HP Business Process Testing

Software Version: 11.00

User Guide

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Table of Contents

Welcome to This Guide

Welcome to HP Business Process Testing. Business Process Testing with HP Application Lifecycle Management (ALM) enables non-technical subject matter experts to build and work with business components in a script-free environment and to create application-quality business process tests.

This chapter includes:

➤ How This Guide is Organized on page 10

➤ Documentation Library Guides on page 13

➤ Additional Online Resources on page 16

How This Guide is Organized

The HP Business Process Testing User Guide describes how to use Business Process Testing to create business process tests. It provides step-by-step instructions to help you create and debug business components, create flows, build and run business process tests, and report defects detected during the testing process.

This guide contains the following chapters:

Chapter 1   Introducing Business Process Testing

Provides an introduction to the Business Process Testing model and its integration with HP QuickTest Professional and other testing tools.

Chapter 2   Getting Started with Business Components

Provides an overview of the Business Components module in ALM, and describes the component tree view. The chapter also describes the key elements in the module interface, including the various formats of the tabs when working with manual components, keyword view components, and scripted components.

Chapter 3   Working with Business Components

Describes how to create, define, and modify the business components that are incorporated into business process tests and flows. The chapter also describes how to request new components, enter manual steps in a requested component, and generate reports, graphs, and other project documents that include component information.

Chapter 4   Designing Manual Component Steps

Describes how to create business component content in the form of manual steps and expected results, and how to create and insert parameters into the steps directly from the Component Steps tab.

Chapter 5   Working with Automated Component Steps

Describes how to work with automated component steps, how to convert manual components to keyword-driven components, and how to add or modify component content in the form of keyword-driven steps, operations, parameters, and comments. The chapter also describes viewing scripted components that are created in QuickTest Professional and other testing tools.

Chapter 6   Getting Started with Business Process Tests

Provides an overview of the Test Plan module in ALM and describes the unique elements in the module interface when a business process test or flow is selected.

Chapter 7   Managing Business Process Tests

Describes how to create and manage business process tests and flows in the Test Plan module of ALM.

Chapter 8   Working with Flows

Describes how to create and develop flows, and how to use flows to build business process tests.

Chapter 9   Working with Parameters

Describes how to expand the flexibility and reusability of business components, flows, and business process tests by replacing fixed values with parameters.

Chapter 10   Linking Parameters

Describes how to expand the scope of business process tests and flows by passing the values of output component parameters to input component parameters of subsequent business components in a flow or test.

Chapter 11   Working with Iterations

Describes how configure a component or flow to run a specified number of iterations during a single run, using different values for the component's or flow's parameters.

Documentation Library

The Documentation Library is an online help system that describes how to use ALM. You can access the Documentation Library in the following ways:

➤ Click **Documentation Library** in the ALM Help menu to open the Documentation Library home page. The home page provides quick links to the main help topics.

➤ Click **Help on this page** in the ALM Help menu to open the Documentation Library to the topic that describes the current page.

Documentation Library Guides

The Documentation Library consists of the following guides and references, available online, in PDF format, or both. PDFs can be read and printed using Adobe Reader, which can be downloaded from the Adobe Web site *(*http://www.adobe.com*)*.

Reference	Description
Using this Documentation Library	Explains how to use the Documentation Library and how it is organized.
What's New?	Describes the newest features in the latest version of ALM. To access, select **Help > What's New**.
Product Feature Movies	Short movies that demonstrate the main product features. To access, select **Help > Product Feature Movies**.
Readme	Provides last-minute news and information about ALM.

Application Lifecycle Management Guides

Guide	Description
HP ALM User Guide	Explains how to use ALM to organize and execute all phases of the application life cycle management process. It describes how to specify releases, define requirements, plan tests, run tests, and track defects.
HP ALM Administrator Guide	Explains how to create and maintain projects using Site Administration, and how to customize projects using Project Customization.
HP ALM Tutorial	A self-paced guide teaching you how to use ALM to manage the application life cycle management process.

Guide	Description
HP ALM Installation Guide	Describes the installation and configuration processes for setting up ALM Platform.
HP Business Process Testing User Guide	Explains how to use Business Process Testing to create business process tests.

ALM Performance Center Guides

Guide	Description
HP ALM Performance Center Quick Start	A self-paced guide giving the Performance Center user a high level overview of creating and running performance tests.
HP ALM Performance Center Guide	Explains to the Performance Center user how to create, schedule, run, and monitor performance tests. Explains to the Performance Center administrator how to use Lab Management for overall lab resource management, lab settings management, and system configuration.
HP ALM Performance Center Installation Guide	Describes the installation processes for setting up Performance Center Servers, Performance Center Hosts and other Performance Center components.
HP ALM Performance Center Troubleshooting Guide	Provides information for troubleshooting problems while working with HP ALM Performance Center.
HP Performance Center of Excellence Best Practices	Provides best practices for successfully building and operating Performance Centers of Excellence.
HP Performance Monitoring Best Practices	Provides best practices for monitoring the performance of applications under test.

ALM Best Practices

Guide	Description
HP ALM Database Best Practices Guide	Provides best practices for deploying ALM on database servers.
HP ALM Upgrade Best Practices Guide	Provides methodologies for preparing and planning your ALM upgrade.
HP ALM Business Models Module Best Practices Guide	Provides best practices for working with the Business Models module.

ALM API References

Guide	Description
HP ALM Project Database Reference	Provides a complete online reference for the project database tables and fields.
HP ALM Open Test Architecture API Reference	Provides a complete online reference for the ALM COM-based API. You can use the ALM open test architecture to integrate your own configuration management, defect tracking, and home-grown testing tools with an ALM project.
HP ALM Site Administration API Reference	Provides a complete online reference for the Site Administration COM-based API. You can use the Site Administration API to enable your application to organize, manage, and maintain ALM users, projects, domains, connections, and site configuration parameters.
HP ALM REST API Reference	Provides an online reference for the ALM REST-based API. You can use the REST API to access and work with ALM data.
HP ALM Custom Test Type Guide	Provides a complete online guide for creating your own testing tool and integrating it into the ALM environment.

Additional Online Resources

The following additional online resources are available from the ALM **Help** menu:

Part	Description
Troubleshooting & Knowledge Base	Opens the Troubleshooting page on the HP Software Support Web site where you can search the Self-solve knowledge base. Choose **Help** > **Troubleshooting & Knowledge Base**. The URL for this Web site is http://h20230.www2.hp.com/troubleshooting.jsp.
HP Software Support	Opens the HP Software Support Web site. This site enables you to browse the Self-solve knowledge base. You can also post to and search user discussion forums, submit support requests, download patches and updated documentation, and more. Choose **Help** > **HP Software Support**. The URL for this Web site is www.hp.com/go/hpsoftwaresupport.
	Most of the support areas require that you register as an HP Passport user and sign in. Many also require a support contract.
	To find more information about access levels, go to:
	http://h20230.www2.hp.com/new_access_levels.jsp
	To register for an HP Passport user ID, go to:
	http://h20229.www2.hp.com/passport-registration.html
HP Software Web site	Opens the HP Software Web site. This site provides you with the most up-to-date information on HP Software products. This includes new software releases, seminars and trade shows, customer support, and more. Choose **Help** > **HP Software Web site**. The URL for this Web site is www.hp.com/go/software.
Add-ins Page	Opens the HP Application Lifecycle Management Add-ins Page, which offers integration and synchronization solutions with HP and third-party tools.

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Introducing Business Process Testing

HP Business Process Testing enables subject matter experts to create business process tests using reusable business components and flows.

This chapter introduces Business Process Testing and HP Application Lifecycle Management application (ALM), and describes workflows for working with Business Process Testing.

Note: For information on configuring user permissions, see the *HP Application Lifecycle Management Administrator Guide*.

This chapter includes:

➤ About Business Process Testing on page 18

➤ Identifying Roles on page 20

➤ A Top-Down Methodology on page 23

➤ Automating Business Process Testing Components on page 34

➤ Setting Up Business Process Testing on page 41

About Business Process Testing

Many applications are mission critical for modern corporations. Effective functional testing is essential to assess the quality of your applications and ensure that they are stable and free from damaging and costly defects.

Business Process Testing enables subject matter experts to:

➤ Design quality assurance tests for an application early in the development cycle and in a script-free environment.

➤ Design quality assurance tests at various levels without any scripting knowledge from the design of a high-level test structure down to the design of actual steps.

Business Process Testing uses a new methodology for testing, and in conjunction with testing tools such as HP QuickTest Professional, provides numerous benefits in an improved automated testing environment.

ALM Editions: Business Process Testing is not available with Performance Center Edition. For more information, see the *HP Application Lifecycle Management User Guide*.

This section includes the following topic(s):

➤ "Benefits of Business Process Testing" on page 18

Benefits of Business Process Testing

Business Process Testing and its integration with various testing tools provide numerous benefits in efficiency and cost reduction, including the following:

➤ Business process tests can be created in a script-free environment by subject matter experts who best understand the business processes that need to be tested, without the need for a programming background.

➤ Business Process Testing enables structured testing of an application by combining test automation and automatically generated, easy-to-understand, plain-language test documentation.

➤ When creating manual tests, Business Process Testing dramatically reduces the need for repeating steps and facilitates text reusability.

➤ Business Process Testing supports a keyword-driven approach for constructing automated scripts.

➤ Business Process Testing is not dependent on the completion of detailed testing scripts. After designing the test and establishing automation guidelines, applications can be tested manually before automated tests are ready by non-technical users. Business process tests can therefore be created and implemented more quickly than other automated tests, enabling potential performance issues to be detected earlier in the development process, and before downtime can occur.

➤ Usage of automation assets (created by the automation engineer) in the design or implementation of test steps does not require coding skills.

➤ Business process test creation is further accelerated by the ability to use modular, reusable flows and business component units in multiple tests.

➤ Version control enables you to keep track of changes made to entities in your project, including business process tests, flows, and components.

➤ Ongoing test maintenance time and costs are reduced, while increasing staff efficiency.

➤ Quality assurance experts can take advantage of the sophisticated automated testing capabilities in QuickTest Professional and other testing tools to prepare object hierarchies and application-specific functions that can be packaged as building blocks for use in business process tests by subject matter experts. Subject matter experts can work efficiently with quality assurance experts to test the functionality of applications.

➤ Documents containing information about the tests, flows, and components in a project can be easily generated.

Identifying Roles

The Business Process Testing model is role-based, allowing non-technical subject matter experts to work on tests with automation engineers, both together and in parallel. Two basic user roles are identified in the Business Process Testing model and are referred to in this guide:

➤ Subject Matter Expert

➤ Automation Engineer

Note: The automation engineer is only needed if the Business Process Testing framework will include automated tests.

These two main roles are the key players designing and implementing business process test. In addition to these two main roles, QA testers use and run the business process tests and ALM administrators set up and configure Business Process Testing.

Roles are flexible, depending on the abilities and time resources of the personnel using Business Process Testing. There are no product-specific rules or limitations controlling which roles must be defined in a particular organization, or which types of users can perform which Business Process Testing tasks (provided that the users have the correct permissions). For example, in some organizations, the tasks of the subject matter expert may be performed by multiple personnel.

Note: To control access to various modules and tasks, ALM enables you to configure access permissions for users. For more information, see the *HP Application Lifecycle Management Administrator Guide*.

Subject Matter Expert

The subject matter expert has specific knowledge of the application logic, a high-level understanding of the entire system, and a detailed understanding of the individual elements and tasks that are fundamental to the application being tested. This enables the subject matter expert to:

➤ Determine the operating scenarios or business processes that must be tested.

For example, the subject matter expert has the knowledge necessary to design the business process at a high-level by creating a business process test and requesting components for the test.

➤ Identify the key business activities that are common to multiple business processes.

For example, most applications require users to log in before they can access any of the application functionality. The subject matter expert could create one business component that represents this login procedure. This component procedure can be used in many business process tests or flows, resulting in easier and more cost-efficient maintenance, updating, and test management.

➤ Participate in other aspects of the creation of business process testing, depending on his/her availability and set of skills. These include:

  ➤ Creating business components, and manual steps for each business component.

  ➤ Defining steps as keyword-driven components and implementing the steps as automated steps, in conjunction with the automation engineer.

  ➤ Creating a business process test from existing components and defining data for test iterations.

  ➤ Creating flows for the business process test.

  ➤ Configuring parameter values for test configurations, components, and flows.

➤ Executing the tests to verify that test was designed appropriately and ran as expected.

➤ Reviewing test results to verify that the results are as expected.

➤ Maintaining test steps for each of the business components.

Automation Engineer

The automation engineer is an expert in QuickTest Professional (or another testing tool) automated testing.

The automation engineer prepares the resources and automated functions required for testing the features associated with each specific component. For example:

➤ The automation engineer can create and maintain application areas both within ALM and other testing tools.

➤ The automation engineer can create function libraries with general scripts which are encapsulated into general operation keywords.

➤ The automation engineer can populate the shared object repository with objects that represent the different objects in the application being tested. The automation engineer can rename the object repository, create more appropriate keywords, and filter out objects which are not relevant. The subject matter expert can use these objects to create steps in keyword-driven business components.

Depending on your company's organization and resources, automation engineers may also be responsible for some of the tasks listed above for the subject matter expert.

Automation engineers can also create, debug, and modify business components in QuickTest Professional (or the relevant testing tool) if required. For more information, see the *HP QuickTest Professional for Business Process Testing User Guide*.

A Top-Down Methodology

Business Process Testing is flexible and does not enforce any one particular model for incorporating business processes into your testing environment. The actual workflow in an organization may differ for different projects, or at different stages of the application development life cycle.

A methodology of defining low-level components first and then designing business process tests based on the defined components is a legitimate methodology that may meet your needs. This section, however, presents a top-down methodology as a preferred alternative from the perspective of the subject matter expert with a high-level understanding of the entire system.

The top-down methodology presented here for working with Business Process Testing is based on:

➤ The high-level design and creation of a structure for business process tests.

➤ The mid-level design, including the:

  ➤ Creation of flows (sets of business components in a logical order that can be executed).

  ➤ Creation of business components (reusable units that perform specific tasks in a business process).

  ➤ Specifying criteria for more granular test coverage (requirements) as necessary.

  ➤ Specifying different test configurations for testing different use-cases and for more "true-to-life" test coverage (requirements).

➤ The low-level implementation of business component content by creating component steps, setting up iterations (for business process tests, flows, and components), parameterizing, and when necessary, automating.

➤ The execution of the business process tests and flows.

The top-down methodology therefore advocates the creation of business process testing entities according to the following hierarchy:

➤ Business process tests, which contain flows and/or business components.

➤ Flows, which contain business components.

➤ Business components (manual or automatic), which contain steps.

Business process tests, business components, and flows are created using ALM's Business Components module and Test Plan module.

Note: The Business Components module is available only if your ALM license includes Business Process Testing. For more information, see "Licensing" on page 41.

The Business Process Testing model is described in the following sections:

➤ Designing the High-level Structure

➤ Designing the Mid-level Structure

➤ Adding Content to the Tests and Flows

➤ Running Business Process Tests and Viewing Results

Designing the High-level Structure

Business Process Testing provides an intuitive interface that enables subject matter experts to create and implement an effective Business Process Testing structure, without using complex scripting or programming procedures.

The high-level component of a Business Process Testing structure is the business process test.

Designing the high-level structure is described in the following sections:

➤ Designing with Automation in Mind

➤ Creating Business Process Tests

Designing with Automation in Mind

Consider if the business process test might one day be automated. Reuse is a key factor when automating tests. Consider the following:

➤ Modularity and reusability facilitate automation. Design your tests to use smaller, reusable components that automated tests can call multiple times.

➤ Reusability and test maintenance. With reusable components, tests are easier to maintain.

➤ Automation engineers can use the design as a structure for creating methods that facilitate automation, instead of for creating scripted components.

This part of the design phase is often done by both the subject matter expert and the automation engineer together.

After designing the test with automation in mind, you can use the Convert to Component feature to create components from a test systematically and effectively. For task details, see "Converting Manual Tests to Components" on page 235.

Creating Business Process Tests

The Test Plan module enables subject matter experts to build and configure business process tests (and flows) that represent the main tasks of a business process.

A business process test is a scenario comprising a sequence of business components or flows, designed to test a specific business process of an application. For details about business process tests, see Chapter 6, "Getting Started with Business Process Tests."

Note: Flows are sets of business components that are executable. As such, they are available from the Test Plan module, which allows them to share the same functionality as business process tests (iterations, parameter, coverage, and results). However, when designing flows, we recommend that you consider them "compound components" and plan their design when "Designing the Mid-level Structure."

So as not to interfere with the high-level design process at this point, business components for each test can be created in the Business Components module, and flows for each test can be created in the Test Plan module, later.

Tip: As the subject matter expert creates the test or flow, he/she can request the creation of new business components. The component request can be very detailed (with a name, a description, a status, and implementation requirements), or a basic shell of the component (for example, specifying only a name). These component requests enable subject matter experts to build business process tests even before the application is ready for testing and make sure no duplicate business components are created.

After a business process test is complete, you can work with it in the Requirements, Test Lab, Analysis, and Defects modules, just as for any other test type.

You can use run conditions to enable components to run selectively, based on earlier stages within the test or flow. This enhances the overall flexibility of a test or flow. For more information, see Chapter 13, "Defining Run Conditions."

This part of the design phase is typically performed by the subject matter expert.

Designing the Mid-level Structure

The design of flows and components, and how they are parameterized, is often the next step in creating the structure of a business process test.

Designing the mid-level structure is described in the following sections:

➤ Creating Flows

➤ Creating Business Components

➤ Linking to Other ALM Entities

➤ Adding Components to Business Process Tests and Flows

Creating Flows

The Test Plan module enables subject matter experts to build and configure flows that represent logical sets of business components that can be executed as a unit ("compound components").

A flow is a type of test comprising a collection of business components in a fixed sequence that performs a specific task. You can use a flow in multiple business process tests. When you modify a flow or any of its components, all business process tests containing that flow reflect that modification. For details about flows, see Chapter 8, "Working with Flows."

This part of the design phase is typically performed by the subject matter expert.

Creating Business Components

A business component is a reusable unit that performs a specific task in a business process and describes the condition or state of the application before and after those tasks. The subject matter expert defines the individual steps for each business component comprising the business process in the form of manual, or non-automated, steps.

You can use a component in multiple business process tests and flows. When you modify a component or its steps, all business process tests or flows containing that component reflect that modification.

The Business Components module enables you to create and manage reusable business components that perform specific tasks in a business process. The Dependencies tab of the module lists all entities that are dependant on each business component, which indicates the need for the component.

This part of the design phase is typically performed by the subject matter expert, but may also be done in conjunction with the automation engineer, depending on available resources and skills.

Linking to Other ALM Entities

You can link business process tests and flows with other ALM entities, such as requirements and defects. This facilitates the integration of business process testing into ALM, providing comprehensive tracking and reporting of business process testing.

This phase is typically performed by the subject matter expert.

Adding Components to Business Process Tests and Flows

To complete the framework, add business components to the relevant business process tests and flows in the Test Plan module by dragging business components from the component tree and dropping them into the test or flow. For more information, see Chapter 8, "Working with Flows" and Chapter 7, "Managing Business Process Tests."

This phase is typically performed by the subject matter expert.

Adding Content to the Tests and Flows

After the general framework for the business process test is designed, the low-level details are implemented. These details form the content of the tests and flows.

Adding the content is described in the following sections:

➤ Adding Component Steps

➤ Parameterizing and Creating Iterations

➤ Grouping Components

➤ Automating Components

Adding Component Steps

Business components are themselves comprised of several application steps. In a Web application, for example, a login component's first step could be to open the application. Its second step could be to enter a user name. Its third step could be to enter a password, and its last step could be to click the **Submit** button on the Web page. The component could also be enhanced with other logic to test important details of the login task.

➤ If designing a manual test (or, before automated testing resources are available for an automated test), you can add manual steps in the Component Steps tab of each component and you can run these steps using the Manual Runner. For information, see Chapter 4, "Designing Manual Component Steps."

➤ If designing an automated test, after automated testing resources are ready, you can convert components to automated components and begin implementing the automated steps for each component by assigning keywords to each step. For information, see Chapter 5, "Working with Automated Component Steps."

This part of the design phase can be performed by the subject matter expert, the automation engineer, or both together.

Parameterizing and Creating Iterations

ALM enables you to expand the scope of business components (both manual and automated), flows, and business process tests by replacing fixed values with input and output parameters. Parameterization enables you to iterate specific components in a business process test, specific components in a flow, configurations, or entire business process tests, thereby creating data-driven tests. This process greatly increases the power and flexibility of your component, flow, or test. For information on component and flow parameterization, see Chapter 9, "Working with Parameters."

Parameterizing and creating parameters can be performed by the subject matter expert or the automation engineer, depending on available skills and resources.

For an example of component parameterization, see the Parameterization Example, below.

Parameterization Example

If you want to create a business process test that tests the business process of booking a flight from an online reservation application, you might structure it from business components that: Log in to the application, select an itinerary, enter credit card details, enter shipping details, and log out.

If you were planning such a test without Business Process Testing, you might use the following diagram as part of your master test plan document:

```
┌─────────────────────────────┐
│   Log in to the Web Site    │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Select a Flight Itinerary │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Enter Credit Card Details │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│    Enter Shipping Details   │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   Log out from the Web Site │
└─────────────────────────────┘
```

Using Business Process Testing, you could directly create a business process test containing business components, as shown below:

The steps in each of these business components can be set up to receive specific elements of data from the test that runs them (for example, the login name and password, the number of passengers, and credit card details). Each of these elements of data, which have different values each time the business component is run, can be parameterized. Each business component run is called an iteration.

Using iterations and parameterization, the same business process test can be used to answer many testing needs, for example:

➤ Testing the flight booking process for users with different login permissions, such as new users, VIP customers, and so on.

➤ Testing the flight booking process for one itinerary, or for several itineraries.

➤ Testing the flight booking process for one passenger, or for several passengers.

Additionally, due to the modular structure of these business components and the ability to control components with external data, you can use the same components in other business process tests and flows.

The login and logout components could be used in most other tests or flows on the same application. For example, you might be able to use the component for entering shipping details in other business process tests that check the business process of ordering online merchandise from the application, or in a test for subscribing to a frequent flyer program.

Grouping Components

In certain business process tests or flows, you may want perform several business components together as a group, perhaps as iterations. This form of parameterization and iteration is done within a test or a flow, and not on an entire test or flow as a whole. For task details, see "Grouping Components and Flows" on page 222.

This part of the design phase is generally performed by the subject matter expert.

Automating Components

If desired, test steps can be automated (this is decided during "Designing with Automation in Mind" on page 25). For details, see Chapter 5, "Working with Automated Component Steps." Automating test steps within ALM is typically done by the subject matter expert in conjunction with the automation engineer.

Automating component steps involves the creation of application areas, which provide access to the settings and resources required to create the content of keyword-driven business components for a particular application or part of an application.

You can create basic application areas based on a default template in the ALM Test Resources module. The default application area template is stored in the **System Application Areas** subfolder and cannot be moved or modified. For details, see the *HP Application Lifecycle Management User Guide*. Use QuickTest to edit and enhance application areas created in ALM.

Automation engineers can create comprehensive application areas in QuickTest. For details, see "Automating Business Process Testing Components" on page 34.

Running Business Process Tests and Viewing Results

When manual tests are ready (or, before automated parts of the test are ready), you can perform a manual run of the business process test or flow.

If automating the business components, you can check for problems arising from the combination and order of components in a business process test or flow by running the test in Debug mode from the Test Plan module. QuickTest Professional (and other testing tools) automated components can be used in the same business process test. The appropriate application is launched to run the components.

You can also check for syntax or logic errors in specific business components by running them individually in QuickTest Professional or another testing tool.

Then, when you are ready to run a complete business process test or flow, or to run it as part of a larger test set, you run it from the Test Lab module.

From the Test Lab module, you can view the results of the test run. These results include the steps in each business component, the actual value of each component parameter, and the results of individual steps.

For details, see Chapter 13, "Defining Run Conditions" and Chapter 14, "Running Business Process Tests and Flows."

Automating Business Process Testing Components

Business process tests and flows are composed of business components. The information in the component's outer layer or shell, for example, the component's description, status, and implementation requirements, together with the steps that make up the component, are defined by the subject matter expert in ALM.

This section describes the following topics:

➤ "Keyword-driven Automation and Integration with QuickTest Professional" on page 34

➤ "Scripted Automation and Integration with Testing Tools" on page 40

Keyword-driven Automation and Integration with QuickTest Professional

When QuickTest Professional is connected to an ALM project with Business Process Testing, the automation engineer can define objects in the object repository and save them in ALM. The objects are then available for insertion into component steps by the subject matter expert in ALM. In addition, all business component information is visible in QuickTest Professional.

Integration between ALM and QuickTest Professional enables the subject matter expert to implement the testing steps for the business components in a keyword view, and also enables the automation engineer to effectively maintain the set of objects in the object repository and the operations in the function libraries.

QuickTest Professional offers two types of automated components; keyword-driven components and scripted components. The automated steps of keyword-driven components can be created and edited in ALM. Scripted component steps can be created and maintained only in QuickTest Professional or another testing tool by the automation engineer.

Each testing step is made up of an item (an object in the application or an operation), and an operation. The available items and operations are defined by the automation engineer.

The automation engineer compiles an object repository containing objects that represent all the objects in the application or application segment that you need to test.

For example, the objects in a login window may be captured in the object repository in QuickTest Professional as follows:
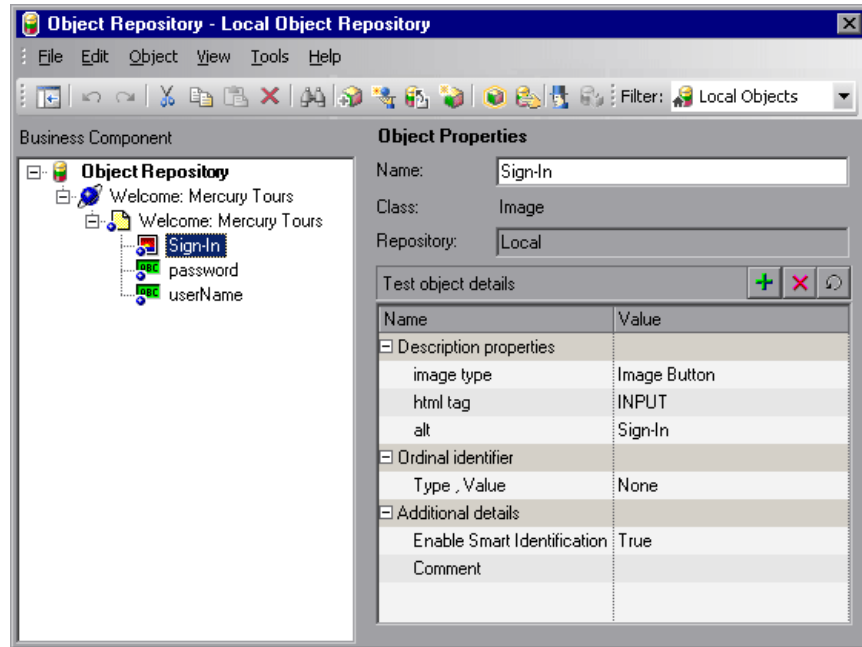
The automation engineer encapsulates all the activities and steps that require programming into a set of function libraries. These function libraries define the operations (or keywords) that your test needs to perform. With keyword-driven components, you can use these operations to create the component steps in the Business Components module in ALM.

The object repository location and associated function libraries for each part of the application being tested are specified in an application area. The application area provides all of the settings and resources required to create the content of its associated keyword-driven business components. These include representations of the objects from your application (contained in the shared object repository) and user-defined operations (contained in function libraries).

Note: You can create basic application areas based on a default template in the ALM Test Resources module. (For details, see the *HP Application Lifecycle Management User Guide*.) However, most application area functionality is provided by the subject matter expert in QuickTest.

All application area settings are automatically inherited by the business components that are based on that application area. Each application area is intended for use with a different part of the application being tested. Each business component is associated with a specific application area. Application areas include the resources and settings described in Business Component Resources and Settings, below.

For more information, see:

➤ Business Component Resources and Settings

➤ Business Process Testing Workflow Using QuickTest Professional

Business Component Resources and Settings

Using QuickTest Professional, the automation engineer defines an important set of resources and settings that comprise the application area or otherwise affect the business component. These include:

➤ "Object Repositories" on page 37

➤ "Function Libraries" on page 37

➤ "Associated Add-ins" on page 37

➤ "Applications List" on page 38

➤ "Recovery Scenarios" on page 38

The resources and settings supplied by the application area apply to all components that are associated with it. You can create multiple application areas for different purposes. Each QuickTest Professional business component must be associated with an application area. You cannot delete an application area that is associated with a business component.

This section contains only a brief description of these resources and settings. For more information on QuickTest Professional resources and settings and the application area, see the *HP QuickTest Professional for Business Process Testing User Guide*.

Object Repositories

The object repository stores all the information about the test objects that are used in each business component. After you associate a shared object repository with an application area, it can be accessed by any component that is associated with that application area.

By using the same shared object repository file for multiple components, the same objects can be used in multiple components, flows, and business process tests in ALM, and object changes in the application can be updated in one central location.

Function Libraries

Function libraries contain VBScript functions, subroutines, and so on, that can be used as operations in a business component.

Associated Add-ins

The specified set of QuickTest Professional Add-ins that is associated with the business component determines the types of objects that QuickTest Professional recognizes and that can be tested using that business component. Each add-in is associated with a development environment. For example, QuickTest Professional includes built-in add-ins for testing in Web, ActiveX, and Visual Basic environments. Additional QuickTest Professional Add-ins are available for testing environments such as SAP Solutions, Java, Oracle, Siebel, terminal emulators, and more.

When you convert manual components to automated components, the add-ins associated with the first keyword-driven or scripted component in a business process test (inherited from the application area used by the component) are automatically loaded in QuickTest Professional when ALM runs the test. Add-ins associated with other components in the business process test are not loaded.

Note: ALM assumes that the add-ins associated with the first component in a business process test are required for all the components in the same test. Therefore, it is important to make sure that all required QuickTest Professional Add-ins are associated with the first business component in the test. If they are not, you should ask the automation engineer to add them to the application area used by the first component in the test. Then update your copy of the application area. For more information on updating the application area, see "Working with Application Areas" on page 136.

Applications List

QuickTest Professional runs components only on the set of Windows-based applications that are specified for the component. It can also run on applications in any other environment for which the appropriate QuickTest Professional Add-in is loaded.

Recovery Scenarios

Recovery scenarios are activated during the running of a business component if an unexpected event occurs, such as an application crash, and the run is suspended. Recovery scenarios define the operations necessary to recover from the event and continue the run.

Business Process Testing Workflow Using QuickTest Professional

The following is an example of a common Business Process Testing workflow using QuickTest Professional. The actual workflow in an organization may differ for different projects, or at different stages of the product development life cycle.

Subject Matter Expert	Create manual components in Quality Center with Business Process Testing
	The following steps can be performed simultaneously and in any order, as required
Subject Matter Expert	Add manual steps to components and convert to automated QuickTest components
Automation Engineer	Configure application area and build object repositories
Automation Engineer	Add programmatic testing functionality in function libraries and compiled modules
Subject Matter Expert	Drag components to build business process tests or flows
Subject Matter Expert	Insert steps in the Keyword View based on defined manual steps
Automation Engineer	Debug components in QuickTest
Subject Matter Expert or Automation Engineer	Debug business process tests or flows by running them from Quality Center
Subject Matter Expert	Add business process tests or flows to Quality Center test sets and run tests (manual and automatic runs)

Scripted Automation and Integration with Testing Tools

Keyword-driven business components and scripted components are both part of Business Process Testing. Both types of components are maintainable, reusable modules that perform a specific task when testing your application.

Scripted component steps can contain programming logic and can be edited only in the applications in which they were created, such as QuickTest Professional or Service Test. They cannot be modified by the subject matter expert in ALM, but you can include these scripted components in any business process tests.

In the Automation sub-tab, you can launch the component in the testing tool in which it was automated.

You create scripted components in QuickTest Professional and Service Test:

➤ For more information on creating and editing scripted components in QuickTest Professional, see the *HP QuickTest Professional for Business Process Testing User Guide*.

➤ For more information on creating and editing scripted components in Service Test, see the *HP Service Test User Guide* and HP Software Self-solve knowledge base article KM1016396 (http://h20230.www2.hp.com/selfsolve/document/KM1016396).

Note: Most of the information, examples, and images in this guide focus specifically on working with keyword-driven business components. However, much of the information also applies to scripted components.

Setting Up Business Process Testing

This section describes the licensing and prerequisites for Business Process Testing in HP Application Lifecycle Management (ALM).

This section includes:

➤ "Licensing" on page 41

➤ "Prerequisites" on page 42

➤ "Accessing Business Process Testing" on page 42

Licensing

A license for Business Process Testing enables you to access the Business Components module and provides the ability to edit business process tests and flows in the Test Plan module.

ALM Editions: Business Process Testing is not available for the Performance Center Edition.

Each user with the proper permissions who logs into an ALM Platform server with a Business Process Testing license uses up both a Business Process Testing license and an ALM license.

Note: You can run test sets containing business process tests in the Test Lab module and you can also edit automated components in QuickTest Professional, even if no Business Process Testing license is available in ALM.

For more information on licensing, see the *HP Application Lifecycle Management Administrator Guide*.

Prerequisites

To work with Business Process Testing, make sure the following prerequisites are met:

➤ To debug or run automated keyword-driven business components, or view test results, make sure that QuickTest Professional version 10.0 or later is installed.

➤ To create and/or modify keyword-driven components and their steps, or to work with external data tables for test configurations, install the QuickTest Professional Add-in for Business Process Testing Add-in on the client computer. The QuickTest Professional Add-in for Business Process Testing is installed from the HP Application Lifecycle Management Add-ins page.

Accessing Business Process Testing

To work with Business Process Testing: In the ALM sidebar, under Testing, select **Business Components**. If **Business Components** is not displayed in the sidebar, one of the following may be the cause:

➤ No Business Process Testing licenses are currently available on the ALM Platform server. Contact your ALM Site Administrator or see the *HP Application Lifecycle Management Administrator Guide*.

➤ You belong to a ALM user group that does not have access to the Business Components module. Contact your ALM Project Administrator or see the *HP Application Lifecycle Management Administrator Guide*.

2

Getting Started with Business Components

The Business Components module enables you to create and manage business components in HP Application Lifecycle Management (ALM). These components provide the basis for Business Process Testing.

This chapter introduces the Business Components module. Chapter 3, "Working with Business Components," describes how to work with the features and other options available in the Business Components module.

Product Feature Movie: To view a movie that demonstrates basic information about Business Process Testing, select **Help** > **Product Feature Movies** in the ALM main window and click **HP Business Process Testing for Business Analysts**.

This chapter includes:

The Business Components Module Window

The Business Components module window is shown below, displaying the Details tab for the component selected in the component tree.
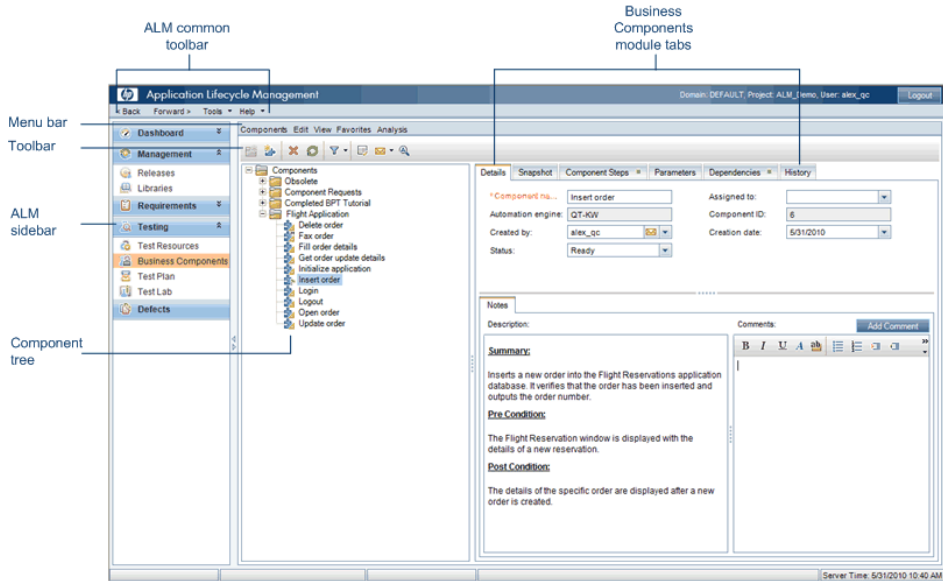
When a business component is selected in the component tree, the Business Components module contains the following key elements:

➤ **Menu bar.** Contains menus with Business Components module commands. For more information, see "Components Module Menu and Toolbar Commands" on page 48.

➤ **Toolbar**. Contains buttons for frequently-used commands in the Business Components module. These commands enable you to create and delete folders and business components, refresh data in the tree, and filter and sort the components displayed in the tree. For more information, see "Components Module Menu and Toolbar Commands" on page 48.

Tip: You can navigate the Business Components module, and perform many commands, using shortcut keys. For a list of shortcut keys, see "Business Component Module Shortcuts" on page 415.

➤ **Filter information**. Describes the filter currently applied to the Component tree. Located directly above the Component tree.

➤ **Component tree.** Enables you to construct and organize the hierarchy of your business component folders and individual business components.

For more information on the component tree, see "Component Tree" on page 46.

For information on the special **Obsolete** and **Component Requests** folders, see "Creating a Component Tree" on page 91.

➤ **Business Component Life-cycle and Statuses**. Enables you to track business components. For details, see "Business Component Life-cycle and Statuses" on page 58.

➤ **Business Components Module Tabs**

The tabs in the Business Components module enable you to provide a complete overview of the component's content.

➤ **Details tab.** Enables you to provide or view the general details of the business component as well as a summarized description and implementation requirements. For general details, see "Understanding the Details Tab" on page 62.

➤ **Snapshot tab.** Enables you to capture a snapshot image that helps to describe the business component from the application and attach it to the selected business component. For general details, see "Understanding the Snapshot Tab" on page 65.

➤ **Component Steps tab.** Enables you to create or view the manual steps of your business component, and to automate it if required. For general details, see "Understanding the Component Steps Tab" on page 68. For task details on creating manual components, see "About Designing Manual Component Steps" on page 121. For task details on automating components, see Chapter 5, "Working with Automated Component Steps."

➤ **Parameters tab.** Enables you to define input and output component parameters and default parameter values for the business component. This allows the component to receive data from an external source and to pass data to other components or flows. For general details, see "Understanding the Parameters Tab" on page 66.

➤ **Dependencies tab.** Displays the dependency relationships between components, tests, flows, and resources (including application areas). For details, see the *HP Application Lifecycle Management User Guide*.

➤ **History tab.** Displays a log of changes made to the component. For details, see the *HP Application Lifecycle Management User Guide*.

➤ **Live Analysis tab**. When a folder is selected, this tab is available for creating a graphical representation of data related to business components.

Component Tree

Business components are displayed graphically in a hierarchical tree. This includes components created in:

➤ the Business Components module

➤ automated testing tools such as QuickTest

➤ the Test Plan module as component requests

You can organize components into folders, and filter and sort the components according to your requirements.

Selecting a folder (other than the **Obsolete** and **Component Requests** folders) in the Component tree displays Details and Live Analysis tabs that enable you to provide a descriptive overview of the folder's contents and create a graphical representation of data related to business components. For conceptual information on live analysis, see the *HP Application Lifecycle Management User Guide*.

In a version-controlled project, a component checked out by the current user is displayed with an open green lock icon next to the component icon. A component checked out by another user is displayed with a red lock icon, together with the name of the user. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*.

Component Tree Icons

Business components and folders are identified by specific icons in the component tree.

➤ **Folder.** Folders organize business components in the tree into logical groups. Selecting a folder in the component tree displays a Description area that enables you to enter a textual description of the folder contents. A folder can either be collapsed or expanded, as indicated by its icons.

➤ **Business Component.** Business components are testing units that perform specific tasks in a business process. Manual business components are indicated by an **M** symbol on the component icon, for example, .

For more information on the icons used to represent business component statuses, see "Business Component Status Icons" on page 59.

Components Module Menu and Toolbar Commands

This section describes the commands available in the Business Components module. The commands are available from the Components Module Menu Bar, the Components Module Toolbar, and the Components Module context menu.

Components Module Menu

The Components Module menu bar contains the following menus:

➤ **Components.** Contains commands that enable you to create business components and folders, go to a specific business component, restore a business component, and send e-mail.

➤ **Edit.** Contains commands that enable you to work with and delete business components and folders.

➤ **View.** Contains commands that enable you to expand and collapse folders, and work with filters.

➤ **Favorites.** Contains commands for listing business components according to favorite settings.

➤ **Analysis.** The Analysis menu contains commands that enable you to generate planning reports and graphs. For more information, see "Generating Reports and Graphs" on page 114.

➤ **Versions.** In a version-controlled project, the Components menu bar also displays the Versions menu, which contains commands for checking in and checking out components. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*.

Components Module Commands

Commands are described below in alphabetical order (unlabeled elements are shown in angle brackets):

UI Elements (A-Z)	Available from	Description
<list of recently used favorite views>	➤ Favorites menu	Displays the four most recently used favorite views in the Business Components module.
		You can define the number of views displayed on the menu by setting the **FAVORITES_DEPTH** parameter in the Site Configuration tab in Site Administration. For details, see the *HP Application Lifecycle Management Administrator Guide*.
Add to Favorites	➤ Favorites menu	Opens the Add Favorite dialog box, enabling you to add a favorite view to your private or the public folder. For information on working with favorites in ALM, see the *HP Application Lifecycle Management User Guide*.
Change Status	➤ context menu	Changes the status of a component without switching to the Details tab. For information on business component statuses, see "Business Component Life-cycle and Statuses" on page 58.
Check In	➤ Versions menu ➤ Toolbar	Opens the Check In dialog box, enabling you to check in the selected components. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*.
		Available from: Version Control-enabled projects

UI Elements (A-Z)	Available from	Description
Check Out	➤ Versions menu ➤ Toolbar	Opens the Check Out dialog box, enabling you to check out the selected components. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*. **Available from:** Version Control-enabled projects
Clean unused components	➤ Components menu ➤ context menu	Simultaneously removes all components that are not being used by any test or flow. **Available from: Obsolete** folder, when selected
Collapse	➤ View menu ➤ context menu	Collapses all branches in the component tree. For information on how to expand and collapse folders, see "Viewing and Modifying Business Components" on page 101.
Component Details	➤ context menu ➤ Toolbar	Displays the Component Details dialog box, enabling you to display and modify the details of the selected component. For information on viewing the details of business components, see "Viewing and Modifying Business Components" on page 101.

UI Elements (A-Z)	Available from	Description
Copy URL/Paste	➤ Edit menu ➤ context menu	Copies a selected component and pastes its URL as a link. The component itself is not copied. Instead, you can paste the address into another location, such as an email or a document. Clicking the link opens ALM and takes you to the component. If you are not already logged in, ALM first prompts for login details.
Copy/Paste	➤ Edit menu ➤ context menu	Copies selected components within the same project or across projects. For information on how to copy folders and business components, see "Copying Folders and Business Components" on page 102. **Notes:** ➤ Defect linkage data for the component are not copied. ➤ The root folder cannot be copied within the same project. ➤ If you paste a component that has the same name as an existing component, the suffix **_Copy** followed by a sequential number is added automatically to the end of the component's name.

UI Elements (A-Z)	Available from	Description
Cut/Paste	➤ Edit menu ➤ context menu	Moves selected components or folders to a different location in the component tree. The root folder cannot be moved. For information on how to cut and paste folders and business components, see "Viewing and Modifying Business Components" on page 101. **Tip:** You can also move a component to a new location in the component tree by dragging it.
Delete	➤ Edit menu ➤ context menu ➤ Toolbar	Removes the selected folders or business components from the component tree. The contents of a removed folder are also removed. You cannot delete the root folder. Any removed component that is used by one or more business process tests or flows is moved to the **Obsolete** folder in the tree. Unused components are permanently deleted. For more information on working with the **Obsolete** folder, see "Removing Business Components" on page 108. **Tip:** Business components can be easily recovered from the **Obsolete** folder if they were deleted accidentally. For more information, see "Restoring Obsolete Business Components" on page 109. **Version Control:** Deleting a business component deletes all previous versions of the component.

UI Elements (A-Z)	Available from	Description
Expand All	➤ View menu ➤ context menu	Expands all branches in the component tree. For information on how to expand and collapse folders, see "Viewing and Modifying Business Components" on page 101.
Favorite bar Favorite: (private) ReadyComponents;	➤ View menu	Displays the Favorite bar, enabling you to reload a view from a drop-down list of existing favorite views. For details, see the *HP Application Lifecycle Management User Guide*.
Filter bar Filter: Status[Ready]	➤ View menu	Displays the current filter.
Filter/Sort	➤ View menu ➤ Toolbar	Enables you to filter and sort the business components in the component tree. For user interface details, see the *HP Application Lifecycle Management User Guide*. For a list of fields available for filtering and sorting, see "Understanding the Details Tab" on page 62.
Find	➤ Edit menu	Searches for a component in the Components module. For details, see the *HP Application Lifecycle Management User Guide*.
Find Next	➤ Edit menu	Searches for the next item that meets the previously defined search criteria.

UI Elements (A-Z)	Available from	Description
Go to Component	➤ Components menu	Opens the Go To Component dialog box, enabling you to find a specific component by the component ID. You can open the details dialog box for the component or you can go to the component's location in the tree. **Note**: You can only go to components that are in the current filter.
Graphs	➤ Analysis menu	Lists the graphs you can generate for component data. Select a predefined graph, or launch the graph wizard. For details on the report types, see "Predefined Standard Graphs" on page 116.
Live Analysis	➤ Analysis menu	Provides a descriptive overview of the folder's contents and creates a graphical representation of data related to business components. For more information on live analysis, see the *HP Application Lifecycle Management User Guide*.
Most Recently Used	➤ Analysis menu	Displays the most recently viewed reports and graphs in the Components module.
New Component	➤ Components menu ➤ context menu ➤ Toolbar	Opens the New Component dialog box, enabling you to add a component under the selected component in the selected component's folder. For more details, see "Creating a Component Tree" on page 91.

UI Elements (A-Z)	Available from	Description
New Component Folder	➤ Components menu ➤ context menu ➤ Toolbar	Opens the Create New Component Folder dialog box, enabling you to add a folder under a selected folder. For more details, see "Creating a Component Tree" on page 91.
Organize Favorites	➤ Favorites menu	Opens the Organize Favorites dialog box, enabling you to organize the list of favorite views by changing properties or deleting views. For information on working with favorites in ALM, see the *HP Application Lifecycle Management User Guide*.
Pending Check In	➤ Versions menu	Opens the Pending Check In dialog box, enabling you to view a list of all entities in the current module that you have checked out. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*. **Available from:** Version Control-enabled projects
Private	➤ Favorites menu	Lists the favorite views that are accessible only to the user who created them. For information on working with favorites in ALM, see the *HP Application Lifecycle Management User Guide*.
Public	➤ Favorites menu	Lists the favorite views that are accessible to all users. For information on working with favorites in ALM, see the *HP Application Lifecycle Management User Guide*.

UI Elements (A-Z)	Available from	Description
Refresh All	➤ View menu ➤ Toolbar	Refreshes the component tree so that it displays the most up-to-date business components.
Rename	➤ Edit menu ➤ context menu	Renames folders and business components in the component tree. For information on how to rename folders and business components, see "Viewing and Modifying Business Components" on page 101. You cannot rename the root, Obsolete, or Component Requests folders. **Syntax exceptions:** A component name cannot include the following characters: \ ^ *
Replace	➤ Edit menu	Replaces a field value in the tree. For details, see the *HP Application Lifecycle Management User Guide*.
Report Selected	➤ context menu	Displays a report of the selected components.
Reports	➤ Analysis menu	Lists the predefined reports you can produce on component data. For details on the report types, see "Predefined Standard Reports" on page 115.
Restore	➤ Components menu ➤ context menu	Restores the selected components from the **Obsolete** folder.

UI Elements (A-Z)	Available from	Description
Send by E-mail	➤ Components menu ➤ context menu ➤ Toolbar	Opens the Send E-mail dialog box, enabling you to send component email to recipients selected from a list or to the author of the component. For more information, see the *HP Application Lifecycle Management User Guide*.
Text Search	➤ Edit menu ➤ Toolbar	Opens the text search pane in the lower part of the Components module window, enabling you to search for records in predefined fields. For more information, see the *HP Application Lifecycle Management User Guide*.
Undo Check Out	➤ Versions menu ➤ context menu	Cancels the check out of selected components and discards changes. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*. **Available for:** Version-controlled projects
Update Selected	➤ Edit menu	Opens the Update Selected dialog box, enabling you to update a field value for multiple selected components. For more information, see the *HP Application Lifecycle Management User Guide*.

UI Elements (A-Z)	Available from	Description
Versions	➤ context menu	Opens a sub-menu with versioning options. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*. **Available for:** Version-controlled projects
Warn before Check Out	➤ Versions menu	Instructs ALM to display a confirmation message before automatically checking out an entity. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*. **Available from:** Version-controlled projects

Business Component Life-cycle and Statuses

The color of the business component icons in the component tree and the symbols shown in the icons vary according to the status of the component. For example, you can use the status to indicate that a business component is ready to be run in a business process test or flow, or that it has errors that require attention before it can be successfully used in a test or flow. The more ready a component is to be included successfully in a business process test or flow, the less severe is its status.

The status of a business component affects the status of any business process tests or flows of which it is a part. The component with the most severe status determines the status of the test or flow. For example, a business component with an Error status causes any business process test or flow of which it is a part to have an Error status.

Additional statuses can be defined by updating the project list for business component statuses. For details, see the *HP Application Lifecycle Management Administrator Guide*.

Business Component Status Icons

Business component statuses and their corresponding icons are described in the following table, listed in order of their level of severity, from the least severe status to the most severe status:

Status	Icon	Color / Symbol	Description
Ready		**Green flag**	The business component is fully implemented and ready to be run. It answers the requirements specified for it and has been tested according to the criteria defined for your specific system.
Maintenance		**Grey tool**	The business component was previously implemented and is now being modified to adapt it for changes that have been made in the application.
Not Implemented		**Yellow asterisk**	A business component request has been initiated in the Test Plan module. The component request status changes from **Not Implemented** to **Under Development** when you move the request from the Component Requests folder in the component tree in the Business Components module. **Note:** This status is not available from the Business Components module.

Status	Icon	Color / Symbol	Description
Under Development		**Yellow triangle**	The business component is currently under development. This status is initially assigned to: ➤ New components created in the Business Components module. ➤ Component requests dragged or moved out of the Component Requests folder into a component folder in the component tree.
Error		**Red**	The business component contains errors that need to be fixed, for example, due to a change in the application. When a business process test or flow contains a component with this status, the status of the entire business process test or flow is also **Error**.

➤ The above icons represent components that have been automated using a testing tool such as QuickTest.

➤ A manual component is indicated by an **M** symbol on the appropriate icon. For example, a component with an **Under Development** status that has not been automated would be indicated by the icon.

Business Component Status Life-cycle

The status of a business component shown in the component tree could change several times during its life-cycle, as illustrated in the example below:

Under Development	The component is created in the Business Components Module
Error	All steps have been implemented, but the component does not run successfully and needs to be debugged
Ready	The component is complete and ready for use in a business process test or flow
Error	A change in the application prevents the component from running successfully
Maintenance	The component is being modified to adapt it for changes made in the application
Ready	The component is complete and ready for use in a business process test or flow

Understanding the Details Tab

The Details tab enables you to define component attributes, a general description of the business component, and detailed implementation requirements. It also enables you to communicate with the automation engineer and other component users and developers.

You can change the business component's status and other details displayed in this tab by choosing alternative selections from the drop-down lists.

Notes:

➤ You can add user-defined fields and change the label of the fields in the Business Components module. You can also customize project lists. For details, see the *HP Application Lifecycle Management Administrator Guide*.

➤ You can use the Script Editor to restrict and dynamically change the fields and values in the Business Components module. For details, see the *HP Application Lifecycle Management Administrator Guide*.

