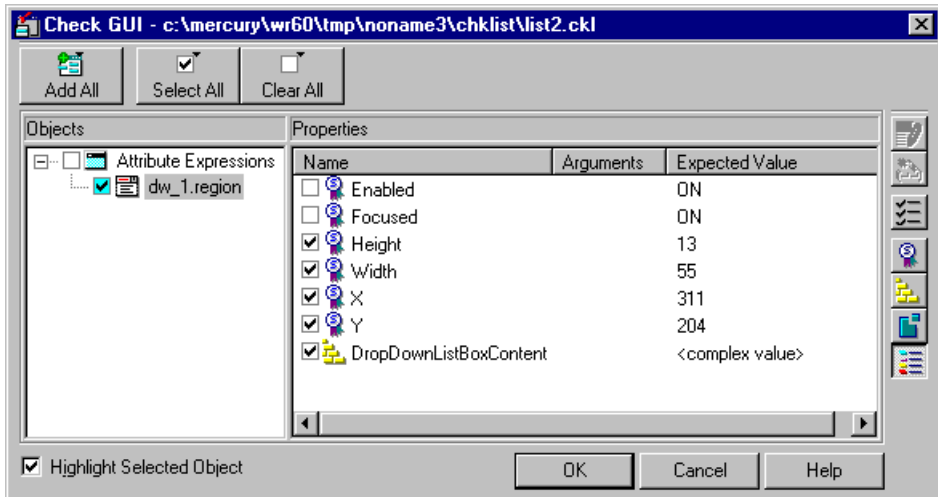


3 While recording, press the CHECK GUI FOR OBJECT/WINDOW softkey.

4 Double-click in the DropDown object.



The Check GUI dialog box opens.



The example above displays the Check GUI dialog box for a DropDown list. The Check GUI dialog box for a DropDown DataWindow is identical to the dialog box for a DataWindow.



- In the **Properties** pane, select the **DropDownListBoxContent** check and click the **Edit Expected Value** button, or double-click the “<complex value>” entry in the **Expected Value** column.

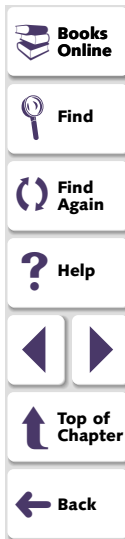
The **Edit Check** dialog box opens.



- 6 You can select which checks to perform and edit the expected data. For additional information on using this dialog box, see [Understanding the Edit Check Dialog Box](#) on page 451.
- 7 When you are done, click **OK** to save your changes, close the Edit Check dialog box, and restore the Check GUI dialog box.
- 8 Click **OK** to close the Check GUI dialog box.

WinRunner captures the GUI information and stores it in the test's expected results folder. The WinRunner window is restored and an **obj_check_gui** statement is inserted into the test script. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference*.

Note: If you wish to check additional objects while performing a check on the contents, use the **Create > GUI Checkpoint > For Multiple Objects** command (instead of the **Create > GUI Checkpoint > For Object/Window** command), which inserts a **win_check_gui** statement into your test script. For information on checking the standard GUI properties of DropDown objects, see Chapter 12, [Checking GUI Objects](#).



Checking Properties of DataWindows

You can create a GUI checkpoint that checks the properties of a DataWindow. One of the properties you can check is **DWTableContent**, which is a check on the contents of the DataWindow. You create a content check on a DataWindow as you would create one on a table. For additional information on checking table contents, see Chapter 16, [Checking Table Contents](#).

Checking Properties of a DataWindow with Default Checks

You can create a GUI checkpoint that checks the properties of a DataWindow with default checks. There are different default checks for different types of DataWindows.

To check the properties of a DataWindow with default checks:



- 1 Choose **Create > GUI Checkpoint > For Object/Window** or click the **GUI Checkpoint for Object/Window** button on the User toolbar.
- 2 Click in the DataWindow once.

WinRunner captures the GUI information and stores it in the test's expected results folder. The WinRunner window is restored and an **obj_check_gui** statement is inserted into the test script. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference*.



Checking Properties of a DataWindow while Specifying which Checks to Perform

You can create a GUI checkpoint that checks the properties of a DataWindow while specifying which checks to perform.

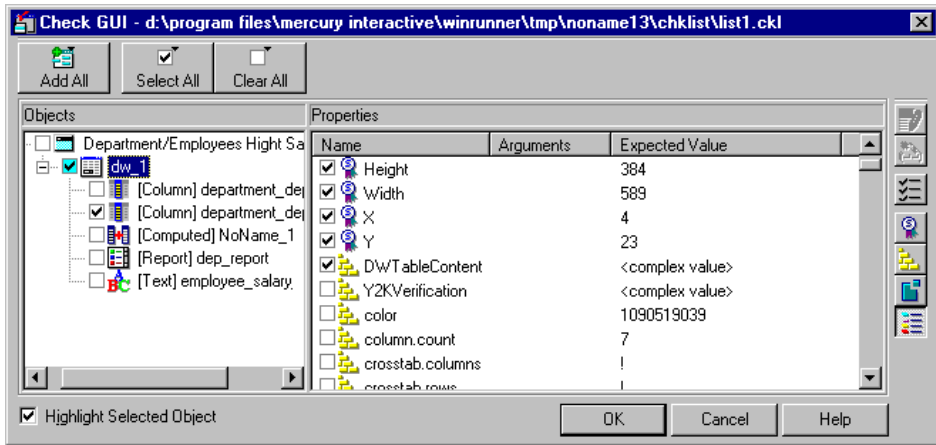
To check the properties of a DataWindow while specifying which checks to perform:



- 1 Choose **Create > GUI Checkpoint > For Object/Window** or click the **GUI Checkpoint for Object/Window** button on the User toolbar.
- 2 Double-click in the DataWindow.



- 3 The Check GUI dialog box opens.

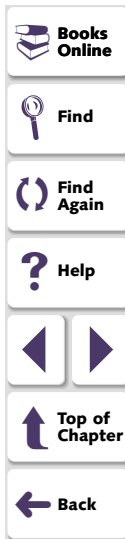


Note that the properties of objects within a DataWindow are displayed in the dialog box. WinRunner can perform checks on these objects. For additional information, see [Checking Properties of Objects within DataWindows](#) on page 436.



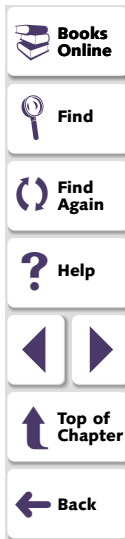
- 4 Select the **DWTTableContent** check and click the **Edit Expected Value** button, or double-click the “<complex value>” entry in the **Expected Value** column.

The **Edit Check** dialog box opens.



- 5 You can select which checks to perform and edit the expected data. For additional information on using this dialog box, see [Understanding the Edit Check Dialog Box](#) on page 451.
- 6 When you are done, click **OK** to save your changes, close the Edit Check dialog box, and restore the Check GUI dialog box.
- 7 Click **OK** to close the Check GUI dialog box.

WinRunner captures the GUI information and stores it in the test's expected results folder. The WinRunner window is restored and an **obj_check_gui** statement is inserted into the test script. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference*.



Checking Properties of Objects within DataWindows

You can create a GUI checkpoint that checks the properties of the following DataWindow objects:

- DataWindows
- DataWindow columns
- DataWindow text
- DataWindow reports
- DataWindow graphs
- DataWindow computed columns

DataWindow objects cannot be highlighted in the application you are testing. You can create a GUI checkpoint that checks the properties of objects within DataWindows using the Check GUI dialog box. For information on GUI checkpoints, see Chapter 12, [Checking GUI Objects](#).

To check the properties of objects in a DataWindow:

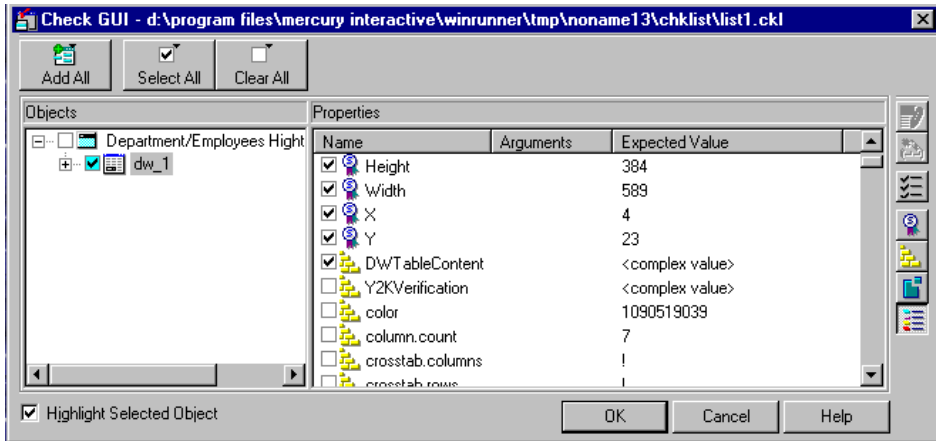


- 1 Choose **Create > GUI Checkpoint > For Object/Window** or click the **GUI Checkpoint for Object/Window** button on the User toolbar.
- 2 Double-click the DataWindow in the application you are testing.

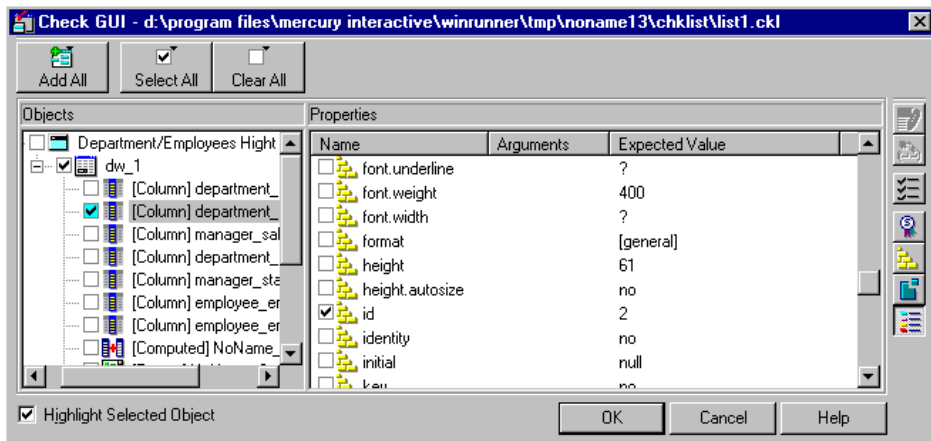
WinRunner may take a few seconds to capture information about the DataWindow.



The **Check GUI** dialog box opens.

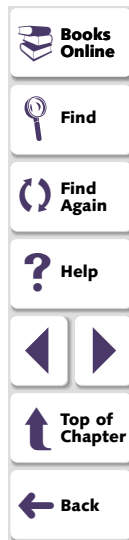


- In the **Objects** pane, click the Expand sign (+) beside the DataWindow to display its objects, and select an object to display its properties.



The **Objects** pane displays the DataWindow and the objects within it. The **Properties** pane displays the properties of the object in the DataWindow that is highlighted in the Objects pane. These objects can be columns, computed columns, text, graphs, and reports. Note that each object has one or more default property checks.

Specify which objects of the DataWindow to check: first, select an object in the Objects pane; next, select the properties to check in the Properties pane.



- 4 Click **OK** to close the dialog box.

An **obj_check_gui** statement is inserted into your test script. For more information on the **obj_check_gui** function, see Chapter 12, **Checking GUI Objects**, or refer to the *TSL Online Reference*.

Note: If an object in a DataWindow is displayed in the Objects pane of the GUI checkpoint dialog boxes as “NoName,” then the object has no internal name.



Working with Computed Columns in DataWindows

If computed columns are placed in detail band of the DataWindow, WinRunner can record and run tests on them. WinRunner uses the **tbl_get_selected_cell**, **tbl_activate_cell**, and **tbl_get_cell_data** TSL functions to record and run tests on computed columns. For information on using these TSL functions, refer to the *TSL Online Reference*.

WinRunner can also retrieve data about computed columns which are not placed in detail band of the DataWindow, using the **tbl_get_cell_data** TSL function. For information about this TSL function, refer to the *TSL Online Reference*.

To check the contents of computed columns in detail band of the DataWindow, use the **DWComputedContent** property check.

You cannot refer to a computed column by its index, since the computed column is not part of the database. Therefore, you must refer to a computed column by its name.

- Record a selection on the computed column. The name of the column appears in the **tbl_selected_cell** statement inserted in your test script.
- Perform a GUI checkpoint on the DataWindow in which the computed column appears. The name of the computed column appears in the Objects pane below the name of the parent DataWindow.



Creating Tests

Checking Table Contents

When you work with WinRunner with added support for application development environments such as Visual Basic, PowerBuilder, Delphi, and Oracle, you can create GUI checkpoints that check the contents of tables in your application.

This chapter describes:

- **Checking Table Contents with Default Checks**
- **Checking Table Contents while Specifying Checks**
- **Understanding the Edit Check Dialog Box**



About Checking Table Contents

Tables are generally part of a specific development environment application, such as Visual Basic, PowerBuilder, Delphi, and Oracle. These toolkits can display database information in a grid. In order to perform the checks on a table described in this chapter, you must install and load add-in support for the relevant development environment. You can choose to install support for Visual Basic or PowerBuilder applications when you install WinRunner. In addition, you can install support for other development environments, such as Delphi and Oracle, separately. You can use the Add-In Manager dialog box to choose which add-in support to load for each session of WinRunner. For information on the Add-In Manager dialog box, see Chapter 2, [WinRunner at a Glance](#). For information on displaying the Add-In Manager dialog box, see Chapter 40, [Setting Global Testing Options](#).

Once you install WinRunner support for any of these tools, you can add a GUI checkpoint to your test script that checks the contents of a table.



You can create a GUI checkpoint for table contents by clicking in the table and choosing the properties that you want WinRunner to check. You can check the default properties recommended by WinRunner, or you can specify which properties to check. Information about the table and the properties to be checked is saved in a *checklist*. WinRunner then captures the current values of the table properties and saves this information as *expected results*. A GUI checkpoint is automatically inserted into the test script. This checkpoint appears in your test script as an **obj_check_gui** or a **win_check_gui** statement. For more information about GUI checkpoints and checklists, see Chapter 12, **Checking GUI Objects**.

When you run the test, WinRunner compares the current state of the properties in the table to the expected results. If the expected results and the current results do not match, the GUI checkpoint fails. You can view the results of the checkpoint in the WinRunner Test Results Window. For more information, see Chapter 32, **Analyzing Test Results**.

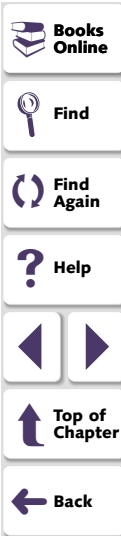
Note that any GUI object you check that is not already in the GUI map is added automatically to the temporary GUI map file. See Chapter 3, **Understanding How WinRunner Identifies GUI Objects**, for more information.

This chapter provides step-by-step instructions for checking the contents of tables.



You can also create a GUI checkpoint that checks the contents of a PowerBuilder DropDown list or a DataWindow: you check a DropDown list as you would check a single-column table; you check a DataWindow as you would check a multiple-column table. For additional information, see Chapter 15, [Checking PowerBuilder Applications](#).

In addition to checking a table's contents, you can also check its other properties. If a table contains ActiveX properties, you can check them in a GUI checkpoint. WinRunner also has built-in support for ActiveX controls that are tables. For additional information, see Chapter 13, [Working with ActiveX and Visual Basic Controls](#). You can also check a table's standard GUI properties in a GUI checkpoint. For additional information, see Chapter 12, [Checking GUI Objects](#).



Checking Table Contents with Default Checks

You can create a GUI checkpoint that performs a default check on the contents of a table.

A default check performs a case-sensitive check on the contents of the entire table. WinRunner uses column names and the index number of rows to locate the cells in the table.

You can also perform a check on table contents in which you specify which checks to perform. For additional information, see [Checking Table Contents while Specifying Checks](#) on page 447.

To check table contents with a default check:



- 1 Choose **Create > GUI Checkpoint > For Object/Window** or click the **GUI Checkpoint for Object/Window** button on the User toolbar.
- 2 Click in the table in the application you are testing.

WinRunner may take a few seconds to capture information about the table.

An **obj_check_gui** statement is inserted into your test script. For more information on the **obj_check_gui** function, refer to the *TSL Online Reference*.



Note: If you wish to check other table object properties while performing a check on the table contents, use the **Create > GUI Checkpoint > For Multiple Objects** command (instead of the **Create > GUI Checkpoint > For Object/Window** command), which inserts a `win_check_gui` statement into your test script. For information on checking the standard GUI properties of tables, see Chapter 12, [Checking GUI Objects](#). For information on checking the ActiveX control properties of a tables, see Chapter 13, [Working with ActiveX and Visual Basic Controls](#).



Checking Table Contents while Specifying Checks

You can use a GUI checkpoint to specify which checks to perform on the contents of a table. To create a GUI checkpoint on table contents in which you specify checks, you choose a GUI checkpoint command and double-click in the table.

The example in the procedure below uses WinRunner with add-in support for Visual Basic and the Flights table in the sample Visual Basic Flights application.

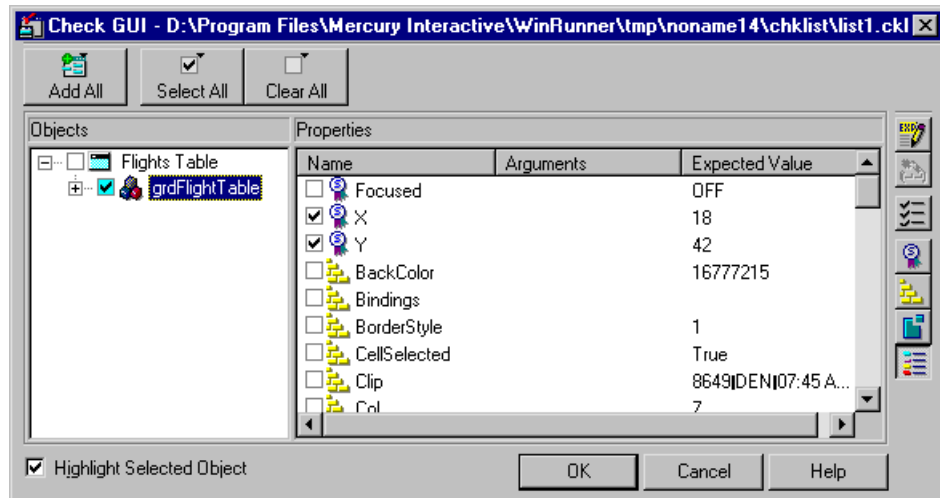
To check table contents while specifying which checks to perform:



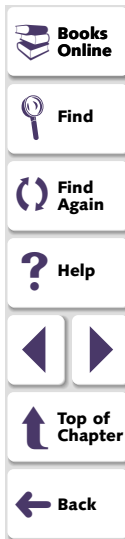
- 1 Choose **Create > GUI Checkpoint > For Object/Window** or click the **GUI Checkpoint for Object/Window** button on the User toolbar.
- 2 Double-click in the table in the application you are testing.



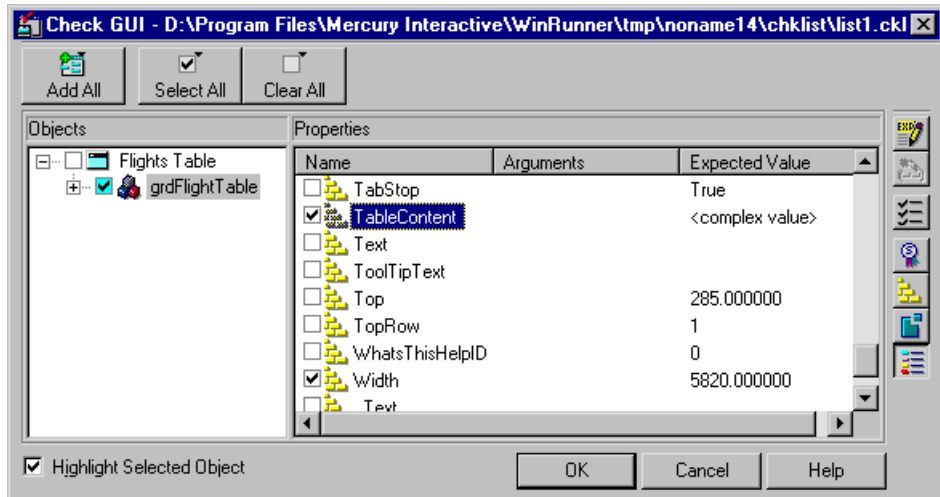
WinRunner may take a few seconds to capture information about the table, and then the **Check GUI** dialog box opens.



The dialog box displays the table's unique table properties as nonstandard objects.

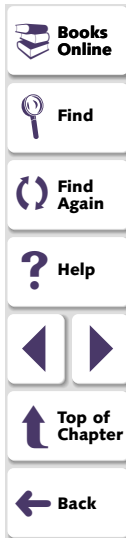


- 3 Scroll down in the dialog box or resize it so that the **TableContent** property check is displayed in the **Properties** pane. Note that the table contents property check may have a different name than **TableContent**, depending on which toolkit is used.



- 4 Select the **TableContent** (or corresponding) property check and click the **Edit Expected Value** button. Note that **<complex value>** appears in the Expected Value column for this property check, since the expected value of this check is too complex to be displayed in this column.

The Edit Check dialog box opens.



- 5 You can select which cells to check and edit the expected data. For additional information on using this dialog box, see [Understanding the Edit Check Dialog Box](#) on page 451.
- 6 When you are done, click **OK** to save your changes, close the Edit Check dialog box, and restore the Check GUI dialog box.
- 7 Click **OK** to close the Check GUI dialog box.

An `obj_check_gui` statement is inserted into your test script. For more information on the `obj_check_gui` function, refer to the *TSL Online Reference*.

Note: If you wish to check other table object properties while performing a check on the table contents, use the **Create > GUI Checkpoint > For Multiple Objects** command (instead of the **Create > GUI Checkpoint > For Object/Window** command), which inserts a `win_check_gui` statement into your test script. For information on checking the standard GUI properties of tables, see Chapter 12, [Checking GUI Objects](#). For information on checking the ActiveX control properties of a tables, see Chapter 13, [Working with ActiveX and Visual Basic Controls](#).



Understanding the Edit Check Dialog Box

The Edit Check dialog box enables you to specify which cells in a table to check, and which verification method and verification type to use. You can also edit the expected data for the table cells included in the check.



(For information on how to open the Edit Check dialog box, see [Checking Table Contents while Specifying Checks](#) on page 447.)

Edit Check

Select Checks | Edit Expected Data

1. Select the rows, columns or cells to check: Auto Size

	Order_Numb	Customer_N	Departure_D	Flight_Num	Tickets_Ord	Class	Agents_Nam	Send_Sign
1		John Does It	1999-07-11 19:5	6232	1	1	test	N
2		Fred Smith	1999-07-12 19:5	4295	3	2	test	N
3		Mary Parker	1999-07-13 19:5	4194	5	3	test	N
4		Jon Baker	1999-07-14 19:5	4219	4	2	test	N
5		Kim Smith	1999-07-15 19:5	6195	6	1	test	N
6		Joe Shmoe	1999-07-16 19:5	4210	1	2	test	N

2. Set verification type: Case Sensitive

3. Add Cell [column 'Order_Number', row 1] - Case Sensitive check

List of checks:

- Column 'Order_Number' - Case Sensitive check
- Column 'Departure_Date' - Case Sensitive check
- Cell [column 'Customer_Name', row 1] - Case Sensitive check

Delete

Verification methods:

Column:

- Name
- Index

Verify column headers

Row:

- Key
- Index

Select key columns:

- Order_Number
- Customer_Name
- Departure_Date
- Flight_Number

OK Cancel Help

Ready



In the **Select Checks** tab, you can specify the information that is saved in the GUI checklist:

- which table cells to check
- the verification method
- the verification type

Note that if you are creating a check on a single-column table, the contents of the Select Checks tab of the Edit Check dialog box differ from what is shown above. For additional information, see [Specifying the Verification Method for a Single-Column Table](#) on page 457.

Specifying which Cells to Check

The **List of Checks** pane displays all the checks that will be performed, including the verification type. When the Edit Check dialog box is opened for the first time for a checkpoint, the default check is displayed:

- The default check for a multiple-column table is a case sensitive check on the entire table by column name and row index.
- The default check for a single-column table is a case sensitive check on the entire table by row position.



Note: If your table contains multiple columns with the same name, WinRunner disregards the duplicate columns and does not perform checks on them. Therefore, you should select the column index option.

If you do not wish to accept the default settings, you must delete the default check before you specify the checks to perform. Select the “Entire Table - Case Sensitive check” entry in the **List of Checks** box and click the **Delete** button. Alternatively, double-click this entry in the **List of Checks** box. A WinRunner message prompts you to delete the highlighted check. Click **Yes**.

Next, specify the checks to perform. You can choose different verification type for different selections of cells. Therefore, specify the verification type before selecting cells. For more information, see [Specifying the Verification Type](#) on page 458.

Highlight the cells on which you want to perform the content check. Next, click the **Add** button toolbar to add a check for these cells. Alternatively, you can:

- double-click a cell to check it
- double-click a row header to check all the cells in a row
- double-click a column header to check all the cells in a column
- double-click the top-left corner to check the entire table

A description of the cells to be checked appears in the **List of Checks** box.



Specifying the Verification Method

You can select the verification method to control how WinRunner identifies columns or rows within a table. The verification method applies to the entire table. Specifying the verification method is different for multiple-column and single-column tables.

Specifying the Verification Method for a Multiple-Column Table

Column

- **Name:** WinRunner looks for the selection according to the column names. A shift in the position of the columns within the table does not result in a mismatch.
- **Index:** WinRunner looks for the selection according to the index, or position, of the columns. A shift in the position of the columns within the table results in a mismatch. Select this option if your table contains multiple columns with the same name. For additional information, see the note on [page 454](#). Choosing this option enables the **Verify column headers** check box, which enables you to check column headers as well as cells.



Row

- Key:** WinRunner looks for the rows in the selection according to the data in the key column(s) specified in the **Select key columns** list box. For example, you could tell WinRunner to identify the second row in the table on page x based on the arrival time for that row. A shift in the position of the rows does not result in a mismatch. If the key selection does not uniquely identify a row, WinRunner checks the first matching row. You can use more than one key column to uniquely identify the row.

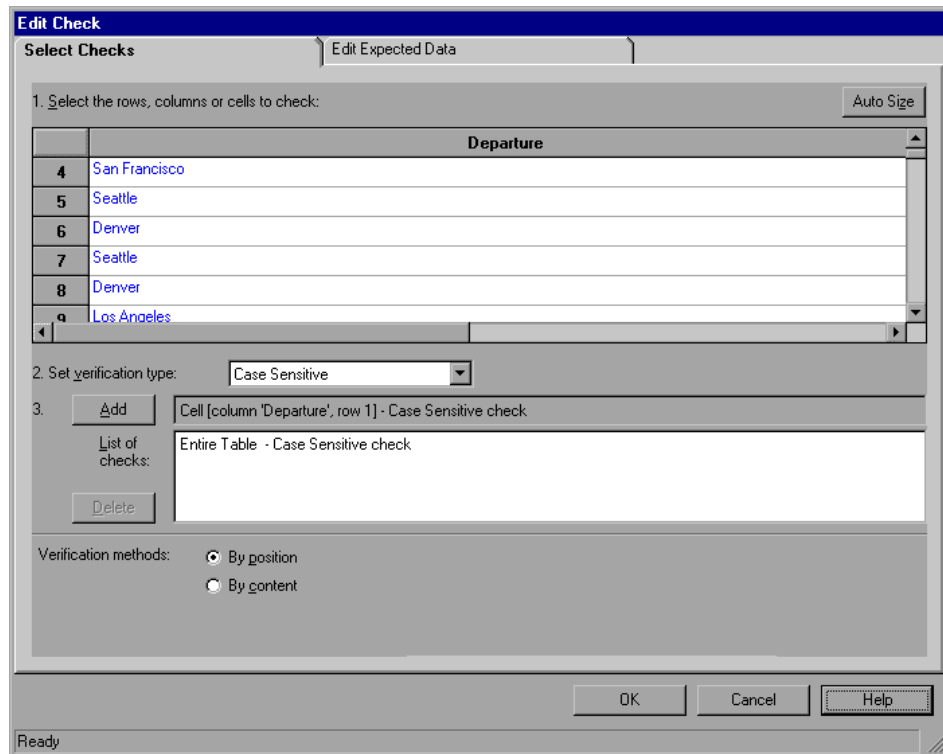
Note: If the value of a cell in one or more of the key columns changes, WinRunner will not be able to identify the corresponding row, and a check of that row will fail with a “Not Found” error. If this occurs, select a different key column or use the Index verification method.

- Index** (default setting): WinRunner looks for the selection according to the index, or position, of the rows. A shift in the position of any of the rows results in a mismatch.



Specifying the Verification Method for a Single-Column Table

The Verification Method box in the Select Checks tab for a single-column table is different from that for a multiple-column table. The default check for a single-column table is a case sensitive check on the entire table by row position.



- **By position:** WinRunner checks the selection according to the location of the items within the column.
- **By content:** WinRunner checks the selection according to the content of the items, ignoring their location in the column.

Specifying the Verification Type

WinRunner can verify the contents of a table in several different ways. You can choose different verification types for different selections of cells.

- **Case Sensitive** (the default): WinRunner compares the text content of the selection. Any difference in case or text content between the expected and actual data results in a mismatch.
- **Case Insensitive:** WinRunner compares the text content of the selection. Only differences in text content between the expected and actual data result in a mismatch.
- **Numeric Content:** WinRunner evaluates the selected data according to numeric values. WinRunner recognizes, for example, that “2” and “2.00” are the same number.
- **Numeric Range:** WinRunner compares the selected data against a numeric range. Both the minimum and maximum values are any real number that you specify. This comparison differs from text and numeric content verification in that the actual table data is compared against the range that you defined and not against the expected results.



Note: This option causes a mismatch on any string that does not begin with a number. A string starting with 'e' is translated into a number.

- **Case Sensitive Ignore Spaces:** WinRunner checks the data in the cell according to case and content, ignoring differences in spaces. WinRunner reports any differences in case or content as a mismatch.
- **Case Insensitive Ignore Spaces:** WinRunner checks the content in the cell according to content, ignoring differences in case and spaces. WinRunner reports only differences in content as a mismatch.

Click **OK** to save your changes to both tabs of the Edit Check dialog box. The dialog box closes and the Check GUI dialog box is restored.

Editing the Expected Data



To edit the expected data in the table, click the **Edit Expected Data** tab. If you previously saved changes in the Select Checks tab, you can click **Reload Table** to reload the table selections from the checklist. A WinRunner message prompts you to reload the saved data. Click **Yes**.

Note that if you previously saved changes to the Select Checks tab, and then reopened the Edit Check dialog box, the table appears color coded in the Edit Expected Data tab.



The cells included in the check appear in blue on a white background. The cells excluded from the check appear in green on a yellow background.

Edit Check

Select Checks | **Edit Expected Data**

	Order_Num	Customer_N	Departure_D	Flight_Num	Tickets_Ord	Class	Agents_Nam	Send_Signa
1	1	John Does It	1999-07-11 1	6232	1	1	test	N
2	2	Fred Smith	1999-07-12 1	4295	3	2	test	N
3	3	Mary Parker	1999-07-13 1	4194	5	3	test	N
4	4	Jon Baker	1999-07-14 1	4219	4	2	test	N
5	5	Kim Smith	1999-07-15 1	6195	6	1	test	N
6	6	Joe Shmoe	1999-07-16 1	4210	1	2	test	N
7	7	Jane Doe	1999-07-17 1	3291	9	1	test	N
8	8	Bob Johnson	1999-07-18 1	6218	2	2	test	N
9	9	Jack Barnes	1999-07-19 1	6232	1	1	test	N
10	10	Jane Hansen	1999-07-20 1	4214	2	3	test	N

Ready

OK Cancel Help

Books Online

Find

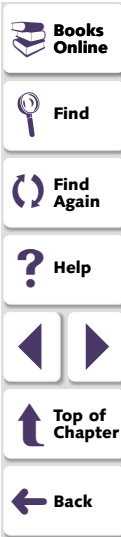
Find Again

Help

Top of Chapter

Back

To edit the expected value of data in a cell, double-click inside the cell. A cursor appears in the cell. Change the contents of the cell, as desired. Click **OK** to save your changes to both tabs of the Edit Check dialog box. The dialog box closes and the Check GUI dialog box is restored.



Creating Tests

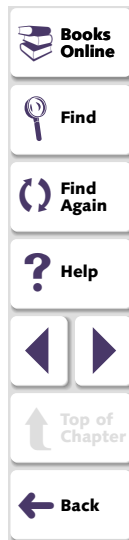
Checking Databases

By adding runtime database record checkpoints you can compare the information in your application during a test run with the corresponding record in your database.

By adding standard database checkpoints to your test scripts, you can check the contents of databases in different versions of your application.

This chapter describes:

- **Creating a Runtime Database Record Checkpoint**
- **Creating a Default Check on a Database**
- **Creating a Custom Check on a Database**
- **Messages in the Database Checkpoint Dialog Boxes**
- **Working with the Database Checkpoint Wizard**
- **Understanding the Edit Check Dialog Box**
- **Modifying a Standard Database Checkpoint**
- **Modifying the Expected Results of a Standard Database Checkpoint**
- **Parameterizing Standard Database Checkpoints**
- **Specifying a Database**
- **Using TSL Functions to Work with a Database**



About Checking Databases

When you create database checkpoints, you define a query on your database, and your database checkpoint checks the values contained in the *result set*. The result set is set of values retrieved from the results of the query.

There are several ways to define the query that will be used in your database checkpoints:

- You can use Microsoft Query to create a *query* on a database. The results of a query on a database are known as a *result set*. You can install Microsoft Query from the *custom installation* of Microsoft Office.
- You can define an ODBC query manually, by creating its SQL statement.
- You can use Data Junction to create a *conversion* file that converts a database to a *target* text file. (For standard database checkpoints only). Note that Data Junction is not automatically included in your WinRunner package. To purchase Data Junction, contact your Mercury Interactive representative. For detailed information on working with Data Junction, refer to the documentation in the Data Junction package.

For purposes of simplicity, this chapter will refer to the result of the ODBC query or the target of the Data Junction conversion as a result set.



About Runtime Database Record Checkpoints

You can create runtime database record checkpoints in order to compare the values displayed in your application during the test run with the corresponding values in the database. If the comparison does not meet the success criteria you specify for the checkpoint, the checkpoint fails. You can define a successful runtime database record checkpoint as one where one or more matching records were found, exactly one matching record was found, or where no matching records are found. The results of the checkpoint can be viewed in the Test Results window. For more information, see Chapter 32, [Analyzing Test Results](#).

Runtime record checkpoints are useful when the information in the database changes from one run to the other. Runtime record checkpoints enable you to verify that the information displayed in your application was correctly inserted to the database or conversely, that information from the database is successfully retrieved and displayed on the screen.

Note that when you create a runtime database record checkpoint, the data in the application and in the database are generally in the same format. If the data is in different formats, you can follow the instructions in [Comparing Data in Different Formats](#) on page 476 to create a runtime database record checkpoint. Note that this feature is for advanced WinRunner users only.



About Standard Database Checkpoints

You can create standard database checkpoints to compare the current values of the properties of the result set during the test run to the expected values captured during recording or otherwise set before the test run. If the expected results and the current results do not match, the database checkpoint fails.

Standard database checkpoints are useful when the expected results can be established before the test run.

There are two types of standard database checkpoints: Default and Custom.

You can use a default check to check the entire contents of a result set, or you can use a custom check to check the partial contents, the number of rows, and the number of columns of a result set. Information about which result set properties to check is saved in a *checklist*. WinRunner captures the current information about the database and saves this information as *expected results*. A *database checkpoint* is automatically inserted into the test script. This checkpoint appears in your test script as a **db_check** statement.



For example, when you check the database of an application for the first time in a test script, the following statement is generated:

```
db_check("list1.cdl", "dbvf1");
```

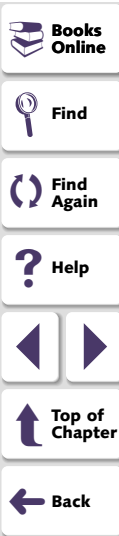
where `list1.cdl` is the name of the checklist containing information about the database and the properties to check, and `dbvf1` is the name of the *expected results file*. The checklist is stored in the test's *chklist* folder. If you are working with Microsoft Query or ODBC, it references a **.sql* query file, which contains information about the database and the SQL statement. If you are working with Data Junction, it references a **.djs* conversion file, which contains information about the database and the conversion. When you define a query, WinRunner creates a checklist and stores it in the test's *chklist* folder. The expected results file is stored in the test's *exp* folder. For more information on the **db_check** function, refer to the *TSL Online Reference*.

When you run the test, the database checkpoint compares the current state of the database in the application being tested to the expected results. If the expected results and the current results do not match, the database checkpoint fails. The results of the checkpoint can be viewed in the Test Results window. For more information, see Chapter 32, [Analyzing Test Results](#).



You can modify the expected results of an existing standard database checkpoint before or after you run your test. You can also make changes to the query in an existing database checkpoint. This is useful if you move the database to a new location on the network.

When you create a database checkpoint using ODBC/Microsoft Query, you can add parameters to an SQL statement to parameterize your checkpoint. This is useful if you want to create a database checkpoint on a query in which the SQL statement defining your query changes.



Creating a Runtime Database Record Checkpoint

You can add a runtime database record checkpoint to your test in order to compare information that appears in your application during a test run with the current value(s) in the corresponding record(s) in your database.

You add runtime database record checkpoints by running the Runtime Record Checkpoint wizard. When you are finished, the wizard inserts the appropriate **db_record_check** statement into your script.

Note that when you create a runtime database record checkpoint, the data in the application and in the database are generally in the same format. If the data is in different formats, you can follow the instructions in [Comparing Data in Different Formats](#) on page 476 to create a runtime database record checkpoint. Note that this feature is for advanced WinRunner users only.

Using the Runtime Record Checkpoint Wizard

The Runtime Record Checkpoint wizard guides you through the steps of defining your query, identifying the application controls that contain the information corresponding to the records in your query, and defining the success criteria for your checkpoint.

To activate the wizard, select **Create > Database Checkpoint > Runtime Record Check**.



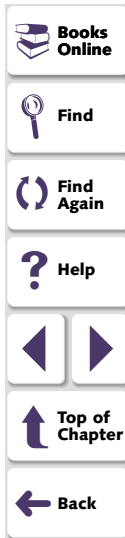
Define Query Screen

The Define Query screen enables you to select a database and define a query for your checkpoint. You can create a new query from your database using Microsoft Query, or manually define an SQL statement.



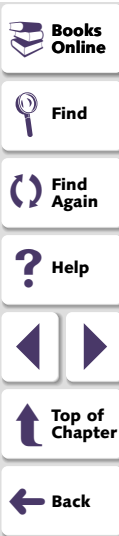
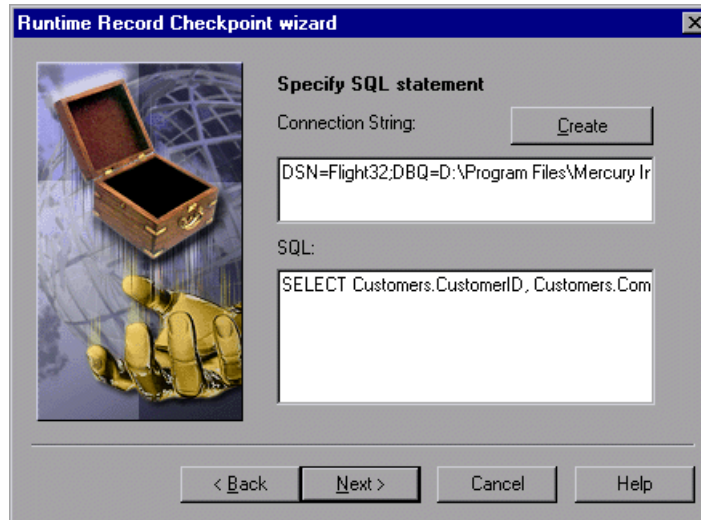
You can choose from the following options:

- **Create new query:** Opens Microsoft Query, enabling you to create a new query. Once you finish defining your query, you return to WinRunner. For additional information, see [Creating a Query in ODBC/Microsoft Query](#) on page 540.
- **Specify SQL statement:** Opens the Specify SQL statement screen in the wizard, enabling you to specify the connection string and an SQL statement. For additional information, see [Specifying an SQL Statement](#) on page 497.



Specify SQL Statement Screen

The Specify SQL statement screen enables you to manually specify the database connection string and the SQL statement.



Enter the required information:

- **Connection String:** Enter the connection string, or click the Create button
 - **Create:** Opens the ODBC Select Data Source dialog box. You can select a *.dsn file in the Select Data Source dialog box to have it insert the connection string in the box for you.
- **SQL:** Enter the SQL statement.

Note: You cannot use an SQL statement of the type "SELECT * from ..." with the **db_record_check** function. Instead, you must supply the tables and field names. The expected SQL format is: `SELECT table_name1.field_name1, table_name2.field_name2, ... FROM table_name1, table_name2, ... [WHERE ...]`

Match Database Field Screen

The Match database field screen enables you to identify the application control or text in your application that matches the displayed database field. You repeat this step for each field included in your query.

This screen includes the following options.

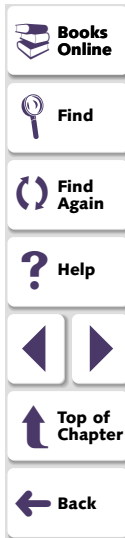


- **Database field:** Displays a database field from your query. Use the pointing hand to identify the control or text that matches the displayed field name.
- **Logical Name:** Displays the logical name of the control you select on your application.

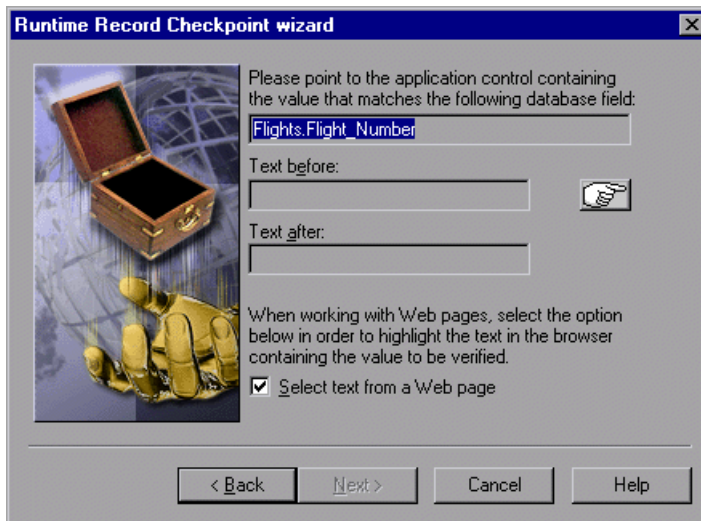
(Displayed only when the **Select text from a Web page** check box is cleared).



- **Text before:** Displays the text that appears immediately before the text to check.
(Displayed only when the Select text from a Web page check box is checked)



- **Text after:** Displays the text that appears immediately after the text to check.
(Displayed only when the **Select text from a Web page** check box is selected.)



- **Select text from a Web page:** Enables you to indicate the text on your Web page containing the value to be verified.

Note: When selecting text from a Web page, you must use the pointer to select the text.

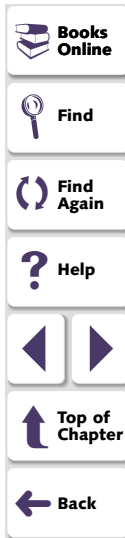


Matching Record Criteria Screen

The Matching record criteria screen enables you to specify the number of matching database records required for a successful checkpoint.



- **Exactly one matching record:** Sets the checkpoint to succeed if exactly one matching database record is found.
- **One or more matching records:** Sets the checkpoint to succeed if one or more matching database records are found.
- **No matching records:** Sets the checkpoint to succeed if no matching database records are found.



When you click **Finish** on the Runtime Record Checkpoint wizard, a **db_record_check** statement is inserted into your script. For more information on the **db_record_check** function, refer to the *TSL Online Reference* or the *TSL Reference Guide*.

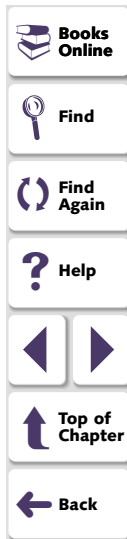
Comparing Data in Different Formats

Suppose you want to compare the data in your application to data in the database, but the data is in different formats. You can follow the instructions below to create a runtime database record checkpoint without using the Runtime Record Checkpoint Wizard. Note that this feature is for advanced WinRunner users only.

For example, in the sample Flight Reservation application, there are three radio buttons in the Class box. When this box is enabled, one of the radio buttons is always selected. In the database of the sample Flight Reservation application, there is one field with the values 1, 2, or 3 for the matching class.

To check that data in the application and the database have the same value, you must perform the following steps:

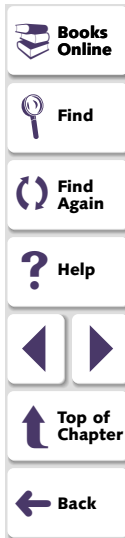
- 1 Record on your application up to the point where you want to verify the data on the screen. Stop your test. In your test, manually extract the values from your application.
- 2 Based on the values extracted from your application, calculate the expected values for the database. Note that in order to perform this step, you must know the mapping relationship between both sets of values. See the example below.



- 3 Add these calculated values to any edit field or editor (e.g. Notepad). You need to have one edit field for each calculated value. For example, you can use multiple Notepad windows, or another application that has multiple edit fields.
- 4 Use the GUI Map Editor to teach WinRunner:
 - the controls in your application that contain the values to check
 - the edit fields that will be used for the calculated values
- 5 Add TSL statements to your test script to perform the following operations:
 - extract the values from your application
 - calculate the expected database values based on the values extracted from your application
 - write these expected values to the edit fields
- 6 Use the Runtime Record Checkpoint wizard, described in [Using the Runtime Record Checkpoint Wizard](#) on page 468, to create a `db_record_check` statement.

When prompted, instead of pointing to your application control with the desired value, point to the edit field where you entered the desired calculated value.

Tip: When you run your test, make sure to open the application(s) with the edit field(s) containing the calculated values.



Example of Comparing Different Data Formats in a Runtime Database Record Checkpoint

The following excerpts from a script are used to check the Class field in the database against the radio buttons in the sample Flights application. The steps refer to the instructions on [page 476](#).

Step 1

Extract values from GUI objects in application.

```
button_get_state("First",vFirst);  
button_get_state("Business",vBusiness);  
button_get_state("Economy",vEconomy);
```

Step 2

Calculate the expected values for the database.

```
if (vFirst)  
    expDBval = "1" ;  
else if (vBusiness)  
    expDBval = "2" ;  
else if (vEconomy)  
    expDBval = "3" ;
```



Step 3

Add these calculated values to an edit field to be used in the checkpoint.

```
set_window("Untitled - Notepad", 1);  
edit_set("Edit", expDBval);
```

Step 4

Create a runtime database record checkpoint using the wizard.

```
db_record_check("list1.cvr", DVR_ONE_MATCH);
```



Creating a Default Check on a Database

When you create a default check on a database, you create a standard database checkpoint that checks the entire result set using the following criteria:

- The default check for a multiple-column query on a database is a case sensitive check on the entire result set by column name and row index.
- The default check for a single-column query on a database is a case sensitive check on the entire result set by row position.

If you want to check only part of the contents of a result set, edit the expected value of the contents, or count the number of rows or columns, you should create a custom check instead of a default check. For information on creating a custom check on a database, see [Creating a Custom Check on a Database](#) on page 485.



Creating a Default Check on a Database Using ODBC or Microsoft Query

You can create a default check on a database using ODBC or Microsoft Query.

To create a default check on a database using ODBC or Microsoft Query:



- 1 Choose **Create > Database Checkpoint > Default Check** or click the **Default Database Checkpoint** button on the User toolbar. If you are recording in Analog mode, press the CHECK DATABASE (DEFAULT) softkey in order to avoid extraneous mouse movements. Note that you can press the CHECK DATABASE (DEFAULT) softkey in Context Sensitive mode as well.

Note: The first time you create a default database checkpoint, either Microsoft Query or the Database Checkpoint wizard opens. Each subsequent time you create a default database checkpoint, the last tool used is opened. If the Database Checkpoint wizard opens, follow the instructions in [Working with the Database Checkpoint Wizard](#) on page 491.



- 2 If Microsoft Query is installed and you are creating a new query, an instruction screen opens for creating a query.

If you do not want to see this message next time you create a default database checkpoint, clear the **Show this message next time** check box.

Click **OK** to close the instruction screen.

If Microsoft Query is not installed, the Database Checkpoint wizard opens to a screen where you can define the ODBC query manually. For additional information, see [Setting ODBC \(Microsoft Query\) Options](#) on page 493.

- 3 Define a query, copy a query, or specify an SQL statement. For additional information, see [Creating a Query in ODBC/Microsoft Query](#) on page 540 or [Specifying an SQL Statement](#) on page 497.

Note: If you want to be able to parameterize the SQL statement in the `db_check` statement that is generated, then in the last wizard screen in Microsoft Query, click **View data or edit query in Microsoft Query**. Follow the instructions in [Guidelines for Parameterizing SQL Statements](#) on page 539.



- 4 WinRunner takes several seconds to capture the database query and restore the WinRunner window.

WinRunner captures the data specified by the query and stores it in the test's *exp* folder. WinRunner creates the *msqr*.sql* query file and stores it and the database checklist in the test's *chklist* folder. A database checkpoint is inserted in the test script as a **db_check** statement. For more information on the **db_check** function, refer to the *TSL Online Reference*.

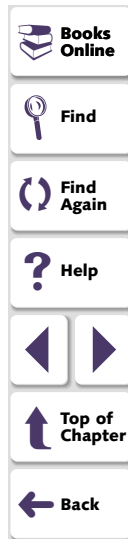
Creating a Default Check on a Database Using Data Junction

You can create a default check on a database using Data Junction.

To create a default check on a database:



- 1 Choose **Create > Database Checkpoint > Default Check** or click the **Default Database Checkpoint** button on the User toolbar. If you are recording in Analog mode, press the CHECK DATABASE (DEFAULT) softkey in order to avoid extraneous mouse movements. Note that you can press the CHECK DATABASE (DEFAULT) softkey in Context Sensitive mode as well.



Note: The first time you create a default database checkpoint, either Microsoft Query or the Database Checkpoint wizard opens. Each subsequent time you create a default database checkpoint, the last client used is opened: if you used Microsoft Query, then Microsoft Query opens; if you use Data Junction, then the Database Checkpoint wizard opens. Note that the Database Checkpoint wizard must open whenever you use Data Junction to create a database checkpoint.

For information on working with the Database Checkpoint wizard, see [Working with the Database Checkpoint Wizard](#) on page 491.

- 2 An instruction screen opens for creating a query.

If you do not want to see this message next time you create a default database checkpoint, clear the **Show this message next time** check box.

Click **OK** to close the instruction screen.

- 3 Create a new conversion file or use an existing one. For additional information, see [Creating a Conversion File in Data Junction](#) on page 542.
- 4 WinRunner takes several seconds to capture the database query and restore the WinRunner window.

WinRunner captures the data specified by the query and stores it in the test's *exp* folder. WinRunner creates the *.djs conversion file and stores it in the checklist in the test's *chklist* folder. A database checkpoint is inserted in the test script as a **db_check** statement. For more information on the **db_check** function, refer to the *TSL Online Reference*.



Creating a Custom Check on a Database

When you create a custom check on a database, you create a standard database checkpoint in which you can specify which properties to check on a result set.

You can create a custom check on a database in order to:

- check the contents of part or the entire result set
- edit the expected results of the contents of the result set
- count the rows in the result set
- count the columns in the result set

You can create a custom check on a database using ODBC, Microsoft Query or Data Junction.

To create a custom check on a database:

- 1 Choose **Create > Database Checkpoint > Custom Check**. If you are recording in Analog mode, press the CHECK DATABASE (CUSTOM) softkey in order to avoid extraneous mouse movements. Note that you can press the CHECK DATABASE (CUSTOM) softkey in Context Sensitive mode as well.

The Database Checkpoint wizard opens.

- 2 Follow the instructions on working with the Database Checkpoint wizard, as described in [Working with the Database Checkpoint Wizard](#) on page 491.

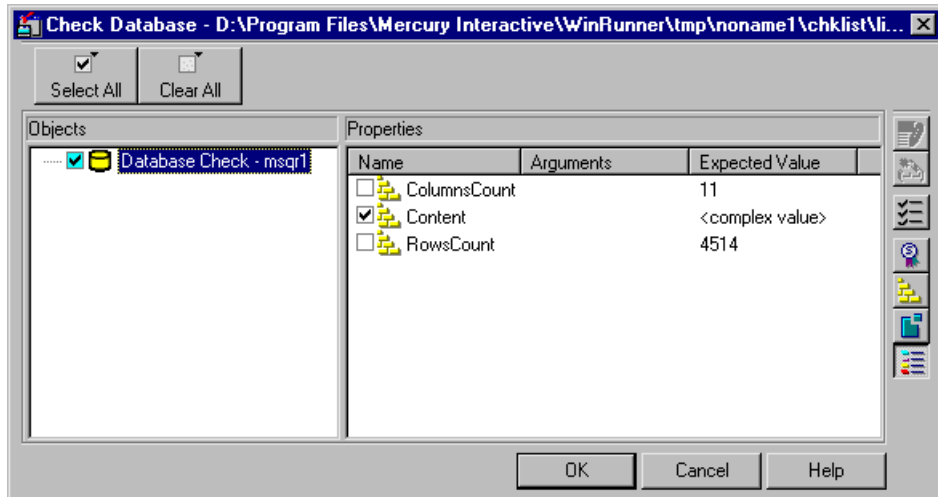


- 3 If you are creating a new query, an instruction screen opens for creating a query.
If you do not want to see this message next time you create a default database checkpoint, clear the **Show this message next time** check box.
- 4 If you are using ODBC or Microsoft Query, define a query, copy a query, or specify an SQL statement. For additional information, see [Creating a Query in ODBC/Microsoft Query](#) on page 540 or [Specifying an SQL Statement](#) on page 497.

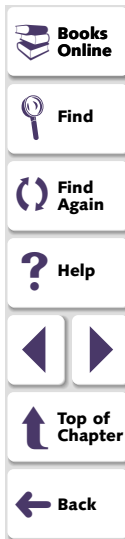
If you are using Data Junction, create a new conversion file or use an existing one. For additional information, see [Creating a Conversion File in Data Junction](#) on page 542.
- 5 If you are using Microsoft Query and you want to be able to parameterize the SQL statement in the **db_check** statement which will be generated, then in the last wizard screen in Microsoft Query, click **View data or edit query in Microsoft Query**. Follow the instructions in [Parameterizing Standard Database Checkpoints](#) on page 533.
- 6 WinRunner takes several seconds to capture the database query and restore the WinRunner window.



The **Check Database** dialog box opens.



The **Objects** pane contains “Database check” and the name of the **.sql* query file or **.djs* conversion file included in the database checkpoint. The **Properties** pane lists the different types of checks that can be performed on the result set. A check mark indicates that the item is selected and is included in the checkpoint.



- 7 Select the types of checks to perform on the database. You can perform the following checks:

ColumnsCount: Counts the number of columns in the result set.

Content: Checks the content of the result set, as described in [Creating a Default Check on a Database](#) on page 480.

RowsCount: Counts the number of rows in the result set.



- 8 If you want to edit the expected value of a property, first select it. Next, either click the **Edit Expected Value** button, or double-click the value in the Expected Value column.

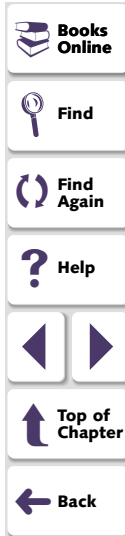
- For **ColumnsCount** or **RowCount** checks on a result set, the expected value is displayed in the **Expected Value** field corresponding to the property check. When you edit the expected value for these property checks, a spin box opens. Modify the number that appears in the spin box.
- For a **Content** check on a result set, <complex value> appears in the **Expected Value** field corresponding to the check, since the content of the result set is too complex to be displayed in this column. When you edit the expected value, the **Edit Check** dialog box opens. In the **Select Checks** tab, you can select which checks to perform on the result set, based on the data captured in the query. In the **Edit Expected Data** tab, you can modify the expected results of the data in the result set.

For more information, see [Understanding the Edit Check Dialog Box](#) on page 504.



- 9 Click **OK** to close the Check Database dialog box.

WinRunner captures the current property values and stores them in the test's *exp* folder. WinRunner stores the database query in the test's *chklist* folder. A database checkpoint is inserted in the test script as a **db_check** statement. For more information on the **db_check** function, refer to the *TSL Online Reference*.



Messages in the Database Checkpoint Dialog Boxes

The following messages may appear in the Properties pane in the Expected Value or the Actual Value fields in the Check Database or the Database Checkpoint Results dialog boxes:

Message	Meaning
Complex Value	The expected or actual value of the selected property check is too complex to display in the column. This message will appear for the content checks.
Cannot Capture	The expected or actual value of the selected property could not be captured.

Note: For information on the Database Checkpoint Results dialog box, see Chapter 32, [Analyzing Test Results](#).



Working with the Database Checkpoint Wizard

The wizard opens whenever you create a custom database checkpoint and whenever you work with Data Junction. You can also use an SQL statement to create a database checkpoint. When working with SQL statements, create a custom database check and choose the ODBC (Microsoft Query) option.

You can work in either ODBC/Microsoft Query mode or Data Junction mode. Depending on the last tool used, a screen opens for either ODBC (Microsoft Query) or Data Junction. You can change from one mode to another in the first wizard screen.

The Database Checkpoint wizard enables you to:

- switch between ODBC (Microsoft Query) mode and Data Junction mode
- specify an SQL statement without using Microsoft Query
- use existing queries and conversions in your database checkpoint



ODBC (Microsoft Query) Screens

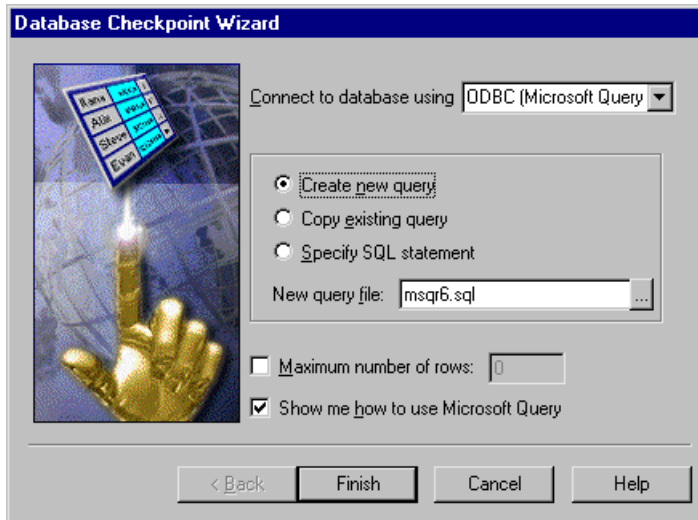
There are three screens in the Database Checkpoint wizard for working with ODBC (Microsoft Query). These screens enable you to:

- set general options:
 - switch to Data Junction mode
 - choose to create a new query, use an existing one, or specify an SQL statement
 - limit the number of rows in the query
 - display an instruction screen
- select an existing source query file
- specify an SQL statement



Setting ODBC (Microsoft Query) Options

The following screen opens if you are creating a custom database checkpoint or working in ODBC mode.



You can choose from the following options:

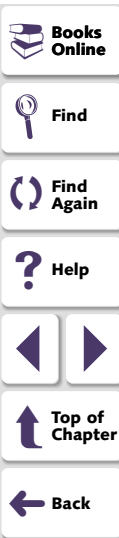
- **Create new query:** Opens Microsoft Query, enabling you to create a new ODBC *.sql query file with the name specified below. Once you finish defining your query:
 - If you are creating a default database checkpoint, a **db_check** statement is inserted into your test script.
 - If you are creating a custom database checkpoint, the Check Database dialog box opens. For information on the Check Database dialog box, see [Creating a Custom Check on a Database](#) on page 485.
- **Copy existing query:** Opens the **Select source query file** screen in the wizard, which enables you to copy an existing ODBC query from another query file. For additional information, see [Selecting a Source Query File](#) on page 495.
- **Specify SQL statement:** Opens the **Specify SQL statement** screen in the wizard, which enables you to specify the connection string and an SQL statement. For additional information, see [Specifying an SQL Statement](#) on page 497.
- **New query file:** Displays the default name of the new *.sql query file for this database checkpoint. You can use the browse button to browse for a different *.sql query file.



- **Maximum number of rows:** Select this check box and enter the maximum number of database rows to check. If this check box is cleared, there is no maximum. Note that this option adds an additional parameter to your **db_check** statement. For more information, refer to the *TSL Online Reference*.
- **Show me how to use Microsoft Query:** Displays an instruction screen.

Selecting a Source Query File

The following screen opens if you chose to use an existing query file in this database checkpoint.



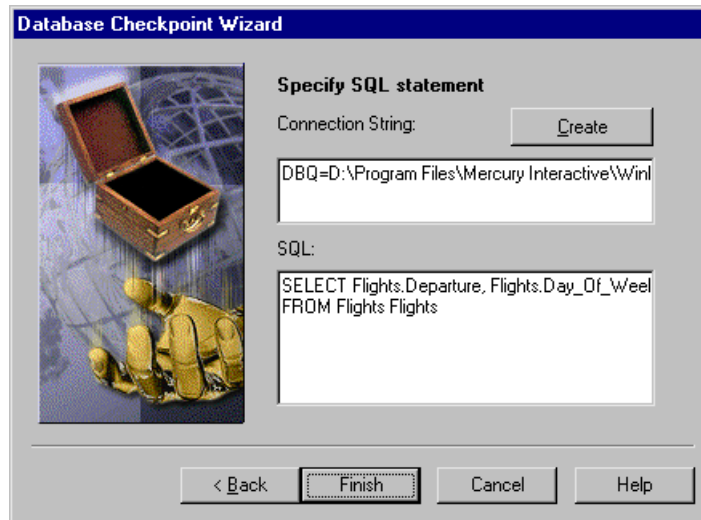
Enter the pathname of the query file or use the **Browse** button to locate it. Once a query file is selected, you can use the **View** button to open the file for viewing.

- If you are creating a default database checkpoint, a **db_check** statement is inserted into your test script.
- If you are creating a custom database checkpoint, the Check Database dialog box opens. For information on the Check Database dialog box, see [Creating a Custom Check on a Database](#) on page 485.



Specifying an SQL Statement

The following screen opens if you chose to specify an SQL statement to use in this database checkpoint.



In this screen you must specify the connection string and the SQL statement:

- **Connection String:** Enter the connection string, or click **Create** to open the ODBC Select Data Source dialog box, in which you can select a *.*dsn* file, which inserts the connection string in the box.
- **SQL:** Enter the SQL statement.

Note: If you create an SQL statement containing parameters, an instruction screen opens. For information on parameterizing SQL statements, see [Parameterizing Standard Database Checkpoints](#) on page 533.

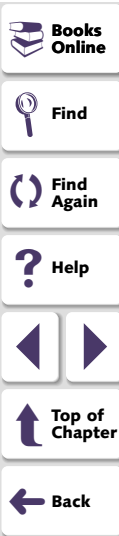
- If you are creating a default database checkpoint, a **db_check** statement is inserted into your test script.
- If you are creating a custom database checkpoint, the Check Database dialog box opens. For information on the Check Database dialog box, see [Creating a Custom Check on a Database](#) on page 485.



Data Junction Screens in the Database Checkpoint Wizard

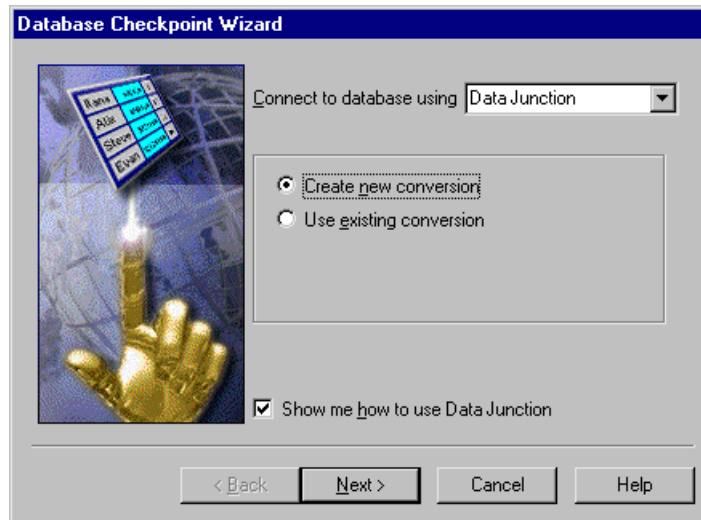
There are two screens in the Database Checkpoint wizard for working with Data Junction. These screens enable you to:

- set general options:
 - switch to ODBC (Microsoft Query) mode
 - choose to create a new conversion or use an existing one
 - display an instruction screen
- specify the conversion file



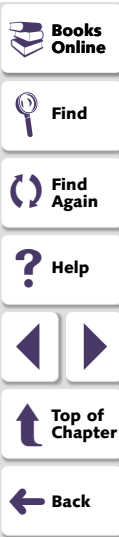
Setting Data Junction Options

The following screen opens if you last worked with Data Junction or if you are creating a default database checkpoint for the first time when only Data Junction is installed:



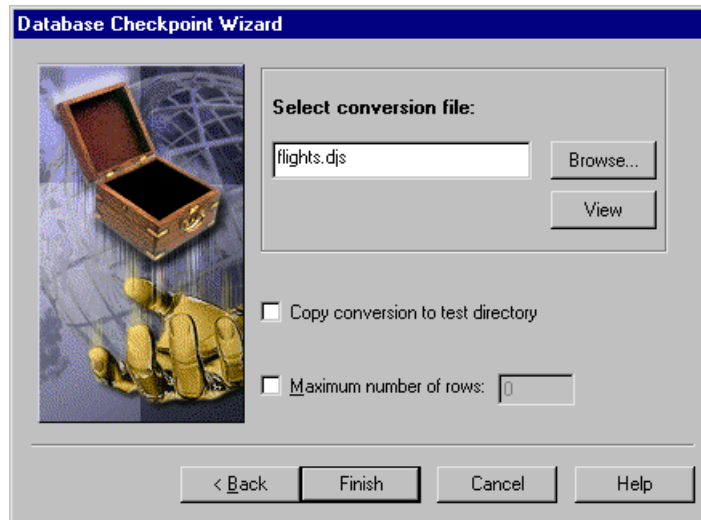
You can choose from the following options:

- **Create new conversion:** Opens Data Junction and enables you to create a new conversion file. For additional information, see [Creating a Conversion File in Data Junction](#) on page 542. Once you have created a conversion file, the Database Checkpoint wizard screen reopens to enable you to specify this file. For additional information, see [Selecting a Data Junction Conversion File](#) on page 502.
- **Use existing conversion:** Opens the **Select conversion file** screen in the wizard, which enables you to specify an existing conversion file. For additional information, see [Selecting a Data Junction Conversion File](#) on page 502.
- **Show me how to use Data Junction** (available only when **Create new conversion** is selected): Displays instructions for working with Data Junction.



Selecting a Data Junction Conversion File

The following wizard screen opens when you are working with Data Junction.



Enter the pathname of the conversion file or use the **Browse** button to locate it. Once a conversion file is selected, you can use the **View** button to open the file for viewing.



You can also choose from the following options:

- **Copy conversion to test folder:** Copies the specified conversion file to the test folder.
- **Maximum number of rows:** Select this check box and enter the maximum number of database rows to check. If this check box is cleared, there is no maximum.

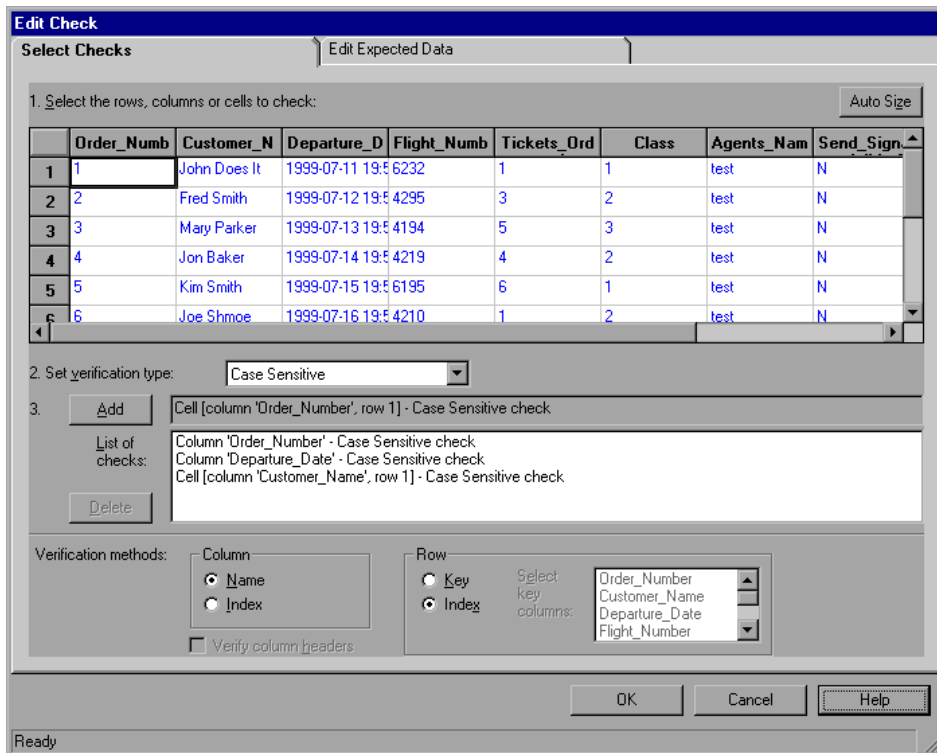
When you are done:

- If you are creating a default database checkpoint, a **db_check** statement is inserted into your test script.
- If you are creating a custom database checkpoint, the Check Database dialog box opens. For information on the Check Database dialog box, see [Creating a Custom Check on a Database](#) on page 485.



Understanding the Edit Check Dialog Box

The **Edit Check** dialog box enables you to specify which cells to check, and which verification method and verification type to use. You can also edit the expected data for the database cells included in the check. (For information on how to open the Edit Check dialog box, see [Creating a Custom Check on a Database](#) on page 485.)



In the **Selected Checks** tab, you can specify the information that is saved in the database checklist:

- which database cells to check
- the verification method
- the verification type

Note that if you are creating a check on a single-column result set, the contents of the Select Checks tab of the Edit Check dialog box differ from what is shown above. For additional information, see [Specifying the Verification Method for a Single-Column Result Set](#) on page 509.

Specifying which Cells to Check

The **List of Checks** pane displays all the checks that will be performed, including the verification type. When the Edit Check dialog box is opened for the first time for a checkpoint, the default check is displayed:

- The default check for a multiple-column result set is a case sensitive check on the entire result set by column name and row index.
- The default check for a single-column result set is a case sensitive check on the entire result set by row position.



Note: If your result set contains multiple columns with the same name, WinRunner disregards the duplicate columns and does not perform checks on them. Therefore, you should create a custom check on the database and select the column index option.

If you do not wish to accept the default settings, you must delete the default check before you specify the checks to perform. Select the “Entire Table - Case Sensitive check” entry in the **List of Checks** pane and click the **Delete** button. Alternatively, double-click this entry in the **List of Checks** pane. A WinRunner message prompts you to delete the highlighted check. Click **Yes**.

Next, specify the checks to perform. You can choose different verification types for different selections of cells. Therefore, specify the verification type before selecting cells. For more information, see [Specifying the Verification Type](#) on page 510.

Highlight the cells on which you want to perform the content check. Next, click the **Add** button to add a check for these cells. Alternatively, you can:

- double-click a cell to check it
- double-click a row header to check all the cells in a row
- double-click a column header to check all the cells in a column
- double-click the top-left corner to check the entire result set

A description of the cells to be checked appears in the **List of Checks** pane.



Specifying the Verification Method

You can select the verification method to control how WinRunner identifies columns or rows within a result set. The verification method applies to the entire result set. Specifying the verification method is different for multiple-column and single-column result sets.

Specifying the Verification Method for a Multiple-Column Result Set

Column

- **Name:** (default setting): WinRunner looks for the selection according to the column names. A shift in the position of the columns within the result set does not result in a mismatch.
- **Index:** WinRunner looks for the selection according to the index, or position, of the columns. A shift in the position of the columns within the result set results in a mismatch. Select this option if your result set contains multiple columns with the same name. For additional information, see the note on [page 506](#). Choosing this option enables the **Verify column headers** check box, which enables you to check column headers as well as cells.



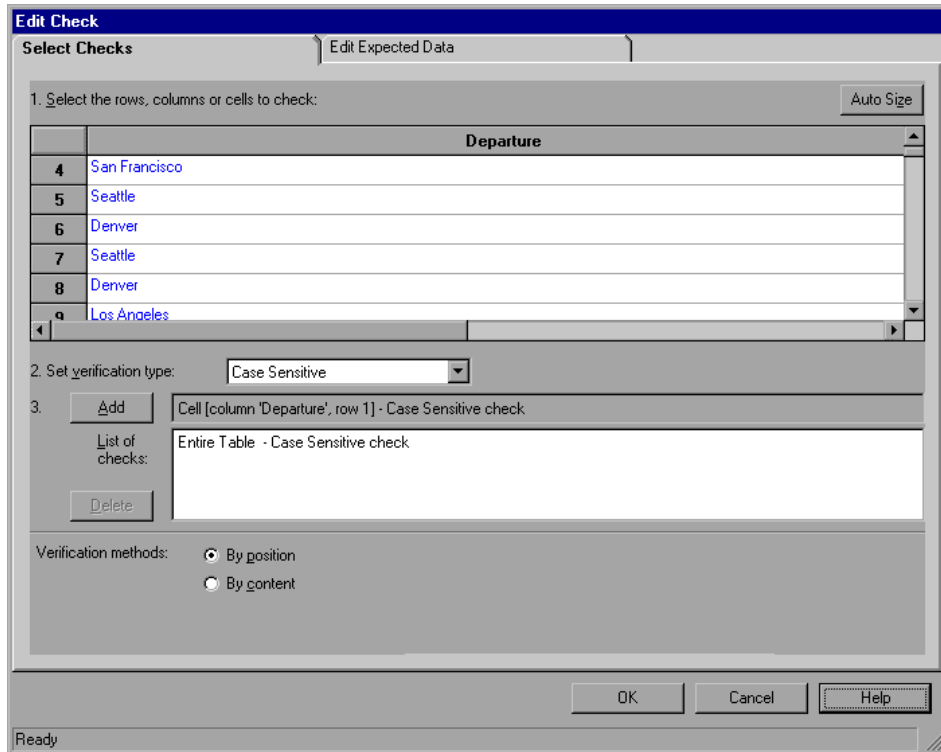
Row

- **Key:** WinRunner looks for the rows in the selection according to the key(s) specified in the **Select key columns** list box, which lists the names of all columns in the result set. A shift in the position of any of the rows does not result in a mismatch. If the key selection does not identify a unique row, only the first matching row will be checked.
- **Index:** (default setting): WinRunner looks for the selection according to the index, or position, of the rows. A shift in the position of any of the rows results in a mismatch.



Specifying the Verification Method for a Single-Column Result Set

The Verification Method box in the Select Checks tab for a single-column result set is different from that for a multiple-column result set. The default check for a single-column result set is a case sensitive check on the entire result set by row position.



- **By position:** WinRunner checks the selection according to the location of the items within the column.
- **By content:** WinRunner checks the selection according to the content of the items, ignoring their location in the column.

Specifying the Verification Type

WinRunner can verify the contents of a result set in several different ways. You can choose different verification types for different selections of cells.

- **Case Sensitive** (the default): WinRunner compares the text content of the selection. Any difference in case or text content between the expected and actual data results in a mismatch.
- **Case Insensitive:** WinRunner compares the text content of the selection. Only differences in text content between the expected and actual data result in a mismatch.
- **Numeric Content:** WinRunner evaluates the selected data according to numeric values. WinRunner recognizes, for example, that “2” and “2.00” are the same number.



- **Numeric Range:** WinRunner compares the selected data against a numeric range. Both the minimum and maximum values are any real number that you specify. This comparison differs from text and numeric content verification in that the actual database data is compared against the range that you defined and not against the expected results.

Note: This option causes a mismatch on any string that does not begin with a number. A string starting with 'e' is translated into a number.

- **Case Sensitive Ignore Spaces:** WinRunner checks the data in the field according to case and content, ignoring differences in spaces. WinRunner reports any differences in case or content as a mismatch.
- **Case Insensitive Ignore Spaces:** WinRunner checks the content in the cell according to content, ignoring differences in case and spaces. WinRunner reports only differences in content as a mismatch.

Click **OK** to save your changes to both tabs of the Edit Check dialog box. The dialog box closes and the Check Database dialog box is restored.



Editing the Expected Data

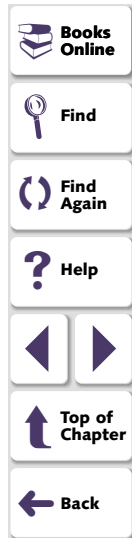
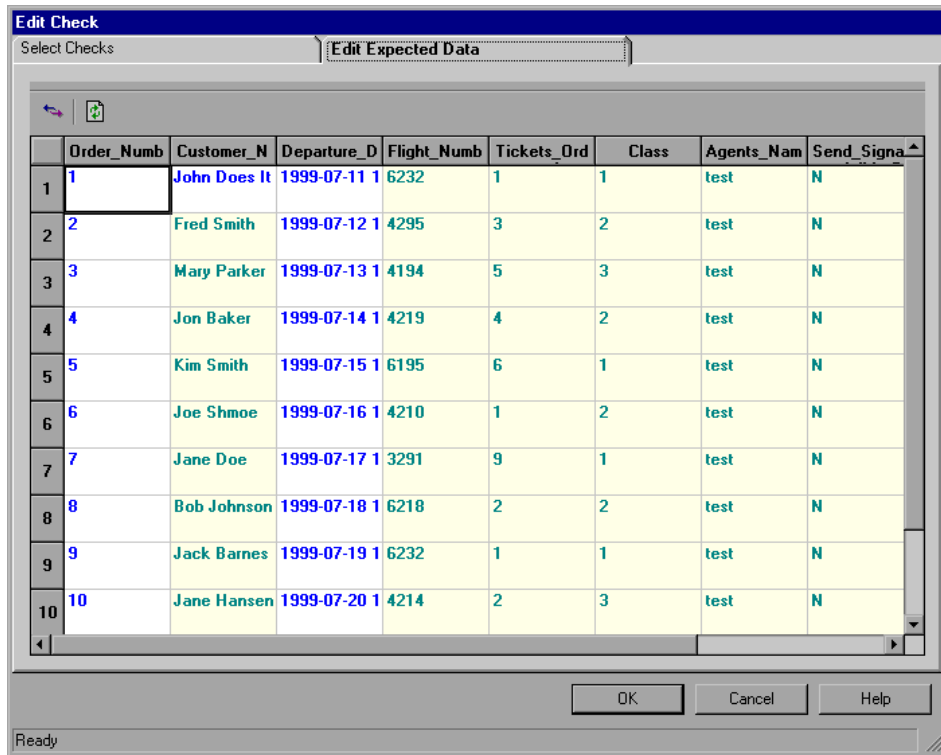


To edit the expected data in the result set, click the **Edit Expected Data** tab. If you previously saved changes in the Select Checks tab, you can click **Reload Table** to reload the selections from the checklist. A WinRunner message prompts you to reload the saved data. Click **Yes**.

Note that if you previously saved changes to the Select Checks tab, and then reopened the Edit Check dialog box, the table appears color coded in the Edit Expected Data tab.

The cells included in the check appear in blue on a white background. The cells excluded from the check appear in green on a yellow background.





To edit the expected value of data in a cell, double-click inside the cell. A cursor appears in the cell. Change the contents of the cell, as desired. Click **OK** to save your changes to both tabs of the Edit Check dialog box. The dialog box closes and the Check Database dialog box is restored.

Modifying a Standard Database Checkpoint

You can make the following changes to an existing standard database checkpoint:

- make a checklist available to other users by saving it in a shared folder
- change which database properties to check in an existing checklist
- modify a query in an existing checklist

Note: In addition to modifying database checklists, you can also modify the expected results of database checkpoints. For more information, see [Modifying the Expected Results of a Standard Database Checkpoint](#) on page 529.

Saving a Database Checklist in a Shared Folder

By default, checklists for database checkpoints are stored in the folder of the current test. You can specify that a checklist be placed in a shared folder to enable wider access, so that you can use the same checklist in multiple tests.

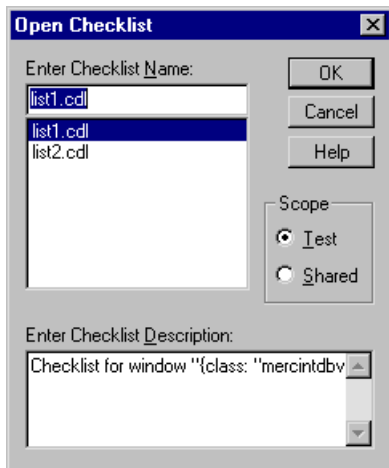
The default folder in which WinRunner stores your shared checklists is *WinRunner installation folder/chklist*. To choose a different folder, you can use the **Shared Checklists** box in the Folders tab of the General Options dialog box. For more information, see Chapter 40, [Setting Global Testing Options](#).



To save a database checklist in a shared folder:

- 1 Choose **Create > Edit Database Checklist**.

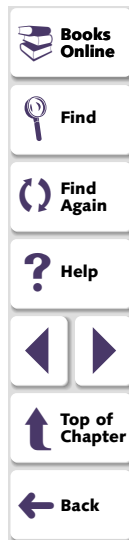
The Open Checklist dialog box opens.



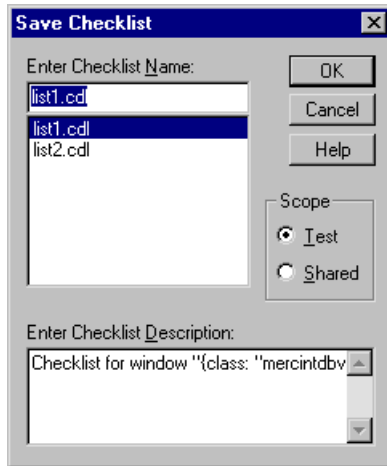
- 2 Select a database checklist and click **OK**. Note that database checklists have the .cdl extension, while GUI checklists have the .ctl extension. For information on GUI checklists, see [Modifying GUI Checklists](#) on page 290.

The Open Checklist dialog box closes. The Edit Database Checklist dialog box displays the selected database checklist.

- 3 Save the checklist by clicking **Save As**.



The Save Checklist dialog box opens.



- 4 Under **Scope**, click **Shared**. Type in a name for the shared checklist. Click **OK** to save the checklist and close the dialog box.
- 5 Click **OK** to close the Edit Database Checklist dialog box.



Editing Database Checklists

You can edit an existing database checklist. Note that a database checklist includes only a reference to the *msqr*.sql* query file or the **.djs* conversion file of the database and the properties to be checked. It does not include the expected results for the values of those properties.

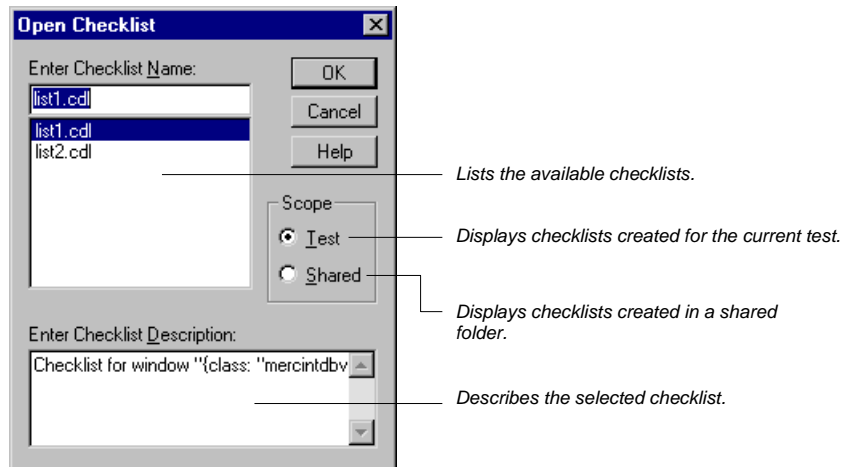
You may want to edit a database checklist to change which properties in a database to check.

To edit an existing database checklist:

- 1 Choose **Create > Edit Database Checklist**. The Open Checklist dialog box opens.
- 2 A list of checklists for the current test is displayed. If you want to see checklists in a shared folder, click **Shared**.



For more information on sharing database checklists, see [Saving a Database Checklist in a Shared Folder](#) on page 514.



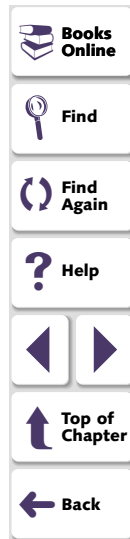
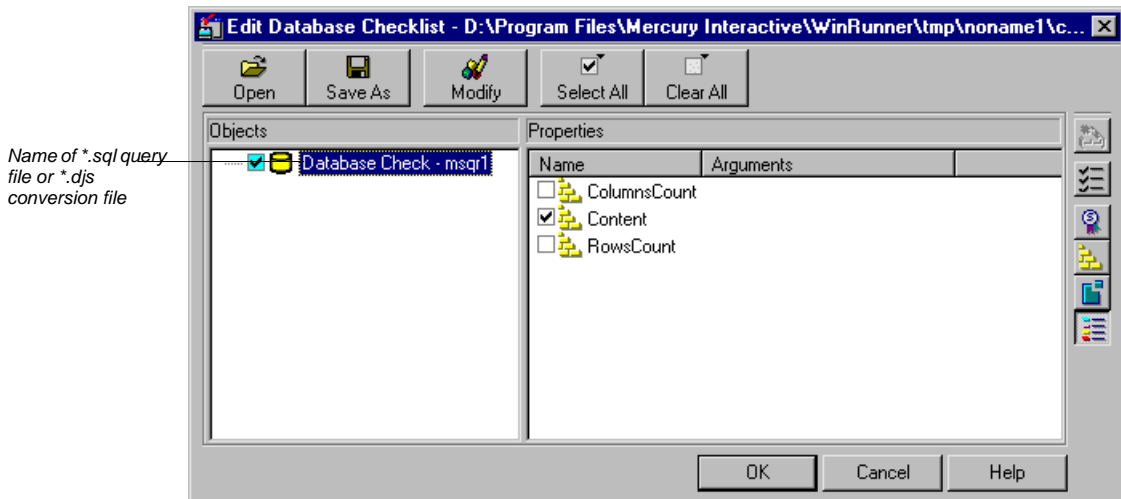
3 Select a database checklist.

4 Click **OK**.

The Open Checklist dialog box closes. The Edit Database Checklist dialog box opens and displays the selected checklist.



The **Objects** pane contains “Database check” and the name of the *.sql query file or *.djs conversion file that will be included in the database checkpoint. The **Properties** pane lists the different types of checks that can be performed on databases. A check mark indicates that the item is selected and is included in the checkpoint.



You can use the **Modify** button to modify the database checkpoint, as described in [Modifying a Query in an Existing Database Checklist](#) on page 521.

In the **Properties** pane, you can edit your database checklist to include or exclude the following types of checks:

ColumnsCount: Counts the number of columns in the result set.

Content: Checks the content of the result set, as described in [Creating a Default Check on a Database](#) on page 480.

RowCount: Counts the number of rows in the result set.

5 Save the checklist in one of the following ways:

- To save the checklist under its existing name, click **OK** to close the Edit Database Checklist dialog box. A WinRunner message prompts you to overwrite the existing checklist. Click **OK**.
- To save the checklist under a different name, click the **Save As** button. The Save Checklist dialog box opens. Type a new name or use the default name. Click **OK**. Note that if you do not click the Save As button, WinRunner automatically saves the checklist under its current name when you click OK to close the Edit Database Checklist dialog box.



A new database checkpoint statement is *not* inserted in your test script.



Note: Before you run your test in Verify run mode, you must update the expected results to match the changes you made in the checklist. To update the expected results, run your test in Update run mode. For more information on running a test in Update run mode, see [WinRunner Test Run Modes](#) on page 834.

Modifying a Query in an Existing Database Checklist

You can modify a query in an existing database checklist from the Edit Database Checklist dialog box. You may want to do this if, for example, you move the database to a new location on the network. You must use the same tool to modify the query that you used to create it.

Modifying a Query Created with ODBC/Microsoft Query

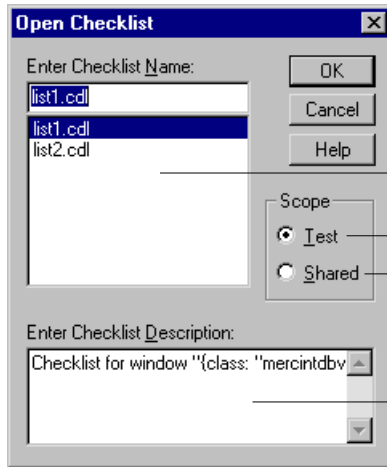
You can modify a query created with ODBC/Microsoft Query from the Edit Database Checklist dialog box.

To modify a database checkpoint created with ODBC/Microsoft Query:

- 1 Choose **Create > Edit Database Checklist**. The Open Checklist dialog box opens.
- 2 A list of checklists for the current test is displayed. If you want to see checklists in a shared folder, click **Shared**.

For more information on sharing database checklists, see [Saving a Database Checklist in a Shared Folder](#) on page 514.





Lists the available checklists.

Displays checklists created for the current test.

Displays checklists created in a shared folder.

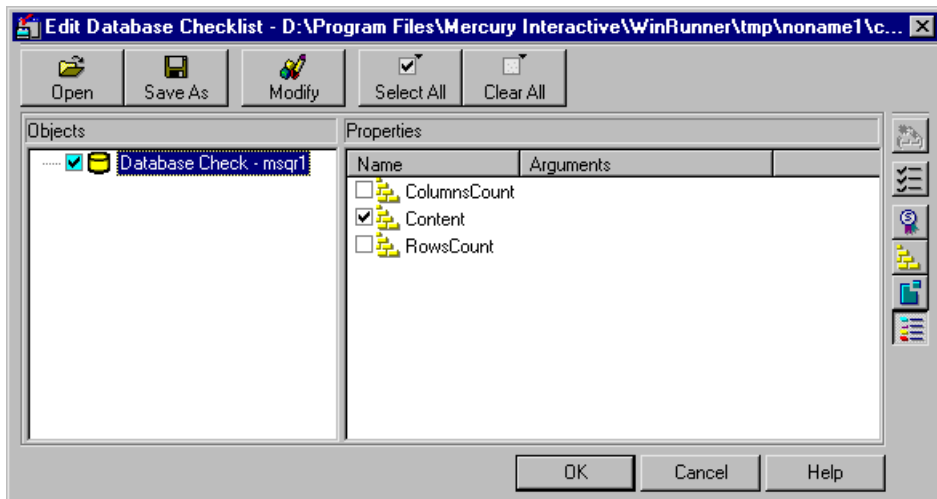
Describes the selected checklist.

- 3 Select a database checklist.
- 4 Click **OK**.

The Open Checklist dialog box closes. The Edit Database Checklist dialog box opens and displays the selected checklist.

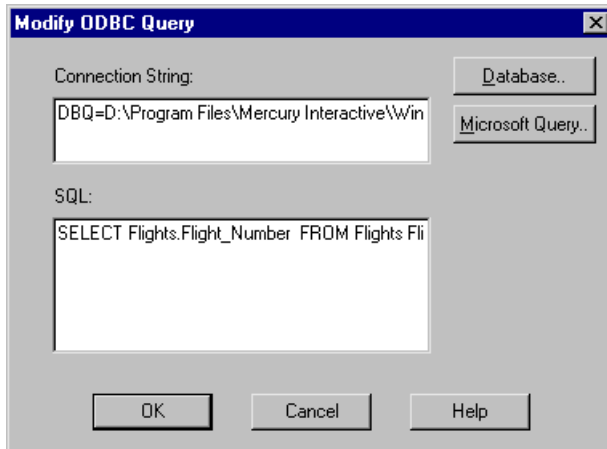


The **Objects** pane contains “Database check” and the name of the *.sql query file that will be included in the database checkpoint. The **Properties** pane lists the different types of checks that can be performed on databases. A check mark indicates that the item is selected and is included in the checkpoint. To modify the properties to check, see [Editing Database Checklists](#) on page 517.



- 5 In the **Objects** column, highlight the name of the query file or the conversion file, and click **Modify**.

The Modify ODBC Query dialog box opens.



- 6 Modify the ODBC query by changing the connection string and/or the SQL statement. You can click **Database** to open the ODBC Select Data Source dialog box, in which you can select a *.*dsn* file, which inserts the connection string in the box. You can click **Microsoft Query** to open Microsoft Query.
- 7 Click **OK** to return to the Edit Checklist dialog box.
- 8 Click **OK** to close the Edit Checklist dialog box.



Note: You must run all tests that use this checklist in Update mode before you run them in Verify mode. For more information, see [Running a Test to Update Expected Results](#) on page 849.

Modifying a Query Created with Data Junction

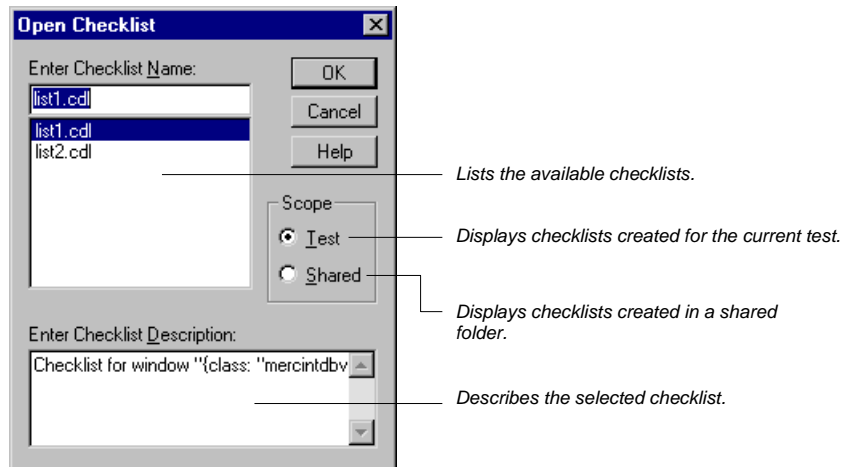
You can modify a Data Junction conversion file used in a database checkpoint directly in Data Junction. To see the pathname of the conversion file, follow the instructions below.