➤ For more information on the Details tab for a business component, see "Providing Component Details and Implementation Requirements" on page 94.

The Details tab can contain the following information:

➤ **Component Name.** The name of the selected component.

➤ **Assigned To.** The user to whom the business component implementation is assigned.

➤ **Automation engine.** How the component was converted to an automated component; **QuickTestKeyword-Driven** (abbreviated **QT-KW**) for a QuickTest keyword-driven component and **QuickTestScripted** (abbreviated **QT-SCRIPTED**) for a QuickTest scripted component, and **SERVICE-TEST-AUTOMATED** for a Service Test component. **MANUAL** is displayed for a component that has not been automated.

➤ **Component ID.** ID assigned to the component when the component was created. This data is automatically entered by ALM, and cannot be modified.

➤ **Created by.** The user that created the business component. This data is automatically entered by ALM, and cannot be modified.

➤ **Creation date.** The date that the business component was created. This data is automatically entered by ALM, and cannot be modified.

➤ **Status.** The status of the business component. For information on business component statuses, see "Business Component Life-cycle and Statuses" on page 58.

➤ **Deleted on** (For components contained in the **Obsolete** folder only.) The date that the business component was deleted. This data is automatically entered by ALM.

➤ **Original Location** (For components contained in the **Obsolete** folder only.) The folder in which the business component was located when it was deleted. This data is automatically entered by ALM.

➤ **Notes** tab. This tab contains two areas for adding notes to the component:

➤ **Description.** The **Description** area enables you to provide an overall textual summary of the business component's purpose or contents, including the intended pre-condition and post-condition of the application at the start and end of the component run.

➤ **Comments.** The **Comments** area enables you to communicate with the automation engineer and other component users or developers by adding remarks, such as requests to the automation engineer for new operations or the need to update a step in the component.

Additional Version Control Fields

The Business Components module's Details tab displays the following additional fields if version control is enabled:

➤ **Version Check Out Date**. The date the version was checked out.

➤ **Version Check Out Time**. The time the version was checked out.

➤ **Version Checked Out By**. The name of the user who checked out the version.

➤ **Version Number**. The version number.

➤ **Version Status**. The status of the version (**Checked Out** or **Checked In**).

Understanding the Snapshot Tab

The Snapshot tab enables you to attach an image associated with the business component.
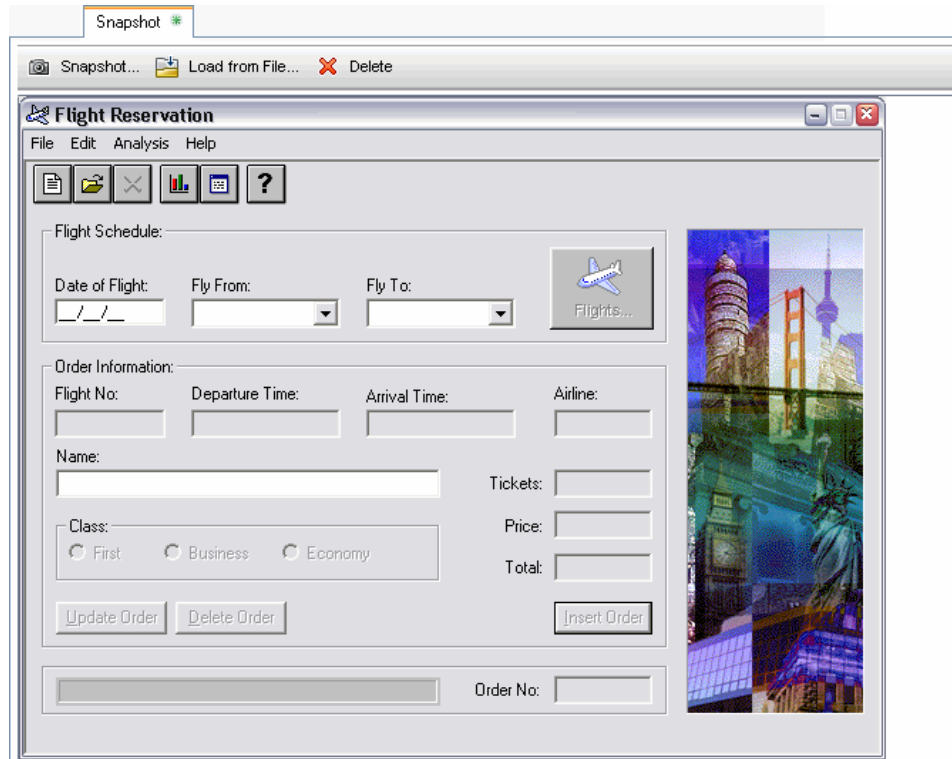
The Snapshot tab toolbar contains the following buttons:

➤ **Snapshot.** Opens the Snapshot dialog box. For information on attaching a snapshot, see "Attaching an Image to a Business Component" on page 98.

➤ **Load from File.** Enables you to load a previously saved **.png**, **.jpg**, **.gif**, or **.bmp** file containing the snapshot. For information on how to load snapshot files, see "Loading an Image" on page 99.

➤ **Delete.** Deletes the currently attached snapshot.

A green asterisk icon ✳ next to the Snapshot tab name indicates that the selected component has one or more snapshots.

For more information on the Snapshot tab, see "Attaching Images" on page 98.

Understanding the Parameters Tab

The Parameters tab enables you to define component parameters that allow a business component to receive data from an external source and/or return data for use in other components or flows.

Input component parameters make business components more flexible and make it easier to reuse the same component in multiple business process tests and flows—by supplying different input values, you can change how the component performs according to those values. Input component parameters also enable you to transfer multiple data values to the component in order to run the same component multiple times (iterations) in a business process test or flow.

Output component parameters allow data values retrieved from a component step in one component to be passed to a subsequent component in the business process test or flow.
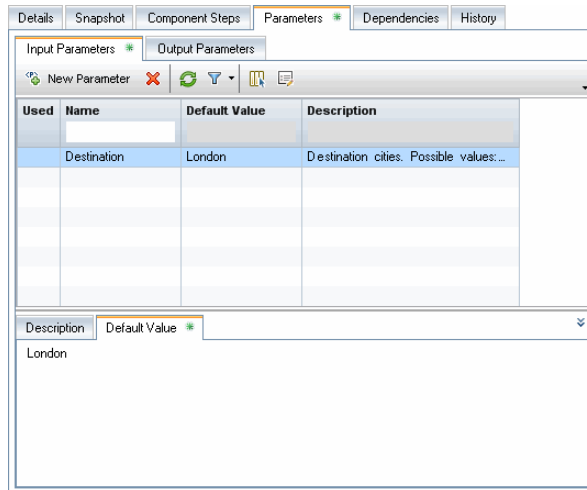
Tip: The Parameters tab for flows is very similar to the Parameters tab for business components.

The Parameters tab for Components (and flows) contains the following tabs:

➤ **Input Parameters.** Enables you to define component parameter names, default values, and descriptions of the input data that the business component can receive from a business process test or flow.

The default value is used when the business component runs, if no other value is supplied by the business process test or flow.

➤ **Output Parameters.** Enables you to define component parameter names and descriptions of the output data that the business component can return to a business process test or flow.

A green asterisk icon ✳ next to the Input Parameters or Output Parameters sub-tab name indicates that the selected component has one or more parameters.

The Input Parameters and Output Parameters sub-tabs each contain the following buttons:

➤ **New Parameter.** Enables you to create new component parameters.

➤ **Delete.** Enables you to delete existing component parameters.

➤ **Refresh**. Enables you to refresh the list of parameters.

➤ **Set Filter**. Enables you to filter or sort the parameters in the list using the Filter dialog box. For a list of parameter fields available for filtering and sorting, see "Understanding the Parameters Tab" on page 66.

➤ **Select Columns.** Opens the Select Columns dialog box, enabling you to specify which columns to display their order. You can also set the number of columns that remain stationary when you scroll horizontally.

➤ **Parameter Details**. Enables you to view the details of a parameter.

For details on the Parameters tab, see Chapter 9, "Working with Parameters."

Understanding the Dependencies Tab

The Dependencies tab displays the dependency relationships that exist between entities such as components, tests, flows, and test resources (such as application areas). For details, see the *HP Application Lifecycle Management User Guide*.

To display the Dependencies tab, select a component in the component tree and click the **Dependencies** tab.

A green asterisk icon ✳ next to the Dependencies tab name indicates that the selected component has one or more dependencies.

Dependencies can only be created outside of ALM, such as in QuickTest.

Understanding the History Tab

The History tab displays changes made to specified fields in an entity. For each change, the tab displays the date and time of the change and the name of the user who made the change. In addition, this tab displays a history of baselines in which the entity appears.

For details, see the *HP Application Lifecycle Management User Guide*.

Understanding the Component Steps Tab

The Component Steps tab provides an editable table in which you can create manual steps for your component. You can describe each step to be performed, create and insert parameters where required, and describe the expected result of the step.

You can include this manual component in a business process test or flow and then manually run the steps you created. Alternatively, you can choose to convert a manual component to an automated keyword-driven or a scripted component for a specific testing tool such as QuickTest.

The Component Steps Tab

Below is a sample of the Component Steps tab before automation.

A green asterisk icon ✳ next to the Component Steps tab name indicates that the selected component has one or more component steps.

You create each step in the business component as a row in the Component Steps tab. A step is an operation to be performed on an application. For each step, you describe the procedure to be performed, and define a successful, expected result. When a business process test or flow runs in ALM, the steps defined in the associated business components are performed.

The rows in the Component Steps tab are divided into the following columns:

➤ **Step Name column**. Displays an incrementing number for each step that you create, for example, Step 1, Step 2, and so on. You can change this default to a more descriptive name if required.

➤ **Description column**. Describes the step procedure to be performed on the application.

➤ **Expected Result** column. Describes the expected result of performing the procedure described in the Description column.

Component Steps Tab Toolbar and Context Menu Commands

The Component Steps tab contains the following commands from its toolbar and its context menu:

➤ **New Step.** Opens the New Component dialog box, enabling you to add a step below the selected step. For more information, see "The New Component Dialog Box" on page 83.

➤ **Edit step.** (or double-click a step) Opens the Component Step Details Dialog Box, enabling you to edit the selected manual step. For more information, see "The Component Step Details Dialog Box" on page 87.

➤ **Renumber Steps**. Rearrange the steps in a different order by renumbering them.

➤ **Delete Selected**. Deletes the selected component steps.

➤ **Copy steps.** Copies the selected component steps to the clipboard. Use this button in conjunction with the **Paste steps** button.

➤ **Paste steps.** Pastes the copied component steps to a new location.

➤ **Generate Script**. Converts the manual component to an automated QuickTest keyword-driven business component or a QuickTest scripted component, or a Service Test scripted component. For information on how to automate components, see "Generating a Script to Automate Components" on page 140.

When automating a component, additional sub-tabs open:

➤ **Manual Steps sub-tab.** Displays or provides access to the original manual steps of the component. For more information, see "Understanding the Manual Steps and Automation Sub-tabs" on page 73.

➤ **Automation sub-tab.** Displays or provides access to automated components. For keyword-driven components, enables you to create and modify the steps of your automated business component in a keyword-driven, table format, and provides a plain-language textual description of each step of the implemented component. For more information, see "Understanding the Manual Steps and Automation Sub-tabs" on page 73.

For more information, see "Understanding the Manual Steps and Automation Sub-tabs" on page 73.

➤ **Insert Parameter.** Inserts a parameter into the step. This command is enabled only when your focus is in the Description or Expected Result cells. For more information on inserting parameters, see "Defining Input and Output Component Parameters for a Business Component" on page 100.

➤ **Find Text.** Opens the Find dialog box, enabling you to search in the tab for steps that contain a specified text value. Select the column in which you want to search, and enter the value you want to find. For more information, see "Using the Find Dialog Box in the Component Steps Tab" on page 72.

➤ **Select Columns.** Opens the Select Columns dialog box, enabling you to specify which columns to display their order. You can also set the number of columns that remain stationary when you scroll horizontally.

➤ **Adjust row heights.** Changes the row height of the step so that more or less of the text in the step is visible.

➤ **Save steps.** Saves the component steps that you have created or modified. New or changed steps are not saved until either you click this button or you leave the Component Steps tab. For more information, see "Saving Component Steps" on page 151.

➤ **Move Up.** Moves the selected step up or down in the list.

➤ **Move Down.** Moves the selected step up or down in the list.

➤ **Export**. This context menu command exports the information in the tab to several formats. For more information, see "Exporting Component Steps Data to a File" on page 73.

For more information on the Component Steps tab, see Chapter 4, "About Designing Manual Component Steps."

Using the Find Dialog Box in the Component Steps Tab

You can search for values in the Component Steps tab using the Find dialog box.
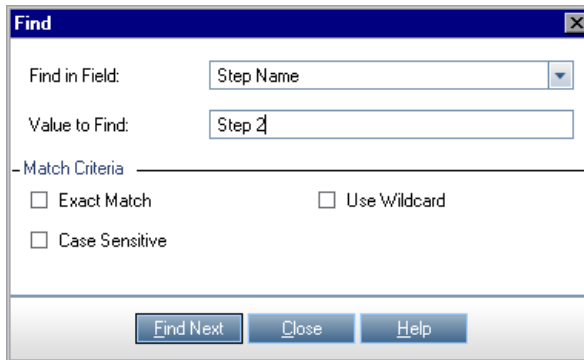
To find a value:

1 Click the **Find Text** button in the toolbar.

2 In the **Find in Field** box, select the column in which you want to search for a specific value.

3 In the **Value to Find** box, enter the value to find.

4 To find exact matches only, select the **Exact Match** box.

5 To distinguish between uppercase and lowercase characters, select the **Case Sensitive** check box.

6 To use pattern-matching wildcard characters in the search, select the **Use Wildcard** check box.

7 Click the **Find Next** button. ALM attempts to locate any steps with the specified value. If the search is successful, the step is highlighted. If the search is unsuccessful, an information box opens.

Exporting Component Steps Data to a File

You can export the information in the Component Steps tab to several formats, including text file, Microsoft Word document, Microsoft Excel spreadsheet, or HTML document.

To export data to a file:

1 Right-click in the Component Steps tab and select **Export To**. The Export All Grid Data dialog box opens.

2 Navigate to the location for the exported file.

3 In the **File name** box, enter a name for the file.

4 In the **Save as type** box, select a file type.

5 Click **Save**.

Understanding the Manual Steps and Automation Sub-tabs

If automating a business component, the following two sub-tabs are displayed after clicking the **Generate Script** button in the toolbar of the Component Steps tab.

➤ **Manual Steps**. Displays the manual steps that were originally displayed in the Component Steps tab. These are the steps that you can automate using the Automation sub-tab, adding automated steps that can be run by a specific testing tool such as QuickTest.

For additional information on working with the Manual Steps sub-tab to create manual steps, see Chapter 4, "Designing Manual Component Steps."

➤ **Automation**. Enables you to automate the component either as a keyword-driven or scripted component.

The appearance and functionality of the Automation sub-tab depends on the development and use of the component selected in the component tree.

➤ When automating a business component as a keyword-driven component in ALM, you add and modify the steps of a business component in a keyword-driven, table format. This format is called the Keyword view.

You can also automate a component as a keyword-driven component in a testing tool such as QuickTest, and save it to the current project. When accessing this type of automated component in ALM, the automated steps are displayed in Keyword view.

For more information, see Chapter 2, "Understanding the Automation Sub-tab - Keyword View."

➤ When automating as a scripted component, a **Launch** button displays enabling you to launch a testing tool, such as QuickTest.

For more information, see Chapter 2, "Understanding the Automation Sub-tab - Scripted View."

For information on working with the Automation sub-tab to automate components, see Chapter 5, "Working with Automated Component Steps."

Understanding the Automation Sub-tab - Scripted View

Complex functionality, such as loops or conditional statements, is added to a keyword-driven component using operations from a function library that was created for your needs by the automation engineer. Scripted components can contain this type of programming functionality directly inside the steps. They can be created in ALM, QuickTest Professional, or another testing tool.

However, the individual steps in the scripted component are not shown in the Automation sub-tab, and they can be edited only in the appropriate testing tool. Click the **Launch** button in the Automation sub-tab to open the applicable testing tool and edit the component.

You can include combinations of scripted, manual, and keyword-driven component types in business process tests and flows.

For more information on creating and editing scripted components in QuickTest, see the *HP QuickTest Professional for Business Process Testing User Guide*.

Automation Sub-tab Scripted View Buttons

The Automation sub-tab scripted view contains the following button:

➤ **Launch**. Launches the applicable testing tool, such as QuickTest, and enables you to edit the component directly in the tool.

Understanding the Automation Sub-tab - Keyword View

The Keyword View format of the Automation sub-tab is displayed when a component is created in ALM and then automated as a QuickTest keyword-driven component, or is created as a business component in QuickTest or another testing tool.

The Automation sub-tab of a keyword-driven business component enables you to create new steps and modify the existing steps of your business component in a keyword-driven, table format. You can provide additional information in the form of comments.

Each step or comment in the component is created as a row in the table. Columns separate the steps into individual parts, which you can modify if required. Each step of a keyword-driven component is automatically documented as you complete it, providing a plain-language textual description of the component. This information makes it easy to review the operations of an implemented (or under development) component.

You can select which columns to display in the Automation sub-tab and their order in the tab. If you do not see one or more of the required columns in the tab, you can use the Keyword View Options dialog box to display them. You can display the **Documentation** column only, for example, if you want to use the steps as instructions for manual testing. For more information, see "Setting Keyword View Options" on page 144.

Note: To view content in the Automation sub-tab, the QuickTest Professional Add-in for Business Process Testing must be installed. For more information, see "Prerequisites" on page 42.

This topic also contains the following information:

➤ "Automation Sub-tab Example" on page 77

➤ "Automation Sub-tab Keyword View Commands" on page 78

➤ "Automation Sub-tab Keyword View Columns" on page 80

Automation Sub-tab Example

The steps of the following component were created in ALM. The component was then automated as a QuickTest keyword-driven component. You can see the automatic conversion of the manual steps that were created in the Component Steps tab before the component was automated:
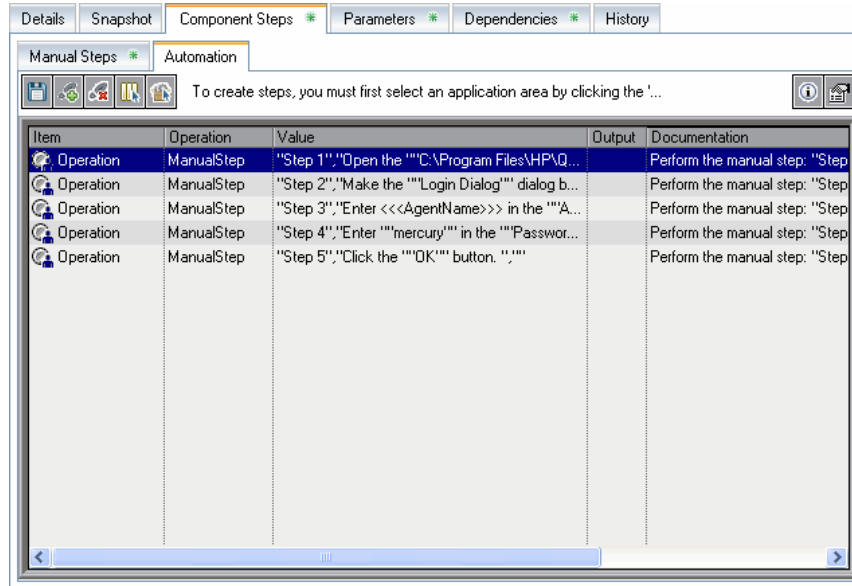
Note: In the sample Automation sub-tab above, an application area has not yet been chosen.

The following component was created as a business component in QuickTest Professional. It already contains automated steps.

Automation Sub-tab Keyword View Commands

The Automation sub-tab keyword view contains the following toolbar buttons and context menu commands:

Toolbar Button Commands

➤ **Save.** Saves the business component steps and comments. Steps and comments you create or modify are not saved until either you click this button or you leave the Automation sub-tab. For more information, see "Saving Component Steps" on page 151.

➤ **Add Step.** Enables you to add a step or comment below the selected step. For more information, see "Creating Steps in the Keyword View" on page 149.

➤ **Delete Step.** Deletes the selected steps or comments.

➤ **View Options.** Opens the Keyword View Options dialog box, enabling you to specify which columns to display in the Automation sub-tab and the order in which they are displayed. For more information, see "Setting Keyword View Options" on page 144.

➤ **Select Application Area.** Enables you to select an application area on which to base your business component, or select a different application area. For more information, see "Choosing the Application Area" on page 139.

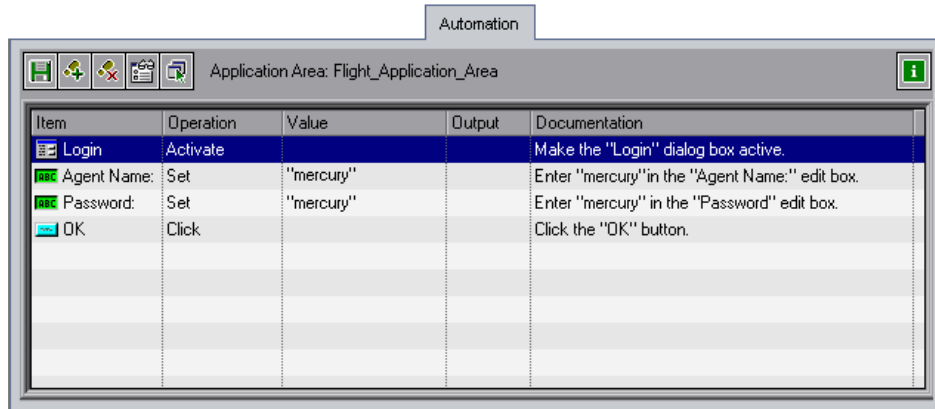➤ **General Information.** Displays information about the business component and its path.

➤ **Information.** Displays the QuickTest Professional Add-in for Business Process Testing version installed on your ALM client.

Context Menu Commands from Table Cells

➤ **Insert New Step.** Enables you to insert an new step below the selected row.

➤ **Insert Operation.** Enables you to insert an operation row below the selected row.

➤ **Insert Comment.** Enables you to insert a comment row below the selected row.

➤ **Checkpoint Properties.** Enables you to compare the current value of a specified property with the expected value for that property. For more information, see "Adding Additional QuickTest Functionality to the Automated Component" on page 82.

➤ **Cut.** Deletes the selected rows and stores them on the Clipboard.

➤ **Copy.** Copies the selected rows to the Clipboard.

➤ **Paste.** Pastes cut or copied rows below the selected row in the tab.

➤ **Delete.** Deletes selected steps or comments in the tab.

Context Menu Commands from Table Headings

➤ **Item.** Toggles the display of the Item column on/off.

➤ **Operation.** Toggles the display of the Operation column on/off.

➤ **Value.** Toggles the display of the Value column on/off.

➤ **Output.** Toggles the display of the Output column on/off.

➤ **Documentation**. Toggles the display of the Documentation column on/off.

➤ **Documentation only**. Hides all columns other than Documentation.

➤ **Copy Documentation to Clipboard.** Copies the contents of the Documentation column to the clipboard.

Automation Sub-tab Keyword View Columns

The Automation sub-tab in the keyword view format can contain the following columns:

➤ Item Column

➤ Operation Column

➤ Value Column

➤ Output Column

➤ Documentation Column

Item Column

The **Item** column displays the objects in your application on which you perform operations. These objects are defined in the object repository that was prepared for you by the automation engineer and associated with the application area on which your business component is based.

You select the item from an icon-based list, which displays the item and all sibling objects of the previous step, as well as any child objects for the previous step.

For example, if the previous step specifies the **Login Window** object, then the **User name** and **Password** objects might be displayed for the next step.

This column can also display the **Operation** item, which enables you to select from operations defined in the function libraries associated with your component's application area. For example, operations that open an application at the start of a business component or check the value of a specific property.

For more information on selecting objects and operations, see "Selecting an Item for a Step" on page 152.

If you want to add a comment to your business component, you can select **Comment** from the list. Comments are displayed in a free-text cell that extends the entire width of the row.

For more information on adding comments, see "Entering Comments in the Keyword View" on page 162.

Operation Column

The **Operation** column displays the operation to be performed on the item selected in the business component step. This column provides a list of all available operations that can be performed on the object selected in the **Item** column, for example, **Click** or **Select**.

The available operations change dynamically according to the item selected in the **Item** column. By default, the most commonly used operation for the object is displayed.

For more information on selecting operations, see "Selecting an Operation for a Step" on page 157.

Value Column

The **Value** column displays the values for the selected operation. The **Value** cell is partitioned according to the number of values that must or can be supplied for the selected operation.

The value can be a fixed value (a constant), a **local** parameter, or a **component** parameter.

➤ **Local parameter.** A local parameter is specific to the business component. Its value is defined within the component and can be accessed by that component only. It is intended for use in a single step or between component steps, for example, as an output parameter for one step and an input parameter for a later step. For more information, see "Parameterizing in the Keyword View" on page 164.

➤ **Component parameter.** A component parameter is assigned a value from an external source, such as the business process test designer, test runner, or from a retrieved value of another component or flow. For more information, see Chapter 9, "Working with Parameters."

Output Column

The **Output** column displays the parameter in which output values for the step are stored. You can use the value stored in an output parameter later in the business component or as an input parameter in other business components or flows.

Similar to the **Value** column, you can use two types of parameters when specifying an output parameter—a local parameter or a component parameter.

For more information on defining the output type and settings for output values, see "Defining Output Values for Steps" on page 159.

Documentation Column

The **Documentation** column displays read-only auto-documentation of what the step does, in a plain-language textual description.

You can copy the contents of the Documentation column to the clipboard. Right-click the column header row and select **Copy Documentation to Clipboard** from the displayed menu. Right-click at the location you want to paste the text and select **Paste**.

Adding Additional QuickTest Functionality to the Automated Component

When creating steps in a component, automation engineers working in a testing tool such as QuickTest can also add standard checkpoint and output value steps:

➤ **Checkpoint** steps compare the current value of a specified property with the expected value for that property.

➤ **Output value** steps capture one or more values at a specific point in your component and store them for the duration of the run session. The values can later be used as input at a different point in the run.

Checkpoint and output value steps are visible and editable in ALM. For more information, see "Adding Checkpoints and Output Values to Steps" on page 174.

The New Component Dialog Box

The New Component dialog box enables you to add manual steps to your component. You open this dialog box from the Component Steps tab by clicking the **Add Step** button in the toolbar.

For information on working with the details of your components, see "About Designing Manual Component Steps" on page 121.

Note:

➤ You can add user-defined fields and change the label of any of the fields in the Components module. You can also customize project lists. For more details, refer to the *HP Application Lifecycle Management Administrator Guide*.

➤ You can use the Script Editor to restrict and dynamically change the fields and values in the Components module. For more details, refer to the *HP Application Lifecycle Management Administrator Guide*.

The New Component dialog box toolbar contains the following buttons:

➤ **Clear All Fields.** Clears all data in the dialog box.

➤ **Spell Checking.** Checks the spelling of the selected word or all the words in the component.

➤ **Thesaurus.** Displays a synonym, antonym, or related word for the selected word.

➤ **Spelling Options.** Configures the way ALM checks spelling.

For a list of available fields, see "Understanding the Details Tab" on page 62.

The Component Details Dialog Box

The Component Details dialog box enables you to update the details of a business component.
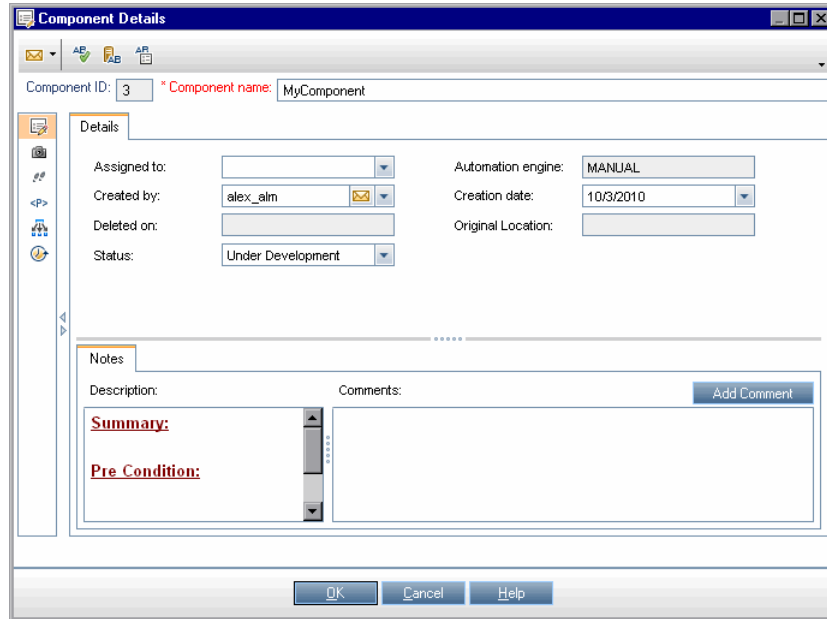
Note:

➤ You can add user-defined fields and change the label of any of the fields in the Components module. You can also customize project lists. For more details, refer to the *HP Application Lifecycle Management Administrator Guide*.

➤ You can use the Script Editor to restrict and dynamically change the fields and values in the Components module. For more details, refer to the *HP Application Lifecycle Management Administrator Guide*.

The Component Details dialog box toolbar contains the following buttons:

➤ **Send by E-mail**. Sends an email with the component details. For more information, see the *HP Application Lifecycle Management User Guide*.

➤ **Spell Checking.** Checks the spelling of the selected word or all the words in the component.

➤ **Thesaurus.** Displays a synonym, antonym, or related word for the selected word.

➤ **Spelling Options.** Configures the way ALM checks spelling.

The Component Details dialog box contains sidebar entries that provide additional information about the component. For details on these sidebar entries (tabs), see "Business Components Module Tabs" on page 45.

For a list of available fields, see "Understanding the Details Tab" on page 62.

The Component Step Details Dialog Box

The Component Step Details dialog box enables you to edit a selected step.

Click a component in the component tree and click the **Add Step** button or **Edit Step** button on the toolbar to open the dialog box.
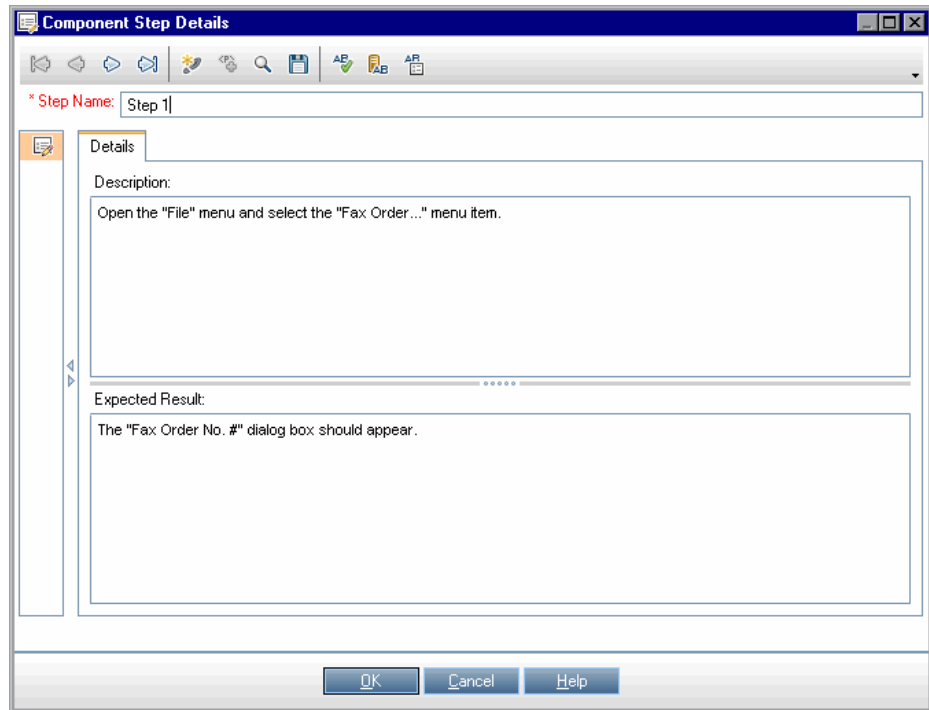
For information on working with the details of your components, see "About Designing Manual Component Steps" on page 121.

The Component Step Details dialog box toolbar contains the following buttons:

➤ **First Step.** Jumps to the first manual step in the component.

➤ **Previous Step.** Jumps to the previous manual step.

➤ **Next Step.** Jumps to the next manual step.

➤ **Last Step.** Jumps to the last manual step in the component.

➤ **New Step.** Adds a step below the selected step.

➤ **Insert Parameter.** Inserts a parameter into the step. This command is enabled only when your focus is in the Description or Expected Result cells. For more information on inserting parameters, see "Defining Input and Output Component Parameters for a Business Component" on page 100.

➤ **Find Text.** Opens the Find dialog box, enabling you to search in the tab for steps that contain a specified text value. Select the column in which you want to search, and enter the value you want to find. For more information, see "Using the Find Dialog Box in the Component Steps Tab" on page 72.

➤ **Save steps.** Saves the component steps that you have created or modified. New or changed steps are not saved until either you click this button or you leave the Component Steps tab. For more information, see "Saving Component Steps" on page 151.

➤ **Spell Checking.** Checks the spelling of the selected word or all the words in the component.

➤ **Thesaurus.** Displays a synonym, antonym, or related word for the selected word.

➤ **Spelling Options.** Configures the way ALM checks spelling.

3

Working with Business Components

You create business components and define their details in the Business Components module. You can then combine these components into business process tests and flows in the Test Plan module, as described in Chapter 6, "Getting Started with Business Process Tests."

This chapter describes the basic management operations required to create and define business components.

This chapter includes:

➤ About Working with Business Components on page 90

➤ Creating a Component Tree on page 91

➤ Defining Business Components on page 93

➤ Viewing and Modifying Business Components on page 101

➤ Mailing Components on page 110

➤ Handling Component Requests on page 110

➤ Analyzing Your Project on page 114

Note: To control access to various modules and tasks, HP Application Lifecycle Management (ALM) enables you to configure access permissions for users. The procedures described in this chapter are dependent on the user or user group to which the user belongs having the proper permissions. For more information, see the *HP Application Lifecycle Management Administrator Guide*.

About Working with Business Components

Before creating business components, you create a component tree in which to store them. For details, see "Creating a Component Tree" on page 91.

You create business components in the Business Components module by defining the details of the component's shell (which comprises an overview of the information that is required at the test-creation level), such as the component's description, status, implementation requirements, and so on, and storing the components in the component tree. You can then incorporate the components into business process tests and flows in the Test Plan module tabs.

Components created by converting manual tests, or by using other testing tools such as QuickTest Professional, are also stored in the component tree and can be included in business process tests and flows.

Business component definitions include a description of the component's purpose, the conditions of the application being tested before and after the component steps are performed, and the actual steps that comprise the component. You can define the steps in the business component as manual steps, or you can automate them using a testing tool such as QuickTest.

You can also define manual steps for the component, and then choose whether to convert it to an automated QuickTest keyword-driven component, or QuickTest scripted component. For keyword-driven components, you can begin implementing the automated steps in the Keyword View. Components can be created and used to build business process tests and flows even if the implementation of the application has not yet begun.

You can define input component parameters that are required by the business component and output component parameter values returned to other components or flows.

Several of the component shell settings that you define in the Business Components module, for example, the snapshot and the component parameters, can be viewed and modified in the Business Component Settings dialog box in QuickTest.

Note: For more information on the Business Component Settings dialog box, see the *HP QuickTest Professional for Business Process Testing User Guide.*

After the business component has been defined, the subject matter expert and the automation engineer can work independently of each other, in parallel or sequentially, depending on the status of the application being tested.

Creating a Component Tree

The component tree displays business components in a graphical hierarchy. Icons identify the status of the component and whether it is an automated or manual component.

At the top level of the component tree is the **Components** root folder, which contains the:

➤ **Obsolete** folder, which contains any components that have been removed from the components folders but are still being used by one or more business process tests or flows.

➤ **Component Requests** folder, which contains requests for new components.

➤ Business components folders, which contains business components.

The **Components** root folder, the **Component Requests** folder, and the **Obsolete** folder cannot be renamed or deleted. For information on the special **Obsolete** and **Component Requests** folders, see "Understanding the Obsolete Folder" on page 107 and "Requesting New Components for Business Process Tests or Flows" on page 227.

Components cannot be created directly in the root folder. Create component folders in which to save your components.

In a version-controlled project, the new components you create are automatically checked out.

To create a component folder in the component tree:

1 Log in to your ALM project as described in the *HP Application Lifecycle Management User Guide*. The ALM window opens.

2 To access the Business Components module: In the ALM sidebar, under Testing, select **Business Components**. The Business Components module opens.

If **Business Components** is not displayed in the sidebar, see "Accessing Business Process Testing" on page 42.

3 In the component tree, select the **Components** root folder, or another folder in the tree.

4 Click the **New Component Folder** button in the tree toolbar, or right-click and select **New Component Folder**. The New Component Folder dialog box opens.

5 Enter a descriptive name in the **Component Folder Name** box and click **OK**.

Note: Component folder names must not contain two consecutive semicolons (;;) or include any of the following characters: \ * ^

The new folder is displayed under the folder you selected in step 3.

To add a new business component to a folder:

1 Select the folder and click the **New Component** button in the toolbar, or right-click the folder and select **New Component**. The New Component dialog box opens. For user interface details, see "The New Component Dialog Box" on page 83.

2 Enter a descriptive name in the **Component Name** box and click **OK**. The new business component is displayed under the folder in the component tree. Components in a folder are displayed in alphabetical order. New components are automatically assigned the status of **Under Development**.

Note: Business component names cannot exceed 255 characters, contain two consecutive semicolons (;;), or include any of the following characters: **! % * { } \ | ' : " / < > ?**
Spaces at the beginning or end of business component names are ignored.

After you have created your business component, you define its shell and content, as described in "Defining Business Components" below.

Defining Business Components

After you create a business component and select it in the component tree, the component tabs are displayed. You define the component by entering the relevant details into the various component tabs.

This section contains the following topics:

➤ "Providing Component Details and Implementation Requirements" on page 94

➤ "Attaching Images" on page 98

➤ "Defining Input and Output Component Parameters for a Business Component" on page 100

Providing Component Details and Implementation Requirements

You provide or view the general details and attributes of the business component in the upper area of the Details tab. You can enter additional descriptive information in the Notes tab in the lower area of the window.

You can also edit business components in the Component Details dialog box.

This section describes:

➤ "Component Details Tab and Details Dialog Box" on page 94

➤ "Specifying General Component Details" on page 95

➤ "Specifying Implementation Requirements" on page 96

➤ "Adding Comments to the Business Component" on page 97

Component Details Tab and Details Dialog Box

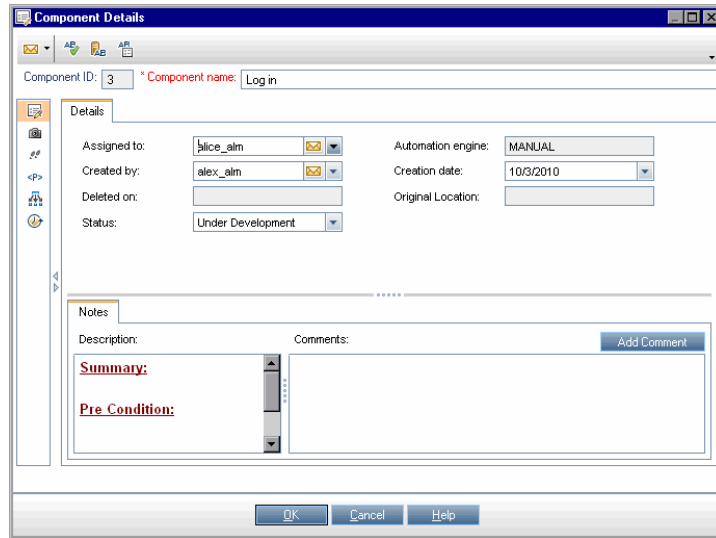An example of the Details tab for a component is shown below.

An example of the Component Details dialog box is shown below.

For a list of the fields available in the Details tab and the Component Details dialog box, see "The Component Details Dialog Box" on page 85.

Specifying General Component Details

You provide or view the general details and attributes of the business component in the upper area of the Details tab.

To specify general component details:

1 In the **Assigned To** box, enter or select the name of the user responsible for writing and maintaining the testing steps for this business component. You can click the arrow to search for a specific user in the user list or view users by user group.

2 In the **Status** box, you can modify the status of the business component, if required. To do so, select a different status from the list. The icon in the component tree changes dynamically according to your selection.

Business component statuses and their corresponding icons are described in "Business Component Life-cycle and Statuses" on page 58.

The status can also be modified by the automation engineer in the Business Component Settings dialog box in QuickTest.

Specifying Implementation Requirements

You can enter additional descriptive information and implementation requirements in the Notes tab in the lower area of the window.

In the **Description** area, enter a description of the business component's purpose or contents, and the business component's implementation requirements.

You can use the following section headings that are provided by default:

➤ **Summary.** Enter an overall textual description of the business component's purpose or contents.

➤ **Pre-Condition.** Describe the point in the application at which the current business component starts. This generally includes information on which applications should be open or closed, whether the component should launch an application, and/or the state of the application prior to the first step in the component.

➤ **Post-Condition.** Describe the point in the application at which the current business component ends. This generally includes information on whether the component steps should close any applications and/or information on the state of the application after the last step in the component. For example, if you want the component to allow iterations, the post-conditions should specify that the application's end state should match its state at the beginning of the component.

For keyword-driven components, you can also use this area to specify additional functionality that needs to be provided by the automation engineer in the form of new, registered operations.

Notes:

➤ The **Description** area provides a comprehensive selection of text editing and formatting commands.

➤ The information that you enter in the Business Components module **Description** area can be viewed in the Business Component Settings dialog box in QuickTest.

➤ The information can also be viewed in the Component Details pane of the Test Script tab in the Test Plan module, as described in "Component and Flow Details Pane" on page 202.

Adding Comments to the Business Component

The **Comments Area** in the Details tab provides a communication channel between different users of the component.

The automation engineer, other component users, or developers can then view the information that you enter. These users may also provide feedback or instructions for you in this area. For more information, see "Components and Flows Pane" on page 200.

To add comments to the Comments Area:

1 Click the **Add Comment** button to automatically insert your user name and the current server date into the **Comments Area** as an introduction to your comments.

2 Enter any additional information or remarks that you want to communicate to the automation engineer or other users, such as requests for new operations, future changes planned for the component, or alternative tests or flows in which the component can be used.

Note: The **Comments** area provides a comprehensive selection of text editing and formatting commands.

Attaching Images

A snapshot of a specific part of the application provides a visual cue of the contents or purpose of the business component. You can view the image for each component in a business process test or flow in the Test Script tab of the Test Plan module by clicking the relevant thumbnail image. Viewing the sequence of these images can help you to better understand the business process test or flow.

You can capture and attach an image associated with the business component using the Snapshot dialog box, or you can load a previously saved **.png**, **.jpg**, **.gif**, or **.bmp** image from your local drive.

Only one image can be attached to a business component.

For user interface details, see the *HP Application Lifecycle Management User Guide*.

➤ Attaching an image is described in "Attaching an Image to a Business Component" on page 98.

➤ Loading a saved image is described in "Loading an Image" on page 99.

Attaching an Image to a Business Component

You capture and attach an image associated with a business component in the Snapshot tab.
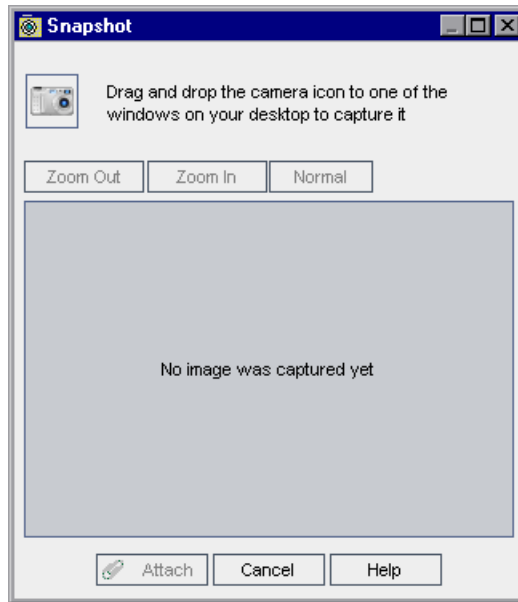
To attach an image to a business component:

1 In the Business Components module, select the relevant business component in the component tree and click the **Snapshot** tab.

2 Click the **Snapshot** button in the toolbar.

The Snapshot dialog box opens.

3 Display the object you want to capture on your desktop. The Snapshot dialog box remains in view.

4 Drag and drop the camera icon from the Snapshot dialog box onto the object you want to use for your snapshot image. The image is captured and displayed in the Snapshot dialog box.

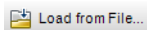**5** Click the **Attach** button. The image is saved and displayed in the Snapshot tab of the component.

Loading an Image

You can load an image for your component from a local drive.

To load an image for a business component:

1 Select the relevant business component in the component tree and click the **Snapshot** tab.

2 Click the **Load from File**. button in the toolbar. The Select Snapshot dialog box opens.

3 Browse to the location of the snapshot you want to attach and click **Open**.

Note: The image that you attach or load in the Business Components module Snapshot tab can be viewed in the Test Script tab of the Test Plan module, as described in "Test Script Tab" on page 196.

The image can also be viewed or replaced in the Business Component Settings dialog box in QuickTest.

Defining Input and Output Component Parameters for a Business Component

In the Parameters tab, you can define the input component parameters that the business component can receive and the output component parameters that the component can pass to other components and flows. Input component parameters enable components to use data provided by an external source. Output values enable data from one component to be passed as an input value to a subsequent component or flow in the test.

Component parameter names, descriptions, and default values (in the case of input component parameters) are initially defined in the Business Components module. Actual values for input component parameters are assigned in the Test Plan module.

For task details on working with parameters, see Chapter 9, "Working with Parameters."

Viewing and Modifying Business Components

You can view and modify business components and component folders in the component tree.

Viewing and Modifying Business Components in the Component Tree

When the Business Components module is first accessed, the component tree displays only the highest level folder or business component in the hierarchy. Expand the folders as necessary.

To modify a component, select it in the tree and edit the data in the displayed tabs. Alternatively, double-click the component and edit the data in the Component Details dialog box. For more information, see "Defining Business Components" on page 93.

To refresh a folder or business component in the tree, select the folder or component and click the **Refresh All** button in the toolbar.

To filter or sort the business components in the tree, click the **Filter/Sort** button in the toolbar to open the Filter components dialog box. Any currently applied filters or sort orders are displayed under the component tree toolbar.

When defining a filter, you can also include a **cross filter,** which is available in the **Cross filter** tab of the Filter components dialog box. This is an advanced, second filter on fields in the Test Plan module. For example, you can define the cross filter to display the components in the component tree that exist in a specific business process test.

For more information on filtering and sorting a tree, and on using a cross filter, see the *HP Application Lifecycle Management User Guide*.

Copying Folders and Business Components

You can copy an existing business component or folder and paste it to another location in the component tree, or to another project or server. You can also share all the components in a project across multiple projects.

This section describes:

➤ "Copying Business Process Testing Entities to Other Projects" on page 102

➤ "Copying Components or Component Folders in the Current Project" on page 104

➤ "Copying Components or Component Folders between Projects" on page 105

➤ "Sharing Components and Component Resources" on page 107

Copying Business Process Testing Entities to Other Projects

When copying a business component, an application area, or a component folder to another project or server, consider the following:

When Copying...	Consider the Following...
All Entities	➤ Both servers must be running the same version of ALM. ➤ The source and target projects must be opened in separate browsers. ➤ Before you copy components that were created in a previous version of Quality Center, you must upgrade them to the current version. For more information, see the *HP Application Lifecycle Management Administrator Guide*.

When Copying...	Consider the Following...
All Entities *(continued)*	➤ In a version-controlled project, you can copy and paste any checked in entity, as well as any entity that is checked out by another user - the copied entity will contain the last checked-in data. However, you cannot copy and paste an entity that is currently checked out by you. You must first check in the entity and all its checked-out dependencies before copying and pasting it. For example, consider a business process test containing a flow, which in turn contains a business component and a scripted component. Before copying and pasting the test, you need to check in the components in the Business Components module, the resources associated with those components in the Test Resources module, and the flow in the Test Plan module.
Business Components	➤ If the component path in the target project already exists, and a business component in a test or flow matches the name and signature of an existing component (meaning the number of parameters, parameter types, and so on), the existing component is linked to the business process tests or flows that include it, and the original component is not copied. ➤ If the signatures do not match, the component is copied and a suffix, for example _Copy_1, is automatically added to the component name to create a unique name.

When Copying...	Consider the Following...
Folders	➤ If a copied folder has the same name as a folder that already exists in the target folder, a duplicate name warning message is displayed. Click **OK**. The folder is copied to the new position in the component tree, and a suffix, for example _Copy_1, is automatically added to the folder name.
	➤ Components within folders that are copied in the component tree are also copied. All considerations for copying individual components to other projects or servers, as described above, also apply to all components copied when you copy a folder. You can then use the settings and steps of the copied components as the basis for new components.
Application Areas	When you copy a business component, its associated application area is also automatically copied, unless an application area with the same name already exists in the location in which you are copying the component.
	Caution: If an application area with the same name already exists in the target location, the application area is not copied, and the new component is linked to the existing application area. You must check to ensure that the application area in the new location has the correct settings and resource files for the component you are copying.

Copying Components or Component Folders in the Current Project

You can copy components or component folders within the same project. For more information, see "Copying Business Process Testing Entities to Other Projects" on page 102

To copy an existing folder or business component:

1 Select the components or component folders that you want to copy in the component tree.

2 Right-click and select **Copy**. Alternatively, Select **Edit** > **Copy**.

3 In the component tree, right-click the folder in which you want to paste the new folder or business component, and select **Paste**. The folder or component is copied to the new position in the component tree.

4 If you want to change the name of the copied folder or business component, right-click the folder or component in the tree, select **Rename** from the context menu and then enter a new name.

5 If required, select the copied business component in the tree and modify the settings in the tabs as described in "Defining Business Components" on page 93.

Copying Components or Component Folders between Projects

You can copy components or component folders from one project to another. For more information, see "Copying Business Process Testing Entities to Other Projects" on page 102.
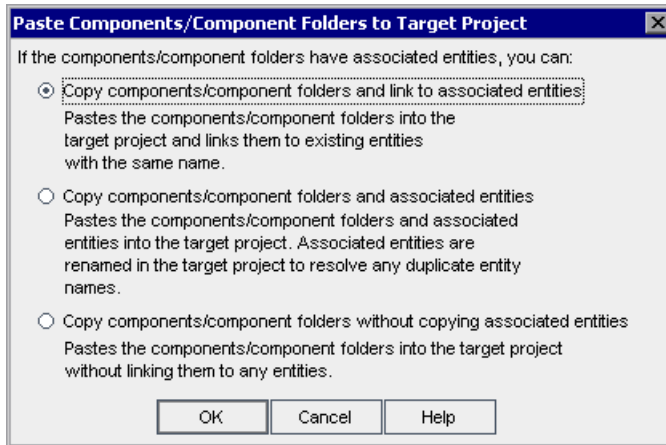
If the components or component folders have related entities, you can instruct ALM to copy them using one of the following methods:

➤ Copy components or component folders and their related entities to the target project. Entities in the target project with duplicate names are renamed.

➤ Copy components or component folders to the target project and associate them to existing entities with the same name.

➤ Copy components or component folders to the target project without copying related entities. The associations to the entities are removed.

To copy a component or component folder between projects:

1 If copying to another project or server, open the source and target projects in separate browsers.

2 Select the components or component folders that you want to copy in the component tree.

3 Right-click and select **Copy**. Alternatively, select **Edit** > **Copy**.

4 Open another instance of ALM and log into the project to which you want to paste the components.

5 Select the folder to which you want to copy the components or component folders.

6 Right-click and select **Paste**. Alternatively, select **Edit > Paste**. The Paste Components/Component Folders to Target Project dialog box opens.

7 Select one of the following options:

➤ **Copy components/component folders and link to associated entities.** ALM copies the components or component folders and pastes them into the target project. The copied components or component folders are linked to related entities with the same name and path. If an entity does not exist in the target project, ALM copies it to the target project and links it to the component.

➤ **Copy components/component folders and associated entities.** ALM copies the components or component folders along with the related entities and pastes them into the target project. If a related entity already exists in the target project, the copied entity is renamed to resolve the duplicate name.

➤ **Copy components/component folders without copying associated entities.** ALM copies the components/component folders without copying related entities, and pastes them into the target project. The copied items are not associated with any entities.

Click **OK**.

Sharing Components and Component Resources

In addition to copying components, you can share all the components in a project across multiple projects. ALM enables you to create baseline libraries of components, tests, and other entities, together with their resources. These entities can then be reused in other projects. For more information, see the *HP Application Lifecycle Management User Guide*.

Understanding the Obsolete Folder

When you delete business components that are currently being used by one or more business process tests or flow, they are automatically transferred to the **Obsolete** folder.

Business components in the **Obsolete** folder are read-only, cannot be modified, and cannot be added to other tests and flows.

Business components in the **Obsolete** folder can be restored to their original location using the **Restore** option, as described in "Restoring Obsolete Business Components" on page 109. They can also be transferred to any position in the component tree by dragging them from the **Obsolete** folder to the required position.

Note: Business components whose original location folders have been deleted (and exist in the **Obsolete** folder), and component requests that were not previously located in the component tree, can be transferred to the component tree using the drag and drop method only.

You can delete business components from the **Obsolete** folder if they are no longer being used by any business process test or flow.

Tip: You can simultaneously delete from the **Obsolete** folder all the business components that are no longer being used by any business process test or flow. Right-click the **Obsolete** folder and select **Clean unused components**.

When importing libraries, components in the **Obsolete** folder are not included in the process.

In a version-controlled project, components in the **Obsolete** folder cannot be checked in or checked out. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*.

Removing Business Components

You can delete a folder or remove a business component that is not required.

Business components that are not being used by any business process test or flow are permanently deleted. Components that are being used by one or more business process tests or flows are automatically transferred to the **Obsolete** folder. Obsolete business components cannot be copied, modified, or added to other tests and flows. For more information on the **Obsolete** folder, see "Understanding the Obsolete Folder" on page 107.

The deletion date and original location of a removed business component in the **Obsolete** folder are shown in the component's Details tab.

In addition, the component status is displayed with the **Obsolete** icon in the Test Script tab in the Test Plan module, to indicate that the component should not be used in business process tests or flows.

If you delete a component folder in the component tree, its subfolders and all the business components in the folders are removed. Components contained in the folders that are being used by one or more business process tests or flows are transferred to the **Obsolete** folder.

Note: Business process tests or flows containing one or more obsolete components are assigned the status of **Outdated**, indicating that a more up-to-date component may be required in the test or flow.

Before you choose to remove a business component, you can check whether any business process tests or flows are using that component by selecting it in the tree and clicking the **Dependencies** tab.

To remove a folder or business component:

1 Select the folder or business component in the component tree and click the **Delete** button in the toolbar, or right-click the folder or component and select **Delete**. A warning message is displayed.

2 Click **OK**. The folder or business component is removed. Components that are currently being used by a business process test or flow are transferred to the **Obsolete** folder.

Tip: To view a removed business component in the **Obsolete** folder in the component tree, you must first refresh the folder. Select the **Obsolete** folder and click the **Refresh All** button in the tree toolbar.

Restoring Obsolete Business Components

Business components in the Obsolete folder can be restored to their original position in the component tree, if the folder still exists in the tree.

You can view the folder in which the business component was located when it was last deleted in the **Original Location** field in the Component Details tab. The date that the component was deleted is also displayed in the **Deleted on** field.

To restore a business component, right-click the component in the **Obsolete** folder, and select **Restore**. The component is restored to its original location in the component tree.

Note: You can also select the component in the Obsolete folder and drag it to the appropriate folder in the component tree. This method must be used for business components whose original location folders have been deleted in the component tree.

Mailing Components

You can send an e-mail about a component to another user. A link is included in the email message that enables the recipient to go directly to the component in the Business Components module.

To send an email about a business component in the tree, select the component and click the **Send by E-mail** button in the toolbar.

For more information, see the *HP Application Lifecycle Management User Guide*.

Handling Component Requests

It is possible that none of the existing business components in the component tree meets the needs of a business process test or flow. If a necessary component has not been defined, a request for a new component can be initiated, created, edited, and submitted directly from the Test Plan module. This feature is especially useful when the roles of creating components in the Business Components module and building business process tests or flows in the Test Plan module are performed by different personnel.

After a component request has been submitted from the Test Plan module, it is automatically displayed in the **Component Requests** folder in the component tree of the Business Components module. Component requests cannot be copied in the **Component Requests** folder, but they may be edited and version control is supported. Component requests can also be edited in the Test Plan module.
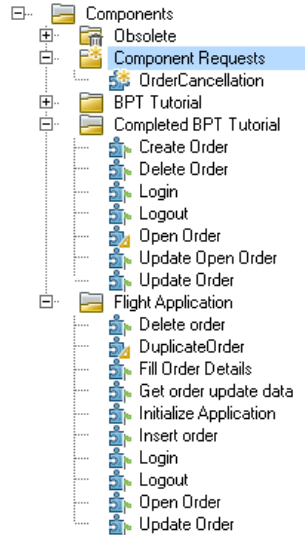
You can select the Dependencies tab to view details of the business process tests or flows that are already using the requested business component.

To change component requests to official business components of the project, you can drag them from the Component Requests folder and drop them in the appropriate folder in the component tree, or cut and paste them into a component folder. When the component requests are moved out of the Component Requests folder, their status changes from **Not Implemented** to **Under Development**.

You can also delete the request if an existing component already answers the same needs as the request, or you otherwise determine that the requested component is unnecessary.

When importing libraries, components in the **Component Requests** folder are not included in the process.

In a version-controlled project, component requests cannot be checked in or checked out. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*.

For more information on requesting business components for business process tests or flows, see "Requesting New Components for Business Process Tests or Flows" on page 227.

Adding Component Requests to the Component Tree as Business Components

If no existing business component answers the needs defined in the component request, create a business component and add it to the component tree.

To add a component request to the component tree:

1 Click the **Refresh All** button above the component tree to ensure that the most recent component requests are displayed in the tree.

2 Select the required component request and drag it to the appropriate folder in the component tree.

   The request is displayed in the new position in the tree and its component tabs are displayed. The status of the request changes from **Not Implemented** to **Under Development**.

3 To rename the request, select it in the tree and then click it. Alternatively, right-click the request and select **Rename**. Edit the request name and press ENTER.

4 Edit the component in the Details, Snapshot, and Parameters tabs, and create component steps in the Component Steps tab, as described in "Defining Business Components" on page 93.

Deleting Component Requests

If a requested business component is not required, you can remove the request from the Component Requests folder.

Note: Business process tests or flows containing one or more obsolete component requests are assigned the status of **Outdated**.

Before you choose to remove a component request, you can check whether any business process tests or flows are using that component request by selecting it in the Component Requests folder and clicking the **Dependencies** tab.

Component requests in the **Obsolete** folder are read-only and cannot be modified, but they can be transferred to any position in the component tree by dragging them from the **Obsolete** folder to the required position.

You can delete component requests from the **Obsolete** folder only if they are no longer being used by any business process test or flow.

To delete a component request from the Component Requests folder:

1 Select the component request in the Component Requests folder and click the **Delete** button in the toolbar. A warning message is displayed.

2 Click **OK**. The request is removed from the folder. Component requests that are currently being used by one or more business process tests or flows are transferred to the **Obsolete** folder. Component requests that are not currently being used by any business process test or flow are permanently deleted from the project.

To permanently delete a component request:

1 Select the component request in the Component Requests folder and click the **Dependencies** tab to check that the request is not currently being used by any business process test or flow.

2 Select the component request in the **Obsolete** folder and click the **Delete** button in the component tree toolbar, or right-click the request and select **Delete**. A warning message is displayed.

3 Click **OK**. The component request is permanently deleted from the project.

Analyzing Your Project

ALM provides a number of features that enable you to analyze the business process testing data in your project.

This section contains the following:

➤ "Generating Reports and Graphs" on page 114

➤ "Generating Project Documents" on page 117

Generating Reports and Graphs

You can create Business Process Testing standard reports and graphs that are customizable in the ALM Dashboard module.

You can also create Business Process Testing standard reports (**quick reports**) and graphs in the **Analysis** menu of the Business Components module (and the Test Plan module). You can use these quick reports for one-time reference, or you can save them in the Dashboard module, where you can continue to configure their data and appearance. The Dashboard module allows you to define the data that the report or graph includes, and add extra layers of related data in sub-reports.

For a list of available predefined reports and graphs for Business Process Testing, see "Predefined Standard Reports" on page 115, and "Predefined Standard Graphs" on page 116.

To create standard predefined (quick) reports in the Business Components module, see the *HP Application Lifecycle Management User Guide*.

To define what data appears in a graph, and how the data is organized, see the *HP Application Lifecycle Management User Guide*.

For more information on the Dashboard module, see the *HP Application Lifecycle Management User Guide*.

In addition, you can use the Graph Wizard from the Business Components module or the Dashboard module to create graphs of component data (Select **Analysis** > **Graphs** > **Graph Wizard.**) You use the Graph Wizard to create graphs of component data in the same way as you create graphs in other ALM modules. For task details on the wizard, see the *HP Application Lifecycle Management User Guide*.

This section contains the following:

➤ "Predefined Standard Reports" on page 115

➤ "Predefined Standard Graphs" on page 116

Predefined Standard Reports

To create business process testing reports, select from a list of predefined quick reports in the **Analysis** > **Reports** sub-menu of the Business Components and Test Plan modules.

The following quick reports are available in the Business Components module:

➤ **Standard Component Report.** Shows all the components currently in the ALM project, including all detail fields, the component descriptions, history, and whether it includes a snapshot.

➤ **Component Hierarchy Report.** Shows the components currently in the ALM project, including all detail fields and the component descriptions. Obsolete components and component requests are not shown in this report.

➤ **Components with Design Steps.** Shows all the components currently in the ALM project, including some detail fields, the component descriptions, and each component's steps.

➤ **Components Used By.** Shows all the components currently in the ALM project, including some detail fields, the component descriptions, and the business process tests and flows that use each component.

➤ **Components with Application Area.** Shows all the components currently in the ALM project, including some detail fields, the component descriptions, and the application area (if any) used by each component.

➤ **Report Selected.** Lists the components currently selected in the tree.

The following business process testing report is available in the Test Plan module:

➤ **Business Process Tests with Script.** Shows all the business process tests and flows currently in the ALM project, including some detail fields, the test or flow descriptions, and the components included in each test or flow. This report also includes information about groups, iterations, **On Failure** status, and contents of flows inside business process tests.

Predefined Standard Graphs

To create business process testing graphs, select from a list of predefined quick graphs in the **Analysis > Graphs** sub-menu of the Business Components module.

The following quick graphs are available:

➤ **Components Summary - Group by 'Status'.** Shows how many components are currently in the ALM project. The number of components is displayed according to the criteria that you specify. You can specify the type of data displayed along the x-axis, and the test plan information by which ALM groups the data. By default, the graph appears as a bar chart.

➤ **Components Progress - Group by 'Status'.** Shows how many components existed in a ALM project at each point during a period of time. The number of components is displayed according to the criteria that you specify. You can specify the time interval displayed along the x-axis, and the test plan information by which ALM groups the data. You can also specify whether you want to view the history of the selected data field, and whether you want to view the number of tests or the change in the number of tests. The graph can be viewed as a line chart only.

➤ **Components Trend - Group by 'Status'.** Shows the history of changes to specific component fields in a ALM project, at each point during a period of time. You specify the field for which you want to view the number of changes, and the time period for which you want to view data. The graph can be viewed as a bar chart only.

Generating Project Documents

The ALM Document Generator enables you to create a Microsoft Word document that includes information about the project's business components.

Business component documentation can include the following for each component in the project: **Description**, **Details**, **Snapshot**, **Steps**, and **Used By**.

For general information on how to generate project documents, see the *HP Application Lifecycle Management User Guide*.

For user interface information specific to Business Process Testing, see "Business Components Page" on page 118.

Business Components Page

This page enables you to specify the component information from the Business Components module that should appear in the Components section of the project document.
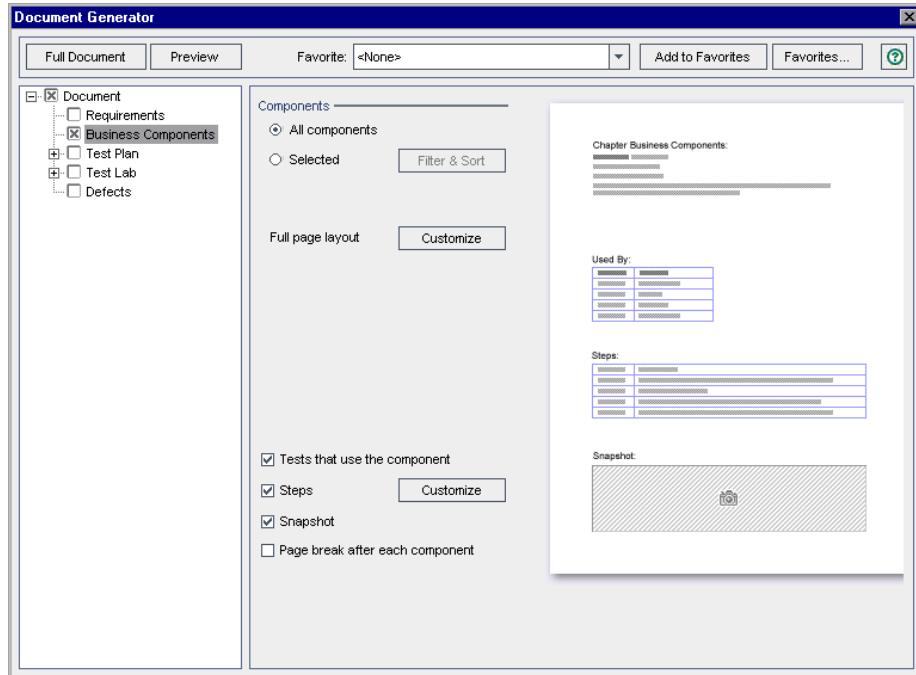
To access	Select **Tools** > **Document Generator**. Then, in the Document Generator tree, select the **Business Components** link.
Important information	Select the check box next to the **Business Components** link to include the data in the project document.
Relevant tasks	"How to Generate a Project Document" in the *HP Application Lifecycle Management User Guide*
See also	"Document Generator Window" in the *HP Application Lifecycle Management User Guide*

User interface elements are described below:

UI Elements (A-Z)	Description
Components	Select one of the following options: ➤ **All components.** Includes all the business components from the component tree. ➤ **Selected.** Includes only selected business components. Click the **Filter & Sort** button to specify the criteria for selecting requirements. For details on using the Filter dialog box, see the *HP Application Lifecycle Management User Guide*.
Full page layout	Use to customize the page layout. Click the **Customize** button to choose the information that you want to appear in the document, such as the component status, description, and whether iterations of the component are allowed.
Page break after each component	Inserts page breaks in the project document after each component.
Snapshot	Includes component snapshots in the document.
Steps	Includes all the steps of the selected components. Click the **Customize** button to configure the tabular layout and the step information that you want to appear in the document, such as the step name, description, and expected result.
Tests that use the component	Includes a list of business process tests or flows that use the component.

4

Designing Manual Component Steps

Use the Component Steps tab in the Business Components module to create or modify manual business component content in the form of steps and expected results. Combine your manual components into business process tests and flows and follow the steps to manually test your application.

This chapter includes:

➤ About Designing Manual Component Steps on page 121

➤ How to Design Manual Step on page 124

➤ Working with Parameters in Manual Steps on page 128

➤ An Example of Using Manual Steps to Manually Test an Application on page 130

About Designing Manual Component Steps

You design manual component steps by:

➤ Creating and Modifying Steps in the Component Steps Tab on page 122

➤ Parameterizing Steps on page 122

➤ Automating Steps—Optional on page 123

When you finish designing your manual steps, you can run tests containing components manually using the Test Lab module. You can check the actual results in the application against the expected results, and then indicate whether the individual steps of the components passed or failed.

Note: You can use your manual steps as guidelines for creating automated steps at a later time, using an applicable testing tool. You can use your manual steps even before the application is ready to be tested automatically, or before automated tests are complete. For more information, see Chapter 5, "Working with Automated Component Steps."

Creating and Modifying Steps in the Component Steps Tab

The Component Steps tab provides a tabular format in which you can create and modify manual steps in your business components. These steps represent operations that should be manually performed on your application when you run the component in a business process test or flow. You can also provide additional information in the form of expected results and comments.

In the Component Steps tab for manual components, you create each step in the component using the Component Details dialog box. For user interface details, see "The Component Details Dialog Box" on page 85.

Each step comprises a step name, a textual description of the procedure to be performed on the application, and the expected result (if any), of performing that step.

Parameterizing Steps

You can expand the scope of your tests, flows, and business components by using variable input and output parameter values in your manual steps. Using variable values in your components can affect test results. When you run your component manually, the parameter is replaced with an assigned value.

HP Application Lifecycle Management (ALM) enables you to create parameters directly from the Component Steps tab and insert them into your component steps.

You can insert input and output parameters into your steps if required. When you enter parameters, you enclose the parameter names between three sets of angle brackets (<<<**parameter**>>>). (Parameters that you insert into your steps using the Select Parameter feature are automatically displayed between <<< >>> brackets.)

Note: ALM recognizes the text between <<< >>> brackets as parameter names, and displays the parameters, or their defined values, for your use when you manually run the component. Therefore it is recommended that you avoid using < or > symbols in parameter names or text in your steps.

Automating Steps—Optional

Later, you can convert your manual component to an automated component. After you automate a component, you can still view its steps in the Manual Steps sub-tab in the Component Steps tab, and you can still run the tests containing this component manually, using the descriptions of the automated steps.

After automating a component, the manual steps are displayed in read-only format. You can edit the content of your original manual steps from the Keyword View in the Automation sub-tab (for keyword-driven components) or the testing tool (for scripted components). This means that you can update automated components in either ALM or a testing tool and still continue to run them manually when needed.

For more information on working with automated steps, see Chapter 5, "Working with Automated Component Steps."

How to Design Manual Step

You can design manual steps in the Component Step Details dialog box.

This section describes:

➤ "Creating Manual Steps" on page 124

➤ "Modifying Manual Steps" on page 127

➤ "Copying Manual Steps" on page 127

➤ "Deleting Manual Steps" on page 127

Creating Manual Steps

To design manual component steps:

1 After you have created a new business component, as described in Chapter 3, "Defining Business Components," in the component tree, select the business component and click the **Component Steps** tab.

Tip: Manual components in the component tree are indicated by an **M** symbol on the component icon, for example, .

The Component Steps tab for a manual component opens.
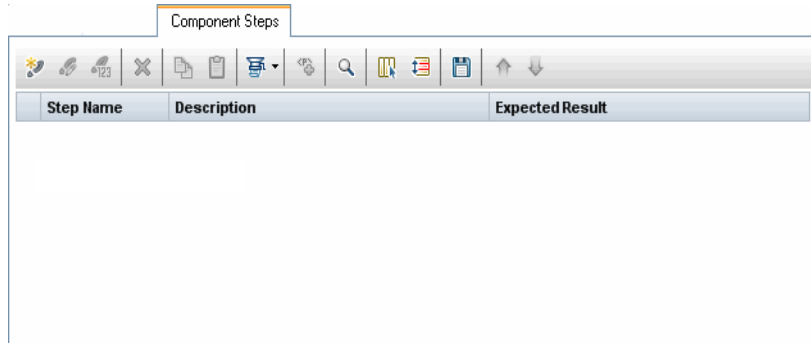
2 In the Component Steps tab toolbar, click the **New Step** button.

The Component Step Details dialog box opens.
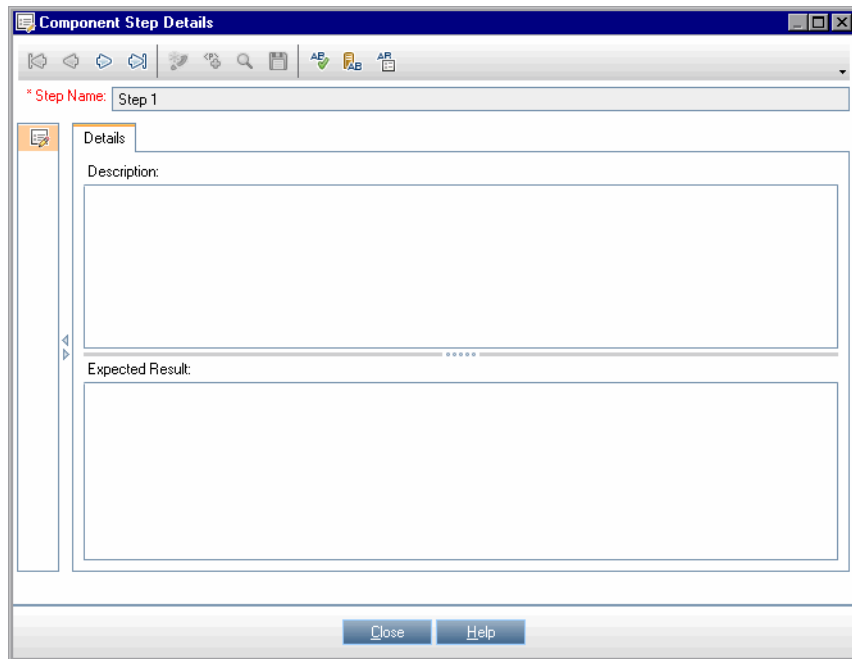
3 In the **Step Name** box, enter a descriptive name for the step.

4 In the **Description** box in the Details tab, enter a full description of how to perform the first manual step.

5 In the **Expected Result** box, enter the expected application response to performing the step.

6 If you want to include parameters in the descriptions or expected results of your manual step, enter the parameter name at the appropriate point in the text, enclosed in three sets of angle brackets < > (that is, <<<**parameter**>>>). The parameter name is automatically validated when you move to another step.

Note: If you apply any text formatting to the parameter name, you must apply the same formatting to the three sets of angle brackets <<<>>>. If you do not, a validation error message opens when you close the step.

Alternatively, click the **Insert Parameter** button after positioning the mouse pointer at the point in the text where you need to enter a parameter. Use the Parameters dialog box to either create a new parameter or to select an existing one from a list.

Note: For more information on parameters, see Chapter 9, "Working with Parameters."

---

7 In the Component Step Details dialog box toolbar, click the **Save Step** button while you work to ensure you do not lose any data.

8 In the Component Step Details dialog box toolbar, click the **New Step** button to create another new step.

9 After saving your steps, click **OK** in the Component Step Details dialog box. The manual steps are displayed in the Component Steps tab.

10 In the Component Steps tab toolbar, click the **Save Steps** button.

Modifying Manual Steps

In a manual component, you can modify manual steps in the Component Step Details dialog box or directly in the Component Steps tab.

➤ To modify a manual component step in the Components Step Details dialog box, click the **Edit Step** button in the Component Steps tab toolbar. Click the **Save steps** button.

➤ To modify a manual component step in the Component Steps tab, select any cell, click the cell again, and modify the step. When you have finished, click the **Save steps** button.

Copying Manual Steps

When working in the Component Steps tab, you can use standard editing **Copy** and **Paste** commands in the context menu to make it easier to create and modify your steps.

To copy a manual component step:

1 In the Component Steps tab, right-click the step and select **Copy**.

2 Right-click a folder and select **Paste**.

Deleting Manual Steps

You can delete manual steps if required.

To delete manual component steps:

1 In the Component Steps tab, select one or more steps that you want to delete.

2 Click the **Delete Selected** button in the toolbar. A warning message is displayed.

3 Click **Yes** to delete the selected items.

Working with Parameters in Manual Steps

You can use parameters to parameterize input and output values in steps.

➤ Input parameters pass values into your business component.

➤ Output parameters pass values from your component to later components in the business process test or flow, or from one step to another step later in the same business component.

Generally, you define component parameters in the Parameters tab of the Business Components module. This is discussed in Chapter 9, "Working with Parameters."

You can also create and insert parameters directly from the Component Steps tab, as described in this section.

Inserting Parameters into Manual Steps

You can insert parameters into new or existing manual steps in the Description or Expected Result columns of the Component Steps tab or the Component Step Details dialog box.

The parameters that you insert are enclosed in three sets of angle brackets, for example, <<<**user_name**>>>.

When you run your component manually, the inserted parameter is replaced with the value of that parameter. For example, if Tom was defined as the value for the user_name parameter, then when you run the manual test, the step "Enter <<<user_name>>> in the Agent Name box" would be displayed as "Enter Tom in the Agent Name box".

To insert parameters into manual steps by typing:

If you know the exact name of the parameter, at the point in the text where you need to enter a parameter in the Description area or Expected Result area, enter the name enclosed in <<<>>> brackets.

To insert parameters into manual steps by selecting from a list:

1 In the Component Steps tab or the Component Step Details dialog box, enter the appropriate text for your step in the Description area or Expected Result area.

2 At the point in the text where you need to enter a parameter, click the **Insert Parameter** button in the toolbar.

The Parameters dialog box opens. The dialog box contains a list of all the existing input and output parameters in the component, and enables you to create a new parameter.
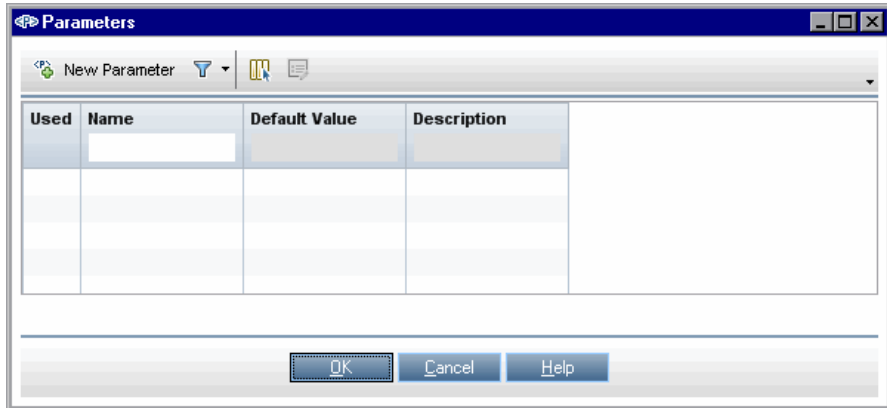
Note: If the required parameter is not in the list, you can create it by clicking the **New Parameter** button in the toolbar. For more information, see "Inserting Parameters into Manual Steps" on page 128.

For details on the Parameters dialog box, see "The New Parameter and Parameter Details Pages" on page 297.

3 Select the required parameter in the list and click **OK**. The parameter is inserted into the text, enclosed in <<< >>> brackets.

An Example of Using Manual Steps to Manually Test an Application

Each manual component step you create comprises a row in the Component Steps tab. For example, you could create the manual component shown below. Its rows contain the steps that are performed to log into the Mercury Flight Reservations sample application. Using the manual steps as a guide, do the following manually:

➤ Access the application and open the Login page.

➤ Enter the value of the parameter <<<UserName>>> in the **Agent Name** edit box.

➤ Enter the value of the parameter <<<Password>>> in the **Password** edit box.

➤ Click the **OK** button and open the Flight Reservation page.

The Component Steps tab for the component is displayed as follows:

For more details on running manual components, see Running a Business Process Test or Flow Manually on page 380.

5

Working with Automated Component Steps

You create automated components by converting manual components to automated components. You use the Automation sub-tab from the Component Steps tab in the Business Components module to add or modify business component content in the form of automated steps, operations, and comments.

Note: This section primarily discusses automation using HP QuickTest Professional. However, you can also automate components with HP Service Test 11.10 or later. For more information, see the *HP Service Test User Guide* and HP Software Self-solve knowledge base article KM1016396 (http://h20230.www2.hp.com/selfsolve/document/KM1016396).

This chapter includes:

➤ Modifying Component Steps in the Keyword View on page 172

➤ Adding Checkpoints and Output Values to Steps on page 174

About Automating Components

You can automate previously-created manual component steps using the applicable testing tool, and use the manual step operations as guidelines for your automated steps. Automate using the Automation sub-tab of the Component Steps tab, which provides:

➤ **For keyword-driven automated components:** A graphical format in which to create and modify automated keyword-driven business component steps. This format is called the Keyword View. The steps in the Keyword View represent the operations that are performed automatically on your application when you run the component using a testing tool.

➤ **For scripted automated components:** A way to launch the relevant testing tool. When working with scripted components, the component steps can be viewed or modified only within the relevant testing tool.

Note: The Automation sub-tab for keyword-driven steps provides similar functionality to the Business Component Keyword View in QuickTest. For a full description of the functionality provided in QuickTest, see the *HP QuickTest Professional for Business Process Testing User Guide*.

The workflow for automating manual component steps comprises the following:

➤ Preparing Automation Resources on page 133

➤ Generating a Script on page 134

➤ Adding Operations and Comments to the Steps on page 134

➤ Parameterizing the Steps—Optional on page 135

➤ Adding Checkpoints and Output Values—Optional on page 135

Preparing Automation Resources

The business component resources for the project are created automatically in the Test Resources module by the QuickTest Professional Add-in for Business Process Testing. This occurs the first time you click the Automation sub-tab in a new project, when you create a QuickTest automated component for the first time, or when QuickTest connects to HP Application Lifecycle Management (ALM) for the first time. These resources are stored in the **BPT Resources** folder.

For business process tests or flows to perform properly, this folder and its subfolders should not be renamed or deleted.

Note: In previous versions of Quality Center, the **BPT Resources** folder was created in the Test Plan module. When upgrading from Quality Center version 9.2, a **BPT Resources** folder that already exists in the Test Plan module must be moved to the Test Resources module using the QuickTest Asset Upgrade Tool for Quality Center.

The **BPT Resources** folder contains all the QuickTest resources available for business components in the project, and includes the following subfolders:

➤ **Application Areas.** Provides all of the settings and resources required to create the content of keyword-driven business components for a particular application or part of an application. The application area typically contains all the items contained in the folders listed below.

➤ **Libraries.** Contains all the function libraries available for business components in the QuickTest project. Function libraries provide customized operations for business components.

The Libraries folder contains the default function library containing operations that can be used when creating business component steps. The automation engineer can store additional function libraries in this folder.

➤ **Object Repositories.** Contains all the shared object repository files available for business components in the QuickTest project. Object repository files define the test objects that can be used in the steps of a business component.

➤ **Recovery Scenarios.** Contains all the recovery scenario files available for business components in the QuickTest project. Recovery scenarios define special operations to recover from errors and unexpected events during the component run. By default, the Recovery Scenarios folder contains the **DefaultWeb.qrs** file, which is a recovery scenario file that can be used in the Web environment.

For conceptual information about application areas, see "Working with Application Areas" on page 136.

Generating a Script

You create manual components in the Component Steps tab. For more information on manual components and steps, see Chapter 4, "Designing Manual Component Steps."

You can then automate the manual components using the applicable testing tool and use the existing manual steps as guidelines to create automated steps.

For conceptual details about generating the script for automation, see "Generating a Script to Automate Components" on page 140.

For task details about generating the script for automation, see "How to Start Automating Manual Component Steps by Generating a Script" on page 141.

Adding Operations and Comments to the Steps

You can provide additional information in the form of free-text comments. You can mix and match entries in a component by including standard steps, operations, and comments, thereby ensuring that every aspect of the application to be tested is covered, even before the application is ready to be tested.

For details about adding operations and steps, see "Creating Steps in the Keyword View" on page 149.

For details about adding comments, see "Entering Comments in the Keyword View" on page 162.

Parameterizing the Steps—Optional

You can also expand the scope of your tests, flows, and business components by using variable input and output parameter values in your business process test or flow. Using variable values in your components can affect test results.

For more information, see "Parameterizing in the Keyword View" on page 164.

Adding Checkpoints and Output Values—Optional

When creating a component, automation engineers working in QuickTest can add standard checkpoints. A checkpoint compares the current value of a specified property with the expected value for that property, and can help identify whether your application is functioning correctly.

The checkpoint is visible and editable in the Checkpoint Properties dialog box in ALM, enabling you to view which properties are set to be checked during the run.

For more information, see "Adding Checkpoints and Output Values to Steps" on page 174.

Working with Application Areas

An application area provides all of the settings and resources required to create the content of keyword-driven business components for a particular application or part of an application. These include:

➤ Representations of the objects from your application, contained in the shared object repository.

Note: The automation engineer can change the behavior of these objects in the application using the RegisterUserFunc utility statement in QuickTest. For more information, see the QuickTest Professional Object Model Reference.

➤ User-defined operations, contained in function libraries.

All application area settings are automatically inherited by the business components that are based on that application area.

Depending on your specific requirements, you can create multiple application areas, each representing a different area or aspect in your application. It is important that you select the correct application area on which to base your business component. Each application area should have a detailed description to help you to make the correct choice.

When you create a business component and choose an associated application area, the settings and resources that are defined in the current application area are embedded in the component. Therefore, any changes that are made to the application area in QuickTest Professional at a later time are applied directly to the component.

Note: The shared object repository, function libraries and scenario files that comprise an application area are links to the actual repository and files stored in ALM. Changes to the stored repository and files affect all the components that reference them, and it is not necessary to update the application area for such changes.

A keyword-driven component must be associated with an application area to create steps for it, but you can also change the application area that is associated with a specific business component when required.

The following topics are described in this section:

➤ "Creating the Application Area" on page 137

➤ "Choosing the Application Area" on page 139

Creating the Application Area

When you create a new application area, you define all of the application area settings and resources needed to create a new business component.

The following users can create application areas:

➤ The automation engineer, in QuickTest Professional. For more information on working with and creating application areas in QuickTest, see the *HP QuickTest Professional for Business Process Testing User Guide*.

➤ Either the subject matter expert or the automation engineer in the Test Resources module in ALM. The application area entity that is created in ALM provides the structure for automation, using default resources.

Note: You can start to create an automated component, even if its application area has not yet been created or fully-defined by the automation engineer. Create the automated component by adding comments describing the steps you need to create when the application area is available. However, if the application area has not yet been created, you cannot add keyword-driven steps to your component.

To create a new application area from within ALM:

1 If not yet connected, connect to the ALM project (for which you want to create the application area) from QuickTest Professional.

For more information, see "Connecting to Your ALM Project" in the *HP QuickTest Professional for Business Process Testing User Guide*.

2 Create the application area resource in ALM's Test Resources module. You can also create other resources with which the application area is associated, such as libraries, object repositories, and recovery scenarios in ALM (and associate them to the application area in QuickTest Professional). For details, see the *HP Application Lifecycle Management User Guide*:

3 In QuickTest Professional, define the settings, and resource files that you want business components associated with the application area to use. By associating a component with an application area, the component is automatically linked to these settings and resource files.

4 In QuickTest Professional, define dependencies between entities. For more information, refer to the *HP QuickTest Professional for Business Process Testing User Guide*.

You can view the associations between the application area and the other resources in the Dependencies tab in the Test Resources module in ALM.

Choosing the Application Area

After an application area is created, the next stage in adding content to an automated, keyword-driven business component is to choose the associated application area.

A business component that does not have an associated application area displays the following message at the top of the Automation sub-tab:

"To create steps, you must first select an application area by clicking the Select Application Area button."

To select or change the application area:

 1 In the Automation sub-tab of the Component Steps tab, click the **Select Application Area** button in the toolbar. The Select Application Area dialog box opens.
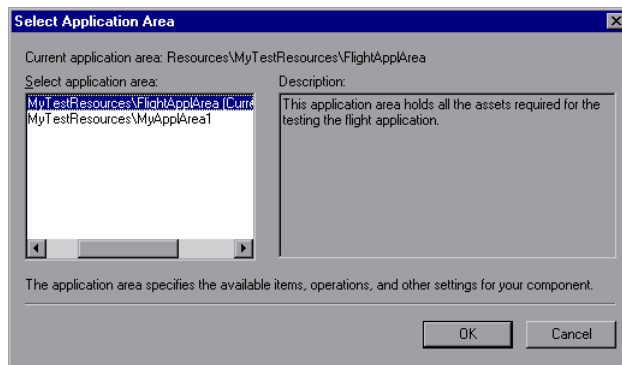
Note: You may be prompted to connect to the project from within QuickTest Professional the first time you try to select an application area. For instructions, see the *HP QuickTest Professional User Guide*.

---

 2 Select the required application area.

3 Click **OK** to associate the business component with the selected application area.

All of the application objects in the associated object repository, and any operations defined in associated function libraries, are now available for you to choose when automating your component steps.

Note: Changing an application area may affect the business component and prevent it from running correctly. For example, if a component step uses an object that is not contained in the object repository of the new application area, the step fails.

Generating a Script to Automate Components

When your application is ready to be tested, and all of the required automation resources have been prepared, you can create the automated keyword-driven or scripted business component steps required to test your application.

The conversion process from manual to automated components is irreversible. However, you can still use the steps in the Manual Steps sub-tab of the Component Steps tab to run the component manually, as described in "Running a Business Process Test or Flow Manually" on page 380.

After generating a script to automate components, the manual steps in the Manual Steps tab are read-only. You can update the steps:

➤ For keyword-driven components: Only by modifying the automated component in the Automation sub-tab of the Component Steps tab.

➤ For scripted components: Directly in a testing tool.

How to Start Automating Manual Component Steps by Generating a Script

This section describes how to automate manual components.

To automate manual components:

1 Select the manual component in the component tree and click the **Component Steps** tab.

Tip: Manual components in the component tree are indicated by an **M** symbol on the component icon, for example, 📋ᴹ.

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2 In the toolbar, click the **Generate Script** button. The available automated component types are displayed in a list.

Note: An item in the automated component list is displayed only if the appropriate testing tool add-in is installed.

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3 Select the applicable component type from the list to automate your manual component. The Automation sub-tab is displayed, and the format of the Automation sub-tab changes to one of the following views, according to your selection.

➤ Selecting **QuickTestKeyword-Driven** converts the component to an automated QuickTest business component. The Automation sub-tab displays the existing manual component steps as Manual Step operations in a keyword view format. For more information, see "Automating Using the Keyword-driven Automation Type" on page 143.

➤ Selecting **QuickTestScripted** converts the component to an automated QuickTest scripted component. The Automation sub-tab provides a **Launch** button that enables you to view or edit the steps in QuickTest. For more information, see "Viewing Scripted Components" on page 142.

Automating Using the Scripted Automation Type

Scripted components are maintainable, reusable modules that perform a specific task when testing your application.

Scripted component steps can contain programming logic and can be edited only in the testing tools in which they were created, such as QuickTest Professional. They cannot be modified by the subject matter expert in ALM, but you can include these scripted components in business process tests.

Viewing Scripted Components

After selecting a business component that was automated as a scripted component in the component tree, you can click the **Launch** button in the Automation sub-tab to open the applicable testing tool and edit the scripted component.

Note: The manual steps of a scripted component that was created in ALM can be modified in the Manual Steps sub-tab and used in manual tests if required.

When you convert a manual component to a scripted component in QuickTest (using the **Generate Script**. button in the Component Steps tab), your manual steps are converted to **ManualStep** operations in the script in QuickTest. The step name, description, and expected results are displayed in the QuickTest Keyword and Expert views.

Automating Using the Keyword-driven Automation Type

Keyword-driven business components are maintainable, reusable modules that perform a specific task when testing your application.

The automated steps of keyword-driven components can be created and edited in ALM.

The following topics are described in this section:

➤ "The Keyword View" on page 143

➤ "Keyword View Example" on page 144

➤ "Setting Keyword View Options" on page 144

The Keyword View

You create each item in the business component, comprising a step or a comment, as a row in the keyword view format of the Automation sub-tab of the Component Steps tab.

A step is an operation to be performed in a business component. After you create a step, you specify its contents. For example, you can select the object on which the step is performed, specify the operation to be performed in the step, and specify any relevant input or output parameters. When a business process test runs in ALM, the steps defined in the associated business components are performed automatically on the application being tested.

In keyword view, columns divide the items into individual cells. You can choose which columns to display, and you can modify the contents of the cells, if required. Steps are automatically documented in the Documentation column of the Automation sub-tab, providing a plain-language textual description of what the step does in the component. For information on selecting which columns to display in the Automation sub-tab, see "Setting Keyword View Options" on page 144.

Creating business component steps in the Automation sub-tab requires little or no programming or scripting knowledge. The programming required to perform each step of the component is done behind-the-scenes in Business Process Testing.

Each component step you create comprises a row in the Automation tab.

Keyword View Example

The Automation sub-tab could contain rows that show the steps that are performed on the Mercury Flight Reservations sample application. For example:

➤ The Login dialog box is opened.

➤ **mercury** is entered in the Agent Name edit box.

➤ **mercury** is entered in the Password edit box.

➤ The **OK** button is clicked.

The Documentation column automatically translates each of the steps into understandable sentences.

Setting Keyword View Options

You can select which columns to display in the Automation sub-tab, specify their order, and set the number of columns that remain stationary when you scroll horizontally. You can also set the font and color of many elements in the Automation sub-tab.

The following tasks are described in this section:

➤ "To select columns to display or hide in the Keyword View Options dialog box:" on page 145

➤ "To display or hide specific columns using the context menu:" on page 146

➤ "To rearrange columns in the Automation sub-tab:" on page 147

➤ "To set font and color options for the Automation sub-tab:" on page 147

To select columns to display or hide in the Keyword View Options dialog box:

1 In the Automation sub-tab, click the **View Options** button in the toolbar. The Keyword View Options dialog box opens.
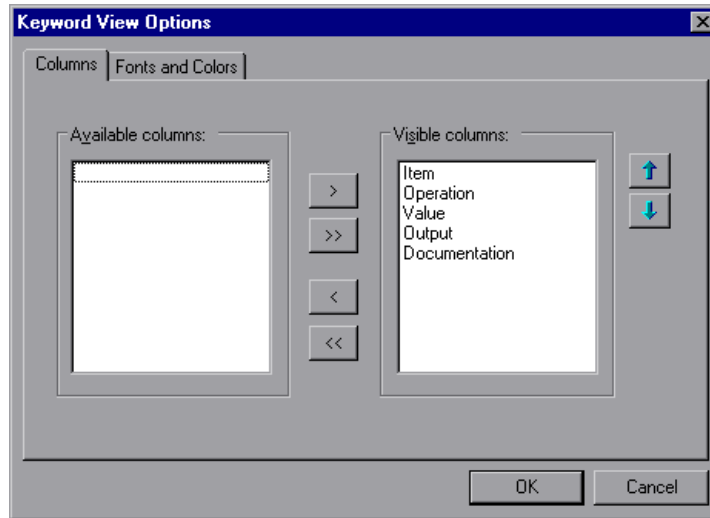
In the Columns tab, the **Available columns** box lists columns not currently displayed in the Automation sub-tab. The **Visible columns** box lists columns currently displayed in the Automation sub-tab.

2 Double-click column names, or select column names and click the arrow buttons (> and <), to move them between the **Available columns** and **Visible columns** boxes.

3 In the **Visible columns** box, set the order in which columns appear in the Automation sub-tab by selecting one or more columns and then using the **Up** and **Down** arrow buttons.

Note: The order of the columns in the Automation sub-tab does not affect the order in which the cells need to be completed for each step. For example, if you choose to display the **Operation** column to the left of the **Item** column, you select the item first, and the **Operation** column list is then refreshed to match the selection you made in the **Item** column.

---

4 Click **OK** to close the dialog box and apply the new column display.

To display or hide specific columns using the context menu:

➤ Display a hidden column by right-clicking the column header row and then selecting the required column name from the displayed menu.

➤ Hide a displayed column by right-clicking the column header row and then selecting the column name from the displayed menu.
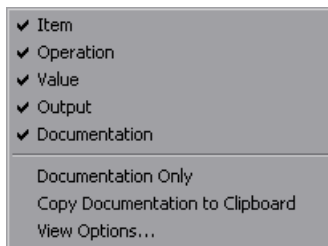
Tip: You may want to display only the **Documentation** column, for example, if you want to use the steps as instructions for manual testing. You can do this by selecting **Documentation Only**. The **Documentation** column and any comments defined in the business component are displayed.

To rearrange columns in the Automation sub-tab:

Drag a column header and drop it at a new location. Red arrows are displayed when the column header is dragged to an available location.

Item	Value	Operation	Output	Documentation
Mercury - QuickTest Professional				
Flight Reservation		Activate		Make the "Flight Reservation" window active.
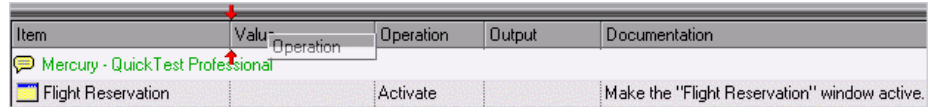
To set font and color options for the Automation sub-tab:

1 In the Automation sub-tab, click the **View Options** button in the toolbar. The Keyword View Options dialog box opens.

2 Click the **Fonts and Colors** tab.

Keyword View Options

Columns | Fonts and Colors

Element: Default

Font name:
Microsoft Sans Serif

Size:
8

Style:
Regular

Foreground:
Black

Background:
Custom

Foreground for read-only:
Grey

Reset all

OK | Cancel
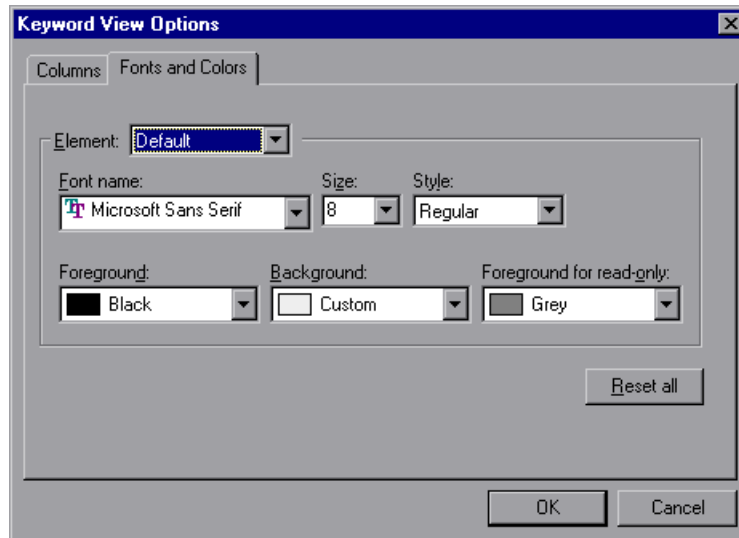
3 Set the display options according to your preferences.

➤ **Element.** Select the rows for which your font and color selections apply.

   ➤ **Default.** Applies your selections to all rows.

   ➤ **Selected Row.** Applies your selection of text and background color to the currently selected row only.

   ➤ **Alternate Rows.** Applies your selection of a background color to alternate rows.

   ➤ **Comment.** Applies your selections to comment rows.

➤ **Font name.** Select the font in which the text displays.

➤ **Size.** Select the font size in which the text displays.

➤ **Style.** Select the font style; **Regular**, **Bold**, **Italic**, or **Underline**.

➤ **Foreground.** Select the color in which the text displays.

➤ **Background.** Select the background color of the rows.

➤ **Foreground for read-only.** Select the color in which read-only text displays.

Tip: Click **Reset all** to change all your selections back to the default.

4 Click **OK** to save your settings.

Creating Steps in the Keyword View

You create the sequential steps that comprise your automated business component content by selecting specific objects from the object repository (created in QuickTest Professional by the automation engineer). You then select the operation to be performed on each object, and define any required values.

It is important to note that when the business component runs, the context of each step in the component must be set by an earlier step or steps. This means that for an operation on an object to be performed successfully, the object must be currently displayed.

For example, consider a business component that opens an existing order in a flights reservation application. Before the **Customer Name** check box can be clicked in a component step, both of the following steps must first be performed:

➤ The application must be opened

➤ The Open Order dialog box must be opened

Creating a New Step

After you have selected an associated application area for your component, you can create new automated steps in the Automation sub-tab.

To create a new step in a business component:

1 In the Automation sub-tab, select the row after which you want to add the new step and click the **Add Step** button in the toolbar, or right-click and select **Insert New Step**. The **Select an Item** list opens.
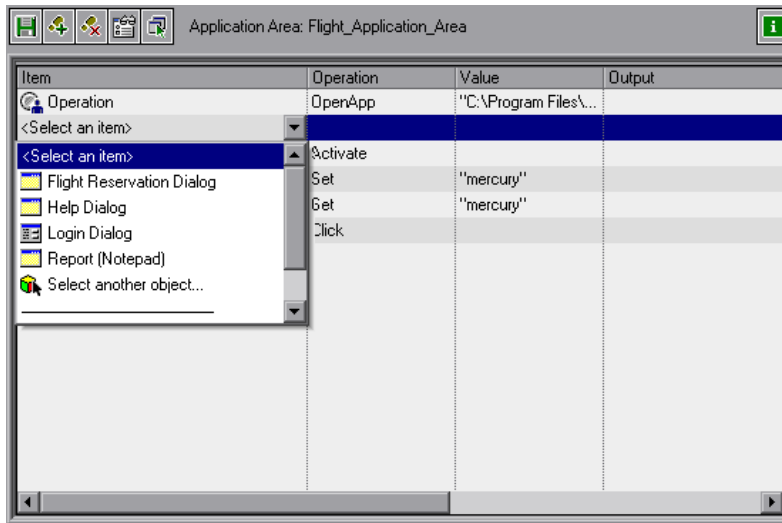
2 Define the step by clicking in the cell for the part of the step you want to add content, as described below. Each cell in the step row represents a different part of the step.

For each step, you can define the following:

➤ **Item.** Either an object on which you perform a step, or a user-defined function (**Operation**). You must select an option from the **Item** column before you can add additional content to a step. For more information, see "Selecting an Item for a Step" on page 152.

Alternatively, you can choose to add a **Comment**, which enables you to add a manual step or other text information between steps. For more information, see "Entering Comments in the Keyword View" on page 162.

➤ **Operation.** The operation to be performed on the item. For more information, see "Selecting an Operation for a Step" on page 157.

➤ **Value** (if relevant). The argument values for the selected operation. For more information, see "Defining Values for Operations" on page 158.

➤ **Output** (if relevant). The parameter in which output values for the step are stored. For more information, see "Defining Output Values for Steps" on page 159.

3 Save the steps as described in "Saving Component Steps" on page 151.

Note: The **Documentation** cell is read-only. This cell displays an explanation of what the step does in a plain-language textual description, for example, Click the "Sign-in" image, or Select "San Francisco" in the "toPort" list. The documentation sentence is displayed only after you have entered the item, operation, and any required values for the selected operation.

You can use these Documentation descriptions to run your automated components manually. For more information, see "Running a Test or Flow Manually" on page 381.

Saving Component Steps

You must save your component steps and any other changes that you make in the Automation sub-tab. Since changes you make in the Automation sub-tab are not saved automatically, it is recommended that you save them periodically.

To save component steps:

Click the **Save** button in the Automation sub-tab toolbar.

or

Select another tab in the component, another location in the component tree, or another module.

Selecting an Item for a Step

An item can be an object in the shared object repository, a comment, or it can indicate a function from a function library. (The **Operation** item is available only if functions were added by the automation engineer to a function library that is associated with the application area on which your business component is based.)

After you select an item, you specify an operation for it. For more information, see "Selecting an Operation for a Step" on page 157.

This section describes:

➤ "Selecting an Object from the Item List" on page 153

➤ "Selecting an Object from the Shared Object Repository" on page 154

➤ "Selecting an Operation Item from the Item List" on page 156

In addition to selecting an item or operation in the **Item** cell, you can also select to include a **Comment**. You use the **Comment** option to add notes about your component or to provide information about adjacent steps. For more information on comments, see "Entering Comments in the Keyword View" on page 162.

Selecting an Object from the Item List

The objects available in the **Select an Item** list are the sibling and child objects of the previous step's object. These objects, for example, the Login dialog box, or User Name text box, are contained in the shared object repository that is associated with the application area on which your business component is based.