To see the pathname of a Data Junction conversion file in a database checkpoint:

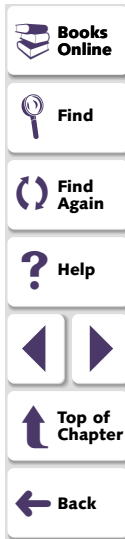
- 1 Choose **Create > Edit Database Checklist**. The Open Checklist dialog box opens.
- 2 A list of checklists for the current test is displayed. If you want to see checklists in a shared folder, click **Shared**.



For more information on sharing database checklists, see [Saving a Database Checklist in a Shared Folder](#) on page 514.



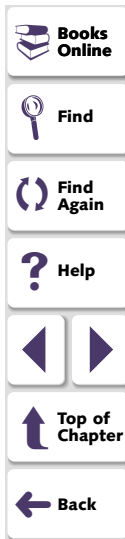
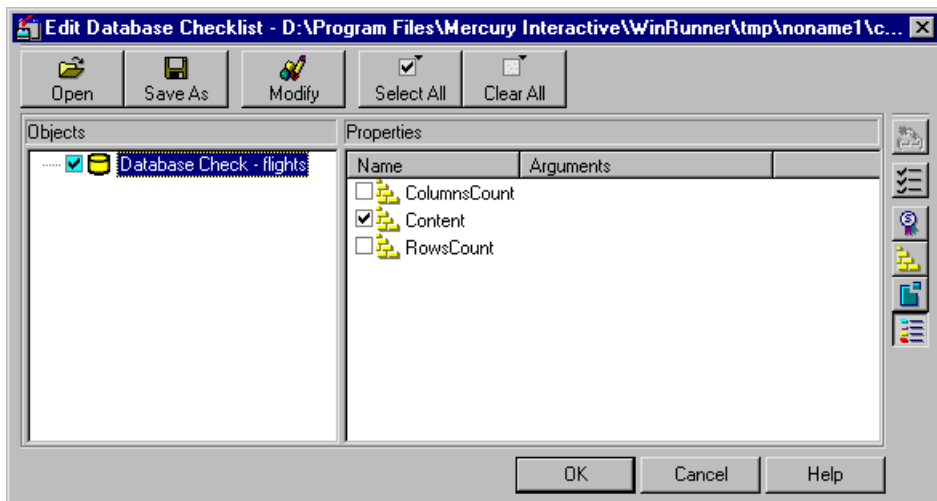
3 Select a database checklist.



4 Click **OK**.

The Open Checklist dialog box closes. The Edit Database Checklist dialog box opens and displays the selected checklist.

The **Objects** pane contains “Database check” and the name of the *.djs conversion file that will be included in the database checkpoint. The **Properties** pane lists the different types of checks that can be performed on databases. A check mark indicates that the item is selected and is included in the checkpoint. To modify the properties to check, see [Editing Database Checklists](#) on page 517.





- 5 In the **Objects** column, highlight the name of the conversion file, and click **Modify**.

WinRunner displays a message to use Data Junction to modify the conversion file and the pathname of the conversion file.

- 6 Click **OK** to close the message and return to the Edit Checklist dialog box.
- 7 Click **OK** to close the Edit Checklist dialog box.
- 8 Modify the conversion file directly in Data Junction.

Note: You must run all tests that use this checklist in Update mode before you run them in Verify mode. For more information, see [Running a Test to Update Expected Results](#) on page 849.



Modifying the Expected Results of a Standard Database Checkpoint

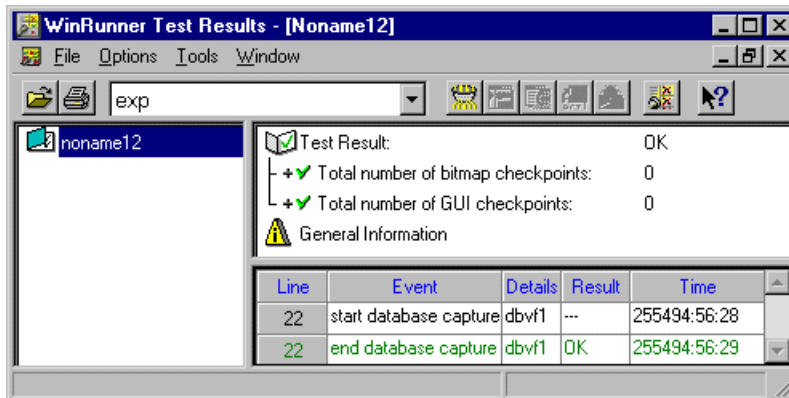
You can modify the expected results of an existing standard database checkpoint by changing the expected value of a property check within the checkpoint. You can make this change before or after you run your test.

To modify the expected results for an existing database checkpoint:



- 1 Choose **Tools > Test Results** or click **Test Results**.

The WinRunner Test Results window opens.



- 2 In the **Results** box, choose your expected results directory (by default, “exp”).



- 3 In the test log, locate the database checkpoint by looking for entries that list “end database capture” in the **Event** column. Note that the line number in the test script appears in the **Line** column of the test log.



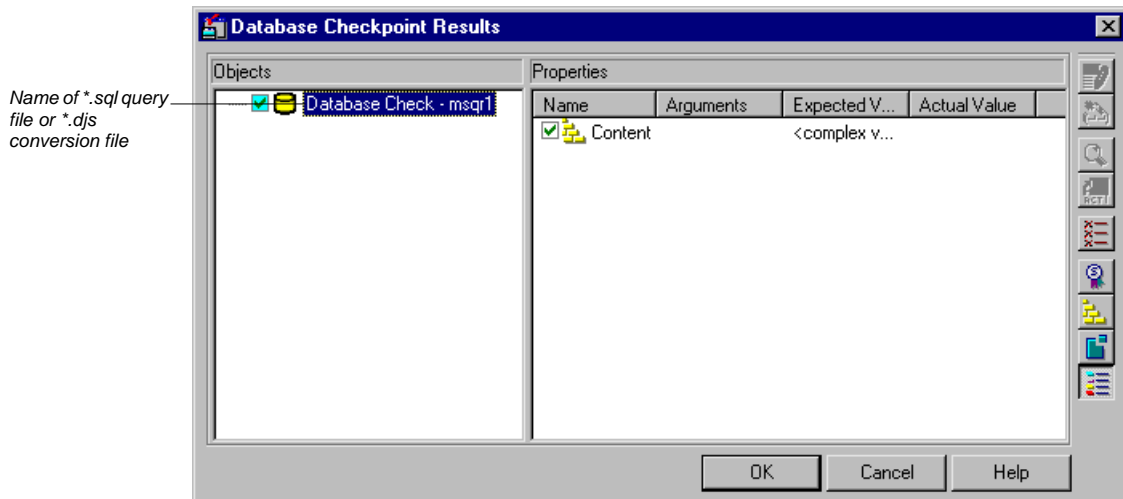
Note: You can use the **Show TSL** button to open the test script to the highlighted line number.



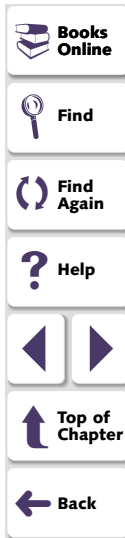
- 4 Double-click the desired “end database capture” entry, or click this entry and click **Display**.



The **Database Checkpoint Results** dialog box opens.



- 5 Select the property check whose expected results you want to modify. Click the **Edit expected value** button. In the **Expected Value** column, modify the value, as desired. Click **OK** to close the dialog box.



Note: You can also modify the expected value of a property check while creating a database checkpoint. For more information, see [Creating a Custom Check on a Database](#) on page 485.

Note: You can also update the expected value of a database checkpoint to the actual value after a test run. For more information, see [Updating the Expected Results of a Checkpoint](#) on page 901.



Parameterizing Standard Database Checkpoints

When you create a standard database checkpoint using ODBC (Microsoft Query), you can add parameters to an SQL statement to parameterize the checkpoint. This is useful if you want to create a database checkpoint with a query in which the SQL statement defining your query changes. For example, suppose you are working with the sample Flight application, and you want to select all the records of flights departing from Denver on Monday when you create the query. You might also want to use an identical query to check all the flights departing from San Francisco on Tuesday. Instead of creating a new query or rewriting the SQL statement in the existing query to reflect the changes in day of the week or departure points, you can parameterize the SQL statement so that you can use a parameter for the departure value. You can replace the parameter with either value: “Denver,” or “San Francisco.” Similarly, you can use a parameter for the day of the week value, and replace the parameter with either “Monday” or Tuesday.”



Understanding Parameterized Queries

A parameterized query is a query in which at least one of the fields of the WHERE clause is parameterized, i.e., the value of the field is specified by a question mark (?). For example, the following SQL statement is based on a query on the database in the sample Flight Reservation application:

```
SELECT Flights.Departure, Flights.Flight_Number, Flights.Day_Of_Week
FROM Flights Flights
WHERE (Flights.Departure=?) AND (Flights.Day_Of_Week=?)
```

- **SELECT** defines the columns to include in the query.
- **FROM** specifies the path of the database.
- **WHERE** (optional) specifies the conditions, or filters to use in the query.
- **Departure** is the parameter that represents the departure point of a flight.
- **Day_Of_Week** is the parameter that represents the day of the week of a flight.

In order to execute a parameterized query, you must specify the values for the parameters.



Note: When you use Microsoft Query to create a query, the parameters are specified by brackets. When Microsoft Query generates an SQL statement, the bracket symbols are replaced by a question mark symbol (?). You can click the SQL button in Microsoft Query to view the SQL statement which will be generated, based on the criteria you add to your query.

Creating a Parameterized Database Checkpoint

You use a parameterized query to create a parameterized checkpoint. When you create a database checkpoint, you insert a **db_check** statement into your test script. When you parameterize the SQL statement in your checkpoint, the **db_check** function has a fourth, optional, argument: the *parameter_array* argument. A statement similar to the following is inserted into your test script:

```
db_check("list1.cdl", "dbvf1", NO_LIMIT, dbvf1_params);
```

The *parameter_array* argument will contain the values to substitute for the parameters in the parameterized checkpoint.

WinRunner cannot capture the expected result set when you record your test. Unlike regular database checkpoints, recording a parameterized checkpoint requires additional steps to capture the expected results set. Therefore, you must use array statements to add the values to substitute for the parameters. The array statements could be similar to the following:

```
dbvf1_params[1] = "Denver";
```



```
dbvf1_params[2] = "Monday";
```

You insert the array statements before the **db_check** statement in your test script. You must run the test in Update mode once to capture the expected results set before you run your test in Verify mode.

To insert a parameterized SQL statement into a db_check statement:

- 1 Create the parameterized SQL statement using one of the following methods:
 - In Microsoft Query, once you have defined your query, add criteria whose values are a set of square brackets ([]). When you are done, click **File > Exit and return to WinRunner**. It may take several seconds to return to WinRunner.
 - If you are working with ODBC, enter a parameterized SQL statement, with a question mark symbol (?) in place of each parameter, in the Database Checkpoint wizard. For additional information, see [Specifying an SQL Statement](#) on page 497.



2 Finish creating the database checkpoint.

- If you are creating a *default* database checkpoint, WinRunner captures the database query.
- If you are creating a *custom* database checkpoint, the Check Database dialog box opens. You can select which checks to perform on the database. For additional information, see [Creating a Custom Check on a Database](#) on page 485. Once you close the Check Database dialog box, WinRunner captures the database query.

Note: If you are creating a *custom* database checkpoint, then when you try to close the Check Database dialog box, you are prompted with the following message: “The expected value of one or more selected checks is not valid. Continuing might cause these checks to fail. Do you wish to modify your selection?” Click **No**. (This message appears because <Cannot Capture> appears under the Expected Value column in the dialog box. In fact, WinRunner only finishes capturing the database query once you specify a value and run your test in Update mode.) For additional information on messages in the Check Database dialog box, see [Messages in the Database Checkpoint Dialog Boxes](#) on page 490.



- 3 A message box prompts you with instructions, which are also described below. Click **OK** to close the message box.

The WinRunner window is restored and a **db_check** statement similar to the following is inserted into your test script.

```
db_check("list1.cdl", "dbvf1", NO_LIMIT, dbvf1_params);
```

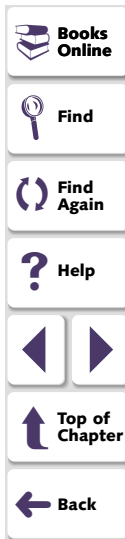
- 4 Create an array to provide values for the variables in the SQL statement, and insert these statements above the **db_check** statement. For example, you could insert the following lines in your test script:

```
dbvf1_params[1] = "Denver";  
dbvf1_params[2] = "Monday";
```

The array replaces the question marks (?) in the SQL statement on [page 534](#) with the new values. Follow the guidelines below for adding an array in TSL to parameterize your SQL statements.

- 5 Run your test in Update mode to update the SQL statement with these values.

After you have completed this procedure, you can run your test in Verify mode with the SQL statement. To change the parameters in the SQL statement, you modify the array in TSL.



Guidelines for Parameterizing SQL Statements

Follow the guidelines below when parameterizing SQL statements in **db_check** statements:

- If the column is numeric, the parameter value can be either a text string or a number.
- If the column is textual and the parameter value is textual, it can be a simple text string.
- If the column is textual and the parameter value is a number, it should be enclosed in simple quotes (' '), e.g. "100". Otherwise the user will receive a syntax error.
- Special syntax is required for dates, times, and time stamps, as shown below:

Date	{d '1999-07-11'}
Time	{t '19:59:27'}
Time Stamp	{ts '1999-07-11 19:59:27'}

Note: The date and time format may change from one ODBC driver to another.



Specifying a Database

While you are creating a database checkpoint, you must specify which database to check. You can use the following tools to specify which database to check:

- ODBC/Microsoft Query
- Data Junction (Standard database checkpoints only).

Creating a Query in ODBC/Microsoft Query

You can use Microsoft Query to choose a data source and define a query within the data source, or you can define a connection string and an SQL statement manually. WinRunner supports the following versions of Microsoft Query:

- version 2.00 (in Microsoft Office 95)
- version 8.00 (in Microsoft Office 97)
- version 2000 (in Microsoft Office 2000)

To create a query in ODBC without using Microsoft Query, specify the connection string and the SQL statement in the Database Checkpoint wizard. For additional information, see [Specifying an SQL Statement](#) on page 497.



To choose a data source and define a query in Microsoft Query:

- 1 Choose a new or an existing data source.
- 2 Define a query.

Note: If you want to parameterize the SQL statement in the **db_check** statement which will be generated, then in the last wizard screen in Microsoft Query 8.00, click **View data or edit query in Microsoft Query**. Follow the instructions in [Guidelines for Parameterizing SQL Statements](#) on page 539.

- 3 When you are done:
 - In version 2.00, choose **File > Exit and return to WinRunner** to close Microsoft Query and return to WinRunner.
 - In version 8.00, in the Finish screen of the Query Wizard, click **Exit and return to WinRunner** and click **Finish** to exit Microsoft Query. Alternatively, click **View data or edit query in Microsoft Query** and click **Finish**. After viewing or editing the data, choose **File > Exit and return to WinRunner** to close Microsoft Query and return to WinRunner.



- 4 Continue creating a database checkpoint in WinRunner:
 - To create a default check on a database, follow the instructions starting at step 4 on [page 483](#).
 - To create a custom check on a database, follow the instructions starting at step 6 on [page 486](#).

For additional information on working with Microsoft Query, refer to the Microsoft Query documentation.

Creating a Conversion File in Data Junction

You can use Data Junction to create a conversion file which converts a database to a target text file. WinRunner supports versions 6.5 and 7.0 of Data Junction.

To create a conversion file in Data Junction:

- 1 Specify and connect to the source database.
- 2 Select an ASCII (delimited) target spoke type and specify and connect to the target file. Choose the “Replace File/Table” output mode.



Note: If you are working with Data Junction version 7.0 and your source database includes values with delimiters (CR, LF, tab), then in the Target Properties dialog box, you must specify “\r\n\t” as the value for the **TransliterationIn** property. The value for the **TransliterationOut** property must be blank.

- 3 Map the source file to the target file.
- 4 When you are done, click **File > Export Conversion** to export the conversion to a *.djs conversion file.
- 5 The Database Checkpoint wizard opens to the **Select conversion file** screen. Follow the instructions in [Selecting a Data Junction Conversion File](#) on page 502.
- 6 Continue creating a database checkpoint in WinRunner:
 - To create a default check on a database, follow the instructions starting at step 4 on [page 483](#).
 - To create a custom check on a database, follow the instructions starting at step 6 on [page 486](#).

For additional information on working with Data Junction, refer to the Data Junction documentation.



Using TSL Functions to Work with a Database

WinRunner provides several TSL functions (**db_**) that enable you to work with databases.

You can use the Function Generator to insert the database functions in your test script, or you can manually program statements that use these functions. For information about working with the Function Generator, see Chapter 25, **Generating Functions**. For more information about these functions, refer to the *TSL Online Reference*.

Checking Data in a Database

You use the **db_check** function to create a standard database checkpoint with ODBC (Microsoft Query) and Data Junction. For information on this function, see **Creating a Default Check on a Database** on page 480 and **Creating a Custom Check on a Database** on page 485. For information on parameterizing **db_check** statements, see **Parameterizing Standard Database Checkpoints** on page 533.



Checking Runtime Data in Your Application Against the Data in a Database

You use the **db_record_check** function to create a runtime database record checkpoint with ODBC (Microsoft Query) and Data Junction. For information on this function, see [Creating a Runtime Database Record Checkpoint](#) on page 468.

TSL Functions for Working with ODBC (Microsoft Query)

When you work with ODBC (Microsoft Query), you must perform the following steps in the following order:

- 1 Connect to the database.
- 2 Execute a query and create a result set based an SQL statement. (This step is optional. You must perform this step only if you do not create and execute a query using Microsoft Query.)
- 3 Retrieve information from the database.
- 4 Disconnect from the database.



The TSL functions for performing these steps are described below:

1 Connecting to a Database

The **db_connect** function creates a new database session and establishes a connection to an ODBC database. This function has the following syntax:

```
db_connect ( session_name, connection_string );
```

The *session_name* is the logical name of the database session. The *connection_string* is the connection parameters to the ODBC database.

2 Executing a Query and Creating a Result Set Based on an SQL Statement

The **db_execute_query** function executes the query based on the SQL statement and creates a record set. This function has the following syntax:

```
db_execute_query ( session_name, SQL, record_number );
```

The *session_name* is the logical name of the database session. The *SQL* is the SQL statement. The *record_number* is an out parameter returning the number of records in the result set.



3 Retrieving Information from the Database

Returning the Value of a Single Field in the Database

The **db_get_field_value** function returns the value of a single field in the database. This function has the following syntax:

```
db_get_field_value ( session_name, row_index, column );
```

The *session_name* is the logical name of the database session. The *row_index* is the numeric index of the row. (The first row is always numbered “0”.) The *column* is the name of the field in the column or the numeric index of the column within the database. (The first column is always numbered “0”.)

Returning the Content and Number of Column Headers

The **db_get_headers** function returns the number of column headers in a query and the content of the column headers, concatenated and delimited by tabs. This function has the following syntax:

```
db_get_headers ( session_name, header_count, header_content );
```

The *session_name* is the logical name of the database session. The *header_count* is the number of column headers in the query. The *header_content* is the column headers, concatenated and delimited by tabs.



Returning the Row Content

The **db_get_row** function returns the content of the row, concatenated and delimited by tabs. This function has the following syntax:

```
db_get_row ( session_name, row_index, row_content );
```

The *session_name* is the logical name of the database session. The *row_index* is the numeric index of the row. (The first row is always numbered “0”.) The *row_content* is the row content as a concatenation of the fields values, delimited by tabs.

Writing the Record Set into a Text File

The **db_write_records** function writes the record set into a text file delimited by tabs. This function has the following syntax:

```
db_write_records ( session_name, output_file [ , headers [ , record_limit ] ] );
```

The *session_name* is the logical name of the database session. The *output_file* is the name of the text file in which the record set is written. The *headers* are an optional Boolean parameter that will include or exclude the column headers from the record set written into the text file. The *record_limit* is the maximum number of records in the record set to be written into the text file. A value of NO_LIMIT (the default value) indicates there is no maximum limit to the number of records in the record set.



Returning the Last Error Message of the Last Operation

The **db_get_last_error** function returns the last error message of the last ODBC or Data Junction operation. This function has the following syntax:

```
db_get_last_error ( session_name, error );
```

The *session_name* is the logical name of the database session. The *error* is the error message.

4 Disconnecting from a Database

The **db_disconnect** function disconnects WinRunner from the database and ends the database session. This function has the following syntax:

```
db_disconnect ( session_name );
```

The *session_name* is the logical name of the database session.



TSL Functions for Working with Data Junction

You can use the following two functions when working with Data Junction.

Running a Data Junction Export File

The **db_dj_convert** function runs a Data Junction export file (.djs file). This function has the following syntax:

```
db_dj_convert ( djs_file [ , output_file [ , headers [ , record_limit ] ] ] );
```

The *djs_file* is the Data Junction export file. The *output_file* is an optional parameter to override the name of the target file. The *headers* are an optional Boolean parameter that will include or exclude the column headers from the Data Junction export file. The *record_limit* is the maximum number of records that will be converted.

Returning the Last Error Message of the Last Operation

The **db_get_last_error** function returns the last error message of the last ODBC or Data Junction operation. This function has the following syntax:

```
db_get_last_error ( session_name, error );
```

The *session_name* is ignored when working with Data Junction. The *error* is the error message.



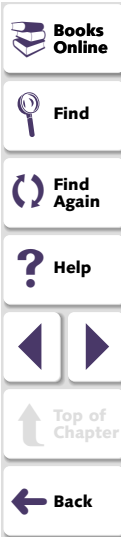
Creating Tests

Checking Bitmaps

WinRunner enables you to compare two versions of an application being tested by matching captured bitmaps. This is particularly useful for checking non-GUI areas of your application, such as drawings or graphs.

This chapter describes:

- **Checking Window and Object Bitmaps**
- **Checking Area Bitmaps**

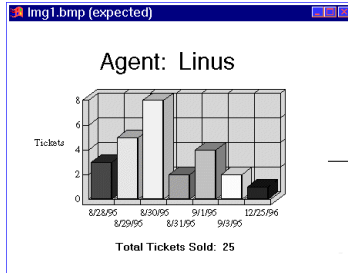


About Checking Bitmaps

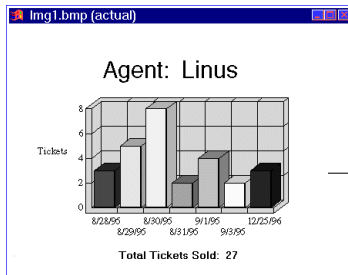
You can check an object, a window, or an area of a screen in your application as a bitmap. While creating a test, you indicate what you want to check. WinRunner captures the specified bitmap, stores it in the expected results folder (*exp*) of the test, and inserts a checkpoint in the test script. When you run the test, WinRunner compares the bitmap currently displayed in the application being tested with the *expected* bitmap stored earlier. In the event of a mismatch, WinRunner captures the current *actual* bitmap and generates a *difference* bitmap. By comparing the three bitmaps (expected, actual, and difference), you can identify the nature of the discrepancy.

Suppose, for example, your application includes a graph that displays database statistics. You could capture a bitmap of the graph in order to compare it with a bitmap of the graph from a different version of your application. If there is a difference between the graph captured for expected results and the one captured during the test run, WinRunner generates a bitmap that shows the difference, pixel by pixel.

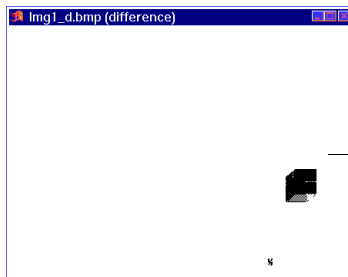




In the expected graph, captured when the test was created, 25 tickets were sold.



In the actual graph, captured during the test run, 27 tickets were sold. The last column is taller because of the larger quantity of tickets.



The difference bitmap shows where the two graphs diverged: in the height of the last column, and in the number of tickets sold.

Books Online

Find

Find Again

Help

Top of Chapter

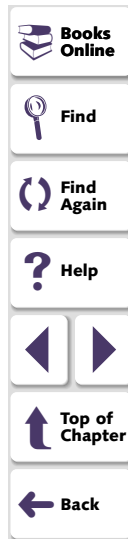
Back

When working in Context Sensitive mode, you can capture a bitmap of a window, object, or of a specified area of a screen. WinRunner inserts a checkpoint in the test script in the form of either a **win_check_bitmap** or **obj_check_bitmap statement**.

To check a bitmap, you start by choosing Create > Bitmap Checkpoint. To capture a window or another GUI object, you click it with the mouse. To capture an area bitmap, you mark the area to be checked using a crosshairs mouse pointer.

Note that when you record a test in Analog mode, you should press the CHECK BITMAP OF WINDOW softkey or the CHECK BITMAP OF SCREEN AREA softkey to create a bitmap checkpoint. This prevents WinRunner from recording extraneous mouse movements. If you are programming a test, you can also use the Analog function **check_window** to check a bitmap. For more information refer to the *TSL Online Reference*.

If the name of a window or object varies each time you run a test, you can define a regular expression in the GUI Map Editor. This instructs WinRunner to ignore all or part of the name. For more information on using regular expressions in the GUI Map Editor, see Chapter 7, [Editing the GUI Map](#).



Note for XRunner users: You cannot use bitmap checkpoints created in XRunner when you run a test script in WinRunner. You must recreate these checkpoints in WinRunner. For information on using GUI map files created in XRunner in WinRunner test scripts, see Chapter 9, [Configuring the GUI Map](#). For information on using XRunner test scripts recorded in Analog mode, see Chapter 11, [Creating Tests](#). For information on using GUI checkpoints created in XRunner, see Chapter 12, [Checking GUI Objects](#).

Note about data-driven testing: In order to use bitmap checkpoints in data-driven tests, you must parameterize the statements in your test script that contain them. For information on using bitmap checkpoints in data-driven tests, see [Using Data-Driven Checkpoints and Bitmap Synchronization Points](#) on page 639.



Checking Window and Object Bitmaps

You can capture a bitmap of any window or object in your application by pointing to it. The method for capturing objects and for capturing windows is identical. You start by choosing **Create > Bitmap Checkpoint > For Object/Window**. As you pass the mouse pointer over the windows of your application, objects and windows flash. To capture a window bitmap, you click the window's title bar. To capture an object within a window as a bitmap, you click the object itself.

Note that during recording, when you capture an object in a window that is not the active window, WinRunner automatically generates a **set_window** statement.

To capture a window or object as a bitmap:



- 1 Choose **Create > Bitmap Checkpoint > For Object/Window** or click the **Bitmap Checkpoint for Object/Window** button on the User toolbar. Alternatively, if you are recording in Analog mode, press the CHECK BITMAP OF OBJECT/WINDOW softkey.

The WinRunner window is minimized, the mouse pointer becomes a pointing hand, and a help window opens.



- 2 Point to the object or window and click it. WinRunner captures the bitmap and generates a **win_check_bitmap** or **obj_check_bitmap** statement in the script.

The TSL statement generated for a window bitmap has the following syntax:

```
win_check_bitmap ( object, bitmap, time );
```

For an object bitmap, the syntax is:

```
obj_check_bitmap ( object, bitmap, time );
```

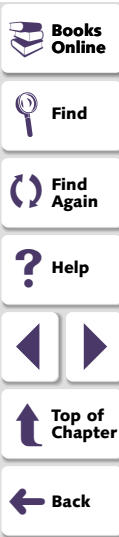
For example, when you click the title bar of the main window of the Flight Reservation application, the resulting statement might be:

```
win_check_bitmap ("Flight Reservation", "Img2", 1);
```

However, if you click the Date of Flight box in the same window, the statement might be:

```
obj_check_bitmap ("Date of Flight:", "Img1", 1);
```

For more information on the **win_check_bitmap** and **obj_check_bitmap** functions, refer to the *TSL Online Reference*.



Note: The execution of the **win_check_bitmap** and **obj_check_bitmap** functions is affected by the current values specified for the *delay_msec*, *timeout_msec* and *min_diff* testing options. For more information on these testing options and how to modify them, see Chapter 41, [Setting Testing Options from a Test Script](#). You can also set the corresponding **Delay for Window Synchronization**, **Timeout for Checkpoints and CS Statements**, and **Threshold for Difference between Bitmaps** testing options globally using the General Options dialog box. For more information, see Chapter 40, [Setting Global Testing Options](#).



Checking Area Bitmaps

You can define any rectangular area of the screen and capture it as a bitmap for comparison. The area can be any size: it can be part of a single window, or it can intersect several windows. The rectangle is identified by the coordinates of its upper left and lower right corners, relative to the upper left corner of the window in which the area is located. If the area intersects several windows or is part of a window with no title (for example, a popup window), its coordinates are relative to the entire screen (the root window).

To capture an area of the screen as a bitmap:



- 1 Choose **Create > Bitmap Checkpoint > For Screen Area** or click the **Bitmap Checkpoint for Screen Area** button. Alternatively, if you are recording in Analog mode, press the CHECK BITMAP OF SCREEN AREA softkey.

The WinRunner window is minimized, the mouse pointer becomes a crosshairs pointer, and a help window opens.

- 2 Mark the area to be captured: press the left mouse button and drag the mouse pointer until a rectangle encloses the area; then release the mouse button.
- 3 Press the right mouse button to complete the operation. WinRunner captures the area and generates a **win_check_bitmap** statement in your script.



Note: Execution of the **win_check_bitmap** function is affected by the current settings specified for the *delay_msec*, *timeout_msec* and *min_diff* test options. For more information on these testing options and how to modify them, see Chapter 41, [Setting Testing Options from a Test Script](#). You can also set the corresponding **Delay for Window Synchronization**, **Timeout for Checkpoints and CS Statements**, and **Threshold for Difference between Bitmaps** testing options globally using the General Options dialog box. For more information, see Chapter 40, [Setting Global Testing Options](#).

The **win_check_bitmap** statement for an area of the screen has the following syntax:

win_check_bitmap (window, bitmap, time, x, y, width, height);

For example, when you define an area to check in the Flight Reservation application, the resulting statement might be:

```
win_check_bitmap ("Flight Reservation", "Img3", 1, 9, 159, 104, 88);
```

For more information on **win_check_bitmap**, refer to the *TSL Online Reference*.



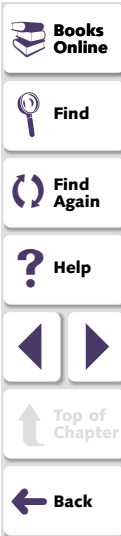
Creating Tests

Checking Text

WinRunner enables you to read and check text in a GUI object or in any area of your application.

This chapter describes:

- **Reading Text**
- **Searching for Text**
- **Comparing Text**
- **Teaching Fonts to WinRunner**



About Checking Text

You can use text checkpoints in your test scripts to read and check text in GUI objects and in areas of the screen. While creating a test you point to an object or a window containing text. WinRunner reads the text and writes a TSL statement to the test script. You may then add simple programming elements to your test scripts to verify the contents of the text.

You can use a text checkpoint to:

- read text from a GUI object or window in your application, using **obj_get_text** and **win_get_text**
- search for text in an object or window, using **win_find_text** and **obj_find_text**
- move the mouse pointer to text in an object or window, using **obj_move_locator_text** and **win_move_locator_text**
- click on text in an object or window, using **obj_click_on_text** and **win_click_on_text**
- compare two strings, using **compare_text**



Note that you should use a text checkpoint on a GUI object only when a GUI checkpoint cannot be used to check the text. For example, suppose you want to check the text on a custom graph object. Since this custom object cannot be mapped to a standard object class (such as pushbutton, list, or menu), WinRunner associates it with the general object class. A GUI checkpoint for such an object can check only the object's width, height, x- and y- coordinates, and whether the object is enabled or focused. It cannot check the text in the object. To do so, you must create a text checkpoint.

The following script segment uses the **win_get_text** function to read text in a graph in a Flight Reservation application.

```
set_window ("Graph", 10);
win_get_text ("Graph", text);
if (text=="Total Tickets Sold: 26")
    report_msg ("The total is correct.");
```

WinRunner can read the visible text from the screen in nearly any situation. Usually this process is automatic. In certain situations, however, WinRunner must first learn the fonts used by your application. Use the Learn Fonts utility to teach WinRunner the fonts. An explanation of when and how to perform this procedure appears in [Teaching Fonts to WinRunner](#) on page 578.



Reading Text

You can read the entire text contents of any GUI object or window in your application, or the text in a specified area of the screen. You read text using the **win_get_text**, **obj_get_text**, and **get_text** functions. These functions can be generated automatically, using a **Create > Get Text** command, or manually, by programming. In both cases, the read text is assigned to an output variable.

To read all the text in a GUI object, you choose **Create > Get Text > From Object/Window** and click an object with the mouse pointer. To read the text in an area of an object or window, you choose **Create > Get Text > From Screen Area** and then use a crosshairs pointer to enclose the text in a rectangle.

In most cases, WinRunner can identify the text on GUI objects automatically. However, if you try to read text and the comment “#no text was found” is inserted into the test script, this means WinRunner was unable to identify your application font. To enable WinRunner to identify text, you must teach WinRunner your application fonts. For more information, see [Teaching Fonts to WinRunner](#) on page 578.



Reading All the Text in a Window or an Object

You can read all the visible text in a window or other object using `win_get_text` or `obj_get_text`.

To read all the visible text in a window or an object:



- 1 Choose **Create > Get Text > From Object/Window** or click the **Get Text from Object/Window** button on the User toolbar. Alternatively, if you are recording in Analog mode, press the GET TEXT FROM OBJECT/WINDOW softkey.

WinRunner is minimized, the mouse pointer becomes a pointing hand, and a Help window opens.

- 2 Click the window or object. WinRunner captures the text in the object and generates a `win_get_text` or `obj_get_text` statement.

In the case of a window, this statement has the following syntax:

```
win_get_text ( window, text );
```

The *window* is the name of the window. The *text* is an output variable that holds all of the text displayed in the window. To make your script easier to read, this text is inserted into the script as a comment when the function is recorded.



For example, if you choose **Create > Get Text > From Object/Window** and click on the Windows Clock application, a statement similar to the following is recorded in your test script:

```
# Clock settings 10:40:46 AM 8/8/95  
win_get_text("Clock", text);
```

In the case of an object other than a window, the syntax is as follows:

```
obj_get_text ( object, text );
```

The parameters of **obj_get_text** are identical to those of **win_get_text**.

Note: When the WebTest add-in is loaded and a Web object is selected, WinRunner generates a **web_frame_get_text** or **web_obj_get_text** statement in your test script. For more information, see Chapter 14, [Checking Web Pages](#), or refer to the *TSL Online Reference*.



Reading the Text from an Area of an Object or a Window

The `win_get_text` and `obj_get_text` functions can be used to read text from a specified area of a window or other GUI object.

To read the text from an area of a window or an object:



- 1 Choose **Create > Get Text > From Screen Area** or click the **Get Text from Screen Area** button on the User toolbar. Alternatively, if you are recording in Analog mode, press the GET TEXT FROM SCREEN AREA softkey.

WinRunner is minimized and the recording of mouse and keyboard input stops. The mouse pointer becomes a crosshairs pointer.
- 2 Use the crosshairs pointer to enclose the text to be read within a rectangle. Move the mouse pointer to one corner of the text you want to capture. Press and hold down the left mouse button. Drag the mouse until the rectangle encompasses the entire text, then release the mouse button. Press the right mouse button to capture the string.

You can preview the string before you capture it. Press the right mouse button before you release the left mouse button. (If your mouse has three buttons, release the left mouse button after drawing the rectangle and then press the middle mouse button.) The string appears under the rectangle or in the upper left corner of the screen.



WinRunner generates a **win_get_text** statement with the following syntax in the test script:

```
win_get_text ( window, text, x1,y1,x2,y2 );
```

For example, if you choose Get Text > Area and use the crosshairs to enclose only the date in the Windows Clock application, a statement similar to the following is recorded in your test script:

```
win_get_text ("Clock", text, 38, 137, 166, 185); # 8/13/95
```

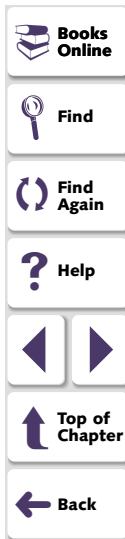
The *window* is the name of the window. The *text* is an output variable that holds all of the captured text. *x1*,*y1*,*x2*,*y2* define the location from which to read text, relative to the specified window. When the function is recorded, the captured text is also inserted into the script as a comment.



The comment occupies the same number of lines in the test script as the text being read occupies on the screen. For example, if three lines of text are read, the comment will also be three lines long.

You can also read text from the screen by programming the Analog TSL function **get_text** into your test script. For more information, refer to the *TSL Online Reference*.

Note: When you read text with a learned font, WinRunner reads a single line of text only. If the captured text exceeds one line, only the leftmost line is read. If two or more lines have the same left margin, then the bottom line is read. See [Teaching Fonts to WinRunner](#) on page 578 for more information.

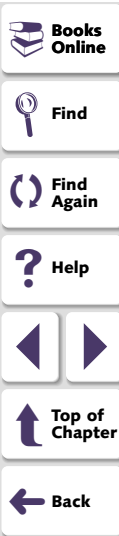


Searching for Text

You can search for text on the screen using the following TSL functions:

- The **win_find_text**, **obj_find_text**, and **find_text** functions determine the location of a specified text string.
- The **obj_move_locator_text**, **win_move_locator_text**, and **move_locator_text** functions move the mouse pointer to a specified text string.
- The **win_click_on_text**, **obj_click_on_text**, and **click_on_text** functions move the pointer to a string and click it.

Note that you must program these functions in your test scripts. You can use the Function Generator to do this, or you can type the statements into your test script. For information about programming functions into your test scripts, see Chapter 25, **Generating Functions**. For information about specific functions, refer to the *TSL Online Reference*.



Getting the Location of a Text String

The **win_find_text** and **obj_find_text** functions perform the opposite of **win_get_text** and **obj_get_text**. Whereas the **get_text** functions retrieve any text found in the defined object or window, the **find_text** functions look for a specified string and return its location, relative to the window or object.

The **win_find_text** and **obj_find_text** functions are Context Sensitive and have similar syntax, as shown below:

```
win_find_text ( window, string, result_array [ ,x1,y1,x2,y2 ] [ ,string_def ] );
```

```
obj_find_text ( object, string, result_array [ ,x1,y1,x2,y2 ] [ ,string_def ] );
```

The *window* or *object* is the name of the window or object within which WinRunner searches for the specified text. The *string* is the text to locate. The *result_array* is the name you assign to the four-element array that stores the location of the string. The optional *x*₁,*y*₁,*x*₂,*y*₂ specify the x- and y-coordinates of the upper left and bottom right corners of the region of the screen that is searched. If these parameters are not defined, WinRunner treats the entire window or object as the search area. The optional *string_def* defines how WinRunner searches for the text.

The **win_find_text** and **obj_find_text** functions return 1 if the search fails and 0 if it succeeds.



In the following example, **win_find_text** is used to determine where the total appears on a graph object in a Flight Reservation application.

```
set_window ("Graph", 10);  
win_find_text ("Graph", "Total Tickets Sold:", result_array, 640,480,366,284,  
FALSE);
```

You can also find text on the screen using the Analog TSL function **find_text**.

For more information on the **find_text** functions, refer to the *TSL Online Reference*.

Note: When **win_find_text**, **obj_find_text**, or **find_text** is used with a learned font, then WinRunner searches for a single, complete word only. This means that any regular expression used in the *string* must not contain blank spaces, and only the default value of *string_def*, FALSE, is in effect.



Moving the Pointer to a Text String

The **win_move_locator_text** and **obj_move_locator_text** functions search for the specified text string in the indicated window or other object. Once the text is located, the mouse pointer moves to the center of the text.

The **win_move_locator_text** and **obj_move_locator_text** functions are Context Sensitive and have similar syntax, as shown:

```
win_move_locator_text ( window, string, [ ,x1,y1,x2,y2 ] [ ,string_def ] );
```

```
obj_move_locator_text ( object, string, [ ,x1,y1,x2,y2 ] [ ,string_def ] );
```

The *window* or *object* is the name of the window or object that WinRunner searches. The *string* is the text to which the mouse pointer moves. The optional *x1,y1,x2,y2* parameters specify the x- and y-coordinates of the upper left and bottom right corners of the region of the window or object that is searched. The optional *string_def* defines how WinRunner searches for the text.

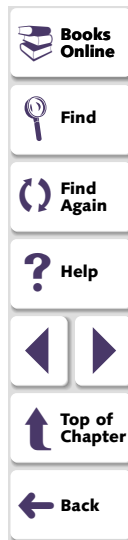


In the following example, **obj_move_locator_text** moves the mouse pointer to a topic string in a Windows on-line help index.

```
function verify_cursor(win,str)
{
    auto text,text1,rc;

    # Search for topic string and move locator to text. Scroll to end of
    document,
    # retry if not found.
    set_window (win, 1);
    obj_mouse_click ("MS_WINTOPIC", 1, 1, LEFT);
    type ("<kCtrl_L-kHome_E>");
    while(rc=obj_move_locator_text("MS_WINTOPIC",str,TRUE)){
        type ("<kPgDn_E>");
        obj_get_text("MS_WINTOPIC", text);
        if(text==text1)
            return E_NOT_FOUND;
        text1=text;
    }
}
```

You can also move the mouse pointer to a text string using the TSL Analog function **move_locator_text**. For more information on **move_locator_text**, refer to the *TSL Online Reference*.



Clicking a Specified Text String

The **win_click_on_text** and **obj_click_on_text** functions search for a specified text string in the indicated window or other GUI object, move the screen pointer to the center of the string, and click the string.

The **win_click_on_text** and **obj_click_on_text** functions are Context Sensitive and have similar syntax, as shown:

```
win_click_on_text ( window, string, [ ,x1,y1,x2,y2 ] [ ,string_def ]
[ ,mouse_button ] );
```

The *window* or *object* is the window or object to search. The *string* is the text the mouse pointer clicks. The optional *x1*,*y1*,*x2*,*y2* parameters specify the region of the window or object that is searched. The optional *string_def* defines how WinRunner searches for the text. The optional *mouse_button* specifies which mouse button to use.



In the following example, **obj_click_on_text** clicks a topic in an online help index in order to jump to a help topic.

```
function show_topic(win,str)
{
    auto text,text1,rc,arr[];

    # Search for the topic string within the object. If not found, scroll down to
    end
    # of document.
    set_window (win, 1);
    obj_mouse_click ("MS_WINTOPIC", 1, 1, LEFT);
    type ("<kCtrl_L-kHome_E>");
    while(rc=obj_click_on_text("MS_WINTOPIC",str,TRUE,LEFT)){
        type ("<kPgDn_E>");
        obj_get_text("MS_WINTOPIC", text);
        if(text==text1)
            return E_GENERAL_ERROR;
        text1=text;
    }
}
```

For information about the **click_on_text** functions, refer to the *TSL Online Reference*.



Comparing Text

The **compare_text** function compares two strings, ignoring any differences that you specify. You can use it alone or in conjunction with the **win_get_text** and **obj_get_text** functions.

The **compare_text** function has the following syntax:

```
variable = compare_text ( str1, str2 [ ,chars1, chars2 ] );
```

The *str1* and *str2* parameters represent the literal strings or string variables to be compared.

The optional *chars1* and *chars2* parameters represent the literal characters or string variables to be ignored during comparison. Note that *chars1* and *chars2* may specify multiple characters.

The **compare_text** function returns 1 when the compared strings are considered the same, and 0 when the strings are considered different. For example, a portion of your test script compares the text string “File” returned by **get_text**. Because the lowercase “l” character has the same shape as the uppercase “I”, you can specify that these two characters be ignored as follows:

```
t = get_text (10, 10, 90, 30);
if (compare_text (t, "File", "l", "I"))
    move_locator_abs (10, 10);
```



Teaching Fonts to WinRunner

You use the Fonts Expert utility only when WinRunner cannot automatically read the text used by your application. In this case, you must teach your application's fonts to WinRunner.

To teach fonts to WinRunner, you perform the following main steps:

- 1 Use the Fonts Expert tool to have WinRunner learn the set of characters (fonts) used by your application.
- 2 Create a font group that contains one or more fonts.

A *font group* is a collection of fonts that are bound together for specific testing purposes. Note that at any time, only one font group may be active in WinRunner. In order for a learned font to be recognized, it must belong to the active font group. However, a learned font can be assigned to multiple font groups.
- 3 Use the TSL **setvar** function to activate the appropriate font group before using any of the text functions.

Note that all learned fonts and defined font groups are stored in a *font library*. This library is designated by the XR_GLOB_FONT_LIB parameter in the *wrun.ini* file; by default, it is located in the *WinRunner installation folder/ fonts* subfolder.

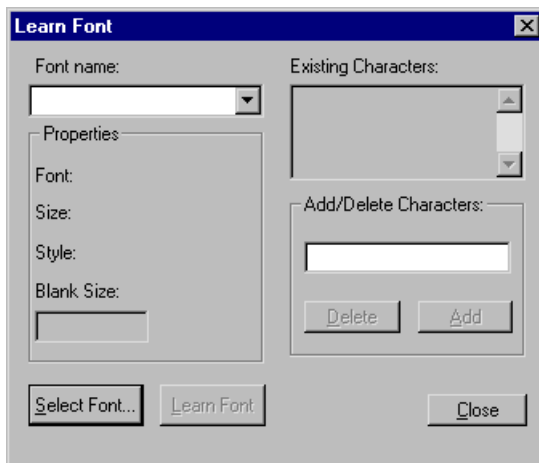


Learning a Font

If WinRunner cannot read the text in your application, use the Font Expert to learn the font.

To learn a font:

- 1 Choose **Tools > Fonts Expert** or choose **Start > Programs > WinRunner > Fonts Expert**. The Fonts Expert opens.
- 2 Choose **Font > Learn**. The Learn Font dialog box opens.



- 3 Type in a name for the new font in the **Font Name** box (maximum of eight characters, no extension).
- 4 Click **Select Font**. The Font dialog box opens.
- 5 Choose the font name, style, and size on the appropriate lists.
- 6 Click **OK**.
- 7 Click **Learn Font**.

When the learning process is complete, the Existing Characters box displays all characters learned and the Properties box displays the properties of the fonts learned. WinRunner creates a file called *font_name.mfn* containing the learned font data and stores it in the font library.

- 8 Click **Close**.

Creating a Font Group

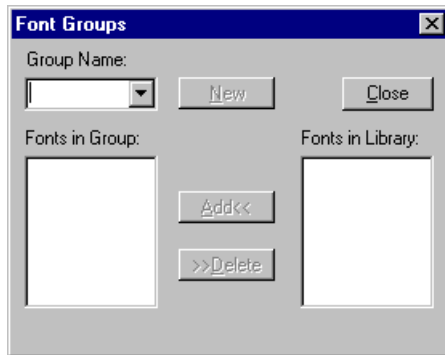
Once a font is learned, you must assign it to a font group. Note that the same font can be assigned to more than one font group.

Note: Put only a couple of fonts in each group, because text recognition capabilities tend to deteriorate as the number of fonts in a group increases.



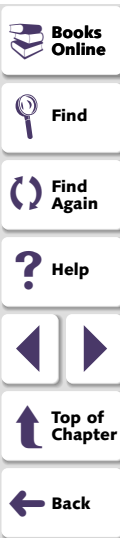
To create a new font group:

- 1 In the Fonts Expert, choose **Font > Groups**. The Font Groups dialog box opens.



- 2 Type in a unique name in the **Group Name** box (up to eight characters, no extension).
- 3 In the **Fonts in Library** list, select the name of the font to include in the font group.
- 4 Click **New**. WinRunner creates the new font group. When the process is complete, the font appear in the Fonts in Group list.

WinRunner creates a file called *group_name.grp* containing the font group data and stores it in the font library.



To add fonts to an existing font group:

- 1 In the Fonts Expert, choose **Font > Groups**. The Font Groups dialog box opens.
- 2 Select the desired font group from the **Group Name** list.
- 3 In the **Fonts in Library** list, click the name of the font to add.
- 4 Click **Add**.

To delete a font from a font group:

- 1 In the Fonts Expert, choose **Font > Groups**. The Font Groups dialog box opens.
- 2 Select the desired font group from the **Group Name** list.
- 3 In the **Fonts in Group** list, click the name of the font to delete.
- 4 Click **Delete**.

Designating the Active Font Group

The final step before you can use any of the text functions is to activate the font group that includes the fonts your application uses.

To designate the active font:

- 1 Choose **Settings > General Options**.
The General Options dialog box opens.
- 2 Click the **Text Recognition** tab.



- 3 In the **Font Group** box, enter a font group.
- 4 Click **OK** to save your selection and close the dialog box.

Only one group can be active at any time. By default, this is the group designated by the `XR_FONT_GROUP` system parameter in the `wrun.ini` file. However, within a test script you can activate a different font group or the **setvar** function together with the `fontgrp` test option.

For example, to activate the font group named `editor` from within a test script, add the following statement to your script:

```
setvar ("fontgrp", "editor");
```

For more information about choosing a font group from the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#). For more information about using the **setvar** function to choose a font group from within a test script, see Chapter 41, [Setting Testing Options from a Test Script](#).



Creating Tests

Creating Data-Driven Tests

WinRunner enables you to create and run tests which are driven by data stored in an external table.

This chapter describes:

- **The Data-Driven Testing Process**
- **Creating a Basic Test for Conversion**
- **Converting a Test to a Data-Driven Test**
- **Preparing the Data Table**
- **Importing Data from a Database**
- **Running and Analyzing Data-Driven Tests**
- **Assigning the Main Data Table for a Test**
- **Using Data-Driven Checkpoints and Bitmap Synchronization Points**
- **Using TSL Functions with Data-Driven Tests**
- **Guidelines for Creating a Data-Driven Test**



About Creating Data-Driven Tests

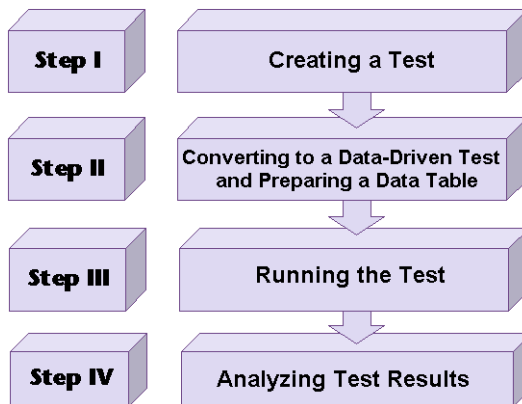
When you test your application, you may want to check how it performs the same operations with multiple sets of data. For example, suppose you want to check how your application responds to ten separate sets of data. You could record ten separate tests, each with its own set of data. Alternatively, you could create a *data-driven* test with a loop that runs ten times. In each of the ten *iterations*, the test is driven by a different set of data. In order for WinRunner to use data to drive the test, you must substitute fixed values in the test with variables. The variables in the test are linked with data stored in a *data table*. You can create data-driven tests using the DataDriver Wizard or by manually adding data-driven statements to your test scripts.



The Data-Driven Testing Process

For non-data-driven tests, the testing process is performed in three steps: creating a test; running the test; analyzing test results. When you create a data-driven test, you perform an extra two-part step between creating the test and running it: converting the test to a data-driven test and creating a corresponding data table.

The following diagram outlines the stages of the data-driven testing process in WinRunner:



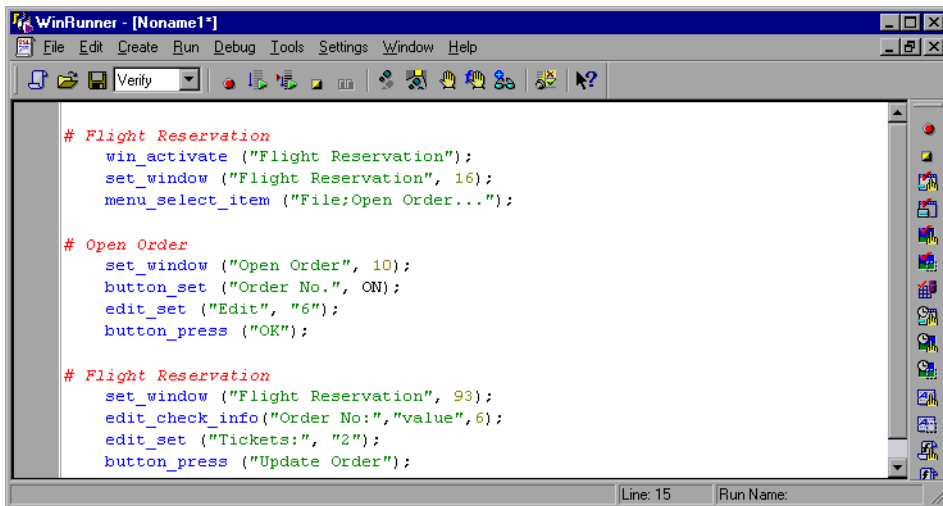
Creating a Basic Test for Conversion

In order to create a data-driven test, you must first create a basic test and then convert it.

You create a basic test by recording a test, as usual, with one set of data. In the following example, the user wants to check that opening an order and updating the number of tickets in the order is performed correctly for a variety of orders. The test is recorded using one passenger's flight data.



To record this test, you open an order and use the **Create > GUI Checkpoint > For Single Property** command to check that the correct order is open. You change the number of tickets in the order and then update the order. A test script similar to the following is created:



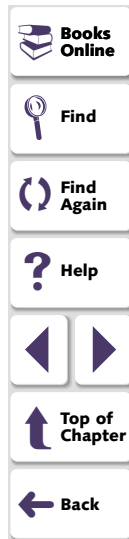
```

# Flight Reservation
win_activate ("Flight Reservation");
set_window ("Flight Reservation", 16);
menu_select_item ("File;Open Order...");

# Open Order
set_window ("Open Order", 10);
button_set ("Order No.", ON);
edit_set ("Edit", "6");
button_press ("OK");

# Flight Reservation
set_window ("Flight Reservation", 93);
edit_check_info("Order No:", "value", 6);
edit_set ("Tickets:", "2");
button_press ("Update Order");
    
```

The purpose of this test is to check that the correct order has been opened. Normally you would use the **Create > GUI Checkpoint > For Object/Window** command to insert an **obj_check_gui** statement in your test script. All **_check_gui** statements contain references to checklists, however, and because checklists do not contain fixed values, they cannot be parameterized from within a test script while creating a data-driven test. You have two options:

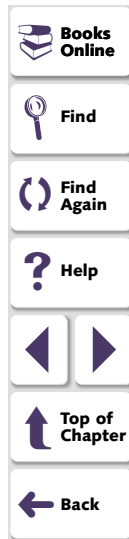


- As in the example above, you use the **Create > GUI Checkpoint > For Single Property** command to create a property check without a checklist. In this case, an **edit_check_info** statement checks the content of the edit field in which the order number is displayed. For information on checking a single property of an object, see Chapter 12, [Checking GUI Objects](#).

WinRunner can write an event to the Test Results window whenever these statements fail during a test run. To set this option, select the **Fail when single property check fails** check box in the Run tab of the General Options dialog box or use the **setvar** function to set the *single_prop_check_fail* testing option. For additional information, see Chapter 40, [Setting Global Testing Options](#), or Chapter 41, [Setting Testing Options from a Test Script](#).

You can use the **Create > GUI Checkpoint > For Single Property** command to create property checks using the following **_check_** functions:

button_check_info	scroll_check_info
edit_check_info	static_check_info
list_check_info	win_check_info
obj_check_info	

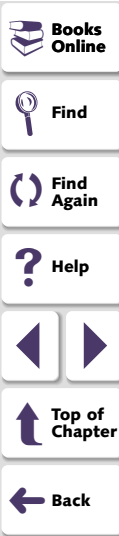


You can also use the following **_check** functions to check single properties of objects without creating a checklist. You can create statements with these functions manually or using the Function Generator. For additional information, see Chapter 25, [Generating Functions](#).

button_check_state	list_check_selected
edit_check_selection	scroll_check_pos
edit_check_text	static_check_text
list_check_item	

For information about specific functions, refer to the *TSL Online Reference*.

- Alternatively, you can create data-driven GUI and bitmap checkpoints and bitmap synchronization points. For information on creating data-driven GUI and bitmap checkpoints and bitmap synchronization points, see [Using Data-Driven Checkpoints and Bitmap Synchronization Points](#) on page 639.



Converting a Test to a Data-Driven Test

The procedure for converting a test to a data-driven test is composed of the following main steps:

- 1 Replacing fixed values in checkpoint statements and in recorded statements with parameters, and creating a data table containing values for the parameters. This is known as *parameterizing* the test.
- 2 Adding statements and functions to your test so that it will read from the data table and run in a loop while it reads each iteration of data.
- 3 Adding statements to your script that open and close the data table.
- 4 Assigning a variable name to the data table (mandatory when using the DataDriver Wizard and otherwise optional).

You can use the DataDriver Wizard to perform these steps, or you can modify your test script manually.

Creating a Data-Driven Test with the DataDriver Wizard

You can use the DataDriver Wizard to convert your entire script or a part of your script into a data-driven test. For example, your test script may include recorded operations, checkpoints, and other statements which do not need to be repeated for multiple sets of data. You need to parameterize only the portion of your test script that you want to run in a loop with multiple sets of data.



To create a data-driven test:

- 1 If you want to turn only part of your test script into a data-driven test, first select those lines in the test script.
- 2 Choose **Tools > DataDriver Wizard**.
 - If you selected part of the test script before opening the wizard, proceed to step 3 on [page 593](#).
 - If you did not select any lines of script, the following screen opens:



If you want to turn only part of the test into a data-driven test, click **Cancel**. Select those lines in the test script and reopen the DataDriver Wizard.

If you want to turn the entire test into a data-driven test, click **Next**.

3 The following wizard screen opens:



The **Use a new or existing Excel table** box displays the name of the Excel file that WinRunner creates, which stores the data for the data-driven test. Accept the default data table for this test, enter a different name for the data table, or use the browse button to locate the path of an existing data table. By default, the data table is stored in the test folder.



In the **Assign a name to the variable** box, enter a variable name with which to refer to the data table, or accept the default name, “table.”

At the beginning of a data-driven test, the Excel data table you selected is assigned as the value of the table variable. Throughout the script, only the table variable name is used. This makes it easy for you to assign a different data table to the script at a later time without making changes throughout the script.

Choose from among the following options:

- **Add statements to create a data-driven test:** Automatically adds statements to run your test in a loop: sets a variable name by which to refer to the data table; adds braces ({ and }), a **for** statement, and a **ddt_get_row_count** statement to your test script selection to run it in a loop while it reads from the data table; adds **ddt_open** and **ddt_close** statements to your test script to open and close the data table, which are necessary in order to iterate rows in the table.

Note that you can also add these statements to your test script manually. For more information and sample statements, see [Adding Statements to Your Test Script to Open and Close the Data Table and Run Your Test in a Loop](#) on page 605.

If you do not choose this option, you will receive a warning that your data-driven test must contain a loop and statements to open and close your data table.

Note: You should not select this option if you have chosen it previously while running the DataDriver Wizard on the same portion of your test script.



- **Import data from a database:** Imports data from a database. This option adds `ddt_update_from_db`, and `ddt_save` statements to your test script after the `ddt_open` statement. For more information, see [Importing Data from a Database](#) on page 612.

Note that in order to import data from a database, either Microsoft Query or Data Junction must be installed on your machine. You can install Microsoft Query from the *custom installation* of Microsoft Office. Note that Data Junction is not automatically included in your WinRunner package. To purchase Data Junction, contact your Mercury Interactive representative. For detailed information on working with Data Junction, refer to the documentation in the Data Junction package.

Note: If the **Add statements to create a data-driven test** option is not selected along with the **Import data from a database** option, the wizard also sets a variable name by which to refer to the data table. In addition, it adds `ddt_open` and `ddt_close` statements to your test script. Since there is no iteration in the test, the `ddt_close` statement is at the end of the block of `ddt_` statements, rather than at the end of the block of selected text.

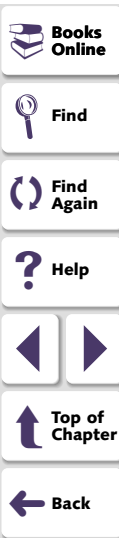


- **Parameterize the test:** Replaces fixed values in selected checkpoints and in recorded statements with parameters, using the **ddt_val** function, and in the data table, adds columns with variable values for the parameters.

Line by line: Opens a wizard screen for each line of the selected test script, which enables you to decide whether to parameterize a particular line, and if so, whether to add a new column to the data table or use an existing column when parameterizing data.

Automatically: Replaces all data with **ddt_val** statements and adds new columns to the data table. The first argument of the function is the name of the column in the data table. The replaced data is inserted into the table.

Note: You can also parameterize your test manually. For more information, see [Parameterizing Values in a Test Script](#) on page 606.



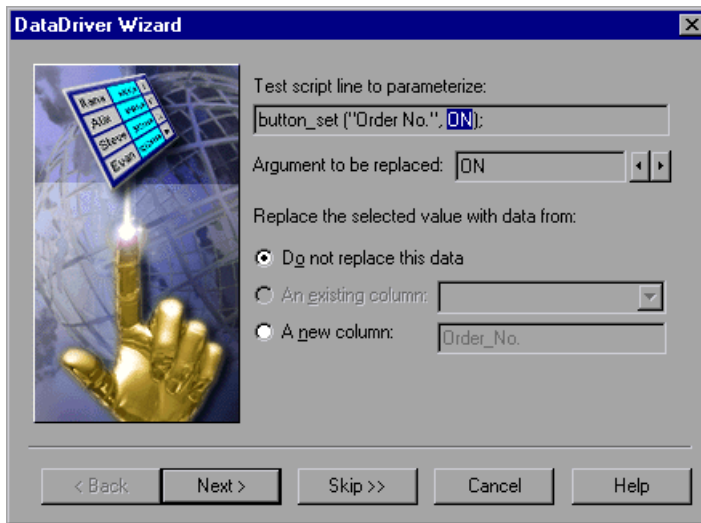
Note: The *ddt_func.ini* file in the *dat* folder lists the TSL functions that the DataDriver Wizard can parameterize while creating a data-driven test. This file also contains the index of the argument that by default can be parameterized for each function. You can modify this list to change the default argument that can be parameterized for a function. You can also modify this list to include user-defined functions or any other TSL functions, so that you can parameterize statements with these functions while creating a test. For information on creating user-defined functions, see Chapter 27, [Creating User-Defined Functions](#).

Click **Next**.

Note that if you did not select any check boxes, only the Cancel button is enabled.

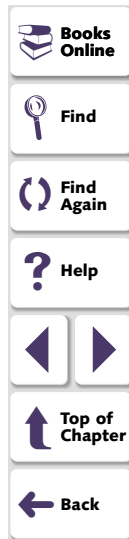


- 4 If you selected the **Import data from a database** check box in the previous screen, continue at **Importing Data from a Database** on page 612. Otherwise, the following wizard screen opens:



The **Test script line to parameterize** box displays the line of the test script to parameterize. The highlighted value can be replaced by a parameter.

The **Argument to be replaced** box displays the argument (value) that you can replace with a parameter. You can use the arrows to select a different argument to replace.



Choose whether and how to replace the selected data:

- **Do not replace this data:** Does not parameterize this data.
- **An existing column:** If parameters already exist in the data table for this test, select an existing parameter from the list.
- **A new column:** Creates a new column for this parameter in the data table for this test. Adds the selected data to this column of the data table. The default name for the new parameter is the logical name of the object in the selected TSL statement above. Accept this name or assign a new name.

In the sample Flight application test script shown earlier on [page 587](#), there are several statements that contain fixed values entered by the user.

In this example, a new data table is used, so no parameters exist yet. In this example, for the first parameterized line in the test script, the user clicks the **Data from a new parameter** radio button. By default, the new parameter is the logical name of the object. You can modify this name. In the example, the name of the new parameter was modified to “Date of Flight.”

The following line in the test script:

```
edit_set ("Edit", "6");
```

is replaced by:

```
edit_set("Edit", ddt_val(table, "Edit"));
```



The following line in the test script:

```
edit_check_info("Order No:", "value", 6);
```

is replaced by:

```
edit_check_info("Order No:", "value", ddt_val(table, "Order_No"));
```

- To parameterize additional lines in your test script, click **Next**. The wizard displays the next line you can parameterize in the test script selection. Repeat the above step for each line in the test script selection that can be parameterized. If there are no more lines in the selection of your test script that can be parameterized, the final screen of the wizard opens.
- To proceed to the final screen of the wizard without parameterizing any additional lines in your test script selection, click **Skip**.

5 The final screen of the wizard opens.

- If you want the data table to open after you close the wizard, select **Show data table now**.
- To perform the tasks specified in previous screens and close the wizard, click **Finish**.
- To close the wizard without making any changes to the test script, click **Cancel**.

Note: If you clicked **Cancel** after parameterizing your test script but before the final wizard screen, the data table will include the data you added to it. If you want to save the data in the data table, then open the data table and then save it.



Once you have finished running the DataDriver Wizard, the sample test script for the example on [page 588](#) is modified, as shown below:

```

table = "default.xls";
rc = ddt_open(table, DDT_MODE_READ);
if (rc != E_OK && rc != E_FILE_OPEN)
    pause("Cannot open table.");
ddt_get_row_count(table, table_RowCount);
for(table_Row = 1; table_Row <= table_RowCount; table_Row ++
{
    ddt_set_row(table, table_Row);

    # Flight Reservation
    set_window ("Flight Reservation", 3);
    menu_select_item ("File;Open Order...");

    # Open Order
    set_window ("Open Order", 21);
    button_set ("Order No.", ON);
    edit_set ("Edit", ddt_val(table, "Edit"));
    button_press ("OK");

    # Flight Reservation
    set_window("Flight Reservation", 1);
    edit_check_info("Order No:", "value", ddt_val(table, "Order_No"));
    edit_set ("Tickets:", "2");
    button_press ("Update Order");
}
ddt_close(table);
    
```

Annotations on the left side of the screenshot:

- Statements to open data table and run test in a loop (points to the first for loop block)
- Parameterized statement (points to the `ddt_val` function call)
- Parameterized property check (points to the `edit_check_info` function call)
- End of loop (points to the closing brace of the for loop)
- Statement to close data table (points to the `ddt_close` function call)

- Books Online
- Find
- Find Again
- Help
-
- Top of Chapter
- Back

If you open the data table (**Tools > Data Table**), the **Open or Create a Data Table** dialog box opens. Select the data table you specified in the DataDriver Wizard. When the data table opens, you can see the entries made in the data table and edit the data in the table. For the previous example, the following entry is made in the data table.

The screenshot shows a window titled "Data Table - D:\Program Files\Mercury Interactive\WinR...". The menu bar includes "File", "Edit", "Data", "Format", and "Help". The main area contains a table with the following structure:

	Edit	Order_No	C	D	E
1	6	6			
2					
3					
4					

The status bar at the bottom of the window displays "Ready".



Creating a Data-Driven Test Manually

You can create a data-driven test manually, without using the DataDriver Wizard. Note that in order to create a data-driven test manually, you must complete all the steps described below:

- defining the data table
- add statements to your test script to open and close the data table and run your test in a loop
- import data from a database (optional)
- create a data table and parameterize values in your test script

Defining the Data Table

Add the following statement to your test script immediately preceding the parameterized portion of the script. This identifies the name and the path of your data table. Note that you can work with multiple data tables in a single test, and you can use a single data table in multiple tests. For additional information, see [Guidelines for Creating a Data-Driven Test](#) on page 657.

```
table="Default.xls";
```

Note that if your data table has a different name, substitute the correct name. By default, the data table is stored in the folder for the test. If you store your data table in a different location, you must include the path in the above statement.



For example:

```
table1 = "default.xls";
```

is a data table with the default name in the test folder.

```
table2 = "table.xls";
```

is a data table with a new name in the test folder.

```
table3 = "C:\\\\Data-Driven Tests\\\\Another Test\\\\default.xls";
```

is a data table with the default name and a new path. This data table is stored in the folder of another test.

Note: Scripts created in WinRunner versions 5.0 and 5.01 may contain the following statement instead.

```
table=getvar("testname") & "\\Default.xls";
```

This statement is still valid. However, scripts created in WinRunner 6.0 use relative paths and therefore the full path is not required in the statement.



Adding Statements to Your Test Script to Open and Close the Data Table and Run Your Test in a Loop

Add the following statements to your test script immediately following the table declaration.

```
rc=ddt_open (table);
if (rc!= E_OK && rc != E_FILE_OPEN)
    pause("Cannot open table.");
ddt_get_row_count(table,table_RowCount);
for(table_Row = 1; table_Row <= table_RowCount ;table_Row ++ )
{
    ddt_set_row(table,table_Row);
```

These statements open the data table for the test and run the statements between the curly brackets that follow for each row of data in the data table.

Add the following statements to your test script immediately following the parameterized portion of the script:

```
}
ddt_close (table);
```



These statements run the statements that appear within the curly brackets above for every row of the data table. They use the data from the next row of the data table to drive each successive iteration of the test. When the next row of the data table is empty, these statements stop running the statements within the curly brackets and close the data table.

Importing Data from a Database

You must add **ddt_update_from_db** and **ddt_save** statements to your test script after the **ddt_open** statement. You must use Microsoft Query to define a query in order to specify the data to import. For more information, see [Importing Data from a Database](#) on page 612. For more information on the **ddt_** functions, see [Using TSL Functions with Data-Driven Tests](#) on page 647 or refer to the *TSL Online Reference*.

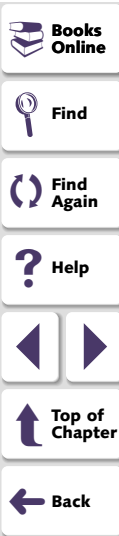
Parameterizing Values in a Test Script

In the sample test script in [Creating a Basic Test for Conversion](#) on page 587, there are several statements that contain fixed values entered by the user:

```
edit_set("Edit", "6");
```

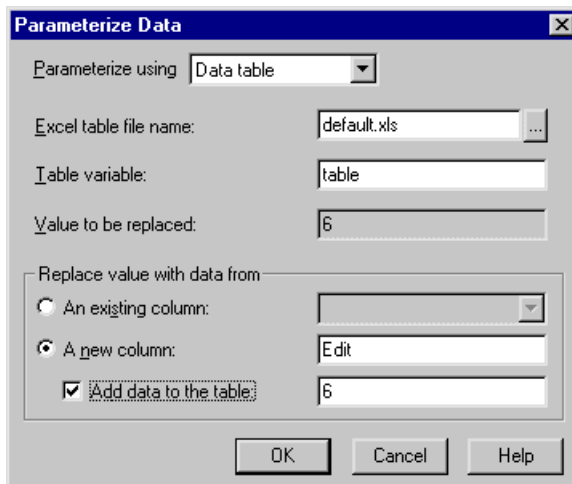
```
edit_check_info("Order No:","value",6);
```

You can use the **Parameterize Data** dialog box to parameterize the statements and replace the data with parameters.



To parameterize statements using a data table:

- 1 In your test script, select the first instance in which you have data that you want to parameterize. For example, in the first **edit_set** statement in the test script above, select: "6".
- 2 Choose **Tools > Parameterize Data**. The Parameterize Data dialog box opens.
- 3 In the **Parameterize using** box, select **Data table**.



- 4 In the **Excel table file name** box, you can accept the default name and location of the data table, enter the different name for the data table, or use the browse button to locate the path of a data table. Note that by default the name of the data table is *default.xls*, and it is stored in the test folder. If you previously worked with a different data table in this test, then it appears here instead.

Click **A new column**. WinRunner suggests a name for the parameter in the box. You can accept this name or choose a different name. WinRunner creates a column with the same name as the parameter in the data table.

The data with quotation marks that was selected in your test script appears in the **Add the data to the table** box.

- If you want to include the data currently selected in the test script in the data table, select the **Add the data to the table** check box. You can modify the data in this box.
- If you do not want to include the data currently selected in the test script in the data table, clear the **Add the data to the table** check box.
- You can also assign the data to an existing parameter, which assigns the data to a column already in the data table. If you want to use an existing parameter, click **An existing column**, and select an existing column from the list.



5 Click **OK**.

In the test script, the data selected in the test script is replaced with a **ddt_val** statement which contains the name of the table and the name of the parameter you created, with a corresponding column in the data table.

In the example, the value "6" is replaced with a **ddt_val** statement which contains the name of the table and the parameter "Edit", so that the original statement appears as follows:

```
edit_set ("Edit", ddt_val(table, "Edit"));
```

In the data table, a new column is created with the name of the parameter you assigned. In the example, a new column is created with the header Edit.

6 Repeat steps 1 to 5 for each argument you want to parameterize.

For more information on the **ddt_val** function, see [Using TSL Functions with Data-Driven Tests](#) on page 647 or refer to the *TSL Online Reference*.



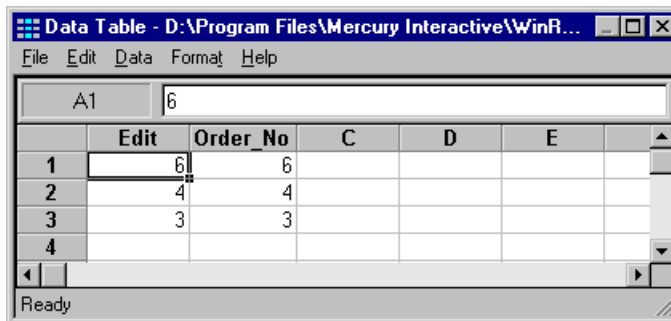
Preparing the Data Table

For each data-driven test, you need to prepare at least one data table. The data table contains the values that WinRunner uses to replace the variables in your data-driven test.

You usually create the data table as part of the test conversion process, either using the Data-Driven Wizard or the Parameterize Data dialog box. You can also create tables separately in Excel and then link them to the test.

After you create the test, you can add data to the table manually or import it from an existing database.

The following data table displays three sets of data that were entered for the test example described in this chapter. The first set of data was entered using the **Tools > Parameterize Value** command in WinRunner. The next two sets of data were entered into the data table manually.



	Edit	Order_No	C	D	E
1	6	6			
2	4	4			
3	3	3			
4					



- Each row in the data table generally represents the values that WinRunner submits for all the parameterized fields during a single iteration of the test. For example, a loop in a test that is associated with a table with ten rows will run ten times.
- Each column in the table represents the list of values for a single parameter, one of which is used for each iteration of a test.

Note: The first character in a column header must be an underscore (_) or a letter. Subsequent characters may be underscores, letters, or numbers.

Adding Data to a Data Table Manually

You can add data to your data table manually by opening the data table and entering values in the appropriate columns.

To add data to a data table manually:

- 1 Choose **Tools > Data Table**. The **Open or Create a Data Table** dialog box opens. Select the data table you specified in the test script to open it, or enter a new name to create a new data table. The data table opens in the data table viewer.
- 2 Enter data into the table manually.



- 3 Move the cursor to an empty cell and choose **File > Save** from within the data table.

Note: Closing the data table does not automatically save changes to the data table. You must use the **File > Save** command from within the data table or a **ddt_save** statement to save the data table. For information on menu commands within the data table, see [Editing the Data Table](#) on page 613. For information on the **ddt_save** function, see [Using TSL Functions with Data-Driven Tests](#) on page 647. Note that the data table viewer does not need to be open in order to run a data-driven test.

Importing Data from a Database

In addition to, or instead of, adding data to a data table manually, you can import data from an existing database into your table. You can use either Microsoft Query or Data Junction to import the data. For more information on importing data from a database, see [Importing Data from a Database](#) on page 622.



Editing the Data Table

The data table contains the values that WinRunner uses for parameterized input fields and checks when you run a test. You can edit information in the data table by typing directly into the table. You can use the data table in the same way as an Excel spreadsheet. You can also insert Excel formulas and functions into cells.

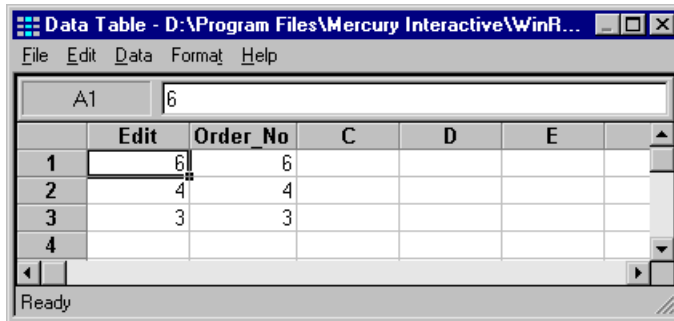
Note: If you do not want the data table editor to reformat your data (e.g. change the format of dates), then strings you enter in the data table should start with a quotation mark ('). This instructs the editor not to reformat the string in the cell.

To edit the data table:

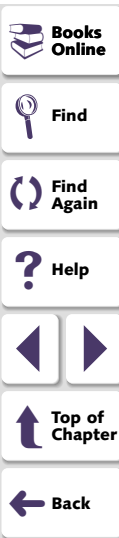
- 1 Open your test.
- 2 Choose **Tools > Data Table**. The **Open or Create a Data Table** dialog box opens.



- 3 Select a data table for your test. The data table for the test opens.



- 4 Use the menu commands described below to edit the data table.
- 5 Move the cursor to an empty cell and select **File > Save** to save your changes.
- 6 Select **File > Close** to close the data table.



File Menu

Use the File menu to import and export, close, save, and print the data table. WinRunner automatically saves the data table for a test in the test folder and names it *default.xls*. You can open and save data tables other than the *default.xls* data table. This enables you to use several different data tables in one test script, if desired.

The following commands are available in the File menu:

File Command	Description
New	Creates a new data table.
Open	Opens an existing data table. If you open a data table that was already opened by the ddt_open function, you are prompted to save and close it before opening it in the data table editor.
Save	Saves the active data table with its existing name and location. You can save the data table as a Microsoft Excel file or as a tabbed text file.
Save As	Opens the Save As dialog box, which enables you to specify the name and location under which to save the data table. You can save the data table as a Microsoft Excel file or as a tabbed text file.



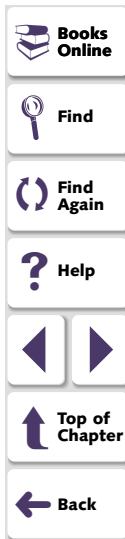
File Command	Description
Import	<p>Imports an existing table file into the data table. This can be a Microsoft Excel file or a tabbed text file. If you open a file that was already opened by the ddt_open function, you are prompted to save and close it before opening it in the data table editor.</p> <p>Note that the cells in the first row of an Excel file become the column headers in the data table viewer. Note that the new table file replaces any data currently in the data table.</p>
Export	<p>Saves the data table as a Microsoft Excel file or as a tabbed text file.</p> <p>Note that the column headers in the data table viewer become the cells in the first row of an Excel file.</p>
Close	<p>Closes the data table. Note that changes are not automatically saved when you close the data table. Use the Save command to save your changes.</p>
Print	<p>Prints the data table.</p>
Print Preview	<p>Previews how the data table will print.</p>
Print Setup	<p>Enables you to select the printer, the page orientation, and paper size.</p>



Edit Menu

Use the Edit menu to move, copy, and find selected cells in the data table. The following commands are available in the Edit menu:

Edit Command	Description
Cut	Cuts the data table selection and writes it to the Clipboard.
Copy	Copies the data table selection to the Clipboard.
Paste	Pastes the contents of the Clipboard to the current data table selection.
Paste Values	Pastes values from the Clipboard to the current data table selection. Any formatting applied to the values is ignored. In addition, only formula results are pasted; formulas are ignored.
Clear All	Clears both the format of the selected cells, if the format was specified using the Format menu commands, and the values (including formulas) of the selected cells.
Clear Formats	Clears the format of the selected cells, if the format was specified using the Format menu commands. Does not clear values (including formulas) of the selected cells.
Clear Contents	Clears only values (including formulas) of the selected cells. Does not clear the format of the selected cells.
Insert	Inserts empty cells at the location of the current selection. Cells adjacent to the insertion are shifted to make room for the new cells.



Edit Command	Description
Delete	Deletes the current selection. Cells adjacent to the deleted cells are shifted to fill the space left by the vacated cells.
Copy Right	Copies data in the leftmost cell of the selected range to the right to fill the range.
Copy Down	Copies data in the top cell of the selected range down to fill the range.
Find	Finds a cell containing a specified value. You can search by row or column in the table and specify to match case or find entire cells only.
Replace	Finds a cell containing a specified value and replaces it with a different value. You can search by row or column in the table and specify to match case or find entire cells only. You can also replace all.
Go To	Goes to a specified cell. This cell becomes the active cell.



Data Menu

Use the Data menu to recalculate formulas, sort cells and edit autofill lists. The following commands are available in the Data menu:

Data Command	Description
Recalc	Recalculates any formula cells in the data table.
Sort	Sorts a selection of cells by row or column and keys.
AutoFill List	<p>Creates, edits or deletes an autofill list.</p> <p>An autofill list contains frequently-used series of text such as months and days of the week. When adding a new list, separate each item with a semi-colon.</p> <p>To use an autofill list, enter the first item into a cell in the data table. Drag the cursor across or down and WinRunner automatically fills in the cells in the range according to the autofill list.</p>



Format Menu

Use the Format menu to set the format of data in a selected cell or cells. The following commands are available in the Format menu:

Format Command	Description
General	Sets format to General. General displays numbers with as many decimal places as necessary and no commas.
Currency(0)	Sets format to currency with commas and no decimal places.
Currency(2)	Sets format to currency with commas and two decimal places.
Fixed	Sets format to fixed precision with commas and no decimal places.
Percent	Sets format to percent with no decimal places. Numbers are displayed as percentages with a trailing percent sign (%).
Fraction	Sets format to fraction.
Scientific	Sets format to scientific notation with two decimal places.
Date: (MM/dd/yyyy)	Sets format to Date with the MM/dd/yyyy format.
Time: h:mm AM/PM	Sets format to Time with the h:mm AM/PM format.
Custom Number	Sets format to a custom number format that you specify.
Validation Rule	Sets validation rule to test data entered into a cell or range of cells. A validation rule consists of a formula to test, and text to display if the validation fails.



Technical Specifications for the Data Table

The following table displays the technical specifications for a data table.

maximum number of columns	256
maximum number of rows	16,384
maximum column width	255 characters
maximum row height	409 points
maximum formula length	1024 characters
number precision	15 digits
largest positive number	9.999999999999999E307
largest negative number	-9.999999999999999E307
smallest positive number	1E-307
smallest negative number	-1E-307
table format	Tabbed text file or Microsoft Excel file.
valid column names	Columns names must not include spaces. They can include only letters, numbers, and underscores (_).



Importing Data from a Database

In order to import data from an existing database into a data table, you must specify the data to import using the DataDriver Wizard. If you selected the **Import data from a database** check box, the DataDriver Wizard prompts you to specify the program you will use to connect to the database. You can select either ODBC/Microsoft Query or Data Junction.

Note that in order to import data from a database, Microsoft Query or Data Junction must be installed on your machine. You can install Microsoft Query from the *custom installation* of Microsoft Office. Note that Data Junction is not automatically included in your WinRunner package. To purchase Data Junction, contact your Mercury Interactive representative. For detailed information on working with Data Junction, refer to the documentation in the Data Junction package.

Note: If you chose to replace data in the data table with data from an existing column in the database, and there is already a column with the same header in the data table, then the data in that column is automatically updated from the database. The data from the database overwrites the data in the relevant column in the data table for all rows that are imported from the database.



Importing Data from a Database Using Microsoft Query

You can use Microsoft Query to choose a data source and define a query within the data source.

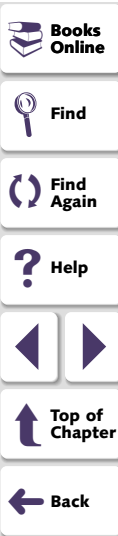
Note that WinRunner supports the following versions of Microsoft Query:

- version 2.00 (part of Microsoft Office 95)
- version 8.00 (part of Microsoft Office 97)
- version 2000 (part of Microsoft Office 2000)



Setting the Microsoft Query Options

After you select Microsoft Query in the **Connect to database using** option, the following wizard screen opens :



You can choose from the following options:

- **Create new query:** Opens Microsoft Query, enabling you to create a new ODBC *.sql query file with the name specified below. For additional information, see [Creating a New Source Query File](#) on page 626.
- **Copy existing query:** Opens the **Select source query file** screen in the wizard, which enables you to copy an existing ODBC query from another query file. For additional information, see [Selecting a Source Query File](#) on page 627.
- **Specify SQL statement:** Opens the **Specify SQL statement** screen in the wizard, which enables you to specify the connection string and an SQL statement. For additional information, see [Specifying an SQL Statement](#) on page 628.
- **New query file:** Displays the default name of the new *.sql query file for the data to import from the database. You can use the browse button to browse for a different *.sql query file.
- **Maximum number of rows:** Select this check box and enter the maximum number of database rows to import. If this check box is cleared, there is no maximum. Note that this option adds an additional parameter to your **db_check** statement. For more information, refer to the *TSL Online Reference*.
- **Show me how to use Microsoft Query:** Displays an instruction screen.

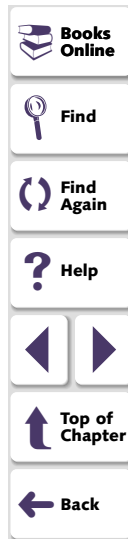


Creating a New Source Query File

Microsoft Query opens if you chose **Create new query** in the last step. Choose a new or existing data source, define a query, and when you are done:

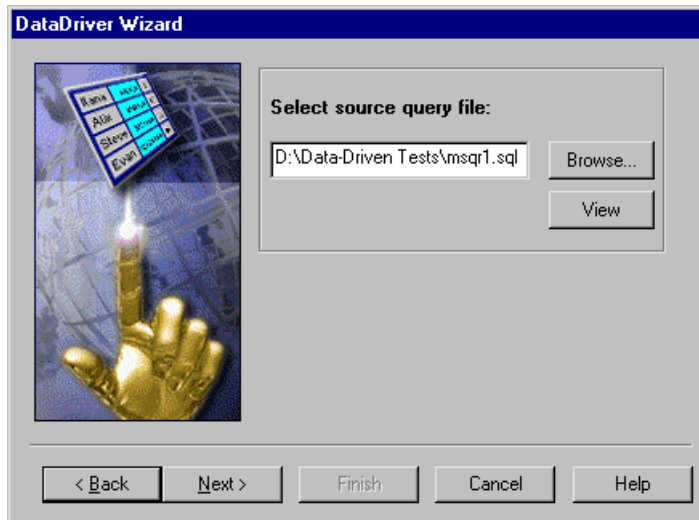
- In version 2.00, choose **File > Exit and return to WinRunner** to close Microsoft Query and return to WinRunner.
- In version 8.00, in the Finish screen of the Query Wizard, click **Exit and return to WinRunner** and click **Finish** to exit Microsoft Query. Alternatively, click **View data or edit query in Microsoft Query** and click **Finish**. After viewing or editing the data, choose **File > Exit and return to WinRunner** to close Microsoft Query and return to WinRunner.

Once you finish defining your query, you return to the DataDriver Wizard to finish converting your test to a data-driven test. For additional information, see step 4 on [page 598](#).



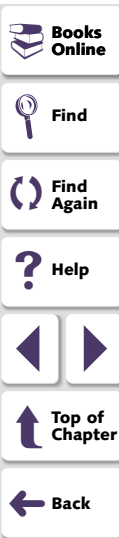
Selecting a Source Query File

The following screen opens if you chose **Copy existing query** in the last step.



Enter the pathname of the query file or use the **Browse** button to locate it. Once a query file is selected, you can use the **View** button to open the file for viewing.

Once you are done, you click **Next** to finish creating your data-driven test. For additional information, see step 4 on [page 598](#).



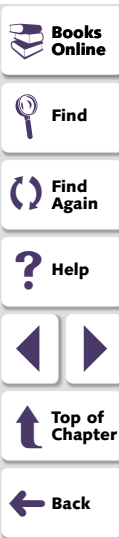
Specifying an SQL Statement

The following screen opens if you chose **Specify SQL statement** in the last step.



In this screen you must specify the connection string and the SQL statement:

- **Connection String:** Enter the connection string, or click **Create** to open the ODBC Select Data Source dialog box, in which you can select a *.dsn file, which inserts the connection string in the box.
- **SQL:** Enter the SQL statement.



Once you are done, you click **Next** to finish creating your data-driven test. For additional information, see step 4 on [page 598](#).

Once you import data from a database using Microsoft Query, the query information is saved in a query file called *msqrN.sql* (where N is a unique number). By default, this file is stored in the test folder (where the default data table is stored). The DataDriver Wizard inserts a **ddt_update_from_db** statement using a relative path and not a full path. During the test run, when a relative path is specified, WinRunner looks for the query file in the test folder. If the full path is specified for a query file in the **ddt_update_from_db** statement, then WinRunner uses the full path to find the location of the query file.

For additional information on using Microsoft Query, refer to the Microsoft Query documentation.



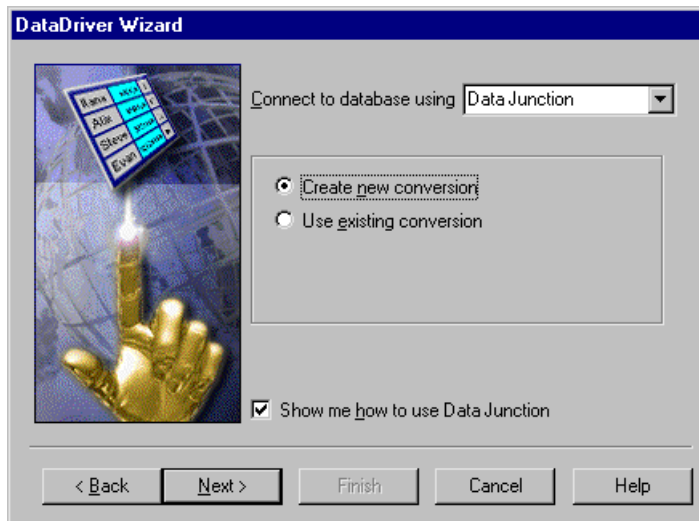
Importing Data from a Database Using Data Junction

You can use Data Junction to create a conversion file that converts a database to a target text file.

Note that WinRunner supports versions 6.5 and 7 of Data Junction.

Setting the Data Junction Options

If Data Junction is installed on your machine, the following wizard screen opens once you choose to import data from a Data Junction database:



You can choose from the following options:

- **Create new conversion:** Opens Data Junction and enables you to create a new conversion file. For additional information, see [Creating a Conversion File in Data Junction](#) on page 631.
- **Use existing conversion:** Opens the **Select conversion file** screen in the wizard, which enables you to specify an existing conversion file. For additional information, see [Selecting a Data Junction Conversion File](#) on page 633.
- **Show me how to use Data Junction** (available only when **Create new conversion** is selected): Displays instructions for working with Data Junction.

Creating a Conversion File in Data Junction

- 1 Specify and connect to the source database.
- 2 Select an ASCII (delimited) target spoke type and specify and connect to the target file. Choose the “Replace File/Table” output mode.

Note: If you are working with Data Junction version 7.0 and your source database includes values with delimiters (CR, LF, tab), then in the Target Properties dialog box, you must specify “\r\n\t” as the value for the **TransliterationIn** property. The value for the **TransliterationOut** property must be blank.



- 3 Map the source file to the target file.
- 4 When you are done, click **File > Export Conversion** to export the conversion to a *.djs conversion file.
- 5 The DataDriver Wizard opens to the **Select conversion file** screen. Follow the instructions in **Selecting a Data Junction Conversion File** on page 633.

For additional information on working with Data Junction, refer to the Data Junction documentation.

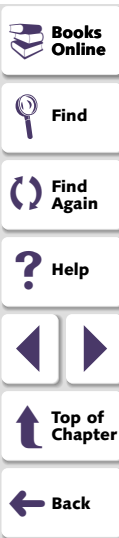


Selecting a Data Junction Conversion File

The following wizard screen opens when you are working with Data Junction.



Enter the pathname of the conversion file or use the **Browse** button to locate it. Once a conversion file is selected, you can use the **View** button to open the Data Junction Conversion Manager if you want to view the file.



You can also choose from the following options:

- **Copy conversion to test folder:** Copies the specified conversion file to the test folder.
- **Maximum number of rows:** Select this check box and enter the maximum number of database rows to import. If this check box is cleared, there is no maximum.

Once you are done, you click **Next** to finish creating your data-driven test. For additional information, see step 4 on [page 598](#).



Running and Analyzing Data-Driven Tests

You run and analyze data-driven tests much the same as for any WinRunner test. The following two sections describe these two procedures.

Running a Test

After you create a data-driven test, you run it as you would run any other WinRunner test. WinRunner substitutes the parameters in your test script with data from the data table. While WinRunner runs the test, it opens the data table. For each iteration of the test, it performs the operations you recorded on your application and conducts the checks you specified. For more information on running a test, see Chapter 1, [Running Tests](#).

Note that if you chose to import data from a database, then when you run the test, the `ddt_update_from_db` function updates the data table with data from the database. For information on importing data from a database, see [Importing Data from a Database](#) on page 612. For information on the `ddt_update_from_db` function, see [Using TSL Functions with Data-Driven Tests](#) on page 647 or refer to the *TSL Online Reference*.



Analyzing Test Results

When a test run is complete, you can view the test results as you would for any other WinRunner test. The Test Results window contains a description of the major events that occurred during the test run, such as GUI and bitmap checkpoints, file comparisons, and error messages. If a certain event occurs during each iteration, then the test results will record a separate result for the event for each iteration.

For example, if you inserted a **ddt_report_row** statement in your test script, then WinRunner prints a row of the data table to the test results. Each iteration of a **ddt_report_row** statement in your test script creates a line in the Test Log table in the Test Results window, identified as “Table Row” in the Event column. Double-clicking this line displays all the parameterized data used by WinRunner in an iteration of the test. For more information on the **ddt_report_row** function, see [Reporting the Active Row in a Data Table to the Test Results](#) on page 655 or refer to the *TSL Online Reference*. For more information on viewing test results, see Chapter 1, [Analyzing Test Results](#).

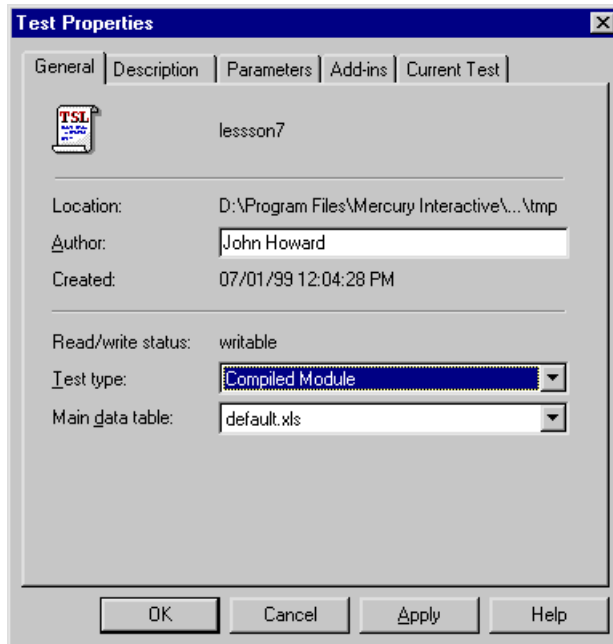


Assigning the Main Data Table for a Test

You can easily set the main data table for a test in the **General** tab of the Test Properties dialog box. The main data table is the table that is selected by default when you choose **Tools > Data Table** or open the DataDriver Wizard.

To assign the main data table for a test:

- 1 Choose **File > Test Properties** and click the **General** tab.



- 2 Choose the data table you want to assign from the **Main data table** list.
All tests that are stored in the Test folder are displayed in the list.
- 3 Click **OK**. The test you selected is assigned as the new main data table.

Note: If you open a different data table after selecting the main data table from the Test Properties dialog box, the last data table opened becomes the main data table.



Using Data-Driven Checkpoints and Bitmap Synchronization Points

When you create a data-driven test, you parameterize fixed values in TSL statements. However, GUI and bitmap checkpoints and bitmap synchronization points do not contain fixed values. Instead, these statements contain the following:

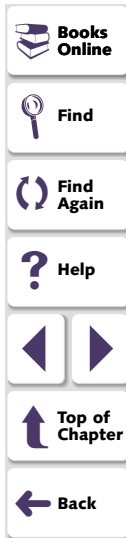
- A GUI checkpoint statement (**obj_check_gui** or **win_check_gui**) contains references to a checklist stored in the test's *chklist* folder and expected results stored in the test's *exp* folder.
- A bitmap checkpoint statement (**obj_check_bitmap** or **win_check_bitmap**) or a bitmap synchronization point statement (**obj_wait_bitmap** or **win_wait_bitmap**) contains a reference to a bitmap stored in the test's *exp* folder.

Note: When you check properties of GUI objects in a data-driven test, it is better to create a single property check than to create a GUI checkpoint: A single property check does not contain checklist, so it can be easily parameterized. You use the **Create > GUI Checkpoint > For Single Property** command to create a property check without a checklist. For additional information on using single property checks in a data-driven test, see [Creating a Basic Test for Conversion](#) on page 587. For information on checking a single property of an object, see Chapter 12, [Checking GUI Objects](#).



In order to parameterize GUI and bitmap checkpoints and bitmap synchronization points statements, you insert dummy values into the data table for each expected results reference. First you create separate columns for each checkpoint or bitmap synchronization point. Then you enter dummy values in the columns to represent captured expected results. Each dummy value should have a unique name (for example, `gui_exp1`, `gui_exp2`, etc.). When you run the test in Update mode, WinRunner captures expected results during each iteration of the test (i.e. for each row in the data table) and saves all the results in the test's *exp* folder.

- For a GUI checkpoint statement, WinRunner captures the expected values of the object properties.
- For a bitmap checkpoint statement or a bitmap synchronization point statement, WinRunner captures a bitmap.



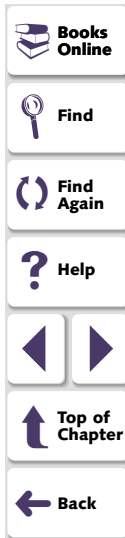
To create a data-driven checkpoint or bitmap synchronization point:

- 1 Create the initial test by recording or programming.

In the example below, the recorded test opens the Search dialog box in the Notepad application, searches for a text and checks that the appropriate message appears. Note that a GUI checkpoint, a bitmap checkpoint, and a synchronization point are all used in the example.

```
set_window ("Untitled - Notepad", 12);
menu_select_item ("Search;Find...");
set_window ("Find", 5);
edit_set ("Find what:", "John");
button_press ("Find Next");
set_window("Notepad", 10);
obj_check_gui("Message", "list1.ckl", "gui1", 1);
win_check_bitmap("Notepad", "img1", 5, 30, 23, 126, 45);
obj_wait_bitmap("Message", "img2", 13);
set_window ("Notepad", 5);
button_press ("OK");
set_window ("Find", 4);
button_press ("Cancel");
```

- 2 Use the DataDriver Wizard (**Tools > DataDriver Wizard**) to turn your script into a data-driven test and parameterize the data values in the statements in the test script. For additional information, see [Creating a Data-Driven Test with the DataDriver Wizard](#) on page 591. Alternatively, you can make these changes to the test script manually. For additional information, see [Creating a Data-Driven Test Manually](#) on page 603.



In the example below, the data-driven test searches for several different strings. WinRunner reads all these strings from the data table.

```

set_window ("Untitled - Notepad", 12);
menu_select_item ("Search;Find...");
table = "default.xls";
rc = ddt_open(table, DDT_MODE_READ);
if (rc!= E_OK && rc != E_FILE_OPEN)
    pause("Cannot open table.");
ddt_get_row_count(table,RowCount);
for (i = 1; i <= RowCount; i++) {
    ddt_set_row(table,i);
    set_window ("Find", 5);
    edit_set ("Find what:", ddt_val(table, "Str"));
    button_press ("Find Next");
    set_window("Notepad", 10);

    # The GUI checkpoint statement is not yet parameterized.
    obj_check_gui("message", "list1.ckl", "gui1", 1);

    # The bitmap checkpoint statement is not yet parameterized.
    win_check_bitmap("Notepad", "img1", 5, 30, 23, 126, 45);

    # The synchronization point statement is not yet parameterized.
    obj_wait_bitmap("message", "img2", 13);
    set_window ("Notepad", 5);
    button_press ("OK");
}
ddt_close(table);
set_window ("Find", 4);
button_press ("Cancel");

```



For example, the data table might look like this:

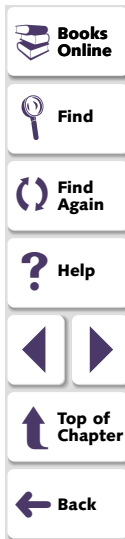
The screenshot shows a window titled "Data Table - D:\Program Files\Mercury Interactive\..." with a menu bar (File, Edit, Data, Format, Help). The main area contains a table with the following data:

	Str	B	C	D	E
1	John				
2	Susan				
3	Bill				
4					

The status bar at the bottom indicates "Ready".

Note that the GUI and bitmap checkpoints and the synchronization point in this data-driven test will fail on the 2nd and 3rd iteration of the test run. The checkpoints and the synchronization point would fail because the values for these points were captured using the "John" string, in the original recorded test. Therefore, they will not match the other strings taken from the data table.

- 3 Create a column in the data table for each checkpoint or synchronization point to be parameterized. For each row in the column, enter dummy values. Each dummy value should be unique.



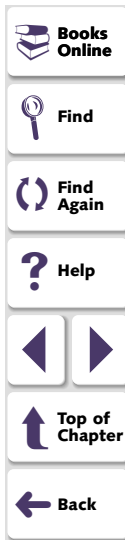
For example, the data table in the previous step might now look like this:

	Str	GUI_Check1	BMP_Check1	Sync1
1	John	gui_exp1	bmp_exp1	sync_exp1
2	Susan	gui_exp2	bmp_exp2	sync_exp2
3	Bill	gui_exp3	bmp_exp3	sync_exp3
4				

- 4 Choose **Tools > Parameterize Data** to open the Assign Parameter dialog box. In the **Existing Parameter** box, change the expected values of each checkpoint and synchronization point to use the values from the data table. For additional information, see [Parameterizing Values in a Test Script](#) on page 606. Alternatively, you can edit the test script manually.

For example, the sample script will now look like this:

```
set_window ("Untitled - Notepad", 12);
menu_select_item ("Search;Find...");
table = "default.xls";
rc = ddt_open(table, DDT_MODE_READ);
if (rc!= E_OK && rc != E_FILE_OPEN)
    pause("Cannot open table.");
```




```

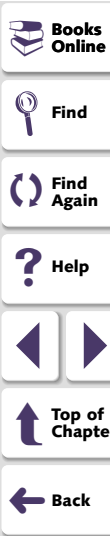
ddt_get_row_count(table,RowCount);
for (i = 1; i <= RowCount; i++) {
    ddt_set_row(table,i);
    set_window ("Find", 5);
    edit_set ("Find what:", ddt_val(table, "Str"));
    button_press ("Find Next");
    set_window("Notepad", 10);

    # The GUI checkpoint statement is now parameterized.
    obj_check_gui("message", "list1.ckl",
        ddt_val(table, "GUI_Check1"), 1);

    # The bitmap checkpoint statement is now parameterized.
    win_check_bitmap("Notepad",
        ddt_val(table, "BMP_Check1"), 5, 30, 23, 126, 45);

    # The synchronization point statement is now parameterized.
    obj_wait_bitmap("message",
        ddt_val(table, "Sync1"), 13);
    set_window ("Notepad", 5);
    button_press ("OK");
}
ddt_close(table);
set_window ("Find", 4);
button_press ("Cancel");

```



- 5 Select **Update** in the run mode box to run your test in Update mode. Choose a **Run** command to run your test.

While the test runs in Update mode, WinRunner reads the names of the expected values from the data table. Since WinRunner cannot find the expected values for GUI checkpoints, bitmaps checkpoints, and bitmap synchronization points in the data table, it recaptures these values from your application and save them as expected results in the *exp* folder for your test. Expected values for GUI checkpoints are saved as expected results. Expected values for bitmap checkpoints and bitmap synchronization points are saved as bitmaps.

Once you have run your test in Update mode, all the expected values for all the sets of data in the data table are recaptured and saved.

Later you can run your test in Verify mode to check the behavior of your application.

Note: When you run your test in Update mode, WinRunner recaptures expected values for GUI and bitmap checkpoints automatically. WinRunner prompts you before recapturing expected values for bitmap synchronization points.



Using TSL Functions with Data-Driven Tests

WinRunner provides several TSL functions that enable you to work with data-driven tests.

You can use the Function Generator to insert the following functions in your test script, or you can manually program statements that use these functions. For information about working with the Function Generator, see Chapter 25, **Generating Functions**. For more information about these functions, refer to the *TSL Online Reference*.

Note: You must use the **ddt_open** function to open the data table before you use any other **ddt_** functions. You must use the **ddt_save** function to save the data table, and use the **ddt_close** function to close the data table.



Opening a Data Table

The **ddt_open** function creates or opens the specified data table. The data table is a Microsoft Excel file or a tabbed text file. The first row in the Excel/tabbed text file contains the names of the parameters. This function has the following syntax:

```
ddt_open ( data_table_name, mode );
```

The *data_table_name* is the name of the data table. The *mode* is the mode for opening the data table: DDT_MODE_READ (read-only) or DDT_MODE_READWRITE (read or write).

Saving a Data Table

The **ddt_save** function saves the information in the specified data table. This function has the following syntax:

```
ddt_save ( data_table_name );
```

The *data_table_name* is the name of the data table.

Note that **ddt_save** does not close the data table. Use the **ddt_close** function, described below, to close the data table.



Closing a Data Table

The **ddt_close** function closes the specified data table. This function has the following syntax:

```
ddt_close ( data_table_name );
```

The *data_table_name* is the name of the data table.

Note that **ddt_close** does not save changes made to the data table. Use the **ddt_save** function, described above, to save changes before closing the data table.

Exporting a Data Table

The **ddt_export** function exports the information of one table file into a different table file. This function has the following syntax:

```
ddt_export ( data_table_filename1, data_table_filename2 );
```

The *data_table_filename1* is the name of the source data table file. The *data_table_filename2* is the name of the destination data table file.



Displaying the Data Table Editor

The **ddt_show** function shows or hides the editor of a given data table. This function has the following syntax:

```
ddt_show ( data_table_name [ , show_flag ] );
```

The *data_table_name* is the name of the table. The *show_flag* is the value indicating whether the editor should be displayed (default=1) or hidden (0).

Returning the Number of Rows in a Data Table

The **ddt_get_row_count** function returns the number of rows in the specified data table. This function has the following syntax:

```
ddt_get_row_count ( data_table_name, out_rows_count );
```

The *data_table_name* is the name of the data table. The *out_rows_count* is the output variable that stores the total number of rows in the data table.

Changing the Active Row in a Data Table to the Next Row

The **ddt_next_row** function changes the active row in the specified data table to the next row. This function has the following syntax:

```
ddt_next_row ( data_table_name );
```

The *data_table_name* is the name of the data table.



Setting the Active Row in a Data Table

The **ddt_set_row** function sets the active row in the specified data table. This function has the following syntax:

```
ddt_set_row ( data_table_name, row );
```

The *data_table_name* is the name of the data table. The *row* is the new active row in the data table.

Setting a Value in the Current Row of the Table

The **ddt_set_val** function writes a value into the current row of the table. This function has the following syntax:

```
ddt_set_val ( data_table_name, parameter, value );
```

The *data_table_name* is the name of the data table. The *parameter* is the name of the column into which the value will be inserted. The *value* is the value to be written into the table.

Note: You can only use this function if the data table was opened in `DDT_MODE_READWRITE` (read or write mode).

To save the new contents of the table, add a **ddt_save** statement after the **ddt_set_val** statement. At the end of your test, use a **ddt_close** statement to close the table.



Setting a Value in a Row of the Table

The `ddt_set_val_by_row` function sets a value in a specified row of the table. This function has the following syntax:

```
ddt_set_val_by_row ( data_table_name, row, parameter, value );
```

The *data_table_name* is the name of the data table. The *row* is the row number in the table. It can be any existing row or the current row number plus 1, which will add a new row to the data table. The *parameter* is the name of the column into which the value will be inserted. The *value* is the value to be written into the table.

Note: You can only use this function if the data table was opened in `DDT_MODE_READWRITE` (read or write mode).

To save the new contents of the table, add a `ddt_save` statement after the `ddt_set_val` statement. At the end of your test, use a `ddt_close` statement to close the table.



Retrieving the Active Row of a Data Table

The **ddt_get_current_row** function retrieves the active row in the specified data table. This function has the following syntax:

```
ddt_get_current_row ( data_table_name, out_row );
```

The *data_table_name* is the name of the data table. The *out_row* is the output variable that stores the specified row in the data table.

Determining Whether a Parameter in a Data Table is Valid

The **ddt_is_parameter** function determines whether a parameter in the specified data table is valid. This function has the following syntax:

```
ddt_is_parameter ( data_table_name, parameter );
```

The *data_table_name* is the name of the data table. The *parameter* is the name of the parameter in the data table.



Returning a List of Parameters in a Data Table

The **ddt_get_parameters** function returns a list of all parameters in the specified data table. This function has the following syntax:

```
ddt_get_parameters ( data_table_name, params_list, params_num );
```

The *data_table_name* is the name of the data table. The *params_list* is the out parameter that returns the list of all parameters in the data table, separated by tabs. The *params_name* is the out parameter that returns the number of parameters in *params_list*.

Returning the Value of a Parameter in the Active Row in a Data Table

The **ddt_val** function returns the value of a parameter in the active row in the specified data table. This function has the following syntax:

```
ddt_val ( data_table_name, parameter );
```

The *data_table_name* is the name of the data table. The *parameter* is the name of the parameter in the data table.



Returning the Value of a Parameter in a Row in a Data Table

The **ddt_val_by_row** function returns the value of a parameter in the specified row of the specified data table. This function has the following syntax:

```
ddt_val_by_row ( data_table_name, row_number, parameter );
```

The *data_table_name* is the name of the data table. The *parameter* is the name of the parameter in the data table. The *row_number* is the number of the row in the data table.

Reporting the Active Row in a Data Table to the Test Results

The **ddt_report_row** function reports the active row in the specified data table to the test results. This function has the following syntax:

```
ddt_report_row ( data_table_name );
```

The *data_table_name* is the name of the data table.



Importing Data from a Database into a Data Table

The **ddt_update_from_db** function imports data from a database into a data table. It is inserted into your test script when you select the Import data from a database option in the DataDriver Wizard. When you run your test, this function updates the data table with data from the database. This function has the following syntax:

```
ddt_update_from_db ( data_table_name, file, out_row_count  
[ , max_rows ] );
```

The *data_table_name* is the name of the data table.

The *file* is an *.sql file containing a query defined by the user in Microsoft Query or *.djs file containing a conversion defined by Data Junction. The *out_row_count* is an out parameter containing the number of rows retrieved from the data table. The *max_rows* is an in parameter specifying the maximum number of rows to be retrieved from a database. If no maximum is specified, then by default the number of rows is not limited.

Note: You must use the **ddt_open** function to open the data table in DDT_MODE_READWRITE (read or write) mode. After using the **ddt_update_from_db** function, the new contents of the table are not automatically saved. To save the new contents of the table, use the **ddt_save** function before the **ddt_close** function.



Guidelines for Creating a Data-Driven Test

Consider the following guidelines when creating a data-driven test:

- A data-driven test can contain more than one parameterized loop.
- You can open and save data tables other than the *default.xls* data table. This enables you to use several different data tables in one test script. You can use the **New**, **Open**, **Save**, and **Save As** commands in the data table to open and save data tables. For additional information, see [Editing the Data Table](#) on page 613.

Note: If you open a data table from one test while it is open from another test, the changes you make to the data table in one test will not be reflected in the other test. To save your changes to the data table, you must save and close the data table in one test before opening it in another test.

- Before you run a data-driven test, you should look through it to see if there are any elements that may cause a conflict in a data-driven test. The DataDriver and Parameterization wizards find all fixed values in selected checkpoints and recorded statements, but they do not check for things such as object labels that also may vary based on external input. There are two ways to solve most of these conflicts:



- Use a regular expression to enable WinRunner to recognize objects based on a portion of its physical description.
- Use the GUI Map Configuration dialog box to change the physical properties that WinRunner uses to recognize the problematic object.
- You can change the active row during the test run by using TSL statements. For more information, see [Using TSL Functions with Data-Driven Tests](#) on page 647.
- You can read from a non-active row during the test run by using TSL statements. For more information, see [Using TSL Functions with Data-Driven Tests](#) on page 647.
- You can add **tl_step** or other reporting statements within the parameterized loop of your test so that you can see the result of the data used in each iteration.
- It is not necessary to use all the data in a data table when running a data-driven test.
- If you want, you can parameterize only part of your test script or a loop within it.
- If WinRunner cannot find a GUI object that has been parameterized while running a test, make sure that the parameterized argument is not surrounded by quotes in the test script.
- You can parameterize statements containing GUI checkpoints, bitmap checkpoints, and bitmap synchronization points. For more information, see [Using Data-Driven Checkpoints and Bitmap Synchronization Points](#) on page 639.



- You can parameterize constants as you would any other string or value.
- You can use the data table in the same way as an Excel spreadsheet, including inserting formulas into cells.
- It is not necessary for the data table viewer to be open when you run a test.
- You can use the **ddt_set_val** and **ddt_set_val_by_row** functions to insert data into the data table during a test run. Then use the **ddt_save** function to save your changes to the data table.

Note: By default, the data table is stored in the test folder.



Creating Tests

Synchronizing the Test Run

Synchronization compensates for inconsistencies in the performance of your application during a test run. By inserting a synchronization point in your test script, you can instruct WinRunner to suspend the test run and wait for a cue before continuing the test.

This chapter describes:

- **Waiting for Objects and Windows**
- **Waiting for Property Values of Objects and Windows**
- **Waiting for Bitmaps of Objects and Windows**
- **Waiting for Bitmaps of Screen Areas**
- **Tips for Synchronizing Tests**



About Synchronizing the Test Run

Applications do not always respond to user input at the same speed from one test run to another. This is particularly common when testing applications that run over a network. A synchronization point in your test script instructs WinRunner to suspend running the test until the application being tested is ready, and then to continue the test.

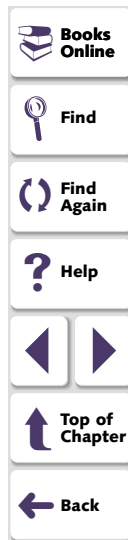
There are three kinds of synchronization points: object/window synchronization points, property value synchronization points, and bitmap synchronization points.

- When you want WinRunner to wait for an object or a window to appear, you create an object/window synchronization point.
- When you want WinRunner to wait for an object or a window to have a specified property, you create a property value synchronization point.
- When you want WinRunner to wait for a visual cue to be displayed, you create a bitmap synchronization point. In a bitmap synchronization point, WinRunner waits for the bitmap of an object, a window, or an area of the screen to appear.



For example, suppose that while testing a drawing application you want to import a bitmap from a second application and then rotate it. A human user would know to wait for the bitmap to be fully redrawn before trying to rotate it. WinRunner, however, requires a synchronization point in the test script after the import command and before the rotate command. Each time the test is run, the synchronization point tells WinRunner to wait for the import command to be completed before rotating the bitmap.

In another example, suppose that while testing an application you want to check that a button is enabled. Suppose that in your application the button becomes enabled only after your application completes an operation over the network. The time it takes for the application to complete this network operation depends on the load on the network. A human user would know to wait until the operation is completed and the button is enabled before clicking it. WinRunner, however, requires a synchronization point after launching the network operation and before clicking the button. Each time the test is run, the synchronization point tells WinRunner to wait for the button to become enabled before clicking it.



You can synchronize your test to wait for a bitmap of a window or a GUI object in your application, or on any rectangular area of the screen. You can also synchronize your test to wait for a property value of a GUI object, such as “enabled,” to appear. To create a synchronization point, you choose a Create > Synchronization Point command indicate an area or an object in the application being tested. Depending on which Synchronization Point command you choose, WinRunner either captures the property value of a GUI object or a bitmap of a GUI object or area of the screen, and stores it in the expected results folder (*exp*). You can also modify the property value of a GUI object that is captured before it is saved in the expected results folder.

A bitmap synchronization point is a synchronization point that captures a bitmap. It appears as a **win_wait_bitmap** or **obj_wait_bitmap** statement in the test script. A property value synchronization point is a synchronization point that captures a property value. It appears as a **_wait_info** statement in your test script, such as **button_wait_info** or **list_wait_info**. When you run the test, WinRunner suspends the test run and waits for the expected bitmap or property value to appear. It then compares the current *actual* bitmap or property value with the *expected* bitmap or property value saved earlier. When the bitmap or property value appears, the test continues.

Note: All **wait** and **wait_info** functions are implemented in milliseconds, so they do not affect how the test runs.



Waiting for Objects and Windows

You can create a synchronization point that instructs WinRunner to wait for a specified object or window to appear. For example, you can tell WinRunner to wait for a window to open before performing an operation within that window, or you may want WinRunner to wait for an object to appear in order to perform an operation on that object.

WinRunner waits no longer than the default timeout setting before executing the subsequent statement in a test script. You can set this default timeout setting in a test script by using the *timeout_msec* testing option with the **setvar** function. For more information, see Chapter 41, [Setting Testing Options from a Test Script](#). You can also set this default timeout setting globally using the **Timeout for Checkpoints and CS Statements** box in the Run tab of the General Options dialog box. For more information, see Chapter 40, [Setting Global Testing Options](#).

You use the **obj_exists** function to create an object synchronization point, and you use the **win_exists** function to create a window synchronization point. These functions have the following syntax:

```
obj_exists ( object [, time ] );
```

```
win_exists ( window [, time ] );
```



The *object* is the logical name of the object. The object may belong to any class. The *window* is the logical name of the window. The *time* is the amount of time (in seconds) that is added to the default timeout setting, yielding a new maximum wait time before the subsequent statement is executed.

You can use the Function Generator to insert this function into your test script or you can insert it manually. For information on using the Function Generator, see Chapter 25, **Generating Functions**. For more information on these functions and examples of usage, refer to the *TSL Online Reference*.

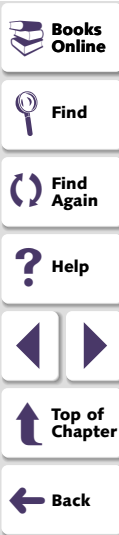


Waiting for Property Values of Objects and Windows

You can create a property value synchronization point, which instructs WinRunner to wait for a specified property value to appear in a GUI object. For example, you can tell WinRunner to wait for a button to become enabled or for an item to be selected from a list.

The method for synchronizing a test is identical for property values of objects and windows. You start by choosing **Create > Synchronization Point > For Object/Window Property**. As you pass the mouse pointer over your application, objects and windows flash. To select a window, you click the title bar or the menu bar of the desired window. To select an object, you click the object.

A dialog box opens containing the name of the selected window or object. You can specify which property of the window or object to check, the expected value of that property, and the amount of time that WinRunner waits at the synchronization point.



A statement with one of the following functions is added to the test script, depending on which GUI object you selected:

GUI Object	TSL Function
button	button_wait_info
edit field	edit_wait_info
list	list_wait_info
menu	menu_wait_info
an object mapped to the generic “object” class	obj_wait_info
scroll bar	scroll_wait_info
spin box	spin_wait_info
static text	static_wait_info
status bar	statusbar_wait_info
tab	tab_wait_info
window	win_wait_info

During a test run, WinRunner suspends the test run until the specified property value in a GUI object is detected. It then compares the current value of the specified property with its expected value. If the property values match, then WinRunner continues the test.



In the event that the specified property value of the GUI object does not appear, WinRunner displays an error message, when the *mismatch_break* testing option is on. For information about the *mismatch_break* testing option, see Chapter 41, **Setting Testing Options from a Test Script**. You can also set this testing option globally using the corresponding

Break when Verification Fails option in the Run tab of the General Options dialog box. For information about setting this testing option globally, see Chapter 40, **Setting Global Testing Options**.

If the window or object you capture has a name that varies from run to run, you can define a regular expression in its physical description in the GUI map. This instructs WinRunner to ignore all or part of the name. For more information, see Chapter 7, **Editing the GUI Map**, and Chapter 23, **Using Regular Expressions**.

During recording, when you capture an object in a window other than the active window, WinRunner automatically generates a **set_window** statement.

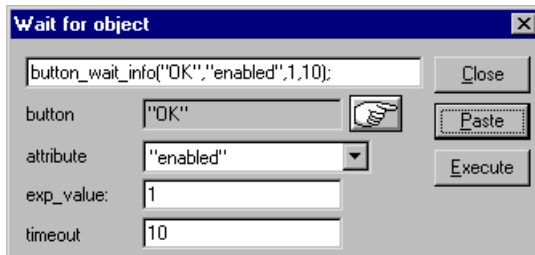
To insert a property value synchronization point:



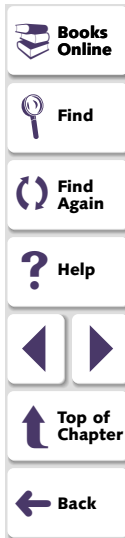
- 1 Choose **Create > Synchronization Point > For Object/Window Property** or click the **Synchronization Point for Object/Window Property** button on the User toolbar. The mouse pointer becomes a pointing hand.
- 2 Highlight the desired object or window. To highlight an object, place the mouse pointer over it. To highlight a window, place the mouse pointer over the title bar or the menu bar.



- Click the left mouse button. Depending on whether you clicked an object or a window, either the **Wait for Object** or the **Wait for Window** dialog box opens.



- Specify the parameters of the property check to be carried out on the window or object, as follows:
 - Window or type of object: The name of the window or object you clicked appears in a read-only box. To select a different window or object, click the pointing hand.
 - Property: Select the property of the object or window to be checked from the list. The default property for the window or type of object specified above appears by default in this box.
 - Expected value: Enter the expected value of the property of the object or window to be checked. The current value of this property appears by default in this box.



- **Timeout:** Enter the amount of time (in seconds) that WinRunner waits at the synchronization point in addition to the amount of time that WinRunner waits specified in the *timeout_msec* testing option. You can change the default amount of time that WinRunner waits using the *timeout_msec* testing option. For more information, see Chapter 41, **Setting Testing Options from a Test Script**. You can also change the default timeout value in the **Timeout for Checkpoints and CS Statements** box in the Run tab of the General Options dialog box. For more information, see Chapter 40, **Setting Global Testing Options**.

Note: Any changes you make to the above parameters appear immediately in the text box at the top of the dialog box.

- 5 Click **Paste** to paste this statement into your test script.

The dialog box closes and a **_wait_info** statement that checks the property values of an object is inserted into your test script. For example, **button_wait_info** has the following syntax:

button_wait_info (*button*, *property*, *value*, *time*);

The *button* is the name of the button. The *property* is any property that is used by the button object class. The *value* is the value that must appear before the test run can continue. The *time* is the maximum number of seconds WinRunner should wait at the synchronization point, added to the *timeout_msec* testing option. For more information on **_wait_info** statements, refer to the *TSL Online Reference*.



For example, suppose that while testing the Flight Reservation application you order a plane ticket by typing in passenger and flight information and clicking Insert. The application takes a few seconds to process the order. Once the operation is completed, you click Delete to delete the order.

In order for the test to run smoothly, a **button_wait_info** statement is needed in the test script. This function tells WinRunner to wait up to 10 seconds (plus the timeout interval) for the Delete button to become enabled. This ensures that the test does not attempt to delete the order while the application is still processing it. The following is a segment of the test script:

```
button_press ("Insert");  
button_wait_info ("Delete","enabled",1,"10");  
button_press ("Delete");
```

Note: You can also use the Function Generator to create a synchronization point that waits for a property value of a window or an object. For information on using the Function Generator, see Chapter 25, **Generating Functions**. For more information about working with these functions, refer to the *TSL Online Reference*.



Waiting for Bitmaps of Objects and Windows

You can create a bitmap synchronization point that waits for the bitmap of an object or a window to appear in the application being tested.

The method for synchronizing a test is identical for bitmaps of objects and windows. You start by choosing **Create > Synchronization Point > For Object/Window Bitmap**. As you pass the mouse pointer over your application, objects and windows flash. To select the bitmap of an entire window, you click the window's title bar or menu bar. To select the bitmap of an object, you click the object.

During a test run, WinRunner suspends test execution until the specified bitmap is redrawn, and then compares the current bitmap with the expected one captured earlier. If the bitmaps match, then WinRunner continues the test.

In the event of a mismatch, WinRunner displays an error message, when the *mismatch_break* testing option is on. For information about the *mismatch_break* testing option, see Chapter 41, [Setting Testing Options from a Test Script](#). You can also set this testing option globally using the corresponding **Break when Verification Fails** option in the Run tab of the General Options dialog box. For information about setting this testing option globally, see Chapter 40, [Setting Global Testing Options](#).



If the window or object you capture has a name that varies from run to run, you can define a regular expression in its physical description in the GUI map. This instructs WinRunner to ignore all or part of the name. For more information, see Chapter 7, [Editing the GUI Map](#), and Chapter 23, [Using Regular Expressions](#).

During recording, when you capture an object in a window other than the active window, WinRunner automatically generates a **set_window** statement.

To insert a bitmap synchronization point for an object or a window:



- 1 Choose **Create > Synchronization Point > For Object/Window Bitmap** or click the **Synchronization Point for Object/Window Bitmap** on the User toolbar. Alternatively, if you are recording in Analog mode, press a SYNCHRONIZE BITMAP OF OBJECT/WINDOW softkey. The mouse pointer becomes a pointing hand.
- 2 Highlight the desired window or object. To highlight an object, place the mouse pointer over it. To highlight a window, place the mouse pointer over its title bar or menu bar.
- 3 Click the left mouse button to complete the operation. WinRunner captures the bitmap and generates an **obj_wait_bitmap** or a **win_wait_bitmap** statement with the following syntax in the test script.

obj_wait_bitmap (*object, image, time*);

win_wait_bitmap (*window, image, time*);



For example, suppose that while working with the Flight Reservation application, you decide to insert a synchronization point in your test script.

If you point to the Date of Flight box, the resulting statement might be:

```
obj_wait_bitmap ("Date of Flight:", "Img5", 22);
```

For more information on **obj_wait_bitmap** and **win_wait_bitmap**, refer to the *TSL Online Reference*.

Note: The execution of **obj_wait_bitmap** and **win_wait_bitmap** is affected by the current values specified for the *delay_msec*, *timeout_msec* and *min_diff* testing options. For more information on these testing options and how to modify them, see Chapter 41, **Setting Testing Options from a Test Script**. You may also set these testing options globally, using the corresponding **Delay for Window Synchronization, Timeout for Checkpoints and CS Statements**, and **Threshold for Difference between Bitmaps** boxes in the Run tab of the General Options dialog box. For more information about setting these testing options globally, see Chapter 40, **Setting Global Testing Options**.



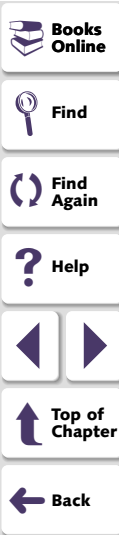
Waiting for Bitmaps of Screen Areas

You can create a bitmap synchronization point that waits for a bitmap of a selected area in your application. You can define any rectangular area of the screen and capture it as a bitmap for a synchronization point.

You start by choosing Create > Synchronization Point > For Screen Area Bitmap. As you pass the mouse pointer over your application, it becomes a crosshairs pointer, and a help window opens in the top left corner of your screen.

You use the crosshairs pointer to outline a rectangle around the area. The area can be any size: it can be part of a single window, or it can intersect several windows. WinRunner defines the rectangle using the coordinates of its upper left and lower right corners. These coordinates are relative to the upper left corner of the object or window in which the area is located. If the area intersects several objects in a window, the coordinates are relative to the window. If the selected area intersects several windows, or is part of a window with no title (a popup menu, for example), the coordinates are relative to the entire screen (the root window).

During a test run, WinRunner suspends test execution until the specified bitmap is displayed. It then compares the current bitmap with the expected bitmap. If the bitmaps match, then WinRunner continues the test.



In the event of a mismatch, WinRunner displays an error message, when the *mismatch_break* testing option is on. For information about the *mismatch_break* testing option, see Chapter 41, [Setting Testing Options from a Test Script](#). You may also set this option using the corresponding **Break when Verification Fails** check box in the Run tab of the General Options dialog box. For information about setting this testing option globally, see Chapter 40, [Setting Global Testing Options](#).

To define a bitmap synchronization point for an area of the screen:



- 1 Choose **Create > Synchronization Point > For Screen Area Bitmap** or click the **Synchronization Point for Screen Area Bitmap** button on the User toolbar. Alternatively, if you are recording in Analog mode, press the SYNCHRONIZE BITMAP OF SCREEN AREA softkey.

The WinRunner window is minimized to an icon, the mouse pointer becomes a crosshairs pointer, and a help window opens in the top left corner of your screen.

- 2 Mark the area to be captured: press the left mouse button and drag the mouse pointer until a rectangle encloses the area; then release the mouse button.
- 3 Click the right mouse button to complete the operation. WinRunner captures the bitmap and generates a **win_wait_bitmap** or **obj_wait_bitmap** statement with the following syntax in your test script.

win_wait_bitmap (*window, image, time, x, y, width, height*);

obj_wait_bitmap (*object, image, time, x, y, width, height*);



For example, suppose you are updating an order in the Flight Reservation application. You have to synchronize the continuation of the test with the appearance of a message verifying that the order was updated. You insert a synchronization point in order to wait for an “Update Done” message to appear in the status bar.

WinRunner generates the following statement:

```
obj_wait_bitmap ("Update Done...", "Img7", 10);
```

For more information on **win_wait_bitmap** and **obj_wait_bitmap**, refer to the *TSL Online Reference*.

Note: The execution of **win_wait_bitmap** and **obj_wait_bitmap** statements is affected by the current values specified for the *delay_msec*, *timeout_msec* and *min_diff* testing options. For more information on these testing options and how to modify them, see Chapter 41, **Setting Testing Options from a Test Script**. You may also set these testing options globally, using the corresponding **Delay for window synchronization**, **Timeout for checkpoints and CS statements**, and **Threshold for difference between bitmaps** boxes in the Run tab of the General Options dialog box. For more information about setting these testing options globally, see Chapter 40, **Setting Global Testing Options**.



Tips for Synchronizing Tests

- **Stopping or pausing a test:** You can stop or pause a test that is waiting for a synchronization statement by using the pause or stop softkeys. For information on using softkeys, see [Activating Test Creation Commands Using Softkeys](#) on page 249.
- **Recording in Analog mode:** When recording a test in Analog mode, you should press the SYNCHRONIZE BITMAP OF OBJECT/WINDOW or the SYNCHRONIZE BITMAP OF SCREEN AREA softkey to create a bitmap synchronization point. This prevents WinRunner from recording extraneous mouse movements. If you are programming a test, you can use the Analog TSL function **wait_window** to wait for a bitmap. For more information, refer to the *TSL Online Reference*.
- **Data-driven testing:** In order to use bitmap synchronization points in data-driven tests, you must parameterize the statements in your test script that contain them. For information on using bitmap synchronization points in data-driven tests, see [Using Data-Driven Checkpoints and Bitmap Synchronization Points](#) on page 639.



Creating Tests

Handling Unexpected Events and Errors

You can instruct WinRunner to handle unexpected events and errors that occur in your testing environment during a test run.

This chapter describes:

- [Handling Pop-Up Exceptions](#)
- [Handling TSL Exceptions](#)
- [Handling Object Exceptions](#)
- [Activating and Deactivating Exception Handling](#)
- [Handling Web Exceptions](#)

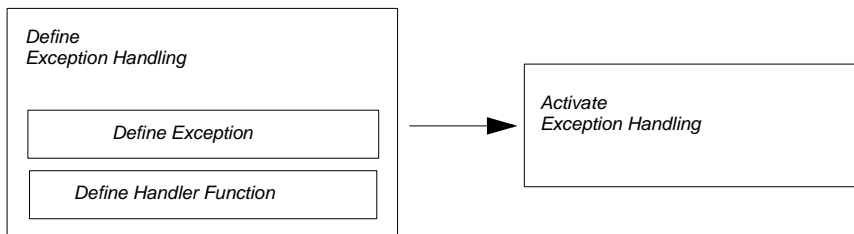


About Handling Unexpected Events and Errors

Unexpected events and errors during a test run can disrupt your test and distort test results. This is a problem particularly when running batch tests unattended: the batch test is suspended until you perform the action needed to recover.

Using *exception handling*, you can instruct WinRunner to detect an unexpected event when it occurs and act to recover the test run. For example, you can instruct WinRunner to detect a “Printer out of paper” message and call a handler function. The handler function recovers the test run by clicking the OK button to close the message.

To use exception handling, you must define and activate it.



Define exception handling: Describe the event or error you want WinRunner to detect, and define the actions it will perform in order to resume test execution. To do this, you define the exception and define a handler function.



Activate exception handling: Instruct WinRunner to look for any occurrence of the exception you defined.

WinRunner enables you to handle the following types of exceptions:

- **Pop-up exceptions:** Instruct WinRunner to detect and handle the appearance of a specific window.
- **TSL exceptions:** Instruct WinRunner to detect and handle TSL functions that return a specific error code.
- **Object exceptions:** Instruct WinRunner to detect and handle a change in a property for a specific GUI object.
- **Web exceptions:** When the WebTest add-in is loaded, you can instruct WinRunner to handle unexpected events and errors that occur in your Web site during a test run. For more information on loading WinRunner with the WebTest add-in, see [Loading WinRunner Add-Ins](#) on page 55.



Handling Pop-Up Exceptions

A test run is often disrupted by a window that pops up unexpectedly during a test run, such as a message box indicating that the printer is out of paper. Sometimes, the test run cannot continue until you close the window.

A pop-up exception instructs WinRunner to detect a specific window that may appear during a test run and to recover test execution, for example, by clicking an OK button to close a window.

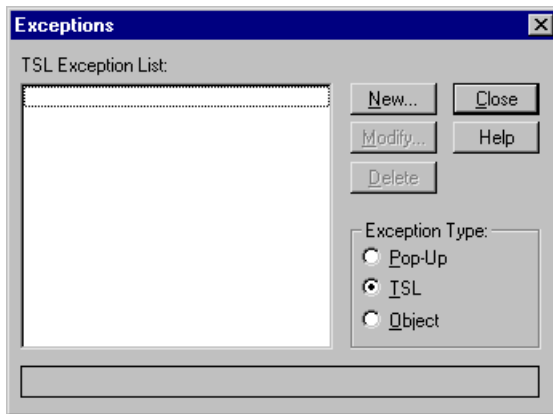


Defining Pop-Up Exceptions

You use the Pop-Up Exception dialog box to define pop-up exceptions.

To define a pop-up exception:

- 1 Choose **Tools > Exception Handling** to open the Exceptions dialog box.



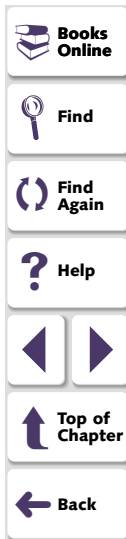
- 2 In the **Exception Type** box, click **Pop-Up**. Then click **New**.



The Pop-Up Exception dialog box opens.



- 3 In the **Exception Name** box, type in a new name.
- 4 Choose the pop-up window in one of the following ways:
 - **Click the pointing hand and click the window.** If the window to which you pointed is not in the GUI map, WinRunner adds it to the map. WinRunner enters the logical name into the **Window Name** box.
 - **Type the name of the window into the Window Name box.** You can type in the window's title or its logical name. If the window is not in the GUI map, WinRunner assumes that the name you specify is the window's title. You can also specify a regular expression.

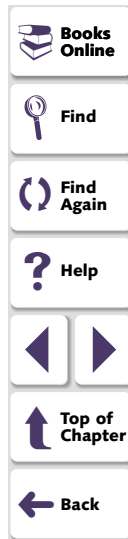


- 5 Choose a handler function: click a default (press Enter, click Cancel, or click OK), or click **User Defined Function Name** to specify a user-defined handler. If you choose the last option, the dialog box changes to display the **User Defined Function Name** box.

If you specify a user-defined handler function in the **User Defined Function Name** box that is undefined or in an unloaded compiled module, the **Handler Function Definition** dialog box opens automatically, displaying a handler function template. For more information on defining handler functions, see [Defining Handler Functions for Pop-Up Exceptions](#) on page 687.

- 6 To activate exception handling active at all times, select the **Activate by Default** check box.
- 7 Click **OK** to complete the definition and close the dialog box. The new exception appears in the **Pop-Up Exception List** in the Exceptions dialog box.

WinRunner activates handling and adds the new exception to the list of default pop-up exceptions in the Exceptions dialog box. Default exceptions are defined by the XR_EXCP_POPUP configuration parameter in the *wrun.ini* file.



Note: As an alternative to using the Pop-Up Exception dialog box, you can define a pop-up exception in a test script using the **define_popup_exception** function, and you can activate it using the **exception_on** function. For more information on activating and deactivating exceptions, see **Activating and Deactivating Exception Handling** on page 703. Note that exceptions you define using TSL are valid only for the current WinRunner session. For more information on **define_popup_exception**, refer to the *TSL Online Reference*.



Defining Handler Functions for Pop-Up Exceptions

The handler function is responsible for recovering test execution. When WinRunner detects a specific window, it calls the handler function. You implement this function to respond to the unexpected event in a way that meets your specific testing needs.

When defining an exception from the Pop-Up Exception dialog box, you can specify one of two types of handler functions:

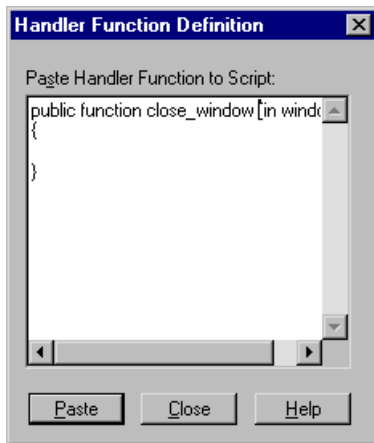
- **Default actions:** WinRunner clicks the OK or Cancel button in the pop-up window, or presses Enter on the keyboard. To select a default handler, click the appropriate button in the dialog box.
- **User-defined handler:** If you prefer, specify the name of your own handler. Click User Defined Function Name and type in a name in the User Defined Function Name box.

If you specify a user-defined handler that is either undefined or in an unloaded compiled module, WinRunner automatically displays a template in the Handler Function Definition dialog box. You can use the template to help you create a handler function. The handler function must receive the *window_name* as a parameter.

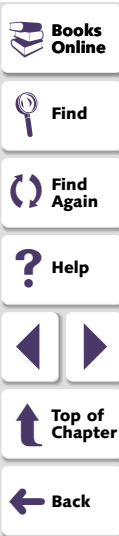


To define your own handler function using the **Handler Function Definition** dialog box:

- 1 Define an exception using the **Pop-Up Exception** dialog box, as described in [Defining Pop-Up Exceptions](#) on page 683. Specify a new name for the handler function.
- 2 Click **OK**. The dialog box closes and the **Handler Function Definition** dialog box opens, displaying the handler function template.



- 3 Create a function that closes the window and recovers test execution.
- 4 Click **Paste** to paste the statements into the WinRunner window.
- 5 Click **Close** to close the Handler Function Definition dialog box.
- 6 You can edit the test script further if necessary. When you are done, save the script in a compiled module.



User-defined handler functions should be stored in a compiled module. For WinRunner to call the function, the compiled module must be loaded when the exception occurs. For more information, refer to Chapter 28, **Creating Compiled Modules**.

In the following example, the handler function is edited to handle an error message. A Flights Reservation application sometimes displays a “FATAL DATABASE ERROR” message, often as the result of a faulty database entry. You can create a handler function that gets the faulty entry number and its value, and writes the information to the test execution report. Then, it dismisses the error message.

The script segment below shows how the handler function (`my_win_handler`) can be edited in the template:

```
public function my_win_handler(string win_name)
{
    auto order_num;
    set_window("Open Order",2);
    edit_get_text("Order Value",order_num);
    report_msg("Database error. Order number:" & order_num);
    set_window(win_name);
    button_press ("OK");
}
```



Handling TSL Exceptions

A TSL exception enables you to detect and respond to a specific error code returned during test execution.

Suppose you are running a batch test on an unstable version of your application. If your application crashes, you want WinRunner to recover test execution. A TSL exception can instruct WinRunner to recover test execution by exiting the current test, restarting the application, and continuing with the next test in the batch.

Defining TSL Exceptions

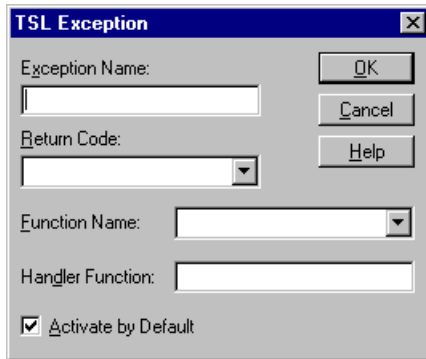
You use the TSL Exception dialog box to define, modify, and delete TSL exceptions.

To define a TSL exception:

- 1 Choose **Tools > Exception Handling** to open the Exceptions dialog box.
- 2 In the **Exception Type** box, click **TSL**. Then click **New**.



The TSL Exception dialog box opens.



- 3 In the **Exception Name** box, type in a new name.
- 4 In the **Return Code** list, choose a return code.
- 5 In the **Function Name** list, choose a TSL function. If you choose **<<any function>>** or do not specify a function, WinRunner defines the exception for any TSL function in the list that returns the specified return code.
- 6 In the **Handler Function** box, type in the name of a handler function.

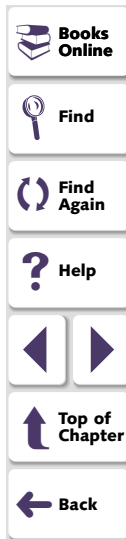
If you specify a handler function that is undefined or is in an unloaded compiled module, the **Handler Function Definition** dialog box opens automatically, displaying a handler function template. For more information on defining handler functions, see [Defining Handler Functions for TSL Exceptions](#) on page 693.



- 7 To activate exception handling at all times, select the **Activate by Default** check box.
- 8 Click **OK** to complete the definition and close the dialog box. The new exception appears in the **TSL Exception List** in the Exceptions dialog box.

Once you have defined the exception, WinRunner activates handling and adds the exception to the list of default TSL exceptions in the Exceptions dialog box. Default TSL exceptions are defined by the XR_EXCP_TSL configuration parameter in the *wrun.ini* configuration file.

Note: As an alternative to using the TSL Exception dialog box, you can define a TSL exception in a test script using the **define_TSL_exception** function, and you can activate it using the **exception_on** function. For more information on activating and deactivating exceptions, see [Activating and Deactivating Exception Handling](#) on page 703. Note that exceptions you define using TSL are valid only for the current WinRunner session. For more information on **define_TSL_exception**, refer to the *TSL Online Reference*.



Defining Handler Functions for TSL Exceptions

The handler function is responsible for recovering test execution. When WinRunner detects a specific error code, it calls the handler function. You implement this function to respond to the unexpected error in the way that meets your specific testing needs.

If you specify a handler that is either undefined or in an unloaded compiled module, WinRunner automatically displays a template in the Handler Function Definition dialog box. You can use the template to help you create a handler function. The handler function must receive the *return_code* and the *function_name* as parameters.

To define a handler function using the Handler Function Definition dialog box:

- 1 Define an exception using the **TSL Exception** dialog box, as described in [Defining TSL Exceptions](#) on page 690. Specify a new name for the handler function.
- 2 Click **OK**. The dialog box closes and the **Handler Function Definition** dialog box opens, displaying the handler function template.
- 3 Create a function that recovers test execution.
- 4 Click **Paste** to paste the statements into the WinRunner window.
- 5 Click **Close** to close the Handler Function Definition dialog box.



- 6 You can further edit the test script if necessary. When you are done, save the script in a compiled module.

In order for the exception to call the handler function, the compiled module must be loaded when the exception occurs. For more information, refer to Chapter 28, [Creating Compiled Modules](#).

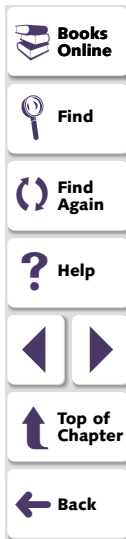
The following example uses the Flight Reservation application to demonstrate how you can instruct WinRunner to record a specific event in the test report. In the application, it is illegal to select an item from the “Fly To:” list without first selecting an item from the “Fly From:” list.

Suppose you program a stress test to create such a situation. The test selects the first item in the “Fly From:” list for every selection from the “Fly To:” list. If the “Fly From:” list is empty, the command:

```
list_select_item ("Fly From:", "#0");
```

returns the error code `E_ITEM_NOT_FOUND`.

You could implement exception handling to identify each occurrence of the `E_ITEM_NOT_FOUND` return value for the **list_select_item** command. You do this by defining a handler function that reacts by recording the event in the test report.



Edit the handler function (`list_item_handler`) in the template as follows:

```
public function list_item_handler(rc, func_name)
{
report_msg("List Fly From: is empty")
}
```

Note: The handler function of a TSL exception does not need to return any value. However, a TSL exception defined for a TSL Context Sensitive function can return one of the following values:

- **RETRY:** The function is executed again. If the exception recurs, it is not handled again. An exception handler should return `RETRY` if the problem that caused the exception is resolved.
- **DEF_PROCESSING:** The function is handled by default, as though no exception was defined. The TSL command that called the exception is processed as though an exception was never detected (i.e. messages are generated, the Run wizard opens, or the return value is reported).

For example, if a **button_press** statement returns a value of `E_NOT_UNIQUE`, and this error code is defined as an exception, the exception handler is called. If it returns `DEF_PROCESSING`, the Run wizard opens and tries to resolve the problem of the non-unique button. Therefore, an exception handler should return `DEF_PROCESSING` when the handler cannot resolve the exception.



Handling Object Exceptions

During testing, unexpected changes can occur to GUI objects in the application you are testing. These changes are often subtle but they can disrupt the test run and distort results.

One example is a change in the color of a button. Suppose that your application uses a green button to indicate that an electrical network is closed; the same button may turn red when the network is broken.

You could use exception handling to detect a different color in the button during the test run, and to recover test execution by calling a handler function that closes the network and restores the button's color.

Defining Object Exceptions

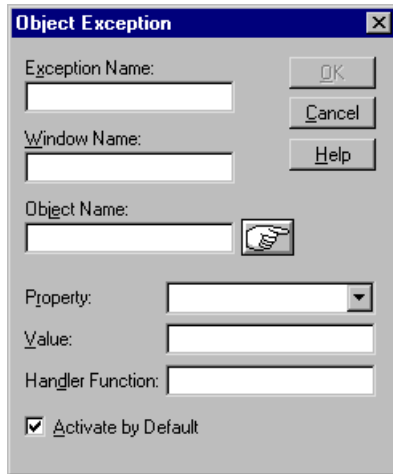
You use the Object Exception dialog box to define, modify, and delete object exceptions.

To define an object exception:

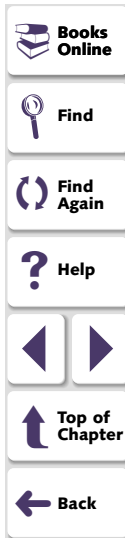
- 1 Choose **Tools > Exception Handling** to open the Exceptions dialog box.
- 2 In the **Exception Type** box, click **Object**. Then click **New**.



The Object Exception dialog box opens.



- 3 In the **Exception Name** box, type in a new name.



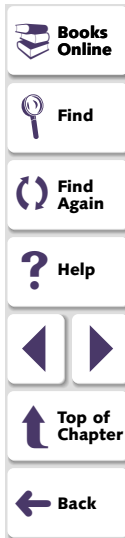
4 Choose the object in one of the following ways:

- **Click the pointing hand and click the object.** The names of the object and its parent window appear in the boxes.
- **Type the names of the object and its parent window.** In the **Object Name** box, type in the name of the object. In the **Window Name** box, type in the name of the window in which the object is found.
- If the object exception you are defining is for a window, enter the name of the window in the **Window Name** box and leave the **Object Name** box empty.

Note that for an object exception, the object and its parent window must be in the loaded GUI map when exception handling is activated.

- 5 In the **Property** list, choose the property for which you are defining the object exception.
- 6 In the **Value** box, type in a value for the property you have selected. If you do not specify a value, the exception will be defined for any change from the current property value.

Note that the property you specify for the exception cannot appear in the object's physical description. If you attempt to specify such a property, WinRunner will display an error message. To work around the problem, modify the object's physical description. For more information, refer to Chapter 7, [Editing the GUI Map](#).



- 7 In the **Handler Function** box, enter the name of the handler function.

If you specify a handler function that is undefined or in an unloaded compiled module, the Handler Function dialog box opens, displaying a handler function template. For more information on defining handler functions, see [Defining Handler Functions for Object Exceptions](#) on page 700.

- 8 To make exception handling active at all times, select the **Activate by Default** check box.

If you have not specified a value for the property, ensure that the object is displayed when you press the OK button. You can activate exception handling only if WinRunner can learn the current value of the property.

- 9 Click **OK** to complete the definition and close the dialog box. The new exception appears in the **Object Exception List** in the Exceptions dialog box.

Once you have defined the exception, WinRunner activates handling and adds the exception to the list of default object exceptions in the Exceptions dialog box. Default object exceptions are defined by the XR_EXCP_OBJ configuration variable in the wrun.ini file.



Note: As an alternative to using the Object Exception dialog box, you can define an object exception in a test script using the **define_object_exception** function, and you can activate it using the **exception_on** function. For more information on activating and deactivating exceptions, see [Activating and Deactivating Exception Handling](#) on page 703.

Note that exceptions you define with TSL are valid only for the current WinRunner session. For more information on **define_object_exception**, refer to the *TSL Online Reference*.

Defining Handler Functions for Object Exceptions

The handler function is responsible for recovering test execution. When WinRunner detects a changed property, it calls the handler function. You implement this function to respond to the unexpected event in a way that meets your specific testing needs.

If you specify a handler function that is either undefined or in an unloaded compiled module, WinRunner automatically displays a template in the Handler Function Definition dialog box. You can use the template to help you create a handler function. The handler function must receive the *window*, *object*, *property* and *value* as parameters.



Note that the first command in the template is **exception_off**. This is because an object exception does not detect the actual change in the specified object property; rather, it detects a state in the specified object property. The handler function must deactivate exception handling as soon as the function begins to execute. If not, the exception will immediately reoccur, calling the handler function endlessly.

Only if the handler function has fixed the problem that caused the exception to occur, call **exception_on** at the bottom of the handler function so that if the exception reoccurs, it will be detected again. (Note that the **exception_on** statement appears in the the template, but it is commented out.)

To define a handler function using the Handler Function Definition dialog box:

- 1 Define an exception using the **Object Exception** dialog box, as described in [Defining Object Exceptions](#) on page 696.
- 2 Click **OK**. The dialog box closes and the **Handler Function Definition** dialog box opens, displaying the handler function template.
- 3 Create a function that recovers test execution.
- 4 Click **Paste** to paste the statements into WinRunner. The dialog box closes.
- 5 Click **Close** to exit the Handler Function Definition dialog box.



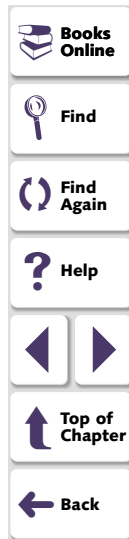
- 6 You can further edit the test script if necessary. When you are done, save the script in a compiled module. To enable exception detection, ensure that you load the compiled module before test execution.

Handler functions must be stored in a compiled module. For WinRunner to call the handler function, the compiled module must be loaded at the moment the exception occurs. For more information, refer to Chapter 28, **Creating Compiled Modules**.

For example, the labels of GUI objects may become corrupted during testing, often as a result of memory management problems. You could define exception handling to take care of such irregularities in the Flights application. The handler function that is called might write the unexpected event to a test report, close and restart your application, then exit the current test and continue to the next test in the batch. To do this, you would edit the handler function (label_handler) in the template as follows:

```
public function label_handler(in win, in obj, in attr, in val)
{
#ignore this exception while it is handled:
exception_off("label_except");
report_msg("Label has changed");
menu_select_item ("File;Exit");
invoke_application ("flights", "", "C:\\\\FRS", "SW_SHOWMAXIMIZED");
#if the value of "attr" no longer equals "val":
exception_on("label_except");
textit;}

```



Activating and Deactivating Exception Handling

When you define an exception by using the Exceptions dialog box, exception handling is activated by default. To turn off activating exception handling by default, clear the **Activate by Default** check box in each Exception dialog box.

You can also activate exception handling in a test script by using TSL commands:

- To instruct WinRunner to begin detecting an exception, insert an **exception_on** statement at the appropriate point in your test script.
- To instruct WinRunner to stop detecting an exception, use the **exception_off** function. Use **exception_off_all** to stop detection of all active exceptions.

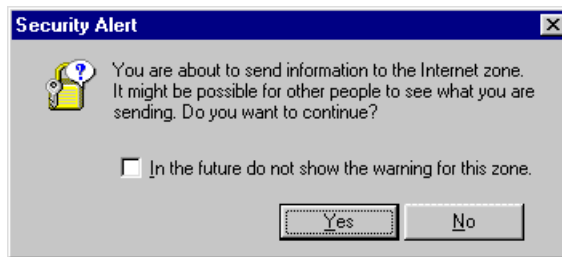
For more information on these functions, refer to the *TSL Online Reference*.

Note: To activate and deactivate Web exceptions, see [Activating and Deactivating Web Exceptions](#) on page 709.



Handling Web Exceptions

When the WebTest add-in is loaded, you can instruct WinRunner to handle the appearance of a specific dialog box in your Web site during a test run. For example, if a Security Alert dialog box appears during a test run, you can instruct WinRunner to recover the test run by clicking the Yes button.



WinRunner contains a list of exceptions that it supports in the Web Exception Editor. You can modify the list and configure additional exceptions that you would like WinRunner to support.

For information on loading WinRunner with the WebTest add-in, see [Loading WinRunner Add-Ins](#) on page 55.

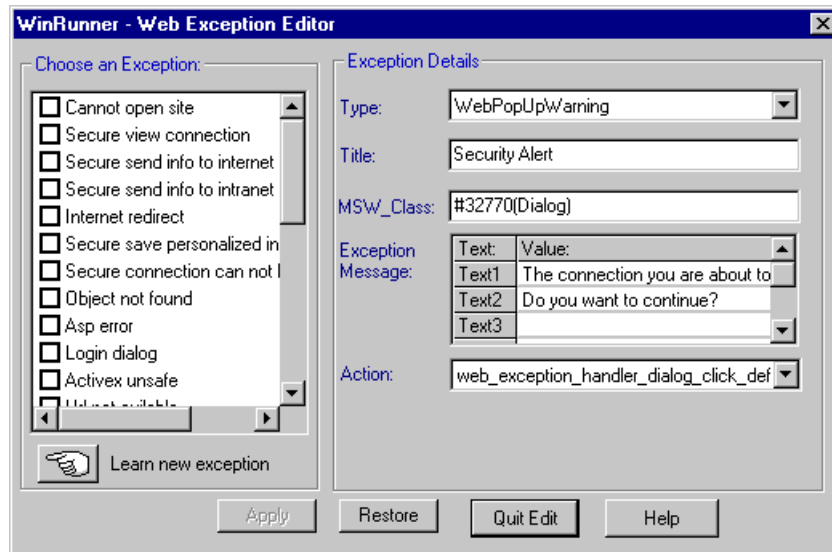


Defining Web Exceptions

You can define a new exception to the list of exceptions in the Web Exception Editor.

To define a Web exception:

- 1 Choose **Tools > Web Exception Handling**. The Web Exception Editor opens.



- 2 Click the pointing hand and click the dialog box. A new exception is added to the list.
- 3 In the **Type** list, select an exception type.

- **WebPopUpError** indicates that the exception is an error dialog box
- **WebPopUpWarning** indicates that the exception is a warning dialog box.

The Editor displays the title, MSW_Class, and message of the exception.

- 4 In the **Action** list, choose the handler function action that is responsible for recovering test execution.
 - **Web_exception_handler_dialog_click_default** activates the default button.
 - **Web_exception_handler_fail_retry** activates the default button and reloads the Web page.
 - **Web_exception_enter_username_password** uses the given user name and password.
 - **Web_exception_handler_dialog_click_yes** activates the Yes button.
 - **Web_exception_handler_dialog_click_no** activates the No button.

5 Click **Apply**. The Save Configuration dialog box opens.

6 Click **OK** to save the changes to the configuration file.

Click **Quit Edit** to exit the Web Exception Editor.

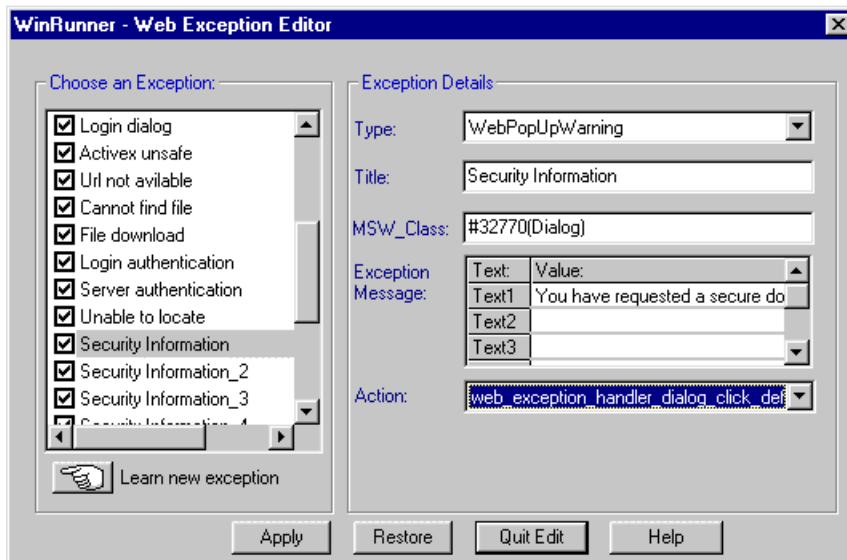


Modifying an Exception

You can modify the details of an exception listed in the Web Exception Editor.

To modify the details of an exception:

- 1 Choose **Tools > Web Exception Handling**. The Web Exception Editor opens.
- 2 In the **Choose an Exception list**, click an exception.



The exception is highlighted. The current description of the exception appears in the Exception Details area.



- 3 To modify the exception type, choose a type from the **Type** list.
 - **WebPopUpError** indicates that the exception is an error dialog box
 - **WebPopUpWarning** indicates that the exception is a warning dialog box.
- 4 To modify the title of the dialog box, type a new title in the **Title** box.
- 5 To modify the text that appears in the exception dialog box, click a text line and edit the text.
- 6 To change the action that is responsible for recovering test execution, choose an action from the **Action** list.
 - **Web_exception_handler_dialog_click_default** activates the default button.
 - **Web_exception_handler_fail_retry** activates the default button and reloads the Web page.
 - **Web_exception_enter_username_password** uses the given user name and password.
 - **Web_exception_handler_dialog_click_yes** activates the Yes button.
 - **Web_exception_handler_dialog_click_no** activates the No button.
- 7 Click **Apply**. The Save Configuration dialog box opens.
- 8 Click **OK** to save the changes to the configuration file.
- 9 Click **Quit Edit** to exit the Web Exception Editor.



Activating and Deactivating Web Exceptions

The Web Exception Editor includes a list of all the available exceptions. You can choose to activate or deactivate any exception in the list.

To change the status of an exception:

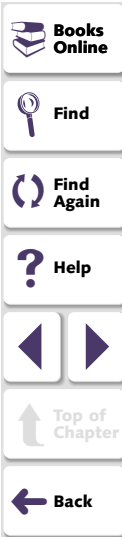
- 1 Choose **Tools > Web Exception Handling**. The Web Exception Editor opens.
- 2 In the **Choose an Exception** list, click an exception. The exception is highlighted. The current description of the exception appears in the Exception Details area.
- 3 To activate an exception, select its check box. To deactivate the exception, clear its check box.
- 4 Click **Apply**. The Save Configuration dialog box opens.
- 5 Click **OK** to save the changes to the configuration file.
- 6 Click **Quit Edit** to exit the Web Exception Editor.



Creating Tests Using Regular Expressions

You can use regular expressions to increase the flexibility and adaptability of your tests. This chapter describes:

- **When to Use Regular Expressions**
- **Regular Expression Syntax**



About Regular Expressions

Regular expressions enable WinRunner to identify objects with varying names or titles. You can use regular expressions in TSL statements or in object descriptions in the GUI map. For example, you can define a regular expression in the physical description of a push button so that WinRunner can locate the push button if its label changes.

A regular expression is a string that specifies a complex search phrase. In most cases the string is preceded by an exclamation point (!). (In descriptions or arguments of functions where a string is expected, such as the **match** function, the exclamation point is not required.) By using special characters such as a period (.), asterisk (*), caret (^), and brackets ([]), you define the conditions of the search. For example, the string “!windo.*” matches both “window” and “windows”. See [Regular Expression Syntax](#) on page 716 for more information.

Note that WinRunner regular expressions include options similar to those offered by the UNIX `grep` command.



When to Use Regular Expressions

Use a regular expression when the name of a GUI object can vary each time you run a test. For example, you can use a regular expression in the following instances:

- the physical description of an object in the GUI map
- a GUI checkpoint, when evaluating the contents of an edit object or static text object with a varying name
- a text checkpoint, to locate a varying text string using **win_find_text** or **object_find_text**

Using a Regular Expression in an Object's Physical Description in the GUI Map

You can use a regular expression in the physical description of an object in the GUI map, so that WinRunner can ignore variations in the object's label. For example, the physical description:

```
{  
class: push_button  
label: "!St.*"  
}
```

enables WinRunner to identify a push button if its label toggles from “Start” to “Stop”.



Using a Regular Expression in a GUI Checkpoint

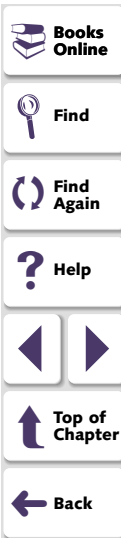
You can use a regular expression in a GUI checkpoint, when evaluating the contents of an edit object or a static text object with a varying name. You define the regular expression by creating a GUI checkpoint on the object in which you specify the checks. The example below illustrates how to use a regular expression if you choose **Create > GUI Checkpoint > For Object/Window** and double-click a static text object. Note that you can also use a regular expression with the **Create > GUI Checkpoint > For Multiple Objects** command. For additional information about GUI checkpoints, see Chapter 12, [Checking GUI Objects](#).

To define a regular expression in a GUI checkpoint:

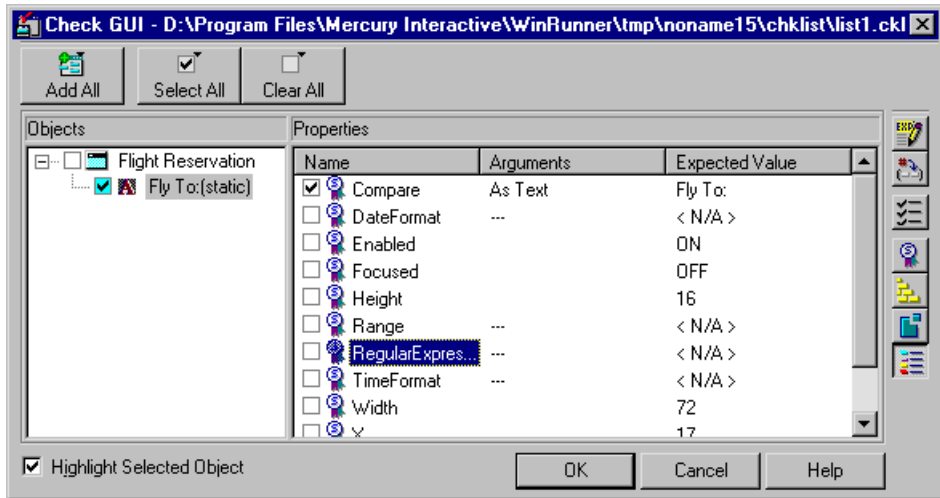
- 1 Create a GUI checkpoint for an object in which you specify the checks. In this example, choose **Create > GUI Checkpoint > For Object/Window**.

The WinRunner window is minimized, the mouse pointer becomes a pointing hand, and a help window opens on the screen.

- 2 Double-click a static text object.

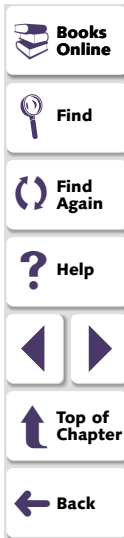
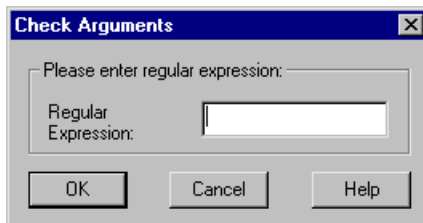


- 3 The **Check GUI** dialog box opens:



- 4 In the **Properties** pane, highlight the “Regular Expression” property check and then click the **Specify Arguments** button.

The **Check Arguments** dialog box opens:



- 5 Enter the regular expression in the **Regular Expression** box, and then click **OK**.

Note: When a regular expression is used to perform a check on a static text or edit object, it should *not* be preceded by an exclamation point.

- 6 If desired, specify any additional checks to perform, and then click **OK** to close the Check GUI dialog box.

An **obj_check_gui** statement is inserted into your test script.

For additional information on specifying arguments, see [Specifying Arguments for Property Checks](#) on page 324.

Using a Regular Expression in a Text Checkpoint

You can use a regular expression in a text checkpoint, to locate a varying text string using **win_find_text** or **object_find_text**. For example, the statement:

```
obj_find_text ("Edit", "win.*", coord_array, 640, 480, 366, 284);
```

enables WinRunner to find any text in the object named “Edit” that begins with “win”.

Since windows often have varying labels, WinRunner defines a regular expression in the physical description of a window. For more information, see Chapter 7, [Editing the GUI Map](#).



Regular Expression Syntax

Regular expressions must begin with an exclamation point (!), except when defined in a Check GUI dialog box, a text checkpoint, or a **match**, **obj_find_text**, or **win_find_text** statement. All characters in a regular expression are searched for literally, except for a period (.), asterisk (*), caret (^), and brackets ([]), as described below. When one of these special characters is preceded by a backslash (\), WinRunner searches for the literal character. For example, if you are using a **win_find_text** statement to search for a phrase beginning with “Sign up now!”, then you should use the following regular expression: “Sign up now!\!*”.

The following options can be used to create regular expressions:

Matching Any Single Character

A period (.) instructs WinRunner to search for any single character. For example, welcome.

matches welcomes, welcomed, or welcome followed by a space or any other single character. A series of periods indicates a range of unspecified characters.



Matching Any Single Character within a Range

In order to match a single character within a range, you can use brackets ([]). For example, to search for a date that is either 1968 or 1969, write:

```
196[89]
```

You can use a hyphen (-) to indicate an actual range. For instance, to match any year in the 1960s, write:

```
196[0-9]
```

Brackets can be used in a physical description to specify the label of a static text object that may vary:

```
{  
class: static_text,  
label: "!Quantity[0-9]"  
}
```

In the above example, WinRunner can identify the static_text object with the label "Quantity" when the quantity number varies.

A hyphen does not signify a range if it appears as the first or last character within brackets, or after a caret (^).



A caret (^) instructs WinRunner to match any character except for the ones specified in the string. For example:

```
[^A-Za-z]
```

matches any non-alphabetic character. The caret has this special meaning only when it appears first within the brackets.

Note that within brackets, the characters “.”, “*”, “[“ and “\” are literal. If the right bracket is the first character in the range, it is also literal. For example:

```
[]g-m]
```

matches the “]“ and g through m.

Note: Two “\” characters together (“\\”) are interpreted as a single “\” character. For example, in the physical description in a GUI map, “!D:\\.*” does not mean all labels that start with “D:\”. Rather, it refers to all labels that start with “D:.”. To specify all labels that start with “D:\”, use the following regular expression: “!D:\\\\..*”.



Matching Specific Characters

An asterisk (*) instructs WinRunner to match one or more occurrences of the preceding character. For example:

Q*

causes WinRunner to match Q, QQ, QQQ, etc.

A period "." followed by an asterisk "*" instructs WinRunner to locate the preceding characters followed by any combination of characters. For example, in the following physical description, the regular expression enables WinRunner to locate any push button that starts with "O" (for example, On or Off).

```
{
class: push_button
label: "!O.*"
}
```

You can also use a combination of brackets and an asterisk to limit the label to a combination of non-numeric characters. For example:

```
{
class: push_button
label: "!O[a-zA-Z]*)"
}
```



Programming with TSL



Programming with TSL

Enhancing Your Test Scripts with Programming

WinRunner test scripts are composed of statements coded in Mercury Interactive's Test Script Language (TSL). This chapter provides a brief introduction to TSL and shows you how to enhance your test scripts using a few simple programming techniques.

This chapter describes:

- **Statements**
- **Comments and White Space**
- **Constants and Variables**
- **Performing Calculations**
- **Creating Stress Conditions**
- **Decision-Making**
- **Sending Messages to the Test Results Window**
- **Starting Applications from a Test Script**
- **Defining Test Steps**
- **Comparing Two Files**



About Enhancing Your Test Scripts with Programming

When you record a test, a test script is generated in Mercury Interactive's Test Script Language (TSL). Each TSL statement in the test script represents keyboard and/or mouse input to the application being tested.

TSL is a C-like programming language designed for creating test scripts. It combines functions developed specifically for testing with general purpose programming language features such as variables, control-flow statements, arrays, and user-defined functions. TSL is easy to use because you do not have to compile. You enhance a recorded test script simply by typing programming elements into the test window, and immediately execute the test.

TSL includes four types of functions:

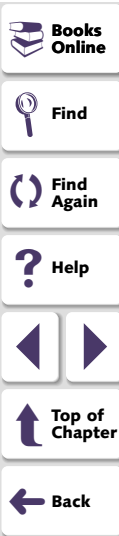
- *Context Sensitive* functions perform specific tasks on GUI objects, such as clicking a button or selecting an item from a list. Function names, such as **button_press** and **list_select_item**, reflect the function's purpose.
- *Analog* functions depict mouse clicks, keyboard input, and the exact coordinates traveled by the mouse.
- *Standard* functions perform general purpose programming tasks, such as sending messages to a report or performing calculations.
- *Customization* functions allow you to adapt WinRunner to your testing environment.



WinRunner includes a visual programming tool which helps you to quickly and easily add TSL functions to your tests. For more information, see Chapter 25, [Generating Functions](#).

This chapter introduces some basic programming concepts and shows you how to use a few simple programming techniques in order to create more powerful tests. For more information, refer to the following documentation:

- The *TSL Online Reference* includes general information about the TSL language, individual functions, examples of usage, function availability, and guidelines for working with TSL. You can open this online reference by choosing **Help > TSL Online Reference**. You can also open this reference directly to the help topic for a specific function by pressing the F1 key when your cursor is on a TSL statement in your test script, or by clicking the context-sensitive Help button and then clicking a TSL statement in your test script.
- The *TSL Reference Guide* includes general information about the TSL language, individual functions, function availability, and guidelines for working with TSL. This printed book is included in your WinRunner documentation set. You can also access a PDF version of this book, which is easy to print, by choosing **Help > Books Online** and then clicking **Test Script Language** from the WinRunner Books Online home page.



Statements

When WinRunner records a test, each line it generates in the test script is a statement. A statement is any expression that is followed by a semicolon. A single statement may be longer than one line in the test script.

For example:

```
if (button_check_state("Underline", OFF) == E_OK)
    report_msg("Underline check box is unavailable.");
```

If you program a test script by typing directly into the test window, remember to include a semicolon at the end of each statement.



Comments and White Space

When programming, you can add comments and white space to your test scripts to make them easier to read and understand.

Comments

A comment is a line or part of a line in a test script that is preceded by a pound sign (#). When you run a test, the TSL interpreter does not process comments. Use comments to explain sections of a test script in order to improve readability and to make tests easier to update.

For example:

```
# Open the Open Order window in Flight Reservation application
set_window ("Flight Reservation", 10);
menu_select_item ("File;Open Order...");

# Select the reservation for James Brown
set_window ("Open Order_1");
button_set ("Customer Name", ON);
edit_set ("Value", "James Brown"); # Type James Brown
button_press ("OK");
```

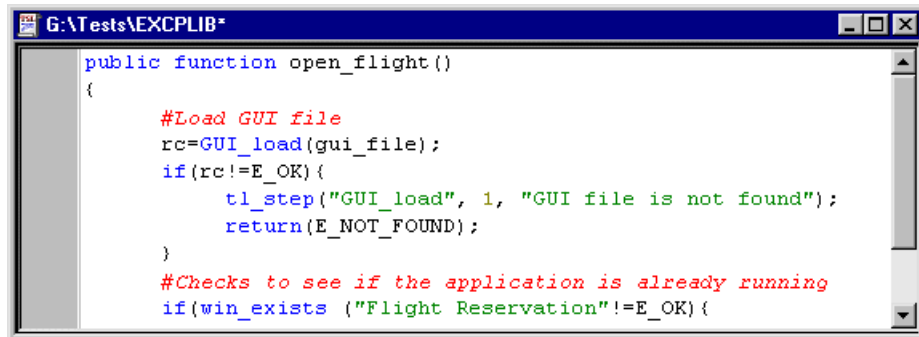
You can use the **Insert comments and indent statements** option in the Record tab of the General Options dialog box to have WinRunner automatically divide your test script into sections while you record based on window focus changes.



When you choose this option, WinRunner automatically inserts a comment at the beginning of each section with the name of the window and indents the statements under each comment. For more information on the Insert comments and indent statements option, see [Insert Comments and Indent Statements](#) on page 1037.

White Space

White space refers to spaces, tabs, and blank lines in your test script. The TSL interpreter is not sensitive to white space unless it is part of a literal string. Use white space to make the logic of a test script clear.



```
G:\Tests\EXCPLIB*
public function open_flight()
{
    #Load GUI file
    rc=GUI_load(gui_file);
    if(rc!=E_OK){
        tl_step("GUI_load", 1, "GUI file is not found");
        return(E_NOT_FOUND);
    }
    #Checks to see if the application is already running
    if(win_exists ("Flight Reservation"!=E_OK) {
```



Constants and Variables

Constants and variables are used in TSL to manipulate data. A constant is a value that never changes. It can be a number, character, or a string. A variable, in contrast, can change its value each time you run a test.

Variable and constant names can include letters, digits, and underscores (_). The first character must be a letter or an underscore. TSL is case sensitive; therefore, y and Y are two different characters. Certain words are reserved by TSL and may not be used as names.

You do not have to declare variables you use outside of function definitions in order to determine their type. If a variable is not declared, WinRunner determines its type (auto, static, public, extern) when the test is run.

For example, the following statement uses a variable to store text that appears in a text box.

```
edit_get_text ("Name:", text);  
    report_msg ("The Customer Name is " & text);
```

WinRunner reads the value that appears in the File Name text box and stores it in the *text* variable. A **report_msg** statement is used to display the value of the text variable in a report. For more information, see [Sending Messages to the Test Results Window](#) on page 737. For information about variable and constant declarations, see Chapter 27, [Creating User-Defined Functions](#).



Performing Calculations

You can create tests that perform simple calculations using mathematical operators. For example, you can use a multiplication operator to multiply the values displayed in two text boxes in your application. TSL supports the following mathematical operators:

+	addition
-	subtraction
-	negation (a negative number - unary operator)
*	multiplication
/	division
%	modulus
^ or **	exponent
++	increment (adds 1 to its operand - unary operator)
--	decrement (subtracts 1 from its operand - unary operator)



TSL supports five additional types of operators: concatenation, relational, logical, conditional, and assignment. It also includes functions that can perform complex calculations such as **sin** and **exp**. See the *TSL Online Reference* for more information.

The following example uses the Flight Reservation application. WinRunner reads the price of both an economy ticket and a business ticket. It then checks whether the price difference is greater than \$100.

```
# Select Economy button
set_window ("Flight Reservation");
button_set ("Economy", ON);

# Get Economy Class ticket price from price text box
edit_get_text ("Price:", economy_price);

# Click Business.
button_set ("Business", ON);

# Get Business Class ticket price from price box
edit_get_text ("Price:", business_price);

# Check whether price difference exceeds $100
if ((business_price - economy_price) > 100)
tl_step ("Price_check", 1, "Price difference is too large.");
```



Creating Stress Conditions

You can create stress conditions in test scripts that are designed to determine the limits of your application. You create stress conditions by defining a loop which executes a block of statements in the test script a specified number of times. TSL provides three statements that enable looping: *for*, *while*, and *do/while*. Note that you cannot define a constant within a loop.

For Loop

A *for* loop instructs WinRunner to execute one or more statements a specified number of times. It has the following syntax:

```
for ( [ expression1 ] ; [ expression2 ] ; [ expression3 ] )
    statement
```

First, *expression1* is executed. Next, *expression2* is evaluated. If *expression2* is true, *statement* is executed and *expression3* is executed. The cycle is repeated as long as *expression2* remains true. If *expression2* is false, the *for* statement terminates and execution passes to the first statement immediately following.

For example, the *for* loop below selects the file UI_TEST from the File Name list in the Open window. It selects this file five times and then stops.

```
set_window ("Open")
for (i=0; i<5; i++)
    list_select_item ("File Name:_1", "UI_TEST"); # Item Number 2
```



While Loop

A *while* loop executes a block of statements for as long as a specified condition is true. It has the following syntax:

```
while ( expression )  
    statement ;
```

While *expression* is true, the statement is executed. The loop ends when the expression is false.

For example, the *while* statement below performs the same function as the *for* loop above.

```
set_window ("Open");  
i=0;  
while (i<5)  
    {  
    i++;  
    list_select_item ("File Name:_1", "UI_TEST"); # Item Number 2  
    }
```



Do/While Loop

A *do/while* loop executes a block of statements for as long as a specified condition is true. Unlike the *for* loop and *while* loop, a *do/while* loop tests the conditions at the end of the loop, not at the beginning. A *do/while* loop has the following syntax:

```
do
    statement
while (expression);
```

The statement is executed and then the *expression* is evaluated. If the expression is true, then the cycle is repeated. If the *expression* is false, the cycle is not repeated.

For example, the *do/while* statement below opens and closes the Order dialog box of Flight Reservation five times.

```
set_window ("Flight Reservation");
i=0;
do
{
    menu_select_item ("File;Open Order...");
    set_window ("Open Order");
    button_press ("Cancel");
    i++;
}
while (i<5);
```



Decision-Making

You can incorporate decision-making into your test scripts using *if/else* or *switch* statements.

If/Else Statement

An *if/else* statement executes a statement if a condition is true; otherwise, it executes another statement. It has the following syntax:

```
if ( expression )  
    statement1;  
[ else  
    statement2; ]
```

expression is evaluated. If *expression* is true, *statement1* is executed. If *expression1* is false, *statement2* is executed.



For example, the *if/else* statement below checks that the Flights button in the Flight Reservation window is enabled. It then sends the appropriate message to the report.

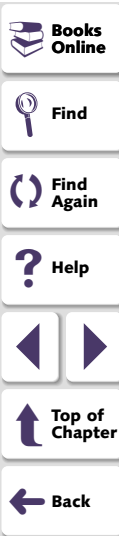
```
#Open a new order
set_window ("Flight Reservation_1");
menu_select_item ("File; New Order");

#Type in a date in the Date of Flight: box
edit_set_insert_pos ("Date of Flight:", 0, 0);
type ("120196");

#Type in a value in the Fly From: box
list_select_item ("Fly From:", "Portland");

#Type in a value in the Fly To: box
list_select_item ("Fly To:", "Denver");

#Check that the Flights button is enabled
button_get_state ("FLIGHT", value);
if (value != ON)
    report_msg ("The Flights button was successfully enabled");
else
    report_msg ("Flights button was not enabled. Check that values for
                Fly From and Fly To are valid");
```



Switch Statement

A *switch* statement enables WinRunner to make a decision based on an expression that can have more than two values. It has the following syntax:

```
switch (expression)  
{  
    case case_1:  
        statements  
    case case_2:  
        statements  
    case case_n:  
        statements  
    default: statement(s)  
}
```

The *switch* statement consecutively evaluates each case expression until one is found that equals the initial expression. If no case is equal to the expression, then the default statements are executed. The default statements are optional.

Note that the first time a case expression is found to be equal to the specified initial expression, no further case expressions are evaluated. However, all subsequent statements enumerated by these cases are executed, unless you use a *break* statement to pass execution to the first statement immediately following the *switch* statement.



The following test uses the Flight Reservation application. It randomly clicks either the First, Business or Economy Class button. Then it uses the appropriate GUI checkpoint to verify that the correct ticket price is displayed in the Price text box.

```
arr[1]="First";arr[2]="Business";arr[3]="Economy";
while(1)
{
    num=int(rand()*3)+1;
    # Click class button
    set_window ("Flight Reservation");
    button_set (arr[num], ON);

    # Check the ticket price for the selected button
    switch (num)
    {
        case 1: #First
            obj_check_gui("Price:", "list1.ckl", "gui1", 1);
            break;
        case 2: #Business
            obj_check_gui("Price:", "list2.ckl", "gui2", 1);
            break;
        case 3: #Economy
            obj_check_gui("Price:", "list3.ckl", "gui3", 1);
    }
}
```



Sending Messages to the Test Results Window

You can define a message in your test script and have WinRunner send it to the test results window. To send a message to a test results window, add a **report_msg** statement to your test script. The function has the following syntax:

```
report_msg ( message );
```

The *message* can be a string, a variable, or a combination of both.

In the following example, WinRunner gets the value of the label property in the Flight Reservation window and enters a statement in the test results containing the message and the label value.

```
win_get_info("Flight Reservation", "label", value);  
report_msg("The label of the window is " & value);
```



Starting Applications from a Test Script

You can start an application from a WinRunner test script using the **invoke_application** function. For example, you can open the application being tested every time you start WinRunner by adding an **invoke_application** statement to a startup test. See Chapter 43, **Initializing Special Configurations**, for more information.

The **invoke_application** function has the following syntax:

invoke_application (*file*, *command_option*, *working_dir*, *show*);

The *file* designates the full path of the application to invoke. The *command_option* parameter designates the command line options to apply. The *work_dir* designates the working directory for the application and *show* specifies how the application's main window appears when open.

For example, the statement:

```
invoke_application("c:\\flight1a.exe", "", "", SW_MINIMIZED);
```

starts the Flight Reservation application and displays it as an icon.



Defining Test Steps

After you run a test, WinRunner displays the overall result of the test (pass/fail) in the Report form. To determine whether sections of a test pass or fail, add **tl_step** statements to the test script.

The **tl_step** function has the following syntax:

tl_step (*step_name*, *status*, *description*);

The *step_name* is the name of the test step. The *status* determines whether the step passed (0), or failed (any value except 0). The *description* describes the step.

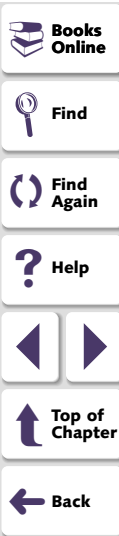
For example, in the following test script segment, WinRunner reads text from Notepad. The **tl_step** function is used to determine whether the correct text is read.

```
win_get_text("Document - Notepad", text, 247, 309, 427, 329);  
if (text=="100-Percent Compatible")  
    tl_step("Verify Text", 0, "Correct text was found in Notepad");  
else  
    tl_step("Verify Text", 1,"Wrong text was found in Notepad");
```



When the test run is completed, you can view the test results in the WinRunner Report. The report displays a result (pass/fail) for each step you defined with **tl_step**.

Note that if you are using TestDirector to plan and design tests, you should use **tl_step** to create test steps in your automated test scripts. For more information, refer to the *TestDirector User's Guide*.



Comparing Two Files

WinRunner enables you to compare any two files during a test run and to view any differences between them using the **file_compare** function.

While creating a test, you insert a **file_compare** statement into your test script, indicating the files you want to check. When you run the test, WinRunner opens both files and compares them. If the files are not identical, or if they could not be opened, this is indicated in the test report. In the case of a file mismatch, you can view both of the files directly from the report and see the lines in the file that are different.

Suppose, for example, your application enables you to save files under a new name (Save As...). You could use file comparison to check whether the correct files are saved or whether particularly long files are truncated.

To compare two files during a test run, you program a **file_compare** statement at the appropriate location in the test script. This function has the following syntax:

```
file_compare ( file_1, file_2 [ ,save_file ] );
```

The *file_1* and *file_2* parameters indicate the names of the files to be compared. If a file is not in the current test folder, then the full path must be given. The optional *save_file* parameter saves the name of a third file, which contains the differences between the first two files.



In the following example, WinRunner tests the Save As capabilities of the Notepad application. The test opens the *win.ini* file in Notepad and saves it under the name *win1.ini*. The **file_compare** function is then used to check whether one file is identical to the other and to store the differences file in the test directory.

```
# Open win.ini using WordPad.
system("write.exe c:\win95\win.ini");
set_window("win.ini - WordPad",1);

# Save win.ini as win1.ini
menu_select_item("File;Save As...");
set_window("Save As");
edit_set("File Name:_0","c:\Win95\win1.ini");
set_window("Save As", 10);
button_press("Save");

# Compare win.ini to win1.ini and save both files to "save".
file_compare("c:\\win95\\win.ini","c:\\win95\\win1.ini","save");
```

For information on viewing the results of file comparison, see Chapter 32, [Analyzing Test Results](#).



Programming with TSL

Generating Functions

Visual programming helps you add TSL statements to your test scripts quickly and easily.

This chapter describes:

- **Generating a Function for a GUI Object**
- **Selecting a Function from a List**
- **Assigning Argument Values**
- **Modifying the Default Function in a Category**



About Generating Functions

When you record a test, WinRunner generates TSL statements in a test script each time you click a GUI object or use the keyboard. In addition to the recordable functions, TSL includes many functions that can increase the power and flexibility of your tests. You can easily add functions to your test scripts using WinRunner's visual programming tool, the Function Generator.

The Function Generator provides a quick, error-free way to program scripts. You can:

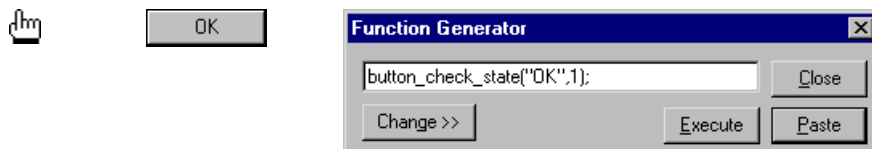
- Add Context Sensitive functions that perform operations on a GUI object or get information from the application being tested.
- Add Standard and Analog functions that perform non-Context Sensitive tasks such as synchronizing test execution or sending user-defined messages to a report.
- Add Customization functions that enable you to modify WinRunner to suit your testing environment.

You can add TSL statements to your test scripts using the Function Generator in two ways: by pointing to a GUI object, or by choosing a function from a list. When you choose the Insert Function command and point to a GUI object, WinRunner suggests an appropriate Context Sensitive function and assigns values to its arguments. You can accept this suggestion, modify the argument values, or choose a different function altogether.



By default, WinRunner suggests the default function for the object. In many cases, this is a **get** function or another function that gets information about the object. For example, if you choose Create > Insert Function > For Object/Window and then click an OK button, WinRunner opens the Function Generator dialog box and generates the following statement:

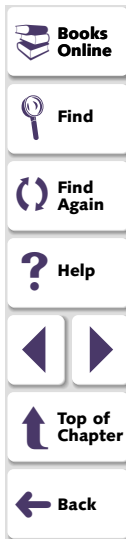
```
button_check_state("OK",1);
```



This statement examines the OK button and gets the current value of the enabled property. The *value* can be 1 (enabled), or 0 (disabled).

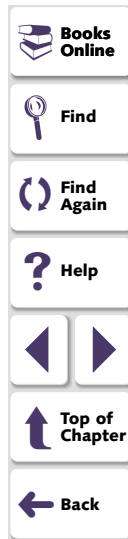
To change to another function for the object, click Change. Once you have generated a statement, you can use it in two different ways, separately or together:

- *Paste* the statement into your test script. When required, a **set_window** statement is inserted automatically into the script before the generated statement.
- *Execute* the statement from the Function Generator.



Note that if you point to an object that is not in the GUI map, the object is added automatically to the temporary GUI map file when the generated statement is executed or pasted into the test script.

Note: You can customize the Function Generator to include the user-defined functions that you most frequently use in your test scripts. You can add new functions and new categories and sub-categories to the Function Generator. You can also set the default function for a new category. For more information, see Chapter 42, [Customizing the Function Generator](#). You can also change the default function for an existing category. For more information, see [Modifying the Default Function in a Category](#) on page 757.



Generating a Function for a GUI Object

With the Function Generator, you can generate a Context Sensitive function simply by pointing to a GUI object in your application. WinRunner examines the object, determines its class, and suggests an appropriate function. You can accept this default function or select another function from a list.