If you want to select an item other than a sibling or child object of the previous step's object, you can select the **Select another object** item. The example below shows the objects available for the step following a **userName** edit box object.
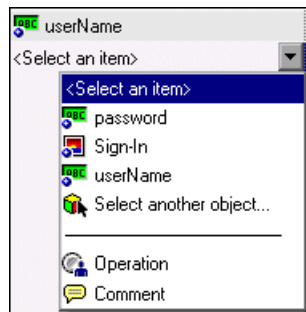
Notes:

➤ If no application area is associated with the component, and/or no objects are available, only the **Operation** and **Comment** items are included in the **Select an Item** list. Some operation functions, such as **OpenApp**, are available without an associated application area.

➤ If an object included in a step is later removed from the shared object repository by the automation engineer, the component run fails. Objects that are missing from the shared object repository are indicated in the Automation sub-tab by the 🔍 icon.

To select an object from the displayed Item list:

1 In the Automation sub-tab, click in the **Item** cell, and then click the arrow button to display the **Select an Item** list. If you have just created a new step, the list opens automatically as soon as you create the new step.

2 In the **Select an Item** list, select the object on which you want to perform the step. The item you select is displayed in the **Item** cell.

You now need to specify an operation for the step. For more information, see "Selecting an Operation for a Step" on page 157.

Selecting an Object from the Shared Object Repository

The shared object repository includes all of the objects that were defined for the application area on which your business component is based. If the object for which you want to add a step is not displayed in the item list, you can select any object from the object repository using the Select Test Object dialog box.

For more information on the shared object repository, see the *HP QuickTest Professional for Business Process Testing User Guide*.

To select an object from the shared object repository:

1 Click in the **Item** cell, then click the arrow button to display the **Select an Item** list. If you have just created a new step, the list opens automatically as soon as you create the new step.

2 In the **Select an Item** list, select **Select another object**.

The Select Test Object dialog box opens.
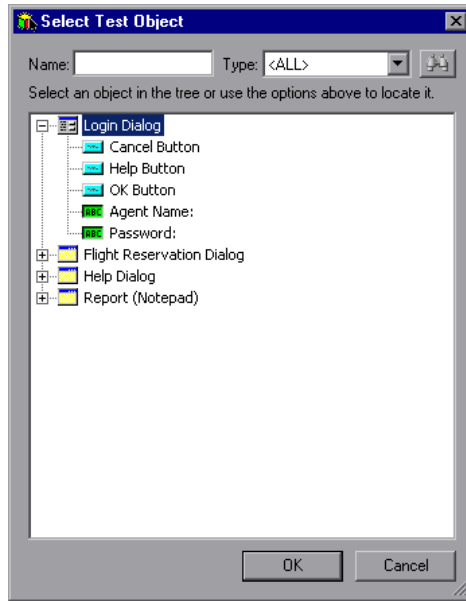
🔍 **Tip:** You can search for the object you require by entering the object name (or the beginning letters of the name) in the **Name** box and clicking the **Find Next** button. You can also limit the number of objects displayed in the list by selecting the type of object you require from the **Type** list, for example, Check Box, or Button.

---

3 Select an object from the shared object repository tree and click **OK**. The selected object is displayed in the **Item** cell and is also added to the **Select an Item** list.

You now need to specify an operation for the step. For more information, see "Selecting an Operation for a Step" on page 157.

Selecting an Operation Item from the Item List

Operations, or **keywords**, are customized functions that may group together multiple steps, as well as programming logic that can perform a specific task in your application. For example, you can use an operation to open an application at the start of a business component, or check the value of a specific property of an object in your application.

Business Process Testing provides a set of basic keywords for you to use. The automation engineer can add to or enhance the keywords in QuickTest Professional. These keywords are derived from built-in methods and properties, as well as user-defined functions associated with the application area. The automation engineer manages the keywords and selects which of them should be available in the Item list when creating automated components.

Note: If an operation included in a step is later removed from the application area by the automation engineer, the component run fails. Operations that are missing from the application area are indicated in the Automation sub-tab by the 🔖 icon.

For more information on managing keywords, see the *HP QuickTest Professional for Business Process Testing User Guide*.

To select an Operation item:

1 Click in the **Item** cell and then click the arrow button to display the **Select an Item** list. If you have just entered a new step, the list opens automatically as soon as you create the new step.

2 In the **Select an Item** list, select **Operation**. The **Operation** item is displayed in the **Item** cell.

You now need to specify an operation for the step. For more information, see "Selecting an Operation for a Step", below.

Selecting an Operation for a Step

In the **Operation** cell, you specify the operation to be performed on the item selected in the **Item** column. The available operations vary according to the item selected. The default operation (most commonly-used operation) for the item is automatically displayed in the **Operation** column.

If you select an application object in the **Select an Item** list, the **Operation** list for that object includes built-in operations and any operations that were created for that specific object type in the application area's function libraries. For example, if you selected a button object, the list contains the most commonly used methods available for the button object, such as **Click**.

If you select **Operation** in the **Item** column, the list contains the operations defined in the function library or libraries associated with the component's application area. For information on function libraries, see the *HP QuickTest Professional for Business Process Testing User Guide*.

To select an operation for a step:

In the Automation sub-tab, click in the **Operation** cell, then click the arrow button and select the operation to be performed on the item. The operation can be either a built-in operation or an operation from a function library, depending on the item you selected.

Tip: When you position the cursor over an operation in the list, a tooltip describes the operation.

Defining Values for Operations

The **Value** cell lists the values for the operation arguments. An operation **argument** provides the specific information that an operation uses to accomplish a specific purpose. For example, the argument of an edit box Set operation indicates the specific value to enter in the edit box. The argument numbers for a Click operation can optionally indicate the specific coordinates of the click. A particular operation may have required arguments, optional arguments, or no arguments at all.

The **Value** cell is partitioned according to the number of possible arguments of the selected operation. Each partition contains different options, depending on the type of argument that can be entered in the partition, as follows:

Argument Partition	Argument Type	Instructions
	String	Enables you to enter any alphanumeric string enclosed by quotes. If you do not enter the quotes, Business Process Testing adds them automatically. If you modify a cell that contains a string enclosed by quotes by removing the quotes, Business Process Testing does not restore the quotes, and the value is treated as a variable name.
	Integer	Enables you to enter any number, or use the up and down arrows to select a number.
True	Boolean	Enables you to select a **True** or **False** value from the list.
micMiddleBtn	Predefined constant	Enables you to select a value from the list.

To define or modify a value:

Click in each partition of the **Value** cell and enter the argument values for the selected operation, or click the parameterization button to parameterize the value. When you click in the **Value** cell, a tooltip displays information for each argument. In the tooltip, the argument for the partition that is currently highlighted is displayed in bold, and any optional arguments are enclosed in square brackets.
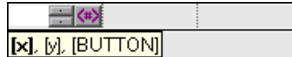
You can parameterize the value for an argument using a local or component parameter. For more information, see "Parameterizing in the Keyword View" on page 164.

Defining Output Values for Steps

For component steps that return an output value, you define the settings in the **Output** cell. This determines where the output value is stored and how it is used during the component run session. When the output value step is reached, each value set for output is retrieved and stored in the specified location for use later in the run session.

You can modify the output parameter, as required. If you select a local parameter, you can modify its name and description directly in the Output Options dialog box. If you select a component parameter, its name and description are read-only. You can modify the parameter details in the Parameters tab of the Business Components module. For more information on local and component parameters, see "Parameterizing in the Keyword View" on page 164.

If, after you specify an output value, you choose not to save the output value, you can cancel it. For more information, see "Canceling Output for a Parameter" on page 161.

To configure output for a parameter:

 1 Click in the **Output** cell of a component step that returns an output value. Click the **Specify parameter for output** button. The Output Options dialog box opens.

Output Options	✕
Output Types:	
Local Parameter ▾	
┌ Details ────────────────────	
Name: p_AddToTestResults ▾	
Description: [ ]	
OK Cancel	
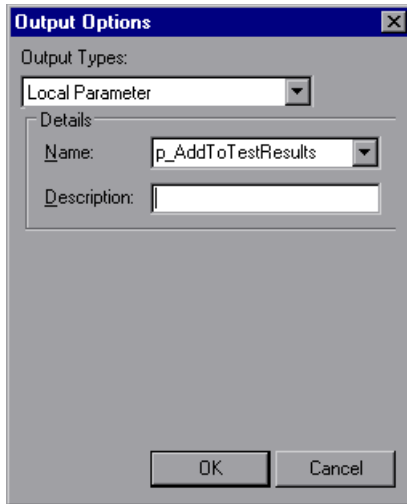
Note: The default output type is **Component parameter** if at least one output parameter is defined in the business component Parameter tab. If you select **Local parameter**, the dialog box changes to the Output Options dialog box for a local parameter.

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2 In the **Output Types** box, select either **Component parameter** or **Local parameter**.

➤ If you select **Component parameter**, the **Parameter** box displays the available component parameters. The information displayed is read-only.

➤ If you select **Local parameter**, the dialog box changes to the Output Options dialog box for a local parameter. The **Details** area displays the name and description of the available local parameters. You can select a local parameter and specify the details for it, or create a new local parameter if needed.

For more information, see "Parameterizing Output Values" on page 169.

Tip: If you click in the **Output** cell after you specify an output parameter for an item, the 🏠 icon is displayed in the cell for a local parameter, and the 🧩 icon is displayed in the cell for a component parameter.

Canceling Output for a Parameter

If you do not want to store the output value for a business component step, you can cancel it.

To cancel output for a parameter:

Click in the **Output** cell. Then click the **Cancel** button to cancel output for the parameter.

Entering Comments in the Keyword View

A comment is a free text entry that you can enter on a new line below the currently selected step in a business component. Comments span an entire row in the Automation sub-tab.

The 💬 icon indicates a comment in the Automation sub-tab. You can use comments for several purposes. For example, you may want to use comments to plan steps to be included in a business component before your application is ready to be tested.

Then, when the application is ready, you can use your plan (comments) to verify that every item that needs to be tested is included in the component steps.

You may want to add comments to a business component to improve readability and make it easier to update. For example, you may want to add a comment before each section of a component to specify what that section includes.

After you add a comment, it is always visible in your component, as long as one or more columns are displayed. In addition, as you scroll from side to side across the tab, the comment can always be seen. Comments are not processed when business components run.

Note: After you insert a comment, you cannot change it to a step.

To add a comment to your business component:

 1 Select a row after which you want to add a comment, click in the **Item** cell and select **Comment** from the list, or right-click a component step and select **Insert Comment**.

Note: You can also click the **Add Step** button in the toolbar and select **Comment** from the list.

A comment row is added below the selected step.

 2 Enter text in the comment row.

To modify an existing comment:

Double-click the comment. The text box becomes a free-text field. Alternatively, you can click the 💬 icon.

To delete a comment:

Select the comment and click the **Delete Step** button in the toolbar. The comment is permanently removed from the business component.

Parameterizing in the Keyword View

You can define input parameters that pass values into your business component, and output parameters that pass values from your component to external sources or from one step to another step. You can also define local parameters for use within the component only. You can then use these parameters to parameterize input and output values in steps.

You can define two types of parameters—**local parameters** and **component parameters**.

Local parameter. A local parameter is defined for a specific business component. It is not accessible by other business components. You define local parameters in the Automation sub-tab using the Value Configuration Options dialog box for input parameters and the Output Options dialog box for output parameters. You cannot delete local parameters, but you can cancel their input or output.

Component parameter. A component parameter whose value is set can be returned to or retrieved from a location outside the component. The values of these parameters can be passed from one component in a business process test or flow to a later one during a test run. You define component parameters in the Parameters tab of the Business Components module.

This section describes how to configure local parameters and parameterize input and output values using local and component parameters. For more information on parameters, see Chapter 9, "Working with Parameters."

After you define a parameter you can use it to parameterize a value. You can also change the parameterized value back to a constant value by entering it directly in the **Value** cell.

Parameterizing Input Values

In the **Value** cell, you can parameterize input values for a step using local or component parameters.

To parameterize an input value using a local parameter:

⟨#⟩   **1** In the **Value** cell, click the **Configure the value** button. The Value
       Configuration Options dialog box opens.
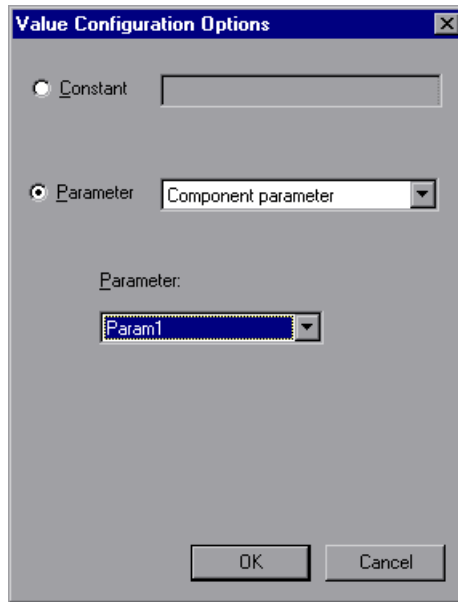
If at least one input component parameter is defined in the component,
the default input type is **Component parameter**.

2 Select the **Parameter** radio button and then select **Local Parameter** from
the list.
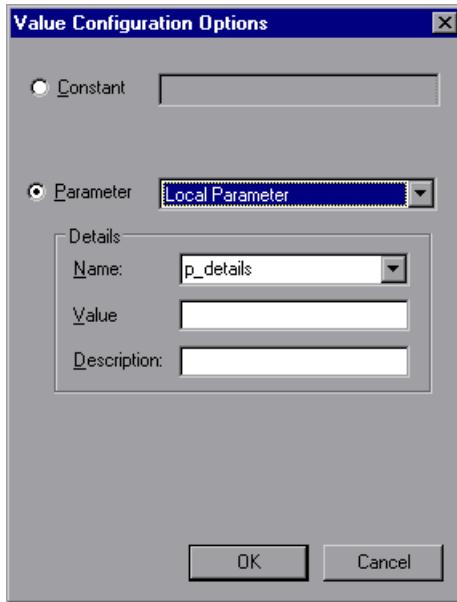
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The details for the local parameter type are displayed.

3 Specify the property details for the local parameter:

➤ **Name.** Enter a meaningful name for a new parameter or select an existing parameter name from the list.

➤ **Value.** Enter an input value for the parameter.

➤ **Description.** Enter a brief description for the parameter.

4 Click **OK**. The local parameter is displayed in the **Value** cell of your step. When the business component runs, it uses the value specified in the parameter for the step.

Tips:

➤ You can cancel the parameterization of a value by selecting the **Constant** radio button in the Value Configuration Options dialog box and entering a constant value.

➤ If you click a partition in the **Value** cell of a step after you define a local parameter for it, the ⬢ icon is displayed in that partition of the cell.

To parameterize an input value using a component parameter:

1 In the **Value** cell, click the **Configure the value** button. The Value Configuration Options dialog box opens.
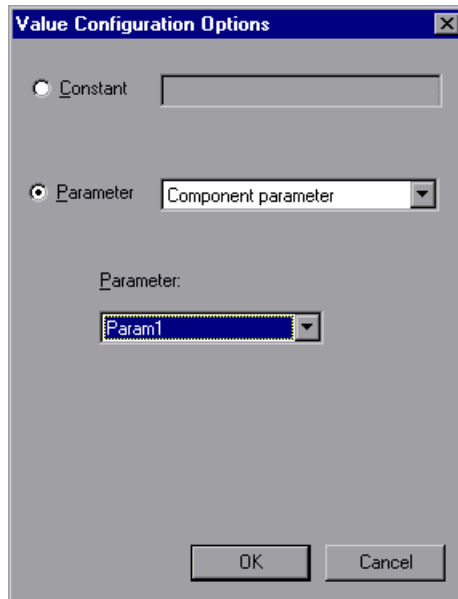
If at least one input component parameter is defined in the business component, the default input type is **Component parameter** and the default input name is the first input parameter from the Parameters tab of the Business Components module.

Note: If no component parameter is defined, you must define one before you can use it to parameterize an input value. For more information, see Chapter 9, "Working with Parameters."

---

2 Select the **Parameter** radio button and then select **Component Parameter** from the list. Click the list arrow to view the available component parameters and their descriptions. Select the component parameter you want to use for the parameterized value.

3 Click **OK**. The component parameter is displayed in the **Value** cell of your step. When the business component runs, it uses the value specified in the parameter for the step.

Tips:

➤ You can cancel the parameterization of a value by selecting the **Constant** radio button in the Value Configuration Options dialog box and entering a constant value.

➤ If you click a partition of the **Value** cell after you define a component parameter for it, the ![icon] icon is displayed in that partition of the cell.

Parameterizing Output Values

You can parameterize output values for a step using local or component parameters in the **Output** cell of a step. You can then use the output parameter value as an input value in a later step in the component, or in a later component or flow in the test.

To parameterize an output value using a local parameter:

1 In the **Output** cell, click the **Specify parameter for output** button. The Output Options dialog box opens.
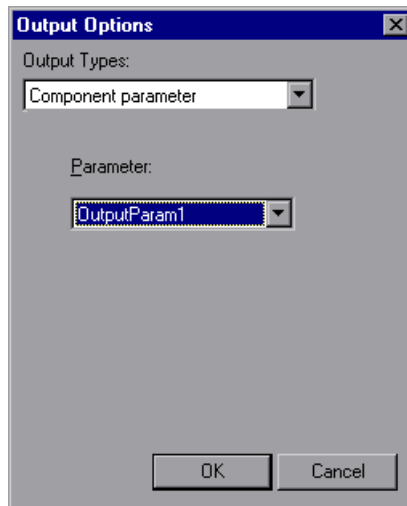
If at least one output component parameter is defined in the business component, the default output type is **Component parameter** and the default output name is the first output parameter from the Parameters tab of the Business Components module.

2 In the **Output Types** box, select **Local parameter**. The details for the local parameter type are displayed.
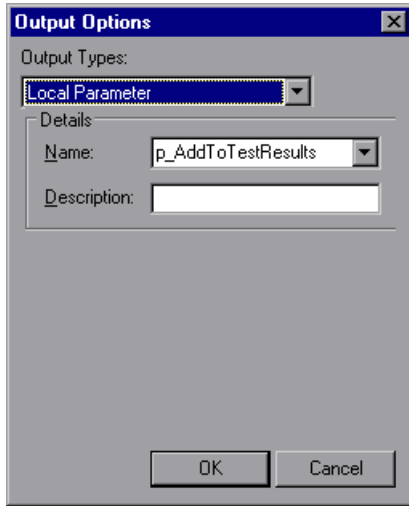
3 Specify the property details for the local parameter:

➤ **Name.** Enter a meaningful name for a new parameter or choose an existing parameter name from the list.

➤ **Description.** Enter a brief description for the parameter.

4 Click **OK**. The local parameter is displayed in the **Output** cell of your step. When the business component runs, it outputs the value to the output parameter specified for the step.

Tip: If you click the **Output** cell after you define a local parameter for it, the 🏠 icon is displayed in that partition of the cell.

To parameterize an output value using a component parameter:

1 In the **Output** cell, click the **Specify parameter for output** button. The Output Options dialog box opens.
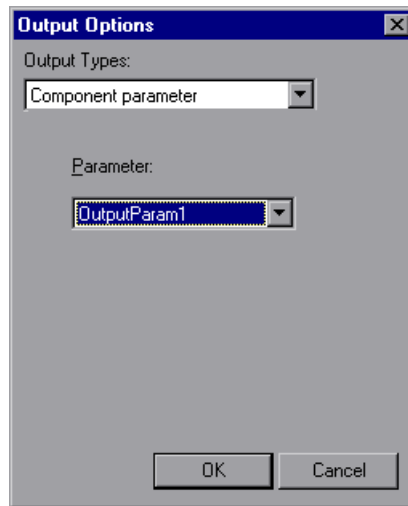
If at least one output component parameter is defined in the business component, the default output type is **Component parameter** and the default output name is the first output parameter from the Parameters tab of the Business Components module.

Note: If no component parameter is defined, you must define one before you can use it to parameterize an output value. For more information, see Chapter 9, "Working with Parameters."

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2 In the **Parameter** box, click the list arrow to view the available component parameters and their descriptions. The details for the component parameter are displayed in read-only format. Select the component parameter you want to use to store the output value.

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3 Click **OK**. The component parameter is displayed in the **Output** cell of your step. When the business component runs, it outputs the value to the output parameter specified for the step.

Tip: If you click a partition of the **Output** cell after you define a component parameter for it, the icon is displayed in that partition of the cell.

Modifying Component Steps in the Keyword View

You can modify any part of a step in the Automation sub-tab. For example, you can change the object on which the step is performed or change the operation to be performed in the step.

Note: Business components that are currently open in another session of ALM or in QuickTest are locked and open in read-only mode.

When working in the Automation sub-tab, you can use the standard editing commands (**Cut**, **Copy**, **Paste** and **Delete**) in the context-sensitive menu to make it easier to modify your steps, operations, or comments. You can also drag and drop these items to move them to a different location within a business component.

For more information, see:

➤ Moving a Component Step

➤ Deleting a Component Step

Moving a Component Step

You can move a step (or other item) to a different location within a business component.

To move a step in the component, perform one of the following:

➤ In the **Item** column, drag the step up or down and drop it at the required location. The step is positioned below the item over which it is dropped.

➤ Right-click the step and select **Cut** to cut it to the Clipboard. Right-click an item and then select **Paste** to paste the step from the Clipboard. The step is positioned below the selected item.

➤ To duplicate a step, right-click it and select **Copy**. Then right-click an item and select **Paste**. The step is positioned below the selected item.

Deleting a Component Step

You can delete a business component step (or other item), if required. Before you delete a step, make sure that removing it does not prevent the component from running correctly.

Note: You cannot delete a step if one of its cells is in edit mode.

To delete a step in the Automation sub-tab:

1 Select the step that you want to delete.

2 Click the **Delete Step** button in the toolbar. A warning message is displayed.

Note: A warning message is not displayed when a comment is deleted.

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3 Click **Yes** to delete the selected item.

Adding Checkpoints and Output Values to Steps

When creating steps in a component, automation engineers working in QuickTest can add checkpoint and output value steps. In ALM, you can view details of, and sometimes edit, these steps.

This section contains the following:

➤ "Checkpoints" on page 174

➤ "The Checkpoint Properties Dialog Box" on page 175

➤ "Output Value Steps" on page 178

➤ "The Output Value Properties Dialog Box" on page 179

Checkpoints

When creating a component, automation engineers working in QuickTest can add standard checkpoints. A checkpoint compares the current value of a specified property with the expected value for that property, and can help identify whether your application is functioning correctly.

The checkpoint is visible and editable in the Checkpoint Properties dialog box in ALM, enabling you to view which properties are set to be checked during the run. The properties for the object are listed in the Properties pane of the dialog box. The pane includes the properties, their expected values, and their value types. For more information, see "The Checkpoint Properties Dialog Box" on page 175.

When a component containing one or more checkpoints runs, QuickTest compares the expected value of the checkpoint to the actual value. If the value does not match, the checkpoint fails. You can view the results of the checkpoint in the Run Results Viewer. For more information, see "Viewing Run Results of Business Process Tests or Flows" on page 410.

The Checkpoint Properties Dialog Box

Description	Enables you to accept or modify the property values of the checkpoint.
To Access	Select an automated component in the business components module, open the Automation sub-tab, and click the **Checkpoint Properties** button ☑ in the Value column of a checkpoint step.
See Also	➤ "Checkpoints" on page 174 ➤ "Editing the Expected Value of an Object Property" on page 177 ➤ "Viewing Run Results of Business Process Tests or Flows" on page 410

Below is an image of the Checkpoint Properties dialog box.

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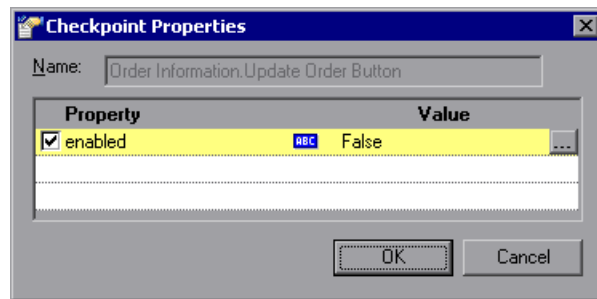
The dialog box displays the following information about the checkpoint:

Information	Description
Name	The name assigned to the checkpoint.
Value Type	The expected value type of the property.
	➤ The ABC icon indicates that the value of the property is currently a constant.
	➤ The 🔺 icon indicates that the value of the property is currently a parameter.
	➤ The 🧩 icon indicates that the value of the property is currently a component parameter.

Checkpoint Properties Dialog Box Options

Option	Description
Check box	You can accept the selected checks or modify them accordingly.
	➤ To check a property, select the corresponding check box.
	➤ To exclude a property check, clear the corresponding check box.
Browse ⋯	When you click the **Browse** button for a property in the Checkpoint Properties dialog box, the Parameterization / Properties dialog box opens, in which you can set the property value as a Constant or a Parameter.
	See "Editing the Expected Value of an Object Property" on page 177.

Additional References

Related Concepts	"Output Value Steps" on page 178

Editing the Expected Value of an Object Property

When you click the **Browse** button for a property <u>...</u> in the Checkpoint Properties dialog box, the Parameterization / Properties dialog box opens. In this dialog box, you can set the expected property value as a **Constant** or a **Parameter**.
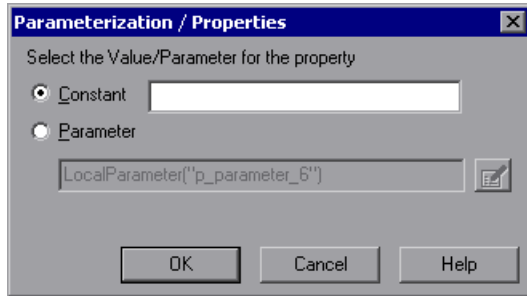
➤ **Constant.** A value that is defined directly in the step and remains unchanged when the component runs.

If you select **Constant**, you can edit the value directly in the **Constant** box.

➤ **Parameter.** A value that is defined or generated separately from the step and is retrieved when the specific step runs.

If you select **Parameter** for a value that is already parameterized, the **Parameter** box displays the current parameter definition for the value. If you select **Parameter** for a value that is not yet parameterized, you can click the **Parameter Options** button to open the Parameter Options dialog box.

Specify the property details for the parameter. For more information on using parameters in your components, see "Working with Parameters" on page 263.

Output Value Steps

When creating steps in a component, automation engineers working in QuickTest can add output value steps. An output value step is a step in which one or more values are captured at a specific point in your component and stored for the duration of the run session. The values can later be used as input at a different point in the run session. However, output values are stored only for the duration of the run session. When the run session is repeated, the output values are recaptured.

You can use standard output value steps to output property values of most objects. For example, you can use an output value step to output text strings by specifying to output the text property of an object.

The output value steps determine where the values are stored during the run session and how they can be used. When you run a component containing one or more output value steps, QuickTest retrieves each value at the specified point and stores it in the specified location. When the value is needed later in the run session, QuickTest retrieves it from this location and uses it as required.

After the run session, you can view the values retrieved during the session as part of the session results. For more information, see "Viewing Run Results of Business Process Tests or Flows" on page 410.
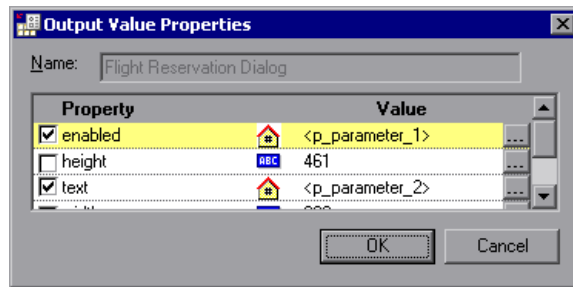
The output value step is visible and editable in ALM in the Output Value Properties dialog box. The properties are listed in the Properties pane of the dialog box. The pane includes the properties, the property values that are currently stored with the object in the object repository, and their value types. The Output Value Properties dialog box enables you to choose which property values to output and to define the settings for each value that you select.

You can select a number of properties to output for the same object and define the output settings for each property value. When the output value step is reached during the run session, QuickTest retrieves all of the specified property values.

The Output Value Properties Dialog Box

Description	Enables you to choose which property values to output and to define the settings for each value that you select.
To Access	Select a component in the business components module, open the Automation sub-tab, and click the **Output Value Properties** button 🔳 in the Value column for an output value operation.
See Also	**Conceptual overview**: "Output Value Steps" on page 178
	Related tasks:
	➤ "Defining Output Values for Steps" on page 159
	➤ "Parameterizing Output Values" on page 169
	➤ "Specifying the Output Settings for a Property Value" on page 180
	Additional related topic: "Additional References" on page 180

Below is an image of the Output Value Properties dialog box.

The dialog box displays the following information about the checkpoint:

Item	Description
Name	The name assigned to the output value.
Value Type	The expected value type of the property.
	The ABC icon indicates that the value of the property is currently a constant.
	The ⬠ icon indicates that the value of the property is currently a parameter.
	The ⬠ icon indicates that the value of the property is currently a component parameter.

Output Value Properties Dialog Box Options

| Option	Description
Check box	To specify a property to output, select the corresponding check box. You can select more than one property for the object and specify the output options for each property value you select.
Browse ⬚	When you click the **Browse** button for a property in the Output Value Properties dialog box, the Parameterization / Properties dialog box opens, in which you can modify the property value.
	See "Specifying the Output Settings for a Property Value" on page 180

Additional References

Related Tasks	"Viewing Run Results of Business Process Tests or Flows" on page 410
Related Concepts	"Checkpoints" on page 174

Specifying the Output Settings for a Property Value

When you click the **Browse** button for a selected property ⬚ in the Output Value Properties dialog box, the Parameterization / Properties dialog box opens.

The dialog box displays the output definition for the selected property value.
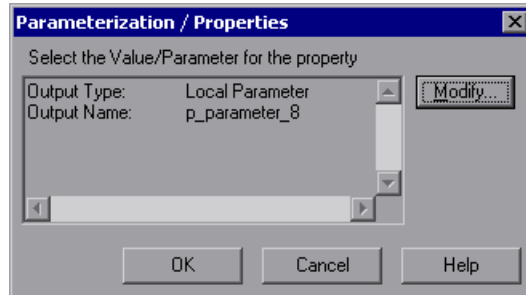
When you select a property value to output, you can:

➤ Change the output type and/or settings for the selected value by clicking the **Modify** button. The Output Options dialog box opens and displays the current output type and settings for the value. For more information, see "Defining Output Values for Steps" on page 159.

➤ Accept the displayed output definition by clicking **OK**.

6

Getting Started with Business Process Tests

You use the Test Plan module to build and configure business process tests and flows by combining business components into an effective testing structure.

This chapter introduces the elements of the Test Plan module that are available for business process tests and flows. Chapter 7, "Managing Business Process Tests" describes how to work with the features and other options available in the Test Plan module.

This chapter includes:

About Getting Started with Business Process Testing in the Test Plan Module

You create and manage business process tests and flows in the Test Plan module.

➤ Business process tests are testing scenarios comprised of business components and flows.

➤ Flows are a type of test that comprise a sequence of business components.

For information on creating components in the Business Components module, see Chapter 3, "Working with Business Components." For information on creating flows in the Test Plan module, see Chapter 8, "Working with Flows."

Business process tests and flows are used to challenge the application implementation by testing the processes on which the whole application is based.

Note: The Test Plan module can be used to design manual tests, automated business process tests and flows, and automated tests using other products, such as HP QuickTest Professional. The information and procedures described in this chapter are relevant only to Business Process Testing, and are viewed using the Test Plan Tree view of the Test Plan module.

All the standard functionality in the Test Plan module applies to Business Process Testing as well. For more information on using the Test Plan module, see the *HP Application Lifecycle Management User Guide*.

To access a business process test or a flow in the Test Plan module:

1 If not already logged in, log in to your HP Application Lifecycle Management (ALM) project as described in the *HP Application Lifecycle Management User Guide*. The ALM main window opens.

Note: After login, ALM displays the module in which you last worked.

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2 In the ALM sidebar, under Testing, select **Test Plan**.

3 If the Test Plan module opens to the **Test Grid**, select **View** > **Test Plan Tree** to work with business process tests or flows as described in this chapter.

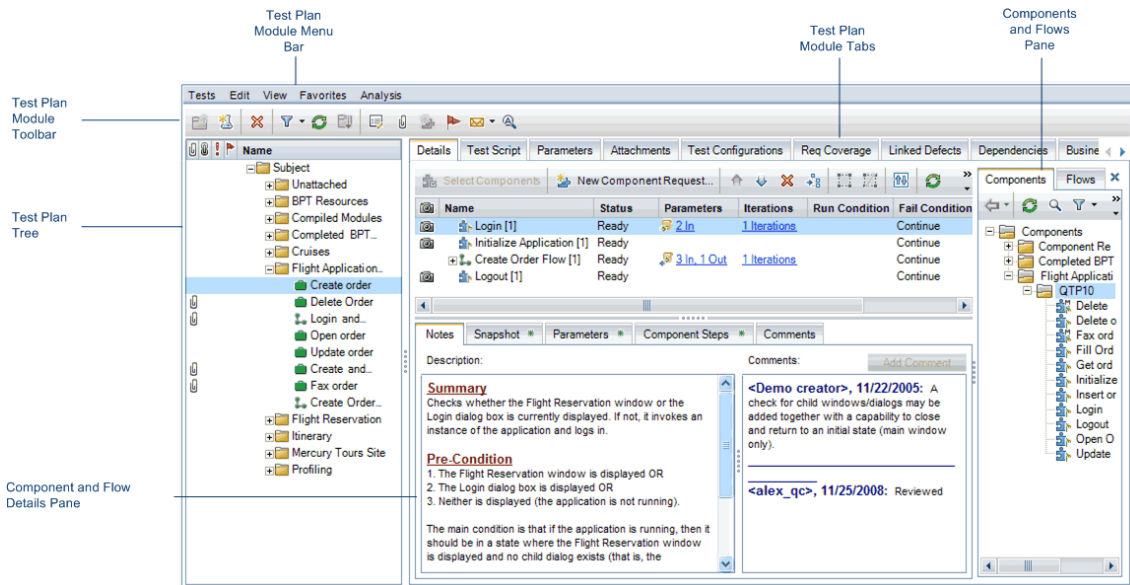**4** Select a business process test or a flow in the Test Plan tree.

Note:

Data in the Test Plan module is read-only under the following circumstances:

➤ The data in the Test Plan module tabs when a business process test or flow is selected are read-only if no Business Process Testing license is available.

➤ Business process tests that are currently open in another session of ALM are locked and can be opened only in read-only mode.

The Test Plan Module Window for Business Process Testing

This section introduces the Test Plan module window for Business Process Testing. The Test Plan module for Business Process Testing differs from the Test Plan module for other ALM test types.

The Test Plan module window is shown below, with a business process test selected and the Test Script tab chosen. Different tabs appear when a folder, a flow, or other test types are selected.

Depending on whether a business process test, flow, or folder is selected in the Test Plan tree, the interface may contain the following key elements:

➤ "Test Plan Module Menu Bar" on page 187

➤ "Test Plan Module Toolbar" on page 187

➤ "Test Plan Tree" on page 188

➤ "Test Plan Module Tabs for Business Process Testing" on page 190

➤ "Test Plan Module Components and Flows Pane" on page 210

➤ Filter information, which describes the filter currently applied to the grid or tree. Located directly above the grid filter boxes or tree.

Test Plan Module Menu Bar

The Test Plan menu bar contains the **Tests**, **Edit**, **View, Favorites,** and **Analysis** menus, from which you can create and modify tests (including business process tests and flows), remove tests, change the displayed view, and generate reports.

For more information on the Test Plan menu bar, see the *HP Application Lifecycle Management User Guide*.

Test Plan Module Toolbar

The Test Plan toolbar contains buttons for commands that are commonly used when creating and modifying the Test Plan tree, such as creating or deleting business process tests and flows, refreshing the data, and filtering the tree. For more information on these commands, see the *HP Application Lifecycle Management User Guide*.

Tip: You can navigate the Test Plan module, and perform many Test Plan module commands, using shortcut keys. For a list of shortcut keys, see "Test Plan Module Shortcuts for Business Process Testing" on page 417.


When working with Business Process Testing, the Test Plan toolbar also contains the following button:

Convert to Component. Opens the Select Destination Folder dialog box, which enables you to convert existing manual tests to manual components. For more information, see "Converting Manual Tests to Components" on page 235.

Test Plan Tree

The Test Plan tree is a graphical representation of your test plan, displaying subject folders, business process tests, and flows according to the hierarchical relationship of their functions within the business process.
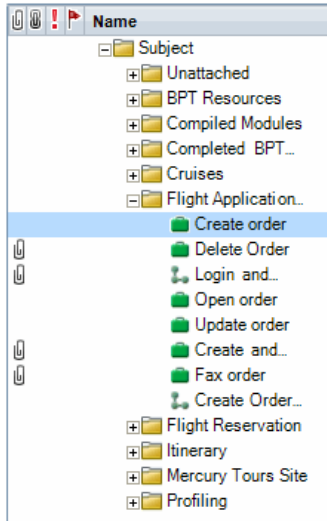
The entities that comprise the Test Plan tree are described under:

➤ "Test Plan Tree Folders" on page 188

➤ "Statuses and Icons" on page 190

After you have built the basic structure of your plan in the Test Plan tree, you can create business process tests and flows and assign them to the appropriate subjects in the tree. You build the content of a flow by dragging business components from the component tree and dropping them in the flow or business process test. For more information, see Chapter 8, "Working with Flows," and Chapter 7, "Managing Business Process Tests."

Test Plan Tree Folders

The Test Plan tree contains the following folders:

➤ The top level in the Test Plan tree is the Subject root folder, which contains the Unattached folder and the test folders.

The Subject folder cannot be renamed or deleted. You can click the **Set Filter/Sort** button in the toolbar to sort the other folders in the tree according to your own requirements.

Selecting the subject folder displays Description, Attachments, and Live Analysis tabs that enable you to provide a descriptive overview of the folder's contents, attach appropriate files, URLs or other information, and create a graphical representation of data related to test plans and test sets. For more information on these tabs, see the *HP Application Lifecycle Management User Guide*.

➤ The Unattached folder contains tests whose folders have been removed from the tree and which have not been assigned to any other folder.

The Unattached folders cannot be renamed or deleted. You can click the **Set Filter/Sort** button in the toolbar to sort the other folders in the tree according to your own requirements.

➤ Test folders contain your tests and flows. These folders can be renamed and deleted. You can click the **Set Filter/Sort** button in the toolbar to sort the other folders in the tree according to your own requirements.

Selecting a test folder in the Test Plan tree displays Description, Attachments, and Live Analysis tabs that enable you to provide a descriptive overview of the folder's contents, attach appropriate files, URLs or other information, and create a graphical representation of data related to test plans and test sets. For more information on these tabs, see the *HP Application Lifecycle Management User Guide*.

➤ **In previous versions of Quality Center:** The **BPT Resources** folder was created in the Test Plan module. For business process tests or flows to perform properly in ALM, this folder and its subfolders should not be renamed or deleted.

In ALM, the **BPT Resources** folder no longer exists in the Test Plan module. This folder, which contains the business component resources in the project, is created automatically in the Test Resources module the first time you click the Automation sub-tab in a new project, when you create a QuickTest automated component for the first time, or when QuickTest connects to ALM for the first time.

Statuses and Icons

Note the following status indicators and icons in the Test Plan tree:

➤ The status of business process tests and flows in the Test Plan tree are indicated by their icon colors. For more information, see "Understanding Business Process Test and Flow Statuses" on page 193.

➤ Tests and flows in the Test Plan tree to which an alert has been sent are indicated by a red exclamation mark ! icon to the left of the test or flow name. Clicking the red exclamation mark opens the alert.

➤ In a version-controlled project, tests and flows checked out by the current user are displayed with an open green lock icon ▲ . Tests and flows checked out by another user are displayed with a red lock icon ▲ , together with the name of the user. No lock icon indicates that the test or flow is checked in.

Test Plan Module Tabs for Business Process Testing

Selecting a business process test or flow in the Test Plan tree displays tabs that provide an overview of the business process test or flow, and its status.

The tabs are described in this section.

➤ "Details Tab" on page 191

➤ "Test Script Tab" on page 196

➤ "Parameters Tab" on page 203

➤ "Test Configurations Tab" on page 205 (for business process tests only)

➤ "Attachments Tab" on page 206

➤ "Req Coverage Tab" on page 207

➤ "Linked Defects Tab" on page 207

➤ "Dependencies Tab" on page 208

➤ "Business Models Linkage Tab" on page 208

➤ "Criteria Tab" on page 209 (for business process tests only)

➤ "History Tab" on page 210

Details Tab

The Details tab enables you to enter details and a general description of the business process test or flow.

Note:

➤ You can add user-defined fields and change the label of any of the fields in the Test Plan module. You can also customize project lists. For more details, refer to the *HP Application Lifecycle Management Administrator Guide*.

➤ You can use the Script Editor to restrict and dynamically change the fields and values in the Test Plan module. For more details, refer to the *HP Application Lifecycle Management Administrator Guide*.

The following information is generally displayed in the Details tab:

Field/Tab	Description
Test Name	The current name of the business process test or flow.
	Tip: This field is read-only in the Details tab, but you can rename a business process or flow in the Test Plan Tree. Select the name in the tree, and then click it again to activate the name label for editing. Alternatively, right-click it in the tree and select **Rename**. Then edit the name and press ENTER.
Creation Date	The date on which the business process test or flow was created.
Designer	The user responsible for designing the business process test or flow. By default, the user who created the test or flow is displayed in this box. You can select another user from the list, if required. Clicking the e-mail button ✉ enables you to send an e-mail message about the test or flow to the specified designer.
Status	The status of the business process test or flow. This box is read-only because the status of the test or flow is determined by the status of its business components. The component with the most severe status determines the test or flow status.
	For more information on component statuses, see "Component Tree" on page 46. For more information on test or flow statuses, see "Understanding Business Process Test and Flow Statuses" on page 193.
Test ID	A unique numeric ID automatically assigned by ALM to the business process test or flow. This field is read-only.

Field/Tab	Description
Description tab	A rich text edit area enabling you to enter an overall textual summary of the business process test or flow's purpose, or any other relevant text.
Comments tab	A rich text edit area enabling you to enter any additional information or remarks that you want to communicate to other users, such as future changes planned for the test or flow, or alternative tests or flows in which the components can be used. You can click the **Add Comment** button in the tab to automatically insert your user name and the current server date into the area as an introduction to your comments.

Note: The Details tab's Description and Comments tabs provide a comprehensive selection of text editing and formatting commands.

Understanding Business Process Test and Flow Statuses

Business process test and flow statuses are identified in the Test Plan module tree by specific icons, and in the **Status** box in the test or flow's Details tab. The icons are colored and the symbols shown in the icons vary according to the status of the business process test or flow. For example, a green **Ready** icon indicates that all the business components in the test or flow are ready to be run, and a red **Error** icon indicates that at least one component has one or more errors that require attention.

The status of a business process test or flow is set to **Design** when the test or flow is created, and changes to **Maintenance** when it has been modified. The status is subsequently determined by the business component in the test or flow with the most severe status. For example, suppose you have a business process test that contains:

➤ 2 **Ready** components

➤ 1 **Maintenance** component

➤ 1 **Under Development** component

➤ 1 **Error** component

➤ 1 **Under Development** (requested) component

In this example, the test status is **Error**, because **Error** is the most severe status of a business component in the test.

If one of the business components was deleted and moved to the **Obsolete** folder in the component tree, then the test or flow status would change to **Outdated**, because an Obsolete component is more severe than the **Error** status.

Business process test and flow statuses and their corresponding icons are described in the following table, from the least severe status to the most severe status:

Status	Icon	Color	Description
Ready		**Green**	All the business components included in the business process test or flow have **Ready** status, indicating that they are fully implemented and ready to be run.
Maintenance		**Yellow**	The business process test or flow has been modified since it was created, or one or more business components included in the test or flow are being modified or are not yet complete, and have **Under Development** or **Maintenance** status (and no components in the test or flow have a more severe status). The **Under Development** component status is initially assigned to: ➤ New components created in the Business Components module. ➤ Component requests dragged into a component folder in the component tree.

Status	Icon	Color	Description
Error		**Red**	One or more business components included in the business process test or flow have **Error** status, indicating that they have errors that will or may cause a test run to fail.
Outdated		**Gray**	One or more business components included in the business process test or flow are Obsolete, indicating that they are outdated and are included in the **Obsolete** folder in the component tree in the Business Components module.

Note: Tests created in other testing tools can also be included in the Test Plan module tree, and are identified by other icons.

User Defined Fields

If relevant test fields were defined in the Project Customization window in ALM, the Required Test Fields dialog box opens when a new test or flow is created. These fields are displayed in the Details tab.

For more information on user defined fields, see the *HP Application Lifecycle Management Administrator Guide*.

Test Script Tab

The Test Script tab enables you to build the structure of the business process test or flow by adding business components (and, in the case of tests, flows).

You use this tab to:

➤ Add business components (created in the Business Components module or in a testing tool such as QuickTest Professional) to a business process test or flow.

➤ Group components in a business process test or flow.

➤ Add flows to a business process test.

➤ View and set values for input and output component parameters.

➤ Define flow parameters and their default values.

➤ Define failure conditions.

➤ Add run conditions to a flow.

➤ Create iterations of components, groups, and flows.

➤ Validate tests and flows.

➤ Run tests or flows in Debug mode.

➤ Generate requests for additional business components that you require for your test or flow.

A green asterisk icon ✳ next to the Test Script tab name indicates that the selected business process test contains one or more business components or flows, or the selected flow contains one or more business components.

In addition to the standard functionality available for business process tests, the Test Script tab includes additional functionality when working with flows. For more information on using this tab when working with flows, see "Understanding the Test Script Tab for Flows" on page 258.
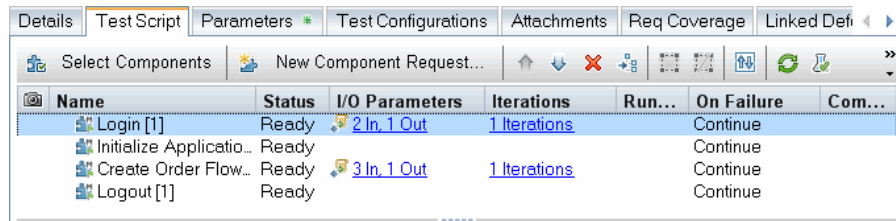
For task information, see "Creating Business Process Tests" on page 213.

The Test Script tab comprises the following panes:

➤ Test Script Pane

➤ Components and Flows Pane

➤ Component and Flow Details Pane

Test Script Pane

For each business component in the business process test or flow, the Script pane displays the name, status, input and output component parameters, iterations, run conditions, comments, and whether the test or flow continues if the component fails during the run.

This section contains:

➤ "Test Script Pane Links" on page 197

➤ "Test Script Pane Toolbar" on page 198

➤ "Test Script Pane Context Menu" on page 199

Test Script Pane Links

The Test Script pane contains the following links for each business component:

I/O Parameters. Displays the input and output parameters defined for the business component in the I/O Parameters dialog box. For user interface details, see "The I/O Parameter Dialog Box" on page 325.

Iterations. Lets you manage the iterations for the business component, flow, or group, including setting parameter values for each iteration in the Iterations dialog box. For task details, see "How to Define Iterations to Run with Different Values" on page 334.

Test Script Pane Toolbar

The Test Script pane toolbar contains the following toolbar buttons:

➤ **Select Components.** Opens the Components and Flows pane on the right side of the Script pane. The pane displays a tree of the business components defined for the project in the Components tab. If the item selected in the Script pane is a business process test, the pane also displays a tree of the flows defined for the project in the Flows tab. For more information on building a business process test using these components, see "Adding Components and Flows to a Business Process Test" on page 216. For more information on building a business process test using these flows, see "Adding Flows to Business Process Tests" on page 261.

➤ **New Component Request.** Enables you to request a new business component. For more information on generating a request for a new component, see "Requesting New Components for Business Process Tests or Flows" on page 227.

➤ **Move Up/Move Down.** Enables you to change the testing order in the business process test by moving a selected component or flow up or down in the order. If you select a group node, you can move the group within the business component or flow.

➤ **Remove from Test.** Removes the:

  ➤ Selected business component from the business process test or flow.

  ➤ Selected group from the business process test or flow.

  ➤ Selected flow from the business process test.

  If criteria are specified for a component that is about to be removed, a warning message is displayed. The component is still available for future use, if required, from the component tree pane.

➤ **Go to Component/Flow.** Goes to and opens the selected business component or flow.

➤ **Group.** Creates a new group that includes the selected business components and flows. For more information, see "Grouping Components and Flows" on page 222.

➤ **Ungroup.** Removes the selected group, or the grouping in which the selected business component or flow is a member. For more information, see "Grouping Components and Flows" on page 222.

➤ **Show Test Parameters Promotion Status.** Enables you to view a list of test and flow parameters that were promoted and where they were originally defined. For task details, see "How to View the Promotion Status for Test and Flow Parameters" on page 284

➤ **Refresh.** Updates the data, such as the component parameter data and snapshot, for each business component in the business process test. The test itself is not updated.

➤ **Validate Test.** Checks the business process test or flow and all the test instances within the test set for errors. For more information, see "Validating Business Process Tests and Flows" on page 234.

➤ **Run or Debug Test.** Enables you to run and debug a business process test. For more information, see "Debugging Tests in the Test Plan Module" on page 400.

When you select a flow in the Test Plan tree, the Test Script tab includes the following toolbar buttons:

➤ **Add/Edit Run Condition.** Enables you to add run conditions to your flow. For more information, see "Adding Run Conditions" on page 371.

➤ **Remove Run Condition.** Enables you to remove an existing run condition from your flow. For more information, see "Managing Run Conditions" on page 374.

Test Script Pane Context Menu

The right-click context menu in the Test Script pane includes many of the above options, as well as the following commands, which provide additional functionality and information about the business process test or flow:

➤ **Go To Component.** Goes to the component in the Business Components module.

➤ **Iterations.** Opens the Iterations dialog box for the selected business component or flow.

➤ **Grouping.** Opens a submenu with the **Group** and **Ungroup** options.

➤ **Expand all below this node.** Expands the business components in the tree for the selected group or flow.

➤ **Collapse**. Collapses the business components in the tree for the selected group or flow.

➤ **Details.** Opens the Details dialog box for the component or flow so that you can view its details. If you select a component request, opens the Details dialog box for the component request and you can edit the request.

Components and Flows Pane

The Components and Flows pane can be optionally displayed on the right side of the Test Script tab. The pane comprises two tabs, the Components tab and the Flows tab, that display the hierarchical structure of all business components and flows in the project. The **Component Requests** branch in the Components tab shows any additional components that may have been requested from the Test Plan module.

If the Components and Flows pane is not visible, click the **Select Components** button in the Test Script tab toolbar.

An example of the Components and Flows pane is shown below:
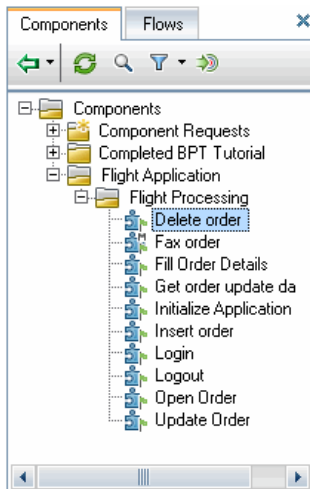
You use the Components and Flows pane to build a business process test by dragging and dropping one or more business components, flows, or component requests from the relevant tabs into the Script pane (or by clicking the **Quick Add** button in the tab toolbar).

The Components tab and the Flows tab each contain the following toolbar buttons:

➤ **Quick Add.** Adds the selected business component or flow after the component, group or flow selected in the Test Script pane (or at the end of the test if no component or flow is selected). As the component or flow is added, parameters, if any exist, are promoted according to the last promotion method used.

Alternatively, to explicitly set the promotion method, click the down arrow and choose one of the following options:

➤ **Add And Automatically Promote All Parameters**. All parameters are promoted to the next level as the component or flow is added.

➤ **Add Without Promoting Parameters**. Parameters are not promoted to the next level as the component or flow is added.