Using the Default Function for a GUI Object

When you generate a function by pointing to a GUI object in your application, WinRunner determines the class of the object and suggests a function. For most classes, the default function is a **get** function. For example, if you click a list, WinRunner suggests the **list_get_selected** function.

To use the default function for a GUI object:



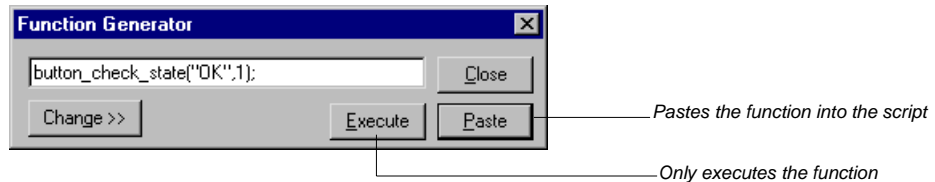
- 1 Choose **Create > Insert Function > For Object/Window** or click the **Insert Function for Object/Window** button on the User toolbar. WinRunner shrinks to an icon and the mouse pointer becomes a pointing hand.
- 2 Point to a GUI object in the application being tested. Each object flashes as you pass the mouse pointer over it.
- 3 Click an object with the left mouse button. The **Function Generator** dialog box opens and shows the default function for the selected object. WinRunner automatically assigns argument values to the function.

To cancel the operation without selecting an object, click the right mouse button.



- To *paste* the statement into the script, click **Paste**. The function is pasted into the test script at the insertion point and the Function Generator dialog box closes.

To *execute* the function, click **Execute**. The function is executed but is not pasted into the test script.



- Click **Close** to close the dialog box.

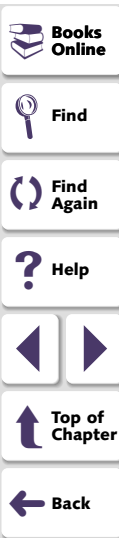
Selecting a Non-Default Function for a GUI Object

If you do not want to use the default function suggested by WinRunner, you can choose a different function from a list.

To select a non-default function for a GUI object:



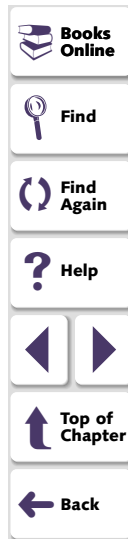
- Choose **Create > Insert Function > For Object/Window** or click the **Insert Function for Object/Window** button on the User toolbar. WinRunner is minimized and the mouse pointer becomes a pointing hand.
- Point to a GUI object in the application being tested. Each object flashes as you pass the mouse pointer over it.



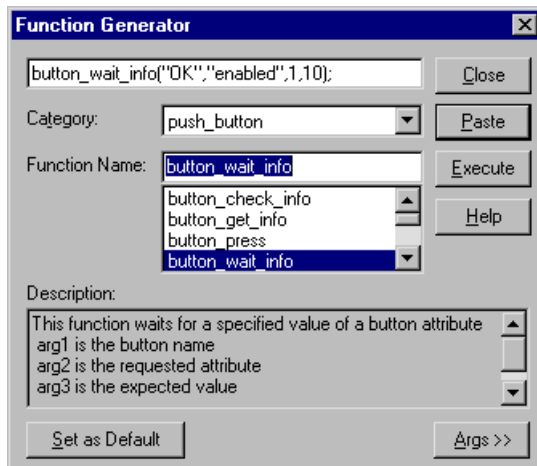
- 3 Click an object with the left mouse button. The **Function Generator** dialog box opens and displays the default function for the selected object. WinRunner automatically assigns argument values to the function.

To cancel the operation without selecting an object, click the right mouse button.

- 4 In the Function Generator dialog box, click **Change**. The dialog box expands and displays a list of functions. The list includes only functions that can be used on the GUI object you selected. For example, if you select a push button, the list displays **button_get_info**, **button_press**, etc.

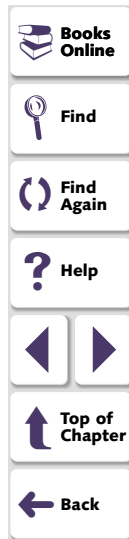


- In the **Function Name** list, select a function. The generated statement appears at the top of the dialog box. Note that WinRunner automatically fills in argument values. A description of the function appears at the bottom of the dialog box.



- If you want to modify the argument values, click **Args**. The dialog box expands and displays a text box for each argument. See [Assigning Argument Values](#) on page 754 to learn how to fill in the argument text boxes.
- To *paste* the statement into the test script, click **Paste**. The function is pasted into the test script at the insertion point.

To *execute* the function, click **Execute**. The function is immediately executed but is not pasted into the test script.



- 8 You can continue to generate function statements for the same object by repeating the steps above without closing the dialog box. The object you selected remains the active object and arguments are filled in automatically for any function selected.
- 9 Click **Close** to close the dialog box.



Selecting a Function from a List

When programming a test, perhaps you know the task you want the test to perform but not the exact function to use. The Function Generator helps you to quickly locate the function you need and insert it into your test script. Functions are organized by category; you select the appropriate category and the function you need from a list. A description of the function is displayed along with its parameters.

To select a function from a list:



- 1 Choose **Create > Insert Function > From Function Generator** or click the **Insert Function from Function Generator** button on the User toolbar to open the Function Generator dialog box.
- 2 In the **Category** list, select a function category. For example, if you want to view menu functions, select menu. If you do not know which category you need, use the default *all_functions*, which displays all the functions listed in alphabetical order.
- 3 In the **Function Name** list, choose a function. If you select a category, only the functions that belong to the category are displayed in the list. The generated statement appears at the top of the dialog box. Note that WinRunner automatically fills in the default argument values. A description of the function appears at the bottom of the dialog box.



4 To define or modify the argument values, click **Args**. The dialog box expands and displays a text box for each argument. See [Assigning Argument Values](#) on page 754 to learn how to fill in the argument text boxes.

5 To *paste* the statement into the test script, click **Paste**. The function is pasted into the test script at the insertion point.

To *execute* the function, click **Execute**. The function is immediately executed but is not pasted into the test script.

6 You can continue to generate additional function statements by repeating the steps above without closing the dialog box.

7 Click **Close** to close the dialog box.



Assigning Argument Values

When you generate a function using the Function Generator, WinRunner automatically assigns values to the function's arguments. If you generate a function by clicking a GUI object, WinRunner evaluates the object and assigns the appropriate argument values. If you choose a function from a list, WinRunner fills in default values where possible, and you type in the rest.

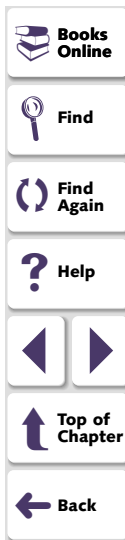
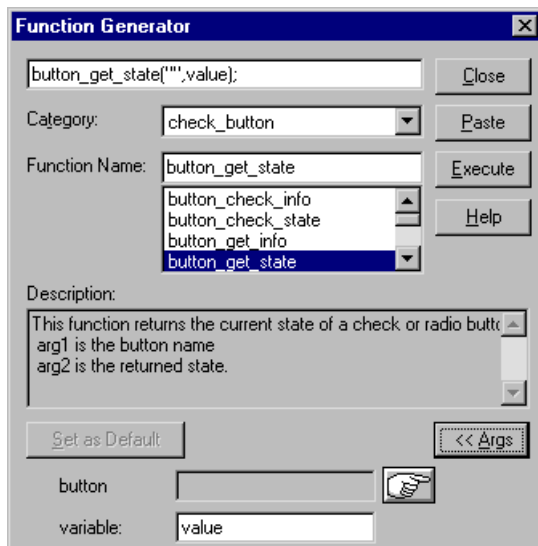
To assign or modify argument values for a generated function:



- 1 Choose **Create > Insert Function > From Function Generator** or click the **Insert Function from Function Generator** button on the User toolbar to open the Function Generator dialog box.
- 2 In the **Category** list, select a function category. For example, if you want to view menu functions, select menu. If you do not know which category you need, use the default *all_functions*, which displays all the functions listed in alphabetical order.
- 3 In the **Function Name** list, choose a function. If you select a category, only the functions that belong to the category are displayed in the list. The generated statement appears at the top of the dialog box. Note that WinRunner automatically fills in the default argument values. A description of the function appears at the bottom of the dialog box.



- 4 Click **Args**. The dialog box expands based on the number of arguments in the function.



- 5 Assign values to the arguments. You can assign a value either manually or automatically.

To *manually* assign values, type in a value in the argument text box. For some text boxes, you can choose a value from a list.

To *automatically* assign values, click the pointing hand and then click an object in your application. The appropriate values appear in the argument text boxes.

Note that if you click an object that is not compatible with the selected function, a message states “The current function cannot be applied to the pointed object.” Click OK to clear the message and return to the Function Generator.



Modifying the Default Function in a Category

In the Function Generator, each function category has a default function. When you generate a function by clicking an object in your application, WinRunner determines the appropriate category for the object and suggests the default function. For most Context Sensitive function categories, this is a **get** function. For example, if you click a text box, the default function is **edit_get_text**. For Analog, Standard and Customization function categories, the default is the most commonly used function in the category. For example, the default function for the system category is **invoke_application**.

If you find that you frequently use a function other than the default for the category, you can make it the default function.

To change the default function in a category:



- 1 Choose **Create > Insert Function > From Function Generator** or click the **Insert Function from Function Generator** button on the User toolbar to open the Function Generator dialog box.
- 2 In the **Category** list, select a function category. For example, if you want to view menu functions, select menu.
- 3 In the **Function Name** list, select the function that you want to make the default.
- 4 Click **Set as Default**.
- 5 Click **Close**.



The selected function remains the default function in its category until it is changed or until you end your WinRunner session. To save changes to the default function setting, add a **generator_set_default_function** statement to your startup test. For more information on startup tests, see Chapter 43, [Initializing Special Configurations](#).

The **generator_set_default_function** function has the following syntax:

```
generator_set_default_function ( category_name, function_name );
```

For example:

```
generator_set_default_function ("push_button", "button_press");
```

sets **button_press** as the default function for the push_button category.



Programming with TSL

Calling Tests

The tests you create with WinRunner can call, or be called by, any other test. When WinRunner calls a test, parameter values can be passed from the calling test to the called test.

This chapter describes:

- **Using the Call Statement**
- **Returning to the Calling Test**
- **Setting the Search Path**
- **Defining Test Parameters**



About Calling Tests

By adding **call** statements to test scripts, you can create a modular test tree structure containing an entire test suite. A modular test tree consists of a main test that calls other tests, passes parameter values, and controls test execution.

When WinRunner interprets a **call** statement in a test script, it opens and runs the called test. Parameter values may be passed to this test from the calling test. When the called test is completed, WinRunner returns to the calling test and continues the test run. Note that a called test may also call other tests.

By adding decision-making statements to the test script, you can use a main test to determine the conditions that enable a called test to run.

For example:

```
rc= call login ("Jonathan", "Mercury");
if (rc == E_OK)
{
    call insert_order();
}
else
{
    tl_step ("Call Login", 1, "Login test failed");
    call open_order ();
}
```



This test calls the login test. If login is executed successfully, WinRunner calls the insert_order test. If the login test fails, the open_order test runs.

You commonly use **call** statements in a batch test. A batch test allows you to call a group of tests and run them unattended. It suppresses messages that are usually displayed during execution, such as one reporting a bitmap mismatch. For more information, see Chapter 33, [Running Batch Tests](#).

Note: If a called test that was created in the *GUI Map File per Test* mode references GUI objects, it may not run properly in the *Global GUI Map File* mode.



Using the Call Statement

You can use two types of call statements to invoke one test from another:

- A **call** statement invokes a test from within another test.
- A **call_close** statement invokes a test from within a script and closes the test when the test is completed.

The **call** statement has the following syntax:

```
call test_name ( [ parameter1, parameter2, ...parametern ] );
```

The **call_close** statement has the following syntax:

```
call_close test_name ( [ parameter1, parameter2, ... parametern ] );
```

The *test_name* is the name of the test to invoke. The *parameters* are the parameters defined for the called test.

The parameters are optional. However, when one test calls another, the **call** statement should designate a value for each parameter defined for the called test. If no parameters are defined for the called test, the **call** statement must contain an empty set of parentheses.

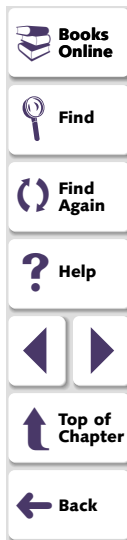


Any called test must be stored in a folder specified in the search path, or else be called with the full pathname enclosed within quotation marks.

For example:

```
call "w:\\tests\\my_test" ();
```

While running a called test, you can pause execution and view the current call chain. To do so, choose Debug > Calls.



Returning to the Calling Test

The **return** and **test** statements are used to stop execution of called tests.

- The **return** statement stops the current test and returns control to the calling test.
- The **test** statement stops test execution entirely, unless tests are being called from a batch test. In this case, control is returned to the main batch test.

Both functions provide a return value for the called test. If **return** or **test** is not used, or if no value is specified, then the return value of the **call** statement is 0.

return

The **return** statement terminates execution of the called test and returns control to the calling test. The syntax is:

```
return [( expression )];
```

The optional *expression* is the value returned to the **call** statement used to invoke the test.



For example:

```
# test_a
if (call test_b() == "success")
    report_msg("test_b succeeded");

# test_b
if
(win_check_bitmap ("Paintbrush - SQUARES.BMP", "Img_2", 1))
    return("success");
else
    return("failure");
```

In the above example, test_a calls test_b. If the bitmap comparison in test_b is successful, then the string “success” is returned to the calling test, test_a. If there is a mismatch, then test_b returns the string “failure” to test_a.

textit

When tests are run interactively, the **textit** statement discontinues test execution. However, when tests are called from a batch test, **textit** ends execution of the current test only; control is then returned to the calling batch test. The syntax is:

```
textit [( expression )];
```

The optional *expression* is the value returned to the call statement that invokes the test.



For example:

```
# batch_test
return_val = call help_test();
report_msg("help returned the value" return_val);

# help_test
call select_menu(help, index);
msg = get_text(4,30,12,100);
if (msg == "Index help is not yet implemented")
    textit("index failure");
...
```

In the above example, `batch_test` calls `help_test`. In `help_test`, if a particular message appears on the screen, execution is stopped and control is returned to the batch test. Note that the return value of the `help_test` is also returned to the batch test, and is assigned to the variable `return_val`. If **textit** is not used, `return_val` has a null value.

For more information on batch tests, see Chapter 33, [Running Batch Tests](#).



Setting the Search Path

The search path determines the directories that WinRunner will search for a called test.

To set the search path, choose **Settings > General Options**. The General Options dialog box opens. Click the **Folders** tab and choose a search path in the **Search Path for Called Tests** box. WinRunner searches the directories in the order in which they are listed in the box. Note that the search paths you define remain active in future testing sessions.

- To add a folder to the search path, type in the folder name in the text box. Use the **Add**, **Up**, and **Down** buttons to position this folder in the list.
- To delete a search path, select its name from the list and click **Delete**.

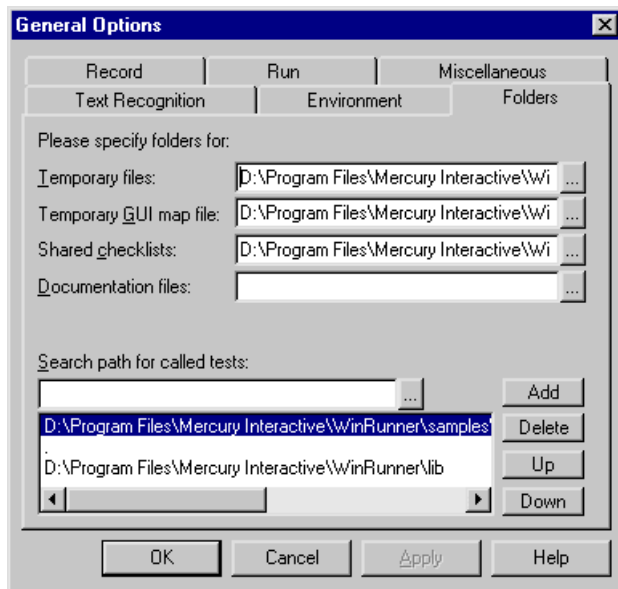
For more information about how to set a search path in the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#).

You can also set a search path by adding a **setvar** statement to a test script. A search path set using **setvar** is valid for the current test run only.

For example:

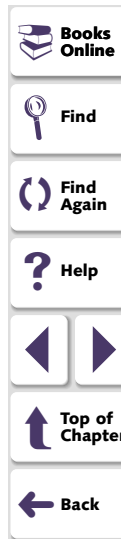
```
setvar ("searchpath", "<c:\\ui_tests>");
```





This statement tells WinRunner to search the `c:\ui_tests` folder for called tests. For more information on using the **setvar** function, see Chapter 41, [Setting Testing Options from a Test Script](#).

Note: If WinRunner is connected to TestDirector, you can also set a search path within a TestDirector database. For more information, see [Using TSL Functions with TestDirector](#) on page 1205.



Defining Test Parameters

A parameter is a variable that is assigned a value from outside the test in which it is defined. You can define one or more parameters for a test; any calling test must then supply values for these parameters.

For example, suppose you define two parameters, *starting_x* and *starting_y* for a test. The purpose of these parameters is to assign a value to the initial mouse pointer position when the test is called. Subsequently, two values supplied by a calling test will supply the x- and y-coordinates of the mouse pointer.

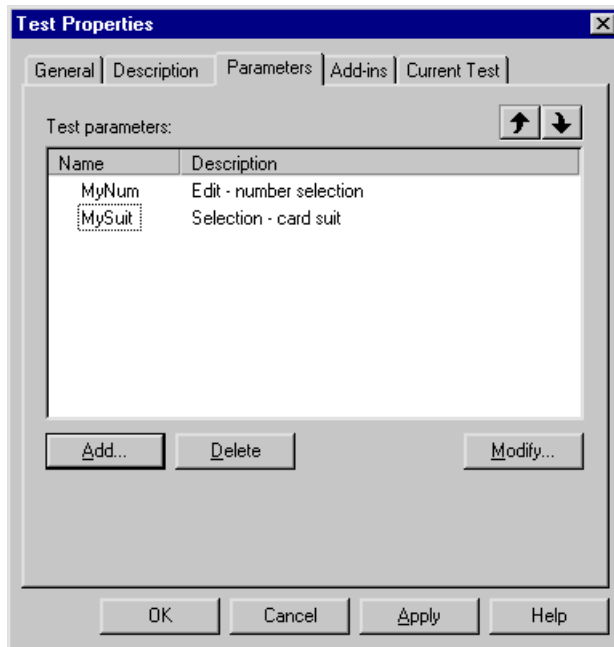
You can define parameters in a test in the Parameters tab of the Test Properties dialog box, or in the Parameterize Data dialog box.

- Use the Parameters tab of the Test Properties dialog box when you want to manage the parameters of the test including adding, modifying, and deleting the parameters list for the test.
- Use the Parameterize Data dialog box when you want to replace data from the test with existing parameters. You can also create new parameters from this dialog box.



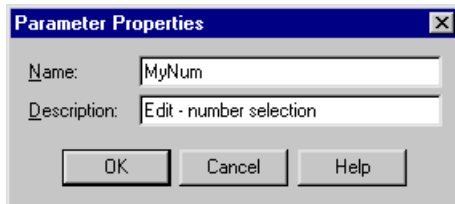
Defining Test Parameters in the Test Properties Dialog Box

You can define and manage test parameters in the **Parameters** tab of the Test Properties dialog box. To open this tab, choose **File > Test Properties** and click the **Parameters** tab.



To define a new parameter:

- 1 In the **Parameters** tab of the Test Properties dialog box, click **Add**. The Parameter Properties dialog box opens.



- 2 Enter a **Name** and a **Description** for the parameter.
- 3 Click **OK**. The parameter is added to the Test parameters list.
- 4 Use the **Up** and **Down** arrow buttons to change the order of the parameters.



Note: Because parameter values are assigned sequentially, the order in which parameters are listed determines the value that is assigned to a parameter by the calling test.

- 5 Click **OK** to close the dialog box.



To modify a parameter in the parameter list:

- 1 In the **Parameters** tab of the Test Properties dialog box, select the name of the parameter to modify.
- 2 Click **Modify**. The Parameter Properties dialog box opens with the current name and description of the parameter.
- 3 Modify the parameter as needed.
- 4 Click **OK** to close the dialog box. The modified parameter is displayed in the Test parameters list.

To delete a parameter from the parameter list:

- 1 In the **Parameters** tab of the Test Properties dialog box, select the name of the parameter to delete.
- 2 Click **Delete**.
- 3 Click **OK** to close the dialog box.

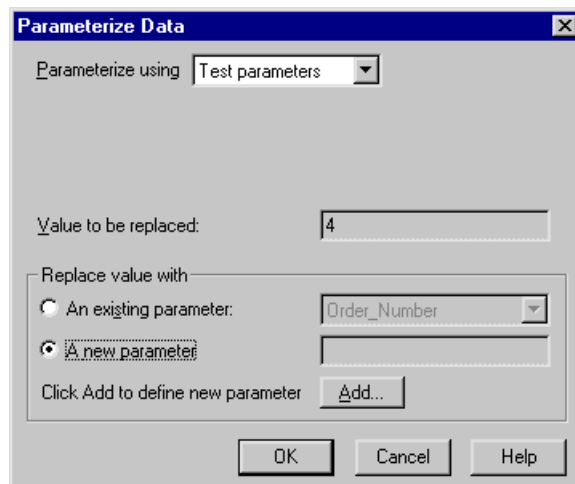


Defining Test Parameters in the Parameterize Data Dialog Box

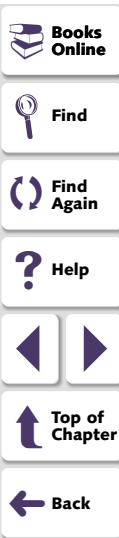
You can replace a selected value in your test script with an existing or new parameter using the Parameterize Data dialog box.

To parameterize statements using test parameters:

- 1 In your test script, select the first instance in which you have data that you want to parameterize.
- 2 Choose **Tools > Parameterize Data**. The Parameterize Data dialog box opens.



- 3 In the **Parameterize using** box, select “Test parameters”.



- 4 In the **Replace value with** box, select **An existing parameter** or **A New parameter**.
 - If you select **An existing parameter**, select the parameter you want to use. Note that the parameters listed here are the same as those listed in the Parameters tab of the Test Properties dialog box.
 - If you select **A new parameter**, click the **Add** button. The Parameter Properties dialog box opens. Add a new parameter as described on [page 771](#). The new parameter appears in the new parameter field. The new parameter is also added to the Parameters tab of the Test Properties dialog box.
- 5 Click **OK**.

The data selected in the test script is replaced with the parameter you created or selected. When the test is called by the calling test, the parameter is replaced by the value defined in the calling test.
- 6 Repeat steps 1 to 5 for each argument you want to parameterize.



Test Parameter Scope

The parameter defined in the called test is known as a *formal* parameter. Test parameters can be constants, variables, expressions, array elements, or complete arrays.

Parameters that are expressions, variables, or array elements are evaluated and then passed to the called test. This means that a copy is passed to the called test. This copy is local; if its value is changed in the called test, the original value in the calling test is not affected. For example:

```
# test_1 (calling_test)
i = 5;
call test_2(i);
print(i); # prints "5"

# test_2 (called test), with formal parameter x
x = 8;
print(x); # prints "8"
```

In the calling test (test_1), the variable *i* is assigned the value 5. This value is passed to the called test (test_2) as the value for the formal parameter *x*. Note that when a new value (8) is assigned to *x* in test_2, this change does not affect the value of *i* in test_1.



Complete arrays are passed by reference. This means that, unlike array elements, variables, or expressions, they are not copied. Any change made to the array in the called test affects the corresponding array in the calling test. For example:

```
# test_q  
a[1] = 17;  
call test_r(a);  
print(a[1]); # prints "104"  
  
# test_r, with parameter x  
x[1] = 104;
```

In the calling test (`test_q`), element 1 of array `a` is assigned the value 17. Array `a` is then passed to the called test (`test_r`), which has a formal parameter `x`. In `test_r`, the first element of array `x` is assigned the value 104. Unlike the previous example, this change to the parameter in the called test does affect the value of the parameter in the calling test, because the parameter is an array.

All undeclared variables that are not on the formal parameter list of a called test are global; they may be accessed from another called or calling test, and altered. If a parameter list is defined for a test, and that test is not called but is run directly, then the parameters function as global variables for the test run. For more information about variables, refer to the *TSL Online Reference*.



The test segments below illustrates the use of global variables. Note that test_a is not called, but is run directly.

```
# test_a, with parameter k
```

```
# Note that the ampersand (&) is a bitwise AND operator. It signifies concatenation.
```

```
i = 1;
```

```
j = 2;
```

```
k = 3;
```

```
call test_b(i);
```

```
print(j & k & l); # prints '256'
```

```
# test_b, with parameter j
```

```
# Note that the ampersand (&) is a bitwise AND operator. It signifies concatenation.
```

```
j = 4;
```

```
k = 5;
```

```
l = 6;
```

```
print(i & j & k); # prints '145'
```



Programming with TSL

Creating User-Defined Functions

You can expand WinRunner's testing capabilities by creating your own TSL functions. You can use these user-defined functions in a test or a compiled module. This chapter describes:

- **Function Syntax**
- **Return Statements**
- **Variable, Constant, and Array Declarations**
- **Example of a User-Defined Function**



About Creating User-Defined Functions

In addition to providing built-in functions, TSL allows you to design and implement your own functions. You can:

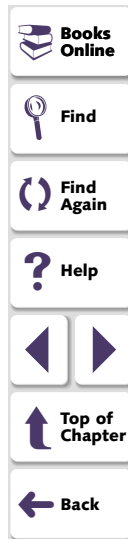
- Create user-defined functions in a test script. You define the function once, and then you call it from anywhere in the test (including called tests).
- Create user-defined functions in a compiled module. Once you load the module, you can call the functions from any test. For more information, see Chapter 28, [Creating Compiled Modules](#).
- Call functions from the Microsoft Windows API or any other external functions stored in a DLL. For more information, see Chapter 29, [Calling Functions from External Libraries](#).

User-defined functions are convenient when you want to perform the same operation several times in a test script. Instead of repeating the code, you can write a single function that performs the operation. This makes your test scripts modular, more readable, and easier to debug and maintain.



For example, you could create a function called `open_flight` that loads a GUI map file, starts the Flight Reservation application, and logs into the system, or resets the main window if the application is already open.

A function can be called from anywhere in a test script. Since it is already compiled, execution time is accelerated. For instance, suppose you create a test that opens a number of files and checks their contents. Instead of recording or programming the sequence that opens the file several times, you can write a function and call it each time you want to open a file.



Function Syntax

A user-defined function has the following structure:

```
[class] function name ([mode] parameter...)  
{  
  declarations;  
  statements;  
}
```

Class

The class of a function can be either *static* or *public*. A static function is available only to the test or module within which the function was defined.

Once you execute a public function, it is available to all tests, for as long as the test containing the function remains open. This is convenient when you want the function to be accessible from called tests. However, if you want to create a function that will be available to many tests, you should place it in a compiled module. The functions in a compiled module are available for the duration of the testing session.

If no class is explicitly declared, the function is assigned the default class, public.



Parameters

Parameters need not be explicitly declared. They can be of mode *in*, *out*, or *inout*. For all non-array parameters, the default mode is *in*. For array parameters, the default is *inout*. The significance of each of these parameter types is as follows:

in: A parameter that is assigned a value from outside the function.

out: A parameter that is assigned a value from inside the function.

inout: A parameter that can be assigned a value from outside or inside the function.

A parameter designated as *out* or *inout* must be a variable name, not an expression. When you call a function containing an *out* or an *inout* parameter, the argument corresponding to that parameter must be a variable, and not an expression. For example, consider a user-defined function with the following syntax:

```
function get_date (out todays_date) { ... }
```

Proper usage of the function call would be

```
get_date (todays_date);
```



Illegal usage of the function call would be

```
get_date (date[i]); or get_date ("Today's date is"& todays_date);
```

because both contain expressions.

Array parameters are designated by square brackets. For example, the following parameter list in a user-defined function indicates that variable *a* is an array:

```
function my_func (a[], b, c){ ... }
```

Array parameters can be either mode out or inout. If no class is specified, the default mode inout is assumed.

Return Statements

The **return** statement is used exclusively in functions. The syntax is:

```
return [( expression )];
```

This statement passes control back to the calling function or test. It also returns the value of the evaluated expression to the calling function or test. If no expression is assigned to the **return** statement, an empty string is returned.



Variable, Constant, and Array Declarations

Declaration is usually optional in TSL. In functions, however, variables, constants, and arrays must all be declared. The declaration can be within the function itself, or anywhere else within the test script or compiled module containing the function. You can find additional information about declarations in the *TSL Online Reference*.

Variables

Variable declarations have the following syntax:

```
class variable [= init_expression];
```

The *init_expression* assigned to a declared variable can be any valid expression. If an *init_expression* is not set, the variable is assigned an empty string. The *class* defines the scope of the variable. It can be one of the following:

auto: An auto variable can be declared only within a function and is local to that function. It exists only for as long as the function is running. A new copy of the variable is created each time the function is called.

static: A static variable is local to the function, test, or compiled module in which it is declared. The variable retains its value until the test is terminated by an Abort command. This variable is initialized each time the definition of the function is executed.



Note: In compiled modules, a **static** variable is initialized whenever the compiled module is compiled.

public: A public variable can be declared only within a test or module, and is available for all functions, tests, and compiled modules.

extern: An extern declaration indicates a reference to a public variable declared outside of the current test or module.

Remember that you must declare all variables used in a function within the function itself, or within the test or module that contains the function. If you wish to use a public variable that is declared outside of the relevant test or module, you must declare it again as **extern**.

The **extern** declaration must appear within a test or module, before the function code. An extern declaration cannot initialize a variable.

For example, suppose that in Test 1 you declare a variable as follows:

```
public window_color=green;
```



In Test 2, you write a user-defined function that accesses the variable `window_color`. Within the test or module containing the function, you declare `window_color` as follows:

```
extern window_color;
```

With the exception of the **auto** variable, all variables continue to exist until the Stop command is executed.

Note: In compiled modules, all variables continue to exist until the Stop command is executed with the exception of the **auto** and **public** variables. (The **auto** variables exist only as long as the function is running; **public** variables exist until exiting WinRunner.)



The following table summarizes the scope, lifetime, and availability (where the declaration can appear) of each type of variable:

Declaration	Scope	Lifetime	Declare the Variable in...
auto	local	end of function	function
static	local	until abort	function, test, or module
public	global	until abort	test or module
extern	global	until abort	function, test, or module

Note: In compiled modules, the Stop command initializes **static** and **public** variables. For more information, see Chapter 28, [Creating Compiled Modules](#).

Constants

The *const* specifier indicates that the declared value cannot be modified. The syntax of this declaration is:

```
[class] const name [= expression];
```



The *class* of a constant may be either public or static. If no class is explicitly declared, the constant is assigned the default class public. Once a constant is defined, it remains in existence until you exit WinRunner.

For example, defining the constant TMP_DIR using the declaration:

```
const TMP_DIR = "/tmp";
```

means that the assigned value /tmp cannot be modified. (This value can only be changed by explicitly making a new constant declaration for TMP_DIR.)

Arrays

The following syntax is used to define the class and the initial expression of an array. Array size need not be defined in TSL.

```
class array_name [ ] [= init_expression]
```

The array class may be any of the classes used for variable declarations (auto, static, public, extern).

An array can be initialized using the C language syntax. For example:

```
public hosts [ ] = {"lithium", "silver", "bronze"};
```



This statement creates an array with the following elements:

```
hosts[0]="lithium"
hosts[1]="silver"
hosts[2]="bronze"
```

Note that arrays with the class *auto* cannot be initialized.

In addition, an array can be initialized using a string subscript for each element. The string subscript may be any legal TSL expression. Its value is evaluated during compilation. For example:

```
static gui_item [ ]={
    "class"="push_button",
    "label"="OK",
    "X_class"="XmPushButtonGadget",
    "X"=10,
    "Y"=60
};
```

creates the following array elements:

```
gui_item ["class"]="push_button"
gui_item ["label"]="OK"
gui_item ["X_class"]="XmPushButtonGadget"
gui_item ["X"]=10
gui_item ["Y"]=60
```



Note that arrays are initialized once, the first time a function is run. If you edit the array's initialization values, the new values will not be reflected in subsequent test runs. To reset the array with the new initialization values, either interrupt test execution with the Stop command, or define the new array elements explicitly. For example:

Regular Initialization	Explicit Definitions
<code>public number_list[] = {1,2,3};</code>	<code>number_list[0] = 1;</code>
	<code>number_list[1] = 2;</code>
	<code>number_list[2] = 3;</code>

Statements

Any valid statement used within a TSL test script can be used within a function, except for the **return** statement.



Example of a User-Defined Function

The following user-defined function opens the specified text file in an editor. It assumes that the necessary GUI map file is loaded. The function verifies that the file was actually opened by comparing the name of the file with the label that appears in the window title bar after the operation is completed.

```
function open_file (file)
{
    auto lbl;
    set_window ("Editor");

    # Open the Open form
    menu_select_item ("File;Open...");

    # Insert file name in the proper field and click OK to confirm
    set_window ("Open");
    edit_set("Open Edit", file);
    button_press ("OK");

    # Read window banner label
    win_get_info("Editor","label",lbl);

    #Compare label to file name
    if ( file != lbl)
        return 1;
    else
        return 0;
}
rc=open_file("c:\\dash\\readme.tx");
pause(rc);
```



Programming with TSL

Creating Compiled Modules

Compiled modules are libraries of frequently-used functions. You can save user-defined functions in compiled modules and then call the functions from your test scripts.

This chapter describes:

- **Contents of a Compiled Module**
- **Creating a Compiled Module**
- **Loading and Unloading a Compiled Module**
- **Example of a Compiled Module**



About Creating Compiled Modules

A compiled module is a script containing a library of user-defined functions that you want to call frequently from other tests. When you load a compiled module, its functions are automatically compiled and remain in memory. You can call them directly from within any test.

For instance, you can create a compiled module containing functions that:

- compare the size of two files
- check your system's current memory resources

Compiled modules can improve the organization and performance of your tests. Since you debug compiled modules before using them, your tests will require less error-checking. In addition, calling a function that is already compiled is significantly faster than interpreting a function in a test script.

You can compile a module in one of two ways:

- Run the module script using the WinRunner Run commands.
- Load the module from a test script using the TSL **load** function.



If you need to debug a module or make changes, you can use the Step command to perform incremental compilation. You only need to run the part of the module that was changed in order to update the entire module.

You can add **load** statements to your startup test. This ensures that the functions in your compiled modules are automatically compiled each time you start WinRunner. See Chapter 43, [Initializing Special Configurations](#), for more information.

Note: If you are working in the GUI Map File per Test mode, compiled modules do not load GUI map files. If your compiled module references GUI objects, then those objects must also be referenced in the test that loads the compiled module. For additional information, see Chapter 6, [Working in the GUI Map File per Test Mode](#).



Contents of a Compiled Module

A compiled module, like a regular test you create in TSL, can be opened, edited, and saved. You indicate that a test is a compiled module by clicking **Compiled Module** in the Test Type box in the Test Properties dialog box. For more information, see [Creating a Compiled Module](#) on page 796.

The content of a compiled module differs from that of an ordinary test: it cannot include checkpoints or any analog input such as mouse tracking. The purpose of a compiled module is not to perform a test, but to store functions you use most frequently so that they can be quickly and conveniently accessed from other tests.

Unlike an ordinary test, all data objects (variables, constants, arrays) in a compiled module must be declared before use. The structure of a compiled module is similar to a C program file, in that it may contain the following elements:

- function definitions and declarations for variables, constants and arrays. For more information, see Chapter 27, [Creating User-Defined Functions](#).
- prototypes of external functions. For more information, see Chapter 29, [Calling Functions from External Libraries](#).
- **load** statements to other modules. For more information, see [Loading and Unloading a Compiled Module](#) on page 799.



Note that when user-defined functions appear in compiled modules:

- A public function is available to all modules and tests, while a static function is available only to the module within which it was defined.
- The loaded module remains resident in memory even when test execution is aborted. However, all variables defined within the module (whether static or public) are initialized.

Creating a Compiled Module

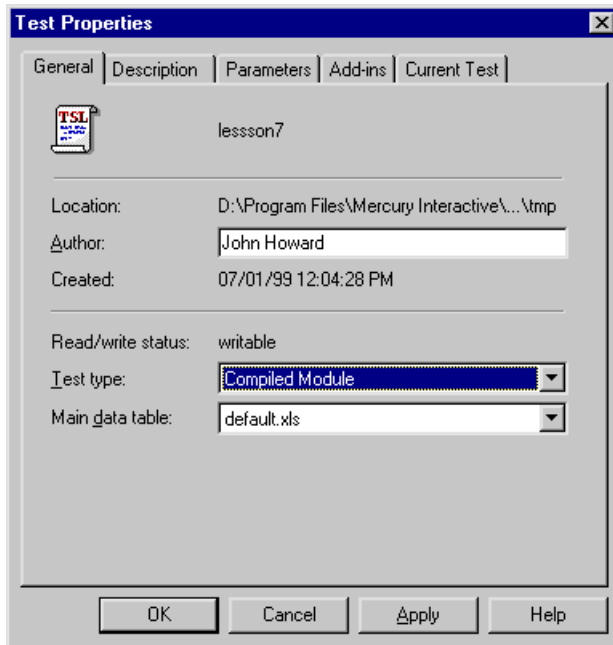
Creating a compiled module is similar to creating a regular test script.

To create a compiled module:

- 1 Choose **File > Open** to open a new test.
- 2 Write the user-defined functions.
- 3 Choose **File > Test Properties** and click the **General** tab.



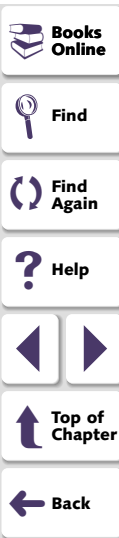
- 4 In the **Test Type** list, choose “Compiled Module” and then click **OK**.



5 Choose **File > Save**.

Save your modules in a location that is readily available to all your tests. When a module is loaded, WinRunner locates it according to the search path you define. For more information on defining a search path, see [Setting the Search Path](#) on page 767.

6 Compile the module using the **load** function. For more information, see [Loading and Unloading a Compiled Module](#) below.



Loading and Unloading a Compiled Module

In order to access the functions in a compiled module you need to load the module. You can load it from within any test script using the **load** command; all tests will then be able to access the function until you quit WinRunner or unload the compiled module.

If you create a compiled module that contains frequently-used functions, you can load it from your startup test. For more information, see Chapter 43, **Initializing Special Configurations**.

You can load a module either as a *system* module or as a *user* module. A system module is generally a closed module that is “invisible” to the tester. It is not displayed when it is loaded, cannot be stepped into, and is not stopped by a pause command. A system module is not unloaded when you execute an **unload** statement with no parameters (global unload).

A user module is the opposite of a system module in these respects. Generally, a user module is one that is still being developed. In such a module you might want to make changes and compile them incrementally.

Note: If you make changes to a function in a loaded compiled module, you must unload and reload the compiled module in order for the changes to take effect.



load

The **load** function has the following syntax:

```
load (module_name [,1 | 0] [,1 | 0] );
```

The *module_name* is the name of an existing compiled module.

Two additional, optional parameters indicate the type of module. The first parameter indicates whether the function module is a system module or a user module: 1 indicates a system module; 0 indicates a user module.

(Default = 0)

The second optional parameter indicates whether a *user* module will remain open in the WinRunner window or will close automatically after it is loaded: 1 indicates that the module will close automatically; 0 indicates that the module will remain open.

(Default = 0)

When the **load** function is executed for the first time, the module is compiled and stored in memory. This module is ready for use by any test and does not need to be reinterpreted.



A loaded module remains resident in memory even when test execution is aborted. All variables defined within the module (whether static or public) are still initialized.

unload

The **unload** function removes a loaded module or selected functions from memory. It has the following syntax:

```
unload ( [ module_name | test_name [ , "function_name" ] ] );
```

For example, the following statement removes all functions loaded within the compiled module named `mem_test`.

```
unload ("mem_test");
```

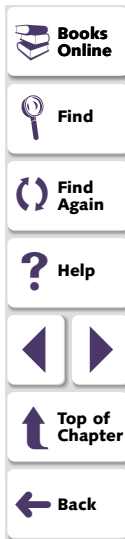
An **unload** statement with empty parentheses removes all modules loaded within all tests during the current session, except for system modules.

reload

If you make changes in a module, you should reload it. The **reload** function removes a loaded module from memory and reloads it (combining the functions of **unload** and **load**).

The syntax of the **reload** function is:

```
reload ( module_name [ ,1|0 ] [ ,1|0 ] );
```



The *module_name* is the name of an existing compiled module.

Two additional optional parameters indicate the type of module. The first parameter indicates whether the module is a system module or a user module: 1 indicates a system module; 0 indicates a user module.

(Default = 0)

The second optional parameter indicates whether a *user* module will remain open in the WinRunner window or will close automatically after it is loaded. 1 indicates that the module will close automatically. 0 indicates that the module will remain open.

(Default = 0)

Note: Do not load a module more than once. To recompile a module, use **unload** followed by **load**, or else use the **reload** function.

If you try to load a module that has already been loaded, WinRunner does not load it again. Instead, it initializes variables and increments a *load counter*. If a module has been loaded several times, then the **unload** statement does not unload the module, but rather decrements the counter. For example, suppose that test A loads the module *math_functions*, and then calls test B. Test B also loads



math_functions, and then unloads it at the end of the test. WinRunner does not unload the module; it decrements the load counter. When execution returns to test A, *math_functions* is still loaded.



Example of a Compiled Module

The following module contains two simple, all-purpose functions that you can call from any test. The first function receives a pair of numbers and returns the number with the higher value. The second function receives a pair of numbers and returns the one with the lower value.

```
# return maximum of two values
function max (x,y)
{
    if (x>=y)
        return x;
    else
        return y;
}

# return minimum of two values
function min (x,y)
{
    if (x>=y)
        return y;
    else
        return x;
}
```



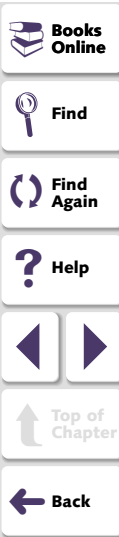
Programming with TSL

Calling Functions from External Libraries

WinRunner enables you to call functions from the Windows API and from any external DLL (Dynamic Link Library).

This chapter describes:

- **Dynamically Loading External Libraries**
- **Declaring External Functions in TSL**
- **Windows API Examples**



About Calling Functions from External Libraries

You can extend the power of your automated tests by calling functions from the Windows API or from any external DLL. For example, using functions in the Windows API you can:

- Use a standard Windows message box in a test with the *MessageBox* function.
- Send a WM (Windows Message) message to the application being tested with the *SendMessage* function.
- Retrieve information about your application's windows with the *GetWindow* function.
- Integrate the system beep into tests with the *MessageBeep* function.
- Run any windows program using *ShellExecute*, and define additional parameters such as the working directory and the window size.
- Check the text color in a field in the application being tested with *GetTextColor*. This can be important when the text color indicates operation status.
- Access the Windows clipboard using the *GetClipboard* functions.

You can call any function exported from a DLL with the `__stdcall` calling convention. You can also load DLLs that are part of the application being tested in order to access its exported functions.



Using the `load_dll` function, you dynamically load the libraries containing the functions you need. Before you actually call the function, you must write an *extern* declaration so that the interpreter knows that the function resides in an external library.

Note: For information about specific Windows API functions, refer to your *Windows API Reference*. For examples of using the Windows API functions in WinRunner test scripts, refer to the *read.me* file in the *Vib\win32api* folder in the installation folder.



Dynamically Loading External Libraries

In order to load the external DLLs (Dynamic Link Libraries) containing the functions you want to call, use the TSL function **load_dll**. This function performs a runtime load of a 32-bit DLL. It has the following syntax:

```
load_dll ( pathname );
```

The *pathname* is the full pathname of the DLL to be loaded.

For example:

```
load_dll ("h:\\qa_libs\\os_check.dll");
```

The **load_16_dll** function performs a runtime load of a 16-bit DLL. It has the following syntax:

```
load_16_dll ( pathname );
```

The *pathname* is the full pathname of the 16-bit DLL to be loaded.

To unload a loaded external DLL, use the TSL function **unload_dll**. It has the following syntax:

```
unload_dll ( pathname );
```



For example:

```
unload_dll ("h:\\qa_libs\\os_check.dll");
```

The *pathname* is the full pathname of the 32-bit DLL to be unloaded.

To unload all loaded 32-bit DLLs from memory, use the following statement:

```
unload_dll ("");
```

The **unload_16_dll** function unloads a loaded external 16-bit DLL. It has the following syntax:

```
unload_16_dll ( pathname );
```

The *pathname* is the full pathname of the 16-bit DLL to be unloaded.

To unload all loaded 16-bit DLLs from memory, use the following statement:

```
unload_16_dll ("");
```

For more information, refer to the *TSL Online Reference*.



Declaring External Functions in TSL

You must write an *extern* declaration for each function you want to call from an external library. The extern declaration must appear before the function call. It is recommended to store these declarations in a startup test. (For more information on startup tests, see Chapter 43, [Initializing Special Configurations](#).)

The syntax of the extern declaration is:

```
extern type function_name ( parameter1, parameter2,... );
```

The *type* refers to the return value of the function. The type can be one of the following:

<i>char</i> (signed and unsigned)	<i>float</i>
<i>short</i> (signed and unsigned)	<i>double</i>
<i>int</i> (signed and unsigned)	<i>string</i> (equivalent to C char*)

Each *parameter* must include the following information:

```
[mode] type [name] [<size>]
```

The *mode* can be either *in*, *out*, or *inout*. The default is *in*. Note that these values must appear in lowercase letters.

The *type* can be any of the values listed above.



An optional *name* can be assigned to the parameter to improve readability.

The `<size>` is required only for an *out* or *inout* parameter of type *string* (see below.)

For example, suppose you want to call a function called `set_clock` that sets the time on a clock application. The function is part of an external DLL that you loaded with the `load_dll` statement. To declare the function, write:

```
extern int set_clock (string name, int time);
```

The `set_clock` function accepts two parameters. Since they are both input parameters, no mode is specified. The first parameter, a string, is the name of the clock window. The second parameter specifies the time to be set on the clock. The function returns an integer that indicates whether the operation succeeded.

Once the extern declaration is interpreted, you can call the `set_clock` function the same way you call a TSL function:

```
result = set_clock ("clock v. 3.0", 3);
```



If an extern declaration includes an *out* or *inout* parameter of type *string*, you must budget the maximum possible string size by specifying an integer *<size>* after the parameter *type* or (optional) *name*. For example, the statement below declares the function `get_clock_string`, that returns the time displayed in a clock application as a string value in the format “The time is...”.

```
extern int get_clock_string (string clock, out string time <20>);
```

The *size* should be large enough to avoid an overflow. If no value is specified for *size*, the default is 100.

TSL identifies the function in your code by its name only. You must pass the correct parameter information from TSL to the function. TSL does not check parameters. If the information is incorrect, the operation fails.

In addition, your external function must adhere to the following conventions:

- Any parameter designated as a *string* in TSL must correspond to a parameter of type *char**.
- Any parameter of mode *out* or *inout* in TSL must correspond to a pointer in your exported function. For instance, a parameter *out int* in TSL must correspond to a parameter *int** in the exported function.
- The external function must observe the standard Pascal calling convention *export far Pascal*.



For example, the following declaration in TSL:

```
extern int set_clock (string name, inout int time);
```

must appear as follows in your external function:

```
int set_clock(  
    char* name,  
    int* time  
);
```



Windows API Examples

The following sample tests call functions in the Windows API.

Checking Window Mnemonics

This test integrates the API function `GetWindowTextA` into a TSL function that checks for mnemonics (underlined letters used for keyboard shortcuts) in object labels. The TSL function receives one parameter: the logical name of an object. If a mnemonic is not found in an object's label, a message is sent to a report.

load the appropriate DLL (from Windows folder)

load ("win32api");

define the user-defined function "check_labels"

```
public function check_labels(in obj)
{
    auto hWnd,title,pos,win;
    win = GUI_get_window();
    obj_get_info(obj,"handle",hWnd);
    GetWindowTextA(hWnd,title,128);
    pos = index(title,"&");
    if (pos == 0)
        report_msg("No mnemonic for object: "& obj & "in window: "& win);
}
```



```

# start Notepad application
invoke_application("notepad.exe", "", "", SW_SHOW);

# open Find window
set_window ("Notepad");
menu_select_item ("Search;Find..");

# check mnemonics in "Up" radio button and "Cancel" pushbutton
set_window ("Find");
check_labels ("Up");
check_labels ("Cancel");

```

Loading a DLL and External Function

This test fragment uses `crk_w.dll` to prevent recording on a debugging application. To do so, it calls the external `set_debugger_pid` function.

```

# load the appropriate DLL
load_dll("crk_w.dll");

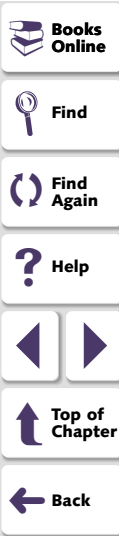
# declare function
extern int set_debugger_pid(long);

# load Systems DLLs (from Windows folder)
load ("win32api");

# find debugger process ID
win_get_info("Debugger", "handle", hwnd);
GetWindowThreadProcessId(hwnd, Proc);

# notify WinRunner of the debugger process ID
set_debugger_pid(Proc);

```



Programming with TSL

Creating Dialog Boxes for Interactive Input

WinRunner enables you to create dialog boxes that you can use to pass input to your test during an interactive test run.

This chapter describes:

- **Creating an Input Dialog Box**
- **Creating a List Dialog Box**
- **Creating a Custom Dialog Box**
- **Creating a Browse Dialog Box**
- **Creating a Password Dialog Box**



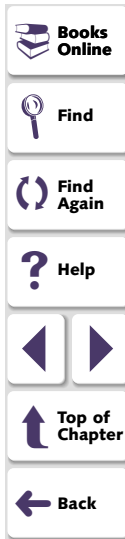
About Creating Dialog Boxes for Interactive Input

You can create dialog boxes that pop up during an interactive test run, prompting the user to perform an action—such as typing in text or selecting an item from a list. This is useful when the user must make a decision based on the behavior of the application under test (AUT) during runtime, and then enter input accordingly. For example, you can instruct WinRunner to execute a particular group of tests according to the user name that is typed into the dialog box.

To create the dialog box, you enter a TSL statement in the appropriate location in your test script. During an interactive test run, the dialog box opens when the statement is executed. By using control flow statements, you can determine how WinRunner responds to the user input in each case.

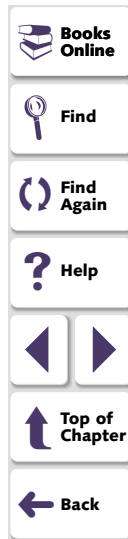
There are five different types of dialog boxes that you can create using the following TSL functions:

- **create_input_dialog** creates a dialog box with any message you specify, and an edit field. The function returns a string containing whatever you type into the edit field, during an interactive run.
- **create_list_dialog** creates a dialog box with a list of items, and your message. The function returns a string containing the item that you select during an interactive run.



- **create_custom_dialog** creates a dialog box with edit fields, check boxes, an “execute” button, and a Cancel button. When the “execute” button is clicked, the **create_custom_dialog** function executes a specified function.
- **create_browse_file_dialog** displays a browse dialog box from which the user selects a file. During an interactive run, the function returns a string containing the name of the selected file.
- **create_password_dialog** creates a dialog box with two edit fields, one for login name input, and one for password input. You use a password dialog box to limit user access to tests or parts of tests.

Each dialog box opens when the statement that creates it is executed during a test run, and closes when one of the buttons inside it is clicked.



Creating an Input Dialog Box

An input dialog box contains a custom one-line message, an edit field, and OK and Cancel buttons. The text that the user types into the edit field during a test run is returned as a string.

You use the TSL function **create_input_dialog** to create an input dialog box. This function has the following syntax:

```
create_input_dialog ( message );
```

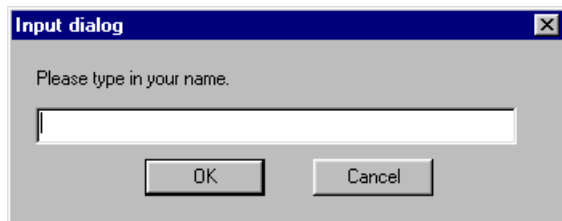
The *message* can be any expression. The text appears as a single line in the dialog box.

For example, you could create an input dialog box that asks for a user name. This name is returned to a variable and is used in an **if** statement in order to call a specific test suite for any of several users.



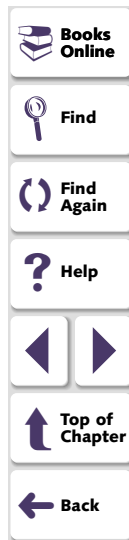
To create such a dialog box, you would program the following statement:

```
name = create_input_dialog ("Please type in your name.");
```



The input that is typed into the dialog box during a test run is passed to the variable *name* when the OK button is clicked. If the Cancel button is clicked, an empty string (empty quotation marks) is passed to the variable *name*.

Note that you can precede the message parameter with an exclamation mark. When the user types input into the edit field, each character entered is represented by an asterisk. Use an exclamation mark to prevent others from seeing confidential information.



Creating a List Dialog Box

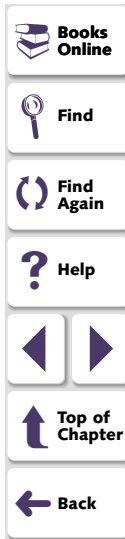
A list dialog box has a title and a list of items that can be selected. The item selected by the user from the list is passed as a string to a variable.

You use the TSL function **create_list_dialog** to create a list dialog box. This function has the following syntax:

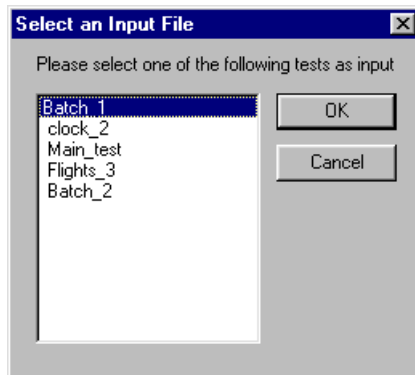
```
create_list_dialog ( title, message, list_items );
```

- *title* is an expression that appears in the window banner of the dialog box.
- *message* is one line of text that appear in the dialog box.
- *list_items* contains the options that appear in the dialog box. Items are separated by commas, and the entire list is considered a single string.

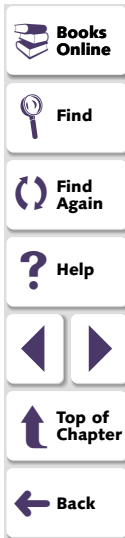
For example, you can create a dialog box that allows the user to select a test to open. To do so, you could enter the following statement:



```
filename = create_list_dialog ("Select an Input File", "Please select one of the following tests as input", "Batch_1, clock_2, Main_test, Flights_3, Batch_2");
```



The item that is selected from the list during a test run is passed to the variable *filename* when the OK button is clicked. If the Cancel button is clicked, an empty string (empty quotation marks) is passed to the variable *filename*.



Creating a Custom Dialog Box

A custom dialog box has a custom title, up to ten edit fields, up to ten check boxes, an “execute” button, and a Cancel button. You specify the label for the “execute” button. When you click the “execute” button, a specified function is executed. The function can be either a TSL function or a user-defined function.

You use the TSL function **create_custom_dialog** to create a custom dialog box. This function has the following syntax:

```
create_custom_dialog ( function_name, title, button_name, edit_name1-n,  
check_name1-m );
```

- *function_name* is the name of the function that is executed when you click the “execute” button.
- *title* is an expression that appears in the title bar of the dialog box.
- *button_name* is the label that will appear on the “execute” button. You click this button to execute the contained function.
- *edit_name* contains the labels of the edit field(s) of the dialog box. Multiple edit field labels are separated by commas, and all the labels together are considered a single string. If the dialog box has no edit fields, this parameter must be an empty string (empty quotation marks).



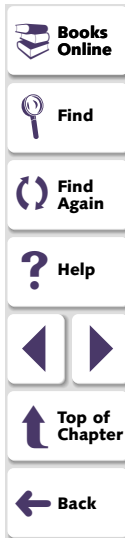
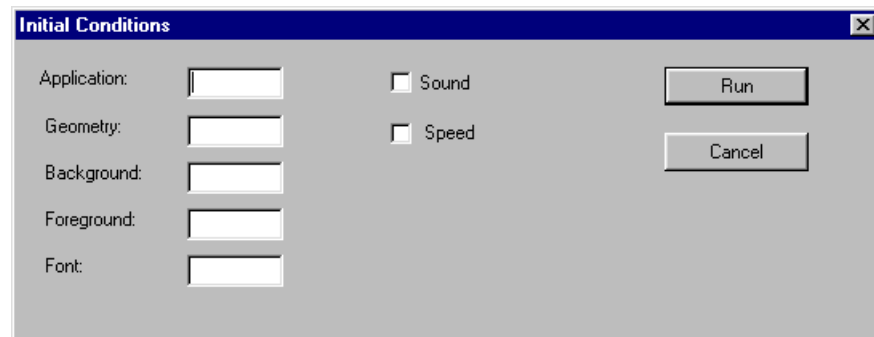
- *check_name* contains the labels of the check boxes in the dialog box. Multiple check box labels are separated by commas, and all the labels together are considered a single string. If the dialog box has no check boxes, this parameter must be an empty string (empty quotation marks).

When the “execute” button is clicked, the values that the user enters are passed as parameters to the specified function, in the following order:

edit_name₁,... edit_name_n,check_name₁,... check_name_m

In the following example, the custom dialog box allows the user to specify startup parameters for an application. When the user clicks the Run button, the user-defined function, *run_application1*, invokes the specified Windows application with the initial conditions that the user supplied.

```
res = create_custom_dialog ("run_application1", "Initial Conditions", "Run",
    "Application:, Geometry:, Background:, Foreground:, Font:", "Sound,
    Speed");
```



If the specified function returns a value, this value is passed to the variable *res*. If the Cancel button is clicked, an empty string (empty quotation marks) is passed to the variable *res*.

Note that you can precede any edit field label with an exclamation mark. When the user types input into the edit field, each character entered is represented by an asterisk. You use an exclamation mark to prevent others from seeing confidential information, such as a password.



Creating a Browse Dialog Box

A browse dialog box allows you to select a file from a list of files, and returns the name of the selected file as a string.

You use the TSL function **create_browse_file_dialog** to create a browse dialog box. This function has the following syntax:

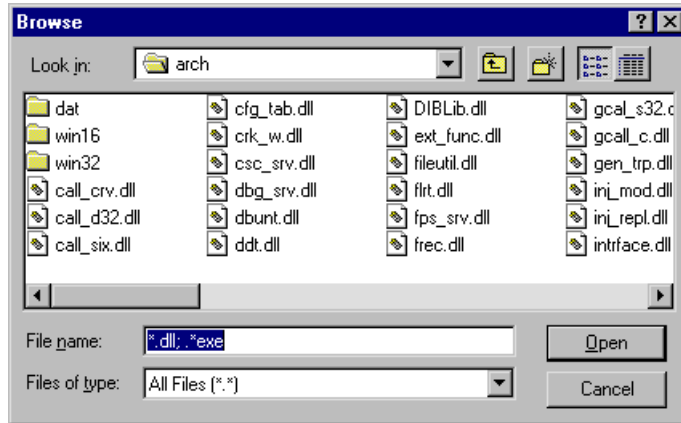
```
create_browse_file_dialog ( filter );
```

where *filter* sets a filter for the files to display in the Browse dialog box. You can use wildcards to display all files (*.*) or only selected files (*.exe or *.txt etc.).

In the following example, the browse dialog box displays all files with extensions .dll or .exe.



```
filename = create_browse_file_dialog( "*.dll;*.exe" );
```



When the OK button is clicked, the name and path of the selected file is passed to the variable *filename*. If the Cancel button is clicked, an empty string (empty quotation marks) is passed to the variable *filename*.



Creating a Password Dialog Box

A password dialog box has two edit fields, an OK button, and a Cancel button. You supply the labels for the edit fields. The text that the user types into the edit fields during the interactive test run is saved to variables for analysis.

You use the TSL function **create_password_dialog** to create a password dialog box. This function has the following syntax:

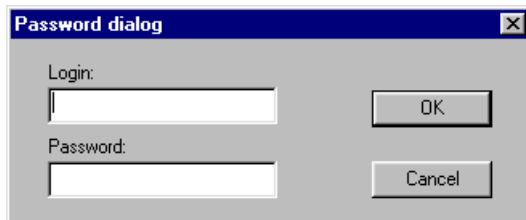
```
create_password_dialog ( login, password, login_out, password_out );
```

- *login* is the label of the first edit field, used for user-name input. If you specify an empty string (empty quotation marks), the default label “Login” is displayed.
- *password* is the label of the second edit field, used for password input. If you specify an empty string (empty quotation marks), the default label “Password” is displayed. When the user enters input into this edit field, the characters do not appear on the screen, but are represented by asterisks.
- *login_out* is the name the parameter to which the contents of the first edit field (*login*) are passed. Use this parameter to verify the contents of the login edit field.
- *password_out* is the name the parameter to which the contents of the second edit field (*password*) are passed. Use this parameter to verify the contents of the password edit field.



The following example shows a password dialog box created using the default edit field labels.


```
status = create_password_dialog ("", "", user_name, password);
```





If the OK button is clicked, the value 1 is passed to the variable *status*. If the Cancel button is clicked, the value 0 is passed to the variable *status* and the *login_out* and *password_out* parameters are assigned empty strings.





Running Tests


 **Books
Online**


 **Find**

 **Find
Again**

 **Help**



 **Top of
Chapter**

 **Back**

Running Tests

Running Tests

Once you have developed a test script, you run the test to check the behavior of your application.

This chapter describes:

- **WinRunner Test Run Modes**
- **WinRunner Run Commands**
- **Choosing Run Commands Using Softkeys**
- **Running a Test to Check Your Application**
- **Running a Test to Debug Your Test Script**
- **Running a Test to Update Expected Results**
- **Controlling the Test Run with Testing Options**
- **Reviewing Current Test Settings**
- **Solving Common Test Run Problems**



About Running Tests

When you run a test, WinRunner interprets your test script, line by line. The execution arrow in the left margin of the test script marks each TSL statement as it is interpreted. As the test runs, WinRunner operates your application as though a person were at the controls.

You can run your tests in three modes:

- Verify mode, to check your application
- Debug mode, to debug your test script
- Update mode, to update the expected results

You choose a run mode from the list on the Standard toolbar. The Verify mode is the default run mode.



Use WinRunner's Run menu commands to run your tests. You can run an entire test, or a portion of a test. Before running a Context Sensitive test, make sure the necessary GUI map files are loaded. For more information, see Chapter 5, [Working in the Global GUI Map File Mode](#).

You can run individual tests or use a batch test to run a group of tests. A batch test is particularly useful when your tests are long and you prefer to run them overnight or at other off-peak hours. For more information, see Chapter 33, [Running Batch Tests](#).



WinRunner Test Run Modes

WinRunner provides three modes in which to run tests—Verify, Debug, and Update. You use each mode during a different phase of the testing process.

Verify

Use the Verify mode to check your application. WinRunner compares the *current* response of your application to its *expected* response. Any discrepancies between the current and expected responses are captured and saved as *verification results*. When you finish running a test, by default the Test Results window opens for you to view the verification results. For more information, see Chapter 32, [Analyzing Test Results](#).

You can save as many sets of verification results as you need. To do so, save the results in a new folder each time you run the test. You specify the folder name for the results using the Run Test dialog box. This dialog box opens each time you run a test in Verify mode. For more information about running a test script in Verify mode, see [Running a Test to Check Your Application](#) on page 845.

Note: Before you run a test in Verify mode, you must have expected results for the checkpoints you created. If you need to update the expected results of your test, you must run the test in Update mode, as described on [page 837](#).

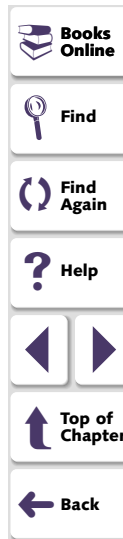


Debug

Use the Debug mode to help you identify bugs in a test script. Running a test in Debug mode is the same as running a test in Verify mode, except that debug results are always saved in the *debug* folder. Because only one set of debug results is stored, the Run Test dialog box does not open automatically when you run a test in Debug mode.

When you finish running a test in Debug mode, the Test Results window does not open automatically. To open the Test Results window and view the debug results, you can click the Test Results button on the main toolbar or choose Tools > Test Results.

Once you run a test in Debug mode, that remains the default run mode for the current WinRunner session until you activate another mode.



Use WinRunner's debugging facilities when you debug a test script:

- Use the Step commands to control how your tests run. For more information, see Chapter 35, [Debugging Test Scripts](#).
- Set breakpoints at specified points in the test script to pause tests while they run. For more information, see Chapter 36, [Using Breakpoints](#).
- Use the Watch List to monitor variables in a test script while the test runs. For more information, see Chapter 37, [Monitoring Variables](#).

For more information about running a test script in Debug mode, see [Running a Test to Debug Your Test Script](#) on page 847.

Tip: You should change the timeout variables to zero while you debug your test scripts, to make them run more quickly. For more information on how to change these variables, see Chapter 40, [Setting Global Testing Options](#), and Chapter 41, [Setting Testing Options from a Test Script](#).



Update

Use the Update mode to update the *expected* results of a test or to create a new expected results folder. For example, you could *update* the expected results for a GUI checkpoint that checks a push button, in the event that the push button default status changes from enabled to disabled. You may want to *create* an additional set of expected results if, for example, you have one set of expected results when you run your application in Windows 95 and another set of expected results when you run your application in Windows NT. For more information about generating additional sets of expected results, see [Generating Multiple Expected Results](#) on page 850.

Note that after a test has run in Update mode or been aborted, Verify automatically becomes the default run mode again.

By default, WinRunner saves expected results in the *exp* folder, overwriting any existing expected results.



You can update the expected results for a test in one of two ways:

- by globally overwriting the full existing set of expected results by running the entire test using a Run command
- by updating the expected results for individual checkpoints and synchronization points using the Run from Arrow command or a Step command

For more information about running a test script in Update mode, see [Running a Test to Update Expected Results](#) on page 849.



WinRunner Run Commands

You use the Run commands to execute your tests. When a test is running, the execution arrow in the left margin of the test script marks each TSL statement as it is interpreted.



Run from Top

Choose the **Run from Top** command or click the corresponding **Run from Top** button to run the active test from the first line in the test script. If the test calls another test, WinRunner displays the script of the called test. Execution stops at the end of the test script.



Run from Arrow

Choose the **Run from Arrow** command or click the corresponding **Run from Arrow** button to run the active test from the line in the script marked by the execution arrow. In all other aspects, the Run from Arrow command is the same as the Run from Top command.



Run Minimized Commands

You run a test using a Run Minimized command to make the entire screen available to the application being tested during test execution. The Run Minimized commands shrink the WinRunner window to an icon while the test runs. The WinRunner window automatically returns to its original size at the end of the test, or when you stop or pause the test run. You can use the Run Minimized commands to run a test either from the top of the test script or from the execution arrow. The following Run Minimized commands are available:

- **Run Minimized > From Top** command
- **Run Minimized > From Arrow** command



Step Commands

You use a Step command or click a Step button to run a single statement in a test script. For more information on the Step commands, see Chapter 35, [Debugging Test Scripts](#). The following Step commands are available:

- **Step** command
- **Step Into** command
- **Step Out** command
- **Step to Cursor** command

The following Step buttons are available:



Step button



Step Into button





Stop

You can stop a test run immediately by choosing the **Stop** command or clicking the **Stop** button. When you stop a test, test variables and arrays become undefined. The test options, however, retain their current values. See [Controlling the Test Run with Testing Options](#) on page 854 for more information.

After stopping a test, you can access only those functions that you loaded using the **load** command. You cannot access functions that you compiled using the Run commands. Recompile these functions to regain access to them. For more information, see Chapter 28, [Creating Compiled Modules](#).



Pause

You can pause a test by choosing the **Pause** command or clicking the **Pause** button. Unlike Stop, which immediately terminates execution, a paused test continues running until all previously interpreted TSL statements are executed. When you pause a test, test variables and arrays maintain their values, as do the test options. See [Controlling the Test Run with Testing Options](#) on page 854 for more information.

To resume running a paused test, choose the appropriate Run command. Test execution resumes from the point where you paused the test.



Choosing Run Commands Using Softkeys

You can activate several of WinRunner's commands using softkeys. WinRunner reads input from softkeys even when the WinRunner window is not the active window on your screen, or when it is minimized. Note that you can configure the default softkey configurations. For more information about configuring softkeys, see Chapter 38, [Customizing WinRunner's User Interface](#).



The following table lists the default softkey configurations for running tests:

Command	Default Softkey Combination	Function
RUN FROM TOP	Ctrl Left + F5	Runs the test from the beginning.
RUN FROM ARROW	Ctrl Left + F7	Runs the test from the line in the script indicated by the arrow.
STEP	F6	Runs only the current line of the test script.
STEP INTO	Ctrl Left + F8	Like Step: however, if the current line calls a test or function, the called test or function appears in the WinRunner window but is not executed.
STEP TO CURSOR	Ctrl Left + F9	Runs a test from the line executed until the line marked by the insertion point.
PAUSE	PAUSE	Stops the test run after all previously interpreted TSL statements have been executed. Execution can be resumed from this point.
STOP	Ctrl Left + F3	Stops the test run.



Running a Test to Check Your Application

When you run a test to check the behavior of your application, WinRunner compares the current results with the expected results. You specify the folder in which to save the verification results for the test.

To run a test to check your application:



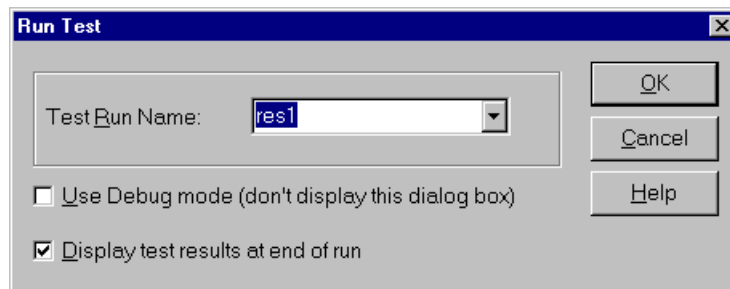
1 If your test is not already open, choose **File > Open** or click the **Open** button to open the test.

2 Make sure that **Verify** is selected from the list of run modes on the Standard toolbar.



3 Choose the appropriate **Run** menu command or click one of the **Run** buttons.

The Run Test dialog box opens, displaying a default test run name for the verification results.



- 4 You can save the test results under the default test run name. To use a different name, type in a new name or select an existing name from the list.

To instruct WinRunner to display the test results automatically following the test run (the default), select the **Display test results at end of run** check box.

Click **OK**. The Run Test dialog box closes and WinRunner runs the test according to the Run command you chose.

- 5 Test results are saved with the test run name you specified.



Running a Test to Debug Your Test Script

When you run a test to debug your test script, WinRunner compares the current results with the expected results. Any differences are saved in the debug results folder. Each time you run the test in Debug mode, WinRunner overwrites the previous debug results.

To run a test to debug your test script:



1 If your test is not already open, choose **File > Open** to open the test.

2 Select **Debug** from the drop-down list of run modes on the Standard toolbar.

3 Choose the appropriate **Run** menu command.



To execute the entire test, choose **Run > Run from Top** or click the **Run from Top** button. The test runs from the top of the test script and generates a set of debug results.



To run part of the test, choose one of the following commands or click one of the corresponding buttons:



Run > Run from Arrow

Run > Run Minimized > From Arrow



Run > Step



Run > Step Into

Run > Step Out

Run > Step to Cursor

The test runs according to the command you chose, and generates a set of debug results.



Running a Test to Update Expected Results

When you run a test to update expected results, the new results replace the expected results created earlier and become the basis of comparison for subsequent test runs.

To run a test to update the expected results:



- 1 If your test is not already open, choose **File > Open** to open the test.
- 2 Select **Update** from the list of run modes on the Standard toolbar.
- 3 Choose the appropriate **Run** menu command.



To update the entire set of expected results, choose **Run > Run from Top** or click the **Run from Top** button.

To update only a portion of the expected results, choose one of the following commands or click one of the corresponding buttons:



Run > Run from Arrow

Run > Run Minimized > From Arrow



Run > Step



Run > Step Into

Run > Step Out

Run > Step to Cursor

WinRunner runs the test according to the Run menu command you chose and updates the expected results. The default folder for expected results is *exp*.



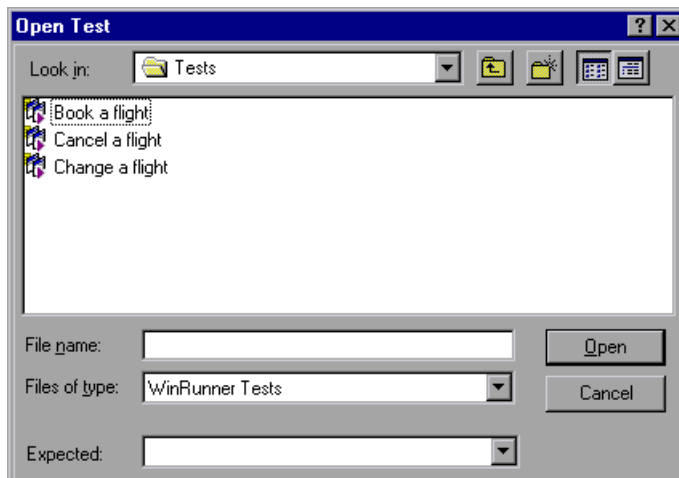
Generating Multiple Expected Results

You can generate more than one set of expected results for any test. You may want to generate multiple sets of expected results if, for example, the response of your application varies according to the time of day. In such a situation, you would generate a set of expected results for each defined period of the day.

To create a different set of expected results for a test:



- 1 Choose **File > Open** or click the **Open** button. The Open Test dialog box opens.



- 2 In the Open Test dialog box, select the test for which you want to create multiple sets of expected results. In the **Expected** box, type in a unique folder name for the new expected results.



Note: To create a new set of expected results for a test that is already open, choose **File > Open** or click the **Open** button to open the Open Test dialog box, select the open test, and then enter a name for a new expected results folder in the **Expected** box.

- 3 Click **OK**. The Open Test dialog box closes.
- 4 Choose **Update** from the list of run modes on the Standard toolbar.
- 5 Choose **Run > Run from Top** or click the **Run from Top** button to generate a new set of expected results.



WinRunner runs the test and generates a new set of expected results, in the folder you specified.



Running a Test with Multiple Sets of Expected Results

If a test has multiple sets of expected results, you specify which expected results to use before running the test.

To run a test with multiple sets of expected results:



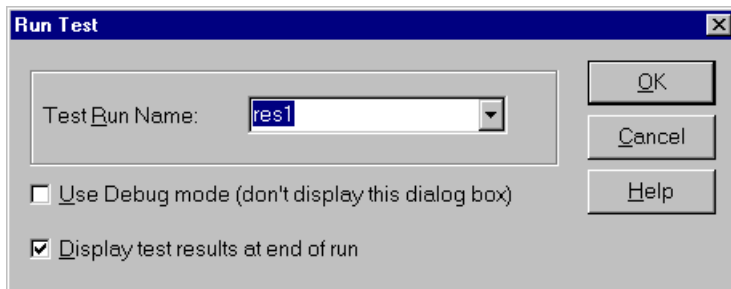
- 1 Choose **File > Open** or click the **Open** button. The Open Test dialog box opens.

Note: If the test is already open, but it is accessing the wrong set of expected results, you must choose **File > Open** or click the **Open** button to open the Open Test dialog box again, next select the open test, and then choose the correct expected results folder in the **Expected** box.

- 2 In the Open Test dialog box, click the test that you want to run. The **Expected** box displays all the sets of expected results for the test you chose.
- 3 Select the required set of expected results in the **Expected** box, and click **Open**. The Open Test dialog box closes.
- 4 Select **Verify** from the drop-down list of run modes on the Standard toolbar.

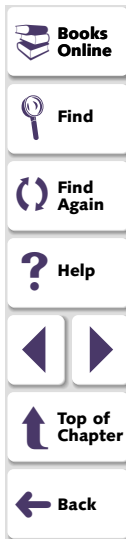


- 5 Choose the appropriate **Run** menu command. The Run Test dialog box opens, displaying a default test run name for the verification results—for example, *res1*.



- 6 Click **OK** to begin the test run, and to save the test results in the default folder. To use a different verification results folder, type in a new name or choose an existing name from the list.

The Run Test dialog box closes. WinRunner runs the test according to the Run menu command you chose and saves the test results in the folder you specified.



Controlling the Test Run with Testing Options

You can control how a test is run using WinRunner's testing options. For example, you can set the time WinRunner waits at a bitmap checkpoint for a bitmap to appear, or the speed that a test is run.

You set testing options in the General Options dialog box. Choose **Settings > General Options** to open this dialog box. You can also set testing options from within a test script using the **setvar** function.

Each testing option has a default value. For example, the default for the threshold for difference between bitmaps option (that defines the minimum number of pixels that constitute a bitmap mismatch) is 0. It can be set globally in the Run tab of the General Options dialog box. For a more comprehensive discussion of setting testing options globally, see Chapter 40, [Setting Global Testing Options](#).

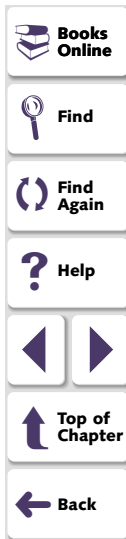
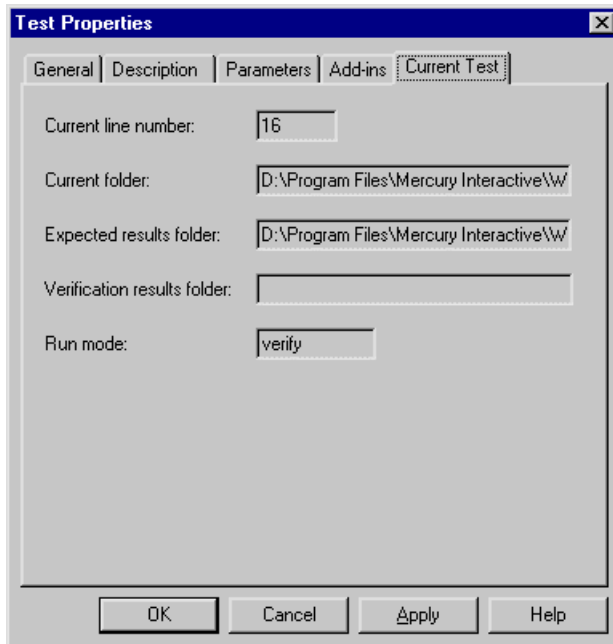
You can also set the corresponding *min_diff* option from within a test script using the **setvar** function. For a more comprehensive discussion of setting testing options from within a test script, see Chapter 41, [Setting Testing Options from a Test Script](#).

If you assign a new value to a testing option, you are prompted to save this change to your WinRunner configuration when you exit WinRunner.



Reviewing Current Test Settings

You can review the settings for the current test in a read-only view in the Current Test tab of the Test Properties dialog box.



Current line number

This box displays the line number of the current location of the execution arrow in the test script.

Note that you can use the **getvar** function to retrieve the value of the corresponding *line_no* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Current folder

This box displays the current working folder for the test.

Note that you can use the **getvar** function to retrieve the value of the corresponding *curr_dir* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Expected results folder

This box displays the full path of the expected results folder associated with the current test run.

Note that you can use the **getvar** function to retrieve the value of the corresponding *exp* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-exp* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Verification results folder

This box displays the full path of the verification results folder associated with the current test run.

Note that you can use the **getvar** function to retrieve the value of the corresponding *result* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Run mode

This box displays the current run mode: Verify, Debug, or Update.

Note that you can use the **getvar** function to retrieve the value of the corresponding *runmode* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



Solving Common Test Run Problems

When you run your Context Sensitive test, WinRunner may open the Run wizard. Generally, the Run wizard opens when WinRunner has trouble locating an object or a window in your application. It displays a message similar to the one below.



There are several possible causes and solutions:

Possible Causes	Possible Solutions
<p>You were working with the temporary GUI map, which you did not save when you exited WinRunner: When you record in an application, WinRunner learns the GUI objects on which you record. Unless you specify otherwise, this information is stored in the temporary GUI map file, which is cleared whenever you exit WinRunner.</p>	<p>WinRunner should relearn your application, so that the logical names and physical descriptions of the GUI objects are stored in the GUI map. When you are done, make sure to save the GUI map file. When you start your test, make sure to <i>load</i> your GUI map file. These steps are described in Chapter 5, Working in the Global GUI Map File Mode.</p>
<p>You saved the GUI map file, but it is not loaded.</p>	<p>Load the GUI file for your test. You can load the file manually each time with the GUI Map Editor, or you can add a GUI_load statement to the beginning of your test script. For more information, see Chapter 5, Working in the Global GUI Map File Mode.</p>

Books Online

Find

Find Again

Help

◀ ▶

↑ Top of Chapter

← Back

Possible Causes	Possible Solutions
<p>The object is not identified during a test run because it has a dynamic label. For example, you may be testing an application that contains an object with a varying label, such as any window that contains the application name followed by the active document name in the title. (In the sample Flight Reservation application, the “Fax Order” window also has a varying label.)</p>	<p>Use a regular expression to enable WinRunner to recognize objects based on a portion of its physical description. For more information on regular expressions, see Chapter 23, Using Regular Expressions.</p> <p>Use the GUI Map Configuration dialog box to change the physical properties that WinRunner uses to recognize the problematic object. For more information on GUI Map configuration, Chapter 9, Configuring the GUI Map.</p>
<p>The physical description of the object/window does not match the physical description in the GUI map.</p>	<p>Modify the physical description in the GUI map, as described in Modifying Logical Names and Physical Descriptions on page 139.</p>
<p>The logical name of the object/window in the test script does not match the logical name in the GUI map.</p>	<p>Modify the logical name of the object/window in the GUI map, as described in Modifying Logical Names and Physical Descriptions on page 139.</p> <p>Modify the logical name of the object/window manually in the test script.</p>



Possible Causes	Possible Solutions
<p>The object/window has a different number of obligatory or optional properties (in the GUI map configuration) than in the GUI map.</p>	<p>In the Configure Class dialog box, configure the obligatory or optional properties which are learned by WinRunner for that class of object, so they will match the physical description in the GUI map, as described in Configuring a Standard or Custom Class on page 188.</p>
	<p>WinRunner should relearn the object/window in the GUI map so that it will learn the obligatory and optional properties configured for that class of object, as described in Chapter 5, Working in the Global GUI Map File Mode.</p>

Tip: WinRunner can learn your application systematically from the GUI Map Editor before you start recording on objects within your application. For more information, see Chapter 5, [Working in the Global GUI Map File Mode](#).

Note: For additional information on solving GUI map problems while running a test, see [Guidelines for Working in the Global GUI Map File Mode](#) on page 118.



Running Tests

Analyzing Test Results

After you run a test, you can view a report of all the major events that occurred during the test run.

This chapter describes:

- **The Test Results Window**
- **Viewing the Results of a Test Run**
- **Analyzing the Results of a GUI Checkpoint**
- **Analyzing the Results of a GUI Checkpoint on Table Contents**
- **Analyzing the Expected Results of a GUI Checkpoint on Table Contents**
- **Analyzing the Results of a Bitmap Checkpoint**
- **Analyzing the Results of a Database Checkpoint**
- **Analyzing the Expected Results of a Content Check in a Database Checkpoint**
- **Updating the Expected Results of a Checkpoint**
- **Viewing the Results of a File Comparison**
- **Reporting Defects Detected During a Test Run**



About Analyzing Test Results

After you run a test, test results are displayed in the Test Results window. This window contains a description of the major events that occurred during the test run, such as GUI, bitmap, or database checkpoints, file comparisons, and error messages. It also includes tables and pictures to help you analyze the results.



The Test Results Window



After a test run, you can view test results in the Test Results window. To open the window, choose **Tools > Test Results** or click the **Test Results** button.

Results

Test tree

Test summary

Test log

Line	Event	Details	Result	Time
1	start run	test1	run	00:00:00
5	bitmap checkpoint	/img1	OK	00:00:03
10	end GUI checkpogui1		OK	00:00:04
11	start GUI checkpogui2		OK	00:00:04
12	stop run	test1	pass	00:00:04



Results

The results box enables you to choose which results to display for the test. You can view the expected results (*exp*) or the actual results for a specified test run.

Test Tree

The test tree shows all tests executed during the test run. The first test in the tree is the *calling test*. Tests below the calling test are *called tests*. To view the results of a test, click the test name in the tree.



Test Summary

The following information appears in the test summary:

Test Results

Indicates whether the test passed or failed. For a batch test, this refers to the batch test itself and not to the tests that it called. Double-click the Test Result button to view the following details:

Total number of bitmap checkpoints: The total number of bitmap checkpoints that occurred during the test run. Double-click to view a detailed list of the checkpoints. For example,

Img1 test1 (5)

indicates the first bitmap checkpoint, in a test called *test1*, in the fifth line of the test script. The number in parentheses indicates the line in the test script that contains the **obj_check_bitmap** or **win_check_bitmap** statement. Double-click the detailed description of the bitmap checkpoint to display the contents of the bitmap checkpoint, as shown in the previous example. For more information, see [Analyzing the Results of a Bitmap Checkpoint](#) on page 892.



Total number of GUI checkpoints: The total number of GUI checkpoints that occurred during the test run. Double-click to view a detailed list of the checkpoints. For example,

```
gui1 test1 (10)
```

indicates the first GUI checkpoint in a test called *test1*, in the tenth line of the test script. The number in parentheses indicates the line in the test script that contains the **obj_check_gui** or **win_check_gui** statement. Double-click the detailed description of the GUI checkpoint to display the GUI Checkpoint Results dialog box for that checkpoint. For more information, see [Analyzing the Results of a GUI Checkpoint](#) on page 878.



General Information

Double-click the General Information icon to view the following test details:



Date: The date and time of the test run.



Operator Name: The name of the user who ran the test.



Expected Results Folder: The name of the expected results folder used for comparison by the GUI and bitmap checkpoints.



Total Run Time: Total time (hr:min:sec) that elapsed from start to finish of the test run.



Test Log

The test log provides detailed information on every major event that occurred during the test run. These include the start and termination of the test; GUI and bitmap checkpoints; file comparisons; changes in the progress of the test flow; changes to system variables; displayed report messages; calls to other tests; and run time errors.

- A row describing a mismatch or failure appears in red; a row describing a successful event appears in green.
- The **Line** column displays the line number in the test script at which the event occurs.
- The **Event** column describes the event, such as the start or end of a checkpoint or of the entire test.
- The **Details** column provides specific information about the event, such as the name of the test (for starting or stopping a test), the name of the checklist (for a checkpoint), or a message (for a **tl_step** statement).
- The **Result** column displays whether the event passed or failed, if relevant.
- The **Time** column displays the amount of time elapsed (in hours:minutes:seconds) from when the test started running until the start of the event.



Double-click the event in the log to view the following information:

- For a bitmap checkpoint, you can view the expected bitmap and the actual bitmap captured during the run. If a mismatch was detected, you can also view an image showing the differences between the expected and actual bitmaps.
- For a GUI checkpoint, you can view the results in a table. The table lists all the GUI objects included in the checkpoint and the results of the checks for each object.
- For a file comparison, you can view the two files that were compared to each other. If a mismatch was detected, the non-matching lines in the files are highlighted.
- For a call to another test in batch mode, you can view whether the **call** statement passed. Note that even though a **call** statement is successful, the called test itself may fail, based on the usual criteria for tests failing. You can set criteria for failing a test in the Run tab of the General Options dialog box. For additional information, see Chapter 40, [Setting Global Testing Options](#).



Viewing the Results of a Test Run

After a test run, you can view test results in the Test Results window. The Test Results window opens and displays the results of the current test. You can view expected, debug, and verification results in the Test Results window.

To view the results of a test run:

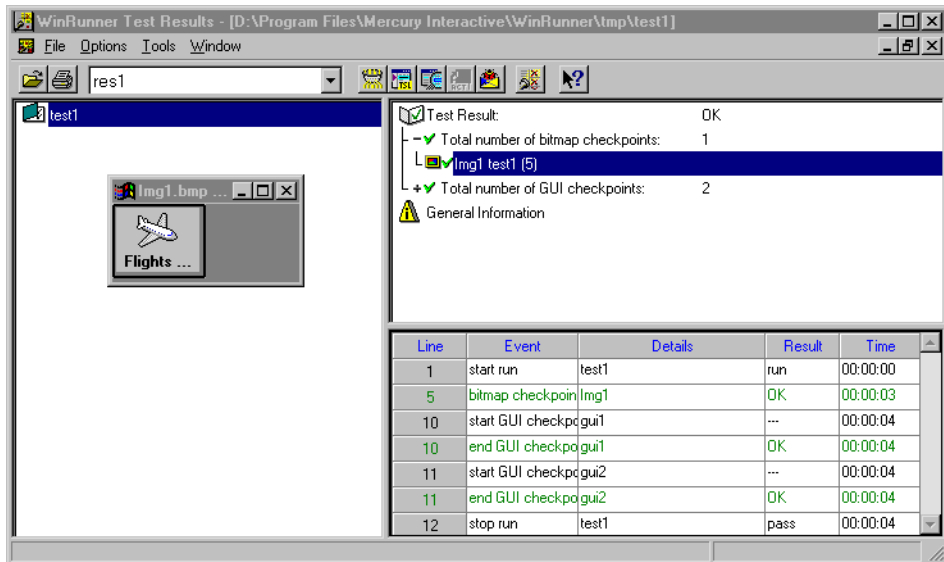


- 1 To open the Test Results window, choose **Tools > Test Results**, or click the **Test Results** button in the main WinRunner window.

To view the results of a non-active test, choose **File > Open**. In the **Open Test Results** dialog box, select the test whose results you want to view.

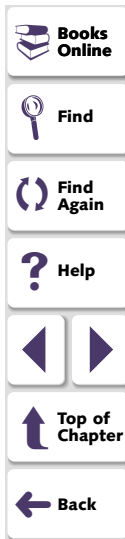


Note that if you ran a test in Verify mode and the **Display Test Results at End of Run** check box was selected (the default) in the Run Test dialog box, the Test Results window automatically opens when a test run is completed. For more information, see Chapter 31, [Running Tests](#).



- By default, the **Test Results** window displays the results of the most recently executed test run.

To view other test run results, click the **Results** box and select a test run.



3 To view a text version of a report, choose **Tools > Text Report** from the Test Results window. The report opens in Notepad.



4 To view only specific types of results in the events column in the test log, choose **Options > Filters** or click the **Filters** button.



5 To print test results directly from the Test Results window, choose **File > Print** or click the **Print** button.

In the **Print** dialog box, choose the number of copies you want to print and click **OK**. Test results print in a text format.

6 To close the Test Results window, choose **File > Exit**.



To view the results of a test run from a TestDirector database:



- 1 Choose **Tools > Test Results** or click the **Test Results** button in the main WinRunner window.

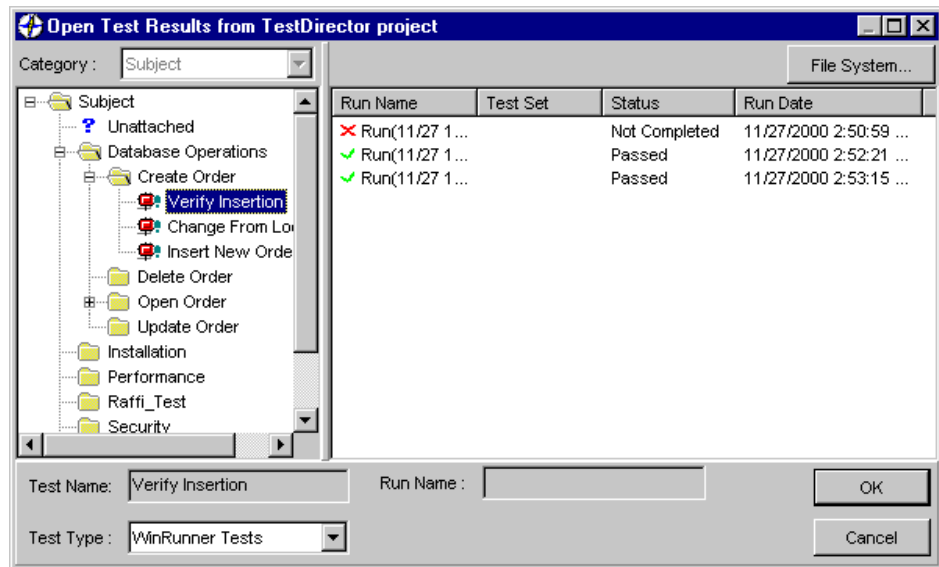
The **Test Results** window opens, displaying the test results of the latest test run of the active test.



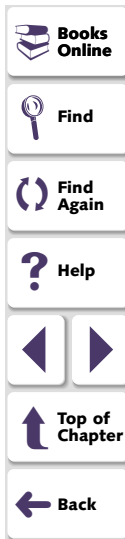
- 2 In the **Test Results** window, choose **File > Open**.



The **Open Test Results from TestDirector Project** dialog box opens and displays the test plan tree.



- 3 In the **Test Type** box, select the type of test to view in the dialog box: **WinRunner Tests** (the default setting), **WinRunner Batch Tests**, or **All Tests**.
- 4 Select the relevant subject in the test plan tree. To expand the tree and view a sublevel, double-click a closed folder. To collapse a sublevel, double-click an open folder.



- 5 Select a test run to view. The **Run Name** column displays whether your test run passed or failed and contains the names of the test runs. The **Test Set** column contains the names of the test sets. Entries in the **Status** column indicate whether the test passed or failed. The **Run Date** column displays the date and time when the test set was run.
- 6 Click **OK** to view the results of the selected test.

See the previous section for an explanation of the options in the Test Results window.

Note: For more information on viewing the results of a test run from a TestDirector database, see Chapter 44, [Managing the Testing Process](#).



Viewing Checkpoint Results

You can view the results of a specific checkpoint in your test. A checkpoint helps you to identify specific changes in the behavior of objects in your application.

To display the results of a checkpoint:



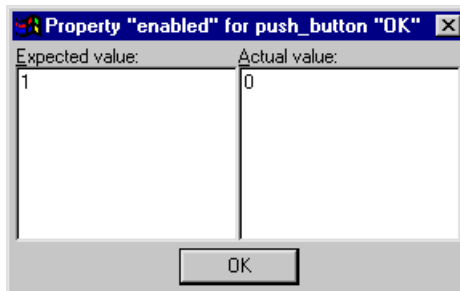
- 1 Choose **Tools > Test Results** or click the **Test Results** button in the main WinRunner window to open the **Test Results** window.
- 2 In the test log, look for entries that list the checkpoint you want to check in the **Event** column. Failed checks appear in red; passed checks appear in green.
- 3 Double-click the appropriate entry in the test log. Alternatively, highlight the entry and choose **Options > Display** or click the **Display** button. The relevant dialog box opens.
- 4 Click **OK** to close the dialog box.

The sections below describe the results information that is provided for each type of checkpoint in more detail.



Analyzing the Results of a Property Check

A property check helps you to identify specific changes in the properties of objects in your application. For example, you can check whether a button is enabled or disabled or whether an item in a list is selected. The expected and actual results of a property check are displayed in the Property dialog box that you open from the Test Results window.

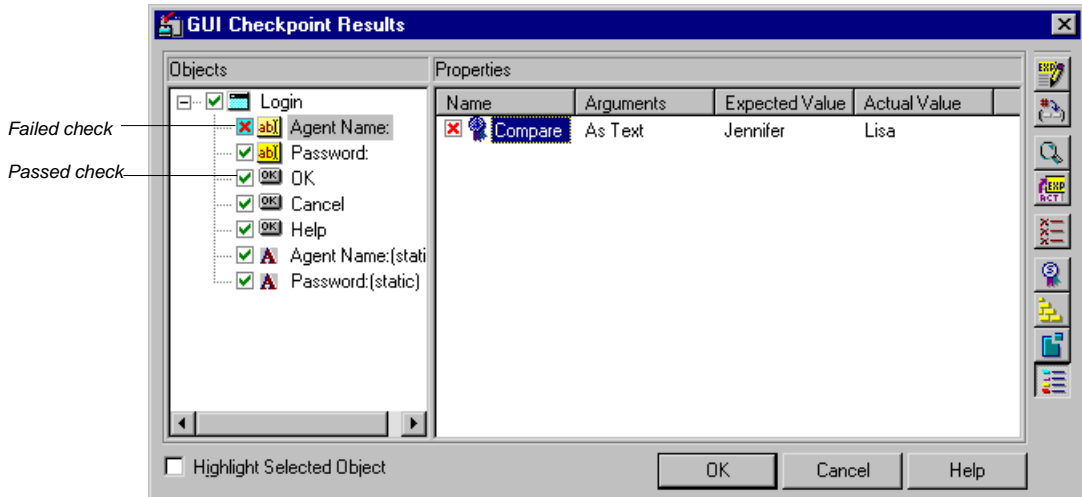


For more information, see Chapter 12, [Checking GUI Objects](#).



Analyzing the Results of a GUI Checkpoint

A GUI checkpoint helps you to identify changes in the look and behavior of GUI objects in your application. The results of a GUI checkpoint are displayed in the GUI Checkpoint Results dialog box that you open from the Test Results window.

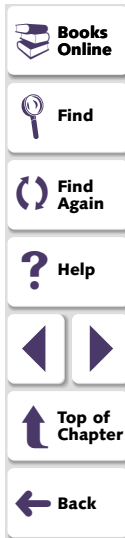


The dialog box lists every object checked and the types of checks performed. Each check is marked as either passed or failed and the expected and the actual results are shown. If one or more objects fail, the entire GUI checkpoint is marked as failed in the test log.










You can update the expected value of a checkpoint. For additional information on see [Updating the Expected Results of a Checkpoint](#) on page 901. For a description of other options in this dialog box, see [Options in the GUI Checkpoint Results Dialog Box](#) on page 880.

For more information, see Chapter 12, [Checking GUI Objects](#).





Options in the GUI Checkpoint Results Dialog Box

The GUI Checkpoint Results dialog box includes the following options:

Button	Description
	Edit Expected Value enables you to edit the expected value of the selected property. For more information, see Editing the Expected Value of a Property on page 335.
	Specify Arguments enables you to specify the arguments for a check on the selected property. For more information, see Specifying Arguments for Property Checks on page 324.
	Compare Expected and Actual Values opens the Compare Values box, which displays the expected and actual values for the selected property check. For a check on table contents, opens the Data Comparison Viewer, which displays the expected and actual values for the check.
	Update Expected Value updates the expected value to the actual value. Note that this overwrites the saved expected value.
	Show Failures Only displays only failed checks.
	Show Standard Properties Only displays only standard properties.
	Show Nonstandard Properties Only displays only nonstandard properties, such as Visual Basic, PowerBuilder, and ActiveX control properties.



Button	Description
	<p>Show User Properties Only displays only user-defined property checks. To create user-defined property checks, refer to the <i>WinRunner Customization Guide</i>.</p>
	<p>Show All Properties displays all properties, including standard, nonstandard, and user-defined properties.</p>



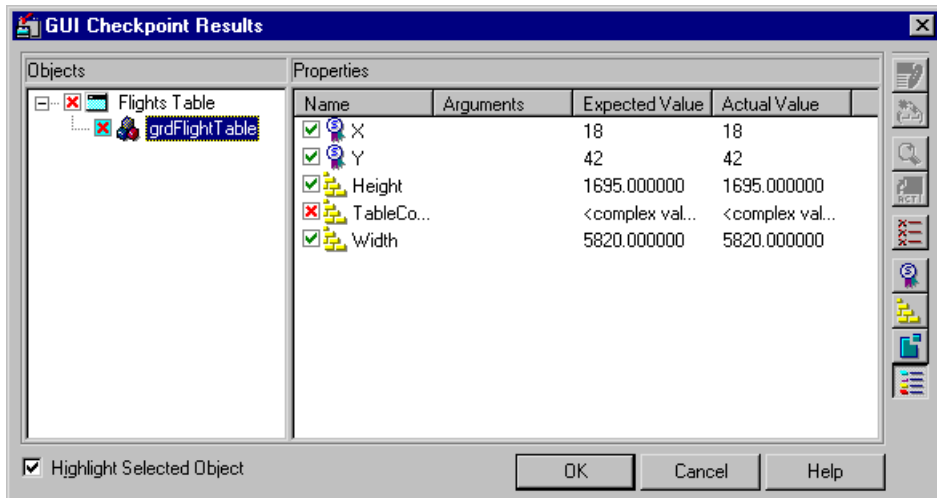
Analyzing the Results of a GUI Checkpoint on Table Contents

You can view the results of a GUI checkpoint on table contents. The results of a GUI checkpoint are displayed in the GUI Checkpoint Results dialog box that you open from the Test Results window. It lists each object included in the GUI checkpoint and the type of checks performed. Each check is listed as either passed or failed, and the expected and actual results are shown. If one or more objects fail, the entire GUI checkpoint is marked as failed in the test log. For more information on checking the contents of a table, see Chapter 16, [Checking Table Contents](#).



To display the results of a GUI checkpoint on table contents:

- 1 Open the GUI Checkpoint Results dialog box as described on [page 876](#).



- 2 Highlight the **TableContent** check and click the **Display** button, or double-click the **TableContent** check. Note that the table contents property check may not be called **TableContent**, and may have a different name instead, depending on which toolkit is used.



The **Data Comparison Viewer** opens, displaying both expected and actual results. All cells are color coded, and all errors and mismatches are listed at the bottom of the window.

Cell contains a mismatch.

Cell does not contain a mismatch.

Cell was not included in the comparison.

List of errors and mismatches

Expected Data				Actual Data					
	Flight	From	Departure	To		Flight	From	Departure	To
1	2457	DEN	10:53 AM	SFO	1	9400	DEN	11:21 AM	LAX
2	9270	DEN	05:21 PM	LAX	2	9270	DEN	05:21 PM	LAX
3	6208	DEN	03:12 PM	LAX	3	6208	DEN	03:12 PM	LAX
4	5439	DEN	12:48 PM	SFO	4	6204	DEN	12:48 PM	LAX
5	6200	DEN	10:24 AM	LAX	5	6200	DEN	10:24 AM	LAX
6	5988	DEN	01:45 PM	LAX	6	5988	DEN	01:45 PM	LAX
7	5595	DEN	04:09 PM	LAX	7	5595	DEN	04:09 PM	LAX
8	5385	DEN	10:09 AM	LAX	8	5385	DEN	10:09 AM	LAX
9	2059	DEN	12:33 PM	LAX	9	2059	DEN	12:33 PM	LAX
10	1513	DEN	06:33 PM	LAX	10	1513	DEN	06:33 PM	LAX
11	1159	DEN	02:57 PM	LAX	11	1159	DEN	02:57 PM	LAX

Mismatch of text : Expected ['Flight', 1] = '2457', Actual ['Flight', 1] = '9400'.
 Mismatch of text : Expected ['Departure', 1] = '10:53 AM', Actual ['Departure', 1] = '11:21 AM'.
 Mismatch of text : Expected ['To', 1] = 'SFO', Actual ['To', 1] = 'LAX'.
 Mismatch of text : Expected ['Price', 1] = '\$149.20', Actual ['Price', 1] = '\$126.40'.

- Books Online
- Find
- Find Again
- Help
-
-
- Top of Chapter
- Back

Use the following color codes to interpret the differences that are highlighted in your window:

- **Blue on white background:** Cell was included in the comparison and no mismatch was found.
- **Cyan on ivory background:** Cell was not included in the comparison.
- **Red on yellow background:** Cell contains a mismatch.
- **Magenta on green background:** Cell was verified but not found in the corresponding table.
- **Background color only:** cell is empty (no text).

3 By default, scrolling between the Expected Data and Actual Data tables in the Data Comparison Viewer is synchronized. When you click a cell, the corresponding cell in the other table flashes red.



To scroll through the tables separately, clear the **Utilities > Synchronize Scrolling** command or click the **Synchronize Scrolling** button to deselect it. Use the scroll bar as needed to view hidden parts of the table.

- 4 To filter a list of errors and mismatches that appear at the bottom of the Data Comparison Viewer, use the following options:
- **To view mismatches for a specific column only:** Double-click a column heading (the column name) in either table.
 - **To view mismatches for a single row:** Double-click a row number in either table.
 - **To view mismatches for a single cell:** Double-click a cell with a mismatch.





- **To view the previous mismatch:** Click the **Previous Mismatch** button.
- **To view the next mismatch:** Click the **Next Mismatch** button.
- **To see all mismatches:** Choose **Utilities > List All Mismatches** or click the **List All Mismatches** button.
- **To clear the list:** Double-click a cell with no mismatch.
- **To see the cell(s) that correspond to a listed mismatch:** Click a mismatch in the list at the bottom of the dialog box to see the corresponding cells in the table flash red. If the cell with the mismatch is not visible, one or both table scroll automatically to display it.



Note: You can edit the data in the Edit Check dialog box, which you open from the GUI Checkpoint Results dialog box. To do so, highlight the **TableContent** (or corresponding) property check, and click the **Edit Expected Value** button. For information on working with the Edit Check dialog box, see [Understanding the Edit Check Dialog Box](#) on page 451.

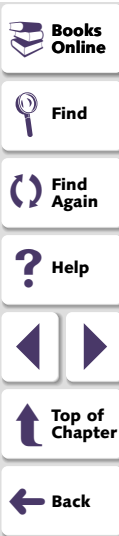
- 5 Choose **File > Exit** to close the Data Comparison Viewer.



Analyzing the Expected Results of a GUI Checkpoint on Table Contents

You can view the expected results of a GUI checkpoint on table contents either before or after you run your test. The expected results of a GUI checkpoint are displayed in the GUI Checkpoint Results dialog box, which you open from the Test Results window. When you view the expected results of a GUI checkpoint on table contents from the Test Results window, you must choose the expected (“exp”) mode in the Results box.

Note that you can also view the expected results of a GUI checkpoint on a table from the Edit Check dialog box. For additional information, see Chapter 16, [Checking Table Contents](#).

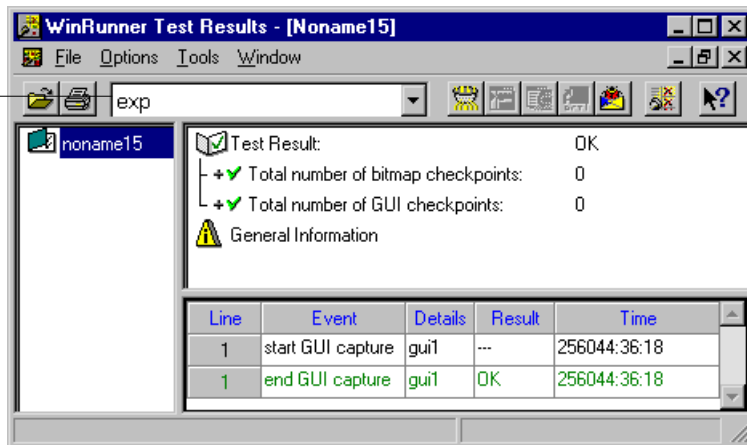


To display the expected results of a GUI checkpoint on table contents:



- 1 Choose **Tools > Test Results**, or click the **Test Results** button in the main WinRunner window to open the WinRunner Test Results window.
- 2 If “exp” does not already appear as the results folder in the Results box, then select it.

Results box

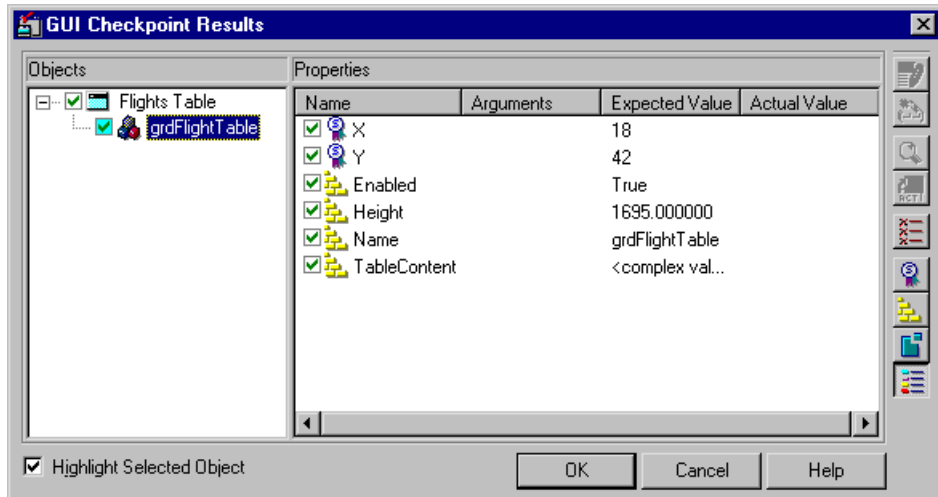


Note that since you are viewing the *expected* results of a test, the total number of GUI checkpoints performed by WinRunner is zero.





- 3 Double-click an “end GUI capture” entry in the test log. Alternatively, highlight the entry and choose **Options > Display** or click the **Display** button. The **GUI Checkpoint Results** dialog box opens and the expected results of the selected GUI checkpoint are displayed.



Note: Since you are viewing the *expected* results of the GUI checkpoint, the *actual* values are not displayed.





- 4 Highlight the **TableContent** check and click the **Display** button, or double-click the **TableContent** check. Note that the table contents property check may not be called **TableContent**, and may have a different name instead, depending on which toolkit is used.

The **Expected Data Viewer** opens, displaying the expected results.

The screenshot shows a window titled "Expected Data Viewer" with a menu bar (File, Edit, View, Utilities, Help) and a toolbar. The main area displays a table titled "Expected Data" with the following columns: Flight, From, Departure, To, Arrival, Airline, and Price. The table contains 10 rows of flight data.

	Flight	From	Departure	To	Arrival	Airline	Price
1	9117	DEN	06:33 PM	LAX	07:31 PM	DA	\$111.60
2	7220	DEN	05:21 PM	LAX	06:19 PM	DA	\$135.20
3	6593	DEN	04:09 PM	LAX	05:07 PM	DA	\$124.80
4	6399	DEN	07:45 AM	LAX	08:43 AM	DA	\$122.40
5	6240	DEN	03:12 PM	LAX	06:12 PM	AA	\$175.47
6	6236	DEN	12:48 PM	LAX	03:48 PM	AA	\$102.90
7	6232	DEN	10:24 AM	LAX	01:24 PM	AA	\$104.00
8	5696	DEN	11:21 AM	LAX	12:19 PM	DA	\$122.40
9	5306	DEN	12:33 PM	LAX	01:31 PM	DA	\$120.00
10	2516	DEN	01:45 PM	LAX	02:43 PM	DA	\$134.00

The status bar at the bottom shows "Ready" and a "NUM" field.





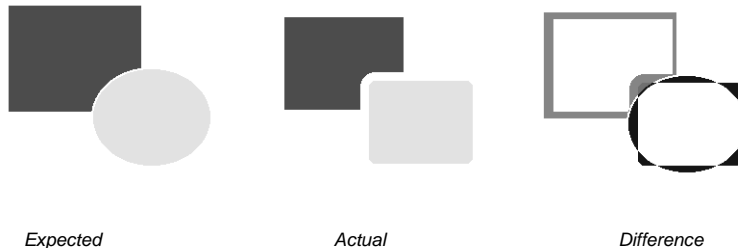
Note: You can edit the data in the Edit Check dialog box, which you open from the GUI Checkpoint Results dialog box. To do so, highlight the **TableContent** (or corresponding) property check, and click the **Edit Expected Value** button. For information on working with the Edit Check dialog box, see [Understanding the Edit Check Dialog Box](#) on page 451.

- 5 Choose **File > Exit** to close the Expected Data Viewer.



Analyzing the Results of a Bitmap Checkpoint

A bitmap checkpoint compares expected and actual bitmaps in your application. In the Test Results window you can view pictures of the expected and actual results. If a mismatch is detected by a bitmap checkpoint during a test run in Verification or Debug mode, the expected, actual, and difference bitmaps are displayed. For a mismatch during a test run in Update mode, only the expected bitmaps are displayed.



To remove a bitmap from the screen, double-click the system menu button in the bitmap window.

Note: You can control which types of bitmaps are displayed (expected, actual, difference) when you view the results of a bitmap checkpoint. To set the controls, choose **Options > Bitmap Controls** in the Test Results window.



Analyzing the Results of a Database Checkpoint

A database checkpoint helps you to identify changes in the contents and structure of databases in your application. The results of a database checkpoint are displayed in the Database Checkpoint Results dialog box that you open from the Test Results window.

Passed check

Failed check

Name	Arguments	Expected Value	Actual Value
Columns...		3	1
Content		<complex val...	<complex val...

Highlight Selected Object

OK Cancel Help

Books Online

Find

Find Again

Help

Top of Chapter

Back

The dialog box displays the checked database and the types of checks performed. Each check is marked as either passed or failed and the expected and the actual results are shown. If one or more property checks on the database fail, the entire database checkpoint is marked as failed in the test log.

You can update the expected value of a checkpoint. For additional information on see [Updating the Expected Results of a Checkpoint](#) on page 901. For a description of other options in this dialog box, see [Options in the Database Checkpoint Results Dialog Box](#) on page 895.










Note: You can edit the data in the Edit Check dialog box, which you open from the Database Checkpoint Results dialog box. To do so, highlight the **Content** check, and click the **Edit Expected Value** button. For information on working with the Edit Check dialog box, see [Understanding the Edit Check Dialog Box](#) on page 504.

For more information, see Chapter 17, [Checking Databases](#).



Options in the Database Checkpoint Results Dialog Box

The Database Checkpoint Results dialog box includes the following options:

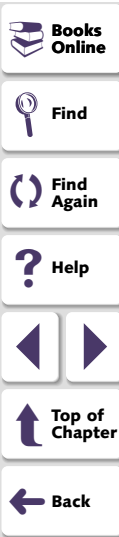
Button	Description
	Edit Expected Value enables you to edit the expected value of the selected property. For more information, see Creating a Custom Check on a Database on page 485.
	Compare Expected and Actual Values opens the Compare Values box, which displays the expected and actual values for the selected property check. For a Content check, opens the Data Comparison Viewer, which displays the expected and actual values for the check.
	Update Expected Value updates the expected value to the actual value. Note that this overwrites the saved expected value.
	Show Failures Only displays only failed checks.
	Show Standard Properties Only displays only standard properties.
	Show Nonstandard Properties Only displays only nonstandard properties, such as Visual Basic, PowerBuilder, and ActiveX control properties.
	Show All Properties displays all properties, including standard, nonstandard, and user-defined properties.



Analyzing the Expected Results of a Content Check in a Database Checkpoint

You can view the expected results of a content check in a database checkpoint either before or after you run your test. The expected results of a database checkpoint are displayed in the Database Checkpoint Results dialog box, which you open from the Test Results window. When you view the expected results of a content check in a database checkpoint from the Test Results window, you must choose the expected (“exp”) mode in the Results box.

Note that you can also view the expected results of a database checkpoint on a table from the Edit Check dialog box. For additional information, see Chapter 17, [Checking Databases](#).

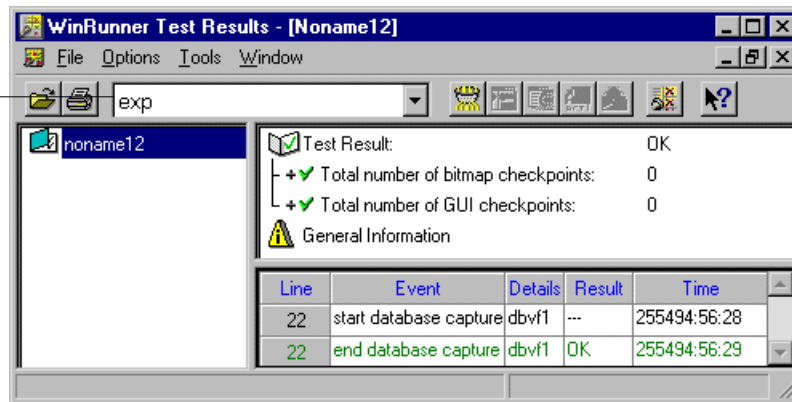


To display the expected results of a content check in a database checkpoint:



- 1 Choose **Tools > Test Results**, or click the **Test Results** button in the main WinRunner window to open the **WinRunner Test Results** window.
- 2 If “exp” does not already appear as the results folder in the Results box, then select it.

Results box

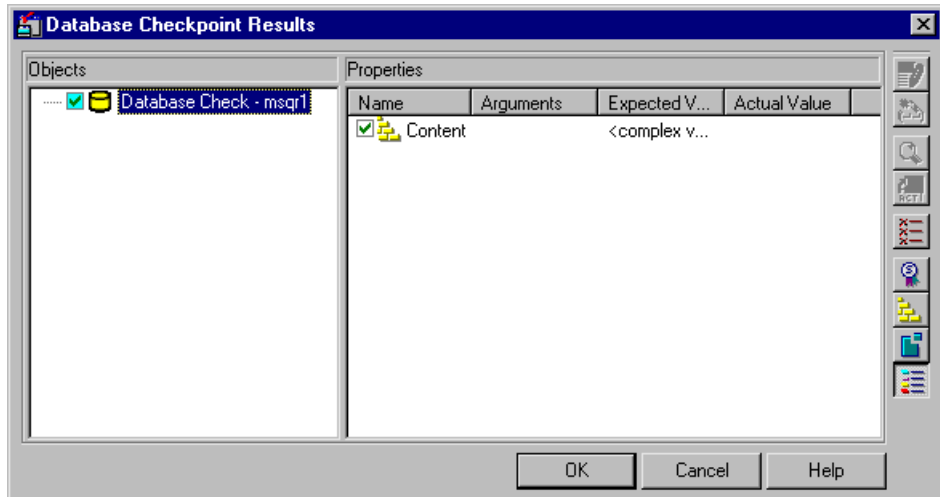


Note that since you are viewing the *expected* results of a test, the total number of database checkpoints performed by WinRunner is zero.





- 3 Double-click an “end database capture” entry in the test log. Alternatively, highlight the entry and choose **Options > Display** or click the **Display** button. The **Database Checkpoint Results** dialog box opens and the expected results of the selected database checkpoint are displayed.



Note that since you are viewing the *expected* results of the database checkpoint, the *actual* values are not displayed.



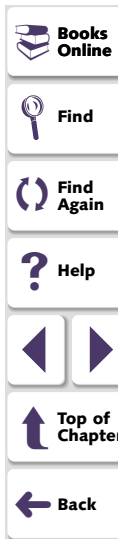
- 4 Highlight the **Content** check and click the **Display** button, or double-click the **Content** check.



The **Expected Data Viewer** opens, displaying the expected results.

The screenshot shows a window titled "Expected Data Viewer" with a menu bar (File, Edit, View, Utilities, Help) and a toolbar. The main area displays a table titled "Expected Data" with the following columns: Flight, From, Departure, To, Arrival, Airline, and Price. The table contains 10 rows of data. The status bar at the bottom shows "Ready" and a "NUM" field.

	Flight	From	Departure	To	Arrival	Airline	Price
1	9117	DEN	06:33 PM	LAX	07:31 PM	DA	\$111.60
2	7220	DEN	05:21 PM	LAX	06:19 PM	DA	\$135.20
3	6593	DEN	04:09 PM	LAX	05:07 PM	DA	\$124.80
4	6399	DEN	07:45 AM	LAX	08:43 AM	DA	\$122.40
5	6240	DEN	03:12 PM	LAX	06:12 PM	AA	\$175.47
6	6236	DEN	12:48 PM	LAX	03:48 PM	AA	\$102.90
7	6232	DEN	10:24 AM	LAX	01:24 PM	AA	\$104.00
8	5696	DEN	11:21 AM	LAX	12:19 PM	DA	\$122.40
9	5306	DEN	12:33 PM	LAX	01:31 PM	DA	\$120.00
10	2516	DEN	01:45 PM	LAX	02:43 PM	DA	\$134.00





Note: You can edit the data in the Edit Check dialog box, which you open from the Database Checkpoint Results dialog box. To do so, highlight the **Content** check, and click the **Edit Expected Value** button. For information on working with the Edit Check dialog box, see [Understanding the Edit Check Dialog Box](#) on page 504.

- 5 Choose **File > Exit** to close the Expected Data Viewer.



Updating the Expected Results of a Checkpoint

If a bitmap, GUI, or database checkpoint fails, you can update the data in the expected results folder (*exp*). The next time you run the test, the new expected results will be compared to the current results in the application.

For GUI and database checkpoints, you can update the results for the entire checkpoint, or update the results for a specific check within the checkpoint.

To update the expected results for an entire checkpoint:

- 1 In the **Test Results** window, highlight a mismatched checkpoint entry in the test log.
- 2 Choose **Options > Update** or click the **Update** button.
- 3 A dialog box warns that overwriting expected results cannot be undone. Click **Yes** to update the results.



To update the expected results for a specific check within a checkpoint:

- 1 Double-click the checkpoint entry in the log, choose **Options > Display**, or click the **Display** button.

The relevant dialog box opens.

- 2 In the **Properties** pane, highlight a failed check.



- 3 Click the **Update Expected Value** button.

- 4 A dialog box warns that if you replace the expected results with the actual results, WinRunner will overwrite the saved expected values. Click **Yes** to update the results.

- 5 Click **OK** to close the dialog box.



Viewing the Results of a File Comparison

If you used a `file_compare` statement in a test script to compare the contents of two files, you can view the results using the WDiff utility. This utility is accessed from the Test Results window.

To view the results of a file comparison:



- 1 Choose **Tools > Test Results** or click the **Test Results** button to open the Test Results window.



- 2 Double-click a “file compare” event in the test log. Alternatively, highlight the event and choose **Options > Display** or click **Display**. The WDiff utility window opens.

C:\mercurey\wrun40\tmp\Sample 1\script	C:\mercurey\wrun40\tmp\Sample 2\script
set window ("Flight Reservation", 10);	set window ("Flight Reservation", 10);
obj_mouse click ("Button 6", 9, 12, LEFT)	obj_mouse click ("Button 6", 6, 6, LEFT);
set window ("Open Order 1", 10);	set window ("Open Order 1", 10);
button_set ("Order No.", ON);	button_set ("Order No.", ON);
edit_set ("Edit", "1");	edit_set ("Edit", "2");
button_press ("OK");	button_press ("OK");
set window ("Flight Reservation", 10);	set window ("Flight Reservation", 10);
obj_mouse click ("Button 7", 9, 11, LEFT)	obj_mouse click ("Button 7", 12, 10, LEFT)
obj_type ("MSMask.MaskedTextBox", "111199");	obj_type ("MSMask.MaskedTextBox", "111199");
list_select_item ("Fly From:", "Denver");	list_select_item ("Fly From:", "Denver");
list_select_item ("Fly To:", "Los Angeles");	list_select_item ("Fly To:", "Los Angeles");
obj_mouse click ("FLIGHT 1", 32, 6, LEFT)	obj_mouse click ("FLIGHT 1", 46, 10, LEFT)
set window ("Flights Table 1", 10);	set window ("Flights Table 1", 10);
list_select_item ("Flight", "1159 DEN	list_select_item ("Flight", "2059 DEN
button_press ("OK");	button_press ("OK");
menu_select_item ("File;Exit");	menu_select_item ("File;Exit");

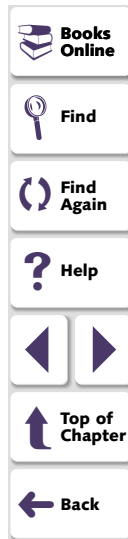
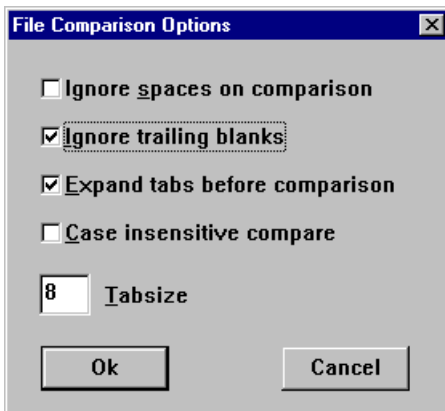
Line contains a mismatch

Line does not contain a mismatch



The WDiff utility displays both files. Lines in the file that contain a mismatch are highlighted. The file defined in the first parameter of the **file_compare** statement is on the left side of the window.

- To see the next mismatch in a file, choose **View > Next Diff** or press the Tab key. The window scrolls to the next highlighted line. To see the previous difference, choose **View > Prev Diff** or press the Backspace key.
- You can choose to view only the lines in the files that contain a mismatch. To filter file comparison results, choose **Options > View > Hide Matching Areas**. The window shows only the highlighted parts of both files.
- To modify the way the actual and expected results are compared, choose **Options > File Comparison**. The File Comparison dialog box opens.



Note that when you modify any of the options, the two files are read and compared again.

Ignore spaces on comparison: Tab characters and spaces are ignored on comparison.

Ignore trailing blanks (default): One or more blanks at the end of a line are ignored during the comparison.

Expand tabs before comparison (default): Tab characters (hex 09) in the text are expanded to the number of spaces which are necessary to reach the next tab stop. The number of spaces between tab stops is specified in the **Tabsize** parameter. This **expand tabs before comparison** option will be ignored, if the **Ignore spaces on comparison** option is selected at the same time.

Case insensitive compare: Uppercase and lowercase is ignored during comparison of the files.

Tabsize: The tabsize (number of spaces between tab stops) is selected between 1 and 19 spaces. The default size is 8 spaces. The option influences the file comparison, if the **expand tabs before comparison** option is also set. Tabs are always expanded to the given number of spaces.

- 3 Choose **File > Exit** to close the WDiff Utility.



Reporting Defects Detected During a Test Run



If a test run detects a defect in the application under test, you can report it directly from the Test Results window to a TestDirector project. To report a defect, click the **Report Bug** button or choose **Tools > Report Bug**.

- If you are using TestDirector 7.0i, the Add Defect dialog box opens directly from the WinRunner Test Results window.
- If you are using TestDirector 6.0 and the TestDirector Web Defect Manager is installed on your machine, then it opens directly from the WinRunner Test Results window. Otherwise, the Remote Defect Reporter opens directly from the WinRunner Test Results window.

For more information, see Chapter 46, [Reporting Defects](#).



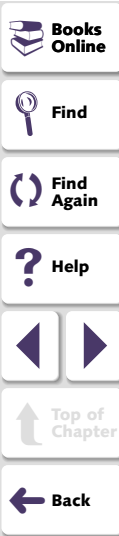
Running Tests

Running Batch Tests

WinRunner enables you to execute a group of tests unattended. This can be particularly useful when you want to run a large group of tests overnight or at other off-peak hours.

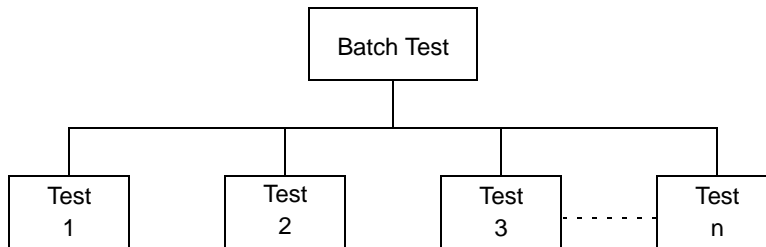
This chapter describes:

- **Creating a Batch Test**
- **Running a Batch Test**
- **Storing Batch Test Results**
- **Viewing Batch Test Results**



About Running Batch Tests

You can run a group of tests unattended by creating and executing a single batch test. A batch test is a test script that contains call statements to other tests. It opens and executes each test and saves the test results.



A batch test looks like a regular test that includes call statements. A test becomes a “batch test” when you select the Run in Batch Mode option in the Run tab of the General Options dialog box before you execute the test.

When you run a test in Batch mode, WinRunner suppresses all messages that would ordinarily be displayed during the test run, such as a message reporting a bitmap mismatch. WinRunner also suppresses all **pause** statements and any halts in the test run resulting from run time errors.



By suppressing all messages, WinRunner can run a batch test unattended. This differs from a regular, interactive test run in which messages appear on the screen and prompt you to click a button in order to resume test execution. A batch test enables you to run tests overnight or during off-peak hours, so that you can save time while testing your application.

When a batch test run is completed, you can view the results in the Test Results window. The window displays the results of all the major events that occurred during the run.

Note that you can also run a group of tests from the command line. For details, see Chapter 34, [Running Tests from the Command Line](#).



Creating a Batch Test

A batch test is a test script that calls other tests. You program a batch test by typing call statements directly into the test window and selecting the Batch Run in Batch Mode option in the Run tab of the General Options dialog box before you execute the test.

A batch test may include programming elements such as loops and decision-making statements. Loops enable a batch test to run called tests a specified number of times. Decision-making statements such as *if/else* and *switch* condition test execution on the results of a test called previously by the same batch script. See Chapter 24, [Enhancing Your Test Scripts with Programming](#), for more information.

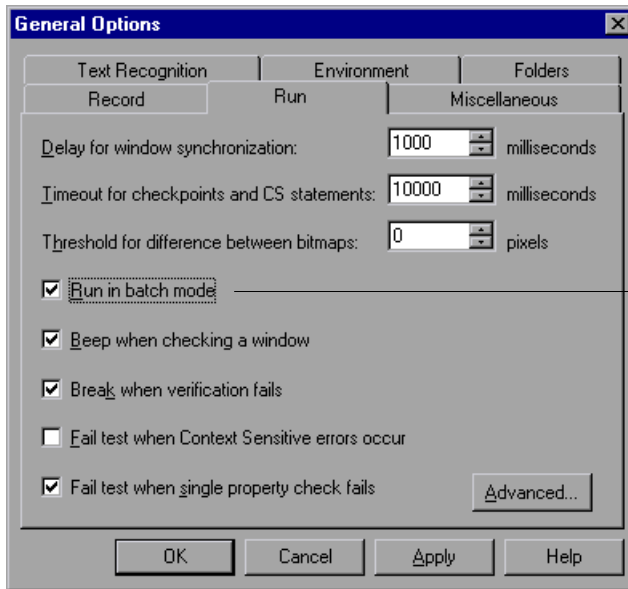
For example, the following batch test executes three tests in succession, then loops back and calls the tests again. The loop specifies that the batch test should call the tests ten times.

```
for (i=0; i<10; i++)
{
  call "c:\\pbtests\\open" ();
  call "c:\\pbtests\\setup" ();
  call "c:\\pbtests\\save" ();
}
```



To enable a batch test:

- 1 Choose **Settings > General Options**. The General Options dialog box opens.
- 2 Click the **Run** tab.
- 3 Select the **Run in batch mode** check box.



Run in batch mode check box

- 4 Click **OK** to close the General Options dialog box.

For more information on setting the batch option in the General Options dialog box, see Chapter 40, **Setting Global Testing Options**.



Running a Batch Test

You execute a batch test in the same way that you execute a regular test. Choose a mode (Verify, Update, or Debug) from the list on the toolbar and choose Run > Run from Top. See Chapter 31, [Running Tests](#), for more information.

When you run a batch test, WinRunner opens and executes each called test. All messages are suppressed so that the tests are run without interruption. If you run the batch test in Verify mode, the current test results are compared to the expected test results saved earlier. If you are running the batch test in order to update expected results, new expected results are created in the expected results folder for each test. See [Storing Batch Test Results](#) below for more information. When the batch test run is completed, you can view the test results in the Test Results window.

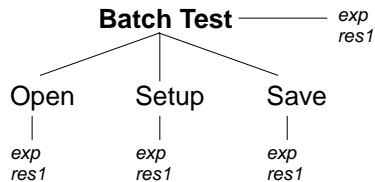
Note that if your tests contain TSL **textit** statements, WinRunner interprets these statements differently for a batch test run than for a regular test run. During a regular test run, **textit** terminates test execution. During a batch test run, **textit** halts execution of the current test only and control is returned to the batch test.



Storing Batch Test Results

When you run a regular, interactive test, results are stored in a subfolder under the test. The same is true when a test is called by a batch test. WinRunner saves the results for each called test separately in a subfolder under the test. A subfolder is also created for the batch test that contains the overall results of the batch test run.

For example, suppose you create three tests: *Open*, *Setup*, and *Save*. For each test, expected results are saved in an *exp* subfolder under the test folder. Suppose you also create a batch test that calls the three tests. Before running the batch test in Verify mode, you instruct WinRunner to save the results in a folder called *res1*. When the batch test is run, it compares the current test results to the expected results saved earlier. Under each test folder, WinRunner creates a subfolder called *res1* in which it saves the verification results for the test. A *res1* folder is also created under the batch test to contain the overall verification results for the entire run.



If you run the batch test in Update mode in order to update expected results, WinRunner overwrites the expected results in the *exp* subfolder for each test and for the batch test.

Note that if you run the batch test without selecting the Run in Batch Mode check box in the General Options dialog box, WinRunner saves results only in a subfolder for the batch test. This can cause problems at a later stage if you choose to run the tests separately, since WinRunner will not know where to look for the previously saved expected and verification results.



Viewing Batch Test Results

When a batch test run is completed, you can view information about the events that occurred during the run in the Test Results window. If one of the called tests fails, the batch test is marked as failed.

The test log section of the Test Results window lists all the events that occurred during the batch test run. Each time a test is called, a *call_test* entry is listed in the log. In the Result column, you can see whether the **call** statement was successful. Note that even though a **call** statement is successful, the called test itself may fail, based on the usual criteria for tests failing. You can set criteria for failing a test in the Run tab of the General Options dialog box. For additional information, see Chapter 40, [Setting Global Testing Options](#).

To view the results of the called test, double-click its *call_test* entry. For more information on viewing test results in the Test Results window, see Chapter 32, [Analyzing Test Results](#).



Running Tests

Running Tests from the Command Line

You can run tests directly from the Windows command line.

This chapter describes:

- **Using the Windows Command Line**
- **Command Line Options**



About Running Tests from the Command Line

You can use the Windows Run command to start WinRunner and run a test according to predefined options. You can also save your startup options by creating a custom WinRunner shortcut. Then, to start WinRunner with the startup options, you simply double-click the icon.

Using the command line, you can:

- start WinRunner
- load the relevant tests
- run the tests
- specify test options
- specify the results directories for the test

Most of the functional options that you can set within WinRunner can also be set from the command line. These include test run options and the directories in which test results are stored. You can also specify a *custom.ini* file that contains these and other environment variables and system parameters.



For example, the following command starts WinRunner, loads a batch test, and runs the test:

```
C:\Program Files\Mercury Interactive\WinRunner\WRUN.EXE -t  
c:\batch\newclock -batch on -run_minimized -dont_quit -run
```

The test *newclock* is loaded and then executed in batch mode with WinRunner minimized. WinRunner remains open after the test run is completed.



Using the Windows Command Line

You can use the Windows command line to start WinRunner with predefined options. If you plan to use the same set of options each time you start WinRunner, you can create a custom WinRunner shortcut.

Starting WinRunner from the Command Line

This procedure describes how to start WinRunner from the command line.

To start WinRunner from the Run command:

- 1 On the Windows **Start** menu, choose **Run**. The Run dialog box opens.
- 2 Type in the path of your WinRunner *wrun.exe* file, and then type in any command line options you want to use.
- 3 Click **OK** to close the dialog box and start WinRunner.

Note: If you add command line options to a path containing spaces, you must specify the path of the *wrun.exe* within quotes, for example:

```
"D:\Program Files\Mercury Interactive\WinRunner\arch\wrun.exe" -  
addins WebTest
```



Adding a Custom WinRunner Shortcut

You can make the options you defined permanent by creating a custom WinRunner shortcut.

To add a custom WinRunner shortcut:

- 1 Create a shortcut for your *wrun.exe* file in Windows Explorer or My Computer.
- 2 Click the right mouse button on the shortcut and choose **Properties**.
- 3 Click the **Shortcut** tab.
- 4 In the **Target** box, type in any command line options you want to use after the path of your WinRunner *wrun.exe* file.
- 5 Click **OK**.



Command Line Options

Following is a description of each command line option.

-addins *list of add-ins to load*

instructs WinRunner to load the specified add-ins. In the list, separate the add-ins by commas (without spaces). This can be used in conjunction with the **-addins_select_timeout** command line option.

Note: All installed add-ins are listed in the registry under:
*HKEY_LOCAL_MACHINE\SOFTWARE\Mercury
Interactive\WinRunner\CurrentVersion\Installed Components\.*

Use the syntax (spelling) displayed in the key names under this branch when specifying the add-ins to load. The names of the add-ins are not case sensitive.

For example, the following line will load the four add-ins that are included with WinRunner:

```
<WinRunner folder>\arch\wrun.exe -addins ActiveX,pb,vb,WebTest
```

(Formerly **-addons.**)



-addins_select_timeout *timeout*

instructs WinRunner to wait the specified time (in seconds) before closing the **Add-In Manager** dialog box when starting WinRunner. When the timeout is zero, the dialog box is not displayed. This can be used in conjunction with the **-addins** command line option.

(Formerly **-addons_select_timeout**.)

-animate

Instructs WinRunner to execute and run the loaded test, while the execution arrow displays the line of the test being run.

-auto_load {on | off}

Activates or deactivates automatic loading of the temporary GUI map file.

(Default = **on**)

-auto_load_dir *path*

Determines the folder in which the temporary GUI map file (*temp.gui*) resides. This option is applicable only when auto load is on.

(Default = **M_Home\dat**)



-batch {on | off}

Runs the loaded test in Batch mode.

(Default = **off**)

Note that you may also set this option using the **Run in batch mode** check box in the Run tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **getvar** function to retrieve the value of the corresponding *batch* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-beep {on | off}

Activates or deactivates the WinRunner system beep.

(Default = **on**)

Note that you may also set this option using the corresponding **Beep when checking a window** check box in the Run tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *beep* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

-create_text_report {on | off}

Instructs WinRunner to write test results to a text report, *report.txt*, which is saved in the results folder.

(Default = **off**)



-cs_fail {on | off}

Determines whether WinRunner fails a test when Context Sensitive errors occur. A Context Sensitive error is the failure of a Context Sensitive statement during a test. Context Sensitive errors are often due to WinRunner's failure to identify a GUI object.

For example, a Context Sensitive error will occur if you run a test containing a **set_window** statement with the name of a non-existent window. Context Sensitive errors can also occur when window names are ambiguous. For information about Context Sensitive functions, refer to the *TSL Online Reference*.

(Default = **off**)

Note that you may also set this option using the corresponding **Fail test when Context Sensitive errors occur** check box in the Run tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *cs_fail* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-cs_run_delay non-negative integer

Sets the time (in milliseconds) that WinRunner waits between executing Context Sensitive statements when running a test.

(Default = **0** [milliseconds])

Note that you may also set this option using the corresponding **Delay between execution of CS statements** box in the Advanced Run Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *cs_run_delay* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-delay_msec non-negative integer

Directs WinRunner to determine whether a window or object is stable before capturing it for a bitmap checkpoint or synchronization point. It defines the time (in milliseconds) that WinRunner waits between consecutive samplings of the screen. If two consecutive checks produce the same results, WinRunner captures the window or object. (Formerly **-delay**, which was measured in seconds.)

(Default = **1000** [milliseconds])

(Formerly **-delay**.)

Note: This parameter is accurate to within 20-30 milliseconds.

Note that you may also set this option using the corresponding **Delay for window synchronization** box in the Run tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *delay_msec* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-dont_connect

If the “Reconnect on startup” option is selected in the Connection to Test Director dialog box, this command line enables you to open WinRunner without connecting to Test Director.

To disable the “Reconnect on startup” option, select **Tools > TestDirector Connection** and clear the **Reconnect on startup** check box as described in Chapter 34, [Running Tests from the Command Line](#).

-dont_quit

Instructs WinRunner not to close after completing the test.

-dont_show_welcome

Instructs WinRunner not to display the Welcome window when starting WinRunner.



-exp *expected results folder name*

Designates a name for the subfolder in which expected results are stored. In a verification run, specifies the set of expected results used as the basis for the verification comparison.

(Default = **exp**)

Note that you may also view this setting using the corresponding **Expected results folder** box in the **Current Test** tab of the Test Properties dialog box, described in Chapter 31, [Reviewing Current Test Settings](#).

Note that you can use the **getvar** function to retrieve the value of the corresponding *exp* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

-fast_replay {on | off}

Sets the speed of the test run. **on** sets tests to run as fast as possible and **off** sets tests to run at the speed at which they were recorded.

Note that you can also specify the test run speed in the Advanced Run Options dialog box in WinRunner (select **Tools > General Options > Run Tab** and click the **Advanced** button).

(Default = **on**)



-f file name

Specifies a text file containing command line options. The options can appear on the same line, or each on a separate line. This option enables you to circumvent the restriction on the number of characters that can be typed into the Target text box in the Shortcut tab of the Windows Properties dialog box.

Note: If a command line option appears both in the command line and in the file, WinRunner uses the settings of the option in the file.

-fontgrp group name

Specifies the active font group when WinRunner is started.

Note that you may also set this option using the corresponding **Font group** box in the Text Recognition tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *fontgrp* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-ini *initialization test name*

Defines the *wrun.ini* file that is used when WinRunner is started. This file is read-only, unless the **-update_ini** command line option is also used.

-min_diff *non-negative integer*

Defines the number of pixels that constitute the threshold for an image mismatch.

(Default = **0** [pixels])

Note that you may also set this option using the corresponding **Threshold for difference between bitmaps** box in the Run tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *min_diff* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-mismatch_break {on | off}

Activates or deactivates Break when Verification Fails before a verification run. The functionality of Break when Verification Fails is different than when running a test interactively: In an interactive run, the test is paused; For a test started from the command line, the first occurrence of a comparison mismatch terminates the test run.

Break when Verification Fails determines whether WinRunner pauses the test run and displays a message whenever verification fails or whenever any message is generated as a result of a Context Sensitive statement during a test that is run in Verify mode.

For example, if a **set_window** statement is missing from a test script, WinRunner cannot find the specified window. If this option is on, WinRunner pauses the test and opens the Run wizard to enable the user to locate the window. If this option is off, WinRunner reports an error in the Test Results window and proceeds to run the next statement in the test script.

(Default = **on**)

Note that you may also set this option using the corresponding **Break when verification fails** check box in the Run tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *mismatch_break* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-rec_item_name {0 | 1}

Determines whether WinRunner records non-unique ListBox and ComboBox items by name or by index.

(Default = 0)

Note that you may also set this option using the corresponding **Record non-unique list items by name** check box in the Record tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *rec_item_name* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

-run

Instructs WinRunner to run the loaded test. To load a test into the WinRunner window, use the **-t** command line option.

-run_minimized

Instructs WinRunner to open minimized. Note that specifying this option does not itself run tests: use the **-t** command line option to load a test and the **-run** command line option to run the loaded test.



-search_path path

Defines the directories to be searched for tests to be opened and/or called. The search path is given as a string.

(Default = **startup folder** and **installation folder\lib**)

Note that you may also set this option using the corresponding **Search path for called tests** box in the Folders tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *searchpath* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-single_prop_check_fail {ON | OFF}

Fails a test run when **_check_info** statements fail. It also writes an event to the Test Results window for these statements. (You can create **_check_info** statements using the **Create > GUI Checkpoint > For Single Property** command.)

You can use this option with the **setvar** and **getvar** functions.

(Default = **on**)

For information about the **check_info** functions, refer to the *TSL Online Reference*.

Note that you may also set this option using the corresponding **Fail test when single property check fails** option in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *single_prop_check_fail* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-speed {normal | fast}

Sets the speed for the execution of the loaded test.

(Default = **fast**)

Note that you may also set this option using the corresponding **Run Speed for Analog Mode** option in the Advanced Run Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *speed* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

(Formerly **-run_speed**.)

-t test name

Specifies the name of the test to be loaded in the WinRunner window. This can be the name of a test stored in a folder specified in the search path or the full pathname of any test stored in your system.



-td_connection {on | off}

Activates or deactivates WinRunner's connection to TestDirector.

(Default = **off**)

(Formerly **-test_director**.)

Note that you can use the corresponding *td_connection* testing option to activate or deactivate WinRunner's connection to TestDirector, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can connect to TestDirector from the **Connection to TestDirector** dialog box, which you open by choosing Tools > TestDirector Connection. For more information about connecting to TestDirector, see Chapter 44, [Managing the Testing Process](#).

-td_cycle_name *cycle name*

Specifies the name of the current test cycle. This option is applicable only when WinRunner is connected to TestDirector.

Note that you can use the corresponding *td_cycle_name* testing option to specify the name of the current test cycle, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

(Formerly **-cycle**.)



-td_database_name database path

Specifies the active TestDirector database. WinRunner can open, execute, and save tests in this database. This option is applicable only when WinRunner is connected to TestDirector.

Note that you can use the corresponding *td_database_name* testing option to specify the active TestDirector database, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that when WinRunner is connected to TestDirector, you can specify the active TestDirector project database from the **Connection to TestDirector** dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information, see Chapter 44, [Managing the Testing Process](#).

(Formerly **-database**.)



-td_password password

Specifies the password for connecting to a database in a TestDirector server.

Note that you can specify the password for connecting to TestDirector from the **Connection to TestDirector** dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see Chapter 44, [Managing the Testing Process](#).

-td_server_name server name

Specifies the name of the TestDirector server to which WinRunner connects.

Note that you can use the corresponding *td_server_name* testing option to specify the name of the TestDirector server to which WinRunner connects, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

In order to connect to the server, use the **td_connection** option.

(Formerly **-td_server**.)



`-td_user_name user name`

Specifies the name of the user who is currently executing a test cycle.

Note that you can use the corresponding `td_user_name` testing option to specify the user, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can specify the user name when you connect to TestDirector from the **Connection to TestDirector** dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see Chapter 44, [Managing the Testing Process](#).

(Formerly `-user_name` or `user`.)



-timeout_msec non-negative integer

Sets the global timeout (in milliseconds) used by WinRunner when executing checkpoints and Context Sensitive statements. This value is added to the *time* parameter embedded in GUI checkpoint or synchronization point statements to determine the maximum amount of time that WinRunner searches for the specified window or object. (Formerly *timeout*, which was measured in seconds.)

(Default = **10,000** [milliseconds])

(Formerly **-timeout**.)

Note: This option is accurate to within 20-30 milliseconds.

Note that you may also set this option using the corresponding **Timeout for checkpoints and CS statements** box in the Run tab of the Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *timeout_msec* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



-tslinit_exp *expected results folder*

Directs WinRunner to the expected folder to be used when the *tslinit* script is running.

-update_ini

Saves changes to configuration made during a WinRunner session when the *wrun.ini* file is specified by the **-ini** command line option.

Note: You can only use this command line option when you also use the **-ini** command line option.

-verify *verification results folder name*

Specifies that the test is to be run in Verify mode and designates the name of the subfolder in which the test results are stored.



Debugging Tests



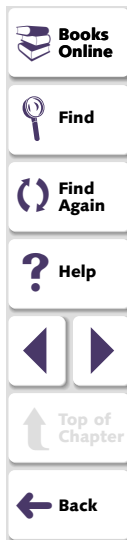
Debugging Tests

Debugging Test Scripts

Controlling the test run can help you to identify and eliminate defects in your test scripts.

This chapter describes:

- **Running a Single Line of a Test Script**
- **Running a Section of a Test Script**
- **Pausing a Test Run**



About Debugging Test Scripts

After you create a test script you should check that it runs smoothly, without errors in syntax or logic. In order to detect and isolate defects in a script, you can use the Step and Pause commands to control test execution.

The following Step commands are available:

- The Step command runs a single line of a test script.
- The Step Into command calls and displays another test or user-defined function.
- The Step Out command—used in conjunction with Step Into—completes the execution of a called test or user-defined function.
- The Step to Cursor command runs a selected section of a test script.

In addition, you can use the Pause command or the **pause** function to temporarily suspend the test run.

You can also control the test run by setting breakpoints. A breakpoint pauses a test run at a pre-determined point, enabling you to examine the effects of the test on your application. For more information, see Chapter 36, [Using Breakpoints](#).



To help you debug your tests, WinRunner enables you to monitor variables in a test script. You define the variables you want to monitor in a Watch List. As the test runs, you can view the values that are assigned to the variables. For more information, see Chapter 37, [Monitoring Variables](#).

When you debug a test script, you run the test in the Debug mode. The results of the test are saved in a *debug* folder. Each time you run the test, the previous debug results are overwritten. Continue to run the test in the Debug mode until you are ready to run it in Verify mode. For more information on using the Debug mode, see Chapter 31, [Running Tests](#).



Running a Single Line of a Test Script

You can run a single line of a test script using the Step, Step Into and Step Out commands.



Step

Choose the **Step** command or click the corresponding **Step** button to execute only the current line of the active test script—the line marked by the execution arrow.

When the current line calls another test or a user-defined function, the called test or function is executed in its entirety but the called test script is not displayed in the WinRunner window.



Step Into

Choose the **Step Into** command or click the corresponding **Step Into** button to execute only the current line of the active test script. However, in contrast to Step, if the current line of the executed test calls another test or a user-defined function in compiled mode:

- The test script of the called test or function is displayed in the WinRunner window.
- The called test or function is not executed. Use Step or Step Out to continue running the test.



Step Out

You use the **Step Out** command only after entering a test or a user-defined function using Step Into. Step Out executes to the end of the called test or user-defined function, returns to the calling test, and then pauses the test run.

Running a Section of a Test Script

You can execute a selected section of a test script using the Step to Cursor command.

To use the Step to Cursor command:

- 1 Move the execution arrow to the line in the test script from which you want to begin test execution. To move the arrow, click inside the margin next to the desired line in the test script.
- 2 Click inside the test script to move the cursor to the line where you want test execution to stop.
- 3 Choose **Run > Step to Cursor** or press the STEP TO CURSOR softkey. WinRunner runs the test up to the line marked by the insertion point.



Pausing a Test Run

You can temporarily suspend a test run by choosing the Pause command or by adding a **pause** statement to your test script.



Pause Command

You can suspend the running of a test by choosing **Run > Pause**, clicking the **Pause** button, or pressing the PAUSE softkey. A paused test stops running when all previously interpreted TSL statements have been executed. Unlike the Stop command, Pause does not initialize test variables and arrays.

To resume running of a paused test, choose the appropriate Run command on the Run menu. The test run continues from the point that you invoked the Pause command, or from the execution arrow if you moved it while the test was suspended.



The pause Function

When WinRunner processes a **pause** statement in a test script, test execution halts and a message box is displayed. If the **pause** statement includes an expression, the result of the expression appears in the message box. The syntax of the **pause** function is:

```
pause ( [ expression ] );
```

In the following example, **pause** suspends the test run and displays the time that elapsed between two points.

```
t1=get_time();  
t2=get_time();  
pause ("Time elapsed" is & t2-t1);
```

For more information on the **pause** function, refer to the *TSL Online Reference*.

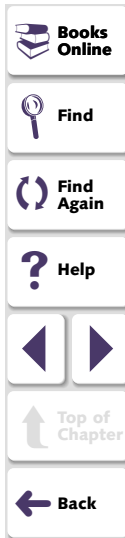


Debugging Tests Using Breakpoints

A breakpoint marks a place in the test script where you want to pause a test run. Breakpoints help to identify flaws in a script.

This chapter describes:

- **Breakpoint Types**
- **Setting Break at Location Breakpoints**
- **Setting Break in Function Breakpoints**
- **Modifying Breakpoints**
- **Deleting Breakpoints**



About Breakpoints



By setting a breakpoint you can stop a test run at a specific place in a test script. A breakpoint is indicated by a breakpoint marker in the left margin of the test window.

WinRunner pauses the test run when it reaches a breakpoint. You can examine the effects of the test run up to the breakpoint, make any necessary changes, and then continue running the test from the breakpoint. Use the Run from Arrow command to restart the test run. Once restarted, WinRunner continues running the test until it encounters the next breakpoint or the test is completed.

You can use breakpoints to:

- suspend the test run and inspect the state of your application
- monitor the entries in the Watch List. See Chapter 37, [Monitoring Variables](#), for more information.
- mark a point from which to begin stepping through a test script using the Step commands. See Chapter 35, [Debugging Test Scripts](#), for more information.

There are two types of breakpoints: Break at Location and Break in Function. A Break at Location breakpoint stops a test at a specified line number in a test script. A Break in Function breakpoint stops a test when it calls a specified user-defined function in a loaded compiled module.



You set a pass count for each breakpoint you define. The pass count determines the number of times the breakpoint is passed before it stops the test run. For example, suppose you program a loop that performs a command twenty-five times. By default, the pass count is set to zero, so test execution stops after each loop. If you set the pass count to 25, execution stops only after the twenty-fifth iteration of the loop.

Note: The breakpoints you define are active only during your current WinRunner session. If you terminate your WinRunner session, you must redefine breakpoints to continue debugging the script in another session.



Breakpoint Types

WinRunner enables you to set two types of breakpoints: Break at Location and Break in Function.

Break at Location

A Break at Location breakpoint stops a test at a specified line number in a test script. This type of breakpoint is defined by a test name and a test script line number. The breakpoint marker appears in the left margin of the test script, next to the specified line. A Break at Location breakpoint might, for example, appear in the Breakpoints dialog box as:

```
ui_test[137] : 0
```

This means that the breakpoint marker appears in the test named *ui_test* at line 137. The number after the colon represents the pass count, which is set here to zero (the default). This means that WinRunner will stop running the test every time it passes the breakpoint.



Break in Function



A Break in Function breakpoint stops a test when it calls a specified user-defined function in a loaded compiled module. This type of breakpoint is defined by the name of a user-defined function and the name of the compiled module in which the function is located. When you define a Break in Function breakpoint, the breakpoint marker appears in the left margin of the WinRunner window, next to the first line of the function. WinRunner halts the test run each time the specified function is called. A Break in Function breakpoint might appear in the Breakpoints dialog box as:

```
ui_func [ui_test : 25] : 10
```

This indicates that a breakpoint has been defined for the line containing the *ui_func* function, in the *ui_test* compiled module: in this case line 25. The pass count is set to 10, meaning that WinRunner stops the test each time the function has been called ten times.



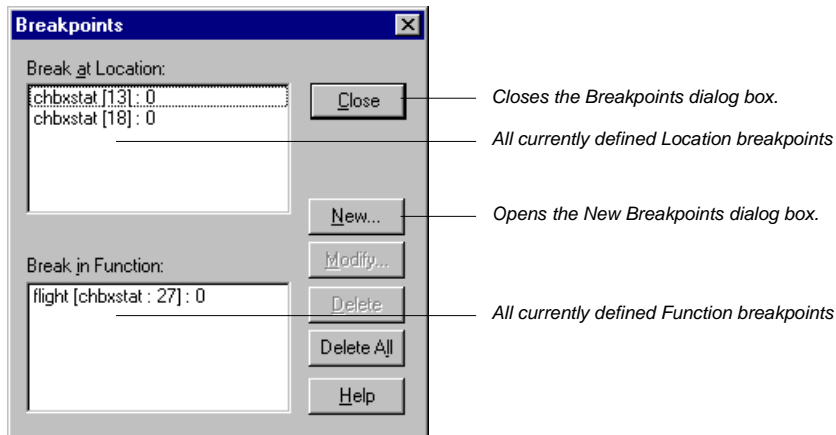
Setting Break at Location Breakpoints

You set Break at Location breakpoints using the Breakpoints dialog box, the mouse, or the Toggle Breakpoint command.

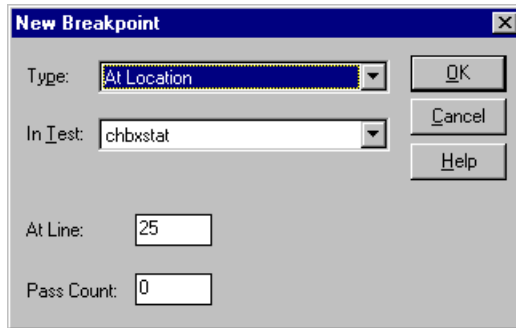
To set a Break at Location breakpoint using the Breakpoints dialog box:



- 1 Choose **Debug > Breakpoints** to open the Breakpoints dialog box. Alternatively, click the **Break in Function** button or choose **Debug > Break in Function** to open the New Breakpoint dialog box and proceed to step 3.



- Click **New** to open the New Breakpoint dialog box.



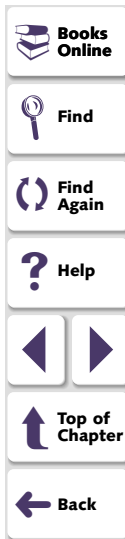
The screenshot shows a dialog box titled "New Breakpoint". It has a title bar with a close button (X). The dialog contains the following fields and controls:

- Type:** A dropdown menu with "At Location" selected.
- In Test:** A dropdown menu with "chbxstat" selected.
- At Line:** A text input field containing the number "25".
- Pass Count:** A text input field containing the number "0".
- Buttons:** "OK", "Cancel", and "Help" buttons are located on the right side of the dialog.

- Accept the breakpoint type and the test name. Modify the line number in the **At Line** box and the pass count in the **Pass Count** box as required.
- Click **OK** to set the breakpoint and close the New Breakpoint dialog box. The new breakpoint appears in the Break at Location list in the Breakpoints dialog box.
- Click **Close** to close the Breakpoints dialog box.

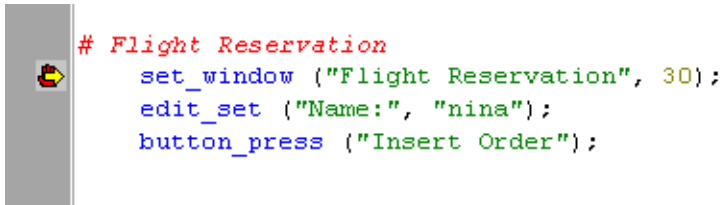


The breakpoint marker appears in the left margin of the test script, next to the specified line.



To set a Break at Location breakpoint using the mouse:

- 1 Move the execution arrow to the line in the test script at which you want test execution to stop. To move the arrow, click inside the margin next to the desired line in the test script.
- 2 Click the right mouse button. The breakpoint symbol appears in the left margin of the WinRunner window:



```
# Flight Reservation
set_window ("Flight Reservation", 30);
edit_set ("Name:", "nina");
button_press ("Insert Order");
```

To set a Break at Location breakpoint using the Toggle Breakpoint command:

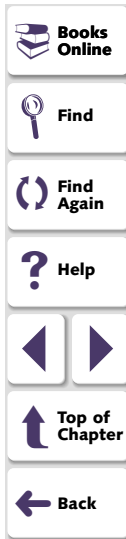
- 1 Move the insertion point to the line of the test script where you want test execution to stop.



- 2 Choose **Debug > Toggle Breakpoint** or click the **Toggle Breakpoint** button. The breakpoint symbol appears in the left margin of the WinRunner window.

To remove a Break at Location breakpoint:

- 1 Click the breakpoint symbol with the right mouse button.
- 2 Choose **Debug > Toggle Breakpoint**, or click the **Toggle Breakpoint** button.



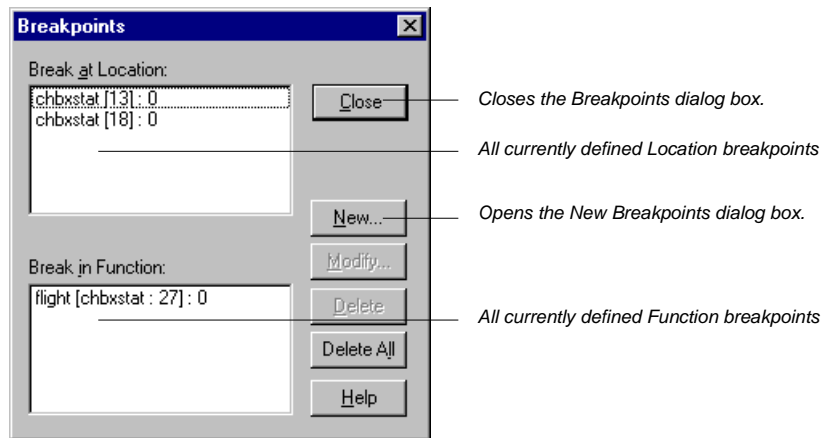
Setting Break in Function Breakpoints

A Break in Function breakpoint stops test execution at the user-defined function that you specify. You can set a Break in Function breakpoint using either the Breakpoints dialog box or the Break in Function command.

To set a Break in Function breakpoint using the Breakpoints dialog box:



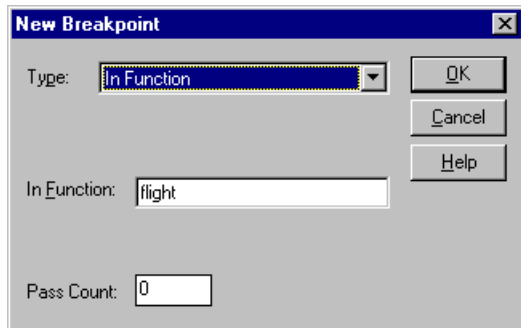
- 1 Choose **Debug > Breakpoints** to open the Breakpoints dialog box. Alternatively, click the **Break in Function** button and proceed to step 3.



- 2 Click **New** to open the New Breakpoint dialog box.



- In the **Type** box, click **In Function**. The dialog box changes so that you can type in a function name and a pass count value.

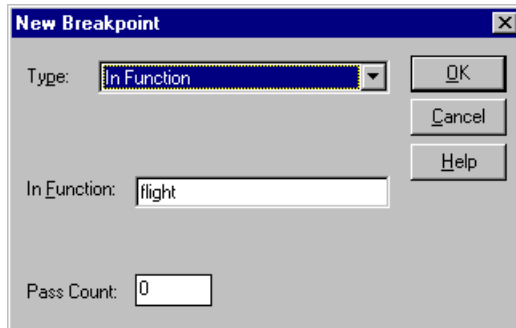


- Enter the name of a user-defined function in the **In Function** box. The function must be compiled by WinRunner. For more information, see Chapter 27, [Creating User-Defined Functions](#), and Chapter 28, [Creating Compiled Modules](#).
- Type a value in the **Pass Count** box.
- Click **OK** to set the breakpoint and close the New Breakpoint dialog box.
The new breakpoint appears in the Break in Function list of the Breakpoints dialog box.
- Click **Close** to close the Breakpoints dialog box.
The breakpoint symbol appears in the left margin of the WinRunner window.

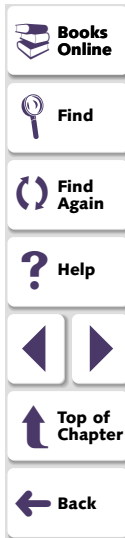


To set a **Break in Function** breakpoint using the **Break in Function** command:

- 1 Choose **Debug > Break in Function**. The New Breakpoint dialog box opens.



- 2 Type the name of a user-defined function in the **In Function** box. The function must be compiled by WinRunner. For more information, see Chapter 27, **Creating User-Defined Functions**, and Chapter 28, **Creating Compiled Modules**.
- 3 Type a value in the **Pass Count** box.
- 4 Click **OK**. The breakpoint symbol appears in the left margin of the WinRunner window.
- 5 Click **Close** to set the breakpoint and close the New Breakpoint dialog box.

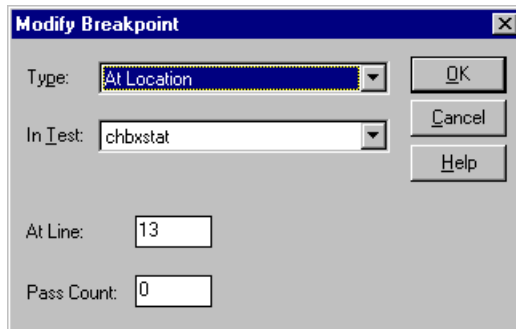


Modifying Breakpoints

You can modify the definition of a breakpoint using the Breakpoints dialog box. You can change the breakpoint's type, the test or line number for which it is defined, and the value of the pass count.

To modify a breakpoint:

- 1 Choose **Debug > Breakpoints** to open the Breakpoints dialog box.
- 2 Select a breakpoint in the **Break at Location** or the **Break in Function** list.
- 3 Click **Modify** to open the Modify Breakpoint dialog box.



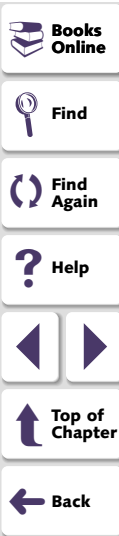
- 4 To change the type of breakpoint, select a different breakpoint type in the **Type** box.

To select another test, click its name in the **In Test** box.

To change the line number at which the breakpoint will appear, type a new value in the **At Line** box.

To change the pass count, type a new value in the **Pass Count** box.

- 5 Click **OK** to close the dialog box.



Deleting Breakpoints

You can delete a single breakpoint or all breakpoints defined for the current test using the Breakpoints dialog box.

To delete a single breakpoint:

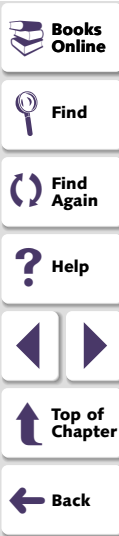
- 1 Choose **Debug > Breakpoints** to open the Breakpoints dialog box.
- 2 Select a breakpoint in either the **Break at Location** or the **Break in Function** list.
- 3 Click **Delete**. The breakpoint is removed from the list.
- 4 Click **Close** to close the Breakpoints dialog box.

Note that the breakpoint symbol is removed from the left margin of the WinRunner window.

To delete all breakpoints:

- 1 Open the Breakpoints dialog box.
- 2 Click **Delete All**. All breakpoints are deleted from both lists.
- 3 Click **Close** to close the dialog box.

Note that all breakpoint symbols are removed from the left margin of the WinRunner window.



Debugging Tests

Monitoring Variables

The Watch List displays the values of variables, expressions, and array elements during a test run. You use the Watch List to enhance the debugging process.

This chapter describes:

- **Adding Variables to the Watch List**
- **Viewing Variables in the Watch List**
- **Modifying Variables in the Watch List**
- **Assigning a Value to a Variable in the Watch List**
- **Deleting Variables from the Watch List**

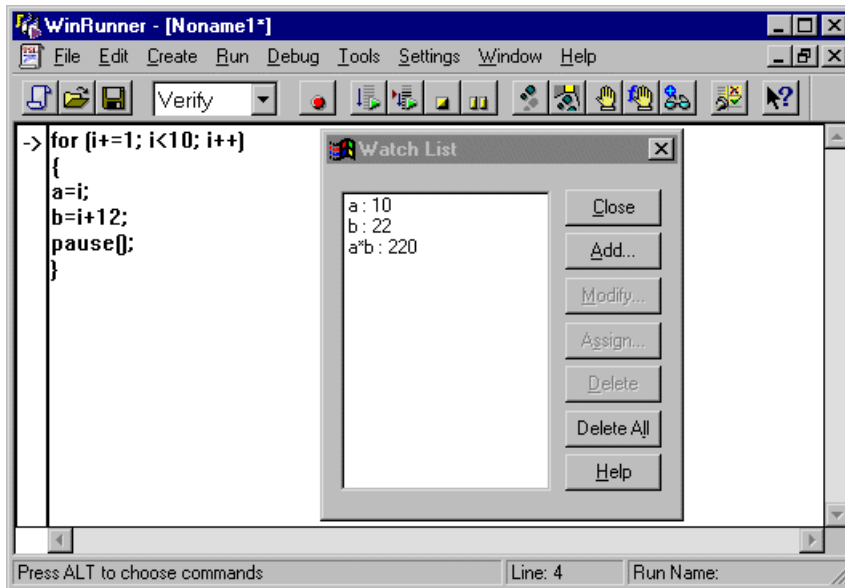


About Monitoring Variables

The Watch List enables you to monitor the values of variables, expressions, and array elements while you debug a test script. Prior to running a test, you add the elements that you want to monitor to the Watch List. During a test run, you can view the current values at each break in the test run—such as after a Step command, at a breakpoint, or at the end of a test.



For example, in the following test, the Watch List is used to measure and track the values of variables *a* and *b*. After each loop is executed, the test pauses so you can view the current values.



After WinRunner executes the first loop, the test pauses. The Watch List displays the variables and updates their values: When WinRunner completes the test run, the Watch List shows the following results:

a:10
b:22

If a test script has several variables with the same name but different scopes, the variable is evaluated according to the current scope of the interpreter. For example, suppose both *test_a* and *test_b* use a static variable *x*, and *test_a* calls *test_b*. If you include the variable *x* in the Watch List, the value of *x* displayed at any time is the current value for the test that WinRunner is interpreting.

If you choose a test in the Calls list (Debug > Calls), the context of the variables and expressions in the Watch List changes. WinRunner automatically updates their values in the Watch List.



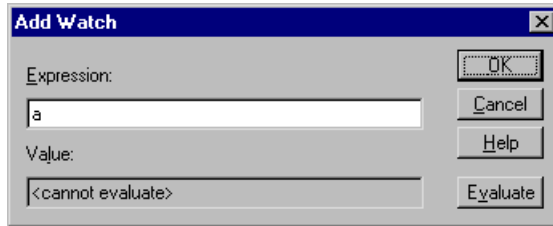
Adding Variables to the Watch List

You add variables, expressions, and arrays to the Watch List using the Add Watch dialog box.

To add a variable, an expression, or an array to the Watch List:



- 1 Choose **Debug > Add Watch** or click the **Add Watch** button to open the Add Watch dialog box.



Alternatively, you can open the Add Watch dialog box from the Watch List. Choose **Debug > Watch List** and click **Add**.

- 2 In the **Expression** box, enter the variable, expression, or array that you want to add to the Watch List.
- 3 Click **Evaluate** to see the current value of the new entry. If the new entry contains a variable or an array that has not yet been initialized, the message “<cannot evaluate>” appears in the **Value** box. The same message appears if you enter an expression that contains an error.



- 4 Click **OK**. The Add Watch dialog box closes and the new entry appears in the **Watch List**.

Note: Do not add expressions that assign or increment the value of variables to the Watch List; this can affect the test run.



Viewing Variables in the Watch List

Once you add variables, expressions, and arrays to the Watch List, you can use the Watch List to view their values.

To view the values of variables, expressions, and arrays in the Watch List:

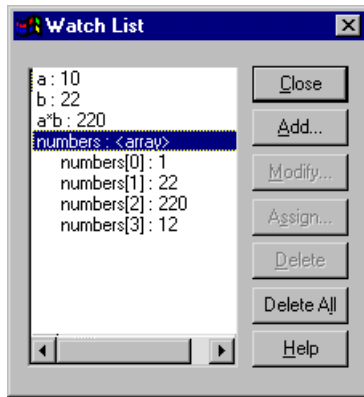
- 1 Choose **Debug > Watch List** to open the Watch List dialog box.



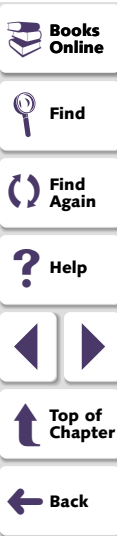
The variables, expressions and arrays are displayed; current values appear after the colon.



- To view values of array elements, double-click the array name. The elements and their values appear under the array name. Double-click the array name to hide the elements.



- Click **Close**.

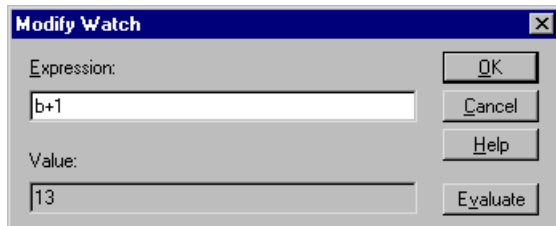


Modifying Variables in the Watch List

You can modify variables and expressions in the Watch List using the Modify Watch dialog box. For example, you can turn variable b into the expression $b + 1$, or you can change the expression $b + 1$ into $b * 10$. When you close the Modify Watch dialog box, the Watch List is automatically updated to reflect the new value for the expression.

To modify an expression in the Watch List:

- 1 Choose **Debug > Watch List** to open the Watch List dialog box.
- 2 Select the variable or expression you want to modify.
- 3 Click **Modify** to open the Modify Watch dialog box.



- 4 Change the expression in the **Expression** box as needed.
- 5 Click **Evaluate**. The new value of the expression appears in the **Value** box.
- 6 Click **OK** to close the Modify Watch dialog box. The modified expression and its new value appear in the Watch List.

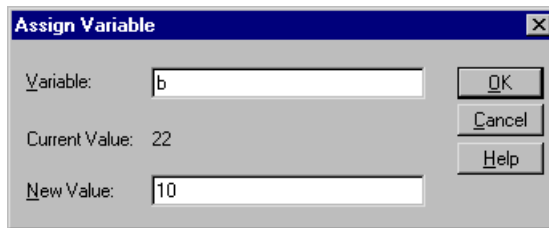


Assigning a Value to a Variable in the Watch List

You can assign new values to variables and array elements in the Watch List. Values can be assigned only to variables and array elements, not to expressions.

To assign a value to a variable or an array element:

- 1 Choose **Debug > Watch List** to open the Watch List dialog box.
- 2 Select a variable or an array element.
- 3 Click **Assign** to open the Assign Variable dialog box.



- 4 Type the new value for the variable or array element in the **New Value** box.
- 5 Click **OK** to close the dialog box. The new value appears in the Watch List.



Deleting Variables from the Watch List

You can delete selected variables, expressions, and arrays from the Watch List, or you can delete all the entries in the Watch List.

To delete a variable, an expression, or an array:

- 1 Choose **Debug > Watch List** to open the Watch List dialog box.
- 2 Select a variable, an expression, or an array to delete.

Note: You can delete an array only if its elements are hidden. To hide the elements of an array, double-click the array name in the Watch List.

- 3 Click **Delete** to remove the entry from the list.
- 4 Click **Close** to close the Watch List dialog box.

To delete all entries in the Watch List:

- 1 Choose **Debug > Watch List** to open the Watch List dialog box.
- 2 Click **Delete All**. All entries are deleted.
- 3 Click **Close** to close the dialog box.



Configuring WinRunner

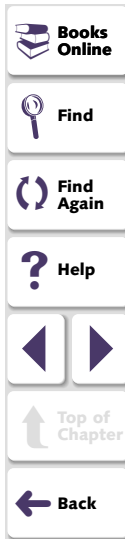


Customizing WinRunner's User Interface

You can customize WinRunner's user interface to adapt it to your testing needs and to the application you are testing.

This chapter describes:

- **Customizing the User Toolbar**
- **Using the User Toolbar**
- **Configuring WinRunner Softkeys**

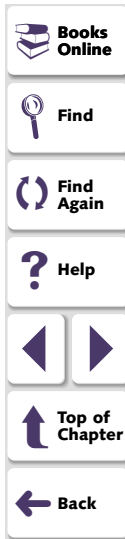


About Customizing WinRunner's User Interface

You can adapt WinRunner's user interface to your testing needs by changing the way you access WinRunner commands.

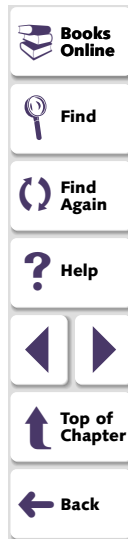
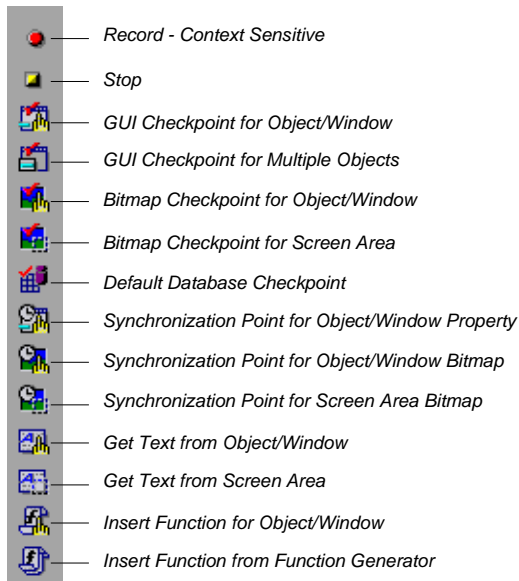
You may find that when you create and run tests, you frequently use the same WinRunner menu commands and insert the same TSL statements into your test scripts. You can create shortcuts to these commands and TSL statements by customizing the User toolbar.

The application you are testing may use softkeys that are preconfigured for WinRunner commands. If so, you can adapt WinRunner's user interface to this application by using WinRunner's Softkey utility to reconfigure the conflicting WinRunner softkeys.



Customizing the User Toolbar

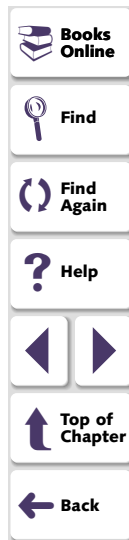
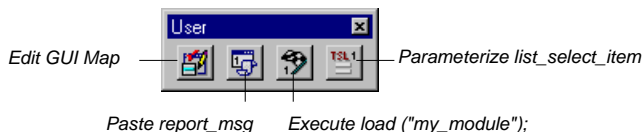
The User toolbar contains buttons for commands used when creating tests. In its default setting, the User toolbar enables easy access to the following WinRunner commands:



By default, the User toolbar is hidden. To display the User toolbar, select it on the Window menu. When it is displayed, its default position is docked at the right edge of the WinRunner window.

The User toolbar is a customizable toolbar. You can add or remove buttons to facilitate access to the commands you most frequently use when testing an application. You can use the User toolbar to:

- Execute additional WinRunner menu commands. For example, you can add a button to the User toolbar that opens the GUI Map Editor.
- Paste TSL statements into your test scripts. For example, you can add a button to the User toolbar that pastes the TSL statement **report_msg** into your test scripts.
- Execute TSL statements. For example, you can add a button to the User toolbar that executes the TSL statement **load ("my_module");**.
- Parameterize TSL statements before pasting them into your test scripts or executing them. For example, you can add a button to the User toolbar that enables you to add parameters to the TSL statement **list_select_item**, and then either paste it into your test script or execute it.

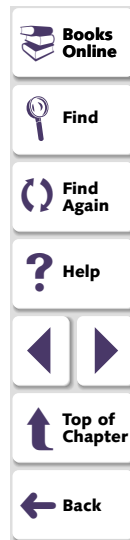


Note: None of the buttons that appear by default in the User toolbar appear in the illustration above.

Adding Buttons that Execute Menu Commands

You can add buttons to the User toolbar that execute frequently-used menu commands.

The tables below illustrate the buttons you can add to the User toolbar and the corresponding menu commands. In cases where the name of a button differs from the name of the menu command, the menu command appears in *italics* below the button name. Buttons that appear on the User toolbar by default are marked with an asterisk (*).

















File Menu

Command	Button	Command	Button
New		Save All	
Open		Test Properties	
Save		Print	
Save As			

 **Books Online**
 **Find**
 **Find Again**
 **Help**
 
 **Top of Chapter**
 **Back**

Edit Menu

Command	Button	Command	Button
Undo		Comment	
Redo		Uncomment	
Cut		Increase Indent	
Copy		Decrease Indent	
Paste		Find	
Delete		Replace	
Select All		Go To	

Books Online

Find

Find Again





















Help


◀ ▶

↑ Top of Chapter

← Back











Create Menu

Command	Button	Command	Button
Record - Context Sensitive *		Synchronization Point > For Object/Window Property *	
Stop *		Synchronization Point > For Object/Window Bitmap *	
GUI Checkpoint > For Single Property		Synchronization Point > For Screen Area Bitmap *	
GUI Checkpoint > For Object/Window *		Edit GUI Checklist	
GUI Checkpoint > For Multiple Objects *		Edit Database Checklist	
Bitmap Checkpoint > For Object/Window *		Get Text > From Object/Window *	
Bitmap Checkpoint > For Screen Area *		Get Text > From Screen Area *	
Default Database Checkpoint *		Insert Function > For Object/Window *	
Custom Database Checkpoint		Insert Function > From Function Generator *	
Runtime Record Checkpoint		RapidTest Script Wizard	

 **Books Online**
 **Find**
 **Find Again**
 **Help**

 **Top of Chapter**
 **Back**

Run Menu

Command	Button	Command	Button
Run from Top		Step Into	
Run from Arrow		Step Out	
Run Minimized (Top) <i>Run Minimized > From Top</i>		Step to Cursor	
Run Minimized (Arrow) <i>Run Minimized > From Arrow</i>		Pause	
Step		Stop	

Books Online






Find




Find Again

Help













Navigation icons: Left arrow, Right arrow, Top of Chapter (up arrow), Back (left arrow)

Debug Menu

Command	Button	Command	Button
Breakpoints		Watch List	
Toggle Breakpoint		Add Watch	
Break in Function			

-  **Books Online**
-  **Find**
-  **Find Again**
-  **Help**
- 
-  **Top of Chapter**
-  **Back**

Tools Menu

Command	Button	Command	Button
Spy <i>GUI Spy</i>		Fonts Expert	
Edit GUI Map <i>GUI Map Editor</i>		Exception Handling	
Configure GUI Map <i>GUI Map Configuration</i>		TestDirector Connection	
GUI Merge Tool		Data Table	
Learn Virtual Objects <i>Virtual Object Wizard</i>		Parameterize Data	
Test Results		Data Driver Wizard	

Books Online

Find

Find Again




Help

◀ ▶






↑ Top of Chapter

← Back

Settings Menu

Command	Button	Command	Button
General Options		Customize User Toolbar	
Editor Options			

Window Menu

Command	Button	Command	Button
Cascade		Arrange Icons	
Tile Horizontally		Close All	
Tile Vertically			

Books Online

Find

Find Again

Help

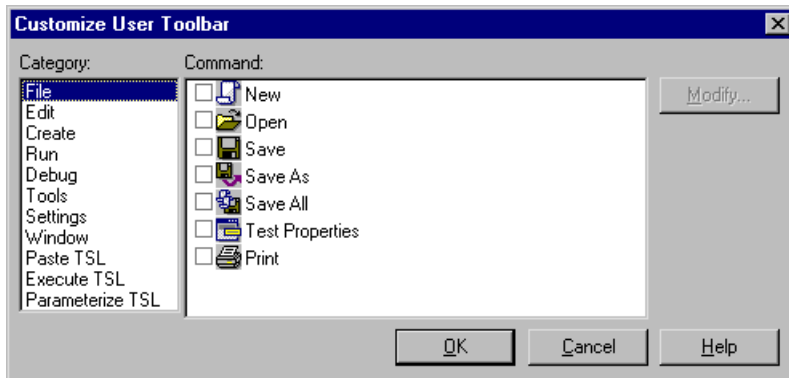
Top of Chapter

Back

To add a menu command to the User toolbar:

- 1 Choose **Settings > Customize User Toolbar**.

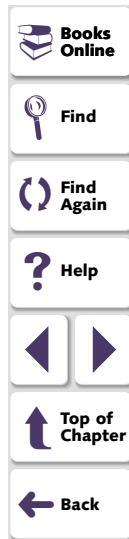
The Customize User Toolbar dialog box opens.



Note that each menu in the menu bar corresponds to a category in the Category pane of the Customize User Toolbar dialog box.

- 2 In the **Category** pane, select a menu.
- 3 In the **Command** pane, select the check box next to the menu command.
- 4 Click **OK** to close the Customize User Toolbar dialog box.

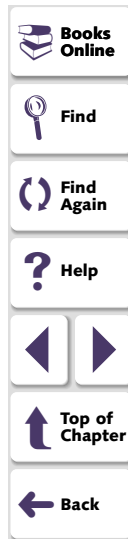
The selected menu command button is added to the User toolbar.



To remove a menu command from the User toolbar:

- 1 Choose **Settings > Customize User Toolbar** to open the Customize User Toolbar dialog box.
- 2 In the **Category** pane, select a menu.
- 3 In the **Command** pane, clear the check box next to the menu command.
- 4 Click **OK** to close the Customize User Toolbar dialog box.

The selected menu command button is removed from the User toolbar.

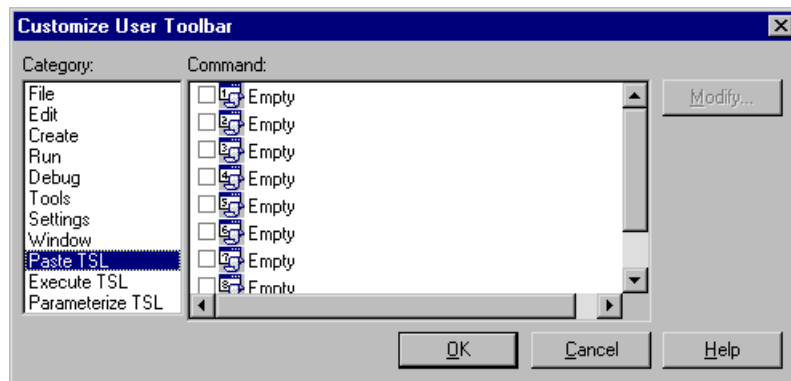


Adding Buttons that Paste TSL Statements

You can add buttons to the User toolbar that paste TSL statements into test scripts. One button can paste a single TSL statement or a group of statements.

To add a button to the User toolbar that pastes TSL statements:

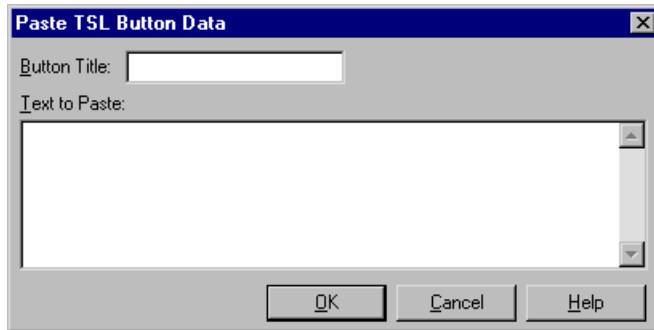
- 1 Choose **Settings > Customize User Toolbar**. The Customize User Toolbar dialog box opens.
- 2 In the **Category** pane, select **Paste TSL**.



- 3 In the **Command** pane, select the check box next to a button, and then select the button.



- 4 Click **Modify**. The Paste TSL Button Data dialog box opens.

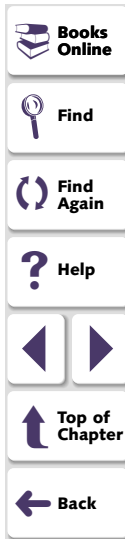


- 5 In the **Button Title** box, enter a name for the button.
- 6 In the **Text to Paste** pane, enter the TSL statement(s).
- 7 Click **OK** to close the Paste TSL Button Data dialog box.

The name of the button is displayed beside the corresponding button in the Command pane.

- 8 Click **OK** to close the Customize User Toolbar dialog box.

The button is added to the User toolbar.



To modify a button on the User toolbar that pastes TSL statements:

- 1 Choose **Settings > Customize User Toolbar** to open the Customize User Toolbar dialog box.
- 2 In the **Category** pane, select **Paste TSL**.
- 3 In the **Command** pane, select the button whose content you want to modify.
- 4 Click **Modify**.
The Paste TSL Button Data dialog box opens.
- 5 Enter the desired changes in the **Button Title** box and/or the **Text to Paste** pane.
- 6 Click **OK** to close the Paste TSL Button Data dialog box.
- 7 Click **OK** to close the Customize User Toolbar dialog box.

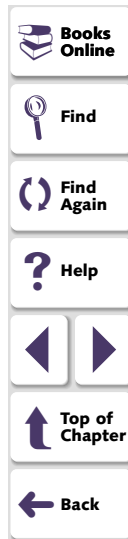
The button on the User toolbar is modified.



To remove a button from the User toolbar that pastes TSL statements:

- 1 Choose **Settings** > **Customize User Toolbar** to open the Customize User Toolbar dialog box.
- 2 In the **Category** pane, select **Paste TSL**.
- 3 In the **Command** pane, clear the check box next to the button.
- 4 Click **OK** to close the Customize User Toolbar dialog box.

The button is removed from the User toolbar.



Adding Buttons that Execute TSL Statements

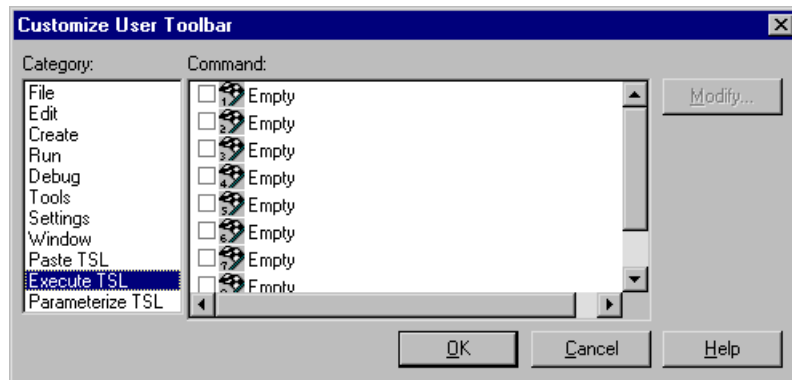
You can add buttons to the User toolbar that execute frequently-used TSL statements.

To add a button to the User toolbar that executes a TSL statement:

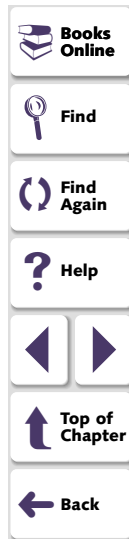
- 1 Choose **Settings > Customize User Toolbar**.