➤ **Add while Setting Promote Options**. The Promote Parameters dialog box opens, enabling you to individually set which parameters should be promoted. For user interface details, see "The Promote Parameters Dialog Box" on page 310.

For task details on promoting parameters, see "Promoting Parameters and Viewing Their Status" on page 282.

➤ **Refresh Selected.** Updates the data in the Components tab or Flows tab.

➤ **Find.** Enables you to search for a folder in the tree using the Find dialog box. For information on Find and Replace functionality, see the *HP Application Lifecycle Management User Guide*.

➤ **Set Filter/Sort.** Enables you to filter and sort the business components or flows in the tree. For more information on filtering and sorting a tree, see the *HP Application Lifecycle Management User Guide*.

➤ **Go to Component/Test by ID**. Displays and highlights the selected component, flow, or test in the tree.

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Component and Flow Details Pane

The Component and Flow Details pane can be optionally displayed at the bottom of the Test Script tab. This pane contains different tabs depending on whether a flow, group, or a business component is selected in the Test Script tab.

The following tabs may be displayed, depending on the entity selected in the component tree:

➤ The **Notes** tab displays the description and comments of the business component, flow, or group in read-only format. For more information on editing or entering implementation requirements for a business component, see "Providing Component Details and Implementation Requirements" on page 94.

➤ The **Manual Steps** tab displays the manual component steps defined for the component. This tab is not displayed for flows. For more information, see Chapter 4, "Designing Manual Component Steps."

➤ The **Snapshot** tab displays the full-sized image of the snapshot attached to the business component. This tab is not displayed for flows. For more information on adding an image, see "Attaching Images" on page 98.

➤ The **Parameters** tab lists the parameters defined for the component or flow. For more information, see Chapter 9, "Working with Parameters."

➤ The **Comments** tab displays additional comments for the component instance that can be used to communicate between various users. For more information, see "Providing Component Details and Implementation Requirements" on page 94.
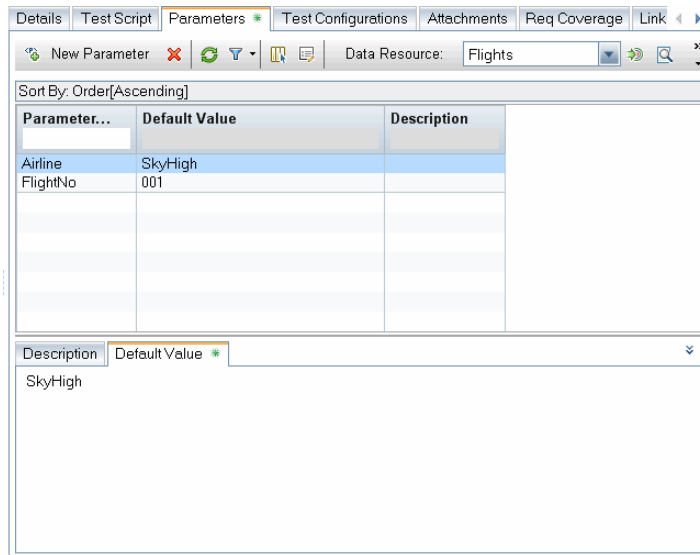
For more information on other test types, see the *HP Application Lifecycle Management User Guide*.

Parameters Tab

The Parameters tab enables you to define:

➤ Input and output parameters at the flow level.

➤ Input parameters at the test level.

The following is an example of the Parameters tab at the test level.

A green asterisk icon ✳ :

➤ Next to the Parameters tab name indicates that the selected test or flow has one or more parameters.

➤ Next to the Default Value tab name indicates that the selected parameter has a default value.

The following tabs are displayed:

➤ The **Description** tab displays the description and comments for the parameter.

➤ The **Default Value** tab displays the default value for the input parameter. You can edit the default value here, but for advanced editing, see "The Set Values Page" on page 301.
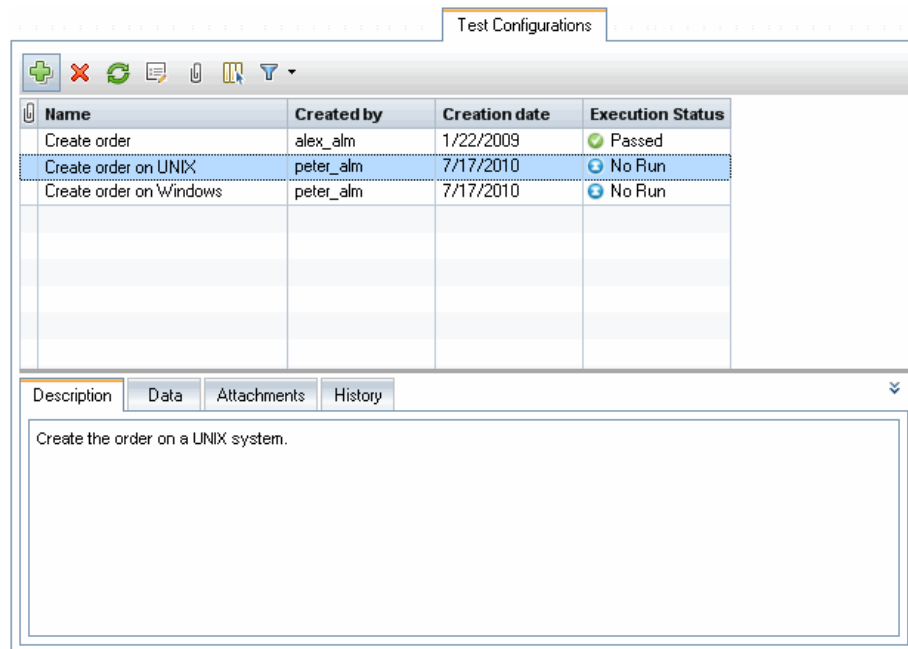
For general details, see Chapter 9, "Working with Parameters."

For task information, see "Defining Parameters and Setting Default Values" on page 273.

Test Configurations Tab

The Test Configurations tab enables you to define and update test configurations.

A **test configuration** is a set of definitions that describe a specific use-case of a test. For example, a test configuration can specify a subset of data or a run-time environment that the test should use. Associating test configurations with requirements provide finer granularity for requirement coverage by enabling coverage by different use-cases of a test.

Name	Created by	Creation date	Execution Status
Create order	alex_alm	1/22/2009	Passed
Create order on UNIX	peter_alm	7/17/2010	No Run
Create order on Windows	peter_alm	7/17/2010	No Run

Description · Data · Attachments · History

Create the order on a UNIX system.

Note: You cannot define configurations for flows.

The following tabs are displayed:

➤ The **Description** tab displays the description and comments for the test configuration.

➤ The **Data** tab displays the data associated with this test configuration. For more information, see "How to Define Test Configurations to Run with Different Values" on page 354.

➤ The **Attachments** tab. For more information, see "Attachments Tab" on page 206.

➤ The **History** tab. For more information, see "History Tab" on page 210.

For task information on working with basic test configurations for manual tests in ALM, see the *HP Application Lifecycle Management User Guide*.

For conceptual details on test configurations for business process tests, see "Working with Parameters—A Workflow" on page 271.

For task details on working with configurations for business process tests, see "How to Define Test Configurations to Run with Different Values" on page 354.

Attachments Tab

The Attachments tab enables you to associate an attachment with a business process test or flow. An attachment can be a file, URL, snapshot, or system information, and is identified by its name, associated application icon, size, and latest modification date and time. The tab also contains a **Description** area that enables you to enter a description of the selected attachment.

A green asterisk icon ✳ next to the Attachments tab name indicates that the selected test or flow has one or more attachments.

You can select an attachment to view its description in the Description area, or double-click an attachment to launch it in the appropriate application.

The Attachments tab for business process tests and flows has the same functionality as the Attachments tab for other test types. For more information on adding attachments, see the *HP Application Lifecycle Management User Guide*.

Req Coverage Tab

The Req Coverage tab enables you to define requirement coverage by linking your business process tests and flows to requirements. Requirements specify the testing objectives in ALM by describing what must be tested in the application to assess its operation or usability. Testing requirements are created in the Requirements module of ALM.

The tab provides a list of all the testing requirements defined in the Requirements module, and enables you to map the specific requirements to the currently selected business process test or flow. This enables you to methodically build your business process tests and flows according to preplanned requirements, and also to review the extent to which your tests and flows cover these testing requirements.

A green asterisk icon ✳ next to the Req Coverage tab name indicates that the selected test or flow includes requirement coverage.

The Req Coverage tab for business process tests has the same functionality as the Req Coverage tab for other test types. For more information on linking requirements to a test, see the *HP Application Lifecycle Management User Guide*.

Linked Defects Tab

The Linked Defects tab enables you to add and link defects to your business process tests.

A green asterisk icon ✳ next to the Linked Defects tab name indicates that the selected test or flow has one or more defects.

The Linked Defects tab for business process tests has the same functionality as the Linked Defects tab for other test types.

For details on linking defects to a test, see the *HP Application Lifecycle Management User Guide*.

Dependencies Tab

The Dependencies tab displays the dependency relationships that exist between:

➤ The selected business component, and entities such as flows and tests.

➤ The selected flow, and entities such as tests.

A green asterisk icon ✳ next to the Dependencies tab name indicates that the selected test or flow has one or more dependencies.

For details, see the *HP Application Lifecycle Management User Guide*.

Business Models Linkage Tab

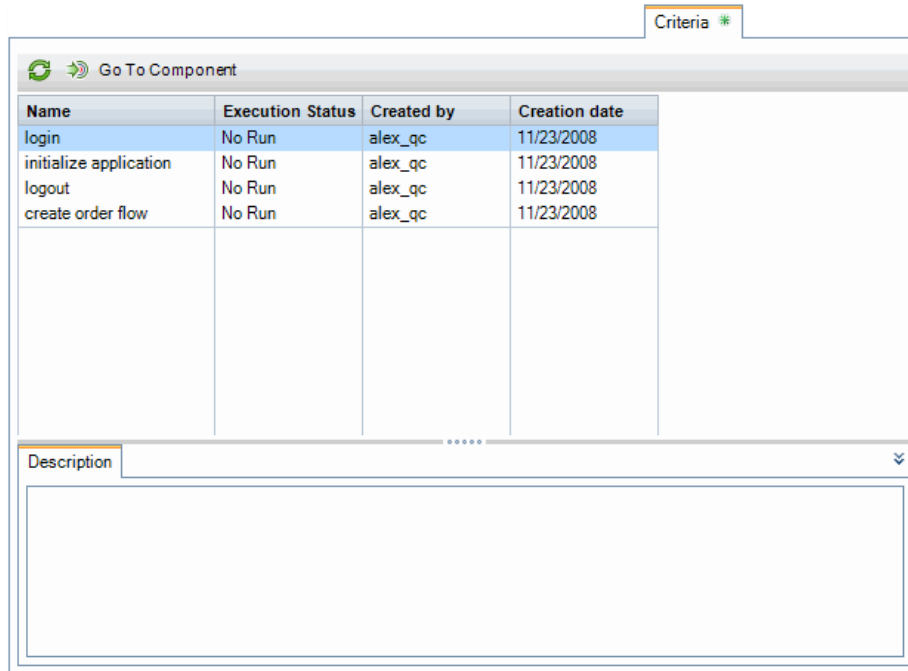The Business Models Linkage tab enables you to link requirements and tests to a model entity. For user interface details, see the *HP Application Lifecycle Management User Guide*.

A green asterisk icon ✳ next to the Business Models Linkage tab name indicates that the selected test or flow is linked to one or more business models.

For user interface details, see the *HP Application Lifecycle Management User Guide*.

Criteria Tab

The Criteria tab enables you to view the entities, such as flows and business components, that comprise a test. These entities are defined as criteria, and are used for the purposes of analyzing requirement coverage at a more granular level.

You cannot define criteria for flows. Flows can, however, be defined as criteria in business process tests.

In the Criteria tab, you can modify a criterion's name and description.

A green asterisk icon ✳ next to the Criteria tab name indicates that the selected business process test has one criterion or more.

For more information, see "Working with Criteria for Requirement Coverage" on page 241.

History Tab

The History tab in the Test Plan module comprises the following sub-tabs.

➤ The Baselines tab (or, when versioning is enabled at the site, the Versions and Baselines tab) displays the baselines of the item selected in the Test Plan tree. For information on working with version control in ALM, see the *HP Application Lifecycle Management User Guide*.

➤ The Audit Log tab displays changes made to specified fields in a test or flow.

For details, see the *HP Application Lifecycle Management User Guide*.

Test Plan Module Components and Flows Pane

When working in the Test Script tab from the Test Plan module, you can toggle the display of the Components pane and the Flows pane by clicking the **Select Components** button in the Script pane toolbar.

This pane enables you to add:

➤ Business components to flows

➤ Business components and flows to business process tests

For task information on using the Components pane and the Flows pane, see "Adding Components and Flows to a Business Process Test" on page 216.

While adding the components and flows, you can also promote parameters to the next level. For task information on promoting parameters, see "Promoting Parameters and Viewing Their Status" on page 282.

7

Managing Business Process Tests

This chapter describes how to create and manage business process tests in the Test Plan module of HP Application Lifecycle Management (ALM). The Test Plan module also enables you to convert existing manual tests to manual components.

This chapter includes:

About Managing Business Process Tests

You create and manage business process tests in the Test Plan module of ALM.

You define the details and description of the test, and then build up the test structure using a sequence of business components and flows in a specific business process. For more information, see "Creating Business Process Tests" on page 213.

You can also define whether a business process test run continues or ends if a specific component in the test fails. For more information, see "Defining Failure Conditions" on page 221.

You can define parameters that allow business components and flows to pass variable values between each other and the business process test. For more information, see "Managing Parameters at the Component, Flow, and Test Levels" on page 218.

You can attach appropriate files, snapshots, and URLs to provide additional information about the business process test, and link the test to preplanned project requirements.

If a business component that is necessary for a business process test has not yet been defined in the Business Components module, you can create a component request. You can use the requested component in the test you are building, and it also acts as a signal to add a new business component to the project. For more information, see "Requesting New Components for Business Process Tests or Flows" on page 227.

ALM enables you to generate a document about your project and business process test, which includes detailed information about the project's requirements, planning, test list, test set folders, and defect tracking data. For more information, see "Generating Documents for Business Process Tests and Flows" on page 251.

Note: Much of the functionality available when working with tests is also available when working with flows. For more information about flows, see Chapter 8, "Working with Flows."

Creating Business Process Tests

You create business process tests by providing the overall details of the test and building a sequence of business components and flows. You can also attach appropriate files and link the test to project requirements.

Create the business process test in the Test Plan module.

To create a business process test:

1 Access the Test Plan module, as described in "About Getting Started with Business Process Testing in the Test Plan Module" on page 184.

Note: Each business process test must be created in a folder or subfolder in the Test Plan tree. Steps 2 to 4 below describe the creation of a folder to contain the test. If you do not need to create a new folder, select the existing folder in which you want to store the business process test and proceed to step 5.

---

2 In the Test Plan tree, select the **Subject** root folder, or another folder or subfolder, in which you want to create a new folder.

3 Click the **New Folder** button in the toolbar above the tree. The New Test Folder dialog box opens.

| New Test Folder |
| Test Folder Name: |
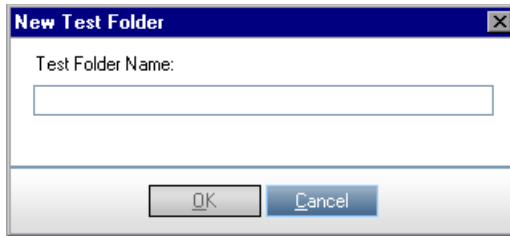
4 In the **Test Folder Name** box, enter a descriptive name for the folder and click **OK**.

Note: The names of business process test folders must not contain two consecutive semicolons (;;) or include any of the following characters: **\ * ^**

The new folder is displayed as a subfolder of the selected folder in the tree.

5 Select the folder in which you want to create the business process test and click the **New Test** button in the toolbar, or right-click the folder and select **New Test.** The New Test dialog box opens.

6 In the **Test Name** box, enter a descriptive name for the business process test.

Note: Business process test names must not contain two consecutive semicolons (;;) or include any of the following characters: \ / : " ' ? ' < > | * %

---

7 From the **Type** list, select **BUSINESS-PROCESS**.

8 Click **OK**. The new business process test is added to the selected folder in the Test Plan tree.

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Adding Components and Flows to a Business Process Test

The first step in building a business process test is to select the business components and flows (or component requests) and add them to the test.

Note: If you require a component in your business process test that does not yet exist, you can create a new component request and include it in your test in the same way as a regular component. For more information, see "Requesting New Components for Business Process Tests or Flows" on page 227.

To select business components and flows:

1 In the Test Plan Tree, select the relevant business process test.

2 Click the **Test Script** tab and ensure that the Components and Flows pane is displayed on the right. If it is not displayed, click the **Select Components** button in the Script pane toolbar.

The Components and Flows pane comprises a Components tab and a Flows tab.
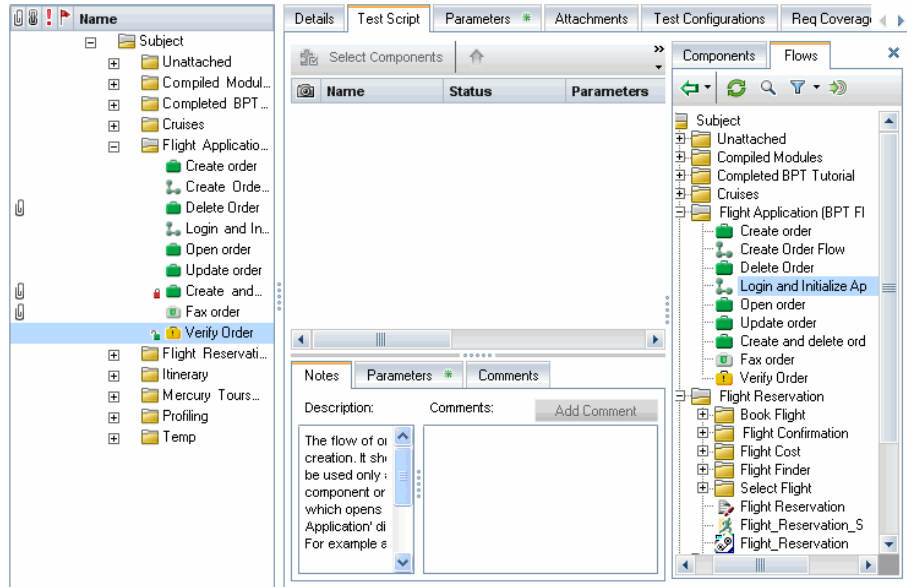
3 In the relevant tab, expand the folder that contains the business component or flow required for the business process test.

4 To add the required component or flow to the Script pane, use one of the following options. For more information, see "Promoting Parameters and Viewing Their Status" on page 282.

➤ To add the component or flow while setting promotion options, click the **Quick Add** button in the toolbar and select **Add while Setting Promote Options**. If the component or flow has parameters defined, the Promote Parameters dialog box opens. This dialog box enables you to choose whether to promote component or flow parameters to the next level. Select the parameters you want to promote. For more information, see "Promoting Parameters and Viewing Their Status" on page 282.

➤ To add the component or flow while automatically promoting all parameters (and without opening the Promote Parameters dialog box), click the **Quick Add** button in the toolbar and select **Add And Automatically Promote All Parameters**. The component or flow parameters are promoted to the next level.

➤ To add the component or flow without promoting all parameters (and without opening the Promote Parameters dialog box), click the **Quick Add** button in the toolbar and select **Add Without Promoting Parameters**. The component or flow parameters are not promoted to the next level.

➤ To add the component or flow using the last-used method for parameter promotion, do one of the following:

   ➤ Double-click the component or the flow.

   ➤ Drag the component or flow to the Script pane.

   ➤ Click the **Quick Add** button in the toolbar.

   ➤ Click the **Quick Add** button in the toolbar, and select the **Quick Add** menu option.

5 If necessary, click **OK** to close the Promote Parameters dialog box.

6 To arrange the business components and flows into a logical testing order, select business components and flows in the Test Script pane and either use the arrow buttons in the toolbar, or use the **Move up** and **Move down** options in the right-click context menu.

Managing Parameters at the Component, Flow, and Test Levels

You can configure how many times, and with which parameter values:

➤ A business component runs in a test.

➤ A flow runs in a test.

➤ A test instance runs using certain configurations and iterations.

For more details on:

➤ Working with parameters: See Chapter 9, "Working with Parameters."

➤ Working with iterations: See Chapter 11, "Working with Iterations."

➤ Working with configurations: See Chapter 12, "Working with Test Configurations."

To view the parameters defined for a component, group, or flow in a business process test:

1 In the Script pane of the Test Script tab, click the link in the I/O Parameters column for the corresponding component, group, or flow.

2 The I/O Parameters dialog box opens.

I/O Parameters [Component <SearchLoan [1]>]		
Input Parameters:		
Name	**Description**	**Link I/O**
CustomerName		☐
LoanID		☐
FromDate		☐
Output Parameters:		
Name	**Description**	**Linked To**

OK   Cancel
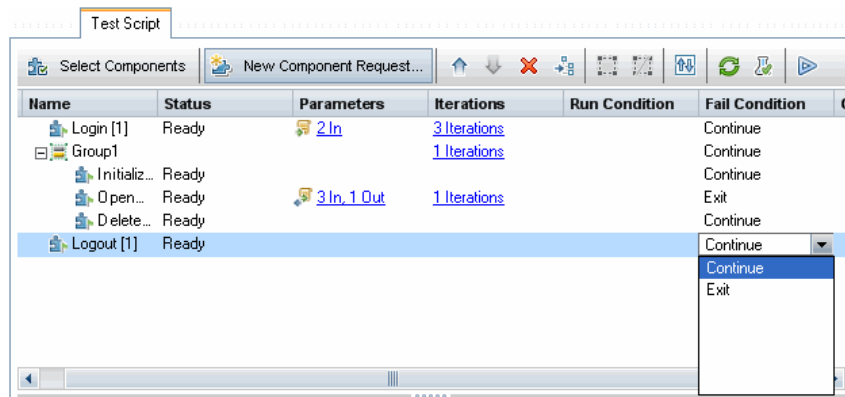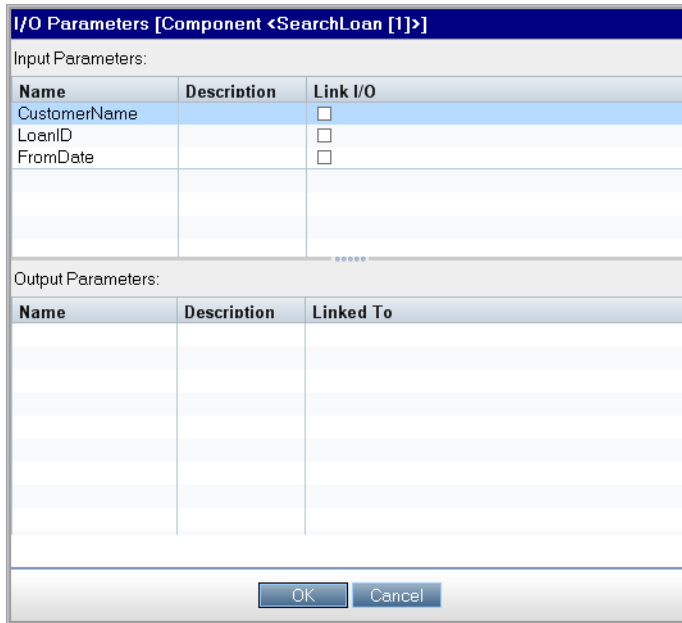
3 Click **OK**.

Note: This dialog box can also be used to link the values of output parameters to input parameters.

Defining Failure Conditions

You can define whether a business process test run continues or ends if a specific business component in the test fails.

To define the failure condition for a component:

1 In the Script pane of the Test Script tab, click in the **On Failure** column for the business component. A down arrow is displayed.
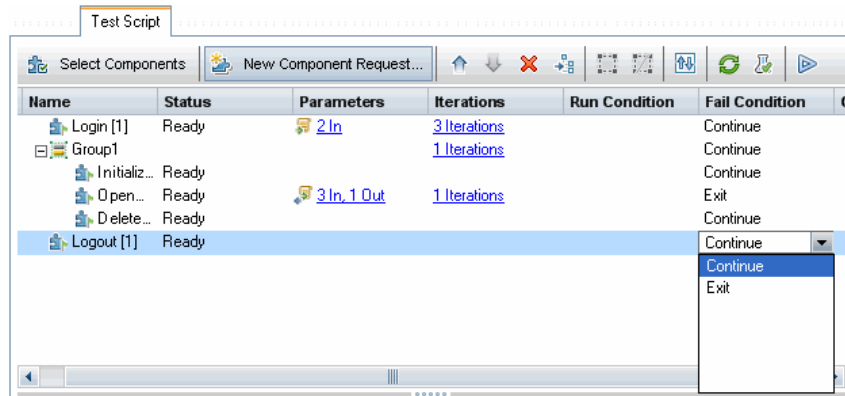
2 Click the down arrow and select one of the following from the list:

➤ **Exit.** The business process test run will end if the selected business component fails.

➤ **Continue.** The business process test will run the next business component if the selected component fails. By default, this failure condition is defined for each component when it is added to a test.

Grouping Components and Flows

In some cases, it may be helpful to iterate several business components or flows together as a group.

This section contains the following topics:

➤ "Creating Groups"

➤ "Modifying a Group"

➤ "Ungrouping a Group"

For conceptual details on group iterations, see "Group Iterations" on page 332.

For task details on iterating groups, see "How to Define Iterations to Run with Different Values" on page 334.

Creating Groups

You create groups of business components and/or flows in the Test Script tab of the Test Plan module. You can combine any number of components or flows in the business process test into a group, providing they comply with the following requirements:

➤ A component or flow can belong to one group only.

➤ Components or flows must be contiguous to be included in the same group.

➤ Components or flows in the group with input parameters must have the same number of iterations. When grouping, if iteration ranges are set per component, ALM requests confirmation that the iteration range should be set to that of the first component's iteration range. For example, if the first component in the group is set to run iterations 2 to 3, the entire group will be set to run iterations 2 to 3.

➤ For iterations of a group to be successful, the state of the application at the end of the last item in the group must match the state of the application before the first item in the group. For example, if the first component in the group assumes that the Login dialog box in an application is open, then at the point where the last component of the group ends, the Login dialog box but be in an open state before the next iteration begins.

To create a group:

1 Select the business process test or flow in which you want to create one or more groups and click the **Test Script** tab.

2 In the Script pane, select one or more contiguous components or flows. The selected items are highlighted.

3 Right-click, and select **Grouping** > **Group**. The group is created above the items.

	Name	Status	I/O…	Iterations	Run…	On Failure
	Login [1]	Ready	3 In, 1 Out	1 Iterations		Continue
	Group 1			1 Iterations		
	CreateLoan [1]	Ready	4 In, 1 Out	1 Iterations		Continue
	SearchLoan [1]	Ready	3 In	1 Iterations		Continue
	ApproveLoan [1]	Ready	2 In, 1 Out	1 Iterations		Continue
	Logout [1]	Ready				Continue

The group is named, by default, **Group** followed by a unique number. You can rename the group by right-clicking its name and selecting **Rename**.

All items to be included in the group must have the same number of iterations and the same iteration range, or a warning message is displayed.

4 Click the iterations link for the group to view and modify the iterations for each of the members in the Group Iterations dialog box.
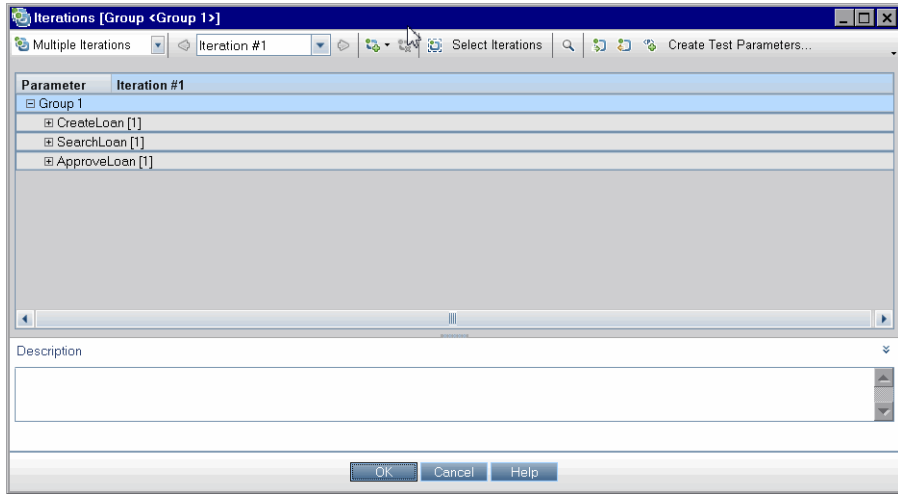
5 Click **OK** to close the Iterations dialog box.

Groups in the Test Script tab are identified by a group node listed above its members. The group node contains the group icon and displays the number of iterations for the group. The group node can be expanded and collapsed to show or hide its members.

➤ The number of iterations indicates the total number of value sets defined for the group.

➤ The iteration range indicates the subset of iterations currently set for use when the test runs.

For task details on working with group iterations, see "How to Define Iterations to Run with Different Values."

For user interface details on working with the Group Iterations dialog box, see "Iterations Dialog Boxes and Tabs."

Modifying a Group

You can add and remove members from component groups as required, change the order of groups in a business process test or flow, and change the order of members inside a group. In addition, you can add or delete iterations for all members in the group, and select a partial iteration range for all members in the group.

Note: Moving a group or a member within a group could cause a parameter reference conflict, for example, where a group is moved to a position preceding the component that provides an input component parameter needed by a parameter in the group.

If the resulting warning message is ignored, the conflicting link to the source parameter is deleted. The value for the source parameter will be empty. You can then either supply a value for the parameter or reinstate the link in the Group Iterations dialog box.

To modify a group:

The following table describes the procedures you can perform when working with groups:

To...	Perform the following:
Add a business component or flow to a group	Drag the component or flow from the Component Tree pane to the relevant position within the group.
	Select the component or flow. Drag the item up or down into the group, and drop it at the required location.
Remove a business component or flow from a group	Select the component or flow. Drag the item up or down out of the group, and drop it at the required location.
Move a group up or down in the test	Select the group node, and right-click, and select **Move up** or **Move down**.

To...	Perform the following:
Add group iterations	Right-click the group and click **Iterations** to open the Group Iterations dialog box. Click the **Add Iteration** button in the toolbar to add a new iteration for all the members in the group. Adding and configuring group iterations is similar to adding and configuring component iterations, as described in "Guidelines for Working with Iterations" on page 335.
Delete group iterations	Right-click the group and click **Iterations** to open the Group Iterations dialog box. Select one or more iteration columns and click the **Delete Iteration** button in the toolbar.
Select a partial iteration range	Click the iterations link for the group to open the Group Iterations dialog box. Click the **Select Iterations** button in the toolbar. Selecting a partial iteration range for the members of a group is similar to selecting a partial iteration range for a single component, as described in "How to Select Iteration Ranges" on page 337.

Ungrouping a Group

Components and flows can be ungrouped if required.

The following table describes several procedures you can perform to ungroup components and flows:

To...	Perform the following:
Remove a grouping	Select the group node and click the **Ungroup** button in the toolbar.
Completely remove a group, including the members in the group	Select the group node and click the **Remove from Test** button in the toolbar.

Requesting New Components for Business Process Tests or Flows

If, while creating a business process test or flow in the Test Plan module, you realize that a necessary business component has not been defined, you can create and submit a component request. The component request is a signal to add the new component to the project.

You can view and edit component requests generated in the Test Plan module in the Component Tree pane on the right of the Test Script tab. You can view component requests in the Component Requests folder of the component tree in the Business Components module.

After confirming that a requested component and its parameters are necessary for business process testing, you can drag the component request from the Component Requests folder to the appropriate folder in the component tree in the Business Components module.

For more information on adding component requests to the component tree, see "Handling Component Requests" on page 110.

This feature is especially useful when the roles of creating components in the Business Components module and building business process tests or flows in the Test Plan module are performed by different personnel.

Creating a Component Request

If a necessary business component has not been defined in the Business Components module, you can create and submit a component request from the Test Plan module.

To create a component request:

1 In the ALM sidebar, click **Test Plan** to open the Test Plan module.

2 In the Test Plan tree, select the business process test or flow for which you want to create a component request and click the **Test Script** tab.

3 Click the **New Component Request** button in the Test Script tab toolbar.

The Component Details dialog box opens.
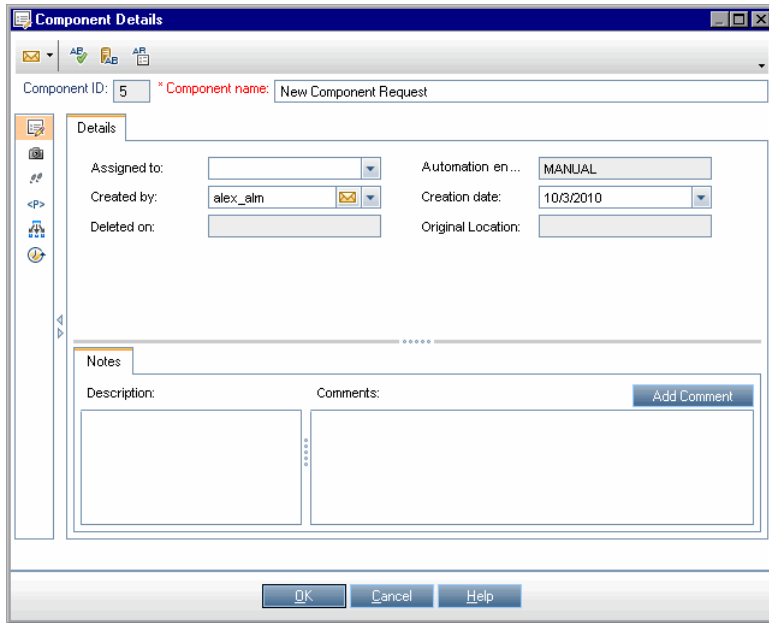
4 In the **Component name** box, either enter a unique name for the request or accept the one supplied for you by ALM.

5 From the **Assigned to** list, select the subject matter expert to whom the request is assigned.

6 If required, click the **Send E-mail** button on the toolbar to send a notification of the new request. For more information, see the *HP Application Lifecycle Management User Guide*.

7 If required, you can click the **Snapshot** sidebar entry to capture and attach an image associated with the component request. For task information on attaching an image, see "Attaching Images" on page 98.

8 Define any other additional properties for the component request at this time, such as description details, and input or output component parameters for the component request.

9 Enter the steps that should comprise the component. For information on how to enter steps, see "About Designing Manual Component Steps" on page 121.

10 Click **OK**. The new component request is displayed in the Test Script tab for the selected business process test or flow, and in the Component Tree pane under the Component Requests folder.

The new request is automatically assigned the status of **Not Implemented**.

Note: The component request status changes from **Not Implemented** to **Under Development** when you move the request from the Component Requests folder into a component folder in the Business Components module.

For more information, see "Handling Component Requests" on page 110.

Modifying a Component Request

You can edit the properties of a component request, provided the request is still listed in the Component Requests folder in the component tree.

To edit a component request:

1 Right-click the component request in the:

> ➤ Script pane of the Test Script tab in the Test Plan module

> ➤ Component tree in the Business Component module

2 Select **Details**. The Component Details dialog box opens.

Note: If the component request has been moved to a component folder from the Component Requests folder in the Business Components module, or if the component request has been moved to the **Obsolete** folder, the properties in the Component Details dialog box are displayed in read-only format.

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3 Edit the properties in the tabs, as required, and click **OK**.

Deleting a Component Request

You can delete a component request in the Business Components module only. For more information, see "Deleting Component Requests" on page 113.

Copying Business Process Tests and Flows

You can duplicate an existing business process test or flow as the basis for a new test or flow in the current project, or in another project, and then position the new test or flow anywhere in the Test Plan tree of that project.

For the purposes of this discussion, references to business process tests also include flows.

Note: You can copy a business process test to another project on the same server or on another server.

When you copy a business process test within the current project, existing business components in the test are linked to the copied test, and the original components are not copied.

When you copy a business process test to another project, the test and its related business components are copied in the same component tree structure as in the source project (including any components in the Obsolete folder).

When components are copied to another project or server as a result of copying a business process test, all considerations for copying components apply, as described in "Copying Folders and Business Components" on page 102.

To copy an existing business process test or flow:

1 If copying to another project or server, open the source and target projects in separate browsers.

2 In the Test Plan tree, right-click the business process test or flow that you want to copy and select **Copy**.

3 Right-click the folder in which you want to paste the new business process test or flow (in the current project or in another project on the same server) and select **Paste**. The test or flow is copied to the new position in the Test Plan tree.

Note: If a copied business process test or flow has the same name as a test that already exists in the target folder, a duplicate name warning message is displayed. Click **OK**. The business process test or flow is copied to the new position in the Test Plan tree and a suffix, for example _Copy_1, is automatically added to the test or flow name to create a unique name within the folder.

---

4 If you want to modify the name, select the test or flow in the tree and click again to activate the test label for editing. Alternatively, right-click the new test or flow and select **Rename**. Then enter a new name.

5 If required, select the new business process test or flow in the tree and modify the settings in the tabs. For more information on business process test settings, see "Test Plan Module Tabs for Business Process Testing" on page 190.

Deleting Business Process Tests and Flows

You can delete a business process test or flow, or a test folder, from the Test Plan tree.

➤ If you delete a business process test or flow, ALM permanently deletes the test or flow from the project. The test or flow is removed from all test sets and the run history is erased.

➤ If you delete a test folder, then by default ALM moves all the tests or flows in the folder to the **Unattached** folder in the tree.

Note: It is highly recommended that you do not run a business process test or flow from the **Unattached** folder. Move the test or flow to a valid folder in the Test Plan tree before running it.


To delete a business process test or flow:

1 In the Test Plan tree, select the business process test or flow and click the **Delete** button in the tree toolbar, or right-click the test and select **Delete**. A warning message is displayed.

2 Click **Yes**. The business process test or flow is permanently deleted.

To delete a test folder:

1 In the Test Plan Tree, select the test folder and click the **Delete** button in the tree toolbar, or right-click the folder and select **Delete**. The Confirm Delete Folder dialog box opens.
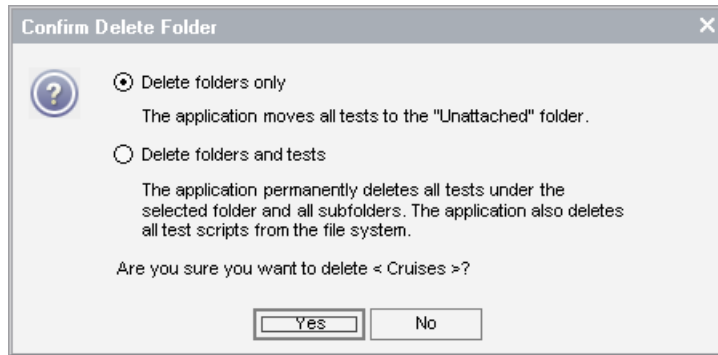
2 Select:

   ➤ **Delete folders only** to move all the tests or flows in the folder to the **Unattached** folder.

   ➤ **Delete folders and tests** to permanently delete all the tests, flows, and subfolders in the folder.

3 Click **Yes**. The folder or the folders, and the tests or flows, are deleted according to your selection.

Mailing Business Process Tests or Flows

You can send an e-mail about one or more business process tests or flows to another user. For example, the email of a business process test could include a flow, the components that flow contains and their component steps, followed by a component and its component steps.

A link is included in the email message that enables the recipient to go directly to the entity in the Test Plan module.

For more information, see the *HP Application Lifecycle Management User Guide*.

Validating Business Process Tests and Flows

You can check your business process tests and flows to locate any component errors that could halt the successful running of the test or flow.

Validating a business process test or flow in the Test Plan module checks all instances of the test or flow within all test sets.

To validate a business process test or flow:

1 In the Test Plan tree, select the business process test or flow and click the **Test Script** tab.

2 Click the **Validate Test** button in the toolbar.

Business Process Testing validates all instances of the business process test or flow and reports the results in the Test Validation Results dialog box, as shown in the example below.

3 If a validation error is reported, you can click the link in the **Entity** column to jump directly to the business component causing the error. Errors are indicated in the **Description** column.

Note: In the case of an iteration range mismatch, the error is indicated in the second component.

Open the Component Iterations dialog box of the component that caused the error, and modify the component parameter or parameters as required. For more information on working with business component parameters, see Chapter 9, "Working with Parameters".

4 Click **OK** to close the Test Validation Results dialog box.

5 When you are finished, repeat the validation check. If the error has been resolved, a message is displayed indicating that the validation was successfully completed.

Converting Manual Tests to Components

In the Test Plan module, you can convert existing manual ALM tests (not business process tests) to manual components using the Select Destination Folder dialog box.

To convert tests to components, in the Test Plan tree, select one or more manual tests or a test folder, and click the **Convert To Component** button. You can also right-click one or more manual tests or a test folder in the Test Plan tree, and select **Convert To Component**.

The new components are created in a folder that you specify or create in the component tree in the Business Components module.

You can also recursively convert all the tests in a folder and all its subfolders simultaneously. In this case, the components are created in the same folder structure in the Business Components module as the original tests in the Test Plan module. If no manual tests exist in the selected source folder, an empty folder structure is created in the specified destination folder.

For more information, see:

➤ "The Select Destination Folder Dialog Box" on page 237

➤ "Considerations When Converting Manual Tests to Components" on page 240

In the Business Components module, the Details tab of the converted component includes the following elements:

➤ **Component name.** The name you enter in the **New Component Name** box in the Destination Folder dialog box. (The default is the name of the test.) If a component with the same name already exists in the destination folder, a suffix, for example _Copy_1, is automatically added to the name to create a unique name within the folder.

➤ **Assigned to.** Remains empty.

➤ **Automation engine**. Displayed as **MANUAL**.

➤ **Created by.** The user who converted the test.

➤ **Creation date.** The date the test was converted.

➤ **Status.** Displayed as **Under Development**.

➤ **Description.** Copied from the Description tab of the test. The name of the source test and the test ID are also displayed.

➤ **Comments.** Copied from the Comments tab of the test.

The Select Destination Folder Dialog Box

Description	Displays the component tree from the Business Components module, and enables you to select a destination folder for your converted components in the tree.
To Access	In the Test Plan tree, do one of the following: ➤ Select one or more manual tests, or a test folder, and click the **Convert To Component** button. ➤ Right-click one or more manual tests, or a test folder, and select **Convert To Component.** ➤ Select one or more manual tests, or a test folder, and select the **Tests** > **Convert To Component** menu command.
Important Information	➤ Only manual tests in the selected folders are converted. ➤ The options available in the Select Destination Folder dialog box depend on whether you select a single test, multiple tests, or a folder in the Test Plan Tree. For more information, see "Select Destination Folder Dialog Box Options" on page 239.
See Also	**Conceptual overview**: "Converting Manual Tests to Components" on page 235. **Additional related topics**: ➤ "Select Destination Folder Dialog Box Options" on page 239. ➤ "Considerations When Converting Manual Tests to Components" on page 240.

Below is an image of the Select Destination Folder dialog box:
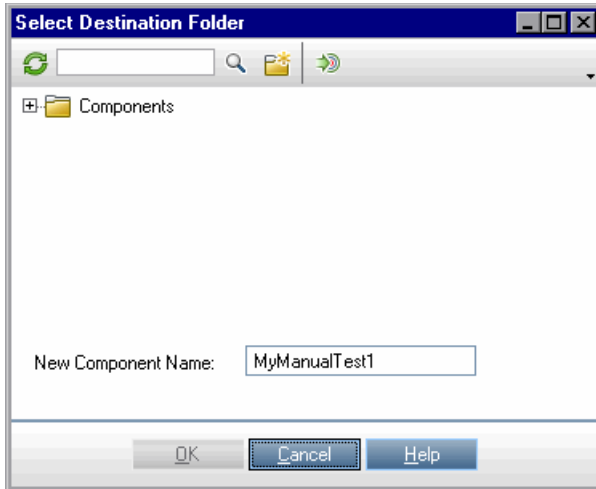
The example shown above opens when a folder is selected in the Test Plan tree.

➤ When a single test is selected:

   ➤ The **New Component Name** box is displayed.

   ➤ The **Include tests in subfolders** check box is not displayed.

➤ When more than one test is selected:

   ➤ The **New Component Name** box is not displayed.

   ➤ The **Include tests in subfolders** check box is not displayed.

Select Destination Folder Dialog Box Options

Option	Description
Refresh	Updates the data in the component tree.
Find	Enables you to search for a folder in the component tree. Full or partial folder names can be entered in the text box to the left of this button. For information on Find and Replace functionality, see the *HP Application Lifecycle Management User Guide*.
New Folder	Enables you to create a new folder for your converted components below the selected destination folder in the component tree.
Go to Entity by ID	Enables you to highlight a folder in the tree by entering its folder ID number.
Include tests in subfolders	Enables you to recursively convert all the tests in the selected folder and all of its subfolders simultaneously. If the number of tests is large, this action may take some time. **Available:** When a test folder is selected in the Test Plan Tree.
New Component Name	Enables you to enter a new name for a converted component. The default is the name of the test. This field is mandatory. **Note:** If a component with the same name already exists in the destination folder, a suffix is automatically added to the name to create a unique name within the folder (for example _Copy_1). **Available:** When a single test is selected in the Test Plan Tree.

Considerations When Converting Manual Tests to Components

Parameters

➤ Test parameter names may contain special characters that are not permitted in a component parameter name. Such characters are replaced with an underscore (_) when the test is converted.

➤ If a parameter name does not start with an English letter, the letter **p** is added as a prefix to the name when the test is converted.

➤ The parameter default value is copied from the test parameter.

➤ The parameter description is copied from the test parameter.

Component Steps

In the Component Steps tab of the new component:

➤ Step names and expected results are copied from the component steps in the test.

➤ Parameter names may be changed during the conversion process - see "Parameters", above. Parameter names in the step descriptions are changed accordingly.

➤ Certain test steps may call another test. If a component step is of type "call to", it is copied as a regular step with the step name "**Call**". The description is displayed as "**Call <linked test name>**".

Other

Attachments, linked defects, and the test history are not copied over to the converted component.

Working with Criteria for Requirement Coverage

In ALM, you can make sure that the tests in your test plan meet your original requirements by adding links between them. This is called requirement coverage.

In the Test Plan module, you create requirement coverage by selecting requirements to link to a test or a test configuration. Alternatively, in the Requirements module, you create test coverage by linking tests or test configurations to a requirement.

With Business Process Testing, you can also link a requirement to criteria. When creating coverage between requirements and business process tests, instead of covering each requirement only at the level of a test and its configuration(s), you can define coverage by criteria, such as flows or business components. This enables you to determine if a test passed or failed on a more granular level. For example, a test can be considered passed even if just one of its business components passed, such as the most critical one. Less critical business components have no effect on the overall status of the test.

This section discusses:

➤ "About Calculating Coverage by Criteria" on page 241

➤ "How to Set Coverage by Criteria" on page 243

➤ "How to Modify the Criteria for Requirement Coverage" on page 247

➤ "How to Analyze Coverage by Criteria" on page 248

About Calculating Coverage by Criteria

The logic used for calculating coverage by criteria is similar to the logic used for calculating coverage by tests and test configurations. For conceptual details on coverage analysis for tests and test configurations, see the *HP Application Lifecycle Management User Guide*.

Consider the following, however, when defining coverage for criteria:

➤ Coverage is calculated only for each instance of the selected criteria.

For example, if a business process test contains three components, **Component1**, **Component2**, and **Component3**, and **Component2** is the only criterion selected for coverage, each instance of **Component1** and **Component3** has no affect on coverage, regardless of whether the instances pass or fail. When all the instances of **Component2** run, the requirement for the entire configuration is considered covered.

➤ Coverage for flows is calculated as follows:

➤ Coverage for flows that are run from within a business process test is calculated for the flow in its entirety, and not according to the individual criteria within the flow.

➤ Coverage for flows that are run independently of a business process test is calculated according to the individual criteria within the flow.

➤ When working with more than one configuration and multiple iterations, coverage for a criterion is calculated for each iteration of each configuration. If one of the criterion for an iteration of a configuration fails, the requirement coverage for the associated test fails.

For example, business process test **OrderFlights** has two business components, **CheckFlights** and **ReserveFlights**. Only **ReserveFlights** is set as a criterion for covering the test requirements, perhaps because it is assumed that if the user was able to reserve a flight, the user must have been able to check the flight. The test has two different configurations, **Domestic** and **International**, representing different types of flights. Each configuration iterates three times, testing the reservation of three domestic flights and three international flights.

Using this example, only the following component instances are examined when calculating coverage:

➤ **Domestic configuration, Iteration 1, ReserveFlights**

➤ **Domestic configuration, Iteration 2, ReserveFlights**

➤ **Domestic configuration, Iteration 3, ReserveFlights**

➤ **International configuration, Iteration 1, ReserveFlights**

➤ **International configuration, Iteration 2, ReserveFlights**

➤ **International configuration, Iteration 3, ReserveFlights**

If just one of these six component instances fails, the associated tests fails when requirement coverage is calculated.

How to Set Coverage by Criteria

With Business Process Testing, you can create requirement coverage for flows and business components in addition to test configurations from the Test Plan module and the Requirements module.

Note: When defining the criteria that ALM should use to calculate coverage for a test configuration, keep in mind that the same criteria are used for all configurations of the test. It is not possible to define different criteria for different configurations for the same test.

To set coverage by criteria from the Test Plan module:

1 In the ALM sidebar, under Tests, select **Test Plan**.

2 If the test plan tree is not displayed, select **View** > **Test Plan Tree**.

3 Select the business process test or flow for which you want to set criteria coverage in the test plan tree.

4 Click the **Req Coverage** tab.

5 If the requirement tree is not displayed in the pane on the right, click **Select Req** button on the toolbar. The requirement tree opens.

6 Select the requirement for which to add coverage in the requirement tree.

7 Click **Add To Coverage** in the requirement tree toolbar (either with or without children). Either the Add Criterion Coverage or Add Advanced Coverage dialog box opens.
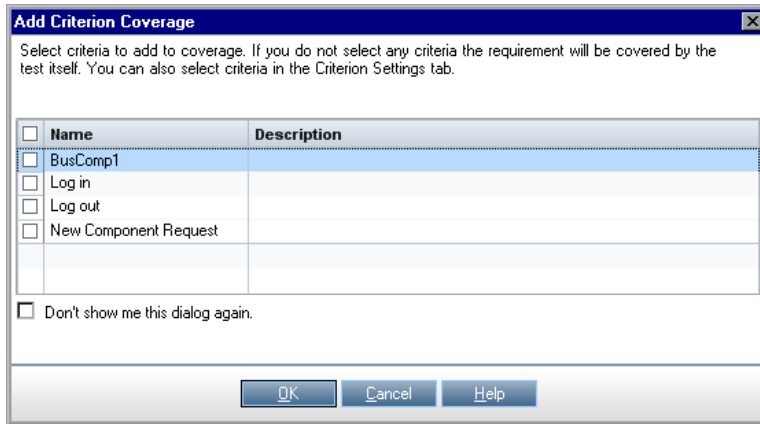
For user interface details on the Add Criterion Coverage dialog box, see the *HP Application Lifecycle Management User Guide*.

8 Select the criteria for which you want coverage and click **OK**. The selected criteria are added to the grid.

If you click **OK** without selecting criteria, the requirement is covered by the entire test.

Tip: To instruct ALM to hide the dialog box and add coverage only at the test level, without prompting you to select flow or business component criteria, select the **Don't show me this dialog again** checkbox. You can reveal the dialog box by selecting **View** > **Req Coverage** > **Show Advanced Coverage**.

---

9 To view the criteria you defined:

   a In the Test Plan tree, select the business process test.

   b Click the **Criteria** tab. View the name, execution status, the name of the user who created the criteria, and the creation date.

For user interface details on the Criteria tab, see the *HP Application Lifecycle Management User Guide*.