The Customize User Toolbar dialog box opens.

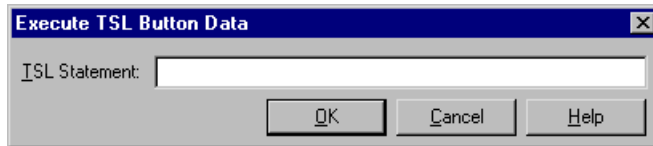
- 2 In the **Category** pane, select **Execute TSL**.



- 3 In the **Command** pane, select the check box next to a button, and then select the button.
- 4 Click **Modify**.



The Execute TSL Button Data dialog box opens.



- 5 In the **TSL Statement** box, enter the TSL statement.
- 6 Click **OK** to close the Execute TSL Button Data dialog box.

The TSL statement is displayed beside the corresponding button in the Command pane.

- 7 Click **OK** to close the Customize User Toolbar dialog box.

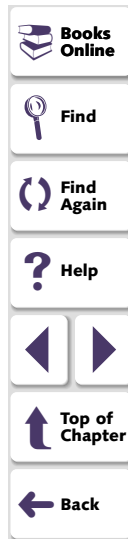
The button is added to the User toolbar.



To modify a button on the User toolbar that executes a TSL statement:

- 1** Choose **Settings > Customize User Toolbar** to open the Customize User Toolbar dialog box.
- 2** In the **Category** pane, select **Execute TSL**.
- 3** In the **Command** pane, select the button whose content you want to modify.
- 4** Click **Modify**.
The Execute TSL Button Data dialog box opens.
- 5** Enter the desired changes in the **TSL Statement** box.
- 6** Click **OK** to close the Execute TSL Button Data dialog box.
- 7** Click **OK** to close the Customize User Toolbar dialog box.

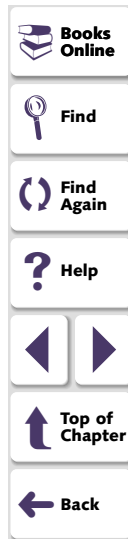
The button on the User toolbar is modified.



To remove a button from the User toolbar that executes a TSL statement:

- 1 Choose **Settings > Customize User Toolbar** to open the Customize User Toolbar dialog box.
- 2 In the **Category** pane, select **Execute TSL**.
- 3 In the **Command** pane, clear the check box next to the button.
- 4 Click **OK** to close the Customize User Toolbar dialog box.

The button is removed from the User toolbar.

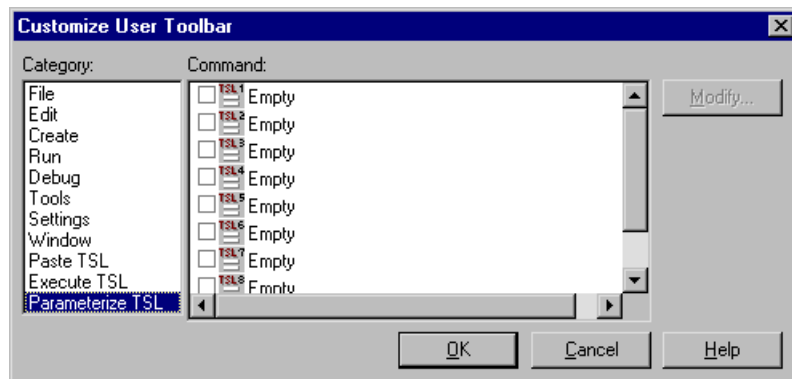


Adding Buttons that Parameterize TSL Statements

You can add buttons to the User toolbar that enable you to easily parameterize frequently-used TSL statements, and then paste them into your test script or execute them.

To add a button to the User toolbar that enables you to parameterize a TSL statement:

- 1 Choose **Settings > Customize User Toolbar**. The Customize User Toolbar dialog box opens.
- 2 In the **Category** pane, select **Parameterize TSL**.

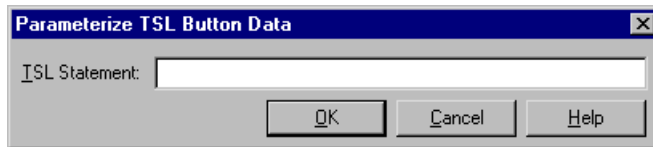


- 3 In the **Command** pane, select the check box next to a button, and then select the button.



4 Click **Modify**.

The Parameterize TSL Button Data dialog box opens.



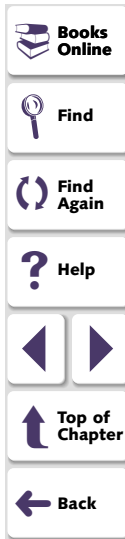
5 In the **TSL Statement** box, enter the name of TSL function. You do not need to enter any parameters. For example, enter **list_select_item**.

6 Click **OK** to close the Parameterize TSL Button Data dialog box.

The TSL statement is displayed beside the corresponding button in the Command pane.

7 Click **OK** to close the Customize User Toolbar dialog box.

The button is added to the User toolbar.



To modify a button on the User toolbar that enables you to parameterize a TSL statement:

- 1 Choose **Settings > Customize User Toolbar** to open the Customize User Toolbar dialog box.
- 2 In the **Category** pane, select **Parameterize TSL**.
- 3 In the **Command** pane, select the button whose content you want to modify.
- 4 Click **Modify**.
The Parameterize TSL Button Data dialog box opens.
- 5 Enter the desired changes in the **TSL Statement** box.
- 6 Click **OK** to close the Parameterize TSL Button Data dialog box.
- 7 Click **OK** to close the Customize User Toolbar dialog box.

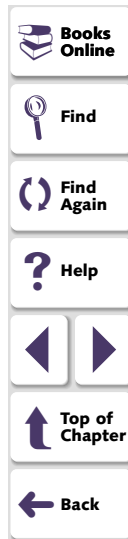
The button on the User toolbar is modified.



To remove a button from the User toolbar that enables you to parameterize a TSL statement:

- 1 Choose **Settings > Customize User Toolbar** to open the Customize User Toolbar dialog box.
- 2 In the **Category** pane, select **Parameterize TSL**.
- 3 In the **Command** pane, clear the check box next to the button.
- 4 Click **OK** to close the Customize User Toolbar dialog box.

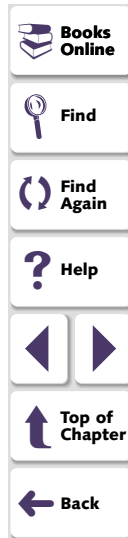
The button is removed from the User toolbar.



Using the User Toolbar

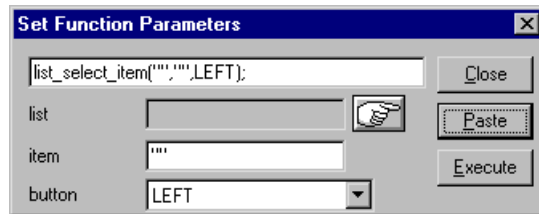
The User toolbar is hidden by default. You can display it by selecting it on the Window menu. To execute a command on the User toolbar, click the button that corresponds to the command you want. You can also access the same TSL-based commands that appear on the User toolbar by choosing them on the Create menu.

When the User toolbar is a “floating” toolbar, it remains open when you minimize WinRunner while recording a test. For additional information, see Chapter 11, [Creating Tests](#).



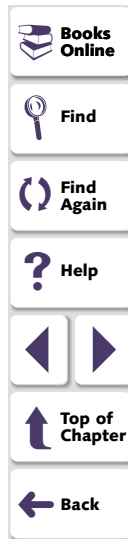
Parameterizing a TSL Statement

When you click a button on the User toolbar that represents a TSL statement to be parameterized, the Set Function Parameters dialog box opens.



The Set Function Parameters dialog box varies in its appearance according to the parameters required by a particular TSL function. For example, the **list_select_item** function has three parameters: *list*, *item*, and *button*. For each parameter, you define a value as described below:

- To define a value for the *list* parameter, you click the pointing hand. WinRunner is minimized, a help window opens, and the mouse pointer becomes a pointing hand. Click the list in your application.
- To define a value for the *item* parameter, you type it in the corresponding box.
- To define a value for the *button* parameter, you select it from the list.



Accessing TSL Statements on the Menu Bar

All TSL statements that you add to the User toolbar can also be accessed via the Create menu.

To choose a TSL statement from a menu:

- To paste a TSL statement, you click **Create > Paste TSL > [TSL Statement]**.
- To execute a TSL statement, you click **Create > Execute TSL > [TSL Statement]**.
- To parameterize a TSL statement, you click **Create > Parameterize TSL > [TSL Statement]**.



Configuring WinRunner Softkeys

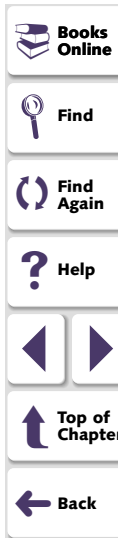
Several WinRunner commands can be carried out using softkeys. WinRunner can carry out softkey commands even when the WinRunner window is not the active window on your screen, or when it is minimized.

If the application you are testing uses a softkey combination that is preconfigured for WinRunner, you can redefine the WinRunner softkey combination using WinRunner's Softkey Configuration utility.

Default Settings for WinRunner Softkeys

The following table lists the default softkey configurations and their functions.

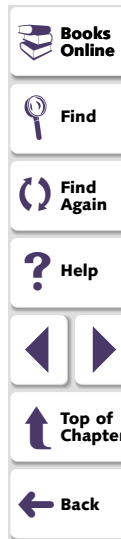
Command	Default Softkey Combination	Function
RECORD	F2	Starts test recording. While recording, this softkey toggles between Context Sensitive and Analog modes.
CHECK GUI FOR SINGLE PROPERTY	Alt Right + F12	Checks a single property of a GUI object.
CHECK GUI FOR OBJECT/WINDOW	Ctrl Right + F12	Creates a GUI checkpoint for an object or a window.



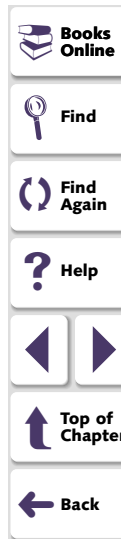
Command	Default Softkey Combination	Function
CHECK GUI FOR MULTIPLE OBJECTS	F12	Opens the Create GUI Checkpoint dialog box.
CHECK BITMAP OF OBJECT/WINDOW	Ctrl Left + F12	Captures an object or a window bitmap.
CHECK BITMAP OF SCREEN AREA	Alt Left + F12	Captures an area bitmap.
CHECK DATABASE (DEFAULT)	Ctrl Right + F9	Creates a check on the entire contents of a database.
CHECK DATABASE (CUSTOM)	Alt Right + F9	Checks the number of columns, rows and specified information of a database.
SYNCHRONIZE OBJECT/WINDOW PROPERTY	Ctrl Right + F10	Instructs WinRunner to wait for a property of an object or a window to have an expected value.
SYNCHRONIZE BITMAP OF OBJECT/WINDOW	Ctrl Left + F11	Instructs WinRunner to wait for a specific object or window bitmap to appear.
SYNCHRONIZE BITMAP OF SCREEN AREA	Alt Left + F11	Instructs WinRunner to wait for a specific area bitmap to appear.



Command	Default Softkey Combination	Function
GET TEXT FROM OBJECT/WINDOW	F11	Captures text in an object or a window.
GET TEXT FROM WINDOW AREA	Alt Right + F11	Captures text in a specified area and adds an obj_get_text statement to the test script.
GET TEXT FROM SCREEN AREA	Ctrl Right + F11	Captures text in a specified area and adds a get_text statement to the test script.
INSERT FUNCTION FOR OBJECT/WINDOW	F8	Inserts a TSL function for a GUI object.
INSERT FUNCTION FROM FUNCTION GENERATOR	F7	Opens the Function Generator dialog box.
RUN FROM TOP	Ctrl Left + F5	Runs the test from the beginning.
RUN FROM ARROW	Ctrl Left + F7	Runs the test from the line in the script indicated by the arrow.
STEP	F6	Runs only the current line of the test script.



Command	Default Softkey Combination	Function
STEP INTO	Ctrl Left + F8	Like Step: however, if the current line calls a test or function, the called test or function is displayed in the WinRunner window but is not executed.
STEP TO CURSOR	Ctrl Left + F9	Runs a test from the line indicated by the arrow to the line marked by the insertion point.
PAUSE	PAUSE	Stops the test run after all previously interpreted TSL statements have been executed. Execution can be resumed from this point using the Run from Arrow command or the RUN FROM ARROW softkey.
STOP	Ctrl Left + F3	Stops test recording or the test run.
MOVE LOCATOR	Alt Left + F6	Records a move_locator_abs statement with the current position (in pixels) of the screen pointer.



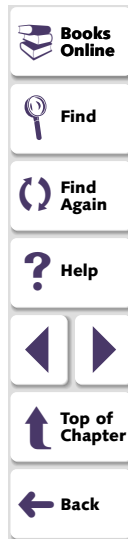
Redefining WinRunner Softkeys

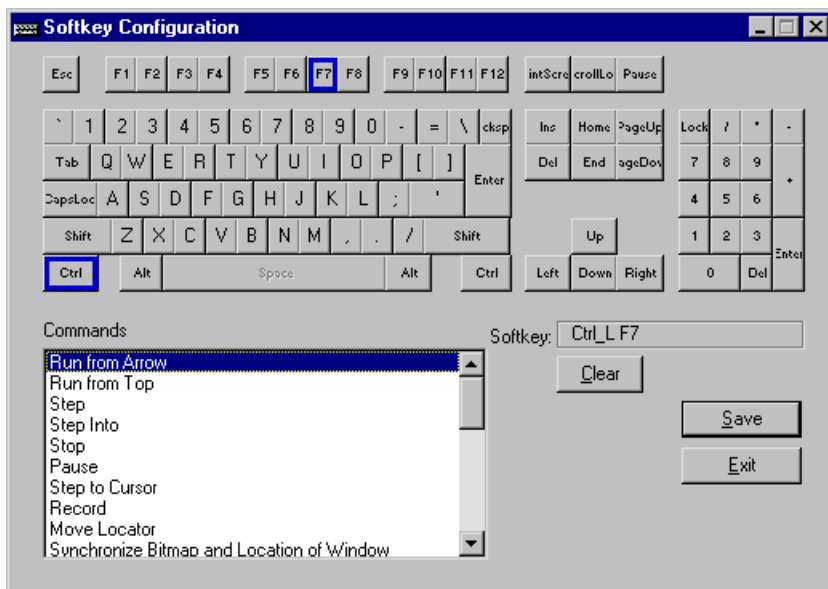
The Softkey Configuration dialog box lists the current softkey assignments and displays an image of a keyboard. To change a softkey setting, you click the new key combination as it appears in the dialog box.

To change a WinRunner softkey setting:

- 1 Choose **Start > Programs > WinRunner > Softkey Configuration**. The Softkey Configuration dialog box opens.

The Commands pane lists all the WinRunner softkeys.

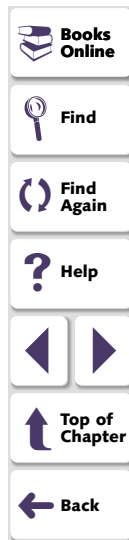




- 2 Click the command you want to change. The current softkey definition appears in the **Softkey** box; its keys are highlighted on the keyboard.
- 3 Click the new key or combination that you want to define. The new definition appears in the **Softkey** box.

An error message appears if you choose a definition that is already in use or an illegal key combination. Click a different key or combination.

- 4 Click **Save** to save the changes and close the dialog box. The new softkey configuration takes effect when you start WinRunner.



Configuring WinRunner

Customizing the Test Script Editor

WinRunner includes a powerful and customizable script editor. This enables you to set the size of margins in test windows, change the way the elements of a test script appear, and create a list of typing errors that will be automatically corrected by WinRunner.

This chapter describes:

- **Setting Display Options**
- **Personalizing Editing Commands**



About Customizing the Test Script Editor

WinRunner's script editor lets you set display options, and personalize script editing commands.

Setting Display Options

Display options let you configure WinRunner's test windows and how your test scripts will be displayed. For example, you can set the size of test window margins, and activate or deactivate word wrapping.

Display options also let you change the color and appearance of different script elements. These include comments, strings, WinRunner reserved words, operators and numbers. For each script element, you can assign colors, text attributes (bold, italic, underline), font, and font size. For example, you could display all strings in the color red.

Finally, there are display options that let you control how the hard copy of your scripts will appear when printed.

Personalizing Script Editing Commands

WinRunner includes a list of default keyboard commands that let you move the cursor, delete characters, cut, copy, and paste information to and from the clipboard. You can replace these commands with commands you prefer. For example, you could change the Set Bookmark [#] command from the default CTRL + K + [#] to CTRL + B + [#].



Setting Display Options

WinRunner's display options let you control how test scripts appear in test windows, how different elements of test scripts are displayed, and how test scripts will appear when they are printed.

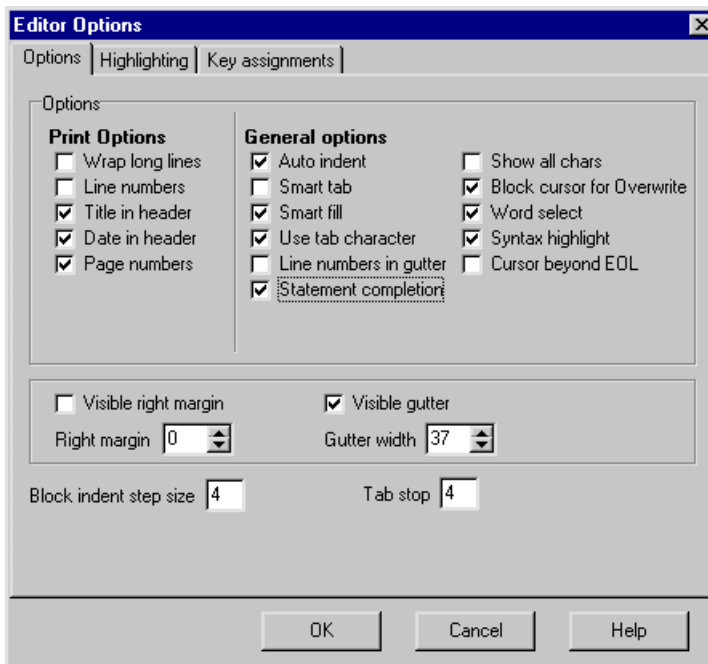
Customizing Test Scripts and Windows

You can customize the appearance of WinRunner's test windows and how your scripts are displayed. For example, you can set the size of the test window margins, highlight script elements, and show or hide text symbols.

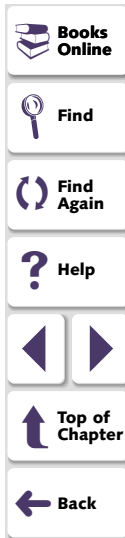


To customize the appearance of your script:

- 1 Choose **Settings > Editor Options**. The Editor Options dialog box opens.



- 2 Click the **Options** tab.



3 Under the **General options** choose from the following options:

Options	Description
Auto indent	Causes lines following an indented line to automatically begin at the same point as the previous line. You can click the Home key on your keyboard to move the cursor back to the left margin.
Smart tab	A single press of the tab key will insert the appropriate number of tabs and spaces in order to align the cursor with the text in the line above.
Smart fill	Insert the appropriate number of tabs and spaces in order to apply the Auto indent option. When this option is not selected, only spaces are used to apply the Auto indent. (Both Auto indent and Use tab character must be selected to apply this option).
Use tab character	Inserts a tab character when the tab key on the keyboard is used. When this option is not enabled, the appropriate number of space characters will be inserted instead.
Line numbers in gutter	Displays a line number next to each line in the script. The line number is displayed in the test script window's gutter.



Options	Description
Statement completion	<p>Opens a list box displaying all available matches to the function prefix whenever the user presses the Ctrl and Space keys simultaneously or the Underscore key. Select an item from the list to replace the typed string. To close the list box, press the Esc key.</p> <p>Displays a tooltip with the function parameters once the complete function name appears in the editor.</p>
Show all chars	Displays all text symbols, such as tabs and paragraph symbols.
Block cursor for Overwrite	Displays a block cursor instead of the standard cursor when you select overwrite mode.
Word select	Selects the nearest word when you double-click on the test window.
Syntax highlight	Highlights script elements such as comments, strings, or reserved words. For information on reserved words, see Reserved Words on page 1021.
Cursor beyond EOL	Enables WinRunner to display the cursor after the end of the current line.
Visible right margin	Displays a line that indicates the test window's right margin.
Right margin	Sets the position, in characters, of the test window's right margin (0=left window edge).



Options	Description
Visible gutter	Displays a blank area (gutter) in the test window's left margin.
Gutter width	Sets the width, in pixels, of the gutter.
Block indent step size	Sets the number characters that the selected block of TSL statements will be moved (indented) when the INDENT SELECTED BLOCK softkey is used. For more information on editor softkeys, see Personalizing Editing Commands on page 1024.
Tab stop	Sets the distance, in characters, between each tab stop.

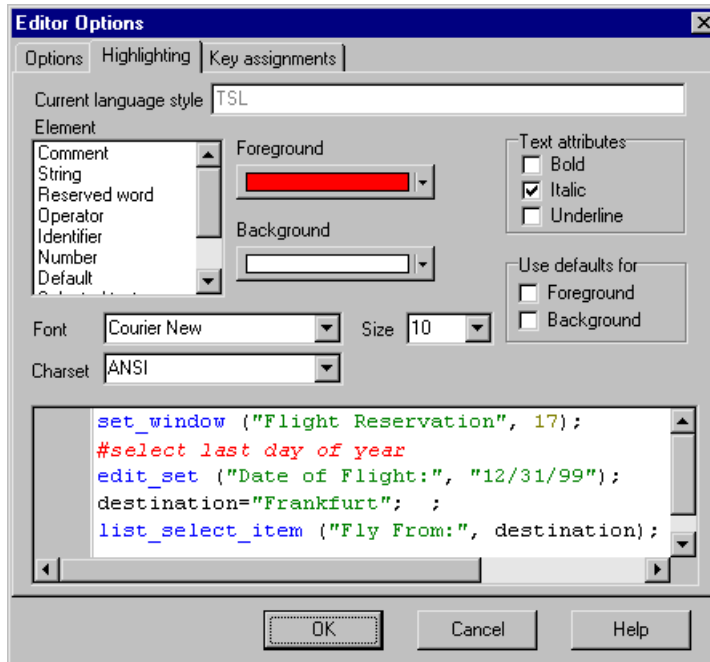
Highlighting Script Elements

WinRunner scripts contain many different elements, such as comments, strings, WinRunner reserved words, operators and numbers. Each element of a WinRunner script is displayed in a different color and style. You can create your own personalized color scheme and style for each script element. For example, all comments in your scripts could be displayed as italicized, blue letters on a yellow background.



To edit script elements:

- 1 Choose **Settings > Editor Options**. The Editor Options dialog box opens to the **Highlighting** tab.



- 2 Select a script element from the **Elements** list.

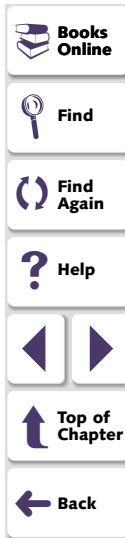


3 Choose from the following options:

Options	Description
Foreground	Sets the color applied to the text of the script element.
Background	Sets the color that appears behind the script element.
Text Attributes	Sets the text attributes applied to the script element. You can select bold, italic, or underline or a combination of these attributes.
Use defaults for	Applies the font and colors of the “default” style to the selected style.
Font	Sets the typeface of all script elements.
Size	Set the size, in points, of all script elements.
Charset	Sets the character subset of the selected font.

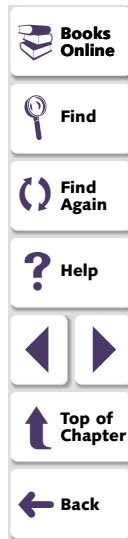
An example of each change you apply will be displayed in the pane at the bottom of the dialog box.

4 Click **OK** to apply the changes.



Reserved Words

WinRunner contains “reserved words,” which include the names of all TSL functions and language keywords, such as auto, break, char, close, continue, int, function. For a complete list of all reserved words in WinRunner, refer to the *TSL Online Reference*. You can add your own reserved words in the `[ct_KEYWORD_USER]` section of the `reserved_words.ini` file, which is located in the `dat` folder in the WinRunner installation directory. Use a text editor, such as Notepad, to open the file. Note that after editing the list, you must restart WinRunner so that it will read from the updated list.

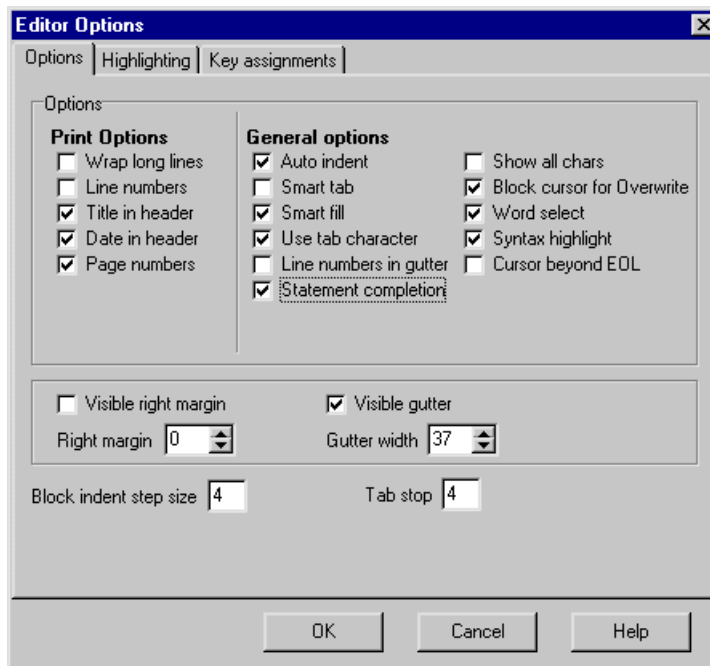


Customizing Print Options

You can set how the hard copy of your script will appear when it is sent to the printer. For example, your printed script can include line numbers, the name of the file, and the date it was printed.

To customize your print options:

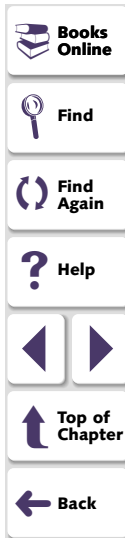
- 1 Choose **Settings > Editor Options**. The Editor Options dialog box opens.
- 2 Click the **Options** tab.



3 Choose from the following Print options:

Option	Description
Wrap long lines	Automatically wraps a line of text to the next line if it is wider than the current printer page settings.
Line numbers	Prints a line number next to each line in the script.
File name in header	Inserts the file name into the header of the printed script.
Date in header	Inserts today's date into the header of the printed script.
Page numbers	Numbers each page of the script.

4 Click **OK** to apply the changes.



Personalizing Editing Commands

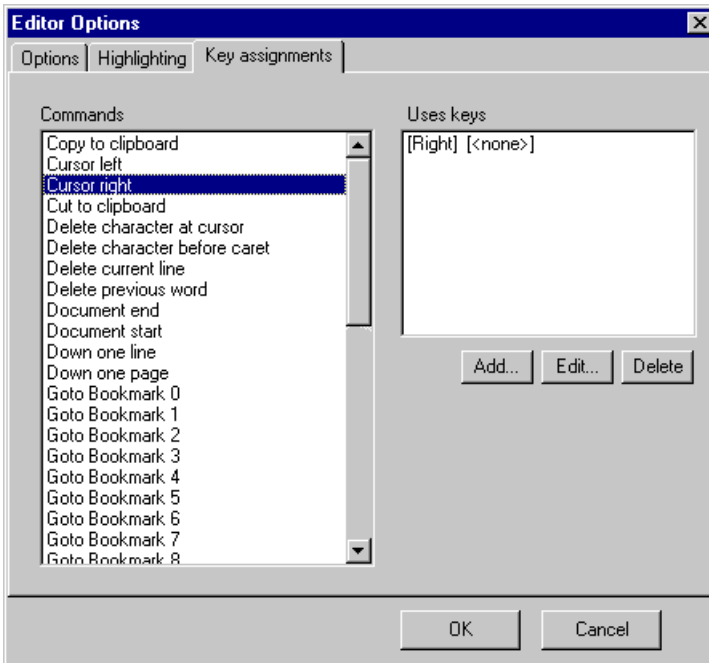
You can personalize the default keyboard commands you use for editing test scripts. WinRunner includes keyboard commands that let you move the cursor, delete characters, cut, copy, and paste information to and from the clipboard. You can replace these commands with your own preferred commands. For example, you could change the Paste command from the default CTRL + V to CTRL + P.

To personalize editing commands:

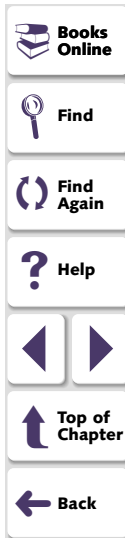
- 1 Choose **Settings > Editor Options**. The Editor Options dialog box opens.



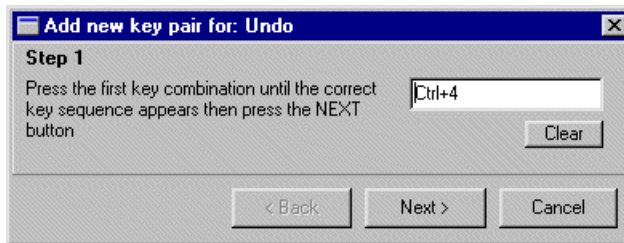
- 2 Click the **Key Assignments** tab.



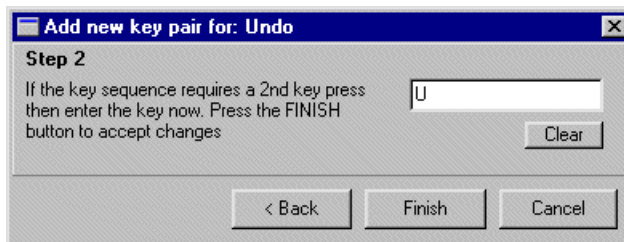
- 3 Select a command from the **Commands** list.



- 4 Click **Add** to create an additional key assignment or click **Edit** to modify the existing assignment. The Add/Edit key pair for dialog box opens. Press the keys you want to use, for example, CTRL + 4:



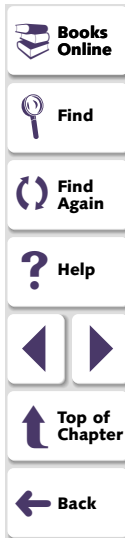
- 5 Click **Next**. To add an additional key sequence, press the keys you want to use, for example U:



- 6 Click **Finish** to add the key sequence(s) to the **Use keys** list.

If you want to delete a key sequence from the list, highlight the keys in the **Uses Key** list and click **Delete**.

- 7 Click **OK** to apply the changes.



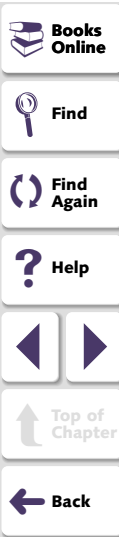
Configuring WinRunner

Setting Global Testing Options

You can control how WinRunner records and runs tests by setting global testing options from the General Options dialog box.

This chapter describes:

- **Setting Global Testing Options from the General Options Dialog Box**
- **Global Testing Options**
- **Choosing Appropriate Timeout and Delay Settings**



About Setting Global Testing Options

WinRunner testing options affect how you record test scripts and run tests. For example, you can set the speed at which WinRunner runs a test, or determine how WinRunner records keyboard input.

Some testing options can be set globally, for all tests, using the General Options dialog box. You can also set and retrieve options from within a test script by using the **setvar** and **getvar** functions. You can use these functions to set and view the testing options for all tests, for a single test, or for part of a single test. For more information about setting and retrieving testing options from within a test script, see Chapter 41, [Setting Testing Options from a Test Script](#).



Setting Global Testing Options from the General Options Dialog Box

Before you record or run tests, you can use the General Options dialog box to modify testing options. The values you set remain in effect for all tests in the current testing session.

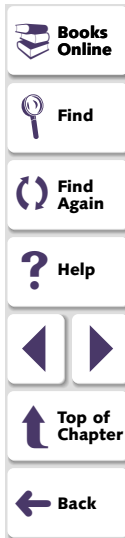
When you end a testing session, WinRunner prompts you to save the testing option changes to the WinRunner configuration. This enables you to continue to use the new values in future testing sessions.

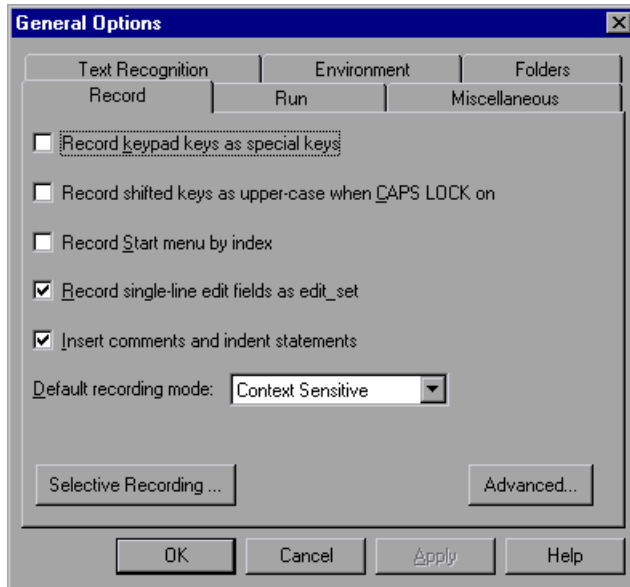
To set global testing options:

- 1 Choose **Settings > General Options**.

The **General Options** dialog box opens. It is divided by subject into six tabbed pages.

- 2 To choose a page, click a tab.
- 3 Set an option, as described in [Global Testing Options](#) on page 1031.
- 4 To apply your change and keep the General Options dialog box open, click **Apply**.
- 5 When you are done, click **OK** to apply your change and close the dialog box.





Global Testing Options

The General Options dialog box contains the following tabbed pages:

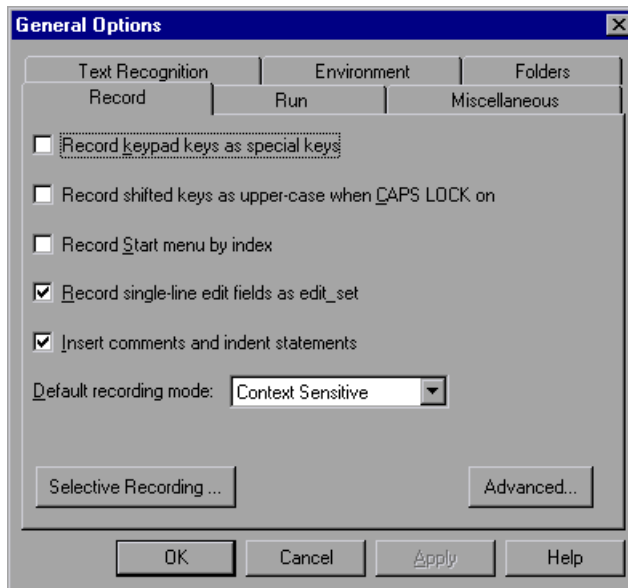
Tab Heading	Subject
Record	options for recording tests
Run	options for running tests
Miscellaneous	options for miscellaneous functions
Text Recognition	options for recognizing text
Environment	testing environment options
Folders	specifying the location of folders for WinRunner files

This section lists the global testing options that can be set using the General Options dialog box. If an option can also be set within a test script by using the **setvar** function, and retrieved using the **getvar** function, it is indicated below. For more information on the **setvar** and **getvar** functions, see Chapter 41, [Setting Testing Options from a Test Script](#).



Record Tab

The Record tab options affect how WinRunner records tests.



Record Keypad Keys as Special Keys

This option determines how WinRunner records pressing keys on the numeric keyboard.

- When this option is selected, WinRunner records pressing the NUM LOCK key. It also records pressing number keys and control keys on the numeric keypad as unique keys in the **obj_type** statement it generates. For example:

```
obj_type ("Edit", "<kNumLock>")  
obj_type ("Edit", "<kKP7>")
```

- When this option is cleared, WinRunner generates identical statements whether you press a number or an arrow key on the keyboard or on the numeric keypad. WinRunner does not record pressing the NUM LOCK key. It does not record pressing number keys or control keys on the numeric keypad as unique keys in the **obj_type** statements it generates.

For example:

```
obj_type ("Edit", "7");
```

(Default = **cleared**)



Note: This option does not affect how **edit_set** statements are recorded. When recording using **edit_set**, WinRunner never records keypad keys as special keys.

Record Shifted Keys as Uppercase when CAPS LOCK On

This option determines whether WinRunner records pressing letter keys and the Shift key together as uppercase letters when CAPS LOCK is activated. If WinRunner records pressing letter keys and the Shift key together as uppercase letters when CAPS LOCK is activated, it ignores the state of the CAPS LOCK key when recording and running tests.

- When this option is selected, WinRunner records pressing letter keys and the Shift key together as uppercase letters when CAPS LOCK is activated. WinRunner ignores the state of the CAPS LOCK key when recording and running tests.
- When this option is cleared, WinRunner records pressing letter keys and the Shift key together as lowercase letters when CAPS LOCK is activated.

(Default = **cleared**)



Record Start Menu by Index

This option determines how WinRunner records on the Windows **Start** menu in Windows 95 and Windows NT.

- When this option is selected, WinRunner records the sequential order in which a menu item appears. For example:

```
button_press ("Start");  
menu_select_item ("item_2;item_0;item_4");
```

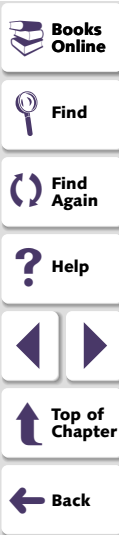
- Select this option when recording the string is expected to fail, e.g. if the name of the menu option is dynamic.

When this option is cleared, WinRunner records the name of the menu item. For example:

```
button_press ("Start");  
menu_select_item ("Programs;Accessories;Calculator");
```

(Default = **cleared**)

Note: In Windows 98 and the Microsoft Internet Explorer 4.0 shell, the Start menu does not belong to the menu class, and therefore, this option is not relevant. When WinRunner records on the Start menu in Windows 98 or the Internet Explorer 4.0 shell, it generates a **toolbar_select_item** statement that contains the command strings.



Record Single-Line Edit Fields as `edit_set`

This option determines how WinRunner records typing a string in a single-line edit field.

- When this option is selected, WinRunner records an **`edit_set`** statement (so that only the net result of all keys pressed and released is recorded). For example, if in the Name field in the Flights Reservation application you type “H”, press Backspace, and then type “Jennifer”, WinRunner generates the following statement:

```
edit_set ("Name","Jennifer");
```

- When this option is cleared, WinRunner generates an **`obj_type`** statement (so that all keys pressed and released are recorded). Using the previous example, WinRunner generates the following statement:

```
obj_type ("Name","H<kBackSpace>Jennifer");
```

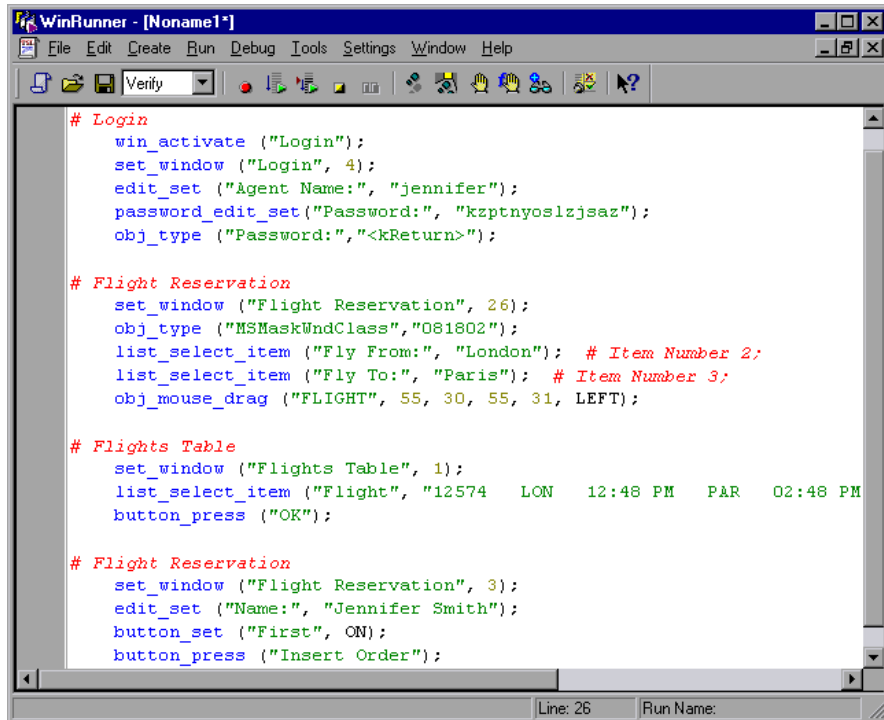
(Default = **selected**)

For more information about the **`edit_set`** and **`obj_type`** functions, refer to the *TSL Online Reference*.



Insert Comments and Indent Statements

This option determines whether WinRunner automatically divides your test script into sections while you record based on window focus changes, automatically inserts comments and automatically indents the statements under each comment. This option enables you to easily group all statements related to the same window.



```

WinRunner - [Noname1*]
File Edit Create Run Debug Tools Settings Window Help
Verify
# Login
win_activate ("Login");
set_window ("Login", 4);
edit_set ("Agent Name:", "jennifer");
password_edit_set ("Password:", "kzptnyoslzjsaz");
obj_type ("Password:", "<kReturn>");

# Flight Reservation
set_window ("Flight Reservation", 26);
obj_type ("MSMaskWndClass", "081802");
list_select_item ("Fly From:", "London"); # Item Number 2;
list_select_item ("Fly To:", "Paris"); # Item Number 3;
obj_mouse_drag ("FLIGHT", 55, 30, 55, 31, LEFT);

# Flights Table
set_window ("Flights Table", 1);
list_select_item ("Flight", "12574 LON 12:48 PM PAR 02:48 PM");
button_press ("OK");

# Flight Reservation
set_window ("Flight Reservation", 3);
edit_set ("Name:", "Jennifer Smith");
button_set ("First", ON);
button_press ("Insert Order");
    
```

Line: 26 Run Name:



- When this option is selected, WinRunner automatically divides your test into sections while you record. A **set_window** statement, as well as any **win_*** statement can create a division. A new division also begins when you switch from context sensitive to analog recording.

For each new section that WinRunner creates, it inserts a comment with the window name. All of the statements that are recorded while the same window remains in focus are indented under that comment. If you record in Analog mode while this option is selected, the comment is always: **Analog Recording**.

- When this option is cleared, WinRunner does not divide statements while you record and does not automatically insert comments.

(Default = **selected**)

Default Recording Mode

This option determines the default recording mode: either Context Sensitive or Analog. While you are recording your test, you can switch back and forth between recording modes. For more information, see Chapter 3, [Understanding How WinRunner Identifies GUI Objects](#).

(Default = **Context sensitive**)



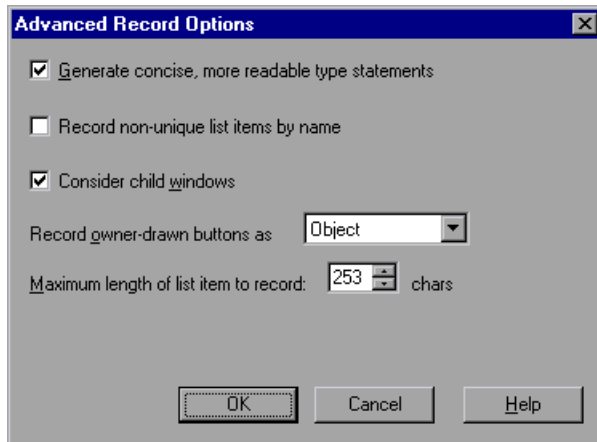
Advanced Recording Options

You set options in the Advanced Record Options dialog box the same way that you set options in the Record tab of the General Options dialog box.

To set advanced recording options:

- 1 Choose **Settings > General Options**. The General Options dialog box opens.
- 2 Click the **Record** tab.
- 3 Click **Advanced**.

The **Advanced Record Options** dialog box opens.



Generate Concise, More Readable Type Statements

This option determines how WinRunner generates **type**, **win_type**, and **obj_type** statements in a test script.

- When this option is selected, WinRunner generates more concise **type**, **win_type**, and **obj_type** statements that represent only the net result of pressing and releasing input keys. This makes your test script easier to read. For example:

```
obj_type (object, "A");
```

- When this option is cleared, WinRunner records the pressing and releasing of each key. For example:

```
obj_type (object, "<kShift_L>-a-a+<kShift_L>+");
```

Clear this option if the exact order of keystrokes is important for your test.

(Default = **selected**)

For more information, refer to the **type**, **win_type**, and **obj_type** functions in the *TSL Online Reference*.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *key_editing* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



Record Non-Unique List Items by Name

This option determines how WinRunner records non-unique ListBox and ComboBox items.

- When this option is selected, WinRunner records non-unique items by name.
- When this option is cleared, WinRunner records non-unique items by index.

(Default = **cleared**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *rec_item_name* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-rec_item_name* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Consider Child Windows

This option determines whether WinRunner records controls (objects) of a child object whose parent is an object but not a window and identifies these controls when running a test.

- When this option is selected, WinRunner identifies controls (objects) of a child object whose parent is an object but not a window.
- When this option is cleared, WinRunner does not identify controls (objects) of a child object whose parent is an object but not a window.

(Default = **selected**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *enum_descendent_toplevel* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Record Owner-Drawn Buttons

Since WinRunner cannot identify the class of owner-drawn buttons, it automatically maps them to the general “object” class. This option enables you to map all owner-drawn buttons to a standard button class (`push_button`, `radio_button`, or `check_button`).

(Default = **Object**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *rec_owner_drawn* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



Maximum Length of List Item to Record

This option defines the maximum number of characters that WinRunner can record in a list item name. If the maximum number of characters is exceeded in a ListView or TreeView item, WinRunner records that item's index number. If the maximum number of characters is exceeded in a ListBox or ComboBox, WinRunner truncates the item's name. The maximum length can be 1 to 253 characters.

(Default = **253** [characters])

Selective Recording

Selective recording enables you to record your actions on selected programs while ignoring actions on other programs. For example, you may not want to record actions you perform on your e-mail client while recording a test.

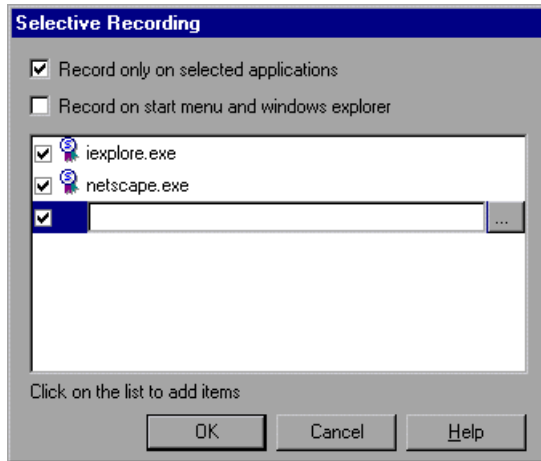
When you enable selective recording, only actions on the selected programs are recorded.

To enable selective recording:

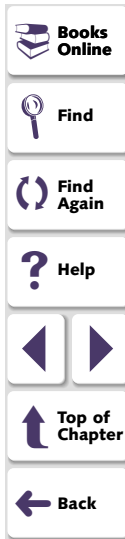
- 1 Choose **Settings > General Options**. The General Options dialog box opens.
- 2 Click the **Record** tab.
- 3 Click **Selective Recording**.



The **Selective Recording** dialog box opens.



- 4 Select **Record only on selected applications**.
- 5 If you want to record actions on the Start menu and on Windows Explorer, select **Record on Start menu and Windows Explorer**.
- 6 If you do not want to record on Internet Explorer and/or Netscape, deselect the options for iexplore.exe and/or netscape.exe.
- 7 To add a new application to the list, click an empty list item. Enter the application's name in the box, or use the browse button to find and select the application.



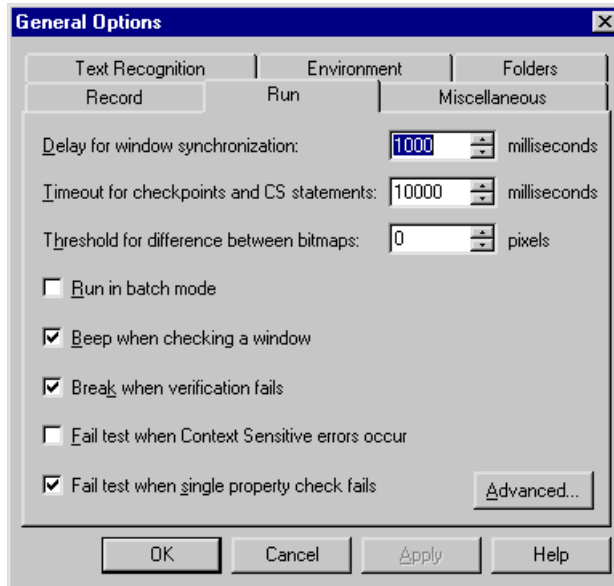
- 8 Click **OK** to close the Selective Recording dialog box.
- 9 Click **OK** to close the General Options dialog box.

Note: Even if you choose only to record on selective applications, you can still create checkpoints and perform all other non-recording operations in WinRunner on all applications.



Run Tab

The Run tab options affect how WinRunner runs tests. You can set additional options for running tests using the Advanced Run Options dialog box, which you can open from the Run tab of the General Options dialog box. For information on the Advanced Run Options dialog box, see [Advanced Run Options Dialog Box](#) on page 1055.



Delay for Window Synchronization

This option sets the sampling interval (in milliseconds) used to determine that a window is stable before capturing it for a Context Sensitive checkpoint or synchronization point. To be declared stable, a window must not change between two consecutive samplings. This sampling continues until the window is stable or the timeout (as set in the **Timeout for Checkpoints and CS Statements** box below) is reached.

In general, a smaller the delay enables WinRunner to capture the object or window more quickly so that the test can continue, but smaller delays increase the load on the system.

(Default = **1000** [milliseconds])

See [Choosing Appropriate Timeout and Delay Settings](#) on page 1086 for more information on when to adjust this setting.

Note: This option is accurate to within 20-30 milliseconds.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *delay_msec* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-delay_msec* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Timeout for Checkpoints and CS Statements

This option sets the global timeout (in milliseconds) used by WinRunner when executing checkpoints and Context Sensitive statements. This value is added to the *time* parameter embedded in GUI checkpoint or synchronization point statements to determine the maximum amount of time that WinRunner searches for the specified window or object. The timeout must be greater than the delay for window synchronization (as set in the **Delay for Window Synchronization** box above).

For example, when the delay is 2,000 milliseconds and the timeout is 10,000 milliseconds, WinRunner checks the window or object in the application under test every two seconds until the check produces the desired results or until ten seconds have elapsed.

(Default = **10000** [milliseconds])

See [Choosing Appropriate Timeout and Delay Settings](#) on page 1086 for more information on when to adjust this setting.

Note: This option is accurate to within 20-30 milliseconds.



Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *timeout_msec* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-timeout_msec* command line option, described in Chapter 34, [Running Tests from the Command Line](#).

Threshold for Difference between Bitmaps

This option defines the number of pixels that constitutes the threshold for a bitmap mismatch. When this value is set to 0, a single pixel mismatch constitutes a bitmap mismatch.

(Default = **0** [pixels])

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *min_diff* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-min_diff* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Run in Batch Mode

This option determines whether WinRunner suppresses messages during a test run so that a test can run unattended. WinRunner also saves all the expected and actual results of a test run in batch mode in one folder, and displays them in one Test Results window.

For example, if a **set_window** statement is missing from a test script, WinRunner cannot find the specified window. If this option is selected and the test is run in batch mode, WinRunner reports an error in the Test Results window and proceeds to run the next statement in the test script. If this option is cleared and the test is not run in batch mode, WinRunner pauses the test and opens the Run wizard to enable the user to locate the window.

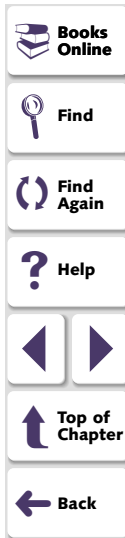
- When this option is selected, WinRunner suppresses messages during a test run so that a test can run unattended.
- When this option is cleared, WinRunner does not suppress messages during a test run.

(Default = **cleared**)

For more information on suppressing messages during a test run, see Chapter 33, [Running Batch Tests](#).

Note that you can use the **getvar** function to retrieve the value of the corresponding *batch* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-batch* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Beep when Checking a Window

This option determines whether WinRunner beeps when checking any window during a test run.

- When this option is selected, WinRunner beeps when checking any window during a test run.
- When this option is cleared, WinRunner does not beep when checking windows during a test run.

(Default = **selected**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *beep* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-beep* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Break when Verification Fails

This option determines whether WinRunner pauses the test run and displays a message whenever verification fails or whenever any message is generated as a result of a Context Sensitive statement during a test that is run in Verify mode. This option should be used only when working interactively.

For example, if a **set_window** statement is missing from a test script, WinRunner cannot find the specified window. If this option is selected, WinRunner pauses the test and opens the Run wizard to enable the user to locate the window. If this option is cleared, WinRunner reports an error in the Test Results window and proceeds to run the next statement in the test script.

- When this option is selected, WinRunner pauses the test run and displays a message whenever verification fails or whenever any message is generated as a result of a context sensitive statement during a test run in Verify mode.
- When this option is cleared, WinRunner does not pause the test run or display a message whenever verification fails or whenever any message is generated as a result of a context sensitive statement during a test run in Verify mode. Note that when this option is cleared, no error message is sent to the test results if the verification fails.

(Default = **selected**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *mismatch_break* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-mismatch_break* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Fail Test when Context Sensitive Errors Occur

This option determines whether WinRunner fails a test when Context Sensitive errors occur. A Context Sensitive error is the failure of a Context Sensitive statement during a test run. Context Sensitive errors often occur when WinRunner cannot identify a GUI object.

For example, a Context Sensitive error will occur if you run a test containing a **set_window** statement with the name of a non-existent window. Context Sensitive errors can also occur when window names are ambiguous. For information about Context Sensitive functions, refer to the *TSL Online Reference*.

- When this option is selected, WinRunner fails the test run if a Context Sensitive statement fails during a test.
- When this option is cleared, WinRunner does not fail the test run if a Context Sensitive statement fails during a test.

(Default = **cleared**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *cs_fail* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-cs_fail* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Fail Test when Single Property Check Fails

This option fails a test run when **_check_info** statements fail. It also writes an event to the Test Results window for these statements. (You can create **_check_info** statements using the **Create > GUI Checkpoint > For Single Property** command.)

- When this option is selected, WinRunner fails the test run if a **_check_info** statement fails during a test.
- When this option is cleared, WinRunner does not fail the test run if a **_check_info** statement fails during a test.

(Default = **selected**)

For information about the **check_info** functions, refer to the *TSL Online Reference*.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *single_prop_check_fail* testing option from within a test script, as described in Chapter 41, **Setting Testing Options from a Test Script**.

Note that you can also set this option using the corresponding *-single_prop_check_fail* command line option, described in Chapter 34, **Running Tests from the Command Line**.



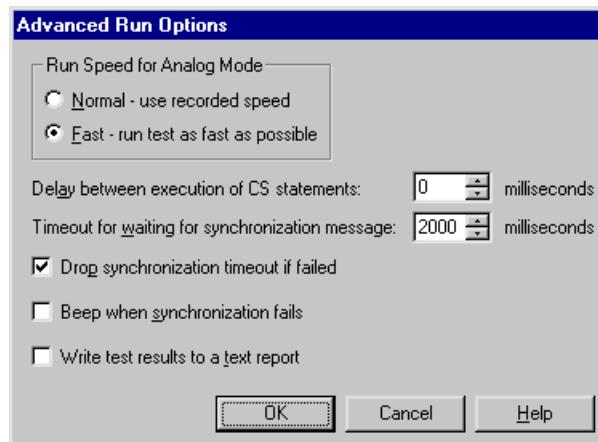
Advanced Run Options Dialog Box

You set options in the Advanced Run Options dialog box the same way that you set options in the Run tab of the General Options dialog box.

To set advanced run options:

- 1 Choose **Settings > General Options**. The General Options dialog box opens.
- 2 Click the **Run** tab.
- 3 Click **Advanced**.

The **Advanced Run Options** dialog box opens.



- 4 Set an option, as described in **Global Testing Options** on page 1031.
- 5 Click **OK** to apply your change and close the dialog box.



Run Speed for Analog Mode

This option determines the default run speed for tests run in Analog mode.

- **Normal** runs the test at the speed at which it was recorded.
- **Fast** runs the test as fast as the application can receive input.

(Default = **Fast**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *speed* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-speed* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Delay between Execution of CS Statements

This option sets the time (in milliseconds) that WinRunner waits before executing each Context Sensitive statement when running a test.

(Default = **0** [milliseconds])

See [Choosing Appropriate Timeout and Delay Settings](#) on page 1086 for more information on when to adjust this setting.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding `cs_run_delay` testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding `-cs_run_delay` command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Timeout for Waiting for Synchronization Message

This option sets the timeout (in milliseconds) that WinRunner waits before validating that keyboard or mouse input was entered correctly during a test run.

(Default = **2000** [milliseconds])

See [Choosing Appropriate Timeout and Delay Settings](#) on page 1086 for more information on when to adjust this setting.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *synchronization_timeout* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note: If synchronization often fails during your test runs, consider increasing the value of this option.



Drop Synchronization Timeout if Failed

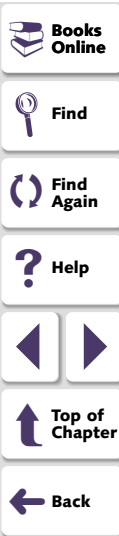
This option determines whether WinRunner minimizes the synchronization timeout (as defined in the **Timeout for Waiting for Synchronization Message** option above) after the first synchronization failure.

- When this option is selected, WinRunner minimizes the synchronization timeout after the first synchronization failure.
- When this option is cleared, WinRunner does not drop the synchronization timeout after the first synchronization failure.

(Default = **selected**)

See [Choosing Appropriate Timeout and Delay Settings](#) on page 1086 for more information on when to adjust this setting.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *drop_sync_timeout* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



Beep when Synchronization Fails

This option determines whether WinRunner beeps when the timeout for waiting for synchronization message fails.

- When this option is selected, WinRunner beeps when the timeout for waiting for synchronization message fails.
- When this option is cleared, WinRunner does not beep when the timeout for waiting for synchronization message fails.

(Default = **cleared**)

See [Choosing Appropriate Timeout and Delay Settings](#) on page 1086 for more information on when to adjust this setting.

Note: Select this option primarily to debug a test script.

Note: If synchronization often fails during your test runs, consider increasing the value of the **Timeout for Waiting for Synchronization Message** option or the corresponding *synchronization_timeout* testing option with the **setvar** function from within a test script.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *sync_fail_beep* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



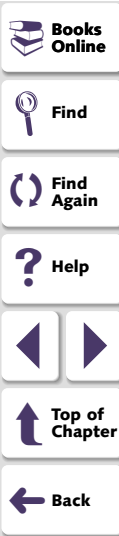
Write Test Results to a Text Report

This option instructs WinRunner to automatically write test results to a text report, called *report.txt*, which is saved in the results folder.

- When this option is selected, WinRunner automatically writes test results to a text report.
- When this option is cleared, WinRunner does not automatically write test results to a text report.

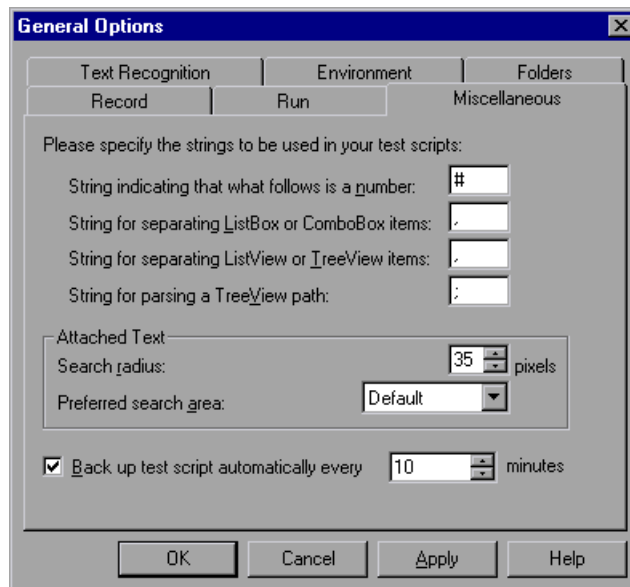
(Default = **cleared**)

Note that you can also set this option using the corresponding `-create_text_report` command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Miscellaneous Tab

The Miscellaneous tab options determine which strings are used by parameters in TSL statements to separate items in a list and identify numbers. Additional options enable you to determine how WinRunner searches and identifies text that is attached to an object.



String Indicating that what Follows is a Number

This option defines the string recorded in the test script to indicate that a list item is specified by its index number. In the following example, the “#” string is used to specify a list item by its index number:

```
set_window ("Food Inventory - Explorer", 3);
list_select_item ("SysTreeView32", "Inventory;Drinks;Soft Drinks");
# Item Number 3;

list_get_items_count("SysListView32", count);
for (i=0; i<count; i++){
    list_select_item ("SysListView32", "#" & i);
    list_get_item ("SysListView32", i, item);
    list_get_item("ListBox", 0 ,item1);
    if(item != item1)
        tl_step("List Selection Check", FAIL, "Incorrect item appearing in
box for item: " & item);
}
```

(Default = #)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *item_number_seq* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



String for Separating ListBox or ComboBox Items

This option defines the string recorded in the test script to separate items in a ListBox or a ComboBox.

(Default = ,)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *list_item_separator* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

String for Separating ListView or TreeView Items

This option defines the string recorded in the test script to separate items in a ListView or a TreeView.

(Default = ,)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *listview_item_separator* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



String for Parsing a TreeView Path

This option defines the string recorded in the test script to separate items in a tree view path.

(Default = ;)

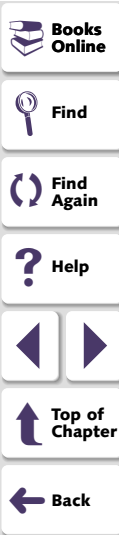
Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *treeview_path_separator* testing option from within a test script, as described in Chapter 41, **Setting Testing Options from a Test Script**.

Attached Text

The Attached Text box determines how WinRunner searches for the text attached to a GUI object. Proximity to the GUI object is defined by two options: the radius that is searched, and the point on the GUI object from which the search is conducted. The closest static text object within the specified search radius from the specified point on the GUI object is that object's attached text.

Sometimes the static text object that appears to be closest to a GUI object is not really the closest static text object. You may need to use trial and error to make sure that the attached text attribute is the static text object of your choice.

Note: When you run a test, you must use the same values for the attached text options that you used when you recorded the test. Otherwise, WinRunner may not identify your GUI object.



Attached Text - Search Radius

This option specifies the radius from the specified point on a GUI object that WinRunner searches for the static text object that is its attached text. The radius can be 3 to 300 pixels.

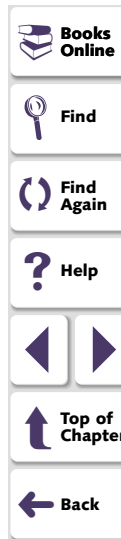
(Default= **35** [pixels])

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *attached_text_search_radius* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Attached Text - Preferred Search Area

This option specifies the point on a GUI object from which WinRunner searches for its attached text.

Option	Point on the GUI Object
Default	top-left corner of regular (English-style) windows; top-right corner of windows with RTL-style (WS_EX_BIDI_CAPTION) windows
Top-Left	top-left corner
Top	midpoint of two top corners
Top-Right	top-right corner



Option	Point on the GUI Object
Right	midpoint of two right corners
Bottom-Right	bottom-right corner
Bottom	midpoint of two bottom corners
Bottom-Left	bottom-left corner
Left	midpoint of two left corners

(Default = **Default**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *attached_text_area* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note: In previous versions of WinRunner, you could not set the preferred search area: WinRunner searched for attached text based on what is now the Default setting for the preferred search area. If backward compatibility is important, choose the Default setting.

Note: A text report of the test results can also be created from the Test Results window by choosing the Tools > Text Report command.



Back Up Test Script Automatically

This option instructs WinRunner to create a backup file for your script periodically, according to the specified interval.

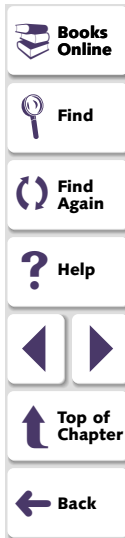
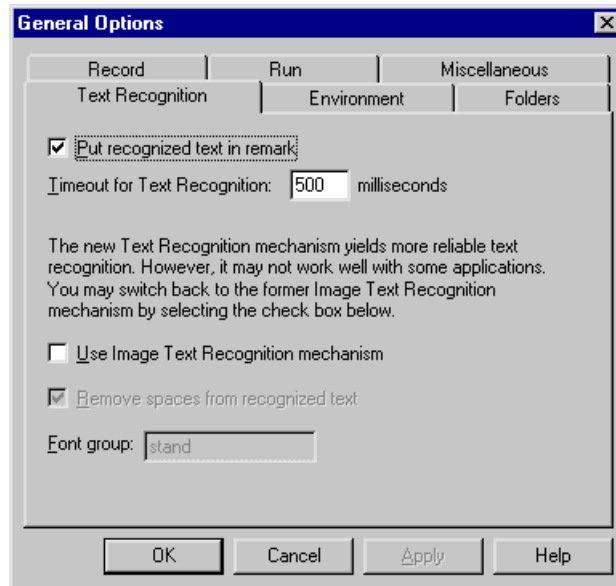
- If this option is selected, WinRunner creates a backup file in your test folder called *script.sav*, which is a simple text file of the script. Each time WinRunner backs up your script, it overwrites the previous *script.sav* file.
- If this option is cleared, WinRunner will not perform automatic backups on your script.

(Default = **selected**. Default interval = **every 10 minutes**)



Text Recognition Tab

The Text Recognition tab options affect how WinRunner recognizes text in your application.



Put Recognized Text in Remark

When you create a text checkpoint, this option determines how WinRunner displays the captured text in the test script.

- If this option is selected, WinRunner inserts text captured by a text checkpoint during test creation into the test script as a remark. For example, if you choose Create > Get Text > From Object/Window, and then click inside the Fly From text box when Portland is selected, the following statement is recorded in your test script:

```
obj_get_text("Fly From:", text);# Portland
```

- If this option is cleared, WinRunner does not insert text captured by a text checkpoint during test creation into the test script as a remark. Using the previous example, WinRunner generates the following statement in your test script:

```
obj_get_text("Fly From:", text);
```

(Default = **selected**)



Timeout for Text Recognition

This option sets the maximum interval (in milliseconds) that WinRunner waits to recognize text when performing a text checkpoint using the standard Text Recognition method during a test run.

(Default = **500** [milliseconds])

See [Choosing Appropriate Timeout and Delay Settings](#) on page 1086 for more information on when to adjust this setting.

Note: If you select the **Use Image Text Recognition** check box (described in the next section), then the value of this option becomes zero, as timeout has no significance for Image Text Recognition.



Use Image Text Recognition Mechanism

This option determines the type of text recognition mechanism used by WinRunner when it performs a text checkpoint during a test run. WinRunner can use either the standard Text Recognition method or Image Text Recognition: standard Text Recognition generally yields the most reliable text results, but it does not work well with all applications; Image Text Recognition enables WinRunner to recognize only the text whose font is defined in a font group. You should choose this option only if you find that Text Recognition does not work well with the application you are testing.

- If this option is selected, WinRunner disables the main Text Recognition mechanism and only uses the Image Text Recognition mechanism.
- If this option is cleared, WinRunner uses Text Recognition until it is timed out in the interval specified in the Timeout for Text Recognition box (described in the previous section). If Text Recognition fails, WinRunner uses Image Text Recognition.

(Default = **cleared**)



Remove Spaces from Recognized Text

This option removes multiple leading and trailing blanks in recognized text.

- If this option is selected, WinRunner removes multiple leading and trailing blank spaces found in recognized text during test creation from the test script.
- If this option is cleared, WinRunner transfers multiple leading and trailing blank spaces found in recognized text during test creation to the test script.

Note: You must restart WinRunner for a change in this setting to take effect.

(Default = **selected**)

Note: This option is only relevant for text recognized using the Image Text Recognition mechanism.



Font Group

To be able to use Image Text Recognition (described in the section above), you must choose an active font group. This option sets the active font group for Image Text Recognition. For more information on font groups, see [Teaching Fonts to WinRunner](#) on page 578.

(Default = **stand**)

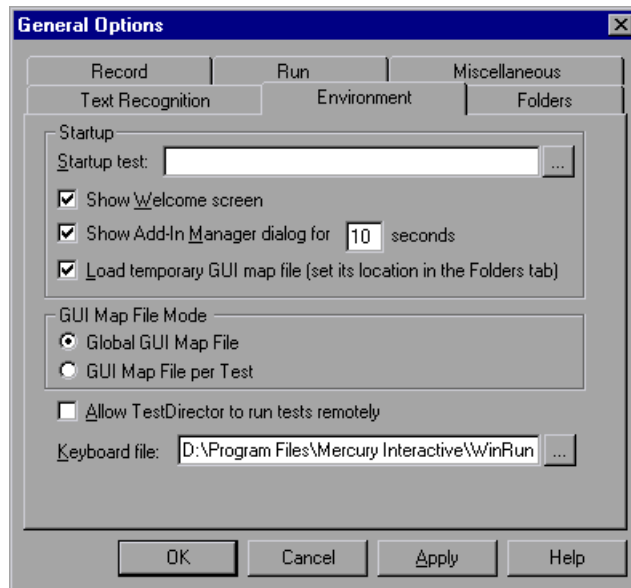
Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *fontgrp* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can also set this option using the corresponding *-fontgrp* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Environment Tab

The Environment tab options affect WinRunner's testing environment.



WinRunner Interface Language

If WinRunner is installed on a non-English operating system, you may have an option to select the WinRunner interface language from the Environment tab of the General Options dialog box.



Startup Test

This option designates the location of your startup test.

Use a startup test to configure recording, load compiled modules, and load GUI map files when starting WinRunner. Note that you can also set the location of your startup test from the RapidTest Script wizard.

(Default = **installation folder**)

Note: A startup test can be used in addition to (and not instead of) the initialization (tslinit) test.

Show Welcome Screen

This option determines whether the Welcome screen is displayed when starting WinRunner.

- If this option is selected, the Welcome screen is displayed when starting WinRunner.
- If this option is cleared, the Welcome screen is not displayed when starting WinRunner.

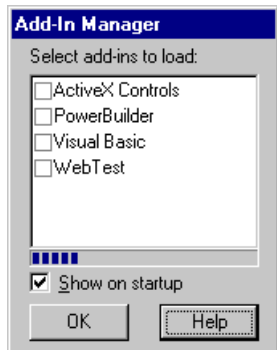
(Default = **selected**)



Show Add-In Manager dialog

This option determines:

- whether to display the **Add-In Manager** dialog box when starting WinRunner
- if the **Add-In Manager** dialog box is displayed when starting WinRunner, how many seconds it remains open before it closes (timeout)



For information about the **Add-In Manager** dialog box and loading installed add-ins when starting WinRunner, see [Loading WinRunner Add-Ins](#) on page 55.

- If this option is selected, the **Add-In Manager** dialog box is displayed when starting WinRunner. In the timeout box, specify the number of seconds to wait before closing the window.
- If this option is cleared, the **Add-In Manager** dialog box is not displayed when starting WinRunner. The timeout box is disabled.

(Default = **selected** and **10** [seconds])



Load Temporary GUI Map File

This option determines whether WinRunner automatically loads the temporary GUI map file into the GUI map.

- If this option is selected, WinRunner automatically loads the temporary GUI map file when starting WinRunner.
- If this option is cleared, WinRunner does not automatically load the temporary GUI map file when starting WinRunner.

(Default = **selected**)

Note: You can set the location of the temporary GUI map file in the **Folders** tab of the **General Options dialog** box. For more information, see [Temporary GUI Map File](#) on page 1082.

Note: This option is disabled when the **Create a new GUI map file for each test** check box is selected, as there are no temporary GUI map files when working with a single GUI map file for each test.



GUI Map File Mode

This option sets the GUI map file mode in WinRunner.

- The **Global GUI Map File** mode enables you to create a GUI map file for your entire application, or for each window in your application. Multiple tests can reference a common GUI map file. For additional information, see Chapter 5, [Working in the Global GUI Map File Mode](#).
- The **GUI Map File per Test** mode enables WinRunner to automatically create a GUI map file for each test you create. You do not need to worry about creating, saving, and loading GUI map files. For additional information, see Chapter 6, [Working in the GUI Map File per Test Mode](#).

(Default = **Global GUI Map File**)

Notes: You must restart WinRunner for a change in this setting to take effect.

If you are working with tests created in WinRunner 6.02 or lower, you must work in the *Global GUI Map File* mode.



Allow TestDirector to Run Tests Remotely

This option enables TestDirector to run WinRunner tests on your machine from a remote machine. This option also adds the WinRunner Remote Agent application to your Windows startup. If the WinRunner Remote Agent application is not currently running on your machine, selecting this option starts it. When this application is running, the WinRunner Remote Agent icon appears in the status area of your screen.

- If this option is selected, TestDirector is allowed to run WinRunner tests from a remote machine. The WinRunner Remote Agent application is added to your Windows startup. If the WinRunner Remote Agent application is not currently running on your machine, it is started, and its icon appears in the status area of your screen.
- If this option is cleared, TestDirector is not allowed to run WinRunner tests from a remote machine. All WinRunner tests must be run locally. The WinRunner Remote Agent application is not part of your Windows startup.

(Default = **cleared**)

For information on running WinRunner tests remotely from TestDirector, refer to your *TestDirector User's Guide*.

Keyboard File

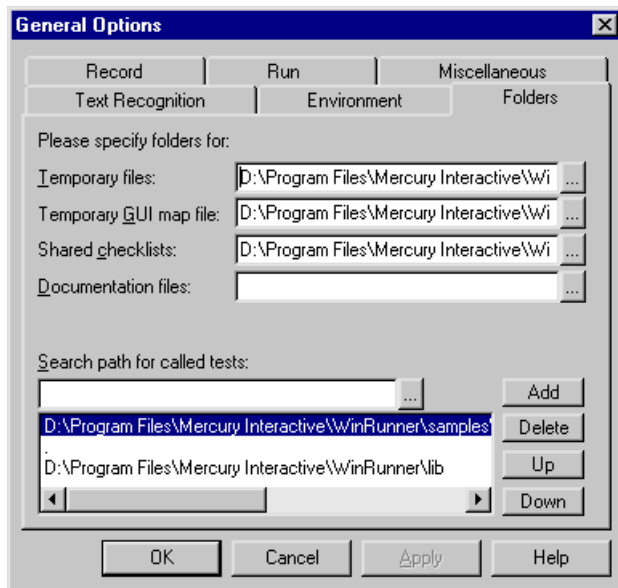
This option designates the path of the keyboard definition file. This file specifies the language that appears in the test script when you type on the keyboard during recording.

(Default = **installation folder\dat\win_scan.kbd**)



Folders Tab

The Folders tab options specify the locations of WinRunner files.



Temporary Files

This box designates the folder containing temporary tests. To enter a new path, type it in the text box or click **Browse** to locate the folder.

Note: If you designate a new folder, you must restart WinRunner in order for the change to take effect.

(Default = **installation folder\tmp**)

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *tempdir* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Temporary GUI Map File

This box designates the folder containing the temporary GUI map file (*temp.gui*). If you select the **Load Temporary GUI Map File** check box in the Environment tab of the General Options dialog box, this file loads automatically when you start WinRunner. To enter a new folder, type it in the text box or click Browse to locate it.

Note: If you designate a new folder, you must restart WinRunner in order for the change to take effect.

(Default = **installation folder\tmp**)



Shared Checklists

This box designates the folder in which WinRunner stores shared checklists for GUI and database checkpoints. In the test script, shared checklist files are designated by SHARED_CL before the file name in a **win_check_gui**, **obj_check_gui**, **check_db**, or **check_gui** statement. To enter a new path, type it in the text box or click Browse to locate the folder. For more information on shared GUI checklists, see [Saving a GUI Checklist in a Shared Folder](#) on page 291. For more information on shared database checklists, see [Saving a Database Checklist in a Shared Folder](#) on page 514.

Note: If you designate a new folder, you must restart WinRunner in order for the change to take effect.

(Default = **installation folder\chklist**)

Note that you can use the **getvar** function to retrieve the value of the corresponding *shared_checklist_dir* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).



Documentation Files

Designates the folder in which documentation files are stored. To enter a new path, type it in the text box or click Browse to locate the folder.

(Default = **installation folder\doc**)

Search Path for Called Tests

This box determines the paths that WinRunner searches for called tests. If you define search paths, you do not need to designate the full path of a test in a call statement. The order of the search paths in the list determines the order of locations in which WinRunner searches for a called test.

To add a search path, enter the path in the text box, and click **Add**. The path appears in the list box, below the text box.

To delete a search path, select the path and click **Delete**.

To move a search path up one position in the list, select the path and click **Up**.

To move a selected path down one position in the list, select the path and click **Down**.

(Default = **installation folder\lib**)

For more information, see Chapter 26, [Calling Tests](#).



Note: When WinRunner is connected to TestDirector, you can specify the paths in a TestDirector database that WinRunner searches for called tests. Search paths in a TestDirector database can be preceded by [TD]. Note that you cannot use the Browse button to specify search paths in a TestDirector database: they must be typed directly into the search path box.

Note that you can use the **setvar** and **getvar** functions to set and retrieve the value of the corresponding *searchpath* testing option from within a test script, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

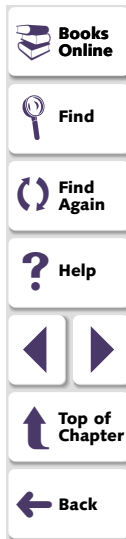
Note that you can also set this option using the corresponding *-search_path* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



Choosing Appropriate Timeout and Delay Settings

The table below summarizes the timeout and delay settings available in the General Options dialog box, and describes the situations in which you may want to adjust each setting.

Setting	Description	Adjustment Recommendations	Default
Delay for Window Synchronization	The amount of time WinRunner waits between each attempt to locate a window or object - enables window to stabilize.	A smaller the delay enables WinRunner to capture the object or window more quickly so that the test can continue, but smaller delays increase the load on the system. In most cases, when you modify the Timeout for Checkpoints and CS Statements, you should modify the delay in order to maintain a constant ratio. To avoid overloading your system, you should not exceed a timeout:delay ratio of 50:1.	1000 (ms)










Setting	Description	Adjustment Recommendations	Default
Timeout for checkpoint and CS statements	The amount of time, in addition to the time parameter embedded in a GUI checkpoint or synchronization point, that WinRunner waits for an object or window to appear.	You should increase this setting if your application takes longer than the current timeout value to successfully display objects and windows. If only one or few objects have this problem, however, it may be preferable to add a synchronization point to the script for the problematic objects.	10000 (ms)
Delay between execution of CS statements	Amount of time WinRunner waits before executing each CS statement.	Increase this delay when you need to slow down the test run, for reasons not related to synchronization issues. For example, you may want to increase the delay so that you can follow the test as it runs step by step.	0 (ms)



Setting	Description	Adjustment Recommendations	Default
Timeout for waiting for synchronization message	The amount of time WinRunner waits before validating that keyboard or mouse input was entered correctly during a test run.	Increase this setting if WinRunner runs the script faster than the application is capable of executing the statements.	2000 (ms)
Drop synchronization timeout if failed	Automatically minimizes the length of the Timeout for waiting for synchronization message setting after the first synchronization validation failure. This increases the likelihood that the test will fail quickly, as mouse and keyboard entries will not be complete.	Select this option to prevent the test from running for a long time with incorrect data due to an incomplete mouse or keyboard entry.	selected



Setting	Description	Adjustment Recommendations	Default
Beep when synchronization fails	WinRunner beeps each time the Timeout for waiting for synchronization message setting is exceeded.	You may want to select this option while debugging your script. If you hear many beeps during a single test run, increase the Timeout for waiting for synchronization message .	cleared
Timeout for text recognition	The amount of time that WinRunner waits to recognize text when performing a text checkpoint using the standard Text Recognition method during a test run.	If text checkpoints fail using the standard Text Recognition method, try increasing this timeout. (Alternatively you can try using Image Text Recognition.)	500 (ms)

 **Books Online**
 **Find**
 **Find Again**
 **Help**

 **Top of Chapter**
 **Back**

Configuring WinRunner

Setting Testing Options from a Test Script

You can control how WinRunner records and runs tests by setting and retrieving testing options from within a test script.

This chapter describes:

- **Setting Testing Options with setvar**
- **Retrieving Testing Options with getvar**
- **Controlling the Test Run with setvar and getvar**
- **Test Script Testing Options**



About Setting Testing Options from a Test Script

WinRunner testing options affect how you record test scripts and run tests. For example, you can set the speed at which WinRunner executes a test or determine how WinRunner records keyboard input.

You can set and retrieve the values of testing options from within a test script. To set the value of a testing option, use the **setvar** function. To retrieve the current value of a testing option, use the **getvar** function. By using a combination of **setvar** and **getvar** statements in a test script, you can control how WinRunner executes a test. You can use these functions to set and view the testing options for all tests, for a single test, or for part of a single test. You can also use these functions in a startup test script to set environment variables.

Most testing options can also be set using the General Options dialog box. For more information on setting testing options using the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#).



Setting Testing Options with setvar

You use the **setvar** function to set the value of a testing option from within the test script. This function has the following syntax:

```
setvar ("testing_option", "value");
```

In this function, *testing_option* may specify any one of the following:

attached_text_area	item_number_seq	searchpath
attached_text_search_radius	key_editing	single_prop_check_fail
beep	list_item_separator	speed
cs_run_delay	listview_item_separator	sync_fail_beep
cs_fail	min_diff	synchronization_timeout
delay_msec	mismatch_break	tempdir
drop_sync_timeout	rec_item_name	timeout_msec
enum_descendent_toplevel	rec_owner_drawn	treeview_path_separator
fontgrp		

For example, if you execute the following **setvar** statement:

```
setvar ("mismatch_break", "off");
```



WinRunner disables the *mismatch_break* testing option. The setting remains in effect during the testing session until it is changed again, either with another **setvar** statement or from the corresponding **Break when verification fails** check box in the Run tab of the General Options dialog box.

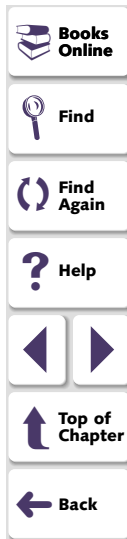
Using the **setvar** function changes a testing option globally, and this change is reflected in the General Options dialog box. However, you can also use the **setvar** function to set testing options for all tests, for a specific test, or even for part of a specific test.

To use the **setvar** function to change a variable only for the current test, without overwriting its global value, save the original value of the variable separately and restore it later in the test. For example, if you want to change the *delay_msec* testing option to 20,000 for a specific test only, insert the following at the beginning of your test script:

```
# Keep the original value of the 'delay_msec' testing option
old_delay = getvar ("delay_msec") ;
setvar ("delay_msec", "20,000") ;
```

To change back the *delay* testing option to its original value at the end of the test, insert the following at the end of your test script:

```
#Change back the 'delay_msec' testing option to its original value.
setvar ("delay_msec", old_delay) ;
```



Retrieving Testing Options with getvar

You use the **getvar** function to retrieve the current value of a testing option. The **getvar** function is a read-only function, and does not enable you to alter the value of the retrieved testing option. (To change the value of a testing option in a test script, use the **setvar** function, described above.) The syntax of this statement is:

```
user_variable = getvar ("testing_option");
```



In this function, *testing_option* may specify any one of the following:

attached_text_area	line_no	speed
attached_text_search_radius	list_item_separator	sync_fail_beep
batch	listview_item_separator	synchronization_timeout
beep	min_diff	td_log_dirname
cs_fail	mismatch_break	td_connection
cs_run_delay	rec_item_name	td_cycle_name
curr_dir	rec_owner_drawn	td_database_name
delay_msec	result	td_server_name
drop_sync_timeout	runmode	td_user_name
enum_descendent_toplevel	searchpath	tempdir
exp	shared_checklist_dir	testname
fontgrp	single_prop_check_fail	timeout_msec
item_number_seq	silent_mode	treeview_path_separator
key_editing		



For example:

```
nowspeed = getvar ("speed");
```

assigns the current value of the run speed to the user-defined variable `nowspeed`.

Note that some testing options are set by WinRunner and cannot be changed through either **setvar** or the General Options dialog box. For example, the value of the `testname` option is always the name of the current test. Use **getvar** to retrieve this read-only value.



Controlling the Test Run with setvar and getvar

You can use **getvar** and **setvar** together to control a test run without changing global settings. In the following test script fragment, WinRunner checks the bitmap `Img1`. The **getvar** function retrieves the values of the `timeout_msec` and `delay_msec` testing options, and **setvar** assigns their values for this **win_check_bitmap** statement. After the window is checked, **setvar** restores the values of the testing options.

```
t = getvar ("timeout_msec");  
d = getvar ("delay_msec");  
setvar ("timeout_msec", 30000);  
setvar ("delay_msec", 3000);  
win_check_bitmap ("calculator", Img1, 2, 261,269,93,42);  
setvar ("timeout_msec", t);  
setvar ("delay_msec", d);
```

Note: You can use the **setvar** and **getvar** functions in a startup test script to set environment variables for a specific WinRunner session.



Test Script Testing Options

This section describes the WinRunner testing options that can be used with the **setvar** and **getvar** functions from within a test script. If you can also use the General Options dialog box to set or view an option, it is indicated below.

attached_text_area

This option specifies the point on a GUI object from which WinRunner searches for its attached text.

Value	Point on the GUI Object
Default	Top-left corner of regular (English-style) windows; Top-right corner of windows with RTL-style (WS_EX_BIDI_CAPTION) windows
Top-Left	Top-left corner
Top	Midpoint of two top corners
Top-Right	Top-right corner
Right	Midpoint of two right corners
Bottom-Right	Bottom-right corner
Bottom	Midpoint of two bottom corners
Bottom-Left	Bottom-left corner
Left	Midpoint of two left corners



You can use this option with the **setvar** and **getvar** functions.

(Default = **Default**)

Note that you may also set this option using the **Attached Text - Preferred search area** box in the Miscellaneous tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note: When you run a test, you must use the same values for the attached text options that you used when you recorded the test. Otherwise, WinRunner may not identify the GUI object.

In previous versions of WinRunner, you could not set the preferred search area: WinRunner searched for attached text based on what is now the Default setting for the preferred search area. If backward compatibility is important, choose the Default setting.



attached_text_search_radius

This option specifies the radius from the specified point on a GUI object that WinRunner searches for the static text object that is its attached text. The radius can be 3 to 300 pixels.

(Default= **35** [pixels])

You can use this option with the **setvar** and **getvar** functions.

Note that you may also set this option using the **Attached Text - Search radius** box in the Miscellaneous tab of the General Options dialog box, described in Chapter 40, **Setting Global Testing Options**.

Note: When you run a test, you must use the same values for the attached text options that you used when you recorded the test. Otherwise, WinRunner may not identify the GUI object.



batch

This option displays whether WinRunner is running in batch mode. In batch mode, WinRunner suppresses messages during a test run so that a test can run unattended. WinRunner also saves all the expected and actual results of a test run in batch mode in one folder, and displays them in one Test Results window. For more information on the batch testing option, see Chapter 33, [Running Batch Tests](#).

For example, if a **set_window** statement is missing from a test script, WinRunner cannot find the specified window. If this option is on and the test is run in batch mode, WinRunner reports an error in the Test Results window and proceeds to run the next statement in the test script. If this option is off and the test is not run in batch mode, WinRunner pauses the test and opens the Run wizard to enable the user to locate the window.

You can use this option with the **getvar** function.

(Default = 0)

Note that you may also set this option using the **Run in batch mode** check box in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



Note that you can also set this option using the corresponding *-batch* command line option, described in Chapter 34, [Running Tests from the Command Line](#).

Note: When you run tests in batch mode, you automatically run them in silent mode. For information about the *silent_mode* testing option, see [page 1121](#).

beep

This option determines whether WinRunner beeps when checking any window during a test run.

You can use this option with the **setvar** and **getvar** functions.

(Default = **on**)

Note that you may also set this option using the corresponding **Beep when checking a window** check box in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding *-beep* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



cs_fail

This option determines whether WinRunner fails a test when Context Sensitive errors occur. A Context Sensitive error is the failure of a Context Sensitive statement during a test. Context Sensitive errors are often due to WinRunner's failure to identify a GUI object.

For example, a Context Sensitive error will occur if you run a test containing a **set_window** statement with the name of a non-existent window. Context Sensitive errors can also occur when window names are ambiguous. For information about Context Sensitive functions, refer to the *TSL Online Reference*.

You can use this option with the **setvar** and **getvar** functions.

(Default = 0)

Note that you may also set this option using the corresponding **Fail test when Context Sensitive errors occur** check box in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding `-cs_fail` command line option, described in Chapter 34, [Running Tests from the Command Line](#).



`cs_run_delay`

This option sets the time (in milliseconds) that WinRunner waits between executing Context Sensitive statements when running a test.

You can use this option with the **setvar** and **getvar** functions.

(Default = **0** [milliseconds])

Note that you may also set this option using the corresponding **Delay between execution of CS statements** box in the Advanced Run Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding `-cs_run_delay` command line option, described in Chapter 34, [Running Tests from the Command Line](#).



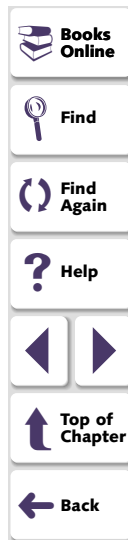
curr_dir

This option displays the current working folder for the test.

You can use this option with the **getvar** function.

This option has no default value.

Note that you may also view the location of the current working folder for the test from the corresponding **Current folder** box in the **Current Test** tab of the Test Properties dialog box, described in Chapter 31, [Reviewing Current Test Settings](#).



delay_msec

This option sets the sampling interval (in seconds) used to determine that a window is stable before capturing it for a Context Sensitive checkpoint or synchronization point. To be declared stable, a window must not change between two consecutive samplings. This sampling continues until the window is stable or the timeout (as set with the *timeout_msec* testing option) is reached. (Formerly *delay*, which was measured in seconds.)

For example, when the delay is two seconds and the timeout is ten seconds, WinRunner checks the window in the application under test every two seconds until two consecutive checks produce the same results or until ten seconds have elapsed. Setting the value to 0 disables all bitmap checking.

You can use this option with the **setvar** and **getvar** functions.

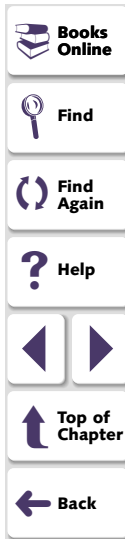
(Default = **1000** [milliseconds])

Note: This option is accurate to within 20-30 milliseconds.

Note that you may also set this option using the corresponding **Delay for window synchronization** box in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



Note that you can also set this option using the corresponding *-delay_msec* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



drop_sync_timeout

determines whether WinRunner minimizes the synchronization timeout (as defined in the **timeout_msec** option) after the first synchronization failure.

(Default = **selected**)

You can use this option with the **getvar** and **setvar** functions.

Note that you may also set this option using the corresponding **Drop synchronization timeout if failed** check box in the Advanced Run Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

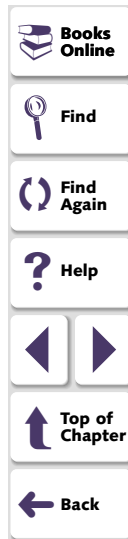
enum_descendent_toplevel

This option determines whether WinRunner records controls (objects) of a child object whose parent is an object but not a window and identifies these controls when running a test.

(Default = **on**)

You can use this option with the **getvar** and **setvar** functions.

Note that you may also set this option using the corresponding **Consider child windows** check box in the Record tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



exp

This option displays the full path of the expected results folder associated with the current test run.

You can use this option with the **getvar** function.

This option has no default value.

Note that you may also view the full path of the expected results folder from the corresponding **Expected results folder** box in the **Current Test** tab of the Test Properties dialog box, described in Chapter 31, [Reviewing Current Test Settings](#)

Note that you can also set this option using the corresponding `-exp` command line option, described in Chapter 34, [Running Tests from the Command Line](#).



fontgrp

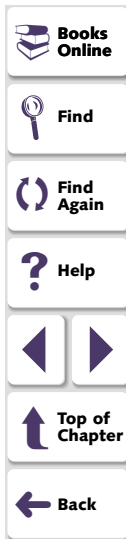
To be able to use Image Text Recognition (instead of the default Text Recognition), (described in [Use Image Text Recognition Mechanism](#) on page 1072), you must choose an active font group. This option sets the active font group for Image Text Recognition. For more information on font groups, see [Teaching Fonts to WinRunner](#) on page 578.

You can use this option with the **setvar** and **getvar** functions.

(Default = **stand**)

Note that you may also set this option using the corresponding **Font group** box in the Text Recognition tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding *-fontgrp* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



`item_number_seq`

This option defines the string recorded in the test script to indicate that a List, ListView, or TreeView item is specified by its index number.

You can use this option with the `setvar` and `getvar` functions.

(Default = #)

Note that you may also set this option using the corresponding **String indicating that what follows is a number** box in the Miscellaneous tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



key_editing

This option determines whether WinRunner generates more concise **type**, **win_type**, and **obj_type** statements in a test script.

When this option is on, WinRunner generates more concise **type**, **win_type**, and **obj_type** statements that represent only the net result of pressing and releasing input keys. This makes your test script easier to read. For example:

```
obj_type (object, "A");
```

When this option is disabled, WinRunner records the pressing and releasing of each key. For example:

```
obj_type (object, "<kShift_L>-a-a+<kShift_L>+");
```

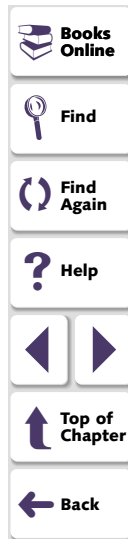
Disable this option if the exact order of keystrokes is important for your test.

For more information on this subject, see the **type** function in the *TSL Online Reference*.

You can use this option with the **setvar** and **getvar** functions.

(Default = **on**)

Note that you may also set this option using the corresponding **Generate concise, more readable type statements** check box in the Advanced Record Options of the Record tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



line_no

This option displays the line number of the current location of the execution arrow in the test script.