To set coverage by criteria from the Requirements module:

1 In the ALM sidebar, under Requirements, select **Requirements**.

2 If the requirement tree is not displayed, select **View** > **Requirements Details**.

3 Select the requirement for which you want to set criteria coverage in the requirement tree.

4 Click the **Test Coverage** tab.

5 If the test plan tree is not displayed in the pane on the right, click **Select** on the toolbar. The Test Plan tree opens.

6 In the Test Plan tree, select the test or flow for which to add coverage.

   ➤ When adding coverage by a flow, the flow is added to the grid.

Note: ALM does not create criteria for a flow's business components when selecting a flow from the test plan tree. To add business components as criteria, add coverage by selecting the corresponding business process test from the test plan tree.

➤ When adding coverage by a business process test, the Add Criterion
Coverage dialog box opens.
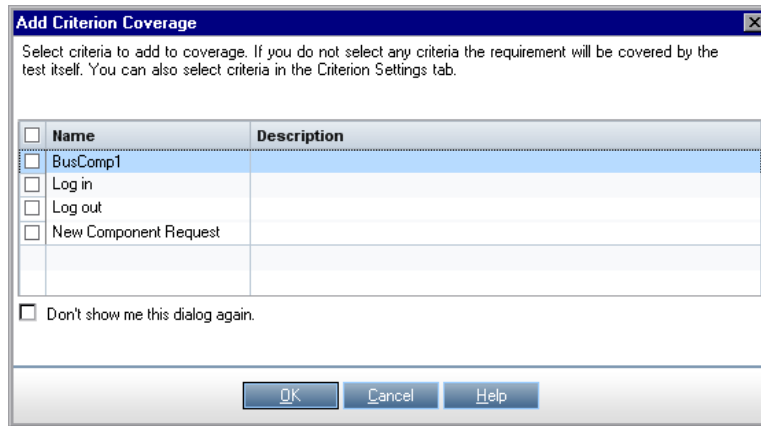
This dialog box shows all criteria (flows, business components) that
have not yet been added as criteria for coverage of this requirement.
For user interface details on the Add Criterion Coverage dialog box, see
the *HP Application Lifecycle Management User Guide*.

7 In the Add Criterion Coverage dialog box, select the criteria for which you
want coverage and click **OK**. The selected criteria are added to the grid.

If you click **OK** without selecting criteria, the coverage is set for the
business process test as a whole and the test name (or, when working with
test configurations, each test configuration name) is added to the grid.

Tip: To instruct ALM to hide the Add Criterion Coverage dialog box and
add coverage only at the test level, without prompting you to select flow
or business component criteria, select the **Don't show me this dialog
again** checkbox. You can reveal the Add Criterion Coverage dialog box by
selecting **View** > **Test Coverage** > **Show Add Criteria to Coverage**.

How to Modify the Criteria for Requirement Coverage

After setting requirement coverage by criteria for business process test, you can modify the coverage by adding and removing criteria using the Criterion Settings tab.

Note: When defining the criteria that ALM should use to calculate coverage for a test configuration, keep in mind that the same criteria are used for all configurations of the test. It is not possible to define different criteria for different configurations for the same test.


To modify existing coverage by criteria:

1 In the ALM sidebar, under Tests, select **Test Plan**.

2 If the test plan tree is not displayed, select **View** > **Test Plan Tree**.

3 Select the business process test or flow for which you want to set criteria coverage in the test plan tree.

4 Click the **Req Coverage** tab.

5 Click the **Criterion Settings** tab near the bottom of the window.

6 To remove a criterion, select the criterion in the grid and click the **Remove Criteria** button on the toolbar.

7 To add a criterion, select the criterion in the grid and click the **Add Criteria** button on the toolbar. The Add Criterion Coverage dialog box opens. For user interface details on the Add Criterion Coverage dialog box, see the *HP Application Lifecycle Management User Guide*.
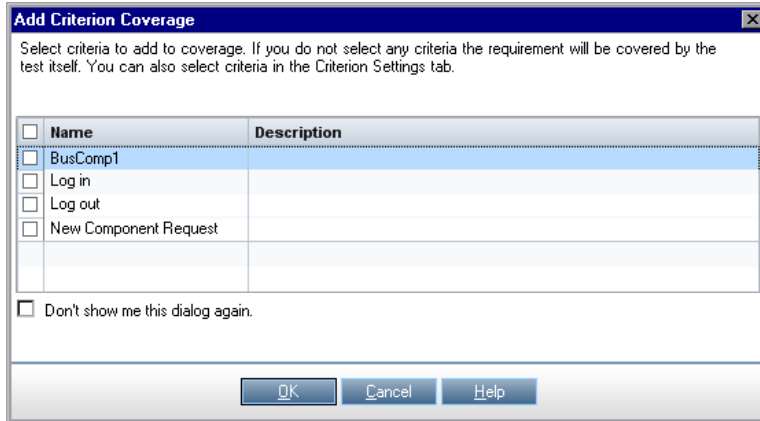
8 In the Add Criterion Coverage dialog box, select the criteria for which you want coverage and click **OK**. The selected criteria are added to the grid.

How to Analyze Coverage by Criteria

The main purpose for setting criteria for coverage is to be able to analyze requirement coverage on a detailed level, such as by business component and flow, and not only on a general level, such as by test.

The following methods enable you to analyze coverage by criteria:

➤ Using the Coverage Analysis View on page 249

➤ Checking Criterion Results on page 249

➤ Checking Criteria Status on page 250

➤ Creating Test Criteria Reports on page 250

Using the Coverage Analysis View

The Coverage Analysis View enables you to examine the status of your requirements by displaying the breakdown of requirements according to test coverage and test configuration coverage.

When working with Business Process Testing, this view also enables you to examine the status of requirements according to criteria coverage, such as by flows and business components.

To access the Coverage Analysis View:

1 In the Requirements module, select **Coverage Analysis** from the View menu.

2 Click the **Direct Cover Status** link for a requirement in the grid. The Coverage Analysis dialog box opens.

> ➤ Click **Show Test Coverage** to see the analysis as a pie chart.

> ➤ Click the pie chart to open the Test Coverage dialog box, from which you can see the coverage criteria in a grid.

For user interface details, see the *HP Application Lifecycle Management User Guide* and the *HP Application Lifecycle Management User Guide*.

Checking Criterion Results

The Criterion Results tab displays the results of the last test criteria run for the selected business process test.

You can also modify the status of the last test criteria run. For example, if a criterion failed due to a temporary condition that should not impact the coverage of the requirement, you can override the misleading status by changing it to **Passed**.

Perform one of the following to access this tab.

➤ In the Test Lab module's Test Sets tab, select a test set and then click the Execution Grid tab.

➤ In the Test Lab module's Test Runs tab, select a run.

➤ In the Test Lab module's Run Details dialog box sidebar, click **Criterion Results**.

Checking Criteria Status

The Criteria Status dialog box displays the status of each criterion for the last test criteria run used for the coverage of the selected requirement.

To access the Criteria Status dialog box:

1 In the Requirements module, select the requirement whose coverage you are checking. Make sure that the requirement already is associated with criteria.

2 Click the **Test Coverage** tab.

3 Click the **Test Configuration Status** tab near the bottom of the window.

4 In the Status column, click the hypertext link for the business process test whose criteria you want to check. The Criteria Status dialog box opens.

Tip: If there is no hypertext link to click, it means no components or flows have been added to the test, and therefore there are no criteria to check. Add components to the test in the Test Plan module and refresh the display in the Requirements module.

---

5 View the status for each criterion's last run.

6 Click **OK**.

Creating Test Criteria Reports

You can create a template-based report for tests that includes test criteria coverage.

For complete task details on creating template-based reports, see the *HP Application Lifecycle Management User Guide*.

To create a report that displays test criteria coverage:

1 In the ALM sidebar, under Dashboard, select **Analysis View**.

2 In the relevant folder, click **New Item** and select **New Project Report**. The New Project Report dialog box opens.

3 Enter a name for the report and click **OK**.

4 In the Configuration tab, right-click and select **Add Report Section**.

5 Select **Tests** in the Type field.

6 Enter a name for the report section in the Name field and click **OK**.

7 In the tree, right-click the test node that you just created and select **Add Report Section**.

8 Select **Test Criteria** in the Type field.

9 Enter a name for the report section in the Name filed and click **OK**.

10 Specify other fields as necessary and click **Generate**.

Generating Documents for Business Process Tests and Flows

The ALM Document Generator enables you to generate Microsoft Word documents containing comprehensive data about a selected business process test, flow, or test set. These documents include detailed information about a project's requirements, planning, test list, test set folders, and defect tracking data.

For more information on generating documents for tests, see the *HP Application Lifecycle Management User Guide*.

Note: For more information on including component data in project documents, see "Generating Project Documents" on page 117.

8

Working with Flows

This chapter describes how to create, build, and manage flows in the Test Plan module of HP Application Lifecycle Management (ALM). This chapter also describes how to add flows to business process tests.

This chapter includes:

About Working With Flows

A flow is a collection of business components in a sequence that can be used as a unit in multiple business process tests. This provides you with a building block you can use in multiple tests, but that has a single point of maintenance. When you modify a flow or any of its components, all business process tests containing that flow reflect that modification.

For an example of how flows can be used in more than one business process test, see "Flow Example" on page 254.

You work with flows in the Test Plan module. After you create a flow, you develop it by providing flow details, adding components, adding attachments, and creating associations between the flow and other ALM records, such as requirements and defects. These associations provide real-time visibility into modifications for interrelated, application-quality elements.

Notes:

➤ Much of the functionality available in ALM when working with flows is the same as the functionality when working with business process tests. For more information, see Chapter 7, "Managing Business Process Tests."

➤ The permission settings for a user group for working with flows are the same as those for the user group for working with tests. For more information on configuring user group permission settings, see the *HP Application Lifecycle Management Administrator Guide*.

Flow Example

Suppose you are testing an application for a production and supply company. The company supplies goods it produces, as well as goods through third-party order processing.

In third-party order processing, the company transfers the sales order to an external vendor. This vendor delivers the goods directly to the customer and invoices the branch company. The customer receives an invoice from the branch company's sales office.

To reflect these options, your application has two separate business processes, one for the **Generating Orders** business process, and one for **Third-party Order** processing. Both business processes begin with the **Create Sales Order** transaction. The **Create Sales Order** transaction contains all the steps necessary to begin sales processing.

The **Generating Orders** business process continues on to delivery and billing of the order, as well as producing a variety of other documents and reports. The **Third-party Order** business process continues on to creating a purchase order, posting a goods receipt, posting an invoice receipt, and invoicing the sales order.

To test these business processes, you would create a flow called **Create Sales Order**. This flow would contain the components that perform the operations necessary to complete the **Create Sales Order** transaction.

You would create one business process test for the **Generating Orders** business process and one for the **Third-party Order** business process. The **Create Sales Order** flow could be used in these two tests since both tests represent business processes that contain the same transaction.

If, at any time in the future, the **Create Sales Order** transaction changes in your application, you would update the **Create Sales Order** flow. Both your business process tests would reflect the changes in your application.

Creating Flows

You create flows within the Test Plan Tree in the Test Plan module. For information on working in the Test Plan module, see "About Getting Started with Business Process Testing in the Test Plan Module" on page 184.

To create a flow:

1 In the ALM sidebar, under Testing, select **Test Plan**.

2 If the Test Plan Tree is not displayed, select **View** > **Test Plan Tree**.

3 Select the folder in the Test Plan Tree in which you want to create the flow and click the **New Test** button. The New Test dialog box opens.

4 From the **Type** list, select **FLOW**.

In a version-controlled project, you can choose whether to check the flow out immediately, and if so, you can add a comment to the check out.

5 In the **Test Name** box, type a name for the flow.

6 Add other details and attachments as necessary.

7 Click **OK**. The flow is added to the selected folder in the Test Plan Tree.

Developing Flows

After you create a flow, you can use the following tabs to plan and design the flow:

➤ **Details tab.** Enables you to view and modify flow details. For more information, see "Details Tab" on page 191.

➤ **Test Script tab.** Enables you to build the structure of the flow by selecting one or more business components and adding them to the flow. For more information, see "Understanding the Test Script Tab for Flows" on page 258.

➤ **Parameters tab.** Enables you to define input and output parameters, and their values, at the flow level. This allows the flow to receive data from an external source and to pass data to components or flows. For general details, see Chapter 9, "Working with Parameters."

➤ **Attachments tab.** Enables you to associate the flow with a file, a URL, a screenshot, system information, or the contents of the clipboard. For more information on working with attachments, see the *HP Application Lifecycle Management User Guide*.

➤ **Req Coverage tab.** Enables you to associate the flow with requirements. You create requirements coverage for a flow in the same way as you would for a test. For more information, see the *HP Application Lifecycle Management User Guide*.

➤ **Linked Defects tab.** Enables you to link the flow with existing defects, or to create a new defect and link it to the flow. For more information on defect linkage, see the *HP Application Lifecycle Management User Guide*.

➤ **Dependencies tab.** Enables you to view the dependency relationships that exist between entities such as components, tests, flows, test resources, and application areas. For more information on entity dependencies, see the *HP Application Lifecycle Management User Guide*.

➤ **Business Models Linkage.** Lists the business process model entities that are tested by the selected test or flow. For more details, see the *HP Application Lifecycle Management User Guide*.

➤ **History tab.** Enables you to view changes made to the item selected in the Test Plan tree, as well as its version history. For details, see the *HP Application Lifecycle Management User Guide*.

Understanding the Test Script Tab for Flows

Most of the functionality available in the Test Script tab for flows is the same as that available for business process tests. For more information on this functionality, see "Test Script Tab" on page 196.

When working with flows, the Test Script tab enables you to build the structure of a flow by:

➤ Adding one or more business components to the flow.

➤ Generating requests for additional business components that you require for your flow.

You can also use the tab to:

➤ Define flow parameters and their default values.

➤ Add run conditions to the flow.

➤ Validate the flow.

➤ Run the flow in Debug mode.

➤ View the snapshots attached to business components in the flow.

➤ View the manual steps of each business component in the flow.

In addition to the standard functionality available for business process tests, the Test Script tab for flows includes the following toolbar buttons:

➤ **Add Run Condition.** Enables you to add run conditions to your flow. For more information, see "Adding Run Conditions" on page 371.

➤ **Remove Run Condition.** Enables you to remove an existing run condition from your flow. For more information, see "Managing Run Conditions" on page 374.

Building a Flow Structure

A flow consists of a sequence of one or more business components. You build the structure of a flow by selecting the business components from the Component Tree and adding them to the flow.

To build a flow:

1 In the Test Plan Tree, select the flow to which you want to add components and click the **Test Script** tab. The Test Script tab displays the components currently in the flow.

2 Click the **Select Components** button. The Component Tree opens in the right pane.
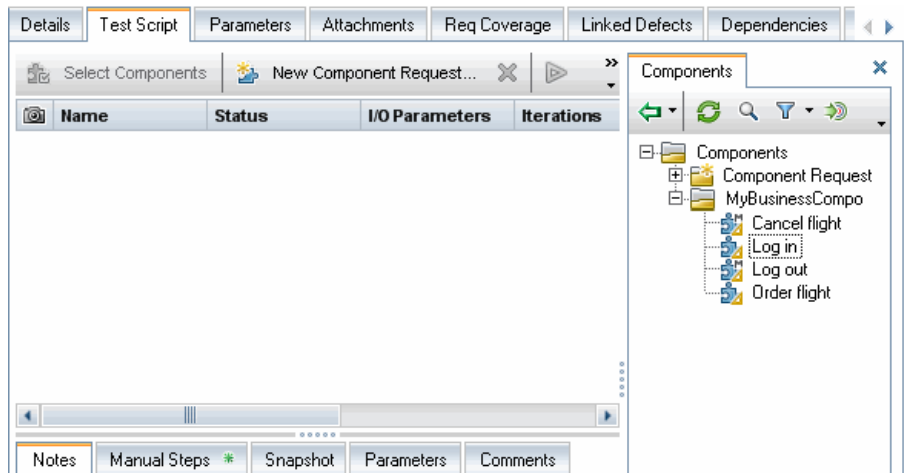
3 In the Component Tree, expand the folder containing the business component that you want to add to the flow.

Tips:

➤ You can search for a component by clicking the **Find** button in the search box located in the component tree pane toolbar.

➤ In addition to adding existing components to your flow from the component tree, you can add component requests. A component request acts as a signal to add a new business component to the Business Components module. You add component requests to a flow as you would for a business process test. For more information on component requests, see "Handling Component Requests" on page 110.

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4 In the component tree, drag the component into the Test Script pane. Alternatively, select the component that you want to add to the flow and click the **Quick Add** button. You can also click the down arrow and choose whether to open the Promote Parameters dialog box. This dialog box enables you to choose whether to promote component or flow parameters to the next level. In the Promote Parameters dialog box, select the parameters you want to promote. For more information about promoting parameters, see "Promoting Parameters and Viewing Their Status" on page 282.

5 Use the **Move Component Up** and **Move Component Down** buttons to arrange the components in the flow in the correct order. Alternatively, click the gray sidebar to the left of a component to highlight the component row and drag the component to the correct position.

6 You can add flow parameters and run conditions to increase the flexibility of your flow. For information on flow parameters, see Chapter 9, "Working with Parameters." For information on run conditions, see Chapter 13, "Defining Run Conditions."

Managing Flows

A business process test can comprise business components and/or flows, or a combination of business components and flows.

You can cut, copy, paste, rename, delete, and validate flows. You perform these actions for flows in the same way as you would for business process tests.

Note: In a version-controlled project, you can copy and paste any checked in flow, as well as any flow that is checked out by another user - the copied flow will contain the last checked-in data. However, you cannot copy and paste a flow that is currently checked out by you. You must check-in the flow before copying and pasting it.

You can send e-mail about a flow to another user. This enables you to inform other personnel about the status of new and existing flows, and the components they contain.

For more information on performing these actions, see Chapter 7, "Managing Business Process Tests."

For more information on adding flows, see "Adding Flows to Business Process Tests" on page 261.

Adding Flows to Business Process Tests

You add flows to business process tests in the same way as you add components, only instead of using the Components tab in the Components and Flows pane, you use the Flows tab. For more information on adding flows and business components to business process tests, see "Adding Components and Flows to a Business Process Test" on page 216.

After you add flows to a test, you can manage the flows and define flow iterations in the same way as you would for business components within a test. For more information on managing business components in a business process test and defining iterations, see Chapter 7, "Managing Business Process Tests."

9

Working with Parameters

You can affect the behavior and results of a business process test by using parameters to define the values that components and flows receive and return.

This chapter describes how to work with parameters in Business Process Testing at the component, flow, and test levels.

Product Feature Movie: To view a movie that demonstrates how to handle Business Process Testing parameters, select **Help** > **Product Feature Movies** in the ALM main window and click **HP Business Process Testing – Parameters and Data Usage**.

This chapter includes:

Parameter Overview

You can expand the scope of business process tests, flows, and components by defining the parameters that a component or flow can receive or return, and then replacing fixed values with these parameters. This process, known as **parameterization**, enables you to perform the same operations on the application you are testing with multiple sets of data.

Note:

➤ You can also define input and output parameters for a business component in QuickTest. For more information, see the *HP QuickTest Professional for Business Process Testing User Guide*.

➤ Defining iterations enables you to automatically run business components, flows, and tests multiple times, each time using different input parameter values. For details, see Chapter 11, "Working with Iterations."

➤ You can run business process tests for different use-cases of the application you are testing. Each use-case of a test is represented by a test configuration. You can associate different sets of data for each test configuration and its iterations. For conceptual details, see "Test Configurations Overview" on page 350.

This section includes:

➤ "Parameter Categories"
➤ "Example: Linking Input and Output Component Parameters"
➤ "Example: Using Flow Parameters"

Parameter Categories

Below is an explanation of the parameter categories for business process testing.

Parameter Categories	Parameter and Description
Input / Output Input and output parameters can be linked to make data available between components or flows within the same business process test. For an example, see "Example: Linking Input and Output Component Parameters" on page 267.	**Input parameters** enable you to define data used by a component or flow that is provided from an external source. When creating components, tests, and flows, you define how the values are supplied for input parameters. An input parameter can receive: ➤ A predefined default value, if no other value is supplied by the test or flow. ➤ An output parameter value returned by a component or flow earlier in the flow or test. ➤ A parameter value that is supplied at the test or flow level, when the test or flow is run.
	Output parameters allow data values retrieved from a component step or flow (the **source**) to be passed as input parameters to a subsequent component or flow (the **target**) in the test run. **Note:** You cannot set a default value for an output parameter.

Parameter Categories	Parameter and Description

Component, Flow, and Test
 	
You can use parameters at the component level, the flow level, and at the test level. Parameters can be promoted from one level to the next.
 	
For an example, see "Example: Parameter Promotion" on page 270.
	Component parameters are parameters defined within a component. Component parameters can be input or output parameters.
	
	These parameters are available to:
	➤ All subsequent steps in the same component.
	➤ Subsequent components in a flow or a test, provided that:
	  ➤ The component parameter is defined as an output parameter in the current test or flow, and as an input parameter in the subsequent component in the current test or flow.
	  ➤ The output parameter in the current test or flow is linked to the input parameter of the subsequent component in the current test or flow.

	Flow parameters are parameters defined within a flow. These parameters are available to all components in the flow. Like component parameters, flow parameters can be input or output parameters. For an example, see "Example: Using Flow Parameters" on page 268.
	Test parameters are parameters defined within a business process test. These parameters are available to all components and flows in the test.
Local Local parameter values are not available outside of the component in which they are defined.	**Local parameter** values are defined within a business component and can be accessed by that component only. It is intended for use in a single step or between component steps, for example, as an output parameter for one step and an input parameter for a later step. This type of parameter is generally used when working with automated QuickTest components in keyword view. For more information, see "Parameterizing in the Keyword View" on page 164.

Example: Linking Input and Output Component Parameters

Suppose you create three components corresponding to different stages in processing a customer loan request:

➤ **CreateLoan.** Receives a loan request and generates a unique loan ID for the request.

➤ **SearchLoan.** Searches the existing loans to verify if the loan exists.

➤ **ApproveLoan.** Approves the loan request.
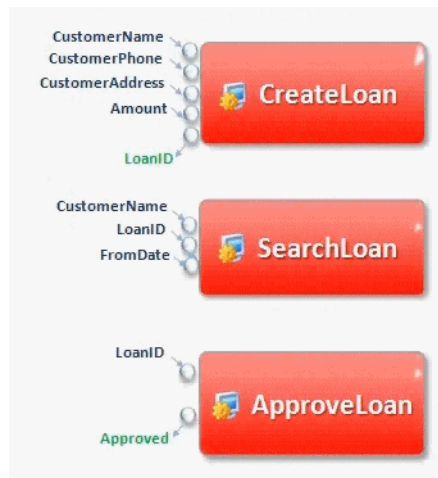
In this example, a business process test tests the entire loan processing workflow from receiving the request through approving the request. An output parameter called **LoanID** is created by the component **CreateLoan**. This output parameter stores the value of the loan ID generated when the loan is requested. You could then use this value as an input parameter for subsequent components or flows in the business process test, such as **SearchLoan** and **ApproveLoan**.

Example: Using Flow Parameters

Continuing the "Example: Linking Input and Output Component Parameters" on page 267, the business process test contains the loan processing workflow, but should also contain components for logging in and out of the banking application. The login and logout processes are typically done once at the beginning of loan processing and once at the end of loan processing, respectfully. The loan processing workflow can occur many times within one session. The following diagram shows how adding a flow can group related business processes together for iteration purposes.
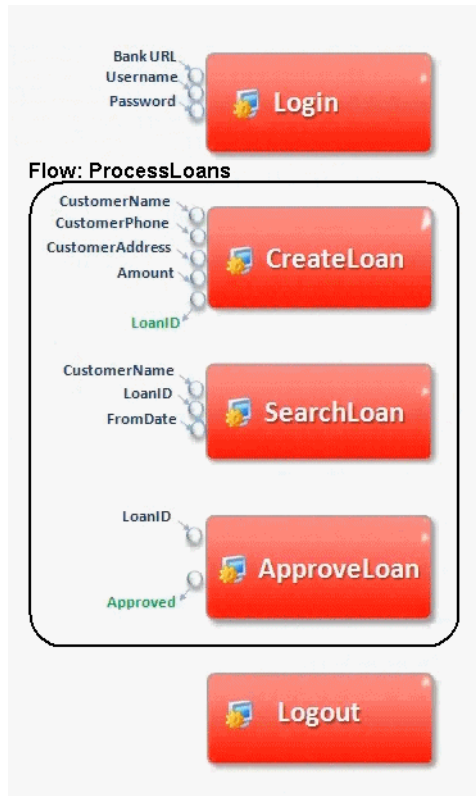
Because three components (**CreateLoan**, **VerifyLoan**, and **ApproveLoan**) need access to the **LoanID** parameter value (and perhaps more components will need access as well), you may want to consider creating the **LoanID** parameter as a flow parameter from the beginning. Any component in the flow would then have access to the loan ID without needing to link input and output parameters.

The **Login** and **Logout** components do not need access to the loan ID.

Tips for Working with Flow Parameters

➤ When designing business process tests using top-down design, you can create flow input parameters as needed. However, when implementing the design, input flow parameters must be assigned the value of a component input parameter in the flow. Otherwise, they have no relevance in the business process test.

➤ When you promote a flow output parameter from a specific component output parameter, the flow output parameter is automatically named to match the component and flow parameter naming convention. If required, you can change the flow output parameter name to suit your needs. For more information, see "Parameter Promotion" below.

Parameter Promotion

Promoting parameters enables the components in other flows (and components and flows in other tests) to access a parameter value. Promotion widens the scope of a parameter so that more entities can use its value when a business process test runs.

You can promote component parameters to the flow or test level at the same time as you add a component to a flow or test. Similarly, flow parameters can be promoted to the test level at the same time as you add a flow to a test.

For task details, see "Promoting Parameters and Viewing Their Status" on page 282.

For user interface details, see "The Promote Parameters Dialog Box" on page 310.

This section includes:

➤ "Example: Parameter Promotion"

Example: Parameter Promotion

Let's take a closer look at the "Example: Using Flow Parameters" on page 268. The three components, **CreateLoan**, **VerifyLoan**, and **ApproveLoan**, process a customer loan request using a parameter called **LoanID**. The loan ID is stored as a flow parameter and is available to the three components in the flow.

However, the business process needs other flows in the business process test, such as **CancelLoans**, to access the loan ID as well.
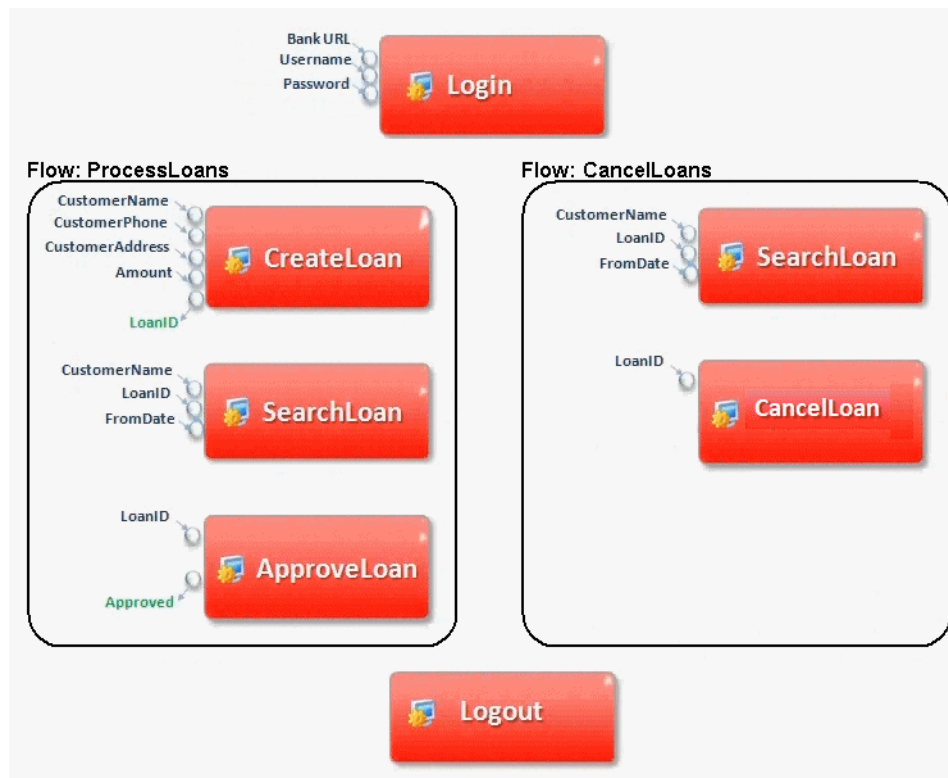
For **LoanID** to be accessible to the other flows, promote the **LoanID** parameter to the flow level for each flow, and then promote the **LoanID** parameter to the test level. A new test level parameter called **LoanID** is created that is accessible to every component and flow in the business process test.

For task information, see "Promoting Parameters and Viewing Their Status" on page 282.

Working with Parameters—A Workflow

This workflow provides general information for how to work with parameters, iterations, and configurations in ALM.

1 Design parameter usage

Consider the following before working with parameters:

➤ Determine which parameters are dependant on other parameters so that you can link them. For conceptual details, see "Parameter Linkage Overview" on page 315.

➤ After designing the various entities in your business process test, determine which parameters should be available at the component, flow, and test levels. For conceptual details, see "Parameter Promotion" on page 269.

➤ Business process tests can be iterated for different use-case scenarios by setting up iterations and test configurations with different values. Design how many times each component, flow, and business process test configuration should run, and with what values. For conceptual details, see "Iterations Overview" on page 330 and "Test Configurations Overview" on page 350.

2 Define parameters and set default values

Define input and output parameters, and their default values. For task details, see "Defining Parameters and Setting Default Values" on page 273.

Link output and input parameters between components. For task details, see "How to Link Parameters" on page 321.

3 Set parameter values for each iteration and test configuration during a run

Define how many times each business component or flow should be iterated when the business process test runs, define configurations (use-cases) for testing the application iteratively according to different scenarios, and set values for parameters.

➤ For task details on iterating components, see "How to Define Iterations to Run with Different Values" on page 334.

➤ For task details on iterating business process test configurations, see "How to Define Test Configurations to Run with Different Values" on page 354.

4 Manage parameters

To manage parameters, you can:

➤ Delete parameters that are no longer needed. For task details, see "How to Delete Parameters" on page 284.

➤ Import and save parameters. For task details, see "How to Import and Save Parameter Values" on page 285.

Defining Parameters and Setting Default Values

You define parameters using various methods. When defining input parameters, you can also set default values.

Method	Purpose / Use	Available from	See Also
Basic	Lets you define parameters, their descriptions, and, for input parameters, default values.	Business Component / Test Plan modules > Parameters tabs	For user interface details, see "The New Parameter and Parameter Details Pages" on page 297. For task details, see "How to Define Parameters from the Parameters Tab" on page 274.
Component Step Definition	Provides the ability to define parameters "on the fly" directly when defining component steps.	Business Component module > Component Steps tab / dialog box	For task details, see "How to Define Component Parameters in Component Steps" on page 276.
Creation of Parameters while Setting Values to Other Parameters	Enables you to define flow and test parameters "on the fly" while setting values for component or flow parameters, such as when the value for a flow parameter should match the value of a new, "as-of-yet-undefined," test parameter. Useful for multiple iterations.	Test Plan module > Iterations dialog boxes	For user interface details, see "Iterations Dialog Boxes and Tabs" on page 340. For task details, see "How to Define Parameters from the Iterations Dialog Boxes" on page 277.

Method	Purpose / Use	Available from	See Also
Generation	Allows you to generate input flow parameters from business component parameters. Useful for multiple iterations.	Test Plan module > Iterations dialog box > Create Test Parameters button	For user interface details, see "The Create Flow/Test Parameters Dialog Box" on page 346. For task details, see "How to Generate Flow and Test Parameters from the Iterations Dialog Boxes" on page 280.
Promotion	Enables you to widen the scope of a parameter so that more entities can use its value when a business process test runs. For example, when a business component parameter is promoted to the flow level and then to the test level, a parameter with the same name is created for the flow and the test. All other entities, whose parameters have also been promoted, access the highest-level value for the parameter.	Test Plan module > Test Script tab	For user interface details, see "The Promote Parameters Dialog Box" on page 310. For task details, see "Promoting Parameters and Viewing Their Status" on page 282.

How to Define Parameters from the Parameters Tab

You can define parameters in the Parameters tabs. This is the basic method for defining parameters.

For user interface details, see "The New Parameter and Parameter Details Pages" on page 297.

To define parameters in the Parameters tab:

1 Access the Parameters tab:

➤ **To define parameters for a business component:** In the Business Components module, select the relevant business component in the component tree.

➤ **To define parameters for a flow or a business process test:** In the Test Plan module, select the relevant flow or business process test in the tree.

2 Click the **Parameters** tab. For business components and flows, the Input Parameters and Output Parameters sub-tabs are displayed.

3 For business components and flows: Click **Input Parameters** or **Output Parameters**.

Note: Test parameters can only be input parameters.

---

4 Click **New Parameter**. The New Parameter dialog box opens for the corresponding entity (component, flow, or test), as indicated in the title bar.

5 Enter a descriptive name in the **Name** or **Parameter Name** box.

6 Click once in the Description tab at the bottom of the dialog box, and enter a description for the parameter.

7 For input parameters, specify a default value for the parameter in the Default Value tab, directly in the grid, or in the Set Value page (accessed by clicking the arrow in the relevant cell). For details on the Set Value page, see "The Set Values Page" on page 301.


Tip: You can use the default value for providing a default value in case a value is not supplied for the run, or you can use the default value as an example for the type of value that can be provided (for example, a phone number example could be **###-###-####**).

---

8 Click **OK**.

9 In the Parameters tab, click the **Refresh** button on the toolbar. The new parameter is listed in the grid.

A line for the new parameter is added in the parameter list.
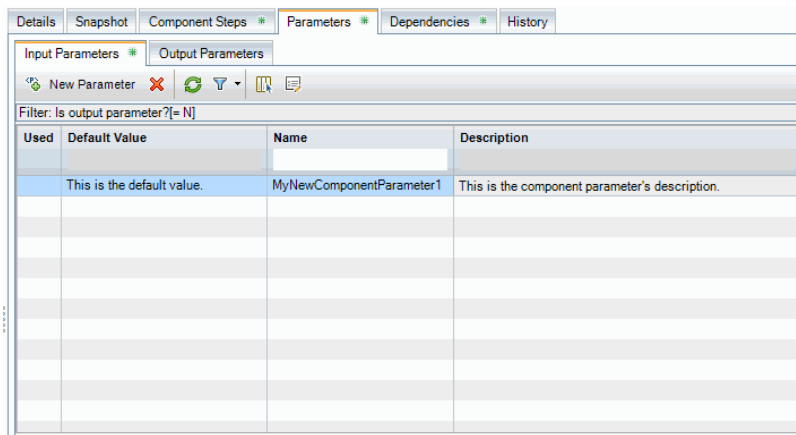
How to Define Component Parameters in Component Steps

ALM enables you to create input and output component parameters directly in the Component Steps tab as you insert them into your component steps.

To define component parameters as you create component steps:

1 In the Business Components module, select a business component and click the **Component Steps** tab.

2 Either create a new step or modify an existing step.

3 In the grid, click either in the **Description** or **Expected Result** field at the position at which you want to add and define a component parameter.

4 Enter a parameter name enclosed between three sets of angle brackets (<<<**parameter**>>>). (Parameters that you insert into your steps using the Select Parameter feature are automatically displayed between <<< >>> brackets.)

5 Click outside of the **Description** or **Expected Result** field.

6 Click the **Save** button on the toolbar.

7 To see the newly-defined parameter, click the **Input Parameters** sub-tab from the Parameters tab and then click the **Refresh** button on the toolbar.

How to Define Parameters from the Iterations Dialog Boxes

You can manually define:

➤ New flow and test parameters from the Component Iterations dialog box.

➤ New test parameters from the Flow Iterations dialog box.

Tip: This method for creating parameters is convenient when you need to set different parameter values for each iteration of the test or flow in which the component (or flow) exists.

Using the Set Value page from the Iterations dialog box, or by typing a value directly in the relevant cell, you can assign values to parameters accordingly:

Parameter	Value to Assign
Component parameter	➤ An existing flow parameter ➤ A newly-defined flow parameter ➤ An existing test parameter ➤ A newly-defined test parameter ➤ Any other value that you specify
Flow parameter	➤ An existing test parameter ➤ A newly-defined test parameter ➤ Any other value that you specify

---

Tip: You can also define flow parameters from the Group Iterations dialog box. You define flow parameters from the Group Iterations dialog box as you would from the Component Iterations dialog box.

This section describes how to set the value of a component parameter while creating a newly-defined flow parameter in the process.

To define a new flow or test parameter to use as the value for a parameter:

1 In the Test Plan module, select the relevant flow or test in the Test Plan tree, and click the **Test Script** tab.

2 In the Script pane of the Test Script tab, click in the **Iterations** column on the row of the entity (flow or component) whose value you want to set.
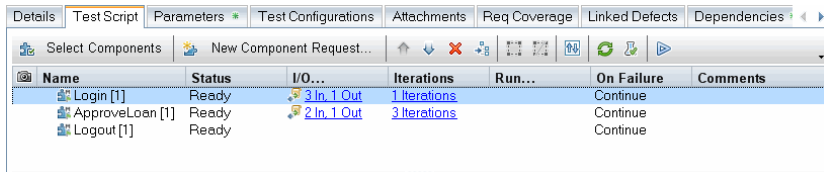
The Iterations dialog box opens.
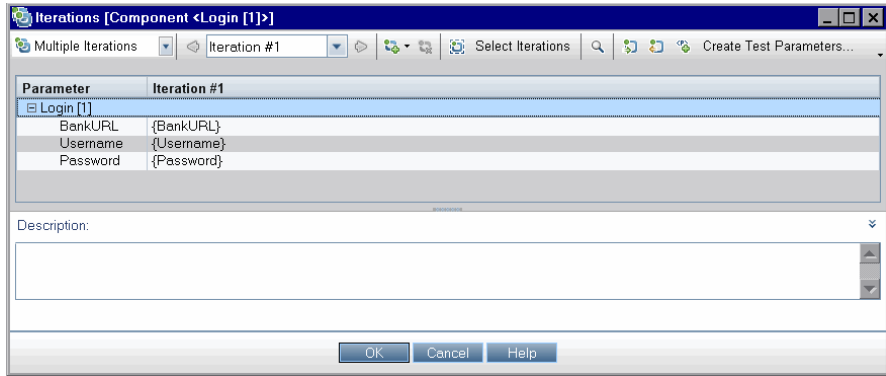
3 Select **Single Iteration View** or **Multiple Iterations View**. When working in Single Iteration View, you can switch iterations either by selecting or clicking the arrows.

4 Click the down arrow next to the cell containing the parameter whose value you want to set. The Set Value page opens.

Tip: You can also type a parameter value directly into the cell in the grid.

---

5 Use one of the following methods to create the parameter:

➤ Select **Fixed Values** and enter a descriptive name for the parameter between curly brackets **{ }**.

Ensure that you do specify the curly brackets **{ }**, as they instruct ALM to treat what you type as a parameter and not as a fixed value.

➤ Select **Test Parameters**. A list of existing flow and test parameters is displayed. Either select an existing parameter or click **New Parameter** to create a new one using the New Test Parameter dialog box. For user interface details on using the New Test Parameter dialog box, see "The New Parameter and Parameter Details Pages" on page 297.

Click **OK**. The New Parameter dialog box closes.

6 Click **OK**. The Iterations dialog box closes.

How to Generate Flow and Test Parameters from the Iterations Dialog Boxes

While defining iterations for business components or flows, you can generate test parameters to use as values for component or flow parameters.

While defining iterations for business components, you can also generate flow parameters to use as values for component parameters.

You can generate flow/test input parameters based on existing input parameters for a component or flow. When the component or flow runs, its parameters take the values assigned to the corresponding test or flow parameters.

There are several criteria you can define when generating flow/test input parameters. For example, you can:

➤ Specify whether to use the same or unique flow/test parameters for each iteration

➤ Configure the naming convention for your flow/test parameters

➤ Generate flow/test parameters for all component parameters

➤ Generate test parameters for all flows

➤ Specify the cells in the Component Iterations dialog box, Flow Iterations dialog box, or Group Iterations dialog box for which you want to generate flow/test parameters

To generate test parameters automatically from an Iterations dialog box:

1 In the ALM sidebar, click **Test Plan** to open the Test Plan module.

2 Click the **Test Script** tab.

3 Select the business process test that contains the relevant business component or flow, or click the flow that contains the relevant business component.

Note: The business component or flow must already have at least one parameter defined.

---

4 Click the **Iterations** link for the component or flow whose input parameters you want to use as a basis for generating test input parameters.

The Iterations dialog box opens. For user interface details on the Iterations dialog boxes, see "Iterations Dialog Boxes and Tabs" on page 340.

Tip: You can also generate flow/test parameters automatically from the Group Iterations dialog box, based on input parameters for components within component groups. You generate flow input parameters from the Group Iterations dialog box as you would from the Component Iterations dialog box. For more information, see "Grouping Components and Flows" on page 222.

---

5 Click the **Create Test Parameters** button on the toolbar. The Create Flow/Test Parameters dialog box opens. Define the criteria for creating and naming test parameters. For more information, see "The Create Flow/Test Parameters Dialog Box" on page 346.

6 Click **OK**. The Create Flow/Test Parameters dialog box closes and flow input parameters are generated for the flow, based on the criteria you selected.

7 Click **OK** to close the Iterations dialog box.

Promoting Parameters and Viewing Their Status

You can promote component parameters to the flow or test level at the same time as you add a component to a flow or test. Similarly, you can promote flow parameters to the test level at the same time as you add a flow to a test.

You can also view the status of promoted parameters.

This section includes the following topics:

➤ "How to Create Parameters Using Promotion" on page 282

➤ "How to View the Promotion Status for Test and Flow Parameters" on page 284

How to Create Parameters Using Promotion

Parameter promotion enables you to create new parameters based on parameters defined on the component or flow level. The new parameters are then accessible to other components and flows in the test.

As you promote parameters, new parameters with the same name are created at the higher level.

You promote parameters to the next level when adding components or flows to a test, or when adding components to a flow.

To create flow or the test level parameters by promotion:

1 In the Test Plan module, select the flow or the test for which you want to promote components.

2 In the Test Script tab, click the **Select Components** button. The Components pane and/or the Flows pane opens.

3 In either the Components pane or the Flows pane, select the component or flow that contains the parameters you want to promote.

4 Click the down arrow on the right side of the **Quick Add** button in the pane's toolbar and select one of the following options for adding the component or flow.

➤ To add the component or flow while explicitly setting promotion options, such as specifying which individual parameters are to be created at the next level, select **Add while Setting Promote Options**.

The Promote Parameters dialog box opens. This dialog box enables you to choose whether to promote component or flow parameters to the next level. Select the parameters you want to promote. For task details, see "Promoting Parameters and Viewing Their Status" on page 282. For user interface details, see "The Promote Parameters Dialog Box" on page 310.

➤ To add the component or flow while automatically promoting all parameters, select **Add And Automatically Promote All Parameters**.

➤ To add the component or flow without promoting parameters, select **Add Without Promoting Parameters**.

➤ To add the component or flow using the last-used method for parameter promotion, do one of the following:

> ➤ Double-click the component or the flow.
>
> ➤ Drag the component or flow to the Script pane.
>
> ➤ Click the **Quick Add** button in the toolbar.
>
> ➤ Click the down arrow on the right side of the **Quick Add** button in the toolbar, and select **Quick Add**.

Note: The Promote Parameters dialog box opens if the **Add while Setting Promote Options** menu option was the last menu option chosen when adding components or flows to the Script pane.

---

5 If necessary, click **OK** to close the Promote Parameters dialog box.

How to View the Promotion Status for Test and Flow Parameters

You can view a list of test and flow parameters, and how they were originally defined, using the Parameters Promotion Status dialog box.

To access the Parameters Promotion Status dialog box in the Test Plan module:

1 In the ALM sidebar, click **Test Plan** to open the Test Plan module.

2 In the Test Plan tree, select the relevant business process test or flow, and click the **Test Script** tab.

3 In the Script pane toolbar, click **Show Test Parameters Promotion Status**. The Parameters Promotion Status dialog box opens. For user interface details, see "The Parameters Promotion Status Dialog Box" on page 312.

4 Review the information and click **OK** to close the Flow or Test Parameters Promotion Status dialog box.

Managing Parameters

This section provides instructions for managing parameters, and includes the following topics:

➤ How to Delete Parameters on page 284

➤ How to Import and Save Parameter Values on page 285

How to Delete Parameters

You can delete input and output component parameters by selecting the parameter in the Input Parameters or Output Parameters sub-tabs and clicking the **Delete** button in the relevant toolbar. A warning message is displayed.

If the component had a **Ready** status before a component parameter was deleted, a popup dialog box enables you to choose whether to modify the component status to **Maintenance**.

Note: If a business process contains the component parameter that you are deleting, the test may not run successfully.

How to Import and Save Parameter Values

The task of defining lists of component or flow parameter values for iterations can be facilitated by importing the values from an external file. You can also save a set of defined parameter values as a file, for example, to use with other business components or flows.

Parameter values are imported and saved in **.csv** (comma separated value) files. This is a file format in which each line is a record, and each data value field in the record is separated by a comma.

The format of a typical **.csv** file for a flight application is shown below:

```
Title              ———————— Version 1.0
Column Headers ——— "Destination","Departure","Date"
                   "London","New York","6/9/2004"
                   "London","Paris","6/9/2004"
Parameter Values ——— "London","Chicago","6/9/2004"
```

➤ The first row is reserved as a title row. It can contain any text.

➤ The second row contains the column headers, including the name of the source business component.

➤ The subsequent rows contain the parameter values that are used in iterations of the business process test or flow.

You map the parameters to the column headers in the **.csv** file using the Map Import Data dialog box. The Map Import Data dialog box opens when you import parameter values from a file.

You can create a **.csv** file manually in a text editor, save a spreadsheet file as a **.csv** file from a program such as Microsoft Excel, or save a set of already defined parameters in a business process test or flow as a **.csv** file.

Tip: Enter a few rows in the Component Iterations or Flow Iterations dialog box and use the **Export** option to create an initial **.csv** file in the proper format. Then edit and save the **.csv** file in a text editor or spreadsheet program to enter actual data.

Importing and saving parameter values is described in the following sections:

➤ "The Map Imported Data Dialog Box"

➤ "How to Import Parameter Values from a File"

➤ "How to Save Parameter Values to a File"

The Map Imported Data Dialog Box

The Map Imported Data dialog box enables you to associate, or map, each component or flow parameter to a column header of the imported **.csv** file.
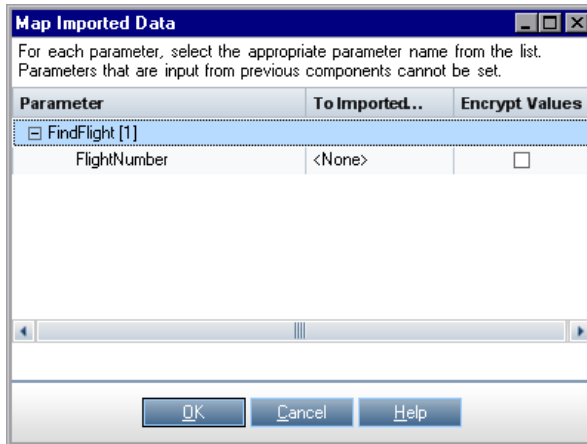
The values in the column corresponding to the selected header become the iteration values used for that component or flow parameter.

When the Map Imported Data dialog box opens, it automatically maps any column headers in the **.csv** file to the corresponding parameter if the column headers are identical. If no identical column header exists, the value **<None>** is displayed for that parameter.

For more information on how to import parameter values, see "How to Import Parameter Values from a File" on page 287.

How to Import Parameter Values from a File

You can import parameter values for component or flow iterations from a **.csv** file. When you import a file, all the records in the file become iterations in the business process test or flow.

Note: The parameter values that you import from a **.csv** file are the values that were defined when the file was last saved before the import. The values in the **.csv** file do not change dynamically according to value changes that may be implemented in ALM. Conversely, the parameter values in ALM do not change dynamically when you make changes to the **.csv** file.

Before importing a **.csv** file, ensure that it is set up in the proper format, as described in "How to Import and Save Parameter Values" on page 285.

To import saved component or flow parameter values:

1 In the ALM sidebar, click **Test Plan** to open the Test Plan module.

2 In the Test Plan tree, select the business process test that contains the relevant business component and click the **Test Script** tab. Make sure the business component has at least one input parameter.

3 In the Test Script pane, right-click the business component or flow for which you want to import component parameter values, and select **Iterations**.

The Component Iterations, or Flow Iterations, dialog box opens.
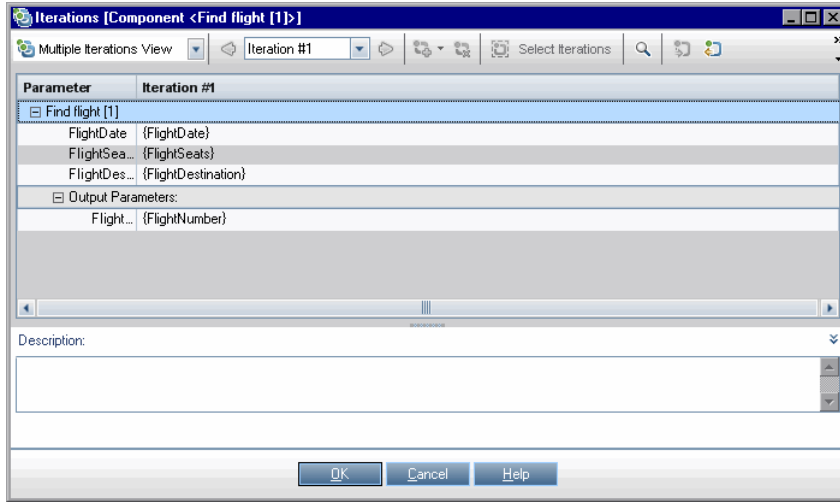
Note: The title and text instructions in the dialog box differ according to whether the dialog box is opened for a component or a flow.

4 Click the **Import** button. The Open dialog box opens.

5 Specify or browse to the **.csv** file that contains the required data and click **Open**. The Map Import Data dialog box opens.
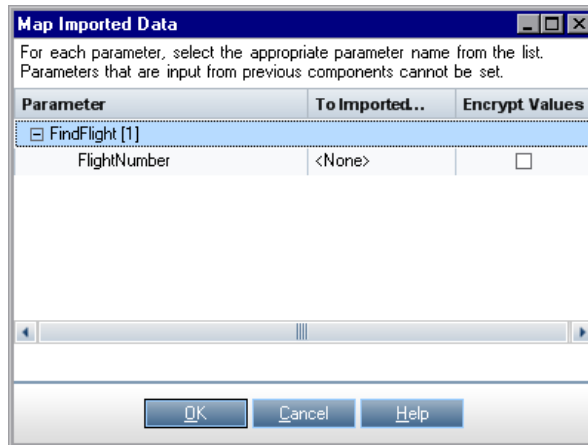
6 Expand the components to locate the relevant parameters for mapping.

7 If you need to select or modify a parameter's mapping, click in the **To Imported** cell for the relevant parameter. A down arrow is displayed.

8 Click the down arrow and select the mapping from the list.

9 Repeat steps 7 and 8 for each mapping you need to set.

10 Click **OK**. A confirmation message is displayed.

11 Click **Yes**. The values from the **.csv** file are imported and displayed in the Iterations dialog box.

Note: If the Component Iterations or Flow Iterations dialog box already has values defined for one or more iterations, these values are overwritten by the imported values. If the Component Iterations or Flow Iterations dialog box has more iterations currently defined than the number of records in the imported file, the surplus iterations in the dialog box will be removed.

---

12 Click **OK** to close the Iterations dialog box.

How to Save Parameter Values to a File

You can save parameter values that you have defined for a business component or flow to a **.csv** file.

You can then apply the same values to other component or flow iterations by importing the saved data. Saving parameters is also a useful way to create an initial **.csv** file that you can edit in a spreadsheet program, and then reimport to the component or flow.

For more information on importing parameters, see "How to Import Parameter Values from a File" on page 287.

Note: The values that you save to a **.csv** file are fixed, and do not change dynamically when you make changes to parameter values in ALM. Conversely, the parameter values in ALM do not change dynamically when you make changes to the **.csv** file. It is important therefore, to check the parameter values in ALM before saving them to a **.csv** file to ensure that they contain up-to-date values.

To save component or flow parameter values:

1 In the ALM sidebar, click **Test Plan** to open the Test Plan module.

2 In the Test Plan tree, select the business process test that contains the relevant business component or flow, and click the **Test Script** tab.

3 In the Script pane, right-click the business component or flow for which you want to save the component parameter values, and select **Iterations**.

The Component Iterations, or Flow Iterations, dialog box opens.

Note: The title and text instructions in the dialog box differs according to whether the dialog box is opened for a component or a flow.

---

4 Click the **Export** button. The Save CSV (Comma Delimited) File dialog box opens.

5 Enter a descriptive name in the **File Name** box and click **Save**. The component or flow parameter values are saved in a **.csv** file. The **.csv** file is saved in a comma delimited table format, as shown in the example below.

```
Version 1.0
"Destination","Departure","Date"
"London","New York","6/9/2004"
"London","Paris","6/9/2004"
"London","Chicago","6/9/2004"
```

Each column in the table represents the list of values for a single parameter. The first row of the table is a title row. The second row contains the parameter names (column headers). Each subsequent row in a column represents a value for the displayed parameter during a single iteration of the business process test or flow.

6 Click **OK** to close the Iterations dialog box.

Dialog Boxes and Tabs for Defining Parameters

This section describes the following:

➤ "The Parameters Page" on page 292

➤ "The New Parameter and Parameter Details Pages" on page 297

➤ "The Set Values Page" on page 301

➤ "The Promote Parameters Dialog Box" on page 310

➤ "The Parameters Promotion Status Dialog Box" on page 312

The Parameters Page

This dialog box or tab enables you to view, select, and insert parameters for business components, flows, and business process tests.

The Parameters tab for the Business Components module is shown below.
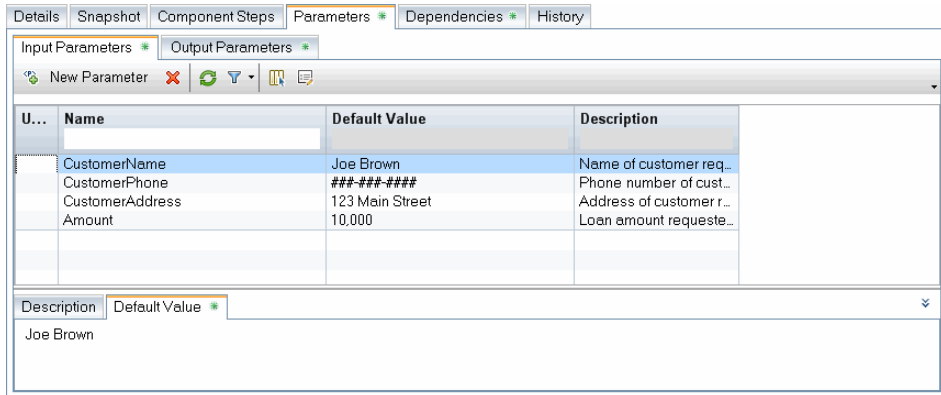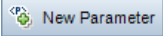
To access	Use one of the following:
	➤ In the Business Components module's component tree, select a component and click the **Parameters** tab.
	➤ In the Business Components module's component tree, select a component and click the **Component Steps** tab. Double-click a step and position the cursor in the Description or Expected Result field. Click the **Insert Parameter** button ⬚. The Parameters dialog box opens.
	➤ In the Test Plan module's component tree, select a business process test or a flow and click the **Parameters** tab.
	➤ In the Test Plan module's component tree, select a business process test or a flow and click the **Test Script** tab. Click the **Parameters** tab at the bottom of the window.

Important information	➤ You can insert component parameters into your steps in the Component Steps tab in the Business Components module. After you select a parameter, the parameter is inserted at the cursor location in the component step, using the syntax <<<parameter name>>>.
	➤ Parameter values are stored, compared, and processed as characters strings (even if values are specified as numeric or date values).
	➤ When selecting the **Parameters** tab from the Test Script tab in the Test Plan module, the parameters can be viewed only. You cannot add, modify, or delete parameters in this tab.
	➤ **Notes for users of QuickTest:**
	Parameters for keyword-driven components can be viewed and modified in the Business Component Settings dialog box. In addition, you can insert Data Table parameters and output values to business components, but you can store the values only in the first row of the Data Table. Component iterations are defined for the business process test in ALM and are not affected by the Data Table.
Relevant tasks	"How to Define Parameters from the Parameters Tab" on page 274
See also	"Parameter Overview" on page 264

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements (A-Z)	Description
New Parameter	**New Parameter.** Opens the New Component Parameter dialog box, enabling you to define a new component parameter. For more details, see "The New Parameter and Parameter Details Pages" on page 297. **Note**: This option is not available when selecting the **Parameters** tab from the Test Script tab in the Test Plan module.
	Delete. Deletes the currently selected parameter. If you delete a parameter that is included in a design step, the parameter in the design step is replaced by regular text, using the syntax: <parameter name>. **Note**: This option is not available: ➤ When selecting the **Parameters** tab from the Test Script tab in the Test Plan module. ➤ From the Parameters dialog box.
	Refresh. Refreshes the component parameters so that they display the most up-to-date information. **Note**: This option is not available: ➤ When selecting the **Parameters** tab from the Test Script tab in the Test Plan module. ➤ From the Parameters dialog box.
	Set Filter. Enables you to filter and sort the component parameters in the grid. Any currently applied filters or sorting orders are displayed below the toolbar. For details, see the *HP Application Lifecycle Management User Guide*. **Note**: This option is not available when selecting the **Parameters** tab from the Test Script tab in the Test Plan module.

UI Elements (A-Z)	Description
	Select Columns. Opens the Select Columns dialog box, enabling you to determine which fields are displayed and their order. For more details, see the *HP Application Lifecycle Management User Guide*. **Note**: This option is not available when selecting the **Parameters** tab from the Test Script tab in the Test Plan module.
	Parameter Details. Opens the Component Parameter Details dialog box, displaying the details of the selected parameter. For more details, see "The New Parameter and Parameter Details Pages" on page 297.
	Map Parameters. For use with configurations that access dynamic data. Enables you to specify sets of parameter values from an external Microsoft Excel file by mapping the parameter names in the Excel file to the parameter names in ALM. For task details, see "How to Map and Filter Data Resource Parameter Values" on page 365 **Available from**: Parameters tab from Test Plan module. This field is not available when selecting the **Parameters** tab from the Test Script tab in the Test Plan module.
	Resource Preview. For use with configurations that access dynamic data. Enables you to preview the resource specified in **Data Resource** in the Resource Preview dialog box. **Available from**: Parameters tab from Test Plan module. This field is not available when selecting the **Parameters** tab from the Test Script tab in the Test Plan module.
	Go To Resource. For use with configurations that access dynamic data. Opens the resource in the Test Resources module. **Available from**: Parameters tab from Test Plan module. This field is not available when selecting the **Parameters** tab from the Test Script tab in the Test Plan module.

UI Elements (A-Z)	Description
<grid filters> Author David	Displays a grid filter box under each column name, enabling you to define a filter condition for a column. Type directly into the box, or click the box to display the browse button, which opens the Select Filter Condition dialog box. For details, see the *HP Application Lifecycle Management User Guide*.
Data Resource	Specifies the name of an external Microsoft Excel file that contains sets of parameter values for each configuration of the test. Used only for configurations defined to access dynamic data. For task information, see "How to Define Configurations that Access Dynamic Data" on page 359. **Available from**: Parameters tab from Test Plan module. This field is not available when selecting the **Parameters** tab from the Test Script tab in the Test Plan module.
Default Value	The default value of the input parameter. This value is used when the component runs if no other value is supplied by the business process test or flow. **Available from**: Input Parameters sub-tabs for business components and business process tests (not flows)
Description	Provides a description of the component parameter's purpose, or other descriptive text.
Filter	Describes the filters currently applied to the list of parameters. Located directly above the grid filter boxes.
Input Parameters	Sub-tab listing all defined input parameters. **Available from**: Parameters tabs

UI Elements (A-Z)	Description
Name	A descriptive name for the parameter.
	➤ Parameter names must begin with a letter and cannot include spaces or any of the following characters: **! @ # $ % ^ & * ( ) + = \ { } | ; ' : " , . / < > ? ~ ` [ ] – ~** Any invalid character is automatically replaced by an underscore (_).
	➤ Parameter names must be unique within a component, flow, or test.
	➤ The parameter name must begin with a letter. If the first character of the component name is not a letter, a prefix, such as **comp_,** is added.
Output Parameters	Sub-tab listing all defined output parameters.
	Available from: Parameters tabs
Used	When checked, this user interface element means the component parameter is included in a step.
	Available from: Parameters tab for business components

The New Parameter and Parameter Details Pages

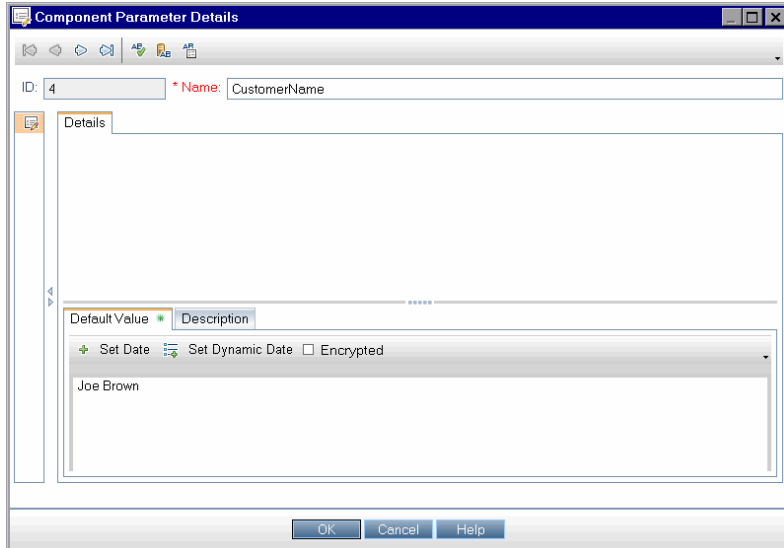The New Parameter dialog box or tab enables you to create:

➤ Input and output component parameters

➤ Input and output flow parameters
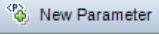
➤ Input test parameters

The Parameter Details dialog box enables you to view the details for parameters.

Below is an example of the New Test Parameter dialog box for flow parameters.
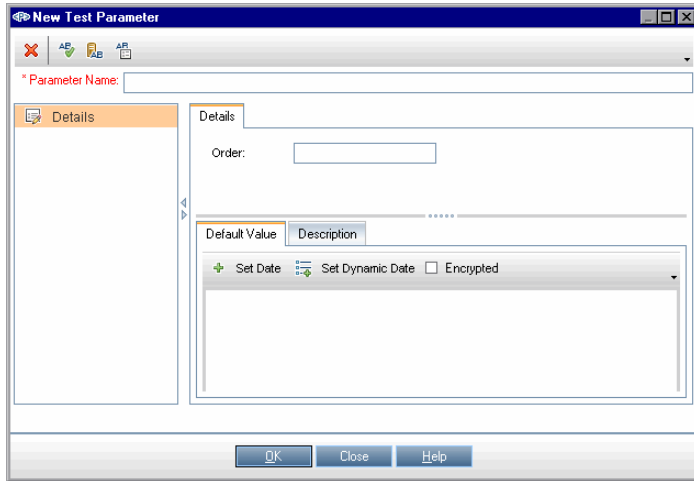
Below is an example of the Parameter details dialog box for component parameters.

To access	➤ To define a new parameter, click the **New Parameter** button [🔧 New Parameter] from a Parameters tab.
	➤ To view the details of a parameter, double-click the parameter from a Parameters tab or dialog box.
Important information	➤ Parameter values are stored, compared, and processed as characters strings (even if values are specified as numeric or date values).
	➤ **Notes for users of QuickTest:**
	Parameters for keyword-driven components can be viewed and modified in the Business Component Settings dialog box. In addition, you can insert Data Table parameters and output values to business components, but you can store the values only in the first row of the Data Table. Component iterations are defined for the business process test in ALM and are not affected by the Data Table.
Relevant tasks	"How to Define Parameters from the Parameters Tab" on page 274
See also	"Parameter Overview" on page 264

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements (A-Z)	Description
[icon]	**First Entity.** Jumps to the first component in the business components module.
	Available from: Parameter Details tabs/dialog boxes
[icon]	**Previous Entity.** Jumps to the previous component in the business components module.
	Available from: Parameter Details tabs/dialog boxes
[icon]	**Next Entity.** Jumps to the next component in the business components module.
	Available from: Parameter Details tabs/dialog boxes

| UI Elements (A-Z)	Description
	Last Entity. Jumps to the last component in the business components module. **Available from**: Parameter Details tabs/dialog boxes
	Delete. Deletes the currently selected parameter. If you delete a parameter that is included in a design step, the parameter in the design step is replaced by regular text, using the syntax: <parameter name>. **Available from**: New Parameter dialog box
	Spell Checking. Checks the spelling of the selected word or all the words in the parameter.
	Thesaurus. Displays a synonym, antonym, or related word for the selected word.
	Spelling Options. Configures the way ALM checks spelling.
Default Value tab	The default value of the input parameter. This value is used when the component runs if no other value is supplied by the business process test or flow. The default value can be entered in the grid directly, in the Set Value page, or in the tab at the bottom of the window. For details on specifying default values for parameters, see "The Set Values Page" on page 301. Default values are saved and compared as strings, but can be specified according to different value types. **Available from**: Input Parameters sub-tabs
Description tab	A description of the component parameter's purpose, or other descriptive text. The description can be entered either in the grid or in the tab at the bottom of the window.
Details tab	Enables you to modify details for the parameter.

UI Elements (A-Z)	Description
Name	A descriptive name for the parameter. ➤ Parameter names must begin with a letter and cannot include spaces or any of the following characters: **! @ # $ % ^ & * ( ) + = \ { } | ; ' : " , . / < > ? ~ ` [ ] – ~** Any invalid character is automatically replaced by an underscore (_). ➤ Parameter names must be unique within a component, flow, or test. ➤ The parameter name must begin with a letter. If the first character of the component name is not a letter, a prefix, such as **comp_,** is added.
Order	The position of the parameter in the set of parameters. **Available for:** Test and flow parameters

The Set Values Page

This page enables you to set default and actual values for parameters at the component, flow, and test levels. This page appears in different formats (as a pane or a dialog box) with different options depending on the context in which it was opened.
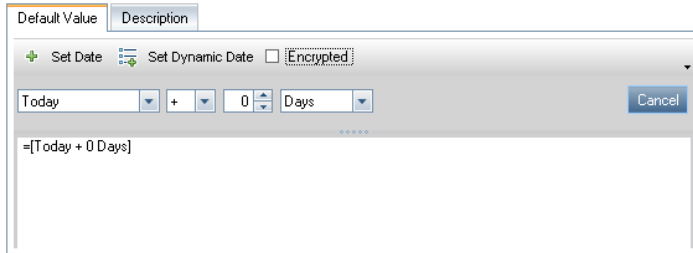
Set Values Pane for Fixed Date Values

The following shows a Set Values pane for setting a default parameter value with the **Set Date** button selected.
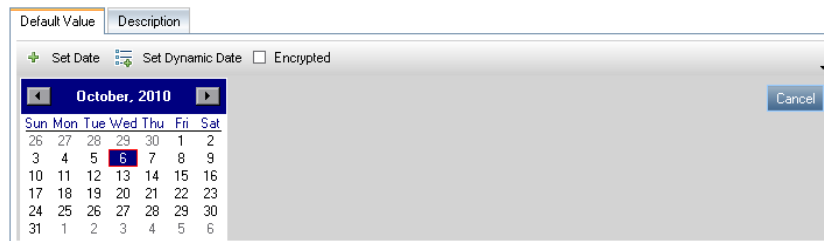
Set Values Pane for Fixed Dynamic Date Values

The following shows a Set Values pane for setting a default parameter value with the **Set Dynamic Date** button selected.
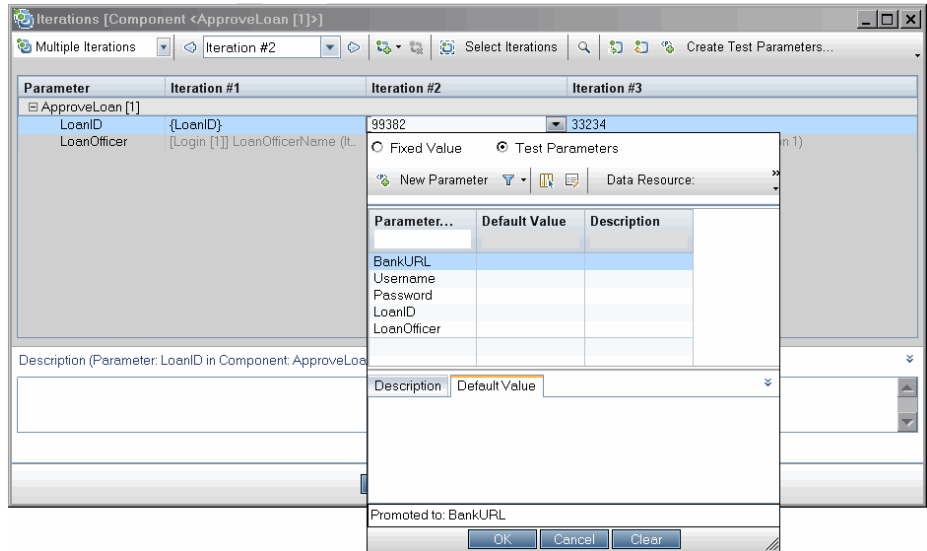

Set Values Pane for Fixed Values for Iterations

The following shows a Set Values dialog box for setting an actual parameter value for an iteration. This dialog box is accessible from the grid of the Component Iterations dialog box or the Flow Iterations dialog box. This shows how the dialog box appears when the **Fixed Value** button is selected.
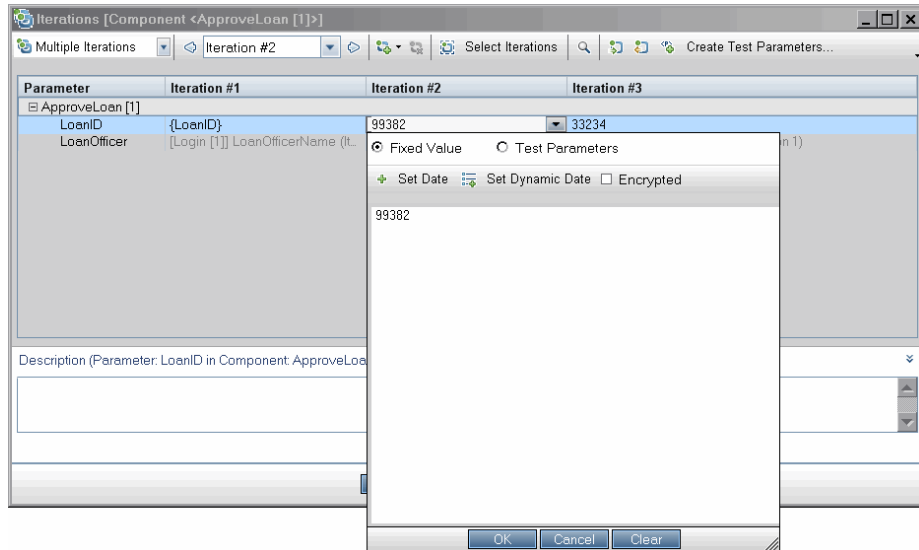
Set Values Pane for Assigning a Test Parameter Value to Another Parameter

The following shows a Set Values dialog box for setting an actual parameter value for an iteration. This dialog box is accessible from the grid of the Component Iterations dialog box or the Flow Iterations dialog box. This shows how the dialog box appears when the **Test Parameters** button is selected.

Description	Enables you to do one of the following:
	➤ Enter a fixed, encrypted, date, or dynamic date value.
	➤ Use the value of a flow or test parameter as the value for a component parameter.
	➤ Use the value of a test parameter as the value for a flow parameter.

To Access	Click the field or cell for the parameter's value or default value in one of the following dialog boxes or tabs. Then, if one exists, click the drop-down button on the right side of the cell or field.
	➤ Parameters tab (in the Business Components and Test Plan modules)
	➤ Parameters dialog box (when inserting a parameter into a component step)
	➤ New Component Parameter dialog box
	➤ New Test Parameter dialog box (for flows and tests)
	➤ Component and Flow Iterations dialog boxes
	➤ Test Iterations tab in the Execution Settings sidebar entry of the Test Instance Details dialog box
	➤ Data sub-tab for static configurations in the Test Configurations tab for a test in the Test Plan module
Important Information	➤ The structure and fields of the page change depending on:
	➤ The location from which you opened the page
	➤ The values you select for fields in this page
	➤ All parameter values are internally stored as strings, regardless of how the parameter values are specified. For example, you can set a value as a date, using a calendar. But when the value is stored and compared to other values, it is compared as a string.
	➤ **String.** One or more characters. When you enter a parameter value as a string, numeric, or boolean value, the value is treated in the same way as any other character. For example, "1" and "1.0" are treated as different strings.
	➤ **Encrypted.** An encoded string. The characters you enter are encrypted and displayed as asterisks.
	➤ **Date**. Date values, which can be specified as fixed dates or dynamic dates (dates relative to another date, such as the current date).
	➤ Values can also be entered by typing a string value directly in the relevant cell in the grid.
Relevant Tasks	"Defining Parameters and Setting Default Values" on page 273

See Also	➤ "Setting Dynamic Dates" on page 307
	➤ "Considerations for Setting Dynamic Dates" on page 308
	➤ "Manually Setting Values for Dynamic Date Parameter Values" on page 309

User interface elements are described below (unlabeled elements are shown in angle brackets):

UI Elements (A-Z)	Description
<calendar area>	Enables you to select a specific date in the calendar.
	➤ Click the right or left arrow to scroll through the calendar.
	➤ Click a date to select it.
	➤ Select **Encrypted** to encrypt the date—optional.
	➤ Click **Cancel** to close the calendar without selecting a date.
	You can also enter date values manually in **<text area>**.
	Available when: Set Date is selected, and if it appears, **Fixed Value** is selected.
<dynamic date area>	Enables you to provide a time relative to the current date (such as **Today**, **WeekAgo**). For task details, see "Setting Dynamic Dates" on page 307.
	Available when: Set Dynamic Date is selected, and if it appears, **Fixed Value** is selected.
<promotion information>	Enables you to see promotion information for the selected parameter.
	Available from: The Component and Flow Iterations dialog boxes (Test Plan module) and the Test Iterations tab (Test Lab module) when **Test Parameters** is selected.
<text area>	Displays the current value for the parameter, and enables you to enter and modify the value.

UI Elements (A-Z)	Description
Encrypted checkbox	Encrypts the fixed value (including dates).
	Specify the fixed value and then check **Encrypted**.
	Once a value is encrypted, it can only be modified in the Set Value page, and not directly in the grid.
	You can modify an encrypted value. It remains encrypted.
	Available when: Entering fixed values, and if it appears, **Fixed Value** is selected.
Fixed Value radio button	Displays areas, fields, and buttons that enable you to enter a fixed value for the parameter.
	Note: The value can be XML code, but use an external tool to validate the XML.
	Available from: Flow and Component Iteration dialog boxes (Test Plan module) and the Test Iterations tab (Test Lab module).
Set Date button	Displays **<calendar area>**, enabling you to select a fixed date value using a calendar.

UI Elements (A-Z)	Description
Set Dynamic Date button	Displays **<dynamic date area>**, enabling you to select a date that is relative to a fixed date.
Test Parameters radio button	Displays the Parameters dialog box, which enables you to select (or create) a flow or test parameter whose value should be used as the value for the selected parameter. You can set the value of a component parameter to the value of a flow or test parameter. Similarly, you can set the value of a flow parameter to the value of a test parameter.
	For user interface details, see "The Parameters Page" on page 292.
	The name of the parameter is entered as a value in the grid, surrounded by curly brackets **{ }** . The curly brackets instruct ALM to treat the parameter as a parameter, and not as a fixed value.
	Available from: Flow and Component Iteration dialog boxes (Test Plan module) and the Test Iterations tab (Test Lab module), when a component or a flow is included in a test.

Setting Dynamic Dates

A dynamic date is a date relative to the current date (today, yesterday, a year from today). You can add or subtract an offset time period to the relative date that you specify (such as 3 months before one year ago).

For example, to specify a date 10 days before the current date, the dynamic date could be: **WeekAgo - 3 days**

To set a dynamic date:

1 Select a relative date from the first list box (for example, **Tomorrow** or **MonthAgo**).

2 Select + or - from the next list.

3 Enter the number in the edit box by which you want to adjust the relative date.

4 Select a time period from the list that you want to use to adjust the relative date.

5 Click **Cancel** to close without selecting a date.

Considerations for Setting Dynamic Dates

Consider the following points when setting dynamic dates:

➤ You can also enter relative date values manually in **<text area>** or other relevant value cells or fields. For details, see "Manually Setting Values for Dynamic Date Parameter Values" on page 309.

➤ When you run a test or flow either automatically or manually, dynamic dates are converted to the actual dates they represent.

➤ When a test or flow run ends, the parameters displayed in Last Run Result show the date used in the run and not the dynamic date value.

➤ When creating a run condition on a parameter that contains a dynamic date value, define the run condition as a static date (for example, **12/10/2011**), which is compared to the actual date used in the run.

➤ The dates use the date on the server (not the client).

➤ For the maximum values that can be added or subtracted to time periods, see "Considerations" under "Manually Setting Values for Dynamic Date Parameter Values" on page 309.

Manually Setting Values for Dynamic Date Parameter Values

You can also set dynamic date values by manually typing the values directly in the relevant field or cell, without selecting field values in the Set Value page's **<dynamic date area>**. Dynamic date parameters must be enclosed by square brackets **[ ]**. You can provide a relative date as the dynamic date value of the date parameter, or you can adjust the date string by an offset value.

The following are the valid relative dates you can enter manually:

[Today], **[Yesterday]**, **[Tomorrow]**, **[WeekAgo]**, **[WeekFromToday]**, **[MonthAgo]**, **[MonthFromToday]**, **[YearAgo]**, **[YearFromToday]**.

The following values can be entered manually to customize a date string by adding or subtracting a time period to or from it:

Value	Represents	Usage
Day/Days/D	Time period in days	[Tomorrow + 1 day], [Today + 3 days], [Yesterday - 5 d]
Week/Weeks/W	Time period in weeks	[Tomorrow - 1 week], [Today + 2 weeks], [MonthFromToday + 3 w]
Month/Months/M	Time period in months	[YearAgo - 1 month], [YearFromToday + 5 months], [Today + 3 m]
Year/Years/Y	Time period in years	[Today - 1 year], [Tomorrow + 2 years], [WeekFromToday + 2 y]

Considerations

➤ Date strings are not case-sensitive. For example, both **[WeekAgo]** and **[Weekago]** are valid values.

➤ Time periods used to modify date strings are not case-sensitive. For example, both **[YearFromToday + 5 Months]** and **[YearFromToday + 5 months]** are valid.

➤ Spaces are not required in dynamic date values. For example, both **[MonthFromToday + 3 w]** and **[MonthFromToday+3w]** are valid.

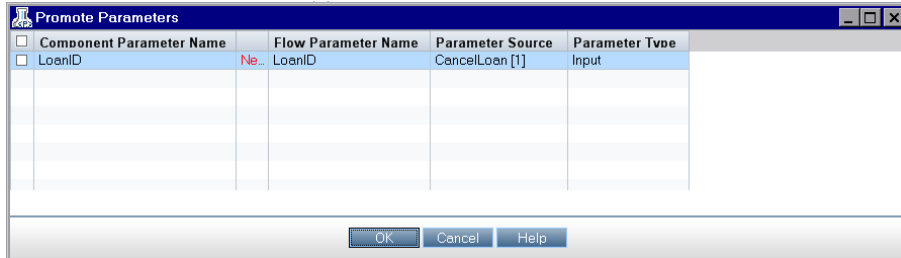➤The following maximum values apply to the time periods used to modify date strings:

Time Period	Maximum Value
Years	5000
Months	60,000
Weeks	240,000
Days	1,680,000

For example, **[today + 5000 years]** is valid. **[today + 5001 years]** is not valid.

The Promote Parameters Dialog Box

This dialog box enables you to promote parameters to the next level.

The contents of the dialog box differs for components and flows.

To Access	In the Test Plan module, display the Components and/or Flows panes to the right of the Test Script tab by clicking the **Select Components** button. Then, select a component or flow that contains parameters in the tree and click the right arrow next to the **Quick Add** button in the toolbar. Select **Add while Setting Promote Options**.
Important Information	➤ The content and text of the Promote Parameters dialog box depends on whether you are adding components to a flow or test, or flows to a test. ➤ Clicking **Cancel** or pressing the ESC key closes the dialog box but still adds the component or flow, without promoting any parameters.
See Also	"Parameter Overview" on page 264

User interface elements are described below:

UI Elements (A-Z)	Description
<New indicator column>	If the parameter is first being created as it is being promoted, **New** is displayed in this column.
<Promote All checkbox>	Promotes all parameters when you add the component to a test or flow, or the flow to a test. The check boxes for the individual parameters below this checkbox are disabled.
<Promote checkboxes>	Enables you to select the parameters that are promoted when you add the component to a test or flow, or the flow to a test.
Cancel	Closes the dialog box but still adds the component or flow, without promoting any parameters.
Component Parameter Name	Displays the parameters of the component or flow.
Parameter Source	Displays the source for the parameter (that is, in which component or flow the parameter was originally defined).

| UI Elements (A-Z)	Description
Parameter Type	Displays the type of parameter, **Input** or **Output**.
Test/Flow Parameter Name	Displays the names assigned to the promoted parameters in the current business process test or flow.

The Parameters Promotion Status Dialog Box

The Parameters Promotion Status dialog box displays flow and test parameters and how they were defined or promoted.

➤ **Test Parameters Promotion Status dialog box**: Lists the business component and flow parameters available in the business process test.

➤ **Flow Parameters Promotion Status dialog box**: Lists the business component parameters available in the flow.

The information provided in these dialog boxes include:

➤ Component input parameters, flow input parameters, and flow output parameters that have been promoted to the flow or test level.

➤ Flow and test parameters defined manually in the Test Plan module, with an indication that these parameters were not promoted.

➤ The names of components and flows from which flow and test parameters were promoted.

Below is an example of the Flow Parameters Promotion Status dialog box for output parameters.
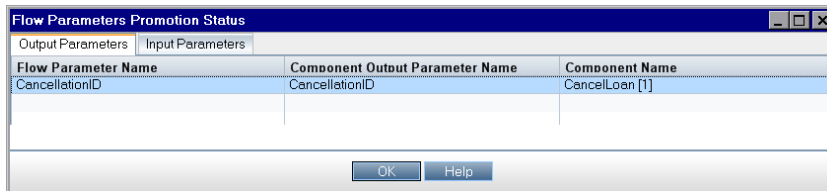
Below is an example of the Test Parameters Promotion Status dialog box.
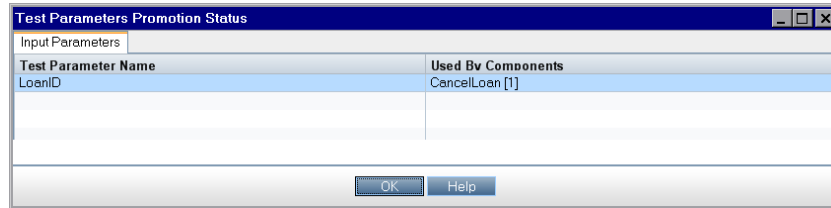
Description	Enables you to:
	➤ View parameters available from the business process test or flow.
	➤ View how the parameters became available to the business process test or flow.
To Access	In the Test Plan module, select a business process test or flow. Click **Show Test Parameters Promotion Status** in the Test Script toolbar.
Important Information	The title bar, structure and fields of the dialog box change depending on the object that was selected in the Test Plan Module: flow or business process test.
Relevant Tasks	"How to View the Promotion Status for Test and Flow Parameters" on page 284
See Also	"How to Create Parameters Using Promotion" on page 282

User interface elements are described below:

UI Elements (A-Z)	Description
Component Name	Name of the component from which the output parameter was promoted.
	If the flow parameter was created manually (that is, not promoted from a business component), this value appears as **N/A** (not applicable).
	Available from: The Output Parameters tab of the Flow Parameters Promotion Status dialog box
Component Output Parameter Name	The name of the corresponding output parameter as defined in the business component.
	If the flow parameter was created manually (that is, not promoted from a business component), this value appears as **N/A** (not applicable).
	Available from: The Output Parameters tab of the Flow Parameters Promotion Status dialog box
Input Parameters	Displays the input parameters defined for either the flow or the business process test.
Output Parameters	Displays the output parameters defined for the flow.
	Available from: The Flow Parameters Promotion Status dialog box
Test / Flow Parameter Name	Name of the parameter defined for the business process test or flow.
Used By Components	Name of the component or flow from which the input parameter was promoted.
	If the parameter was created manually (that is, not promoted), this value appears as **N/A** (not applicable).
	Available from: The Input Parameters tab of the Flow Parameters Promotion Status dialog box, and the Test Parameters Promotion Status dialog box.

10

Linking Parameters

You can make data available between business components and flows by linking output parameters to input parameters.

This chapter describes how to link parameters.

Product Feature Movie: To view a movie that demonstrates how to handle Business Process Testing parameters, select **Help** > **Product Feature Movies** in the ALM main window and click **HP Business Process Testing – Parameters and Data Usage**.

This chapter includes:

Parameter Linkage Overview

Parameter linkage enables you to make data available between business components and flows.

To link parameters, you pass the values of output parameters to input parameters of subsequent business components and flows in a test. The process of setting the value of an input parameter to the value of an output parameter is called linking output and input parameters.

For example, the **CreateLoan** business component has an output parameter that contains a generated loan ID. A subsequent business component, **SearchLoan**, can verify the loan if it has access to **CreateLoan**'s loan ID value. This access is provided by linking the **CreateLoan**'s output parameter to **SearchLoan**'s input parameter.

The component or flow in which the output parameter is defined is the **source**. The component or flow that links to that output parameter is the **target**. In the example above, **CreateLoan** is the source component and **SearchLoan** is the target component.

For task details, see "How to Link Parameters" on page 321.

This overview includes the following topics:

➤ "Linkage and Iterations" on page 316
➤ "Example: Basic Linkage" on page 319
➤ "Example: Linkage with Iterations" on page 320

Linkage and Iterations

You can configure a component or flow to run a certain number of times during a single run, using different data values for the component's or flow's parameters. Each time the component or flow runs is called an iteration. For details on iterations, see Chapter 11, "Working with Iterations."

Iterations of a source can result in multiple parameter output values. In these cases, the value provided by each iteration is passed as input to the corresponding iteration of the target.

Linking can occur successfully only when ALM can determine the target iteration for each source iteration. One of the following conditions must exist:

➤ **Condition 1.** The source has one iteration and the target has one or more iterations (a "1–to–n" relationship).

➤ **Condition 2.** The source and the target have the same number of iterations (an "n–to–n" relationship).

Note: When a source or target is a member of a group, the number of iterations is that of the group.

If the component iterations are not represented by a "1–to–n" or "n–to–n" relationship, a warning message is displayed.

The following topics are discussed in this section:

➤ "Condition 1: Example" on page 317

➤ "Condition 2: Example" on page 318

➤ "Partial Iteration Ranges" on page 318

➤ "Considerations" on page 318

Condition 1: Example

The source component has one iteration and the target component has one or more iterations (a "1–to–n" relationship).

In this case, the same output value of the source component is used in each iteration of the target component.
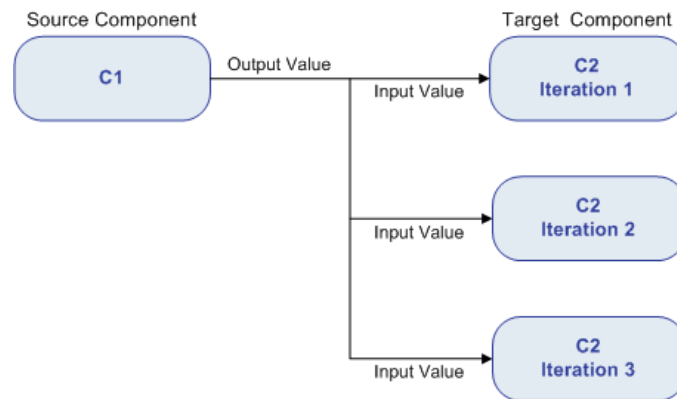
Condition 2: Example

The source component and the target component have the same number of iterations (an "n–to–n" relationship).

In this case, the different output values of each of the source component's iterations are used in the respective iterations of the target component.
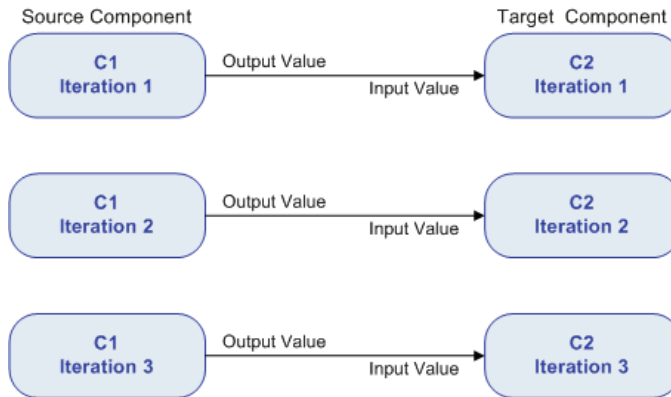
Partial Iteration Ranges

The number of iterations in the relationship between the components can be the number of actual iterations in each component or group, or the number of iterations selected in a partial range.

In the example of Condition 2 above therefore, the three output iteration values of C1 could also have been used as input values in the three iteration runs of C2 (iterations 3, 4 and 5), if that range was selected in C2. For more information on partial iteration ranges, see "How to Select Iteration Ranges" on page 337.

Considerations

Take the following into account when working with parameter linkage and iterations:

➤ When you use the output of a previous component as the value for an input component parameter, the option applies to all component iterations for that input parameter.

➤ When iterations of a source component in a business process test result in multiple parameter output values, the value that is provided by a given iteration run is passed as input to the corresponding iteration of the target component.

➤ Moving a business component, group, or flow can cause a parameter reference conflict, for example, where a target component is moved to a position preceding the source component. If the resulting warning message is ignored, the conflicting link to the source parameter is deleted. This causes the iteration to fail, and the link must be reinstated in the target Iterations dialog box if necessary.

➤ In cases where there is an incompatible number of iterations between input and output component parameters, the parameter name in the column header is displayed in red text in the Iterations dialog box.

➤ Iteration errors cause a business process test or flow that contains the relevant components to fail. These errors are indicated in the Test Script tab in the Test Plan module, and reported when a flow or test is validated. For more information, see "Validating Business Process Tests and Flows" on page 234.

Example: Basic Linkage

Three components exist corresponding to different stages in processing a customer loan:

➤ **CreateLoan.** Receives a loan request and generates a unique loan ID number for the loan.

➤ **SearchLoan.** Searches existing loan requests by ID number to verify the loan.

➤ **ApproveLoan.** Approves the loan once verified.

To define a business process test that tests the entire loan request workflow from receiving the request to approving it, define an output parameter for the component CreateLoan called LoanID, which stores the value of the loan ID number generated when the loan is created. You can then use this value as an input parameter for subsequent components or flows in the business process test, such as SearchLoan and ApproveLoan.

Example: Linkage with Iterations

In the example below, the source component **CreateLoan** has an "n–to–n" ("3 to 3") relationship with the target component **SearchLoan**. For each iteration of component input parameter **LoanID** in **SearchLoan**, there is a corresponding iteration of component output parameter **LoanID** from **CreateLoan**.
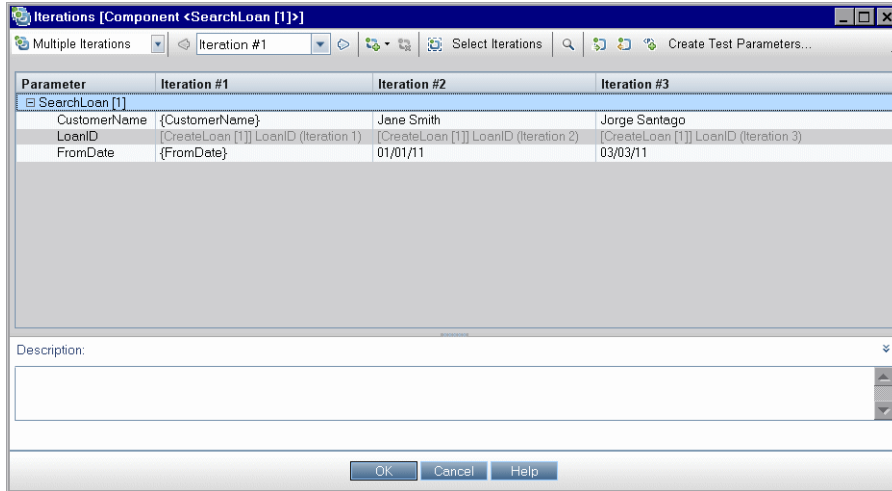
Conversely, the source component Login has a "1–to–n" ("1–to–3") relationship with the target component **ApproveLoan**. Each iteration of component input parameter **LoanOfficer** in the **ApproveLoan** component uses the same component output parameter (Username) from the **Login** component.
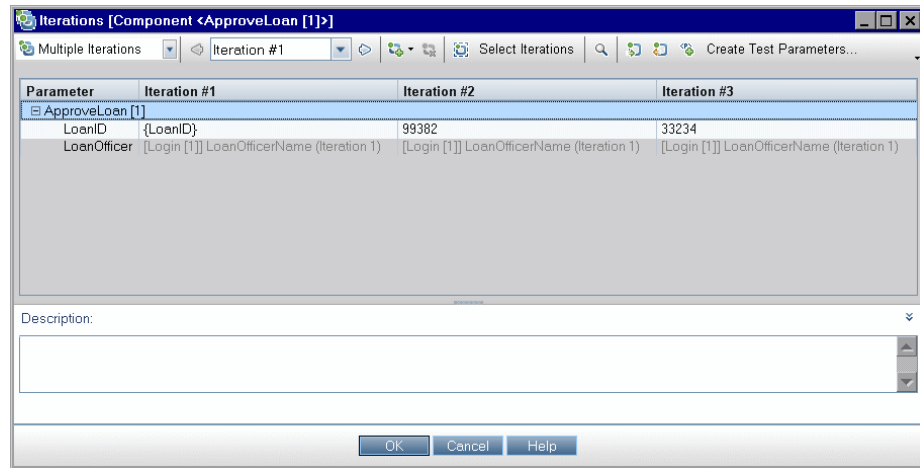
How to Link Parameters

This section describes how to link output and input parameters.

For conceptual details, see "Parameter Linkage Overview."

For user interface details, see "Dialog Boxes for Linking Parameters."

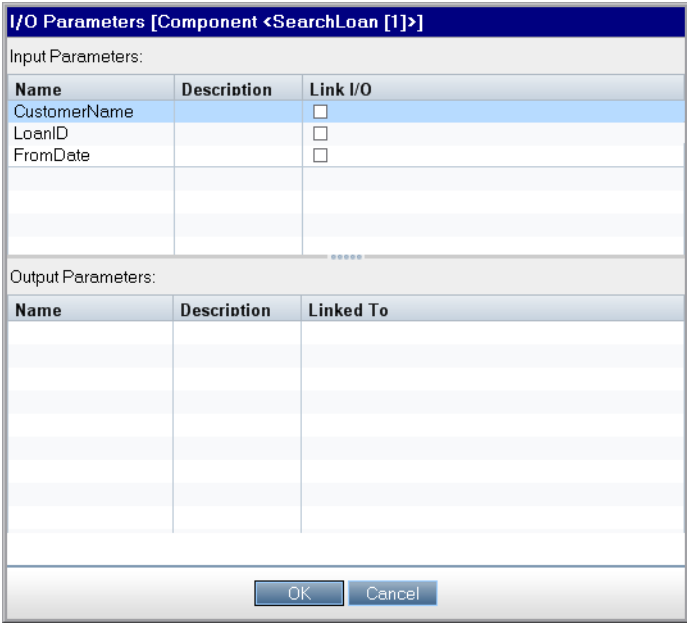**To link output parameters to input parameters:**

1 Design linkage.

➤ Determine which parameters are generated by the application being tested. Create output parameters for these parameters either at the component level or the flow level.

➤ Determine which input parameters are dependant on other parameters in other business components or flows. You will link these input parameters to their corresponding output parameters.

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2 From the Test Plan module, select the relevant business process test or flow.

3 Click the **Test Script** tab.
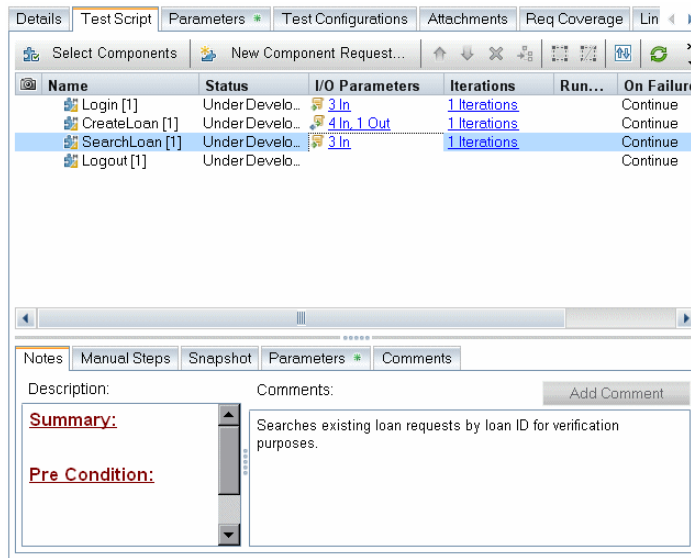
Note the I/O Parameters column. This column displays the total number of input and output parameters defined for each component or flow. For example, the **SearchLoan** component has three input parameters. The total (**3 in**) is a link.

4 Click the link in the I/O Parameters column for a component or flow whose input parameter you want to link to an output parameter (that is, the link of the target). The I/O Parameters dialog box opens.

In the lower pane of this dialog box, you can see which input parameters are already linked to the output parameters. In the example above, none of the parameters is linked.

5 For each component or flow input parameter to link:

a Select the checkbox in the Link I/O column. The Select Output Parameter dialog box opens.

The Select Output Parameter dialog box lists output parameters from each source business component or flow in the business process test prior to the current target component or flow.

b Select the output parameter to link to the input parameter and click **OK**.

Note: If the number of iterations for the output parameter and the input parameter do not match, the parameter name is displayed in red.

The number of iterations are considered a match if either the number of output parameter iterations is equal to the number of input parameter iterations, or if the output parameter iterations is equal to one (regardless of the number of input parameter iterations).

---

6 Click **OK** to close the I/O Parameters dialog box.

Dialog Boxes for Linking Parameters

The section describes:

➤ "The I/O Parameter Dialog Box" on page 325

➤ "The Select Output Parameter Dialog Box" on page 326

The I/O Parameter Dialog Box

The I/O Parameter dialog box enables you to link target input parameters to source output parameters.

The title of the dialog box differs according to the entity for which you opened the dialog box (component or flow).
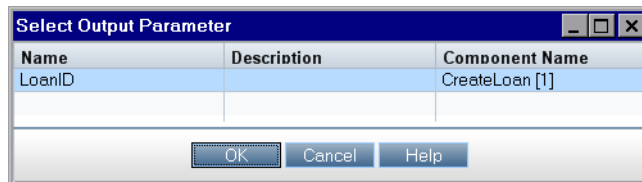
How to access	From the Iterations dialog box for a component or a flow, click the link in the I/O Parameters column.
Relevant tasks	"How to Link Parameters" on page 321
See also	"Parameter Linkage Overview" on page 315

User interface elements are described below:

UI Elements (A-Z)	Description
Description	Description of the parameter.
Input Parameters	Target input parameters defined for the component or flow.
Link I/O checkbox	Checkboxes for linking the target input parameters to source output parameters.
Linked To	Target input parameters linked to the source output parameter.
Name	Name of the parameter.
Output Parameters	Source output parameters defined for the component or flow.

The Select Output Parameter Dialog Box

This dialog box enables you to select the source output parameter to link to a target input parameter.

Select Output Parameter		_ □ ×
Name	**Description**	**Component Name**
LoanID		CreateLoan [1]
	OK Cancel Help	

How to access	From the I/O Parameters dialog box, click a checkbox in the Link I/O column.
Important information	➤ Click the row for the output parameter you want to select, and then click **OK**. ➤ Output parameters from components or flows prior to the current component or flow in the test hierarchy are displayed.
Relevant tasks	"How to Link Parameters" on page 321
See also	"Parameter Linkage Overview" on page 315

User interface elements are described below:

UI Elements (A-Z)	Description
Component Name	Name of the component or flow in which this source output parameter is defined.
Description	Description of the parameter.
Name	Name of the parameter.

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Working with Iterations

You can affect the behavior and results of a business process test by using iterations. You can configure a component, group, or flow to run a specified number of iterations during a single run, using different values for the parameters.

This chapter describes how to work with iterations in Business Process Testing at the component, group, and flow levels.

Product Feature Movie: To view a movie that demonstrates how to handle Business Process Testing parameters, select **Help** > **Product Feature Movies** in the ALM main window and click **HP Business Process Testing – Parameters and Data Usage**.

This chapter includes:

Iterations Overview

Defining iterations enables you to run business components, groups, flows, and tests multiple times, each time using different parameter values. For example:

➤ Searching for different loans in a test for a banking application by supplying different loan IDs

➤ Approving loans with different interest rates

When you run your business component, flow, or test, one iteration is run for each value. For example, a test or flow with ten sets of data runs ten times, and a component with six sets of component parameter values runs six times before proceeding to the next component in the run.

When iterating a component, group, or flow, you determine how, and how many times, it should run. For task details on defining iterations for components, groups, and flows, see "How to Define Iterations to Run with Different Values" on page 334.

When iterating a test, you define how many times each test instance should run using its configurations. For task details on defining iterations for tests and test configurations, see "How to Define Test Configurations to Run with Different Values" on page 354.

Note: You can run business process tests for different use-cases of the application you are testing. Each use-case of a test is represented by a test configuration. You can associate different sets of data for each test configuration and its iterations. For conceptual details, see "Test Configurations Overview" on page 350.

Example

Consider the following business process test for a banking application comprising three business components: **Login**, **CreateLoan**, and **Logout**:
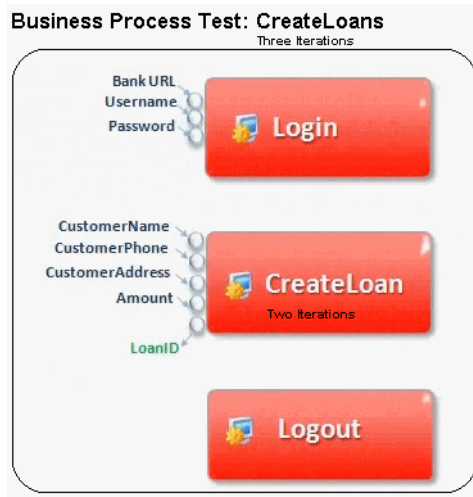
As illustrated above:

➤ The entire business process test is iterated three times.

➤ Different values for the test parameters **BankURL**, **Username**, and **Password** can be used for each test iteration.

➤ Within each of the three test iterations, the **CreateLoan** component is iterated twice. This means that the **CreateLoan** component iterates a total of six times.

➤ Different values for the **CustomerName**, **CustomerPhone**, **CustomerAddress**, and the **Amount** input parameters are used for each iteration of the **CreateLoan** component. Six different input parameters can be supplied in total.