You can use this option with the **getvar** function.

This variable has no default value.

Note that you may also view the current line number in the test script from the corresponding **Current Line** box in the **Current Test** tab of the Test Properties dialog box, described in Chapter 31, [Reviewing Current Test Settings](#).

list_item_separator

This option defines the string recorded in the test script to separate items in a list box or a combo box.

You can use this option with the **setvar** and **getvar** functions.

(Default = ,)

Note that you may also set this option using the corresponding **String for separating ListBox or ComboBox items** box in the Miscellaneous tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



listview_item_separator

This option defines the string recorded in the test script to separate items in a ListView or a TreeView.

You can use this option with the **setvar** and **getvar** functions.

(Default = ,)

Note that you may also set this option using the corresponding **String for separating ListView or TreeView items** box in the Miscellaneous tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

min_diff

This option defines the number of pixels that constitute the threshold for bitmap mismatch. When this value is set to 0, a single pixel mismatch constitutes a bitmap mismatch.

You can use this option with the **setvar** and **getvar** functions.

(Default = **0** [pixels])

Note that you may also set this option using the corresponding **Threshold for difference between bitmaps** box in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding *-min_diff* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



mismatch_break

This option determines whether WinRunner pauses the test run and displays a message whenever verification fails or whenever any message is generated as a result of a context sensitive statement during a test that is run in Verify mode. This option should be used only when working interactively.

For example, if a **set_window** statement is missing from a test script, WinRunner cannot find the specified window. If this option is on, WinRunner pauses the test and opens the Run wizard to enable the user to locate the window. If this option is off, WinRunner reports an error in the Test Results window and proceeds to run the next statement in the test script.

You can use this option with the **setvar** and **getvar** functions.

(Default = **on**)

Note that you may also set this option using the corresponding **Break when verification fails** check box in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding *-mismatch_break* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



rec_item_name

This option determines whether WinRunner records non-unique ListBox and ComboBox items by name or by index.

You can use this option with the **setvar** and **getvar** functions.

(Default = **0**)

Note that you may also set this option using the corresponding **Record non-unique list items by name** check box in the Advanced Record Options of the Record tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding *-rec_item_name* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



`rec_owner_drawn`

Since WinRunner cannot identify the class of owner-drawn buttons, it automatically maps them to the general “object” class. This option enables you to map all owner-drawn buttons to a standard button class (`push_button`, `radio_button`, or `check_button`).

You can use this option with the **setvar** and **getvar** functions.

(Default = **Object**)

Note that you may also set this option using the corresponding **Record owner-drawn buttons** box in the Advanced Record Options of the Record tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



result

This option displays the full path of the verification results folder associated with the current test run.

You can use this option with the **getvar** function.

This option has no default value.

Note that you may also view the full path of the verification results folder from the corresponding **Verification results folder** box in the **Current Test** tab of the Test Properties dialog box, described in Chapter 31, [Reviewing Current Test Settings](#).

runmode

This option displays the current run mode: Verify, Debug, or Update.

You can use this option with the **getvar** function.

This option has no default value.

Note that you may also view the current run mode from the corresponding **Run mode** box in the **Current Test** tab of the Test Properties dialog box, described in Chapter 31, [Reviewing Current Test Settings](#).



searchpath

This option sets the path that WinRunner searches for called tests. If you define search paths, you do not need to designate the full path of a test in a call statement. You can set multiple search paths in a single statement by leaving a space between each path. To set multiple search paths for long file names, surround each path with angle brackets < >. WinRunner searches for a called test in the order in which multiple paths appear in the **getvar** or **setvar** statement.

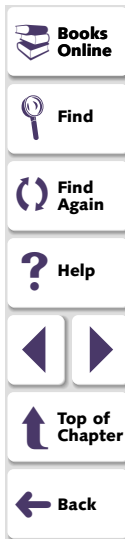
You can use this option with the **setvar** and **getvar** functions.

(Default = **installation folder\lib**)

Note that you may also set this option using the corresponding **Search path for called tests** box in the Folders tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding `-search_path` command line option, described in Chapter 34, [Running Tests from the Command Line](#).

Note: When WinRunner is connected to TestDirector, you can specify the paths in a TestDirector database that WinRunner searches for called tests. Search paths in a TestDirector database can be preceded by [TD].



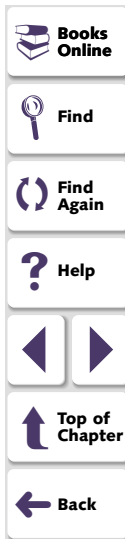
shared_checklist_dir

This option designates the folder in which WinRunner stores shared checklists for GUI and database checkpoints. In the test script, shared checklist files are designated by SHARED_CL before the file name in a **win_check_gui**, **obj_check_gui**, **check_gui**, or **check_db** statement. For more information on shared GUI checklists, see [Saving a GUI Checklist in a Shared Folder](#) on page 291. For more information on shared database checklists, see [Saving a Database Checklist in a Shared Folder](#) on page 514. Note that if you designate a new folder, you must restart WinRunner in order for the change to take effect.

You can use this option with the **getvar** function.

(Default = **installation folder\chklist**)

Note that you may also view the location of the folder in which WinRunner stores shared checklists from the corresponding **Shared checklists** box in the Folders tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



silent_mode

This option displays whether WinRunner is running in silent mode. In silent mode, WinRunner suppresses messages during a test run so that a test can run unattended. When you run a test remotely from TestDirector, you must run it in silent mode, because no one is monitoring the computer where the test is running to view the messages. For information on running tests remotely from TestDirector, see Chapter 44, [Managing the Testing Process](#).

You can use this option with the **getvar** function.

(Default = **off**)

Note: When you run tests in batch mode, you automatically run them in silent mode. For information running tests in batch mode, see Chapter 33, [Running Batch Tests](#).



single_prop_check_fail

This option fails a test run when **_check_info** statements fail. It also writes an event to the Test Results window for these statements. (You can create **_check_info** statements using the **Create > GUI Checkpoint > For Single Property** command.)

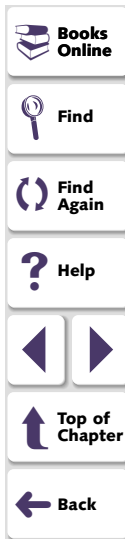
You can use this option with the **setvar** and **getvar** functions.

(Default = 1)

For information about the **check_info** functions, refer to the *TSL Online Reference*.

Note that you may also set this option using the corresponding **Fail test when single property check fails** option in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding **-single_prop_check_fail** command line option, described in Chapter 34, [Running Tests from the Command Line](#).



speed

This option sets the default run speed for tests run in Analog mode. Two speeds are available: *normal* and *fast*.

Setting the option to **normal** runs the test at the speed at which it was recorded.

Setting the option to **fast** runs the test as fast as the application can receive input.

You can use this option with the **setvar** and **getvar** functions.

(Default = **fast**)

Note that you may also set this option using the corresponding **Run Speed for Analog Mode** option in the Advanced Run Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding *-speed* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



sync_fail_beep

This option determines whether WinRunner beeps when synchronization fails.

You can use this option with the **setvar** and **getvar** functions.

(Default = **off**)

Note that you may also set this option using the corresponding **Beep when synchronization fails** check box in the Advanced Run Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note: You use this option primarily to debug a test script.

Note: If synchronization often fails during your test runs, consider increasing the value of the *synchronization_timeout* testing option (described below) or the corresponding **Timeout for waiting for synchronization message** option in the Advanced Run Options dialog box.



synchronization_timeout

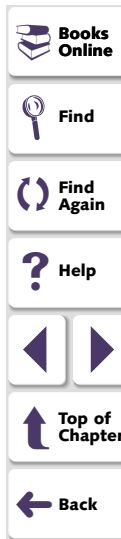
This option sets the timeout (in milliseconds) that WinRunner waits before validating that keyboard or mouse input was entered correctly during a test run.

You can use this option with the **setvar** and **getvar** functions.

(Default = **2000** [milliseconds])

Note that you may also set this option using the corresponding **Timeout for waiting for synchronization message** box in the Advanced Run Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note: If synchronization often fails during your test runs, consider increasing the value of this option.



td_connection

This option indicates whether WinRunner is currently connected to TestDirector.
(Formerly *test_director*.)

You can use this option with the **getvar** function.

(Default = **off**)

Note that you can connect to TestDirector from the **Connection to TestDirector** dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see Chapter 44, **Managing the Testing Process**.

Note that you can also set this option using the corresponding *-td_connection* command line option, described in Chapter 34, **Running Tests from the Command Line**.



td_cycle_name

This option displays the name of the TestDirector test set (formerly known as “cycle”) for the test. (Formerly *cycle*.)

You can use this option with the **getvar** function.

This option has no default value.

Note that you may set this option using the Run Tests dialog box when you run a test set from WinRunner. For more information, see [Running Tests in a Test Set](#) on page 1199. You may also set this option from within TestDirector. For more information, refer to the *TestDirector User's Guide*.

Note that you can also set this option using the corresponding *-td_cycle_name* command line option, described in Chapter 34, [Running Tests from the Command Line](#).



td_database_name

This option displays the name of the TestDirector project database to which WinRunner is currently connected.

You can use this option with the **getvar** function.

This option has no default value.

Note that you may set this option using the **Project Connection** box in the **Connection to TestDirector** dialog box, which you can open by choosing **Tools > TestDirector Connection**. For more information, see Chapter 44, **Managing the Testing Process**.

Note that you can also set this option using the corresponding **-td_database_name** command line option, described in Chapter 34, **Running Tests from the Command Line**.



td_server_name

This option displays the name of the TestDirector server (TDAPI) to which WinRunner is currently connected.

You can use this option with the **getvar** function.

This option has no default value.

Note that you may set this option using the **Server Connection** box in the **Connection to TestDirector** dialog box, which you can open by choosing **Tools > TestDirector Connection**. For more information, see Chapter 44, **Managing the Testing Process**.

Note that you can also set this option using the corresponding *-td_server_name* command line option, described in Chapter 34, **Running Tests from the Command Line**.



td_user_name

This option displays the user name for opening the selected TestDirector database. (Formerly *user*.)

You can use this option with the **getvar** function.

This option has no default value.

Note that you can also set this option using the corresponding *-td_user_name* command line option, described in Chapter 34, [Running Tests from the Command Line](#).

Note that you may set this option using the **User Name** box in the **Connection to TestDirector** dialog box, which you can open by choosing **Tools > TestDirector Connection**. For more information, see Chapter 44, [Managing the Testing Process](#).



tempdir

This option designates the folder containing temporary files. Note that if you designate a new folder, you must restart WinRunner in order for the change to take effect.

You can use this option with the **setvar** and **getvar** functions.

(Default = **installation folder\tmp**)

Note that you may also set this option using the corresponding **Temporary files** box in the Folders tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

testname

This option displays the full path of the current test.

You can use this option with the **getvar** function.

This option has no default value.

Note that you may also view the full path of the current test from the corresponding **Test Name** box in the Current Test tab of the Test Properties dialog box, described in Chapter 31, [Reviewing Current Test Settings](#).



timeout_msec

This option sets the global timeout (in milliseconds) used by WinRunner when executing checkpoints and Context Sensitive statements. This value is added to the *time* parameter embedded in GUI checkpoint or synchronization point statements to determine the maximum amount of time that WinRunner searches for the specified window. The timeout must be greater than the delay for window synchronization (as set with the *delay_msec* testing option). (Formerly *timeout*, which was measured in seconds.)

For example, in the statement:

```
win_check_bitmap ("calculator", Img1, 2, 261,269,93,42);
```

when the *timeout_msec* variable is 10,000 milliseconds, this operation takes a maximum of 12,000 (2,000 +10,000) milliseconds.

You can use this option with the **setvar** and **getvar** functions.

(Default = **10000** [milliseconds])

Note: This option is accurate to within 20-30 milliseconds.



Note that you may also set this option using the corresponding **Timeout for checkpoints and CS statements** box in the Run tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).

Note that you can also set this option using the corresponding `-timeout_msec` command line option, described in Chapter 34, [Running Tests from the Command Line](#).

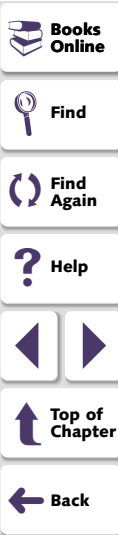
treeview_path_separator

This option defines the string recorded in the test script to separate items in a tree view path.

You can use this option with the **getvar** and **setvar** functions.

(Default = ;)

Note that you may also set this option using the corresponding **String for parsing a TreeView path** box in the Miscellaneous tab of the General Options dialog box, described in Chapter 40, [Setting Global Testing Options](#).



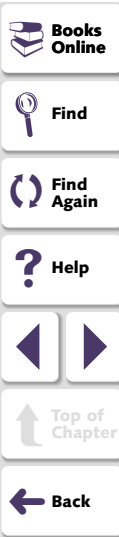
Configuring WinRunner

Customizing the Function Generator

You can customize the Function Generator to include the user-defined functions that you most frequently use in your tests scripts. This makes programming tests easier and reduces the potential for errors.

This chapter describes:

- **Adding a Category to the Function Generator**
- **Adding a Function to the Function Generator**
- **Associating a Function with a Category**
- **Adding a Subcategory to a Category**
- **Setting a Default Function for a Category**



About Customizing the Function Generator

You can modify the Function Generator to include the user-defined functions that you use most frequently. This enables you to quickly generate your favorite functions and insert them directly into your test scripts. You can also create custom categories in the Function Generator in which you can organize your user-defined functions. For example, you can create a category named “my_button”, which contains all the functions specific to the “my_button” custom class. You can also set the default function for the new category, or modify the default function for any standard category.

To add a new category with its associated functions to the Function Generator, you perform the following steps:

- 1 Add a new category to the Function Generator.
- 2 Add new functions to the Function Generator.
- 3 Associate the new functions with the new category.
- 4 Set the default function for the new category.
- 5 Add a subcategory for the new category (optional).

You can find all the functions required to customize the Function Generator in the “function table” category of the Function Generator. By inserting these functions in a startup test, you ensure that WinRunner is invoked with the correct configuration.



Adding a Category to the Function Generator

You use the **generator_add_category** TSL function to add a new category to the Function Generator. This function has the following syntax:

```
generator_add_category ( category_name );
```

where *category_name* is the name of the category that you want to add to the Function Generator.

In the following example, the **generator_add_category** function adds a category called “my_button” to the Function Generator:

```
generator_add_category ("my_button");
```

Note: If you want to display the default function for category when you select an object using the Create > Insert Function > For Object/Window command, then the category name must be the same as the name of the GUI object class.



To add a category to the Function Generator:



- 1 Open the **Function Generator**. (Choose **Create > Insert Function > From Function Generator**, click the **Insert Function from Function Generator** button on the User toolbar, or press the INSERT FUNCTION FROM FUNCTION GENERATOR softkey.)
- 2 In the **Category** box, click **function table**.
- 3 In the **Function Name** box, click **generator_add_category**.
- 4 Click **Args**. The Function Generator expands.
- 5 In the **Category Name** box, type the name of the new category between the quotes. Click **Paste** to paste the TSL statement into your test script.
- 6 Click **Close** to close the Function Generator.

A **generator_add_category** statement is inserted into your test script.

Note: You must run the test script in order to insert a new category into the Function Generator.



Adding a Function to the Function Generator

When you add a function to the Function Generator, you specify the following:

- how the user supplies values for the arguments in the function
- the function description that appears in the Function Generator

Note that after you add a function to the Function Generator, you should associate the function with a category. See [Associating a Function with a Category](#) on page 1151.

You use the **generator_add_function** TSL function to add a user-defined function to the Function Generator.

To add a function to the Function Generator:



- 1 Open the **Function Generator**. (Choose **Create > Insert Function > From Function Generator**, click the **Insert Function from Function Generator** button on the User toolbar, or press the INSERT FUNCTION FROM FUNCTION GENERATOR softkey.)
- 2 In the **Category** box, click **function table**.
- 3 In the **Function Name** box, click **generator_add_function**.
- 4 Click **Args**. The Function Generator expands.
- 5 In the Function Generator, define the *function_name*, *description*, and *arg_number* arguments:



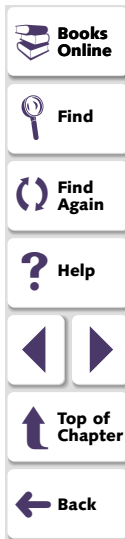
- In the *function_name* box, type the name of the new function between the quotes. Note that you can include spaces and upper-case letters in the function name.
 - In the *description* box, enter the description of the function between the quotes. Note that it does not have to be a valid string expression and it must not exceed 180 characters.
 - In the *arg_number* box, you must choose 1. To define additional arguments (up to eight arguments for each new function), you must manually modify the generated **generator_add_function** statement once it is added to your test script.
- 6 For the function's first argument, define the following arguments: *arg_name*, *arg_type*, and *default_value* (if relevant):
- In the *arg_name* box, type the name of the argument within the quotation marks. Note that you can include spaces and upper-case letters in the argument name.
 - In the *arg_type* box, select **browse**, **point_window**, **point_object**, **select_list**, or **type_edit**, to choose how the user will fill in the argument's value in the Function Generator, as described in [Defining Function Arguments](#) on page 1141.
 - In the *default_value* box, if relevant, choose the default value for the argument.



- Note that any additional arguments for the new function cannot be added from the Function Generator: The *arg_name*, *arg_type*, and *default_value* arguments must be added manually to the **generator_add_function** statement in your test script.

- 7 Click **Paste** to paste the TSL statement into your test script.
- 8 Click **Close** to close the Function Generator.

Note: You must run the test script in order to insert a new function into the Function Generator.



Defining Function Arguments

The `generator_add_function` function has the following syntax:

```
generator_add_function ( function_name, description, arg_number,  
    arg_name_1, arg_type_1, default_value_1,  
    ...  
    arg_name_n, arg_type_n, default_value_n );
```

- *function_name* is the name of the function you are adding.
- *description* is a brief explanation of the function. The description appears in the Description box of the Function Generator when the function is selected. It does not have to be a valid string expression and must not exceed 180 characters.
- *arg_number* is the number of arguments in the function. This can be any number from zero to eight.

For each argument in the function you define, you supply the name of the argument, how it is filled in, and its default value (where possible). When you define a new function, you repeat the following parameters for each argument in the function: *arg_name*, *arg_type*, and *default_value*.

- *arg_name* defines the name of the argument that appears in the Function Generator.
- *arg_type* defines how the user fills in the argument's value in the Function Generator. There are five types of arguments.



browse: The value of the argument is evaluated by pointing to a file in a browse file dialog box. Use *browse* when the argument is a file. To select a file with specific file extensions only, specify a list of default extension(s). Items in the list should be separated by a space or tab. Once a new function is defined, the *browse* argument is defined in the Function Generator by using a Browse button.

point_window: The value of the argument is evaluated by pointing to a window. Use *point_window* when the argument is the logical name of a window. Once a new function is defined, the *point_window* argument is defined in the Function Generator by using a pointing hand.

point_object: The value of the argument is evaluated by pointing to a GUI object (other than a window). Use *point_object* when the argument is the logical name of an object. Once a new function is defined, the *point_object* argument is defined in the Function Generator by using a pointing hand.

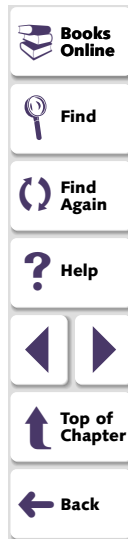
select_list: The value of the argument is selected from a list. Use *select_list* when there is a limited number of argument values, and you can supply all the values. Once a new function is defined, the *select_list* argument is defined in the Function Generator by using a combo box.



type_edit: The value of the argument is typed in. Use *type_edit* when you cannot supply the full range of argument values. Once a new function is defined, the *type_edit* argument is defined in the Function Generator by typing into an edit field.

- *default_value* provides the argument's default value. You may assign default values to ***select_list*** and ***type_edit*** arguments. The default value you specify for a ***select_list*** argument must be one of the values included in the list. You cannot assign default values to ***point_window*** and ***point_object*** arguments.

The following are examples of argument definitions that you can include in **generator_add_function statements**. The examples include the syntax of the argument definitions, their representations in the Function Generator, and a brief description of each definition.



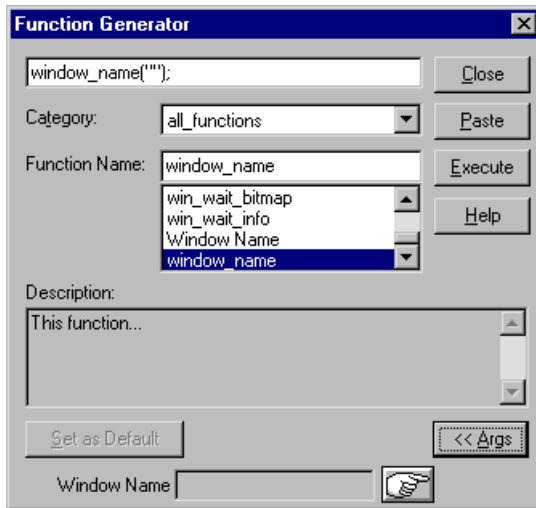
Example 1

```
generator_add_function ("window_name","This function...",1,  
    "Window Name","point_window","");
```

The *function_name* is `window_name`. The *description* is “This function...”. The *arg_number* is 1. The *arg_name* is `Window Name`. The *arg_type* is `point_window`. There is no *default_value*: since the argument is selected by pointing to a window, this argument is an empty string.



When you select the “window_name” function in the Function Generator and click the Args button, the Function Generator appears as follows:

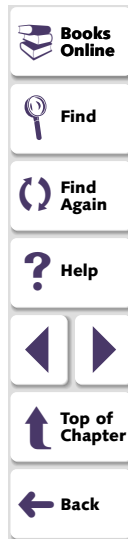
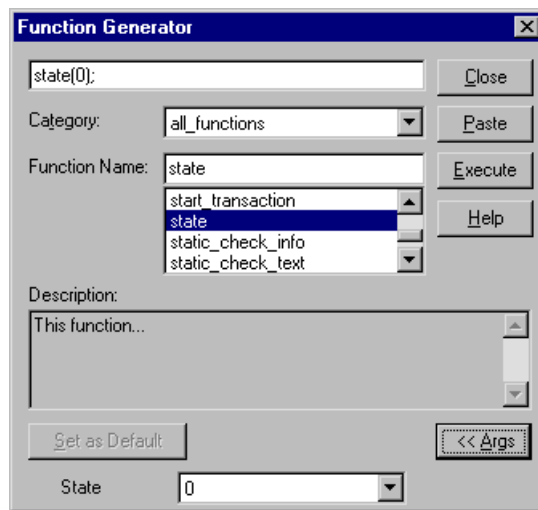


Example 2

```
generator_add_function("state","This function...",1,"State","select_list
(0 1)",0);
```

The *function_name* is state. The *description* is “This function...”. The *arg_number* is 1. The *arg_name* is State. The *arg_type* is select_list. The *default_value* is 0.

When you select the “state” function in the Function Generator and click the Args button, the Function Generator appears as follows:

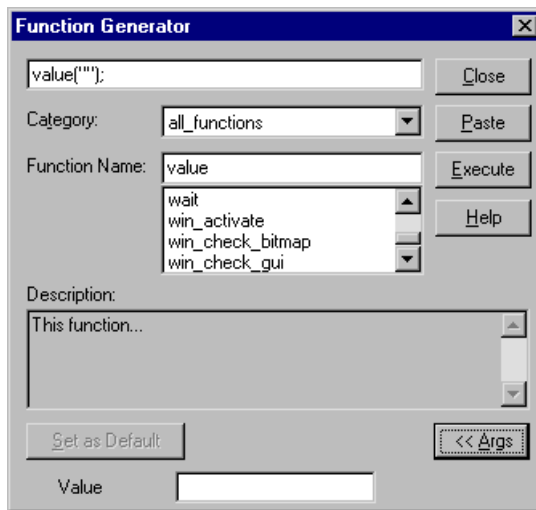


Example 3

```
generator_add_function("value","This function...",1,"Value","type_edit","");
```

The *function_name* is value. The *description* is “This function...”. The *arg_number* is 1. The *arg_name* is Value. The *arg_type* is type_edit. There is no *default_value*.

When you select the “value” function in the Function Generator and click the Args button, the Function Generator appears as follows:



Defining Property Arguments

You can define a function with an argument that uses a Context Sensitive property, such as the label on a pushbutton or the width of a checkbox. In such a case, you cannot define a single default value for the argument. However, you can use the **attr_val** function to determine the value of a property for the selected window or GUI object. You include the **attr_val** function in a call to the **generator_add_function** function.

The **attr_val** function has the following syntax:

```
attr_val ( object_name, "property" );
```

- *object_name* defines the window or GUI object whose property is returned. It must be identical to the *arg_name* defined in a previous argument of the **generator_add_function** function.
- *property* can be any property used in Context Sensitive testing, such as height, width, label, or value. You can also specify platform-specific properties such as *MSW_class* and *MSW_id*.

You can either define a specific property, or specify a parameter that was defined in a previous argument of the same call to the function, **generator_add_function**. For an illustration, see example 2, below.



Example 1

In this example, a function called “check_my_button_label” is added to the Function Generator. This function checks the label of a button.

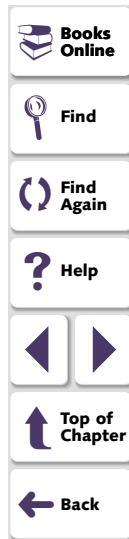
```
generator_add_function("check_my_button_label", "This function checks the
label of a button.", 2,
    "button_name", "point_object", " ",
    "label", "type_edit", "attr_val(button_name, \"label\")");
```

The “check_my_button_label” function has two arguments. The first is the name of the button. Its selection method is *point_object* and it therefore has no default value. The second argument is the label property of the button specified, and is a *type_edit* argument. The **attr_val** function returns the label property of the selected GUI object as the default value for the property.

Example 2

The following example adds a function called “check_my_property” to the Function Generator. This function checks the *class*, *label*, or *active* property of an object. The property whose value is returned as the default depends on which property is selected from the list.

```
generator_add_function ("check_my_property", "This function checks an
object's property.", 3,
    "object_name", "point_object", " ",
    "property", "select_list(\"class\" \"label\" \"active\")", "\"class\"",
    "value:", "type_edit", "attr_val(object_name, property)");
```



The first three arguments in **generator_add_function** define the following:

- the name of the new function (`check_my_property`).
- the description appearing in the Description field of the Function Generator. This function checks an object's property.
- the number of arguments (3).

The first argument of “`check_my_property`” determines the object whose property is to be checked. The first parameter of this argument is the object name. Its type is *point_object*. Consequently, as the null value for the third parameter of the argument indicates, it has no default value.

The second argument is the property to be checked. Its type is *select_list*. The items in the list appear in parentheses, separated by field separators and in quotation marks. The default value is the class property.

The third argument, `value`, is a *type_edit* argument. It calls the **attr_val** function. This function returns, for the object defined as the function's first argument, the property that is defined as the second argument (class, label or active).



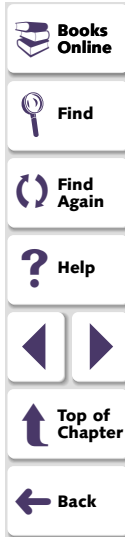
Associating a Function with a Category

Any function that you add to the Function Generator should be associated with an existing category. You make this association using the **generator_add_function_to_category** TSL function. Both the function and the category must already exist.

This function has the following syntax:

generator_add_function_to_category (*category_name*, *function_name*);

- *category_name* is the name of a category in the Function Generator. It can be either a standard category, or a custom category that you defined using the **generator_add_category** function.
- *function_name* is the name of a custom function. You must have already added the function to the Function Generator using the function, **generator_add_function**.



To associate a function with a category:



- 1 Open the Function Generator. (Choose **Create > Insert Function > From Function Generator**, click the **Insert Function from Function Generator** button on the User toolbar, or press the INSERT FUNCTION FROM FUNCTION GENERATOR softkey.)
- 2 In the **Category** box, click **function table**.
- 3 In the **Function Name** box, click **generator_add_function_to_category**.
- 4 Click **Args**. The Function Generator expands.
- 5 In the **Category Name** box, enter the category name as it already appears in the Function Generator.
- 6 In the **Function Name** box, enter the function name as it already appears in the Function Generator.
- 7 Click **Paste** to paste the TSL statement into your test script.
- 8 Click **Close** to close the Function Generator.



A **generator_add_function_to_category** statement is inserted into your test script. In the following example, the “check_my_button_label” function is associated with the “my_button” category. This example assumes that you have already added the “my_button” category and the “check_my_button_label” function to the Function Generator.

```
generator_add_function_to_category ("my_button",  
"check_my_button_label");
```

Note: You must run the test script in order to associate a function with a category.



Adding a Subcategory to a Category

You use the **generator_add_subcategory** TSL function to make one category a subcategory of another category. Both categories must already exist. The **generator_add_subcategory** function adds all the functions in the subcategory to the list of functions for the parent category.

If you create a separate category for your new functions, you can use the **generator_add_subcategory** function to add the new category as a subcategory of the relevant Context Sensitive category.

The syntax of **generator_add_subcategory** is as follows:

```
generator_add_subcategory ( category_name, subcategory_name );
```

- *category_name* is the name of an existing category in the Function Generator.
- *subcategory_name* is the name of an existing category in the Function Generator.



To add a subcategory to a category:

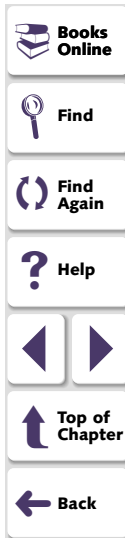


- 1 Open the Function Generator. (Choose **Create > Insert Function > From Function Generator**, click the **Insert Function from Function Generator** button on the User toolbar, or press the INSERT FUNCTION FROM FUNCTION GENERATOR softkey.)
- 2 In the **Category** box, click **function table**.
- 3 In the **Function Name** box, click **generator_add_subcategory**.
- 4 Click **Args**. The Function Generator expands.
- 5 In the **Category Name** box, enter the category name as it already appears in the Function Generator.
- 6 In the **Subcategory Name** box, enter the subcategory name as it already appears in the Function Generator.
- 7 Click **Paste** to paste the TSL statement into your test script.
- 8 Click **Close** to close the Function Generator.

A **generator_add_subcategory** statement is inserted into your test script. In the following example, the “my_button” category is defined as a subcategory of the “push_button” category. All “my_button” functions are added to the list of functions defined for the push_button category.

```
generator_add_subcategory ("push_button", "my_button");
```

Note that you must run the test script in order to add a subcategory to a category.



Setting a Default Function for a Category

You set the default function for a category using the **generator_set_default_function** TSL function. This function has the following syntax:

```
generator_set_default_function ( category_name, function_name );
```

- *category_name* is an existing category.
- *function_name* is an existing function.

You can set a default function for a standard category or for a user-defined category that you defined using the **generator_add_category** function. If you do not define a default function for a user-defined category, WinRunner uses the first function in the list as the default function.

Note that the **generator_set_default_function** function performs the same operation as the Set As Default button in the Function Generator dialog box. However, a default function set through the Set As Default checkbox remains in effect during the current WinRunner session only. By adding **generator_set_default_function** statements to your startup test, you can set default functions permanently.

Note that you must run the test script in order to set a default function for a category.



**To add a subcategory to a category:**

- 1 Open the Function Generator. (Choose **Create > Insert Function > From Function Generator**, click the **Insert Function from Function Generator** button on the User toolbar, or press the INSERT FUNCTION FROM FUNCTION GENERATOR softkey.)
- 2 In the **Category** box, click **function table**.
- 3 In the **Function Name** box, click **generator_set_default_function**.
- 4 Click **Args**. The Function Generator expands.
- 5 In the **Category Name** box, enter the category name as it already appears in the Function Generator.
- 6 In the **Default** box, enter the function name as it already appears in the Function Generator.
- 7 Click **Paste** to paste the TSL statement into your test script.
- 8 Click **Close** to close the Function Generator.

A **generator_set_default_function** statement is inserted into your test script. In the following example, the default function of the push button category is changed from **button_check_enabled** to the user-defined “check_my_button_label” function.

```
generator_set_default_function ("push_button", "check_my_button_label");
```



Configuring Initializing Special Configurations

By creating *startup tests*, you can automatically initialize special testing configurations each time you start WinRunner.

This chapter describes:

- **Creating Startup Tests**
- **Sample Startup Test**



About Initializing Special Configurations

A startup test is a test script that is automatically run each time you start WinRunner. You can create startup tests that load GUI map files and compiled modules, configure recording, and start the application under test.

You designate a test as a startup test by entering its location in the Startup Test box in the Environment tab in the General Options dialog box. For more information on using the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#).



Creating Startup Tests

You should add the following types of statements to your startup test:

- **load** statements, which load compiled modules containing user-defined functions that you frequently call from your test scripts.
- **GUI_load** statements, which load one or more GUI map files. This ensures that WinRunner recognizes the GUI objects in your application when you run tests.
- statements that configure how WinRunner records GUI objects in your application, such as **set_record_attr** or **set_class_map**.
- an **invoke_application** statement, which starts the application being tested.
- statements that enable WinRunner to generate custom record TSL functions when you perform operations on custom objects, such as **add_cust_record_class**.

By including the above elements in a startup test, WinRunner automatically compiles all designated functions, loads all necessary GUI map files, configures the recording of GUI objects, and loads the application being tested.

Note: You can use the RapidTest Script wizard to create a basic startup test called *myinit* that loads a GUI map file and the application being tested. Note that when you work in the *GUI Map File per Test* mode (described in Chapter 6, [Working in the GUI Map File per Test Mode](#),) the *myinit* test does not load GUI map files.



Sample Startup Test

The following is an example of the types of statements that might appear in a startup test:

```
# Start the Flight application if it is not already displayed on the screen
if ((rc=win_exists("Flight")) == E_NOT_FOUND)
    invoke_application("w:\\flight_app\\flight.exe", "", "w:\\flight_app",
SW_SHOW);

# Load the compiled module "qa_funcs"
load("qa_funcs", 1, 1);

# Load the GUI map file "flight.gui"
GUI_load ("w:\\qa\\gui\\flight.gui");

# Map the custom "borbtn" class to the standard "push_button" class
set_class_map ("borbtn", "push_button");
```



Working with TestSuite



Working with TestSuite

Managing the Testing Process

Software testing typically involves creating and running thousands of tests. TestSuite's test management tool, TestDirector, can help you organize and control the testing process.

This chapter describes:

- **Integrating the Testing Process**
- **Accessing WinRunner Tests from TestDirector 7.0i**
- **Connecting to and Disconnecting from a Project**
- **Saving Tests to a Project**
- **Opening Tests in a Project**
- **Managing Test Versions in WinRunner (TestDirector 6.0 only)**
- **Saving GUI Map Files to a Project**
- **Opening GUI Map Files in a Project**
- **Running Tests in a Test Set**
- **Running Tests on Remote Hosts**
- **Viewing Test Results from a Project**
- **Using TSL Functions with TestDirector**
- **Command Line Options for Working with TestDirector**



About Managing the Testing Process

TestDirector is a powerful test management tool that helps you systematically control the testing process. It helps you create a framework and foundation for your testing workflow.

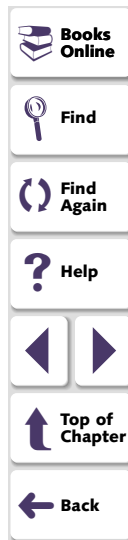
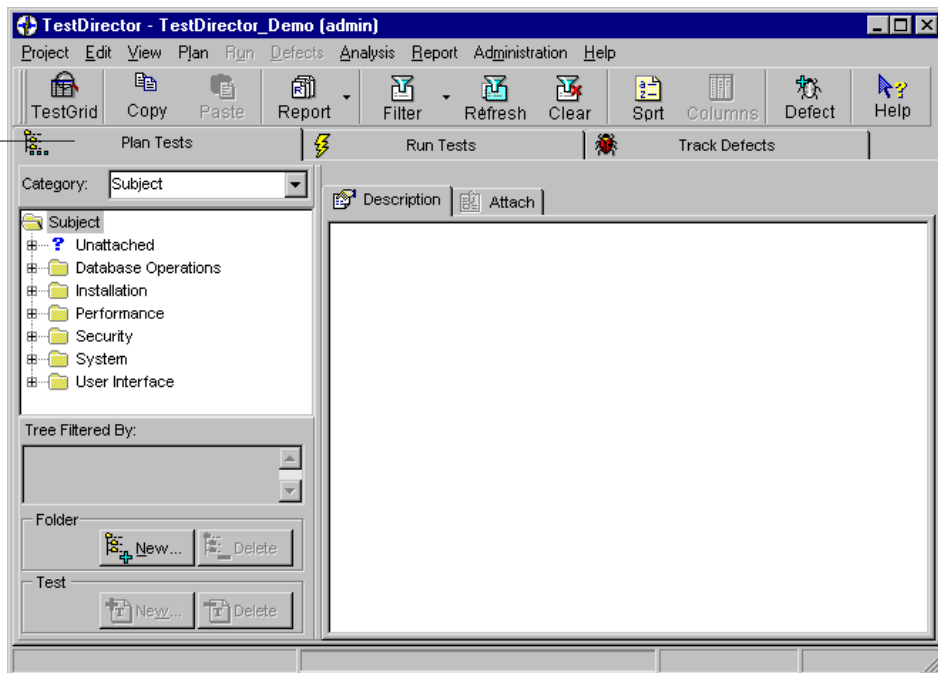
TestDirector helps you maintain a project of tests that cover all aspects of your application's functionality. Every test in your project is designed to fulfill a specified testing requirement of your application. To meet the goals of a project, you organize the tests in your project into unique groups. TestDirector provides an intuitive and efficient method for scheduling and running tests, collecting test results, and analyzing the results.

It also features a system for tracking defects, enabling you to monitor defects closely from initial detection until resolution.



WinRunner works with both TestDirector 6.0 which is client-server based, and TestDirector 7.0i which is Web-based. TestDirector 6.0 divides testing into three modes of operation: Plan Tests, Run Tests, and Track Defects.

Modes of operation



TestDirector 7.0i includes four modes of operation: Requirements Manager, Test Plan Manager, Test Lab Manager, and Defects Manager.

Modes of operation

The screenshot shows the Mercury TestDirector 7.0i web interface. The browser title is "Mercury TestDirector 7.01 at http://zoron/tdbin/ - Microsoft Internet Explorer". The address bar shows "http://zoron/tdbin/start_a.htm". The main content area is titled "TestDirector 7.0i" and features a navigation bar with tabs for "REQUIREMENTS", "TEST PLAN", "TEST LAB", "DEFECTS", "TOOLS", "HELP", and "Logout". The "TEST PLAN" tab is active. Below the navigation bar, there are sections for "Requirements", "View", "Reports", and "Graphs". A "View: Coverage" dropdown is present. On the left, a tree view shows a hierarchy of test cases under "1 - Login Operations" through "7 - Help". On the right, a table displays test case details.

Name	Status	Execution Date	Designer
Change Date	No Run		alec
Change To Location	No Run		mike
Verify Insertion	No Run		shelly
Cancel	No Run		mike
Change From Location	No Run		carol
Insert New Order	No Run		shelly
Customer Boundary	No Run		alec
Check Information	No Run		admin
Fax No. Boundary	No Run		alec



The following table describes how you can use each operation mode:

Operation Mode (TestDirector 6.0)	Operation Mode (TestDirector 7.0i)	Description
N/A	Requirements Manager	Specify testing requirements. This includes defining what you are testing, defining requirement topics and items, and analyzing the requirements.
Plan Tests	Test Plan Manager	Develop a test plan. This includes defining goals and strategy, dividing your plan into categories, developing tests, recording tests in WinRunner, and analyzing the plan.
Run Tests	Test Lab Manager	Run tests on your application. This includes defining groups of tests to meet the various testing goals in your project, scheduling test runs, running tests in WinRunner, and analyzing test results.
Track Defects	Defects Manager	Report and track defects. This includes reporting new defects detected in your application, determining repair priorities, repairing open defects, and analyzing the progress of defect repairs.



TestDirector guides you through the various phases of the testing process. By integrating all the tasks involved in software testing, it helps ensure that you receive the highest quality software.

Note: TestDirector 6.0 provides version control support, which enables you to update and revise your automated test scripts while maintaining old versions of each test. This helps you keep track of the changes made to each test script, see what was modified from one version of a script to another, or return to a previous version of the test script. For more information on version control support, see [Managing Test Versions in WinRunner \(TestDirector 6.0 only\)](#) on page 1188.

Note: This chapter describes the integration of WinRunner with TestDirector 6.0 and TestDirector 7.0i. For more information on working with TestDirector, refer to the *TestDirector User's Guide*.

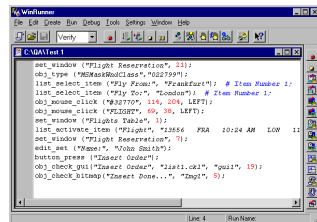


Integrating the Testing Process

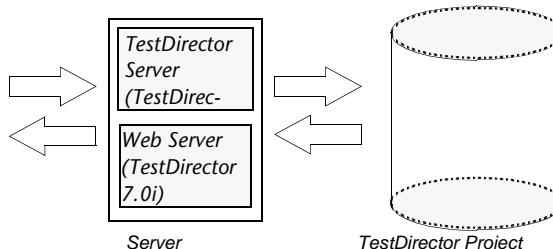
TestDirector and WinRunner work together to integrate all aspects of the testing process. In WinRunner, you can create tests and save them in your TestDirector project. After you run your test, you can view and analyze the results in TestDirector.

TestDirector stores test and defect information in a project. You can create TestDirector projects in Microsoft Access, Oracle, Sybase, or Microsoft SQL. These projects store information related to the current testing project, such as tests, test run results, and reported defects.

In order for WinRunner to access the project, you must connect it to the TestDirector server (in TestDirector 6.0), or the Web server where TestDirector is installed (in TestDirector 7.0i).



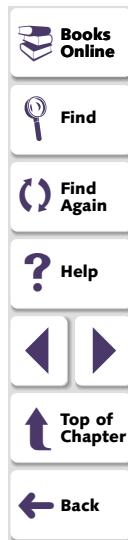
WinRunner



-  Books Online
-  Find
-  Find Again
-  Help
- 
-  Top of Chapter
-  Back

When WinRunner is connected to TestDirector, you can save a test by associating it with a subject in Plan Tests (in TestDirector 6.0), or the Test Plan Manager (in TestDirector 7.0i). You can schedule to run a test on local or remote hosts. Test run results are sent directly to your TestDirector project.

Note: In order for TestDirector to run WinRunner tests from a remote machine, you must enable the Allow TestDirector to Run Tests Remotely option from WinRunner. By default, this option is disabled. You can enable it from the Environment tab of the General Options dialog box (Settings > General Options). For more information on setting this option, see Chapter 40, [Setting Global Testing Options](#).



Accessing WinRunner Tests from TestDirector 7.0i

When TestDirector accesses a WinRunner test, the test is downloaded from a project database to a local temporary directory, which becomes your current working directory. If the test calls another file (for example, a module or a test), and the full pathname of the called file is not specified, the current working directory becomes the relative path of the referenced file. Therefore, WinRunner cannot open the called test.

For example, suppose a test calls the `flt_lib` file:

```
static lib_path = getvar("testname") & "\\..\\flt_lib";  
reload(lib_path);
```

WinRunner looks for the called test in the relative path. To enable WinRunner to find the correct pathname, you can:

- change the pathname of the WinRunner called file, or
- set direct file access for all WinRunner tests (LAN only)



Changing the Pathname of Files

To enable WinRunner to access a called file from a test, save the file in your TestDirector project and then change the pathname in your WinRunner test script.

For example, suppose you save the `flt_lib` file in your TestDirector project under `subject\\module`. TestDirector now calls the file using the following statement:

```
static lib_path = "[TD]\\Subject\\module\\flt_lib";
```

For more information on saving tests to a TestDirector project, see [Saving Tests to a Project](#) on page 1181.



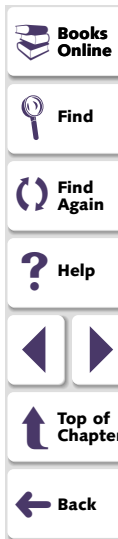
Accessing WinRunner Tests Directly (LAN only)

If you are working in a local area network (LAN) environment, you can set your machine so that it provides direct file access to all WinRunner tests, regardless of their directory path. This enables you to run WinRunner tests from TestDirector without changing the directory path of other called tests.

To set the direct file access option:

- 1 On the machine where WinRunner is installed, click **Run** on the **Start** menu. The Run dialog box opens.
- 2 Type `regedit` and click **OK**. The Registry Editor opens.
- 3 Locate the following folder:
My Computer > HKEY_LOCAL_MACHINE > Software > Mercury Interactive > TestDirector > Testing Tools > WinRunner.
- 4 In the **WinRunner** folder, double-click **DirectFileAccess**. Change the value in the Value Data box to "Y".

Tip: After setting the direct access option, your Web access performance will improve while accessing WinRunner tests from TestDirector.



Connecting to and Disconnecting from a Project

If you are working with both WinRunner and TestDirector, WinRunner can communicate with your TestDirector project. You can connect or disconnect WinRunner from a TestDirector project at any time during the testing process. However, do not disconnect WinRunner from TestDirector while running tests in WinRunner from TestDirector.

The connection process has two stages. First, you connect WinRunner to the server. This server handles the connections between WinRunner and the TestDirector project. Next, you choose the project you want WinRunner to access. The project stores tests and test run information for the application you are testing. Note that TestDirector projects are password protected, so you must provide a user name and a password.

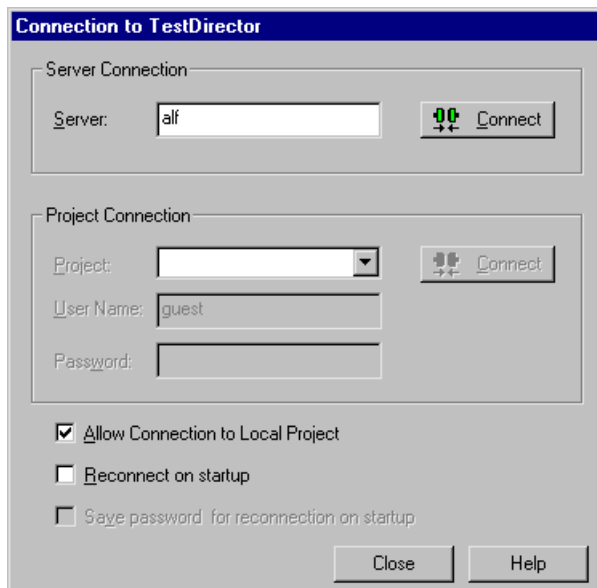


Connecting WinRunner to TestDirector

You must connect WinRunner to the server before you connect WinRunner to a project. For more information, see [Integrating the Testing Process](#) on page 1169.

To connect WinRunner to TestDirector:

- 1 Choose **Tools > TestDirector Connection**. The Connection to TestDirector dialog box opens.



- 2 In the **Server Connection** section, in the **Server** box, enter of the following:
 - For TestDirector 6.0, type the name of the host where the TestDirector server runs.
 - For TestDirector 7.0i, type the URL of the Web server where TestDirector is installed.
- 3 Click **Connect**.

Once the connection to the server is established, the server's name is displayed in read-only format in the **Server** box.
- 4 In the **Project Connection** section, select a TestDirector project from the **Project** list.
- 5 Type a user name in the **User Name** box.
- 6 Type a password in the **Password** box.



- 7 Click **Connect** to connect WinRunner to the selected project.

Once the connection to the selected project is established, the project's name is displayed in read-only format in the **Project** box.

To automatically reconnect to the TestDirector server and the selected project on startup, select the **Reconnect on startup** check box.

If the **Reconnect on startup** check box is selected, then the **Save password for reconnection on startup** check box is enabled. To save your password for reconnection on startup, select the **Save password for reconnection on startup** check box. If you do not save your password, you will be prompted to enter it when WinRunner connects to TestDirector on startup.

Note: If **Reconnect on startup** is selected, but you want to open WinRunner without connecting to TestDirector, you can use the `-td_dont_connect` command line option as described in Chapter 30, "Running Tests from the Command Line."

- 8 Click **Close** to close the Connection to TestDirector dialog box.

Note: You can also connect WinRunner to a TestDirector server and project using the corresponding `-td_connection`, `-td_database_name`, `-td_password`, `-td_server_name`, `-td_user_name` command line options, described in Chapter 30, "Running Tests from the Command Line."



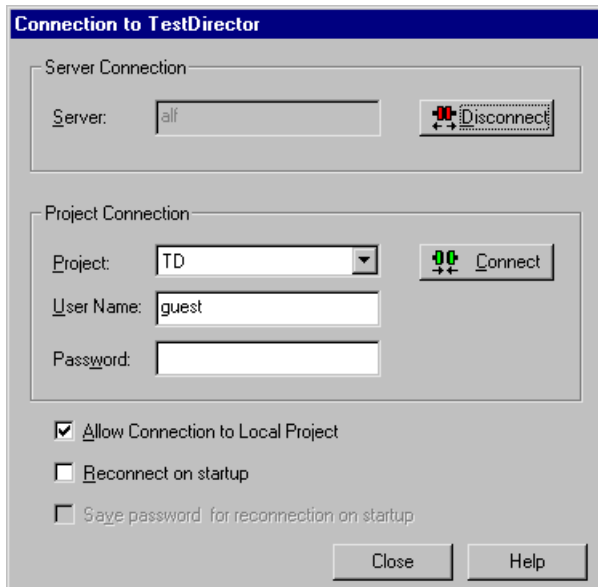
Disconnecting from a TestDirector Project

You can disconnect from a TestDirector project. This enables you to select a different project while using the same server.

To disconnect WinRunner from a project:

- 1 Choose **Tools > TestDirector Connection**.

The Connection to TestDirector dialog box opens.



- 2 In the **Project Connection** section, click **Disconnect** to disconnect WinRunner from the selected project.
- 3 Click **Close** to close the Connection to TestDirector dialog box.

Note: You can also disconnect WinRunner from a TestDirector project using the corresponding *-td_connection* and *-td_database_name* command line options, described in Chapter 30, “Running Tests from the Command Line.”



Disconnecting from a Server

You can disconnect from the server. This enables you to select a different server and a different project.

To disconnect WinRunner from a server:

- 1 Choose **Tools > TestDirector Connection**.

The Connection to TestDirector dialog box opens.

- 2 In the **Server Connection** section, click **Disconnect** to disconnect WinRunner from the TestDirector server.
- 3 Click **Close** to close the Connection to TestDirector dialog box.

Note that you can also disconnect WinRunner from a TestDirector server using the corresponding `-td_connection` and `-td_database_name` command line options, described in Chapter 30, “Running Tests from the Command Line.”

Note: If you disconnect WinRunner from a TestDirector server without first disconnecting from a project, WinRunner’s connection to that project is automatically disconnected.



Saving Tests to a Project

When WinRunner is connected to a TestDirector project, you can create new tests in WinRunner and save them directly to your project. To save a test, you give it a descriptive name and associate it with the relevant subject in the test plan tree. This helps you to keep track of the tests created for each subject and to quickly view the progress of test planning and creation.

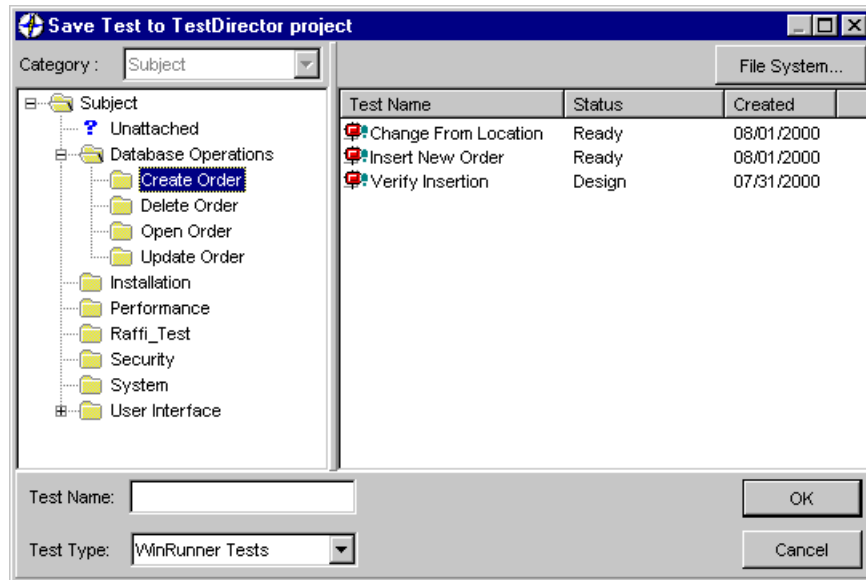
To save a test to a TestDirector project:



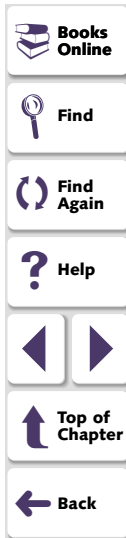
- 1 Choose **File > Save** or click the **Save** button. For a test already saved in the file system, choose **File > Save As**.



The Save Test to TestDirector Project dialog box opens and displays the test plan tree.



Note that the Save Test to TestDirector Project dialog box opens only when WinRunner is connected to a TestDirector project.



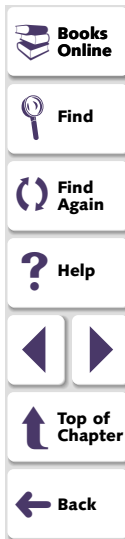
To save a test directly in the file system, click the **File System** button, which opens the Save Test dialog box. (From the Save Test dialog box, you may return to the Save Test to TestDirector Project dialog box by clicking the **TestDirector** button.)

Note: If you save a test directly in the file system, your test will not be saved in the TestDirector project.

- 2 Select the relevant subject in the test plan tree. To expand the tree and view a sublevel, double-click a closed folder. To collapse a sublevel, double-click an open folder.
- 3 In the **Test Name** text box, enter a name for the test. Use a descriptive name that will help you easily identify the test.
- 4 Click **OK** to save the test and to close the dialog box.

Note: To save a batch test, choose **WinRunner Batch Tests** in the **Test Type** box.

The next time you start TestDirector, the new test will appear in the TestDirector's test plan tree. Refer to the *TestDirector User's Guide* for more information.



Opening Tests in a Project

If WinRunner is connected to a TestDirector project, you can open automated tests that are a part of your database. You locate tests according to their position in the test plan tree, rather than by their actual location in the file system.

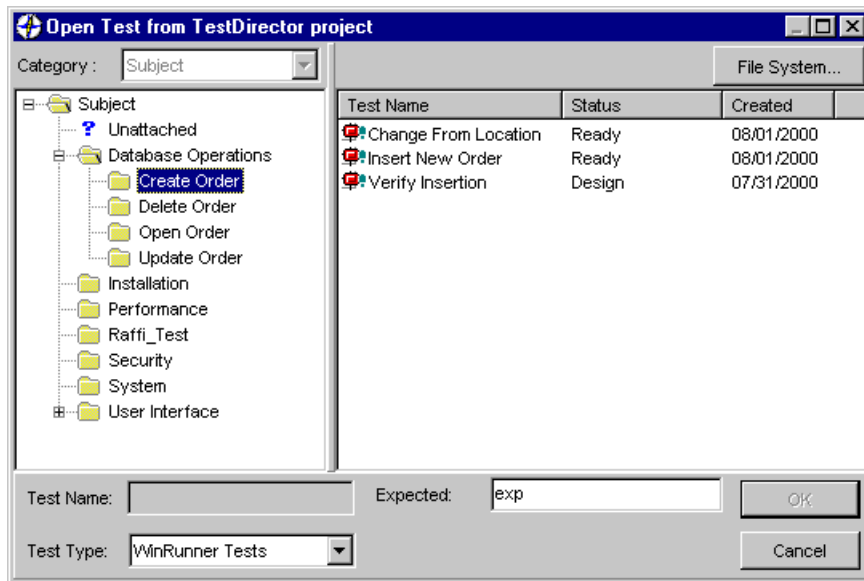
To open a test saved to a TestDirector project:



- 1 Choose **File > Open** or click the **Open** button.



The Open Test from TestDirector Project dialog box opens and displays the test plan tree.



Note that the Open Test from TestDirector Project dialog box opens only when WinRunner is connected to a TestDirector project.



Note: In TestDirector 6.0, if the test you are opening is currently checked into the version control database, then the *latest version* opens and a WinRunner message informs you that you cannot make any changes to this script until you check it out. For more information on version control, see [Managing Test Versions in WinRunner \(TestDirector 6.0 only\)](#) on page 1188.

To open a test directly from the file system, click the **File System** button, which opens the Open Test dialog box. (From the Open Test dialog box, you may return to the Open Test from TestDirector Project dialog box by clicking the **TestDirector** button.)

Note: If you open a test from the file system, then when you run that test, the events of the test run will not be written to the TestDirector project.

- 2 Click the relevant subject in the test plan tree. To expand the tree and view sublevels, double-click closed folders. To collapse the tree, double-click open folders.

Note that when you select a subject, the tests that belong to the subject appear in the **Test Name** list.



- 3 Select a test from the **Test Name** list in the right pane. The test appears in the read-only **Test Name** box.
- 4 If desired, enter an expected results folder for the test in the **Expected** box. (Otherwise, the default folder is used.)
- 5 Click **OK** to open the test. The test opens in a window in WinRunner. Note that the test window's title bar shows the full subject path.

Note: To open a batch test, choose **WinRunner Batch Tests** in the **Test Type** box. For more information on batch tests, see Chapter 33, [Running Batch Tests](#).



Managing Test Versions in WinRunner (TestDirector 6.0 only)

When WinRunner is connected to a TestDirector project with version control support, you can update and revise your automated test scripts while maintaining old versions of each test. This helps you keep track of the changes made to each test script, see what was modified from one version of a script to another, or return to a previous version of the test script.

Note: A TestDirector project with version control support requires the installation of version control software as well as TestDirector's version control software components. For more information, refer to the *TestDirector 6.0 Installation Guide*.

You manage test versions by checking tests in and out of the version control database.



Adding Tests to the Version Control Database

When you add a test to the version control database for the first time, it becomes the *Working Test* and is also assigned a permanent version number.

The working test is the test that is located in the test repository and is used by TestDirector for all test runs.

Note: Usually the latest version is the working test, but any version can be designated as the working test using the Version Manager application. For more information about the Version Manager, refer to the *TestDirector 6.0 User's Guide*.

To add a new test to the version control database:

- 1 Choose **File > Check In**.

Note: The Check In and Check Out options in the File menu are visible only when you are connected to a TestDirector project database with version control support, and you have a test open. The Check In option is enabled only if the active script has been saved to the project database.

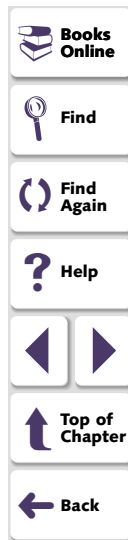


- 2 Click **OK** to confirm adding the test to the version control database.
- 3 Click **OK** to reopen the checked-in test. The test will close and then reopen as a read-only file.

If you have made unsaved changes in the active test, you will be prompted to save the test.

You can review the checked-in test. You can also run the test and view the results. While the test is checked in and is in read-only format, however, you cannot make any changes to the script.

If you attempt to make changes, a WinRunner message reminds you that the script has not been checked out and that you cannot change it.



Checking Tests Out of the Version Control Database

When you open a test that is currently checked in to the version control database, you cannot make any modifications to the script. If you wish to make modifications to this script, you must check out the script.

When you check out a test, the Version Manager copies the *latest version* of the test to your unique checkout directory (automatically created the first time you check out a test), and locks the test in the project database. This prevents other users of the TestDirector project from overwriting any changes you make to the test.

To check out a test:

- 1 Choose **File > Check Out**.
- 2 Click **OK**. The read-only test will close and automatically reopen as a writable script.

Note: The Check Out option is enabled only if the active script is currently checked in to the project's version control database.

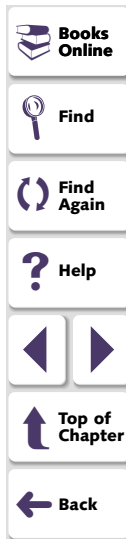
You should check a script out of the version control database only when you want to make modifications to the script or to test the script for workability.



When you run a test while the test is checked out, the results are displayed at the end of the test (if you select the **Display test results at end of run** check box), but they are not saved to the TestDirector project database.

Tip: When you are ready to run tests on your application, you should always check the script into the version control database so that the test results will be stored in the TestDirector project database.

Note: The results that are displayed for a checked-out test only include the tests which were run since the test was last checked out. When you check in the test, the results of any tests you ran while the test was checked out are deleted.



Checking Tests In to the Version Control Database

When you have finished making changes to a test you check it in to the version control database in order to make it the new *latest version* and to assign it as the *working test*.

When you check a test back into the version control database, the Version Manager deletes the test copy from your checkout directory and unlocks the test in the database so that the test version will be available to other users of the TestDirector project.

To check in a test:

- 1 Choose **File > Check In**.
- 2 Click **OK**. The file will close and automatically reopen as a read-only script.

If you run tests after you have checked in the script, the results will be saved to the TestDirector Project database.

Tip: You should close a test in WinRunner before using the Version Manager to change the checked in/checked out status of the test. If you make changes to the test's status via Version Manager while the test is open in WinRunner, WinRunner will not reflect those changes. For more information about Version Manager, refer to the *TestDirector 6.0 User's Guide*.



Saving GUI Map Files to a Project

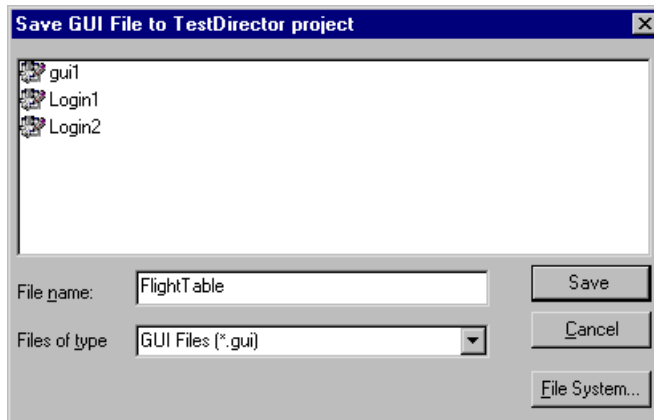
When WinRunner is connected to a TestDirector project, choose **File > Save** in the GUI Map Editor to save your GUI map file to the open database. All the GUI map files used in all the tests saved to the TestDirector project are stored together. This facilitates keeping track of the GUI map files associated with tests in your project.

To save a GUI map file to a TestDirector project:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 From a temporary GUI map file, choose **File > Save**. From an existing GUI map file, choose **File > Save As**.

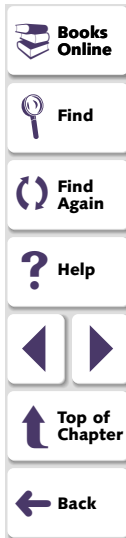


The Save GUI File to TestDirector Project dialog box opens. If any GUI map files have already been saved to the open database, they are listed in the dialog box.



Note that the Save GUI File to TestDirector Project dialog box opens only when WinRunner is connected to a TestDirector project.

To save a GUI map file directly to the file system, click the **File System** button, which opens the Save GUI File dialog box. (From the Save GUI File dialog box, you may return to the Save GUI File to TestDirector Project dialog box by clicking the **TestDirector** button.)



Note: If you save a GUI map file directly to the file system, your GUI map file will not be saved in the TestDirector project.

- 3 In the **File Name** text box, enter a name for the GUI map file. Use a descriptive name that will help you easily identify the GUI map file.
- 4 Click **Save** to save the GUI map file and to close the dialog box.



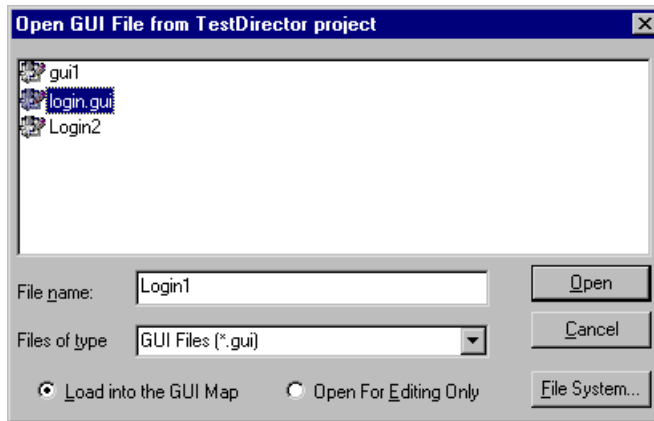
Opening GUI Map Files in a Project

When WinRunner is connected to a TestDirector project, you can use the GUI Map Editor to open a GUI map file saved to a TestDirector project.

To open a GUI map file saved to a TestDirector project:

- 1 Choose **Tools > GUI Map Editor** to open the GUI Map Editor.
- 2 In the GUI Map Editor, choose **File > Open**.

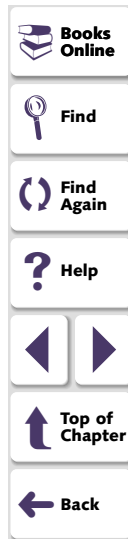
The Open GUI File from TestDirector Project dialog box opens. All the GUI map files that have been saved to the open database are listed in the dialog box.



Note that the Open GUI File from TestDirector Project dialog box opens only when WinRunner is connected to a TestDirector project.

To open a GUI map file directly from the file system, click the **File System** button, which opens the Open GUI File dialog box. (From the Open GUI File dialog box, you may return to the Open GUI File from TestDirector Project dialog box by clicking the **TestDirector** button.)

- 3 Select a GUI map file from the list of GUI map files in the open database. The name of the GUI map file appears in the **File Name** box.
- 4 To load the GUI map file to open into the GUI Map Editor, click **Load into the GUI Map**. Note that this is the default setting. Alternatively, if you only want to edit the GUI map file, click **Open for Editing Only**. For more information, see Chapter 7, [Editing the GUI Map](#).
- 5 Click **Open** to open the GUI map file. The GUI map file is added to the GUI file list. The letter “L” indicates that the file is loaded.



Running Tests in a Test Set

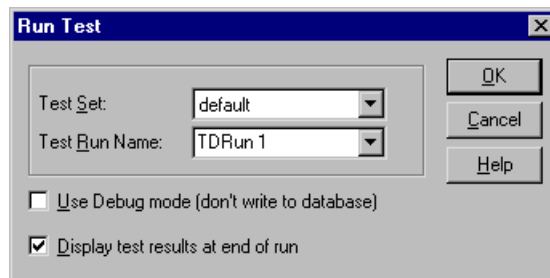
A test set is a group of tests selected to achieve specific testing goals. For example, you can create a test set that tests the user interface of the application or the application's performance under stress. You define test sets when working in TestDirector's test run mode.

If WinRunner is connected to a project and you want to run tests in the project from WinRunner, specify the name of the current test set before you begin. When the test run is completed, the tests are stored in TestDirector according to the test set you specified.

To specify a test set and user name:

- 1 Choose a **Run** command from the **Run** menu.

The Run Test dialog box opens.



- 2 In the **Test Set** box, select a test set from the list. The list contains test sets created in TestDirector.
- 3 In the **Test Run Name** box, select a name for this test run, or enter a new name.

To run tests in Debug mode, select the **Use Debug mode** check box. If this option is selected, the results of this test run are not written to the TestDirector project.

To display the test results in WinRunner at the end of a test run, select the **Display test results at end of run** check box.

- 4 Click **OK** to save the parameters and to run the test.



Running Tests on Remote Hosts

You can run WinRunner tests on multiple remote hosts. To enable TestDirector to use a computer as a remote host, you must activate the Allow TestDirector to Run Tests Remotely option. Note that when you run a test on a remote host, you should run the test in silent mode, which suppresses WinRunner messages during a test run. For more information on silent mode, see Chapter 41, [Setting Testing Options from a Test Script](#).

To enable TestDirector on a remote machine to run WinRunner tests:

- 1 Choose **Settings > General Options** to open the General Options dialog box.
- 2 Click the **Environment** tab.
- 3 Select the **Allow TestDirector to run tests remotely** check box.

Note: If the **Allow TestDirector to run tests remotely** check box is cleared, WinRunner tests can only be run locally.

For more information on setting testing options using the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#).



Viewing Test Results from a Project

If you run tests in a test set, you can view the test results from a TestDirector project. If you run a test set in Verify mode, the Test Results window opens automatically at the end of the test run. At other times, choose **Tools > Test Results** to open the Test Results window. By default, the Test Results window displays the test results of the last test run of the active test. To view the test results for another test or for an earlier test run of the active test, choose **File > Open** in the Test Results window.

To view test results from a TestDirector project:

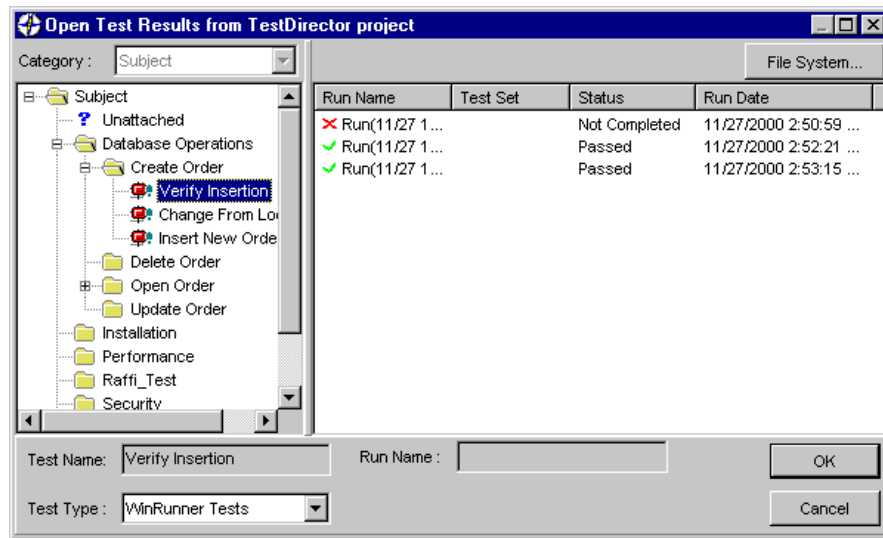
- 1 Choose **Tools > Test Results**.

The Test Results window opens, displaying the test results of the last test run of the active test.

- 2 In the Test Results window, choose **File > Open**.



The Open Test Results from TestDirector Project dialog box opens and displays the test plan tree.



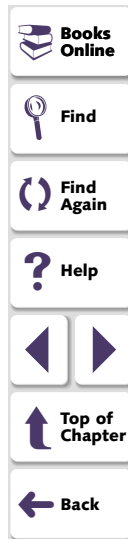
Note that the Open Test Results from TestDirector Project dialog box opens only when WinRunner is connected to a TestDirector project.

To open test results directly from the file system, click the **File System** button, which opens the Open Test Results dialog box. (From the Open Test Results dialog box, you may return to the Open Test Results from TestDirector Project dialog box by clicking the **TestDirector** button.)



- 3 In the **Test Type** box, select the type of test to view in the dialog box: all tests (the default setting), WinRunner tests, or WinRunner batch tests.
- 4 Select the relevant subject in the test plan tree. To expand the tree and view a sublevel, double-click a closed folder. To collapse a sublevel, double-click an open folder.
- 5 Select a test run to view. In the right pane:
 - The **Run Name** column displays whether your test run passed or failed and contains the names of the test runs.
 - The **Test Set** column contains the names of the test sets.
 - Entries in the **Status** column indicate whether the test passed or failed.
 - The **Run Date** column displays the date and time when the test set was run.
- 6 Click **OK** to view the results of the selected test.

For information about the options in the Test Results window, see Chapter 32, [Analyzing Test Results](#).



Using TSL Functions with TestDirector

Several TSL functions facilitate your work with a TestDirector project by returning the values of fields in a TestDirector project. In addition, working with TestDirector facilitates working with many TSL functions: when WinRunner is connected to TestDirector, you can specify a path in a TestDirector project in a TSL statement instead of using the full file system path.

TestDirector Project Functions

Several TSL functions enable you to retrieve information from a TestDirector project.

tddb_get_step_value	Returns the value of a field in the "dessteps" table in a TestDirector project.
tddb_get_test_value	Returns the value of a field in the "test" table in a TestDirector project.
tddb_get_testset_value	Returns the value of a field in the "testcycl" table in a TestDirector project.
tddb_load_attachment	Loads a file attachment of a test and returns the location of the loaded attachment.

You can use the Function Generator to insert these functions into your test scripts, or you can manually program statements that use them.

For more information about these functions, refer to the *TSL Online Reference*.



Call Statements and Compiled Module Functions

When WinRunner is connected to TestDirector, you can specify the paths of tests and compiled module functions saved in a TestDirector project when you use the **call**, **call_close**, **load**, **reload**, and **unload** functions.

For example, if you have a test with the following path in your TestDirector project, Subject\Sub1\My_test, you can call it from your test script with the statement:

```
call ("[TD]\\Subject\\Sub1\\My_test");
```

Alternatively, if you specify the “[TD]\Subject\Sub1” search path in the General Options dialog box or by using a **setvar** statement in your test script, you can call the test from your test script with the following statement:

```
call ("My_test");
```

Note that the [TD] prefix is optional when specifying a test or a compiled module in a TestDirector project.

Note: When you run a WinRunner test from a TestDirector project, you can specify its parameters from within TestDirector, instead of using **call** statements to pass parameters from a test to a called test. For information about specifying parameters for WinRunner tests from TestDirector, refer to the *TestDirector User's Guide*.

For more information on working with the specified Call Statement and Compiled Module functions, refer to the *TSL Online Reference*.



GUI Map Editor Functions

When WinRunner is connected to TestDirector, you can specify the names of GUI map files saved in a TestDirector project when you use GUI Map Editor functions in a test script.

When WinRunner is connected to a TestDirector project, WinRunner stores GUI map files in the GUI repository in the database. Note that the [TD] prefix is optional when specifying a GUI map file in a TestDirector project.

For example, if the `My_gui.gui` GUI map file is stored in a TestDirector project, in `My_project_database\GUI`, you can load it with the statement:

```
GUI_load ("My_gui.gui");
```

For information about working with GUI Map Editor functions, refer to the *TSL Online Reference*.



Specifying Search Paths for Tests Called from TestDirector

You can configure WinRunner to use search paths based on the path in a TestDirector project.

In the following example, a **setvar** statement specifies a search path in a TestDirector project:

```
setvar ( searchpath, [TD]\My_project_database\Subject\Sub1 );
```

For information on how to specify the search path using the General Options dialog box, see Chapter 40, [Setting Global Testing Options](#). For information on how to specify the search path by using a **setvar** statement, see Chapter 41, [Setting Testing Options from a Test Script](#).



Command Line Options for Working with TestDirector

You can use the Windows Run command to set parameters for working with TestDirector. You can also save your startup parameters by creating a custom WinRunner shortcut. Then, to start WinRunner with the startup parameters, you simply double-click the icon.

You can use the following command line options to set parameters for working with TestDirector:

-dont_connect

If the **Reconnect on startup** check box is selected in the **Connection to TestDirector** dialog box, this command line enables you to open WinRunner without connecting to TestDirector.

-td_connection {on | off}

Activates or deactivates WinRunner's connection to TestDirector.

Note that you can use the corresponding *td_connection* testing option to activate or deactivate WinRunner's connection to TestDirector, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can connect to TestDirector from the Connection to TestDirector dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see [Connecting to and Disconnecting from a Project](#) on page 1174.



-td_cycle_name *cycle_name*

Specifies the name of the current test cycle. This option is applicable only when WinRunner is connected to TestDirector.

Note that you can use the corresponding *td_cycle_name* testing option to specify the name of the current test cycle, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

-td_database_name *database_pathname*

Specifies the active TestDirector project. WinRunner can open, execute, and save tests in this project. This option is applicable only when WinRunner is connected to TestDirector.

Note that you can use the corresponding *td_database_name* testing option to specify the active TestDirector database, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that when WinRunner is connected to TestDirector, you can specify the active TestDirector project from the TestDirector Connection dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see [Connecting to and Disconnecting from a Project](#) on page 1174.



-td_password

Specifies the password for connecting to a project in a TestDirector server.

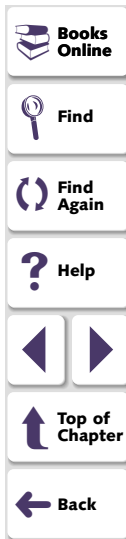
Note that you can specify the password for connecting to TestDirector from the Connection to TestDirector dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see [Connecting to and Disconnecting from a Project](#) on page 1174.

-td_server_name

Specifies the name of the TestDirector server to which WinRunner connects.

Note that you can use the corresponding *td_server_name* testing option to specify the name of the TestDirector server to which WinRunner connects, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can specify the name of the TestDirector server to which WinRunner connects from the Connection to TestDirector dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see [Connecting to and Disconnecting from a Project](#) on page 1174.



-td_user_name *user_name*

Specifies the name of the user who is currently executing a test cycle. (Formerly *user*.)

Note that you can use the corresponding *td_user_name* testing option to specify the user, as described in Chapter 41, [Setting Testing Options from a Test Script](#).

Note that you can specify the user name when you connect to TestDirector from the Connection to TestDirector dialog box, which you open by choosing **Tools > TestDirector Connection**. For more information about connecting to TestDirector, see [Connecting to and Disconnecting from a Project](#) on page 1174.

For more information on using command line options, see Chapter 34, [Running Tests from the Command Line](#).



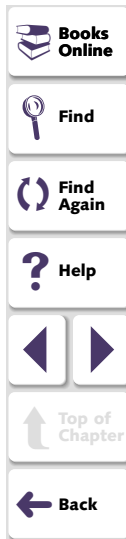
Working with TestSuite

Testing Systems Under Load

Today's applications are run by multiple users over complex client/server or web-based systems. With LoadRunner, TestSuite's load testing tool, you can emulate the load of real users interacting with your server and measure system performance.

This chapter describes:

- **Emulating Multiple Users**
- **Virtual User (Vuser) Technology**
- **Developing and Running Scenarios**
- **Creating GUI Vuser Scripts**
- **Measuring Server Performance**
- **Synchronizing Virtual User Transactions**
- **Creating a Rendezvous Point**
- **A Sample Vuser Script**



About Testing Systems Under Load

Software testing is no longer confined to testing applications that run on a single, standalone PC. Applications are run in network environments where multiple client PCs or UNIX workstations interact with a central server. Web-based applications are also common.

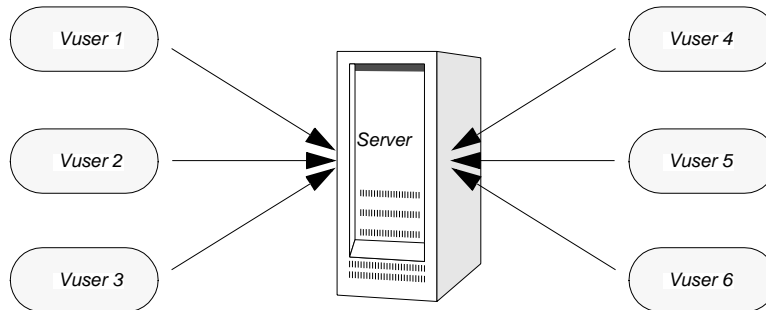
Modern client/server and web-based architectures are complex. While they provide an unprecedented degree of power and flexibility, these systems are difficult to test. LoadRunner emulates load and then accurately measures and analyzes performance and functionality. This chapter provides an overview of how to use WinRunner together with LoadRunner to test your client/server or web-based system. For detailed information about how to test a client/server or web-based system, refer to your LoadRunner documentation.



Emulating Multiple Users

With LoadRunner, you emulate the interaction of multiple users with the server by creating *scenarios*. A scenario defines the events that occur during each load testing session, such as the number of users, the actions they perform, and the machines they use. For more information about scenarios, refer to the **LoadRunner Controller User's Guide**.

In the scenario, LoadRunner replaces the human user with a *virtual user* or *Vuser*. A Vuser emulates the actions of a human user and submits input to the server. A scenario can contain tens, hundreds, or thousands of Vusers.



Load testing your server with LoadRunner



Virtual User (Vuser) Technology

LoadRunner provides a variety of Vuser technologies that enable you to generate load when using different types of client/server or web-based architectures. Each Vuser technology is suited to a particular architecture, and results in a specific type of Vuser. For example, you use GUI Vusers to operate graphical user interface applications in environments such as Microsoft Windows; Web Vusers to emulate users operating Web browsers; RTE Vusers to operate terminal emulators; Database Vusers to emulate database clients communicating with a database application server.

The various Vuser technologies can be used alone or together, to create effective load testing scenarios.

GUI Vusers

GUI Vusers operate graphical user interface applications in environments such as Microsoft Windows. Each GUI Vuser emulates a real user submitting input to and receiving output from a client application.

A GUI Vuser consists of a copy of WinRunner and a client application. The client application can be any application used to access the server, such as a database client. WinRunner replaces the human user and operates the client application. Each GUI Vuser executes a Vuser script. This is a WinRunner test that describes the actions that the Vuser will perform during the scenario. It includes statements that measure and record the performance of the server. For more information, refer to the LoadRunner **Creating Vuser Scripts** guide.



Developing and Running Scenarios

You use the LoadRunner Controller to develop and run scenarios. The Controller is an application that runs on any network PC.

The screenshot displays the LoadRunner Controller interface for a scenario named "Scenario1". The interface is divided into several sections:

- Scenario Groups:** A table showing the configuration of scenario groups. The "web" group is active, with 10 users and 10 transactions per second.
- Scenario Status:** A summary table showing the current state of the scenario.

Scenario Status	Down
Running Vusers	0
Elapsed Time	00:15
Hits/Second	5.6
Passed Transactions	20
Failed Transactions	0
Errors	20
- Transaction Graphs:** A tree view showing various performance metrics such as Transaction Response Time, Transactions per Second (Passed/Failed/Aborted), and Web Server Resource Graphs (Hits per Second, Throughput).
- Running Vusers - Whole scenario:** A line graph showing the number of users over time. The number of users starts at 0, rises to 10, and then drops to 0.
- Transaction Response Time - Whole scenario:** A line graph showing the response time in seconds over time. The response time is low and stable during the user activity period.
- Summary Table:** A table at the bottom providing a detailed overview of the scenario's performance.

Color	Scale	Status	Max	Min	Avg	Std	Last
Green	1	Running	10	0	3.4375	4.582149...	5
Red	1	Error	5	0	0.3125	1.210307...	5
Yellow	1	Finished	0	0	0	0	0

The interface also includes a menu bar (File, View, Scenario, Monitors, Results, Tools, Help), a toolbar, and a status bar at the bottom showing "Scenario status: Down".



The following procedure outlines how to use the LoadRunner Controller to create, run, and analyze a scenario. For more information, refer to the **LoadRunner Controller User's Guide**.

1 Invoke the Controller.

2 Create the scenario.

A scenario describes the events that occur during each load testing session, such as the participating Vusers, the scripts they run, and the machines the Vusers use to run the scripts (load generating machines).

3 Run the scenario.

When you run the scenario, LoadRunner distributes the Vusers to their designated load generating machines. When the load generating machines are ready, they begin executing the scripts. During the scenario run, LoadRunner measures and records server performance data, and provides online network and server monitoring.

4 Analyze server performance.

After the scenario run, you can use LoadRunner's graphs and reports to analyze server performance data captured during the scenario run.

The rest of this chapter describes how to create GUI Vuser scripts. These scripts describe the actions of a human user accessing a server from an application running on a client PC.



Creating GUI Vuser Scripts

A GUI Vuser script describes the actions a GUI Vuser performs during a LoadRunner scenario. You use WinRunner to create GUI Vuser scripts. The following procedure outlines the process of creating a basic script. For a detailed explanation, refer to the LoadRunner **Creating Vuser Scripts** guide.

- 1 Start WinRunner.
- 2 Start the client application.
- 3 Record operations on the client application.
- 4 Edit the Vuser script using WinRunner, and program additional TSL statements. Add control-flow structures as needed.
- 5 Define actions within the script as transactions to measure server performance.
- 6 Add synchronization points to the script.
- 7 Add *rendezvous* points to the script to coordinate the actions of multiple Vusers.
- 8 Save the script and exit WinRunner.



Measuring Server Performance

Transactions measure how your server performs under the load of many users. A transaction may be a simple task, such as entering text into a text field, or it may be an entire test that includes multiple tasks. LoadRunner measures the performance of a transaction under different loads. You can measure the time it takes a single user or a hundred users to perform the same transaction.

The first stage of creating a transaction is to declare its name at the start of the Vuser script. When you assign the Vuser script to a Vuser, the Controller scans the Vuser script for transaction declaration statements. If the script contains a transaction declaration, LoadRunner reads the name of the transaction and displays it in the Transactions window.

To declare a transaction, you use the **declare_transaction** function. The syntax of this functions is:

```
declare_transaction ( "transaction_name" );
```

The *transaction_name* must be a string constant, not a variable or an expression. This string can contain up to 128 characters. No spaces are permitted.



Next, mark the point where LoadRunner will start to measure the transaction. Insert a **start_transaction** statement into the Vuser script immediately before the action you want to measure. The syntax of this function is:

```
start_transaction ( "transaction_name" );
```

The *transaction_name* is the name you defined in the **declare_transaction** statement.

Insert an **end_transaction** statement into the Vuser script to indicate the end of the transaction. If the entire test is a single transaction, then insert this statement in the last line of the script. The syntax of this function is:

```
end_transaction ( "transaction_name" [, status ] );
```

The *transaction_name* is the name you defined in the **declare_transaction** statement. The *status* tells LoadRunner to end the transaction only if the transaction passed (PASS) or failed (FAIL).



Synchronizing Virtual User Transactions

For transactions to accurately measure server performance, they must reflect the time the server takes to respond to user requests. A human user knows that the server has completed processing a task when a visual cue, such as a message, appears. For instance, suppose you want to measure the time it takes for a database server to respond to user queries. You know that the server completed processing a database query when the answer to the query is displayed on the screen. In Vuser scripts, you instruct the Vusers to wait for a cue by inserting synchronization points.

Synchronization points tell the Vuser to wait for a specific event to occur, such as the appearance of a message in an object, and then resume script execution. If the object does not appear, the Vuser continues to wait until the object appears or a time limit expires. You can synchronize transactions by using any of WinRunner's synchronization or object functions. For more information about WinRunner's synchronization functions, see Chapter 21, [Synchronizing the Test Run](#).



Creating a Rendezvous Point

During the scenario run, you instruct multiple Vusers to perform tasks simultaneously by creating a rendezvous point. This ensures that:

- intense user load is emulated
- transactions are measured under the load of multiple Vusers

A rendezvous point is a meeting place for Vusers. To designate the meeting place, you insert rendezvous statements into your Vuser scripts. When the rendezvous statement is interpreted, the Vuser is held by the Controller until all the members of the rendezvous arrive. When all the Vusers have arrived (or a time limit is reached), they are released together and perform the next task in their Vuser scripts.

The first stage of creating a rendezvous point is to declare its name at the start of the Vuser script. When you assign the Vuser script to a Vuser, LoadRunner scans the script for rendezvous declaration statements. If the script contains a rendezvous declaration, LoadRunner reads the rendezvous name and creates a rendezvous. If you create another Vuser that runs the same script, the Controller will add the Vuser to the rendezvous.



To declare a rendezvous, you use the **declare_rendezvous** function. The syntax of this functions is:

```
declare_rendezvous ( "rendezvous_name" );
```

where *rendezvous_name* is the name of the rendezvous. The *rendezvous_name* must be a string constant, not a variable or an expression. This string can contain up to 128 characters. No spaces are permitted.

Next, you indicate the point in the Vuser script where the rendezvous will occur by inserting a **rendezvous** statement. This tells LoadRunner to hold the Vuser at the rendezvous until all the other Vusers arrive. The function has the following syntax:

```
rendezvous ( "rendezvous_name" );
```

The *rendezvous_name* is the name of the rendezvous.



A Sample Vuser Script

In the following sample Vuser script, the “Ready” transaction measures how long it takes for the server to respond to a request from a user. The user enters the request and then clicks OK. The user knows that the request has been processed when the word “Ready” appears in the client application’s Status text box.

In the first part of the Vuser script, the **declare_transaction** and **declare_rendezvous** functions declare the names of the transaction and rendezvous points in the Vuser script. In this script, the transaction “Ready” and the rendezvous “wait” are declared. The declaration statements enable the LoadRunner Controller to display transaction and rendezvous information.

```
# Declare the transaction name  
declare_transaction ("Ready");  
  
# Define the rendezvous name  
declare_rendezvous ("wait");
```

Next, a **rendezvous** statement ensures that all Vusers click OK at the same time, in order to create heavy load on the server.

```
# Define rendezvous points  
rendezvous ("wait");
```

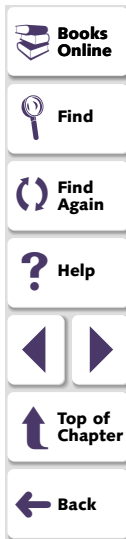


In the following section, a **start_transaction** statement is inserted just before the Vuser clicks OK. This instructs LoadRunner to start recording the “Ready” transaction. The “Ready” transaction measures the time it takes for the server to process the request sent by the Vuser.

```
# Deposit transaction  
start_transaction ( "Ready" );  
button_press ( "OK" );
```

Before LoadRunner can measure the transaction time, it must wait for a cue that the server has finished processing the request. A human user knows that the request has been processed when the “Ready” message appears under Status; in the Vuser script, an **obj_wait_info** statement waits for the message. Setting the timeout to thirty seconds ensures that the Vuser waits up to thirty seconds for the message to appear before continuing test execution.

```
# Wait for the message to appear  
rc = obj_wait_info("Status","value","Ready.",30);
```



The final section of the test measures the duration of the transaction. An if statement is defined to process the results of the **obj_wait_info** statement. If the message appears in the field within the timeout, the first **end_transaction** statement records the duration of the transaction and that it passed. If the timeout expires before the message appears, the transaction fails.

```
# End transaction.  
if (rc == 0)  
    end_transaction ( "OK", PASS );  
else  
    end_transaction ( "OK" , FAIL );
```



Working with TestSuite Reporting Defects

You can report defects detected in your application using the Add Defect dialog box, Web Defect Manager, or Remote Defect Reporter.

This chapter describes:

- **Using the Add Defect Dialog Box (TestDirector 7.0i)**
- **Using the Web Defect Manager (TestDirector 6.0)**
- **Using the Remote Defect Reporter (TestDirector 6.0)**



About Reporting Defects

Locating and repairing software defects efficiently is essential to the development process. Software developers, testers, and end users in all stages of the testing process can detect defects and add them to the defects project. Using the Add Defect dialog box (TestDirector 7.0i), or the Web Defect Manager or the Remote Defect Reporter (TestDirector 6.0), you can report design flaws in your application, and track data derived from defect reports.

For example, suppose you are testing a flight reservation application. You discover that errors occur when you try to order an airline ticket. You open and report the defect. This includes a summary and detailed description of the defect, where it was discovered, and if you are able to reproduce it. The report can also include screen captures, Web pages, text documents, and other files relevant to understanding and repairing the problem.

If you are using TestDirector 7.0i, the Add Defect dialog box opens directly from the WinRunner Test Results window.

If you are using TestDirector 6.0 and the TestDirector Web Defect Manager is installed on your machine, then it opens directly from the WinRunner Test Results window. Otherwise, the Remote Defect Reporter opens directly from the WinRunner Test Results window.



Using the Add Defect Dialog Box (TestDirector 7.0i)

The Add Defect dialog box is a defect tracking component of TestDirector's, Mercury Interactive's Web-based test management tool. You can report application defects directly to a TestDirector project. You can then track defects until the application's developers and software testers determine that they are resolved.

Setting Up the Add Defect Dialog Box

Before you can launch the Add Defect dialog box, you must ensure that TestDirector 7.0i is installed on your computer. You must also ensure that WinRunner is connected to a TestDirector server and project. The connection process has two stages. First, you connect WinRunner to the server. This server handles the connections between WinRunner and the TestDirector project. Next, you choose the project you want WinRunner to access. The project stores tests, test run information, and defects information for the application you are testing. For more information on connecting WinRunner to TestDirector, see [Connecting to and Disconnecting from a Project](#) on page 1174.

For more information about installing TestDirector 7.0i, refer to the *TestDirector 7.0i Installation Guide*.



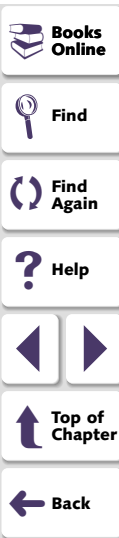
Reporting Defects with the Add Defect Dialog Box

You can report defects detected in your application directly from the WinRunner Test Results window.

To report a defect with the Add Defect dialog box:



- 1 Make sure that the Test Results window is open. If necessary, choose **Tools > Test Results** or click the **Test Results** button to open it.





- 2 Choose **Tools > Report Bug** or click the **Report Bug** button. The Add Defect dialog box opens.

Add Defect

Defect Information

Summary

Status

Assigned To

Priority

Reproducible

Detected By On In Version

Subject

Severity

Project

Description



- 3 Type a short description of the defect in **Summary**.
- 4 Enter information in the rest of the defect text boxes. Note that you must enter information in all the text boxes with red labels.
- 5 Select the **Reproducible** check box if the defect can be recreated under the same conditions by which it was detected.



- 6 Type a more in-depth description of the defect in **Description**.

If you want to clear the data in the Add Defect dialog box, click the **Clear** button.

- 7 You can add an attachment to your defect report:

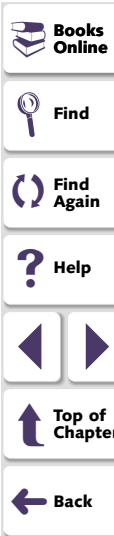
- Click the **Attach File** button to attach a file to the defect.
- Click the **Attach Web Page** button to attach a Web page to the defect.
- Click the **Snapshot** button to capture an image and attach it to the defect.



- 8 Click the **Find Similar Defects** button at the top of the dialog box to compare your defect to the existing defects in the TestDirector project. This lets you know if similar defect records already exist, and helps you to avoid duplicating them. If similar defects are found, they are displayed in the Similar Defects dialog box.
- 9 Click the **Submit** button to add the defect to the database. TestDirector assigns the new defect a Defect ID.

- 10 Click **Close**.

For more information on using the Add Defect dialog box, refer to the *TestDirector 7.0i User's Guide*.



Using the Web Defect Manager (TestDirector 6.0)

The Web Defect Manager is Mercury Interactive's system for reporting and tracking software defects and errors over the Web. The Web Defect Manager is a scalable defect tracking system that helps you monitor defects closely from initial detection until resolution.

The Web Defect Manager is tightly integrated with TestDirector. Multiple users can share defect-tracking information stored in a central repository (TestDirector project). Multiple projects can be stored on a database server. This ensures that authorized users, such as members of the development, quality assurance, and support teams, can share defect-tracking information.

Setting Up the Web Defect Manager

Before you can launch the Web Defect Manager, you must ensure that a Web browser is installed on your computer. You must also ensure that a Web Defect Manager Server is installed on your Web server. For more information about the Web Defect Manager Server, refer to the *TestDirector 6.0 Installation Guide*.

Note: If you want to use the Web Defect Manager with Netscape Navigator, you must run the Netscape Plug-in installation. For more information, refer to the *TestDirector 6.0 Installation Guide*.



Reporting Defects with the Web Defect Manager

When you detect a defect in an application, you send a defect report to the TestDirector project using the Web Defect Manager's Add Defect tab. This tab includes fields that let you describe the defect, where the defect was discovered, and in which build of the application the defect occurred. The Add Defect tab also lets you capture screen images and attach them to your defect report.

To report a defect with the Web Defect Manager:



- 1 Make sure that the Test Results window is open. If necessary, choose **Tools > Test Results** or click the **Test Results** button to open it.



- 2 Choose **Tools > Report Bug** or click the **Report Bug** button. The Web Defect Manager opens.



3 Click the **Add Defect** tab.

The screenshot shows the 'Web Defect Manager - TestDirector_Demo (admin)' interface. The 'Add Defect' tab is active. The form contains the following fields and controls:

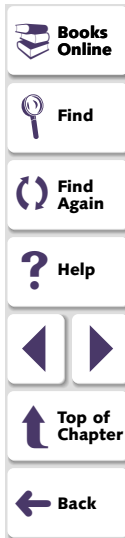
- Summary:** A text input field.
- Detected By:** A dropdown menu with 'admin' selected.
- Detected in Version:** A dropdown menu with 'Flight 1b' selected.
- Detected on Date:** A date picker showing '29/06/99'.
- Assigned To:** A dropdown menu.
- Status:** A dropdown menu with 'New' selected.
- Reproducible:** A checked checkbox.
- Test Set:** A text input field.
- Project:** A dropdown menu with 'Project 2' selected.
- Subject:** A text input field.
- Severity:** A dropdown menu.
- Priority:** A dropdown menu.
- Description:** A large text area.
- Attachments:** A section with icons for adding attachments.

- 4 Type a short description of the defect in **Summary**.
- 5 Enter information in the rest of the defect text boxes. Note that you must enter information in all the text boxes with red labels.



- 6 Select the **Reproducible** check box if the defect can be recreated under the same conditions by which it was detected.
- 7 Type a more in-depth description of the defect in **Description**.
- 8 You can add an attachment to your defect report:
 - Click the **New Attachments** button to attach a file to the defect.
 - Click the **New Web Link** button to attach a Web page to the defect.
 - Click the **Snapshot** button to capture an image and attach it to the defect.
- 9 Click the **Similar** button to compare your defect to the existing defects in the TestDirector project. This lets you know if similar defect records already exist, and helps you to avoid duplicating them. If the Web Defect Manager locates similar defects, they are displayed in the Similar Defects dialog box.
- 10 Click **Add** to add the defect to the TestDirector project. Web Defect Manager assigns the new defect a Defect ID

For additional information on using the TestDirector Web Defect Manager, refer to the *Web Defect Manager User's Guide*.



Using the Remote Defect Reporter (TestDirector 6.0)

The Remote Defect Report is Mercury Interactive's off-site defect reporting tool. The Remote Defect Reporter (RDR) enables software development and testing personnel to report new defects detected in an application without requiring connection to a TestDirector defect project.

You report defects in the Remote Defect Reporter window. By associating the Remote Defect Reporter with a TestDirector project, you can customize the window so that it contains the same selection lists, user lists, and user-defined fields that appear in the project.

After you fill in the details of a new defect, you send the information to an e-mail address or to a file. Later on, the new defects can be imported into a TestDirector defect project where they are monitored until they are resolved in the software.

Setting Up the Remote Defect Reporter

You can choose to send a new defect to an e-mail address or to a file. If you are working on a wide area network, you must report new defects to a mailbox. If you are connected to a local area network, you can achieve best performance by sending new defect reports to a file. In either case, the defect information can later be imported into a TestDirector database.

Note that in order to set up and use the Remote Defect Reporter, you must first install the Remote Defect Reporter from the TestDirector program group.



To set up the Remote Defect Reporter:



- 1 Make sure that the Test Results window is open. If necessary, choose **Tools > Test Results** or click the **Test Results** button to open it.



- 2 Choose **Tools > Report Bug** or click the **Report Bug** button.

The first time you open the Remote Defect Reporter window, you are prompted with the following message: “UseMailSystem parameter not defined. Run setup to fix it?”

- 3 Click **Yes**.
- 4 The Remote Defect Reporter setup program opens.
- 5 Choose the configuration folder, where the files for determining which fields appear in the Remote Defect Reporter are stored. The default location for this folder is the TDPriv folder. To change the location of the configuration folder, click the **Browse** button, select the desired location, and click **OK**. Click **Next** to proceed.
- 6 Choose whether to report defects by e-mail or to a public file: to report defects by e-mail, click **Use E-Mail**; to store defects in a public file, click **Use Public File**. Click **Next** to proceed.



- 7 If you chose to report defects by e-mail, enter the e-mail address for sending defects in the **E-Mail Address** box. If you chose to report defects to a public file, enter its location in the **Report Defects to File** box. The name of the file is *bugs.fdb*. Click **Next** to proceed.
- 8 Click **Finish** to exit the Remote Defect Reporter setup program.

Note: To change setup options at any time, such as the specified e-mail address or the file location, run the setup program again. To run the setup program, choose **Defect > Run Setup** in the Remote Defect Reporter window.

Reporting Defects with the Remote Defect Reporter

You can report defects detected in your application directly from the WinRunner Test Results window.

To report a defect with the Remote Defect Reporter:



- 1 Make sure that the Test Results window is open. If necessary, choose **Tools > Test Results** or click the **Test Results** button to open it.








- 2 Choose **Tools > Report Bug** or click the **Report Bug** button. The Remote Defect Reporter window opens.



Remote Defect Reporter - rdrcollector@location.com



Defect Help



Summary:

Detected By:  Test Set Reference:

Detected in Version:  Project: 

Detected on Date: 7/7/98  Subject: 

Assigned To:  Severity: 

Status:  Priority: 

Reproducible

Description

Attachments



- 3 Type a short description of the defect in **Summary**.
- 4 Enter information in the rest of the defect text boxes. Note that you must enter information in all the text boxes with red labels.
- 5 Select the **Reproducible** check box if the defect can be recreated under the same conditions by which it was detected.
- 6 Type a more in-depth description of the defect in **Description**.
- 7 You can add an attachment to your defect report:
 - Click the **New Attachments** button to attach a file to the defect.
 - Click the **New Web Link** button to attach a Web page to the defect.
- 8 Choose either **Defect > Save to File** or **Defect > Deliver via E-mail**, depending on the option you chose during setup. Alternatively, click the **Save to File** button or the **Deliver via E-mail** button. The defect is sent to either an e-mail address or a file. A message indicates that the defect was sent.



Note: If you send new defects to an e-mail address and your machine is not properly configured to send e-mail, an error message may appear. When a defect report is successfully sent via e-mail or to a file, a confirmation message appears on the screen.

For information on using the TestDirector Remote Defect Reporter, refer to the *Remote Defect Reporter User's Guide*.



Symbols

- \$ symbol in Range property check **329**
- \ character in regular expressions **330, 718**

A

- abs_x property **192, 203**
- abs_y property **192, 203**
- accessing TSL statements on the menu bar **1005**
- Acrobat Reader **31**
- activating an ActiveX control **358**
- active property **192, 206**
- ActiveX controls
 - activating **358**
 - checking sub-object properties **364–367**
 - overview **342–343**
 - retrieving properties **352–357**
 - setting properties **352–357**
 - support for **341–369**
 - viewing properties **347–351**
 - working with TSL table functions **368**
- ActiveX Properties Viewer. *See* GUI Spy
 - ActiveX tab
- ActiveX_activate_method function **358**
- ActiveX_get_info function **352**
- ActiveX_set_info function **354, 355**

- Add All button
 - in the Check GUI dialog box **303**
 - in the Create GUI Checkpoint dialog box **308**
 - in the Edit GUI Checklist dialog box **312**
- Add button
 - in the Create GUI Checkpoint dialog box **308**
 - in the Edit GUI Checklist dialog box **312**
- Add Class dialog box **184**
- Add Defect dialog box **1230–1233**
 - reporting defects **1231**
 - setup **1230**
- Add dialog box (GUI Map Editor) **154**
- Add Watch button **52, 969, 986**
- Add Watch command **969**
- Add Watch dialog box **969**
- add_cust_record_class function **1160**
- Add-In Manager dialog box **55, 1077**
- adding buttons to the User toolbar
 - that execute menu commands **981–990**
 - that execute TSL statements **995–998**
 - that parameterize TSL statements **999–1002**
 - that paste TSL statements **991–994**
- adding objects to a GUI map file **154**
- adding reserved words **1021**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- adding tests to version control **1189**
- Add-ins **243**
- addins command line option **921**
- Add-ins tab, Test Properties dialog box **243**
- add-ins, loading while starting WinRunner **55–56, 1077**
- addins_select_timeout command line option **922**
- addons command line option *See* addins command line option
- addons_select_timeout command line option *See* addins_select_timeout command line option
- Advanced Recording options **1039**
- Advanced Run Options dialog box **929, 1055**
- Allow TestDirector to Run Tests Remotely check box **1080**
- Analog mode **37, 233**
 - run speed **1056, 1123**
 - tests recorded in XRunner **234**
- animate command line option **922**
- API, Windows. *See* calling functions from external libraries
- application being tested
 - illustration **63**
- Argument Specification dialog box **332**
- argument values, assigning **754–756**
- arguments, specifying **324–334**
 - DateFormat property check **327**
 - for Compare property check **326**
 - from the Argument Specification dialog box **332**
 - Range property check **329**
 - RegularExpression property check **330**
 - TimeFormat property check **331**
- Arrange Icons button **988**
- Assign Variable dialog box **974**
- associating add-ins with a test **243**
- attached text **1065**
 - search area **1066, 1098**
 - search radius **1066, 1100**
- Attached Text box **1065**
 - Preferred Search Area box **1066**
 - Search Radius box **1066**
- attached_text property **192, 203**
- attached_text_area testing option **1098**
- attached_text_search_radius testing option **1100**
- atr_val function **1148**
- attributes. *See* properties
- AUT
 - illustration **63**
- Auto Merge (of GUI map files) **164**
 - resolving conflicts created during **167–171**



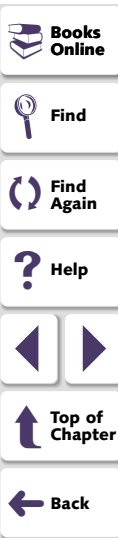
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

auto_load command line option [922](#)
 auto_load_dir command line option [922](#)
 AutoFill List command, data table [619](#)

B

Back Up Test Script Automatically [1068](#)
 batch command line option [923](#)
 batch mode, running tests in [1050](#), [1101](#)
 batch testing option [1101](#)
 batch tests [907–915](#)
 creating [910–911](#)
 expected results [913–914](#)
 overview [908–909](#), [913–914](#)
 running [912](#)
 storing results [913](#)
 verification results [913–914](#)
 viewing results [915](#)
 beep command line option [924](#)
 beep testing option [1102](#)
 Beep when Checking a Window check box [1051](#)
 Beep when Synchronization Fails check box [1060](#)
 Bitmap Checkpoint > For Object/Window [556](#)
 Bitmap Checkpoint > For Screen Area [559](#)
 Bitmap checkpoint commands [556–560](#)

Bitmap Checkpoint for Object/Window button [53](#), [556](#), [979](#)
 Bitmap Checkpoint for Screen Area button [53](#), [559](#), [979](#), [984](#)
 bitmap checkpoints [551–560](#)
 Context Sensitive [556–558](#)
 created in XRunner [555](#)
 in data-driven tests [555](#), [639–646](#)
 of an area of the screen [559–560](#)
 of windows and objects [556–558](#)
 overview [552–555](#)
 test results [869](#)
 viewing results [892](#)
 bitmap synchronization points
 in data-driven tests [678](#)
 of objects and windows [672–674](#)
 of screen areas [675–678](#)
 bitmap verification. *See* bitmap checkpoints
 bitmaps, mismatch [1049](#), [1114](#)
 Break at Location breakpoint [954](#), [956](#)
 Break in Function breakpoint [955](#), [959](#)
 Break in Function button [52](#), [956](#), [959](#), [986](#)
 Break in Function command [956](#), [961](#)
 Break when Verification Fails check box [1052](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- breakpoints [951–964](#)
 - Break at Location [954, 956](#)
 - Break in Function [955, 959](#)
 - deleting [964](#)
 - modifying [962](#)
 - overview [952–953](#)
 - pass count [954, 961](#)
- Breakpoints button [986](#)
- Breakpoints command [956, 959](#)
- Breakpoints dialog box [956, 959](#)
- bugs. *See* [defects](#)
- button_check_info function [269, 589](#)
- button_check_state function [590](#)
- button_wait_info function [667](#)
- buttons on the User toolbar
 - that execute menu commands, adding [981–990](#)
 - that execute TSL statements, adding [995–998](#)
 - that parameterize TSL statements, adding [999–1002](#)
 - that paste TSL statements, adding [991–994](#)
- buttons, recording [1042, 1117](#)

C

- calculations, in TSL [728](#)
- calendar class [200, 316](#)
- call statements [762–763, 1206](#)
- call statements, functions for working with
 - TestDirector [1206](#)
- call_close statement [762–763, 1206](#)
- called tests, specifying search paths [1084, 1119](#)
- calling functions from external libraries [805–815](#)
 - declaring external functions in TSL [810–813](#)
 - examples [814–815](#)
 - loading and unloading DLLs [808–809](#)
 - overview [806–807](#)
- calling tests [759–777](#)
 - call statement [762–763](#)
 - defining parameters [769](#)
 - overview [760–761](#)
 - returning to calling tests [764–766](#)
 - setting the search path [767](#)
 - textit statement [764–766](#)
 - return statement [764–765](#)
- Calls command [763](#)
- Cannot Capture message
 - in Database Checkpoint dialog boxes [490](#)
 - in GUI Checkpoint dialog boxes [300](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- captured text [1070](#)
- Cascade button [988](#)
- Case Insensitive Ignore Spaces verification
 - databases [511](#)
 - tables [415, 459](#)
- Case Insensitive verification
 - databases [510](#)
 - tables [414, 458](#)
- Case Sensitive Ignore Spaces verification
 - databases [511](#)
 - tables [415, 459](#)
- Case Sensitive verification
 - databases [510](#)
 - tables [414, 458](#)
- changes in GUI discovered during test run. See
 - Run wizard
- Check Arguments dialog box
 - for DateFormat Property check [327](#)
 - for Range property check [329, 714](#)
 - for Regular Expression property check [330](#)
 - for TimeFormat property check [331](#)
- CHECK BITMAP OF OBJECT/WINDOW softkey [249, 554, 556](#)
- CHECK BITMAP OF SCREEN AREA softkey [250, 554, 559, 1007](#)
- CHECK BITMAP OF WINDOW softkey [1007](#)
- CHECK DATABASE (CUSTOM) softkey [250, 485, 1007](#)
- CHECK DATABASE (DEFAULT) softkey [250, 481, 483, 1007](#)
- Check Database dialog box [487](#)
 - Cannot Capture message [490](#)
 - Complex Value message [490](#)
- Check GUI dialog box [302–305](#)
 - Cannot Capture message [300](#)
 - closing without specifying arguments [332](#)
 - Complex Value message [300](#)
 - for checking tables [448](#)
 - N/A message [300](#)
 - No properties are available for this object message [301](#)
- CHECK GUI FOR MULTIPLE OBJECTS softkey [249, 277, 1007](#)
- CHECK GUI FOR OBJECT WINDOW softkey [249](#)
- CHECK GUI FOR OBJECT/WINDOW softkey [273, 274, 281, 283, 427, 428, 429, 1006](#)
- CHECK GUI FOR SINGLE PROPERTY softkey [249, 269, 1006](#)
- Check In command [1189, 1193](#)
- Check Out command [1191](#)
- Check Property dialog box [270](#)
 - check_button class [200, 316](#)
 - check_info functions, failing test when statement fails [935, 1054, 1122](#)



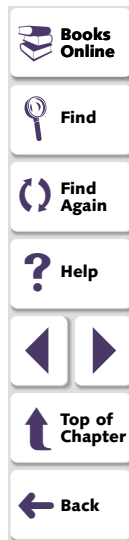
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- check_window function **554**
- checking
 - a single GUI object **272–276**
 - a single GUI object using default checks **273**
 - a single GUI object while specifying checks **274–276**
 - all GUI objects in a window **280–283**
 - all GUI objects in a window using default checks **281–282**
 - all GUI objects in a window while specifying checks **283**
 - multiple GUI objects in a window **277–279**
- checking databases **462–550**
 - overview **463–467**
 - See *also* databases and database checkpoints
- checking tables **441–461**
 - overview **442**
 - See *also* tables
- checking tests
 - into version control **1193**
 - out of version control **1191**
- checking windows **1051, 1102**
- checklists
 - See *also* GUI checklists or database checklists
 - shared **1120**
- checkpoints
 - bitmap **235, 551–560**
 - database **462–550**
 - GUI **235, 265–340**
 - overview **235**
 - text **235, 562–583**
 - updating expected results **901–902**
- child windows, recording **1042, 1108**
- class property **192, 200, 203**
- class_index property **203**
- classes
 - configuring **188–195**
 - object **179**
- Classes of Objects dialog box **303, 304, 308, 309, 312, 313**
- Clear All button
 - in the Check GUI dialog box **304**
 - in the Create GUI Checkpoint dialog box **309**
 - in the Edit GUI Checklist dialog box **313**
- Clear All command, data table **617**
- Clear Contents command, data table **617**
- Clear Formats command, data table **617**
- clearing a GUI map file **156**
- click_on_text functions **570, 576**
- Close All button **988**
- Close All command **264**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- Close command [264](#)
 - for data table [616](#)
- closing the GUI Checkpoint dialog boxes [332](#)
- Collapse Tree command (GUI Map Editor) [137](#)
- column names for data tables [621](#)
- columns, computed [440](#)
- ComboBox
 - maximum length recorded [1043](#)
 - recording non-unique items by name [933](#), [1041](#), [1116](#)
 - string for separating [1064](#), [1113](#)
- command line
 - creating custom WinRunner shortcut [920](#)
 - options [921–942](#)
 - options for working with TestDirector [1209–1212](#)
 - running tests from the [916–942](#)
- Comment command [253](#)
- comments, in TSL [725](#)
- Compare Expected and Actual Values button
 - in the Database Checkpoint Results dialog box [895](#)
 - in the GUI Checkpoint Results dialog box [880](#)
- Compare property check, specifying arguments [326](#)
- compare_text function [577](#)
- comparing files
 - test results [869](#)
 - viewing results [903–905](#)
- comparing two files [741](#)
- compiled module functions for working with TestDirector [1206](#)
- compiled modules [792–804](#)
 - changing functions in [799](#)
 - closed [799](#)
 - creating [796](#)
 - example [804](#)
 - loading [799–803](#)
 - overview [793–794](#)
 - reloading [799–803](#)
 - structure [795](#)
 - system [799](#)
 - Test Properties dialog box, General tab [796](#)
 - unloading [799–803](#)
- Complex Value message
 - in Database Checkpoint dialog boxes [490](#)
 - in GUI Checkpoint dialog boxes [300](#)
- computed columns [440](#)
- configurations, initializing [1158–1161](#)
- Configure Class dialog box [186](#), [189](#), [196](#)
- Configure GUI Map button [987](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- configuring
 - classes [188–195](#)
 - GUI map. See GUI map configuration
 - recording method [195](#)
 - WinRunner softkeys [1006–1011](#)
- connecting WinRunner to a TestDirector project [1126, 1174–1180](#)
- Connection to TestDirector dialog box [1175](#)
- Consider Child Windows check box [1042](#)
- constants, in TSL [727](#)
- Content property check on databases [485–489](#)
- Context Sensitive
 - errors [1053, 1103, 1104](#)
 - mode [36, 225–229](#)
 - recording, common problems [230–232](#)
 - running tests, common problems [858–861](#)
 - statements [1053, 1103](#)
 - statements, delay between executing [1057, 1104](#)
 - statements, timeout [1048, 1132](#)
 - testing, introduction to [58–69](#)
- Context Sensitive mode [59](#)
- Controller, LoadRunner [1217](#)
- controlling test execution with setvar and getvar [1097](#)
- conventions. See typographical conventions
- conversion file for a database checkpoint, working with Data Junction [542–543](#)
- Copy button [983](#)
- Copy command [253](#)
 - for data table [617](#)
- Copy Down command, data table [618](#)
- Copy Right command, data table [618](#)
- copying descriptions of GUI objects from one GUI map file to another [149](#)
- count property [203](#)
- Create GUI Checkpoint dialog box [306–310](#)
 - Cannot Capture message [300](#)
 - closing without specifying arguments [332](#)
 - Complex Value message [300](#)
 - N/A message [300](#)
 - No properties are available for this object message [301](#)
- create_browse_file_dialog function [826](#)
- create_custom_dialog function [823](#)
- create_input_dialog function [819](#)
- create_list_dialog function [821](#)
- create_password_dialog function [828](#)
- create_text_report command line option [924](#)
- creating
 - dialog boxes for interactive input [816–829](#)
 - tests [221–264](#)
 - the User toolbar [979–1002](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

creating the GUI map [93–106](#)
 by recording [102–103](#)
 from the GUI Map Editor [103–106](#)
 with the RapidTest Script Wizard [93–101](#)
 CRV icon [46](#)
 cs_fail command line option [925](#)
 cs_fail testing option [1103](#)
 cs_run_delay command line option [926](#)
 cs_run_delay testing option [1104](#)
 ct_KEYWORD_USER section of
 reserved_words.ini file [1021](#)
 curr_dir testing option [1105](#)
 currency symbols, in Range property check
 [329](#)
 Currency(0) command, data table [620](#)
 Currency(2) command, data table [620](#)
 Current Folder box [856](#)
 Current Line box [856](#)
 current test settings [855–857](#)
 Current Test tab, Test Properties dialog box
 [855](#)
 custom checks on databases [485–489](#)
 custom classes [231](#)
 Custom Database Checkpoint button [984](#)
 custom execution functions [231](#)
 Custom Number command, data table [620](#)

custom objects [231](#)
 adding custom class [184](#)
 mapping to a standard class [183–187](#)
 custom record functions [231](#)
 custom shortcut for starting WinRunner [920](#)
 Customize User Toolbar button [988](#)
 Customize User Toolbar dialog box [989, 991,](#)
 [995, 999](#)
 customizing
 the Function Generator [1134–1156](#)
 WinRunner's user interface [977–1011](#)
 customizing test scripts [1012–1026](#)
 highlighting script elements [1018](#)
 overview [1013](#)
 print options [1014](#)
 script window customization [1023](#)
 Cut button [983](#)
 Cut command [253](#)
 for data table [617](#)
 cycle command line option See [td_cycle_name](#)
 command line option
 cycle testing option. See [td_cycle_name](#)
 testing option

D

Data Bound Grid Control [369](#)
 Data Comparison Viewer [884](#)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



- Data Driver Wizard button [987](#)
- Data Junction
 - choosing a database for a database
 - checkpoint [542–543](#)
 - default database check [483–484](#)
 - importing data from a database [630–634](#)
 - TransliterationIn property [543](#), [631](#)
 - TransliterationOut property [543](#), [631](#)
- Data menu commands, data table [619](#)
- data table
 - column definition [611](#)
 - Data menu commands [619](#)
 - declaration in manually created data-driven
 - tests [603](#)
 - default [637](#)
 - Edit menu commands [617](#)
 - editing [613–620](#)
 - File menu commands [615](#)
 - Format menu commands [620](#)
 - largest number [621](#)
 - main [637](#)
 - maximum column width [621](#)
 - maximum formula length [621](#)
 - maximum number of columns [621](#)
 - maximum number of rows [621](#)
 - maximum row height [621](#)
 - number precision [621](#)
 - preventing data from being reformatted [613](#)
 - row definition [611](#)
 - saving to a new location [606](#)
 - saving with a new name [606](#)
 - smallest number [621](#)
 - table format [621](#)
 - technical specifications [621](#)
 - valid column names [621](#)
 - working with Microsoft Excel [616](#), [648](#)
 - working with more than one data table in a
 - test script [606](#)
- Data Table button [987](#)
- Data Table command [613](#)
- database checklists
 - editing [517–521](#)
 - modifying an existing query [521–528](#)
 - shared [1083](#)
 - sharing [514–516](#)
- Database Checkpoint > Custom Check
 - command
 - for working with ODBC or Microsoft Query [485](#)
- Database Checkpoint > Default Check
 - command
 - for working with Data Junction [483](#)
 - for working with ODBC or Microsoft Query [481](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- Database Checkpoint button [53](#), [984](#)
- Database Checkpoint Results dialog box
 - Cannot Capture message [490](#)
 - Complex Value message [490](#)
 - options [895](#)
- Database Checkpoint wizard [491–503](#)
 - Data Junction screens [499–503](#)
 - ODBC/Microsoft Query screens [492–498](#)
 - selecting a Data Junction conversion file [502](#)
 - selecting a source query file [495](#)
 - setting Data Junction options [500](#)
 - setting ODBC (Microsoft Query) options [493](#)
 - specifying an SQL statement [497](#)
- database checkpoints
 - Database Checkpoint wizard [491–503](#)
 - editing database checklists [517–521](#)
 - modifying [514–528](#)
 - modifying expected results [529–532](#)
 - parameterizing [533–539](#)
 - parameterizing queries [534](#)
 - parameterizing SQL statements [534](#)
 - parameterizing, guidelines [539](#)
 - saving a database checklist to a shared folder [514–516](#)
 - test results [893–895](#)
 - viewing expected results of a contents check [896–900](#)
- database command line option See `td_database_name` command line option
- databases
 - Case Insensitive Ignore Spaces verification [511](#)
 - Case Insensitive verification [510](#)
 - Case Sensitive Ignore Spaces verification [511](#)
 - Case Sensitive verification [510](#)
 - checking [462–550](#)
 - choosing [540–543](#)
 - connecting [546](#)
 - creating a query in Data Junction [542–543](#)
 - creating a query in ODBC/Microsoft Query [540–542](#)
 - custom checks [485–489](#)
 - Database Checkpoint wizard [491–503](#)
 - default check with Data Junction [483–484](#)
 - default check with ODBC/Microsoft Query [481–483](#)
 - default checks [480–484](#)
 - disconnecting [549](#)
 - editing the expected data [512](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

databases (*continued*)

- importing data for data-driven tests
 - 612–634**
- modifying an existing query **521–528**
- modifying checkpoints **514–528**
- Numeric Content verification **510**
- Numeric Range verification **511**
- overview **463–467**
- result set **463**
- retrieving information **547**
- returning the content and number of
 - column headers **547**
- returning the last error message of the last
 - operation for Data Junction **550**
- returning the last error message of the last
 - operation for ODBC **549**
- returning the row content **548**
- returning the value of a single field **547**
- running a Data Junction export file **550**
- runtime checks **468–479**
- specifying which cells to check **505**
- TSL functions for working with **544–550**
- verification method for contents of a
 - multiple-column database **507**
- verification method for contents of a single-
 - column database **510**
- verification type **510**
- writing the record set into a text file **548**

- data-driven tests **584–659**
 - analyzing test results **636**
 - bitmap checkpoints **639–646**
 - bitmap synchronization points **639–646**
 - converting a test script manually **606–609**
 - converting tests to **591–609**
 - converting tests using the DataDriver
 - Wizard **591–600**
 - creating a data table manually **606–609**
 - creating, manually **603–609**
 - DataDriver Wizard **591–602**
 - ddt_func.ini file **597**
 - editing the data table **613–620**
 - GUI checkpoints **639–646**
 - guidelines **657–659**
 - importing data from a database **612–634**
 - overview **585**
 - process **586–636**
 - running **635**
 - technical specifications for the data table
 - 621**
 - using TSL functions with **647–656**
 - with user-defined functions **597**
- DataDriver Wizard **591–602**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

DataWindows

- checking properties [432–435](#)
- checking properties of objects within [436–439](#)
- checking properties while specifying checks [433](#)
- checking properties with default checks [432](#)
- computed columns [440](#)
- date formats supported by DateFormat property check [327](#)
- Date MM/dd/yyyy command, data table [620](#)
- DateFormat property check
 - available date formats [327](#)
 - specifying arguments [327](#)
- db_check function [465, 535](#)
- db_connect function [546](#)
- db_disconnect function [549](#)
- db_dj_convert function [550](#)
- db_execute_query function [546](#)
- db_get_field_value function [547](#)
- db_get_headers function [547](#)
- db_get_last_error function [549, 550](#)
- db_get_row function [548](#)
- db_record_check function [468](#)
- db_write_records function [548](#)
- ddt_close function [594, 649](#)
- ddt_export function [649](#)

- ddt_func.ini file [597](#)
- ddt_get_current_row function [653](#)
- ddt_get_parameters function [654](#)
- ddt_get_row_count function [594, 605, 650](#)
- ddt_is_parameter function [653](#)
- ddt_next_row function [650](#)
- ddt_open function [594, 605, 615, 616, 648](#)
- ddt_report_row function [636, 655](#)
- ddt_save function [595, 606, 612, 648, 659](#)
- ddt_set_row function [605, 651](#)
- ddt_set_val function [651, 659](#)
- ddt_set_val_by_row function [652, 659](#)
- ddt_show function [650](#)
- ddt_update_from_db function [595, 606, 656](#)
- ddt_val function [596, 609, 654](#)
- ddt_val_by_row function [655](#)
- Debug mode [832, 835, 847](#)
- Debug results [835, 847](#)
- debugging test scripts [944–950](#)
 - overview [945–946](#)
 - Pause command [949](#)
 - pause function [950](#)
 - Step command [947](#)
 - Step Into command [947](#)
 - Step Out command [948](#)
 - Step to Cursor command [948](#)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



- decision-making in TSL **733**
 - if/else statements **733**
 - switch statements **735**
- declare_rendezvous function **1224**
- declare_transaction function **1220**
- Decrease Indent command **254**
- default checks
 - on a single GUI object **273**
 - on all objects in a window **281–282**
 - on standard objects **315–323**
- default checks on databases **480–484**
- default database check
 - with Data Junction **483–484**
 - with ODBC/Microsoft Query **481–483**
- Default Database Checkpoint button **481, 483, 979**
- Default Recording Mode box **1038**
- default settings for WinRunner softkeys **1006**
- defects, reporting
 - from Test Results window **906**
- define_object_exception function **700**
- define_popup_exception function **686**
- define_TSL_exception function **692**
- defining functions. *See* user-defined functions
- delay
 - between execution of Context Sensitive statements **1057, 1104**
 - for window synchronization **1047, 1106**
- Delay between Execution of CS Statements box **1057**
- delay command line option. *See* delay_msec command line option
- Delay for Window Synchronization box **1047**
- delay testing option. *See* delay_msec testing option
- delay_msec command line option **927**
- delay_msec testing option **1106**
- Delete button **983**
 - in the Create GUI Checkpoint dialog box **308**
 - in the Edit GUI Checklist dialog box **312**
- Delete command **253**
 - for data table **618**
- deleting objects from a GUI map file **155**
- Description Tab, Test Properties dialog box **239**
- descriptions. *See* physical descriptions
- dialog boxes for interactive input, creating **816–829**
 - overview **817–818**
- dialog boxes, creating
 - browse dialog boxes **826**
 - custom dialog boxes **823**
 - input dialog boxes **819**
 - list dialog boxes **821**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

dialog boxes, creating (*continued*)
 option dialog boxes **821**
 overview **817–818**
 password dialog boxes **828**

disconnecting from a TestDirector
 project **1178**
 server **1180**

Display button in WinRunner Test Results
 window **339, 530**

Display button, in Test Results window **902**

displayed property **192, 203**

dividing the script automatically **1037**

DLLs
 loading **808**
 unloading **808**

Documentation Files box **1084**

dont_connect command line option **928, 1209**

dont_quit command line option **928**

dont_show_welcome command line option
928

Drop Synchronization Timeout if Failed check
 box **1059**

drop_sync_timeout testing option **1108**

DropDown DataWindows. *See* DropDown
 objects

DropDown lists. *See* DropDown objects

DropDown objects
 checking properties with default checks
427
 checking properties, including content,
 while specifying checks **428**
 checking properties, including contents
427–431

drop-down toolbar, recording on a **247**

DropDownListBoxContent property check **428**

DWComputedContent property check **440**

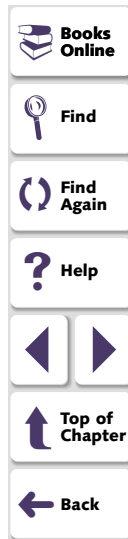
DWTableContent property check **432**

E

Edit Check dialog box **407**
 editing the expected data **416, 459, 512**
 for a multiple-column database **504**
 for a multiple-column table **451**
 for a single-column database **509**
 for a single-column table **413, 457**
 for checking databases **504–513**
 for checking tables **451–461**
 specifying which cells to check **408, 453,**
505
 verification method **411, 455, 507**
 verification type **414, 458, 510**

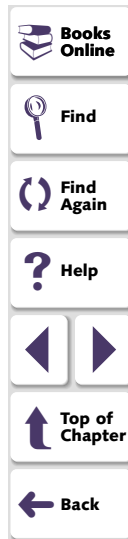
edit class **200, 317**

Edit Database Checklist button **984**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- Edit Database Checklist command [515](#), [517](#)
- Edit Database Checklist dialog box [518](#), [522](#), [527](#)
 - Modify button [523](#), [528](#)
- Edit Expected Value button [335–337](#)
- Edit GUI Checklist button [984](#)
- Edit GUI Checklist command [291](#), [294](#), [311](#)
- Edit GUI Checklist dialog box [310–314](#)
 - closing without specifying arguments [332](#)
 - No properties are available for this object message [301](#)
- Edit GUI Map button [987](#)
- Edit menu commands, data table [617](#)
- edit_check_info function [269](#), [589](#), [590](#)
- edit_check_selection function [590](#)
- edit_set function [1036](#)
- edit_wait_info function [667](#)
- editing
 - database checklists [517–521](#)
 - expected property values [335–337](#)
 - GUI checklists [293–298](#)
 - list of reserved words [1021](#)
- editing tests [253](#)
- editing the GUI map [128–159](#)
- Editor Options button [988](#)
- Editor Options dialog box [1015](#)
- enabled property [192](#), [203](#)
- end_transaction function [1221](#)
- enum_descendent_toplevel testing option [1108](#)
- error handling. *See* exception handling
- Excel. *See* Microsoft Excel
- exception handling [679–709](#)
 - activating and deactivating [703](#), [709](#)
 - object exceptions [696–702](#)
 - overview [680–681](#)
 - pop-up exceptions [682–689](#)
 - See also* exceptions
 - TSL exceptions [690–695](#)
 - Web exceptions [704–709](#)
- Exception Handling button [987](#)
- exception_off function [701](#), [703](#)
- exception_off_all function [703](#)
- exception_on function [701](#), [703](#)
- Exceptions dialog box [683](#)
- exceptions, object [696–702](#)
 - defining [696–699](#)
 - defining handler functions [700–702](#)
- exceptions, pop-up [682–689](#)
 - defining [683–685](#)
 - defining handler functions [687–689](#)
- exceptions, TSL [690–695](#)
 - defining [690–692](#)
 - defining handler functions [693–695](#)



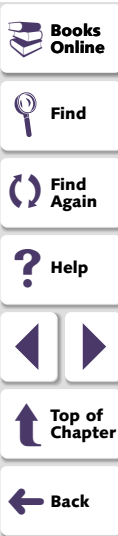
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- exceptions, Web [704–709](#)
 - defining [705–706](#)
 - modifying [707–708](#)
- Execute TSL Button Data dialog box [996](#)
- executing
 - menu commands from the User toolbar [981–990](#)
 - TSL statements from the User toolbar [995–998](#)
- execution arrow [50](#), [224](#)
- exp command line option [929](#)
- exp testing option [1109](#)
- Expand Tree command (GUI Map Editor) [137](#)
- Expected Data Viewer [890](#), [899](#)
- expected results [837](#), [849](#), [850](#)
 - creating multiple sets [850](#)
 - editing contents check on a table [892](#)
 - specifying [852](#)
 - updating [838](#)
 - updating for bitmap, GUI, and database checkpoints [901–902](#)
- Expected Results Folder box [856](#)
- expected results folder, location [856](#), [1109](#)
- expected results of a GUI checkpoint [284](#)
 - editing [335–337](#)
 - modifying [338–340](#)
- Export command, data table [616](#)
- extern declaration [810–813](#)

- external functions, declaring in TSL [810–813](#)
- external libraries, dynamically linking [808–809](#)

F

- f command line option [930](#)
- Fail Test when Context Sensitive Errors Occur check box [1053](#)
- Fail Test when Single Property Check Fails check box [1054](#)
- FarPoint Spreadsheet Control [369](#)
- Fast run speed option [1056](#)
- fast_replay command line option [929](#)
- file comparison [741](#)
- file management [255](#)
- File menu commands, data table [615](#)
- file_compare function [741](#), [903](#)
- filename command line option. See f command line option
- Filters dialog box (GUI Map Editor) [158](#)
- filters, in GUI Map Editor [157](#)
- Find button [983](#)
- Find command [254](#)
 - for data table [618](#)
- Find in GUI Map command [82](#)
- Find Next command [254](#)
- Find Previous command [254](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- find_text function [570–572](#)
- finding
 - a single object in a GUI map file [152](#)
 - multiple objects in a GUI map file [153](#)
- Fixed command, data table [620](#)
- Flight 1A [41](#)
- Flight 1B [41](#)
- Flight Reservation application [41](#)
- floating toolbar [51](#)
- focused property [192, 203](#)
- folder locations, specifying [1081–1085](#)
- font group
 - creating [580–582](#)
 - definition [578](#)
 - designating the active [582](#)
- Font Group box [1074](#)
- font groups [1074, 1110](#)
- Font Groups dialog box [581](#)
- font library [578](#)
- fontgrp command line option [930](#)
- fontgrp testing option [1110](#)
- fonts
 - learning [579–580](#)
 - teaching to WinRunner [578–583](#)
- Fonts Expert [579](#)
- Fonts Expert button [987](#)
- Format menu commands, data table [620](#)
- Fraction command, data table [620](#)
- frame_mdiclient class [200](#)
- Function Generator [743–758](#)
 - assigning argument values [754–756](#)
 - changing the default functions [757–758](#)
 - choosing a function from a list [752–753](#)
 - choosing a non-default function for a GUI object [748](#)
 - get functions [745](#)
 - overview [744–746](#)
 - using the default function for a GUI object [747](#)
- Function Generator dialog box. See Function Generator
- Function Generator, customizing [1134–1156](#)
 - adding a function [1138–1150](#)
 - adding categories [1136–1137](#)
 - adding sub-categories to a category [1154–1155](#)
 - associating a function with a category [1151–1153](#)
 - changing default functions [1156](#)
 - overview [1135](#)
- functions
 - calling from external libraries. See calling functions from external libraries
 - user-defined. See user-defined functions



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

G

General command, data table **620**
 General Options button **988**
 General Options dialog box **857, 1027**
 General Tab, Test Properties dialog box **637**
 General tab, Test Properties dialog box **239, 796**

Generate Concise, More Readable Type
 Statements check box **1040**

generating functions **743–758**
See also Function Generator

generator_add_category function **1136–1137**
 generator_add_function function **1138–1150**
 generator_add_function_to_category function
1151–1153
 generator_add_subcategory function
1154–1155
 generator_set_default_function function **758, 1156**

generic object class **321**

get functions **745**

Get Text > From Object/Window command
565

Get Text from Object/Window button **53, 565, 979, 984**

GET TEXT FROM OBJECT/WINDOW softkey **250, 565, 1008**

Get Text from Screen Area button **53, 567, 979, 984**

Get Text from Screen Area command **567**

GET TEXT FROM SCREEN AREA softkey **251, 567, 1008**

GET TEXT FROM WINDOW AREA softkey **250, 1008**

get_text function **564–569**

getvar function **1094–1096**
 controlling test execution with **1097**

Global GUI Map File mode **87–119**
 guidelines **118–119**
 overview **88–90**
 setting option **177**

Global GUI Map File mode option **177, 1079**

global testing options. *See* setting global testing options

global timeout **1048, 1132**

Go To button **983**

Go To command, for data table **618**

GUI
 learning **81**
 teaching to WinRunner **81**

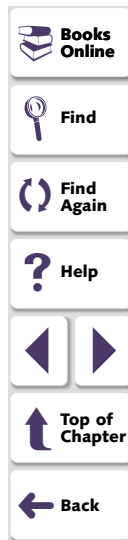
GUI changes discovered during test run. *See* Run wizard

GUI checklists **284**
 editing **293–298**
 modifying **290–298**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- GUI checklists (*continued*)
 - shared [1083](#)
 - sharing [291–292](#)
 - using an existing [287–289](#)
- GUI Checkpoint > For Single Property command
 - command
 - with data-driven tests [588](#)
- GUI Checkpoint commands [273](#), [274](#), [277](#), [281](#), [283](#)
- GUI Checkpoint dialog boxes [299–314](#)
- GUI Checkpoint for Multiple Objects button
 - [53](#), [277](#), [288](#), [306](#), [979](#), [984](#)
 - See also GUI Checkpoint for Multiple Objects command
- GUI Checkpoint for Multiple Objects command
 - [277](#), [288](#), [306](#)
- GUI Checkpoint for Object/Window button [53](#), [273](#), [274](#), [281](#), [283](#), [302](#), [979](#), [984](#)
 - See also GUI Checkpoint for Object/Window command
- GUI Checkpoint for Object/Window command
 - [273](#), [274](#), [281](#), [283](#), [302](#)
- GUI Checkpoint for Single Property button
 - [984](#)
- GUI Checkpoint for Single Property command
 - [269](#)
 - failing test when statement fails [935](#), [1054](#), [1122](#)
 - with data-driven tests [639](#)
- GUI Checkpoint Results dialog box [878](#)
 - Cannot Capture message [300](#)
 - Complex Value message [300](#)
 - N/A message [300](#)
 - No properties are available for this object message [301](#)
 - options [880](#)
 - Update Expected Value button [902](#)
- GUI checkpoints [265–340](#), [370–424](#)
 - checking a single object [272–276](#)
 - checking a single object using default checks [273](#)
 - checking a single object while specifying checks [274–276](#)
 - checking all objects in a window [280–283](#)
 - checking all objects in a window using default checks [281–282](#)
 - checking all objects in a window while specifying checks [283](#)
 - checking multiple objects in a window [277–279](#)
 - checking text in Web objects [419–424](#)
 - checking Web objects [370–424](#)



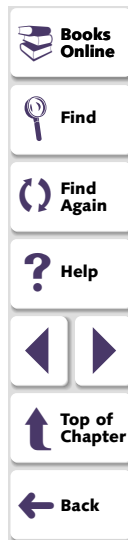
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- GUI checkpoints (*continued*)
 - created in XRunner [268](#)
 - default checks [315–323](#)
 - editing expected property values [335–337](#)
 - editing GUI checklists [293–298](#)
 - GUI Checkpoint dialog boxes [299–314](#)
 - in data-driven tests [639–646](#)
 - modifying expected results [338–340](#)
 - modifying GUI checklists [290–298](#)
 - overview [266–268](#)
 - property checks [315–323](#)
 - saving a GUI checklist to a shared folder [291–292](#)
 - specifying arguments [324–334](#)
 - test results [869, 878–881](#)
 - using an existing GUI checklist [287–289](#)
- GUI checks
 - on standard objects [315–323](#)
 - specifying arguments for [324–334](#)
- GUI Files command (GUI Map Editor) [136](#)
- GUI map
 - configuring [178–210](#)
 - configuring, overview [179–180](#)
 - creating [93–106](#)
 - finding objects or windows [82](#)
 - introduction [58–69](#)
 - loading [111–117](#)
 - overview [71–72](#)
 - saving [107–110](#)
 - understanding [70–86](#)
 - viewing [66](#)
- GUI Map command (GUI Map Editor) [136](#)
- GUI map configuration [178–210](#)
 - configuring a class [188–195](#)
 - creating a permanent [196–198](#)
 - default [181](#)
 - defining [195](#)
 - deleting a custom class [199](#)
 - mapping a custom object to a standard class [183–187](#)
 - overview [179–180](#)
- GUI Map Configuration dialog box [184, 188](#)
- GUI Map Editor [134–138](#)
 - copying/moving objects between files [149](#)
 - deleting objects [155](#)
 - description of [137](#)
 - expanded view [150](#)
 - filtering displayed objects [157](#)
 - functions for working with TestDirector [1207](#)
 - introduction [66](#)
 - learning the GUI of an application [103–106](#)
 - loading GUI files [113–117](#)
- GUI Map File Auto Merge Tool [168](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- GUI Map File Merge Tool [164](#)
 - Auto Merge [164](#)
 - Manual Merge [164](#)
- GUI Map File Mode box [1079](#)
- GUI map file modes
 - changing modes [177](#)
 - comparison of [84–86](#)
 - Global GUI Map File mode [87–119](#)
 - GUI Map File per Test mode [120–127](#)
- GUI Map File per Test mode [120–127](#)
 - guidelines [127](#)
 - overview [121–122](#)
 - setting option [123–125](#)
 - updating a GUI map file [126](#)
- GUI Map File per Test mode option [123–125](#), [1079](#)
- GUI map files
 - adding objects [154](#)
 - clearing [156](#)
 - copying/moving objects between files [149](#)
 - created in XRunner [202](#)
 - deleting objects [155](#)
 - editing [128–159](#)
 - finding a single object [152](#)
 - finding multiple objects [153](#)
 - guidelines [83](#)
 - loading [111–117](#)
 - loading temporary [1078](#)
 - loading using the GUI Map Editor [113–117](#)
 - loading using the GUI_load function [112–113](#)
 - merging [160–177](#)
 - merging in Manual Merge mode [172–176](#)
 - saving [107–110](#)
 - saving changes [159](#)
 - saving temporary [107](#)
 - sharing among tests [91–92](#)
 - temporary [1082](#)
 - tracing objects between files [153](#)
 - updating in GUI Map File per Test mode [126](#)
- GUI Merge Tool button [987](#)
- GUI object properties, viewing [73–80](#)
- GUI objects
 - checking [265–340](#)
 - checking property values [269–271](#)
 - identifying [58–69](#)
 - text attached to [1065](#)
- GUI Spy [73–80](#)
 - ActiveX tab [79](#), [347–351](#)
 - All standard tab [74](#)
 - Recorded tab [77](#)
- GUI Test Builder. *See* GUI Map Editor
- GUI Vuser Scripts [1219](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

GUI Vusers **1216**
 GUI_close function **113**
 GUI_load function **112–113, 859, 1160**
 GUI_open function **113**
 GUI_unload function **113**
 GUI_unload_all function **113**
 gui_ver_add_class function **304, 309, 313**
 gui_ver_set_default_checks function **272, 280**
 guidelines
 for working in the Global GUI Map File
 mode **118–119**
 for working with GUI map files **83**
 working in the GUI Map File per Test mode
 127

H

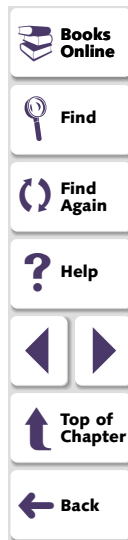
handle property **192, 206**
 Handler Function Definition dialog box **687, 693, 700**
 handler function template
 for popup exceptions **687**
 for TSL exceptions **693**
 object exceptions **702**
 handler functions
 for object exceptions **700–702**
 for pop-up exceptions **687–689**
 for TSL exceptions **693–695**

height property **192, 203**
 Help button **52**
 html_url property **203**

I

identifying GUI objects **58–69**
 overview **59–61**
 Image Text Recognition mechanism **1073**
 Import command, data table **616**
 importing data from a database, for a data-
 driven test **612–634**
 Data Junction conversion file **633**
 Data Junction options **630**
 Microsoft Query file, existing **627**
 Microsoft Query file, new **626**
 Microsoft Query options **624**
 specifying SQL statement **628**
 using Data Junction **630–634**
 using Microsoft Query **624–629**
 Increase Indent command **254**
 index number specifying a list item **1063, 1111**
 index selector **182, 194**
 ini command line option **931**
 initialization tests. *See* startup tests
 insert **1137**
 Insert command, data table **617**

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



Insert comments and indent statements box
1037

Insert Function > For Object/Window command
747–751

Insert Function > From Function Generator
 command **752–753**

Insert Function for Object/Window button **53**,
747–751, 979, 984

INSERT FUNCTION FOR OBJECT/WINDOW softkey
251, 1008

Insert Function from Function Generator button
53, 752–753, 979, 984

INSERT FUNCTION FROM FUNCTION GENERATOR
 softkey **251, 1008, 1137, 1138, 1152**

interactive testing, passing input to tests
816–829

interface language **1075**

invoke_application function **245, 738, 1160**

item_number_seq testing option **1111**

K

key assignments
 creating **1024**
 default **249, 843**

key_editing testing option **1112**

keyboard definition file **1080**

Keyboard File box **1080**

keyboard input, synchronization **1058, 1125**

keyboard shortcuts **249, 843**
 deleting **1024**
 editing **1024**

L

label property **192, 204**

labels, varying **143**

language
 in test script **1080**

language of WinRunner interface **1075**

Learn Font dialog box **579**

Learn Virtual Objects button **987**

learned properties, configuring **190**

learning the GUI of an application **93–106**
 by recording **102–103**
 with the GUI Map Editor **103–106**
 with the RapidTest Script Wizard **93–101**

learning the GUI of your application **81**

IFPSpread.Spread.1 MSW_class. See
 FarPoint Spreadsheet Control

line_no testing option **1113**

list class **200, 319**

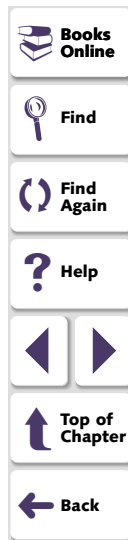
list item
 maximum length **1043**
 specified by its index number **1063, 1111**

list_check_info function **269, 589**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- list_check_item function [590](#)
- list_check_selected function [590](#)
- list_item_separator testing option [1113](#)
- list_wait_info function [667](#)
- ListBox
 - maximum length recorded [1043](#)
 - recording non-unique items by name [933](#), [1041](#), [1116](#)
 - string for separating [1064](#), [1113](#)
- ListView
 - maximum length recorded [1043](#)
 - string for separating [1064](#), [1114](#)
- listview_item_separator testing option [1114](#)
- load function [800](#), [842](#), [1160](#), [1206](#)
- Load Temporary GUI Map File check box [1078](#)
- load_16_dll function [808](#)
- load_dll function [808](#)
- loading add-ins [243](#)
 - while starting WinRunner [55–56](#), [1077](#)
- loading the GUI map file [111–117](#)
 - using the GUI Map Editor [113–117](#)
 - using the GUI_load function [112–113](#)
- loading WinRunner add-ins [55–56](#)
- LoadRunner [1213–1227](#)
 - controller [1217](#)
 - creating GUI Vuser Scripts [1219](#)
 - description [44](#)
 - GUI Vusers [1216](#)
 - measuring server performance [1220](#)
 - rendezvous [1223](#)
 - RTE Vusers [1216](#)
 - scenarios [1215](#), [1217](#)
 - simulating multiple users [1215](#)
 - synchronizing transactions [1222](#)
 - transactions [1220](#)
 - TUXEDO Vusers [1216](#)
 - Vusers [1215](#)
 - Web Vusers [1216](#)
- location
 - current test [1131](#)
 - current working folder [856](#), [1105](#)
 - documentation files [1084](#)
 - expected results folder [856](#), [1109](#)
 - shared checklists [1083](#), [1120](#)
 - temporary files [1082](#), [1131](#)
 - temporary GUI map file [1082](#)
 - verification results folder [857](#), [1118](#)
- location selector [182](#), [194](#)
- logging in to the sample Flight application [41](#)
- logical name
 - definition [65](#)
- logical names
 - modifying [86](#), [118](#), [139–142](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

loops, in TSL **730**
 do/while loops **732**
 for loops **730**
 while loops **731**

M

main data table **637**
 managing the testing process **1163–1212**
 Manual Merge (of GUI map files) **164, 172–176**
 mapping
 a custom class to a standard class **183–187**
 custom objects to a standard class **183–187**
 maximizable property **192, 204**
 Maximum Length of List Item to Record box **1043**
 mdiclient class **200**
 menu bar, WinRunner **48–49**
 menu commands, executing from the User toolbar **981–990**
 menu_item class **200, 320**
 menu_select_item function **247**
 menu_wait_info function **667**
 menu-like toolbar, recording on a **247**
 Merge GUI Map Files command **163**

merging GUI map files **160–177**
 automatically, resolving conflicts **167–171**
 manually **172–176**
 overview **161–162**
 preparing **163–166**
 messages
 in the Database Checkpoint dialog boxes **490**
 in the GUI Checkpoint dialog boxes **300**
 suppressing **1050, 1101**
 MHGLBX.Mh3dListCtrl.1 MSW_class See MicroHelp MH3dList Control
 mic_if_win class **200**
 MicroHelp MH3dList Control **369**
 Microsoft Excel, with data tables **616, 648**
 Microsoft Grid Control **369**
 Microsoft Query
 choosing a database for a database checkpoint **540–542**
 default database check **481–483**
 importing data from a database **624–629**
 min_diff command line option **931**
 min_diff testing option **1114**
 minimizable property **192, 204**
 minimizing WinRunner, when recording a test **246**
 mismatch, bitmap **1049, 1114**
 mismatch_break command line option **932**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

mismatch_break testing option **1115**
 mode **1121**
 Modify button, in Edit Database Checklist dialog box **523, 528**
 Modify dialog box (GUI Map Editor) **142**
 Modify ODBC Query dialog box **524**
 Modify Watch dialog box **973**
 modifying
 expected results of a database checkpoint **529–532**
 expected results of a GUI checkpoint **338–340**
 GUI checklists **290–298**
 logical names of objects **86, 118, 139–142**
 physical descriptions of objects **139–142**
 module_name property **204**
 modules
 closed **799**
 system **799**
 modules, compiled. *See* compiled modules
 monitoring variables. *See* Watch List
 mouse input, synchronization **1058, 1125**
 MOVE LOCATOR softkey **251, 1009**
 move_locator_text function **573–574**
 moving descriptions of GUI objects from one GUI map file to another **149**
 MSDBGrid.DBGrid MSW_class. *See* Data Bound Grid Control

MSGrid.Grid MSW_class. *See* Microsoft Grid Control
 MSW_class property **193, 206**
 MSW_id property **193, 206**
 myinit startup test **121, 1160**

N

N/A message
 in GUI Checkpoint dialog boxes **300**
 names. *See* logical names
 nchildren property **193, 204**
 New Breakpoint dialog box **957, 959, 961**
 New button **52, 255, 982**
 New command **255**
 for data table **615**
 No properties are available for this object message, in GUI Checkpoint dialog boxes **301**
 No properties were captured for this object message, in GUI Checkpoint dialog boxes **301**
 non-English operating system. *See* WinRunner interface language
 nonstandard properties **310, 313**
 Normal run speed option **1056**
 NSTBTitle property **204**
 NSTitle property **204**



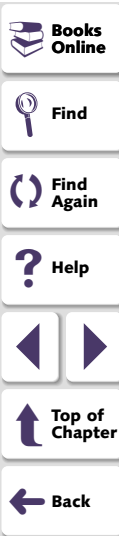
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

num_columns property [204](#)
 num_rows property [204](#)
 Numeric Content verification
 databases [510](#)
 tables [414, 458](#)
 Numeric Range verification
 databases [511](#)
 tables [414, 458](#)

O

obj_check_bitmap function [557](#)
 in data-driven tests [639](#)
 obj_check_gui function [284–286](#)
 in data-driven tests [639](#)
 obj_check_info function [269, 589](#)
 obj_click_on_text [575–576](#)
 obj_col_name property [193, 206](#)
 obj_exists function [664](#)
 obj_find_text function [571–572](#)
 obj_get_text function [564–569](#)
 obj_mouse function [230](#)
 obj_mouse functions [179, 183](#)
 obj_mouse_click function [183](#)
 obj_move_locator_text [573–574](#)
 obj_type function [1036, 1040, 1112](#)
 obj_wait_bitmap function [673](#)
 in data-driven tests [639](#)

obj_wait_info function [667](#)
 object class [179, 200, 321](#)
 buttons, recording [1042, 1117](#)
 Object Exception dialog box [697](#)
 object synchronization points [664–665](#)
 objects
 custom [183–187](#)
 finding in the GUI map [82](#)
 mapping to a standard class [183–187](#)
 standard [192](#)
 virtual. *See also* virtual objects [211–219](#)
 obligatory properties [181](#)
 OCX controls. *See* ActiveX controls
 OCX Properties Viewer. *See* GUI Spy
 ActiveX tab
 ODBC
 choosing a database for a database
 checkpoint [540–542](#)
 default database check [481–483](#)
 OLE controls. *See* ActiveX controls
 online help [31](#)
 online resources [31](#)
 Open button [52, 260, 982](#)
 in the Create GUI Checkpoint dialog box
 [308](#)
 in the Edit GUI Checklist dialog box [312](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Open Checklist dialog box
 for database checklists [515](#), [518](#), [522](#),
[526](#)
 for GUI checklists [288](#), [294](#)
 Open command [260](#)
 for data table [615](#)
 Open GUI File dialog box [114](#)
 Open GUI File from TestDirector Project dialog
 box [116](#), [1197](#)
 Open or Create a Data Table dialog box [602](#),
[611](#), [613](#)
 Open Test dialog box [260](#)
 Open Test from TestDirector Project dialog box
[262](#), [1185](#)
 Open Test Results from TestDirector Project
 dialog box [1203](#)

opening GUI map files in a TestDirector project
[1197–1198](#)

opening tests [255](#)
 from file system [260](#)
 from TestDirector project database [261](#)
 in a TestDirector project [1184–1187](#)

operating systems in languages other than
 English. See WinRunner
 interface language

operators, in TSL [729](#)

optional properties [181](#)

options, global testing. See setting global
 testing options

options, testing
 See setting testing options

owner property [193](#), [206](#)

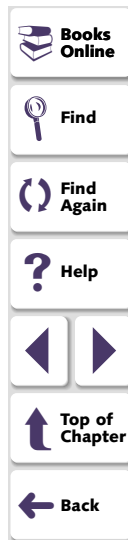
P

Parameterize Data button [987](#)
 Parameterize Data command [607](#), [773](#)
 Parameterize Data dialog box [607](#), [773](#)
 Parameterize TSL Button Data dialog box
[1000](#)
 parameterizing database checkpoints
[533–539](#)
 guidelines [539](#)
 SQL statements [534](#)
 parameterizing TSL statements from the User
 toolbar [999–1002](#)

parameters
 defining for a test [769–777](#)
 formal [775](#)

Parameters tab, Test Properties dialog box
[769](#)

parent property [204](#)
 part_value property [204](#)
 pass count [954](#), [961](#)
 Paste button [983](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- Paste command [253](#)
 - for data table [617](#)
- Paste TSL Button Data dialog box [992](#)
- Paste Values command, data table [617](#)
- pasting TSL statements from the User toolbar [991–994](#)
- Pause button [52](#), [842](#), [949](#), [985](#)
- Pause command [842](#), [949](#)
- pause function [950](#)
- PAUSE softkey [844](#), [949](#), [1009](#)
- pausing test execution using breakpoints [951–964](#)
- pb_name property [193](#), [207](#)
- Percent command, data table [620](#)
- physical descriptions
 - changing regular expressions in [147](#)
 - definition [63–64](#)
 - modifying [139–142](#)
 - non-unique MSW_id in a single window [182](#)
- Pop-Up Exception dialog box [684](#)
- position property [204](#)
- PowerBuilder
 - DataWindows [432–435](#), [436–439](#), [440](#)
 - DropDown objects [427–431](#)
 - object properties [210](#)
 - pb_name property [193](#), [207](#)
 - See *also* checking tables
- PowerBuilder applications [425–440](#)
 - overview [426](#)
- Print button [982](#)
- Print command [264](#)
 - for data table [616](#)
- print options [1014](#)
 - list [1023](#)
- Print Preview command, data table [616](#)
- Print Setup command, data table [616](#)
- problems
 - recording Context Sensitive tests [230–232](#)
 - running Context Sensitive tests [858–861](#)
- programming in TSL [721–740](#)
 - calculations [728](#)
 - comments [725](#)
 - constants [727](#)
 - decision-making [733](#)
 - defining steps [739](#)
 - loops [730](#)
 - overview [722–723](#)
 - starting applications [738](#)
 - variables [727](#)
 - white space [726](#)
- programming, visual. See [Function Generator project \(TestDirector\) 1169](#)
 - connecting WinRunner to a [1174–1180](#)
 - direct file access to WinRunner tests [1171](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

project (TestDirector) *(continued)*
 disconnecting from a [1178](#)
 opening GUI map files in a [1197–1198](#)
 opening tests in a [1184–1187](#)
 running tests remotely [1201](#)
 saving GUI map files to a [1194–1196](#)
 saving tests to a [1181–1183](#)
 specifying search paths for tests called
 from a [1208](#)
 viewing test results from a [1202–1204](#)

properties
 class [200](#)
 default [208](#)
 non-portable [206](#)
 obligatory [181](#)
 optional [181](#)
 portable [203](#)
 PowerBuilder objects [210](#)
 semi-portable [206](#)
 Visual Basic objects [209](#)

properties of ActiveX controls
 retrieving [352–357](#)
 setting [352–357](#)
 viewing [347–351](#)

properties of Visual Basic controls
 retrieving [352–357](#)
 setting [352–357](#)
 viewing [347–351](#)

property checks
 checking property values [269–271](#)
 on standard objects [315–323](#)
 specifying arguments [324–334](#)
 test results [877](#)

Property List button [304, 309, 313](#)
 property value synchronization points
[666–671](#)

property values, editing [335–337](#)
 push_button class [200](#)
 push_button class, push button objects [321](#)
 Put Recognized Text in Remark check box
[1070](#)

Q

query file for a database checkpoint, working
 with ODBC/Microsoft Query [540–542](#)
 quotation marks, in GUI map files [138](#)

R

radio_button class [201, 316](#)
 radius for attached text [1066, 1100](#)
 Range property check
 currency symbols [329](#)
 specifying arguments [329](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- RapidTest Script wizard
 - learning the GUI of an application [93–101](#)
 - startup tests [1160](#)
- RapidTest Script Wizard button [984](#)
- reading text [564–569](#)
 - from an area of an object or a window [567](#)
 - in a window or an object [565](#)
- Readme file [31](#)
- rec_item_name command line option [933](#)
- rec_item_name testing option [1116](#)
- rec_owner_drawn testing option [1117](#)
- Recalc command, data table [619](#)
- recognized text in remarks [1070](#)
- reconnect on startup, TestDirector [928, 1209](#)
- Record - Analog command [248](#)

- Record - Context Sensitive button [52, 53, 979, 984](#)
- Record - Context Sensitive command [248](#)
- Record button [248](#)
- Record commands [248](#)
- Record Keypad Keys as Special Keys check box [1033](#)
- Record Non-Unique List Items by Name check box [1041](#)
- Record Owner-Drawn Buttons box [1042](#)
- Record Shifted Keys as Uppercase when CAPS LOCK On check box [1034](#)

- Record Single-Line Edit Fields as edit_set check box [1036](#)
- RECORD softkey [249, 1006](#)
- Record Start Menu by Index check box [1035](#)
- Record/Run Engine icon [46](#)
- recording
 - automatic comments [1037](#)
 - buttons [1042, 1117](#)
 - child windows [1042, 1108](#)
 - ComboBox items [933, 1041, 1116](#)
 - dividing the script automatically [1037](#)
 - edit fields [1036](#)
 - edit_set statements [1036](#)
 - keys on the numeric keypad [1033](#)
 - ListBox items [933, 1041, 1116](#)
 - obj_type statements [1036](#)
 - object-class buttons [1042, 1117](#)
 - options, setting global [1032–1043](#)
 - problems while [230–232](#)
 - setting default mode [1038](#)
 - Start menu by index [1035](#)
 - with CAPS LOCK key activated [1034](#)
- recording method [195](#)
- recording mode, setting default [1038](#)
- recording tests
 - Analog mode [233](#)
 - Context Sensitive mode [225–229](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- recording tests (*continued*)
 - guidelines [245](#)
 - with WinRunner minimized [246](#)
- redefining WinRunner softkeys [1010](#)
- regex_label property [193](#), [207](#)
- regex_MSWclass property [193](#), [207](#)
- regular expressions [710–719](#)
 - character [330](#), [718](#)
 - changing, in the physical description [147](#)
 - in GUI checkpoints [713](#)
 - in physical descriptions [712](#)
 - in text checkpoints [715](#)
 - overview [711](#)
 - syntax [716–719](#)
- RegularExpression property check, specifying
 - arguments [330](#)
- reload function [801](#), [1206](#)
- remarks, putting text in [1070](#)
- Remote Defect Reporter [1238–1242](#)
 - reporting defects [1240](#)
 - setup [1238](#)
- remote hosts, running tests on [1201](#)
- Remove Spaces from Recognized Text check box [1073](#)
- rendezvous (LoadRunner) [1223](#)
- rendezvous function [1224](#)
- Replace button [983](#)
- Replace command [254](#)
 - for data table [618](#)
- Report Bug button, in Test Results window [906](#)
- Report Bug command, in Test Results window [906](#)
- report_msg function [737](#)
- reporting defects
 - from Test Results window [906](#)
- reporting test results to a text report [1061](#)
- reserved words [1021](#)
- reserved_words.ini file [1021](#)
- result set [463](#)
- result testing option [1118](#)
- results folders
 - debug [847](#)
 - expected [837](#), [850](#)
 - verify [834](#), [845](#)
- results of tests. *See* test results
- return statement [783](#)
- RTL-style windows
 - finding attached text in [1066](#), [1098](#)
 - WinRunner support for applications with [247](#)
- run command line option [933](#)
- Run commands [839](#)
- Run from Arrow button [52](#), [839](#), [985](#)
- Run from Arrow command [839](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

RUN FROM ARROW softkey **844, 1008**
 Run from Top button **52, 839, 985**
 Run from Top command **839**
 RUN FROM TOP softkey **844, 1008**
 Run in Batch Mode check box **908, 1050**
 Run Minimized (Arrow) button **985**
 Run Minimized (Top) button **985**
 Run Minimized > From Arrow command **840**
 Run Minimized > From Top command **840**
 Run Minimized commands **840**
 Run Mode box **857**
 Run Mode button **52**
 run modes

- Debug **832, 835, 847**
- displaying for current test **857, 1118**
- Update **832, 837**
- Verify **832, 834**

 Run Speed for Analog Mode box **1056**
 Run Test dialog box **834, 845, 853**

- for tests in a TestDirector project **1199**

 Run wizard **131–133**
 run_minimized command line option **933**
 run_speed command line option *See speed*
 command line option
 runmode testing option **1118**
 running tests **831–854**

- batch run **907–915**
- checking your application **845**

controlling with configuration parameters **854**
 controlling with test options **854**
 debugging a test script **847**

- for debugging **944–950**
- from a TestDirector project **1201**
- from the command line **916–942**
- in a test set **1199–1200**
- on remote hosts **1201**
- overview **832–833**
- pausing execution **949**
- problems while **858–861**
- run modes **832**
- setting global testing options **1046–1061**
- updating expected results **849**
- with setvar and getvar functions **1097**

 runtime database record checks **468–479**

 Runtime Record Checkpoint button **984**
 runtime record checks **468–479**

S

sample applications **41**
 Save All button **982**
 Save All command **255**

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



- Save As button **982**
 - in the Create GUI Checkpoint dialog box **308**
 - in the Edit GUI Checklist dialog box **312**
- Save As command **255**
 - for data table **615**
- Save button **52, 255, 982**
- Save Checklist dialog box
 - for database checklists **516**
 - for GUI checklists **292**
- Save command **255**
 - for data table **615**
- Save GUI File dialog box **108**
- Save GUI File to TestDirector Project dialog box **110, 1195**
- Save Test dialog box **256**
- Save Test to TestDirector Project dialog box **258, 1182**
- saving
 - GUI map files **107–110**
 - temporary GUI map file **107**
- saving changes to the GUI map file **159**
- saving GUI map files to a TestDirector project **1194–1196**
- saving tests
 - in file system **255**
 - in TestDirector project database **257**
 - to a TestDirector project **1181–1183**
- scenarios, LoadRunner **1215, 1217**
- Scientific command, data table **620**
- Script wizard. See RapidTest Script wizard
- scroll class **201, 322**
- scroll_check_info function **269, 589**
- scroll_check_pos function **590**
- scroll_wait_info function **667**
- search area for attached text **1066, 1098**
- Search Path for Called Tests box **767, 1084**
- search paths
 - for called tests **1084, 1119**
 - for tests called from a TestDirector project **1208**
 - setting **767**
- search radius for attached text **1066, 1100**
- search_path command line option **934**
- searchpath testing option **767, 1119**
- Select All button **983**
 - in the Check GUI dialog box **303**
 - in the Create GUI Checkpoint dialog box **308**
 - in the Edit GUI Checklist dialog box **312**
- Select All command **253**
- Selective Recording **1043**
- selectors
 - configuring **194**
 - index **182, 194**
 - location **182, 194**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

server (TestDirector), disconnecting from a **1180**

server performance, measuring (with LoadRunner) **1220**

Set Function Parameters dialog box **1004**

set, of tests (TestDirector) **1199–1200**

set_class_map function **198, 1160**

set_record_attr function **198, 1160**

set_record_method function **198**

set_window function **69**

setting global testing options **1027–1089**

- current test settings **857**
- environment **1075–1080**
- folder locations **1081–1085**
- miscellaneous **1062–1067**
- recording a test **1032–1043**

running a test **1046–1061**

text recognition **1069–1074**

setting testing options

- globally **1027–1089**
- using the getvar function **1094–1096**
- using the setvar function **1092–1093**
- within a test script **1090–1133**

setvar function **767, 854, 1092–1093**

- controlling test execution with **1097**

Shared Checklists box **1083**

shared checklists, location of **1083, 1120**

shared folder

- for database checklists **514–516**
- for GUI checklists **291–292**

shared_checklist_dir testing option **1120**

sharing GUI map files among tests **91–92**

Sheridan Data Grid Control **369**

shortcut for starting WinRunner **920**

Show Add-In Manager dialog option **1077**

Show All Properties button

- in the Check GUI dialog box **305**
- in the Create GUI Checkpoint dialog box **310**
- in the Database Checkpoint Results dialog box **895**
- in the Edit GUI Checklist dialog box **314**
- in the GUI Checkpoint Results dialog box **881**

Show Failures Only button

- in the Database Checkpoint Results dialog box **895**
- in the GUI Checkpoint Results dialog box **880**

Show Nonstandard Properties Only button

- in the Check GUI dialog box **305**
- in the Create GUI Checkpoint dialog box **310**
- in the Database Checkpoint Results dialog box **895**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- Show Nonstandard Properties Only button
(*continued*)
 - in the Edit GUI Checklist dialog box **313**
 - in the GUI Checkpoint Results dialog box **880**
- Show Selected Properties Only button
 - in the Check GUI dialog box **304**
 - in the Create GUI Checkpoint dialog box **309**
 - in the Edit GUI Checklist dialog box **313**
- Show Standard Properties Only button
 - in the Check GUI dialog box **304**
 - in the Create GUI Checkpoint dialog box **309**
 - in the Database Checkpoint Results dialog box **895**
 - in the Edit GUI Checklist dialog box **313**
 - in the GUI Checkpoint Results dialog box **880**
- Show TSL button, in the WinRunner Test Results window **339, 530**
- Show User Properties Only button
 - in the Check GUI dialog box **305**
 - in the Create GUI Checkpoint dialog box **310**
 - in the Edit GUI Checklist dialog box **314**
 - in the GUI Checkpoint Results dialog box **881**
- Show Welcome Screen check box **1076**
- silent mode, running tests in **1121**
- silent_mode testing option **1121**
- single_prop_check_fail command line option **935**
- single_prop_check_fail testing option **1122**
- Softkey Configuration dialog box **1010**
- softkeys
 - configuring WinRunner **1006–1011**
 - default settings **249, 843, 1006**
- Sort command, data table **619**
- spaces, removing from recognized text **1073**
- Specify ‘Compare’ Arguments dialog box **326**
- Specify Arguments button **324–334**
- Specify Text dialog box **421, 423**
- specifying arguments **324–334**
 - for DateFormat property check **327**
 - for Range property check **329**
 - for RegularExpression property check **330**
 - for TimeFormat property check **331**
 - from the Argument Specification dialog box **332**
- specifying which checks to perform on all objects in a window **283**
- specifying which properties to check for a single object **274–276**
- speed command line option **936**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- speed testing option [1123](#)
- spin class [201](#)
- spin_wait_info function [667](#)
- Spy button [987](#)
- spying on GUI objects [73–80](#)
- SQL statements
 - creating result sets based on [546](#)
 - executing queries from [546](#)
 - parameterizing in database checkpoints [534](#)
 - specifying in the Database Checkpoint wizard [497](#)
- SSDataWidgets.SSDBGridCtrl.1. See Sheridan Data Grid Control
- standard classes. See [classes](#)
- standard objects
 - default checks [315–323](#)
 - property checks [315–323](#)
- standard properties [309, 313](#)
- Standard toolbar [48–49, 52](#)
- Start menu, recording on the [1035](#)
- start_transaction function [1221](#)
- starting the sample Flight application [41](#)
- starting WinRunner, with add-ins [55–56, 1077](#)
- Startup Test box [1076](#)
- startup tests [1158–1161](#)
 - options [1076](#)
 - sample [1161](#)
- static text attached to GUI objects [1065](#)
- static_check_info function [269, 589](#)
- static_check_text function [590](#)
- static_text class [201, 317](#)
- static_wait_info function [667](#)
- status bar class [201](#)
- status bar, WinRunner [49](#)
- statusbar_wait_info function [667](#)
- Step button [52, 841, 947, 985](#)
- Step command [841, 947](#)
- Step Into button [52, 841, 947, 985](#)
- Step Into command [841, 947](#)
- STEP INTO softkey [844, 1009](#)
- Step Out button [985](#)
- Step Out command [841, 948](#)
- STEP softkey [844, 1008](#)
- Step to Cursor button [985](#)
- Step to Cursor command [841, 948](#)
- STEP TO CURSOR softkey [844, 948, 1009](#)
- steps, defining in a test script [739](#)
- Stop button [52, 53, 248, 842, 979, 985](#)
- Stop command [842](#)
- Stop Recording button [984](#)
- Stop Recording command [248](#)
- STOP softkey [251, 844, 1009](#)
- stress conditions, creating in tests [730](#)
- String for Parsing a TreeView Path box [1065](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

String for Separating ListBox or ComboBox
Items box **1064**

String for Separating ListView or TreeView
Items box **1064**

String Indicating that what Follows is a Number
box **1063**

submenu property **205**

support information **32**

suppressing messages **1050, 1101**

sync_fail_beep testing option **1124**

synchronization **1060, 1124**
delaying window **1047, 1106**
following keyboard or mouse input **1058, 1125**
timeout **1059, 1108**
waiting for bitmaps of objects and windows
672–674
waiting for bitmaps of screen areas
675–678
waiting for objects **664–665**
waiting for property values **666–671**
waiting for windows **664–665**

Synchronization Point for Object/Window
Bitmap button **53, 673, 979, 984**

Synchronization Point for Object/Window
Bitmap command **673**

Synchronization Point for Object/Window
Property button **53, 668, 979, 984**

Synchronization Point for Object/Window
Property command **668**

Synchronization Point for Screen Area Bitmap
button **53, 676, 979, 984**

Synchronization Point for Screen Area Bitmap
command **676**

synchronization points **237**
in data-driven tests **639–646**

synchronization_timeout testing option **1125**

SYNCHRONIZE BITMAP OF OBJECT/WINDOW
softkey **250, 673, 678, 1007**

SYNCHRONIZE BITMAP OF SCREEN AREA softkey
250, 676, 678, 1007

SYNCHRONIZE OBJECT PROPERTY (CUSTOM)
softkey **250, 1007**

synchronizing tests **660–678**
tips **678**

system menu property **207**

system module **799**

system variables. *See* setting testing options

systems under load, testing. *See* LoadRunner

T

t command line option **936**

tab class **201**

tab_wait_info function **667**

TableContent property check **447–450**

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



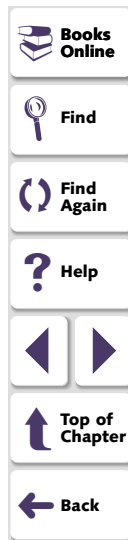
tables

- Case Insensitive Ignore Spaces verification [415](#), [459](#)
 - Case Insensitive verification [414](#), [458](#)
 - Case Sensitive Ignore Spaces verification [415](#), [459](#)
 - Case Sensitive verification [414](#), [458](#)
 - checking [441–461](#)
 - checking contents while specifying checks [447–450](#)
 - checking contents with default checks [445](#)
 - editing results of a contents check [892](#)
 - editing the expected data [416](#), [459](#)
 - Numeric Content verification [414](#), [458](#)
 - Numeric Range verification [414](#), [458](#)
 - overview [442](#)
 - specifying which cells to check [408](#), [453](#)
 - verification method for contents of a single-column database [414](#), [458](#)
 - verification method for multiple-column tables [411](#), [455](#)
 - verification type [414](#), [458](#)
 - viewing expected results of a contents check [887–891](#)
 - viewing results of a contents check [882–886](#)
- tbl_activate_cell function [369](#)
 - tbl_activate_header function [369](#)
 - tbl_get_cell_data function [369](#)
 - tbl_get_cols_count function [369](#)
 - tbl_get_column_name function [369](#)
 - tbl_get_rows_count function [369](#)
 - tbl_get_selected_cell function [369](#)
 - tbl_get_selected_row function [369](#)
 - tbl_select_col_header function [369](#)
 - tbl_set_cell_data function [369](#)
 - tbl_set_selected_cell function [369](#), [427](#), [428](#), [429](#)
 - tbl_set_selected_row function [369](#)
 - td_connection command line option [937](#), [1209](#)
 - td_connection testing option [1126](#)
 - td_cycle_name command line option [937](#), [1210](#)
 - td_cycle_name testing option [1127](#)
 - td_database_name command line option [938](#), [1210](#)
 - td_database_name testing option [1128](#)
 - td_password command line option [939](#), [1211](#)
 - td_server command line option See [td_server_name](#) command line option
 - td_server_name command line option [939](#), [1211](#)
 - td_server_name testing option [1129](#)
 - td_user_name command line option [940](#), [1212](#)
 - td_user_name testing option [1130](#)

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z



- TdApiWnd icon [46](#)
- tddb_get_step_value function [1205](#)
- tddb_get_test_value function [1205](#)
- tddb_get_testset_value function [1205](#)
- tddb_load_attachment function [1205](#)
- teaching WinRunner the GUI of an application [93–106](#)
 - by recording [102–103](#)
 - from the GUI Map Editor [103–106](#)
 - with the RapidTest Script Wizard [93–101](#)
- teaching WinRunner the GUI of your application
 - overview [81](#)
- technical support online [32](#)
- tempdir testing option [1131](#)
- Temporary Files box [1082](#)
- temporary files, location [1082](#), [1131](#)
- temporary GUI map file
 - loading [1078](#)
 - location [1082](#)
 - saving [107](#)
- Temporary GUI Map File box [1082](#)
- temporary GUI map file, saving [107](#)
- test execution
 - controlling with setvar and getvar [1097](#)
 - pausing [949](#)
 - See also* running tests
- test log [868](#)
- Test Properties button [982](#)
- Test Properties command [239](#), [769](#), [796](#)
- Test Properties dialog box [770](#)
 - Add-ins [243](#)
 - Description Tab [239](#)
 - General tab [239](#), [637](#)
 - Parameters tab [769](#)
- test results [862–906](#)
 - bitmap checkpoints [869](#), [892](#)
 - database checkpoints [893–895](#), [896–900](#)
 - file comparison [869](#)
 - for batch tests [915](#)
 - GUI checkpoints [869](#), [878–881](#)
 - property checks [877](#)
 - reporting defects [906](#)
 - tables [882–891](#)
 - tables, editing contents checks on [892](#)
 - updating expected [901–902](#)
 - viewing from a TestDirector project
 - database [873–875](#)
 - viewing, overview [870–875](#)
 - writing to a text report [1061](#)
- Test Results button [52](#), [987](#)
- Test Results window [864–869](#), [871](#)
 - Display button [902](#)
 - for expected results of a content check in a database checkpoint [897](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- Test Results window **864–869, 871**
 - for expected results of a GUI checkpoint on table contents **888**
 - test log **868**
 - test summary **866**
 - test tree **865**
- test run speed **929**
- test run, viewing results **870–875**
- Test Script Language (TSL) **721–740**
 - overview **722–723**
- test scripts **50, 224**
 - customizing **1012–1026**
 - highlighting script elements **1018**
 - language **1080**
 - print options **1014**
 - script window customization **1023**
- test set (TestDirector) **1199–1200**
- test settings, current **857**

- test settings, current, Test Properties dialog box
 - Current Test tab **855**
- test summary **866**
- test tree **865**
- test versions in WinRunner **1188–1193**

- test window
 - customizing appearance of **1013**
 - highlighting script elements **1018**
 - WinRunner **50, 224**
- test wizard. See RapidTest Script wizard
- test_director command line option See td_connection command line option
- test_director testing option. See td_connection testing option
- TestDirector **244**
 - Add Defect dialog box **1230–1233**
 - command line options for working with **1209–1212**
 - defect tracking **1164**
 - defects **1228–1242**
 - description **43**
 - modes of operation **1167**
 - Remote Defect Manager **1238–1242**
 - remote execution setting **1080**
 - TdApiWnd icon **46**
 - test execution **1164**
 - test planning **1164**
 - TSL functions for working with **1205–1208**
 - using WinRunner with **1169–??**
 - version control **1188–1193**
 - Web Defect Manager **1234–1237**
 - working with **1163–1212**
 - See *also* TestDirector project



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- TestDirector Connection button **987**
- TestDirector project **1169**
 - connecting WinRunner to a **1126**,
1174–1180
 - direct file access to WinRunner tests **1171**
 - disconnecting from a **1178**, **1180**
 - displaying its name **1128**
 - displaying the name of the TestDirector test set **1127**
 - displaying the TestDirector (TDAPI) server name to which WinRunner is connected **1129**
 - displaying the user name **1130**
 - functions for working with a **1205**
 - opening GUI map files in a **1197–1198**
 - opening tests in a **1184–1187**
 - running tests from a **1201**
 - saving GUI map files to a **1194–1196**
 - saving tests to a **1181–1183**
 - specifying search paths for tests called from a **1208**
 - viewing test results from a **1202–1204**
 - See also* TestDirector
- testing environment options **1075–1080**
- testing options **854**
 - global. *See* setting global testing options within a test script **1090–1133**
 - See also* setting testing options
- testing process
 - analyzing results **862–906**
 - introduction **38**
 - managing the **1163–1212**
 - running tests **831–854**
- testname command line option. *See* t command line option
- testname testing option **1131**
- tests
 - calling. *See* calling tests startup options **1076**
- tests, creating **221–264**
 - checkpoints **235**
 - documenting test information **239**
 - editing **253**
 - new **255**
 - opening existing **255**
 - planning **238**
 - programming **247**
 - recording **225–234**
 - synchronization points **237**
- TestSuite **43**
- testit statement **764–766**, **912**
- text
 - checking **562–583**
 - comparing **577**
 - getting the location **571–572**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- text (*continued*)
 - reading [564–569](#)
 - searching for [570–576](#)
- text attached to GUI objects [1065](#)
- text checkpoints [562–583](#)
 - comparing text [577](#)
 - creating a font group [580–582](#)
 - overview [562–563](#)
 - reading text [564–569](#)
 - searching for text [570–576](#)
 - teaching fonts to WinRunner [578–583](#)
- text property [193, 207](#)
- text recognition
 - options [1069–1074](#)
 - putting captured text in remarks [1070](#)
 - removing spaces [1073](#)
 - timeout [1071](#)
- text report [1061](#)
- text string
 - clicking a specified [575–576](#)
 - moving the pointer to a [573–574](#)
- Threshold for Difference between Bitmaps box [1049](#)
- Tile Horizontally button [988](#)
- Tile Vertically button [988](#)
- time formats supported by TimeFormat
 - property check [331](#)
- Time h mm AM/PM command, data table [620](#)
- time parameter [1048, 1132](#)
- TimeFormat property check
 - available time formats [331](#)
 - specifying arguments [331](#)
- timeout
 - for checkpoints [1048, 1132](#)
 - for Context Sensitive statements [1048, 1132](#)
 - for synchronization [1059, 1108](#)
 - for text recognition [1071](#)
 - global [1048, 1132](#)
- timeout command line option. *See*
 - timeout_msec command line option
- Timeout for Checkpoints and CS Statements
 - box [1048](#)
- Timeout for Text Recognition box [1071](#)
- Timeout for Waiting for Synchronization
 - Message box [1058](#)
- timeout testing option. *See* timeout_msec
 - testing option
- timeout_msec command line option [941](#)
- timeout_msec testing option [1132](#)
- title bar, WinRunner [48–49](#)
- tl_step function [739](#)
- Toggle Breakpoint button [52, 986](#)
- Toggle Breakpoint command [956](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- toolbar
 - creating a floating [51](#)
 - Standard [48–49](#), [52](#)
 - User [48–49](#), [52–53](#)
- toolbar class [201](#)
- toolbar_select_item function [247](#), [1035](#)
- toolkit_class property [206](#)
- transactions, synchronizing (for LoadRunner) [1222](#)
- TreeView
 - maximum length recorded [1043](#)
 - string for parsing a path [1065](#), [1133](#)
 - string for separating [1064](#), [1114](#)
- treeview_path_separator testing option [1133](#)
- treturn statement [764–765](#)
- True DBGrid Control [369](#)
- TrueDBGrid50.TDBGrid MSW_class. *See* True DBGrid Control
- TrueDBGrid60.TDBGrid MSW_class. *See* True DBGrid Control
- TrueOleDBGrid60.TDBGrid MSW_class. *See* True DBGrid Control
- TSL documentation [723](#)
- TSL Exception dialog box [691](#)
- TSL exceptions. *See* exceptions, TSL
- TSL functions
 - call statement functions with TestDirector [1206](#)
 - compiled module functions with TestDirector [1206](#)
 - for working with a database [544–550](#)
 - for working with TestDirector [1205–1208](#)
 - for working with TestDirector projects [1205](#)
 - GUI Map Editor functions with TestDirector [1207](#)
 - reserved words [1021](#)
 - See also* TSL Online Reference or TSL Reference Guide
 - with data-driven tests [647–656](#)
- TSL Online Reference [31](#), [723](#)
- TSL Reference Guide [30](#), [723](#)
- TSL statements
 - accessing from the menu bar [1005](#)
 - executing from the User toolbar [995–998](#)
 - parameterizing from the User toolbar [999–1002](#)
 - pasting from the User toolbar [991–994](#)
- tslinit_exp command line option [942](#)
- type function [1040](#), [1112](#)
- typographical conventions in this guide [33](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

U

Uncomment command [253](#)
 Undo button [983](#)
 Undo command [253](#)
 unload function [801](#), [1206](#)
 unload_16_dll function [809](#)
 unload_dll function [808](#)
 unmapped classes. See object class
 Update Expected Value button
 in the Database Checkpoint Results dialog box [895](#)
 in the GUI Checkpoint Results dialog box [880](#), [902](#)
 Update mode [832](#), [837](#)
 update_ini command line option [942](#)
 updating expected results of a checkpoint [901–902](#)
 Use Image Text Recognition mechanism check box [1072](#)
 user command line option See `td_user_name` command line option
 user command line option. See `td_user_name` command line option
 user interface, WinRunner, customizing [977–1011](#)
 user module [799](#)
 User properties [305](#), [310](#), [314](#), [881](#)

user testing option. See `td_user_name` testing option
 User toolbar [48–49](#), [52–53](#), [979–1005](#)
 adding buttons that execute menu commands [981–990](#)
 adding buttons that execute TSL statements [995–998](#)
 adding buttons that parameterize TSL statements [999–1002](#)
 adding buttons that paste TSL statements [991–994](#)
 creating the [979–1002](#)
 using the [1003–1005](#)
 user_name command line option See `td_user_name` command line option
 user-defined functions [778–791](#)
 adding to the Function Generator. See customizing the Function Generator
 array declarations [788](#)
 class [781](#)
 constant declarations [787](#)
 declaration of variables, constants, and arrays [784–790](#)
 example [791](#)
 overview [779–780](#)
 parameterizing for data-driven tests [597](#)
 parameters [782](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

user-defined functions (*continued*)
 return statement **783**
 syntax **781–783**
 variable declarations **784**

user-defined properties **305, 310, 314, 881**

using the User toolbar **1003–1005**

using WinRunner with TestDirector **1169–??**

V

valid column names for data tables **621**

Validation Rule command, data table **620**

value property **193, 205**

variables
 in TSL **727**
 monitoring. *See* Watch List

varying window labels **143**

vb_name property **193, 207**

verification failure **1052, 1115**

verification method
 for databases **507**
 for tables **411, 455**

verification results **834, 845**

Verification Results Folder box **857**

verification results folder, location **857, 1118**

verification type
 for databases **510**
 for tables **414, 458**

verification, bitmap. *See* bitmap checkpoints

verify command line option **942**

Verify mode **832, 834, 845**

version control **1188–1193**
 adding tests to **1189**
 checking tests in to **1189, 1193**
 checking tests out of **1191**

version manager **1188–1193**

viewing
 GUI object properties **73–80**
 test results. *See* test results

viewing test results from a TestDirector project
1202–1204

Virtual Object wizard **213–218**

virtual objects **211–219**
 defining **214–218**
 overview **212–213**
 physical description **219**

virtual property **193, 219**

virtual users **1216**

Visual Basic
 object properties **209**
 sample flight application **41**
 vb_name property **193, 207**
See also checking tables

Visual Basic controls
 checking sub-object properties **364–367**
 overview **342–343**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Visual Basic controls (*continued*)
 retrieving properties **352–357**
 setting properties **352–357**
 support for **341–369**
 viewing properties **347–351**
 visual programming. *See* Function Generator

W

wait_window function **678**
 Watch List **965–975**
 Add Watch dialog box **969**
 adding variables **969–970**
 assigning values to variables **974**
 deleting variables **975**
 modifying expressions **973**
 overview **966–968**
 viewing variables **971–972**
 Watch List dialog box **971**
 Watch List button **986**
 Watch List command **971**
 Watch List dialog box **971**
 WDiff utility **903–905**
 Web Defect Manager **1234–1237**
 reporting defects **1235**
 setup **1234**
 Web Exception Editor **705, 707, 709**
 Web exceptions. *See* exceptions, Web

Web objects **370–424**
 checking broken links **396–400**
 checking content of frames, cells, links, or images **381–383**
 checking font or color of text links **393–395**
 checking number of columns and rows **384–386**
 checking object count in frames **375–377**
 checking standard frame properties **372–374**
 checking structure of frames, tables, and cells **378–380**
 checking table content **401–403**
 checking text **419–424**
 checking the URL of links **387–389**
 web_frame_get_text **419, 420**
 web_frame_text_exists **419, 422**
 web_obj_get_text **419, 420**
 web_obj_text_exists **419, 422**
 WebTest add-in **232**
 Welcome to WinRunner window **47**
 displaying **1076**
 What's New in WinRunner help **31**
 white space, in TSL **726**
 width property **193, 205**
 wildcard characters. *See* regular expressions
 win_activate function **245**



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

- win_check_bitmap function [557](#), [560](#)
 - in data-driven tests [639](#)
- win_check_gui function [284–286](#)
 - in data-driven tests [639](#)
- win_check_info function [269](#), [589](#)
- win_click_on_text [575–576](#)
- win_exists function [664](#)
- win_find_text function [571–572](#)
- win_get_text function [564–569](#)
- win_move_locator_text [573–574](#)
- win_type function [1040](#), [1112](#)
- win_wait_bitmap function [673](#)
 - in data-driven tests [639](#)
- win_wait_info function [667](#)
- Win32API library. *See* calling functions from external libraries
- window class [201](#), [323](#)
- window labels, varying [143](#)
- window synchronization points [664–665](#)
- window synchronization, delaying [1047](#), [1106](#)
- Windows API. *See* calling functions from external libraries
- windows, checking [1051](#), [1102](#)
- WinRunner
 - creating custom shortcut for [920](#)
 - interface language [1075](#)
 - introduction [35–44](#)
 - main window [48–49](#)
 - menu bar [48–49](#)
 - online resources [31](#)
 - overview [45–56](#)
 - starting [46–47](#)
 - status bar [49](#)
 - test window [50](#)
 - title bar [48–49](#)
- WinRunner context-sensitive help [31](#)
- WinRunner Customization Guide [30](#)
- WinRunner Installation Guide [30](#)
- WinRunner Record/Run Engine icon [46](#)
- WinRunner Remote Agent application [1080](#)
- WinRunner sample tests [31](#)
- WinRunner support for applications with RTL-style windows [247](#)
- WinRunner Test Results window [864–869](#), [871](#)
 - for expected results of a GUI checkpoint [338](#)
- WinRunner Tutorial [30](#)
- working test [1189](#)
- Write Test Results to a Text Report check box [1061](#)
- WS_EX_BIDI_CAPTION windows, finding attached text in [1066](#)



A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

X

x property [193](#), [205](#)

XR_EXCP_OBJ [699](#)

XR_EXCP_POPUP [685](#)

XR_EXCP_TSL [692](#)

XR_GLOB_FONT_LIB [578](#)

XR_TSL_INIT [198](#), [1159](#)

XRunner

 bitmap checkpoints [555](#)

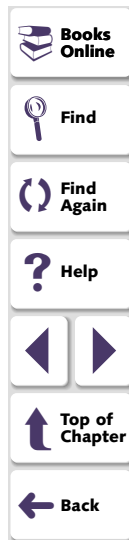
 GUI checkpoints [268](#)

 GUI maps [202](#)

 tests recorded in Analog mode [234](#)

Y

y property [193](#), [205](#)



[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

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Mercury Interactive Corporation
1325 Borregas Avenue
Sunnyvale, CA 94089
Tel. (408) 822-5200 (800) TEST-911
Fax. (408) 822-5300

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