➤ The **CreateLoan** component provides an output value for the **LoanID** parameter for each iteration (six output values provided in total).
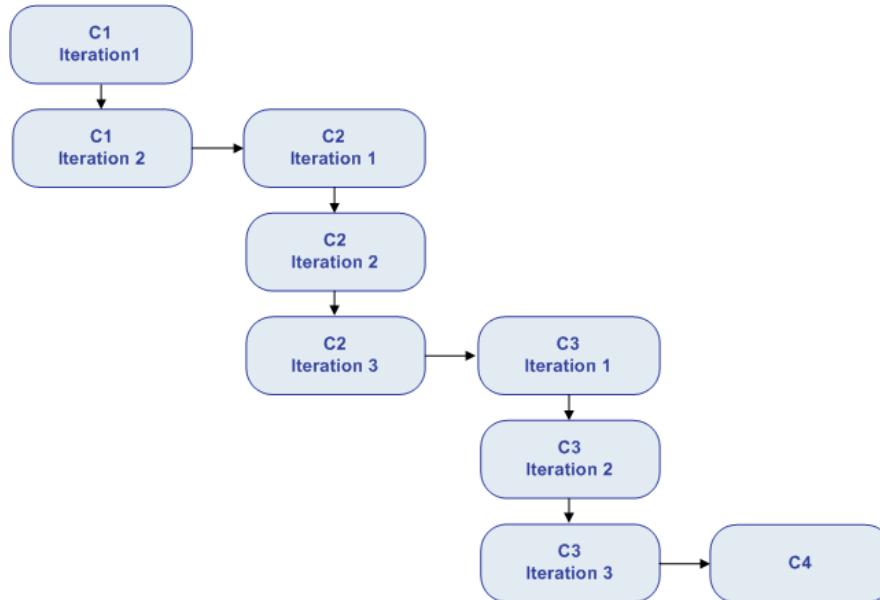
Group Iterations

In some cases, it may be helpful to iterate several business components together as a group in certain business process tests or flows.

Consider a business process test that contains four business components; C1, C2, C3, and C4. The test requires that the components be iterated as follows:

➤ Component C1 - Two iterations

➤ Component C2 - Three iterations

➤ Component C3 - Three iterations

➤ Component C4 - One iteration

Without grouping, the business process test would run each business component in sequence, C1 and its iterations, then C2 and its iterations, then C3 and its iterations, and then C4.

This is illustrated as follows:

Instead of running all the iterations of component C2 followed by all the iterations of component C3, you could group these two components together, enabling the business process test to run:

➤ The first iteration of C1, then the second iteration of C1, followed by

➤ the first iteration of C2, then the first iteration of C3, followed by

➤ the second iteration of C2, then the second iteration of C3, followed by

➤ the third iteration of C2, and then the third iteration of C3 followed by

➤ C4.

This is illustrated as follows:
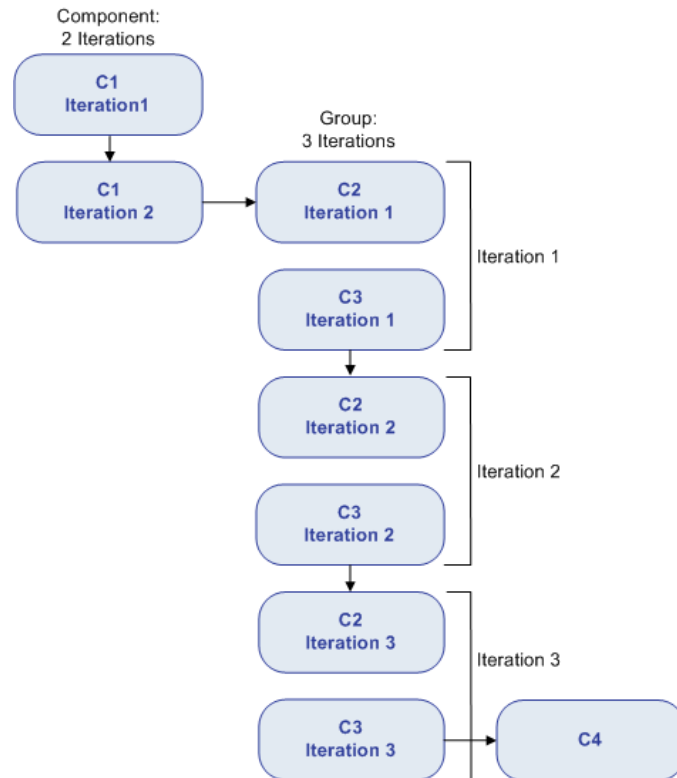
Component groups in the Test Script tab are identified by a group node listed above its member components. The group node contains the group icon and displays the number of iterations for the group. The group node can be expanded and collapsed to show or hide its member components.

➤ The number of iterations indicates the total number of value sets defined for the group.

➤ The iteration range indicates the subset of iterations currently set for use when the test runs.

How to Define Iterations to Run with Different Values

You can instruct a component, business process test, or flow to run multiple times, and use different values each time by defining iterations.

This section includes the following topics:

➤ Guidelines for Working with Iterations on page 335

➤ How to Define Iterations to Run with Different Values on page 335

For information on defining iterations and values for test configurations, see "How to Define Test Configurations to Run with Different Values" on page 354.

Guidelines for Working with Iterations

Take the following guidelines into account to successfully work with iterations:

➤ **Matching an application's post-condition with the next iteration's pre-condition**. For a business component to run iterations successfully, it is essential that the post-condition (the state of the application after the last step in the component runs) matches the pre-condition (the state of the application before the first step in the component runs).

➤ **Linking output parameters to input parameters**. Iterations in a business process test or flow can result in multiple output parameter values. In these cases, each iteration passes its output value as input to the corresponding target component or flow. This is called parameter linkage. For conceptual details, see "Parameter Linkage Overview."

How to Define Iterations to Run with Different Values

You use the Iterations dialog boxes to set the parameter values that a component, group, or flow will use for each iteration. For user interface details, see "Iterations Dialog Boxes and Tabs" on page 340.

To set input parameter values for iterations:

1 In the Test Plan module, select the relevant business process test or flow in the Test Plan tree, and click the **Test Script** tab.

2 In the Script pane of the Test Script tab, right-click the component, group, or flow for which you want to set values and select **Iterations**. (Alternatively, you can click the **Iterations** link of the component, group, or flow.)

The Iterations dialog box for the component, group, or flow opens.
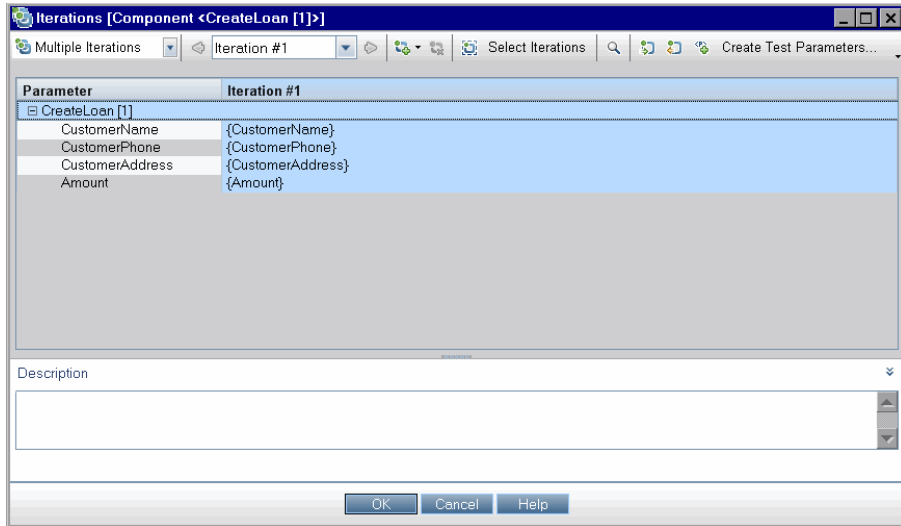
Note: You can also set the values of input flow parameters for iterations from the Test Lab module.

➤ Click **Test Lab** in the sidebar.

➤ Select the test set containing the flow in the test set tree.

➤ Click the **Execution Grid** tab.

➤ Click the link in the Iterations column for the flow.

By default, the **Iterations** column is not displayed in the Execution Grid tab. Add it using the Select Columns dialog box, if required. For information on how to add or arrange columns in ALM, see the *HP Application Lifecycle Management User Guide*.

3 If you want the component, group, or flow to run only once, skip to step 4.

If you want the component, group, or flow to run more than one iteration, click the **Add Iteration** button for each iteration you want to add. You can add a new iteration with blank values, a new iteration with default values, or a copy of the selected iteration. An additional column or row is added for each iteration.

4 Set the value of each input parameter for each iteration. For user interface details, see "The Set Values Page" on page 301.

5 If you want the group, component, or flow to run for a specific range of iterations, click the **Select Iterations** button and select the relevant iterations in the Select Iterations dialog box. For more information on specifying which component iterations to run, see "How to Select Iteration Ranges" on page 337.

6 Click **OK** to close the Iterations dialog box.

Note: If a component, group, or flow has input parameters that reference the output parameters of a different business component or flow, differences between the number of iterations can result in an error. The parameter name in the Iterations dialog box is displayed in red, indicating an iteration range mismatch.
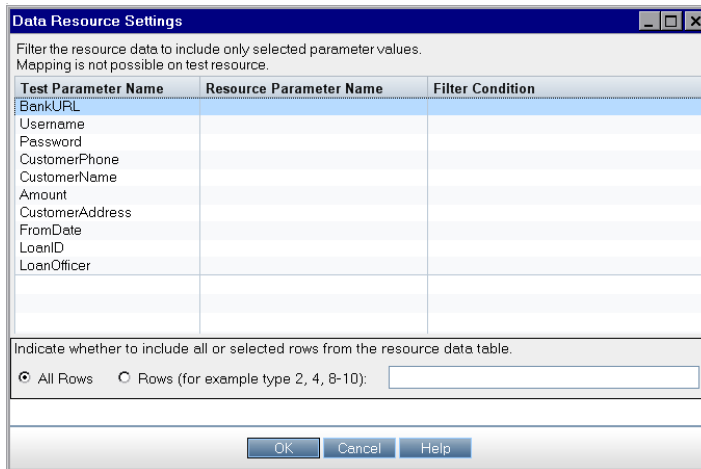

How to Select Iteration Ranges

You can specify a single iteration or a range of iterations to run in a business process test or flow. This enables you to run and check one or more specific iterations without having to run all the defined iterations. In addition, you could use the same business process test or flow definition for different scenarios. Different combinations of iterations can be run for different test runs.

Iteration ranges for components, flows, and test configurations that use static data are specified using the Select Iterations dialog box.
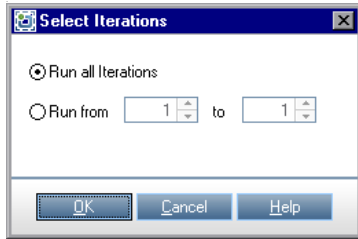
Iteration ranges for test configurations that use dynamic data are specified using the Data Resource Settings dialog box.

For information on working with test configurations, see Chapter 12, "Working with Test Configurations."

The following tasks are described in this section:

➤ "To access the Select Iterations dialog box:" on page 339

➤ "To select an iteration range using the Select Iterations dialog box:" on page 339

➤ "To select an iteration range using the Data Resource Settings dialog box:" on page 339

To access the Select Iterations dialog box:

Perform one of the following:

➤ **For business components and flows:** In any Iterations dialog box toolbar, click the **Select Iterations** button. The Select Iterations dialog box opens.

➤ **For business process tests that use configurations that access static data:**

    a In the Test Plan module, select the business process test.

    b Click the **Parameters** tab.

    c Click the **Data** tab near the bottom of the window.

    d In the Data tab toolbar, click the **Select Iterations** button. The Select Iterations dialog box opens.

To select an iteration range using the Select Iterations dialog box:

1 In the Select Iterations dialog box, select the second radio button. The **from** and **to** spin boxes are enabled.

2 Specify or select the start and end of the iteration range to run in the business process test or flow.

Tip: To run one specific iteration only, enter or select the same iteration number in both the **from** and **to** spin boxes.

---

3 Click **OK**. The iterations that are not selected for inclusion in the run are disabled. When the component or flow runs, only the defined iterations run.

To select an iteration range using the Data Resource Settings dialog box:

1 In the Test Plan module, select the business process test.

2 Click the **Parameters** tab.

3 Click the **Data** tab near the bottom of the window.

4 Click the **Data Resource Settings** button. The Data Resource Settings dialog box opens.

5 Specify the rows from the data resource file that should be processed when the test is run. Iterations are created only for the selected rows.

➤ To process all rows that meet the specified filter condition, if one exists, in the data resource file, select **All Rows**.

➤ To indicate a subset of rows, select **Rows** and enter the row numbers, separated by commas. A range of rows can be specified with a hyphen (for example, 3-5 means that rows 3, 4, and 5 will be processed).

6 Click **OK**.

Dialog Boxes and Tabs for Working with Iterations

This section describes the following topics:

➤ "Iterations Dialog Boxes and Tabs" on page 340

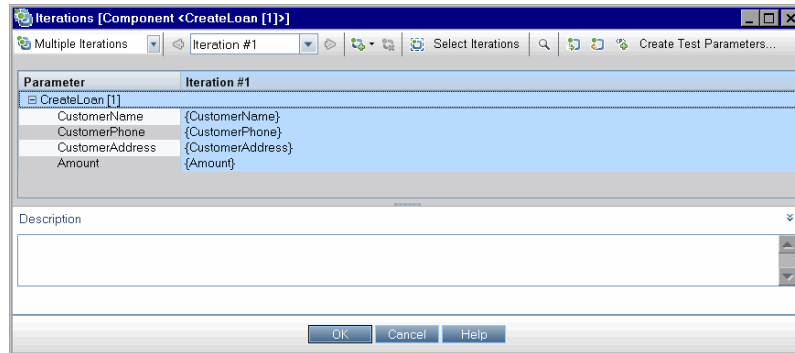➤ "The Create Flow/Test Parameters Dialog Box" on page 346

Iterations Dialog Boxes and Tabs

The following Iterations dialog boxes and tabs enable you to configure the input parameter values that a business component, group, test, or flow uses for each iteration during a test run.
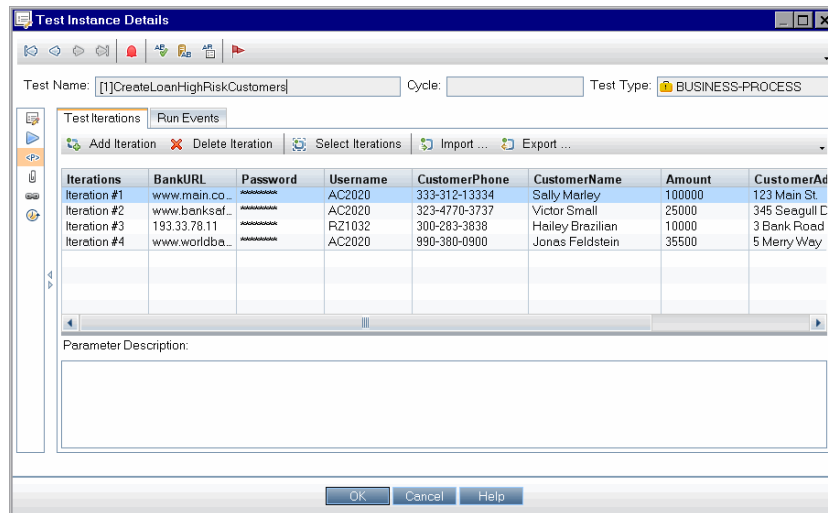
➤ Component Iterations dialog box

➤ Group Iterations dialog box

➤ Flow Iterations dialog box

➤ Test Iterations tab

The title of the dialog box shown above differs according to the entity for which you opened the dialog box.

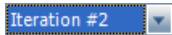Below is an example of an Iterations dialog box for a component:

Below is an example of the Test Iterations tab for a business process test:

How to access	➤ **Component Iterations dialog box**: From the Test Plan module, select any test or flow to which the business component has been added. In the Test Script tab, select the component and click the corresponding **Iterations** hypertext link in the Iterations column.
	➤ **Group Iterations dialog box**: From the Test Plan module, select the business process test or flow in which the group has been defined. In the Test Script tab, select the group and click the corresponding **Iterations** hypertext link in the Iterations column.
	➤ **Flow Iterations dialog box**: From the Test Plan module, select any test to which the flow has been added. In the Test Script tab, select the flow and click the corresponding **Iterations** hypertext link in the Iterations column.
	➤ **Test Iterations tab**: From the Test Lab module, select the test set that contains the test. In the **Execution Grid** tab, right-click the test instance and select **Test Instance Details**. On the sidebar, click **Execution Settings** and select the **Test Iterations** tab.
Important information	➤ Test iterations can also be viewed in the Data tab near the bottom of the window after clicking the **Test Configurations** tab in the Test Plan module. For task details, see "How to Define Test Configurations to Run with Different Values" on page 354.
	➤ The **Add Iteration**, **Delete Iteration**, and **Select Iterations** buttons in the Component Iteration or Flow Iteration dialog box are disabled if the business component is a member of a component group. These are common operations for all group members and can be accessed by clicking the group node to open the Group Iterations dialog box. For more information, see "Grouping Components and Flows" on page 222.
Relevant tasks	➤ "How to Define Iterations to Run with Different Values" on page 335
	➤ "How to Define Test Configurations to Run with Different Values" on page 354

See also	➤ "Iterations Overview" on page 330
	➤ "Group Iterations" on page 332

User interface elements are described below (unlabeled elements are shown in angle brackets):

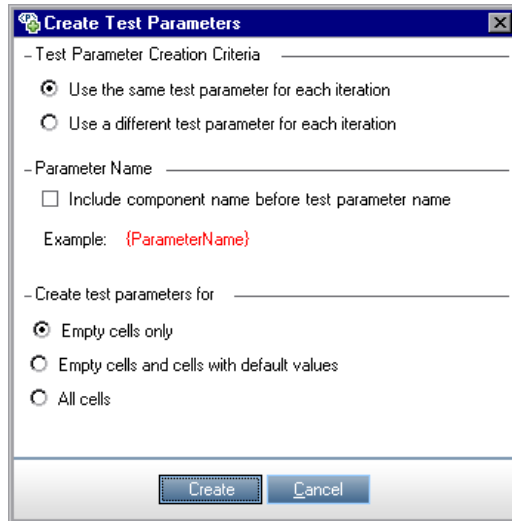| UI Elements (A-Z)	Description
	Multiple Iterations View / Single Iteration View. Enables you to toggle between: ➤ A view that shows all iterations in one dialog box ➤ A view that shows only one iteration at a time in the dialog box. **Not available from:** Test Iterations tab
	Previous / Next Iteration. Displays the next or previous iteration in the dialog box. **Not available from:** Test Iterations tab
Iteration #2	**Iteration.** Displays the iteration currently in focus in the dialog box, and enables you to select a different iteration on which to focus. **Not available from:** Test Iterations tab
	Add Iteration. Adds an iteration for the entity (component, group, test, or flow). When adding iterations in the Iteration dialog boxes, the following options are available: ➤ **Add New Iteration**. Adds a new iteration without setting parameter values. ➤ **Copy Iteration**. Adds a new iteration by copying the values of a selected iteration's parameters. ➤ **Create Iteration with Default Values**. Adds a new iteration and sets the parameter values to the default values. **Note:** This button is disabled when the component or flow for which you are adding an iteration is in a group.

UI Elements (A-Z)	Description
	Remove/Delete Iteration. Deletes the selected iteration for the entity (component, group, test, or flow). For more information on adding and deleting component iterations, see "Guidelines for Working with Iterations" on page 335. **Note:** This button is disabled when the component or flow for which you are deleting an iteration is in a group.
🔘 Select Iterations	**Select Iterations.** Opens the Select Iterations dialog box, which enables you to select which of the defined iterations you want to run during the test run. You can specify one, all, or a range of iterations. For task details, see "How to Select Iteration Ranges" on page 337. **Note:** This button is disabled when the component or flow for which you are selecting iterations is in a group.
🔍	**Find**. Enables you to find a parameter value, a parameter, or a component. For information on Find and Replace functionality, see the *HP Application Lifecycle Management User Guide*. **Not available from:** Test Iterations tab
	Import/Export. Enables you to import component parameter values for iterations from a **.csv** (comma separated value) file, and to save component parameter values to a **.csv** file. For more information on importing and exporting parameter values, see "How to Import and Save Parameter Values" on page 285.
<parameter columns>	Displays the names for each parameter in the displayed iteration. **Available from**: Single Iterations view and the Test Iterations tab
<value columns>	Displays the value for each parameter in the displayed iteration. **Available from**: Single Iterations view and the Test Iterations tab

UI Elements (A-Z)	Description
<values>	The value of the input parameter when the instance runs. The value can be entered in the grid directly or in the Set Value page (accessed by clicking the arrow in the relevant cell).
	For task details on specifying default values for parameters, see "The Set Values Page" on page 301.
	If no value is specified, the default value for that parameter is used. If no default value is specified, no value is displayed and the entity may not run correctly.
	Values are saved and compared as strings, but can be specified according to different value types.
	Test or flow parameters (parameters whose values are to be taken from the business process test or flow), are shown in curly brackets **{ }**. This instructs ALM to treat the parameter as a parameter and not as a fixed value.
Create Flow/Test Parameters	Opens the Create Flow/Test Parameters dialog box, which enables you to generate flow or test parameters from business component input parameters or flow input parameters.
	For user interface details, see "The Create Flow/Test Parameters Dialog Box" on page 346.
	For task details, see "How to Generate Flow and Test Parameters from the Iterations Dialog Boxes" on page 280.
Description area	The description for the parameter and its original source entity (business component, test, or flow).
	Parameter descriptions are initially entered in the module in which they were created (the Business Components module or the Test Plan module), or in QuickTest for automated components.

UI Elements (A-Z)	Description
Iteration # columns/rows	Displays the current values for each parameter in each iteration.
	Available from: Multiple Iterations view and the Test Iterations tab
Parameter column	Names of the parameters, grouped by entity (business component, group, test, or flow).
	Available from: Iterations dialog boxes

The Create Flow/Test Parameters Dialog Box

The Create Flow/Test Parameters dialog box defines the way generated flow or test parameters are created and named.

For task details, see "How to Generate Flow and Test Parameters from the Iterations Dialog Boxes" on page 280.

User interface elements are described below:

Option	Description
Flow/Test Parameters Creation Criteria	➤ **Use the same flow/test parameter for each iteration.** Clears the flow or test parameter values between iterations so that the same parameter names are used for every iteration, but the values are not passed from one iteration to the next. ➤ **Use a different flow/test parameter for each iteration.** Automatically creates a new flow or test parameter for each iteration. The parameter values are saved with each iteration run.
Parameter Name	**Include component name before flow/test parameter name.** If checked, adds the component or flow name as a prefix preceding the generated flow/test parameter name.
Example	Provides an example of the generated parameter name based on the selected criteria.
Create flow/test parameters for	➤ **Empty cells only.** Creates flow/test parameters only for cells that do not contain any value (default). ➤ **Empty cells and cells with default values.** Creates flow/test parameters for all cells that either do not contain a value or contain the default value defined in the component or flow parameter. ➤ **All cells.** Creates flow/test parameters for all cells in the Component Iterations, Group Iterations, or Flow Iterations dialog boxes.

12

Working with Test Configurations

You can run business process tests for different use-cases of the application you are testing. A **test configuration** is a set of definitions that describe a specific use-case of a test. You can associate different sets of data for each test configuration.

This chapter describes how to work with test configurations in Business Process Testing.

This chapter includes:

➤ Test Configurations Overview on page 350

➤ How to Define Test Configurations to Run with Different Values on page 354

➤ How to Generate a Configuration from a Modified Instance on page 367

Test Configurations Overview

You can run business process tests for different use-cases of the application you are testing. Each use-case of a test is represented by a test configuration. You can associate different sets of data for each test configuration and its iterations.

Working with test configurations enables you to run the same test under different scenarios. For example, you may want to check the same test in a Windows environment and again in a UNIX environment. In this case, you can define one business process test with two test configurations. The parameters values for the Windows configuration would contain Windows-specific values (for example, backslashes in a path name) while the UNIX configuration would contain UNIX-specific values (for example, forward slashes in a path name).

When using test configurations with business process tests, you can run a test many times in succession with different values specified in a Microsoft Excel file.

A test configuration can be associated with multiple iterations, based on the number of sets of data supplied for that test configuration.

When creating a business process test, by default, a test configuration is created by ALM. This test configuration is created with the same name as the test. This test configuration can be renamed.

This section contains the following topics:

➤ Test Configurations Associated with Static Data

➤ Test Configurations Associated with Dynamic Data

➤ Configuration Example with Iterations

Test Configurations Associated with Static Data

The basic ALM test configuration accesses static data. Static data are sets of values that are provided for each iteration's parameters directly from within ALM. For task details on creating configurations for ALM manual tests, see the *HP Application Lifecycle Management User Guide*.

When creating test configurations for manual and automated business process tests, you also create a set of static data for each use-case. However, for each test configuration, you can also add iterations and define different parameter values for each iteration. For task details on creating test configurations that access static data for business process tests, see "How to Define Configurations that Access Static Data" on page 357.

Test Configurations Associated with Dynamic Data

Business process test configurations can access dynamic data. Dynamic data are sets of values that are provided for each iteration's parameters from outside of ALM, in an external data table uploaded in the Test Resources module. The external data table is a Microsoft Excel file.

When the business process test instance runs using a configuration that accesses dynamic data, the test instance fetches the parameter values for each iteration of the configuration from the list of parameter values in the Microsoft Excel file.

You can supply ALM with dynamic data resources:

➤ **At the test level.** You can supply a Microsoft Excel file that contains all parameter values for each iteration of the configuration is specified at the test level. The Microsoft Excel file is uploaded as a data table in the Test Resources module, and associated with the business process test configuration in the Parameters tab of the Test Plan module. For task details, see "How to Define Configurations that Access Dynamic Data" on page 359.

➤ **At the configuration level (overriding any test-level data resources).** You can supply an alternate Microsoft Excel file, overriding the test-level data resources file that is associated with the business process test as a whole. The Microsoft Excel file is uploaded as a data table in the Test Resources module, and associated with a specific configuration of the business process test in the Test Configurations tab of the Test Plan module. For task details, see "How to Define Configurations that Access Alternate Dynamic Data" on page 363.

Note: Configurations that access dynamic data are not available for use with ALM manual test configurations.

Configuration Example with Iterations

Consider the following business process test and its three configurations for a banking application comprising three business components: **Login**, **ApproveLoan**, and **Logout**:
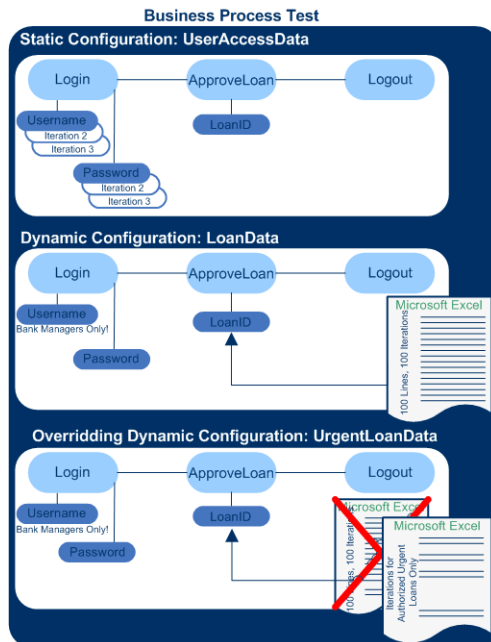
➤ The entire business process test tests the following aspects of the application:

   ➤ Access rights are correct, based on the identity of the user.

   ➤ Load is handled well, such as when a bank manager approves many loans using an external list of data created in Microsoft Excel.

   ➤ A bank manager can approve urgent, high priority loans, based on a different external list created in Microsoft Excel. This external list is to be further narrowed down to include only those loans that have manager authorization.

➤ To test access rights, a configuration named **UserAccessData** accesses static data, which provides different values for the test parameters **Username** and **Password** for three test iterations: One iteration provides the login information for an average loan processor, another for a bank manager, and the third for a system administrator for the application. Each of these users has different permissions and access to the application. The parameter values are specified within ALM.

➤ A configuration named **LoanData** accesses dynamic data for one hundred different values for the **LoanID** input parameters used by the **ApproveLoan** component. These values are provided in a Microsoft Excel test resource of the data table type. A test iteration is run for each value in the Microsoft Excel file, so the test instance that uses this configuration runs one hundred times.

Note: Configurations can supply data values for test iterations, but not for component iterations.

➤ To test urgent loans, a configuration-level data resource can be defined to override the test-level data resource for the business process test. This data resource, **UrgentLoanData**, only contains high priority loans that are to be approved. One test iteration is run for each value that matches the filter criteria in the alternative configuration-level Microsoft Excel file (in this case, urgent loans that have been authorized for approval).

How to Define Test Configurations to Run with Different Values

You can run business process tests according to different use-cases, for example, with a different set of data for each iteration. Each use-case is called a test configuration.

Before running a test within a test set, you can specify the values for any test parameters defined for the test. If you do not specify values, and valid default values have not been specified, the test run may fail.

This section provides instructions for defining configurations for business process tests that access both static and dynamic data:

➤ "How to Modify Test Configurations" on page 354

➤ "How to Define Configurations that Access Static Data" on page 357

➤ "How to Define Configurations that Access Dynamic Data" on page 359

➤ "How to Define Configurations that Access Alternate Dynamic Data" on page 363

➤ "How to Map and Filter Data Resource Parameter Values" on page 365

How to Modify Test Configurations

When a test parameter is created, ALM creates a configuration for the test that accesses static data. You can modify the configuration to suit your needs.
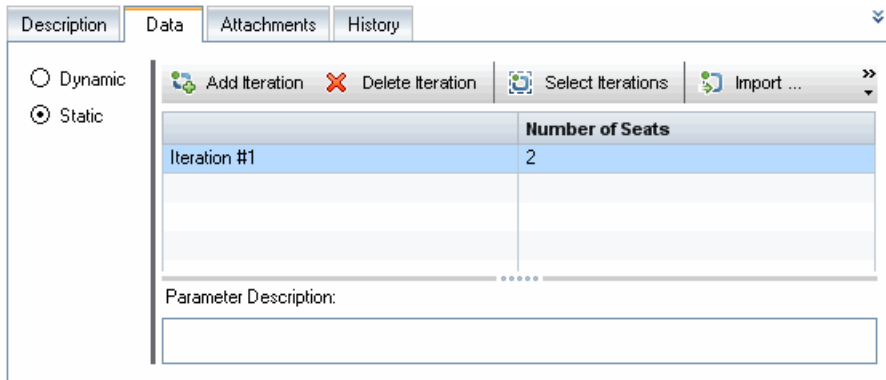
To update test configurations:

1 In the Test Plan module, select the business process test for which you want to modify a test configuration that accesses static data.

2 In the Parameters tab, create test-level parameters that represent the values for the first iteration of the configuration. For task details on creating test-level parameters, see "How to Generate Flow and Test Parameters from the Iterations Dialog Boxes" on page 280.

3 In the Test Configurations tab, a configuration is listed in the configuration grid with the same name as the test. You can rename the configuration by double-clicking the configuration name and typing in a new name.
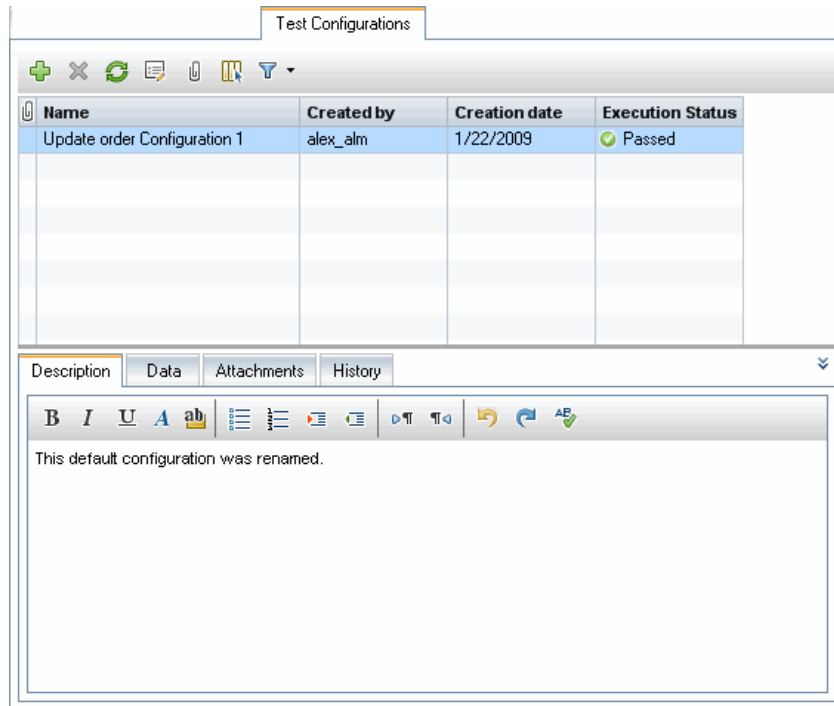

4 Click the **Description** tab near the bottom of the window to enter a description for the configuration.

**5** Click the **Data** tab near the bottom of the window.

6 Select **Static** to view the details of the static data for this test configuration. One iteration exists for this test and the default values for each test parameter for this iteration are displayed.

    a To change the values of a parameter, click in its cell. Type a value directly in the grid, or click the down arrow to open the Set Value page. For task details on setting values, see "The Set Values Page" on page 301.
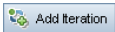
    b To add iterations, click the **Add Iteration** button and update each iteration's parameter values. You can also delete iterations.
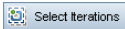
    c To select the iteration ranges (either partial or all) to run in a business process test or flow, click the **Select Iterations** button.

    Alternatively, click **Dynamic** to change the test configuration so that it access an external Microsoft Excel data resource file. For task details, see "How to Define Configurations that Access Dynamic Data" on page 359 and "How to Define Configurations that Access Alternate Dynamic Data" on page 363.

7 Run the test to confirm the test runs according to the expected configurations, iterations, and parameter values.

How to Define Configurations that Access Static Data

Defining static data enables you to specify sets of parameter values for the test directly from within ALM.

You can create configurations that access static data from the Test Plan module, and modify them from the Test Plan and Test Lab modules.
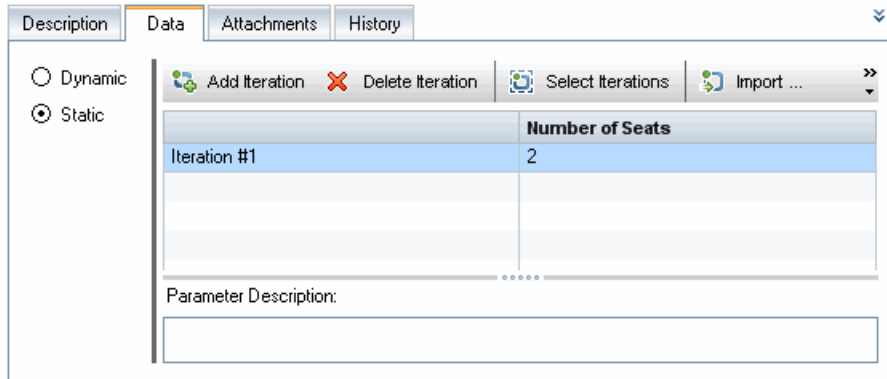
To create a configuration from the Test Plan module:

1 In the Test Plan module, select the business process test for which you want to define a test configuration that accesses static data.

2 Create test-level parameters. For task details on creating test-level parameters, see "How to Generate Flow and Test Parameters from the Iterations Dialog Boxes" on page 280.

3 In the Test Configurations tab, a test configuration is listed in the configuration grid with the same name as the test.

4 Click the **New Configuration** button in the toolbar. The New Test Configuration dialog box opens.

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5 Enter the name and other details for the configuration, and click **OK**. The New Test Configuration dialog box closes.

6 In the Test Plan module, click the **Data** tab near the bottom of the Test Configurations tab.

Description	Data	Attachments	History				⏷

○ Dynamic
⊙ Static

🔧 Add Iteration   ✖ Delete Iteration   ⊡ Select Iterations   📥 Import ...   »

	Number of Seats
Iteration #1	2

Parameter Description:

7 Select **Static** to view the details of the static data for this test configuration. One iteration exists for this test and the default values for each test parameter for this iteration are displayed.

8 To change the values of a parameter, click in its cell. Type a value directly in the grid, or click the down arrow to open the Set Value page. For task details on setting values, see "The Set Values Page" on page 301.

9 To add iterations, click the **Add Iteration** button, and update each iteration's parameter values. You can also delete iterations and select a range of iterations that the test should run. For task details on selecting an iteration range, see "How to Select Iteration Ranges" on page 337.

10 Run the test to confirm the test runs according to the expected configurations, iterations, and parameter values.

To modify an existing configuration from the Test Lab module:

1 Create test-level parameters. For task details on creating test-level parameters, see "How to Generate Flow and Test Parameters from the Iterations Dialog Boxes" on page 280.

2 In the Test Lab module, select the test set that contains the business process test for which you want to define a configuration that accesses static data.

3 Click the **Execution Grid** tab.

4 Right-click the test instance and select **Test Instance Details**. The Test Instance Details dialog box opens.

5 Select the **Execution Settings** sidebar entry.

6 Click the **Test Iterations** tab.

7 Add and delete iterations, defining values for each test parameter in each iteration. You can also:

> ➤ Select a range of iterations that the test should run. For task details, see "How to Select Iteration Ranges" on page 337.

> ➤ Import and export data for each test parameter. For task details, see "How to Import and Save Parameter Values" on page 285.

8 Click **OK** to close the Test Instance Details dialog box.

How to Define Configurations that Access Dynamic Data

Defining dynamic data enables you to specify sets of parameter values for the test from an external Microsoft Excel file.

The same Microsoft Excel file can be used as a data resource for different tests.

Note: To work with dynamic data, make sure that the QuickTest Professional Add-in for Business Process Testing Add-in is installed on the client computer. The QuickTest Professional Add-in for Business Process Testing is installed from the HP Application Lifecycle Management Add-ins page.

To define a configuration that accesses dynamic data:

1 In Microsoft Excel, create a spreadsheet that contains the values for each test parameter.

    a Select the **Sheet1** tab.

    Note: Do not define data in the other sheets. ALM ignores data entered in the other sheets.

---

    b Specify parameter names in the each cell of the first row. The parameter names do not have to match the parameter names defined in the test.

    c Specify values for each parameter under the parameter names, each on a different row. Each row represents an iteration.

    d Save the file.

2 In ALM, create a test resource and upload the Microsoft Excel file to it. For task details on creating test resources and test resource folders, see the *HP Application Lifecycle Management User Guide*.

    a Select the Test Resources module.

    b Either create or select a test resource folder.

    c Click the **New Resource** button to create a new test resource. The New Resource dialog box opens.

    d Enter **Data Table** as the resource type and click **OK**.

    e Click the **Resource Viewer** tab.

    f Click the **Upload File** button.

    g Navigate and select the Microsoft Excel file you created and click **Open**.

    h Click **OK** when prompted that the upload completed successfully. The Resource Viewer lists the default Microsoft Excel sheets. The data is now available in ALM.

You can double-click **Sheet1** to view the data you created in the Resource Viewer tab.


Note: The data in the Microsoft Excel file starts with row number 2. It is assumed that the first row in the Microsoft Excel file contains the names for the data columns, which are mapped to parameter names in ALM.

---

3 In ALM, associate the test resource with the business process test.

   a In the Test Plan module, select the business process test for which you are defining this test configuration.

   b Click the **Parameters** tab.

   c Click the down arrow next to the **Data Resource** field in the toolbar.

   d Navigate to, and select, the data resource and click **OK**. The Microsoft Excel file is now the default external data file for the test.

4 In ALM, map the test parameter names to the resource parameter names in the Microsoft Excel data resource.

   a In the Parameters tab for the test, click the **Map Parameters** button in the toolbar. The Map Parameters dialog box opens, listing each test parameter.
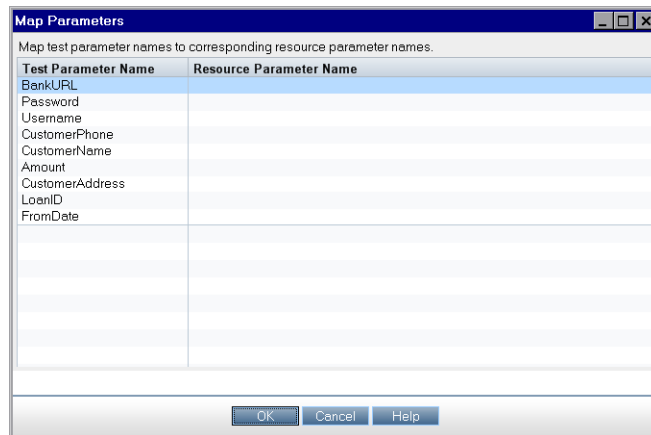
b For each test parameter, click in the cell for its corresponding resource parameter name. Type in the corresponding resource parameter name for each test parameter, and click **OK**.

Tip: The mapping of resource parameter names to test parameter names facilitates reuse of the same resource file by different tests.

---

5 Create the test configuration.

a Click the **New Configuration** button in the toolbar. The New Test Configuration dialog box opens.
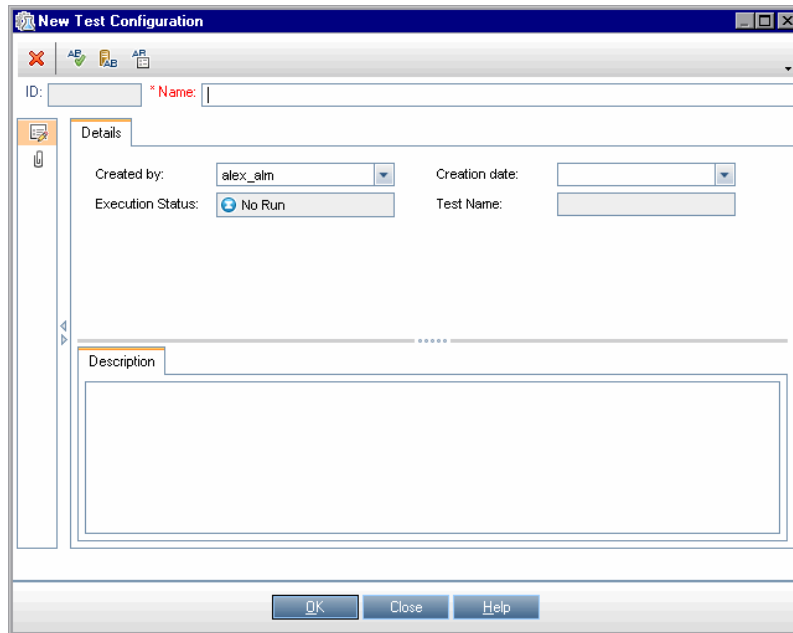
b Enter the name and other details for the configuration, and click **OK**. The New Test Configuration dialog box closes.

c Click the **Data** tab near the bottom of the Test Configurations tab.

d Select **Dynamic**. This instructs ALM to use the Microsoft Excel test resource file defined for the test in the Parameters tab.
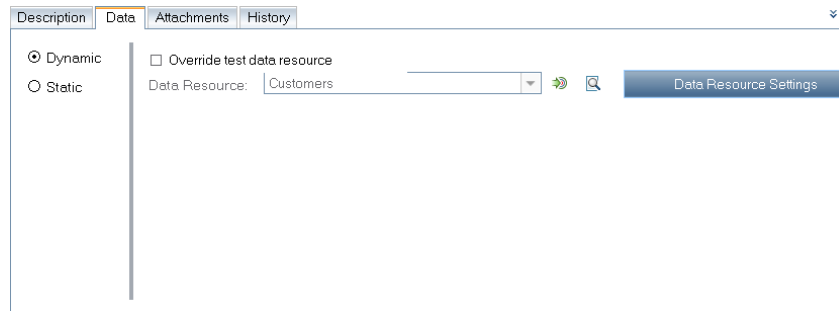
6 To filter the data so that the test runs only on a subset of the parameter values, either by row or by value, click **Data Resource Settings**. The Data Resource Settings dialog box opens. For task details, see "How to Map and Filter Data Resource Parameter Values" on page 365.

7 Run the test to confirm the test runs according to the expected configurations, iterations, and parameter values.

## How to Define Configurations that Access Alternate Dynamic Data

You can create configurations that process alternate dynamic data resource files instead of the dynamic data resource file associated with the business process test.

The same file can be used as a data resource for different tests.

To override the test-level data resource with an alternate, configuration-level data resource:

1 In the Test Plan module, select the business process test for which you are defining this configuration.

2 Click the **Test Configurations** tab.

3 Click the **Data** tab near the bottom of the window.

4 Select **Dynamic**. This instructs ALM to use the Microsoft Excel test resource file defined for the test in the Parameters tab. We will override this data resource in step 5.
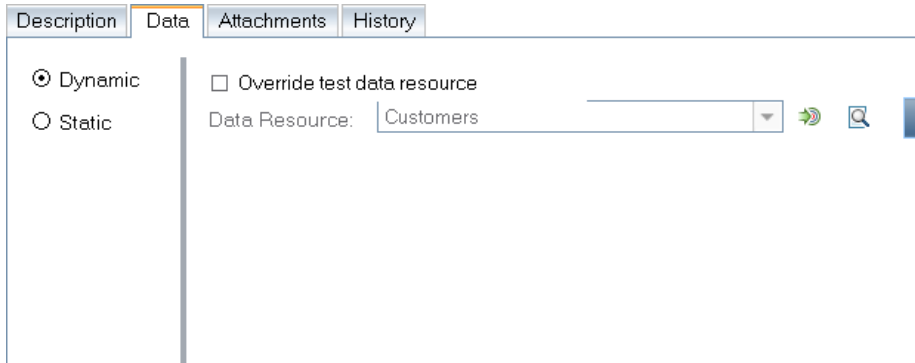
5 Select **Override test data resource**. The Data Resource field is enabled.

6 Navigate to, and select, the alternate data resource. Click **OK**.

7 Click **Data Resource Settings** to map the test parameter names to the resource parameter names in the Data Resource Settings dialog box.
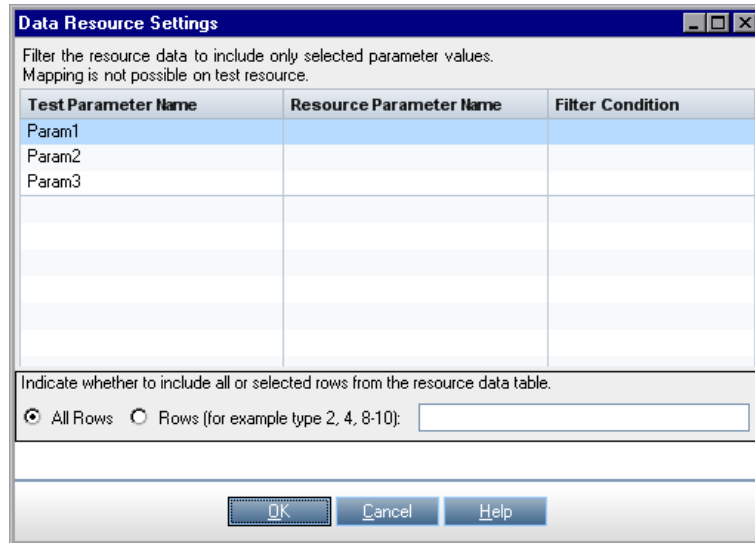
8 For each parameter listed in the Test Parameter Name column, click the cell in the Resource Parameter Name column and type the name of the corresponding resource parameter from the Microsoft Excel file.

9 To filter the data so the test runs only on a subset of the parameter values, either enter a filter condition or row numbers in the Data Resource Settings dialog box. For task details, see "How to Map and Filter Data Resource Parameter Values" on page 365.

10 Click **OK** in the Data Resource Settings dialog box.

11 Run the test to confirm the test runs according to the expected configurations, iterations, and parameter values.

How to Map and Filter Data Resource Parameter Values

When working with configurations that access dynamic data, you can run a test on a subset of the parameter values in the data resource. This is done by instructing ALM to filter out certain parameter values in the Data Resource Settings dialog box.

Note: This dialog box is also used to map test parameter names to alternate data resource parameter names when overriding the default data resource associated with the automated business process test. For each parameter listed in the Test Parameter Name column, click the cell in the Resource Parameter Name column and type the name of the corresponding resource parameter from the Microsoft Excel file.

You can filter the parameter values by specifying filter conditions and specific rows. Only values that match both the filter condition and the specified rows are processed.
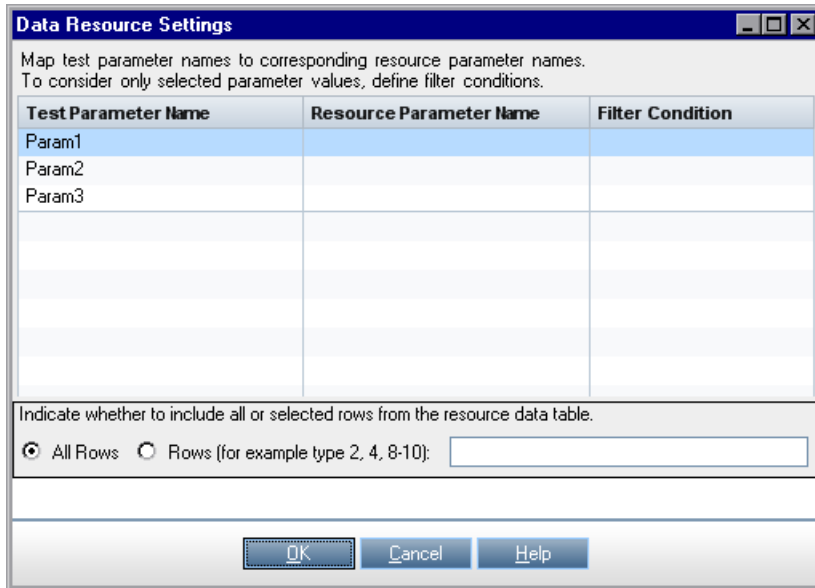
To filter the data:

1 To access the Data Resource Settings dialog box:

   a From the Test Plan module's Test Configurations tab, select the dynamic configuration whose data you want to filter.

   b Click the **Data** tab near the bottom of the window.

   c Click **Data Resource Settings**. The Data Resource Settings dialog box opens.

2 For each parameter by which you want to filter, click its cell in the Filter Condition column and specify a filter according to the following guidelines:

   ➤ Only strings can be specified.

   ➤ Do not specify quotation marks or operators.

   ➤ Only one value can be specified.

3 Specify the rows from the data resource file that should be processed when the test is run:

> ➤ To process all rows that meet the specified filter condition, if one exists, in the data resource file, select **All Rows**.

> ➤ To indicate a subset of rows, select **Rows** and enter the row numbers, separated by commas. A range of rows can be specified with a hyphen (for example, 3-5 means rows 3, 4, and 5 will be processed).

4 Click **OK**.

How to Generate a Configuration from a Modified Instance

In Business Process Testing, you can generate a new test configuration from an existing static test configuration instance whose configuration properties have been modified to no longer match its original static configuration.

For user interface details, see the *HP Application Lifecycle Management User Guide*.

To generate a new configuration:

1 From the Test Lab module's Test Sets tab, right-click the static test configuration instance that was modified in the Execution Grid tab.

				Name	Test: Test Name	Type	Status	Iterations	Pla
				[1]Complete Test Config 1	Complete Test	BUSINESS-...	No Run	Configuration Based	
				[1]Complete Test Config 2	Complete Test	BUSINESS-...	Not Co...	Configuration Based	
				[1]Complete Test Config 3	Complete Test	BUSINESS-...	Passed	Modified	

Tabs: Details | Execution Grid | Execution Flow | Automation | Attachments | Linked Defects | History

Note: If a test instance has not been modified, **Configuration Based** appears in the Iterations column for that instance.

2 Click **Generate Test Configuration**.

Note: The **Generate Test Configuration** option is disabled if:

➤ The test set is pinned to a baseline. You cannot generate test configurations for pinned test sets.

➤ **Version Control:** If the test is checked out by another user, wait until the test is checked in before generating the test configuration.

The Generate Test Configuration dialog box opens.
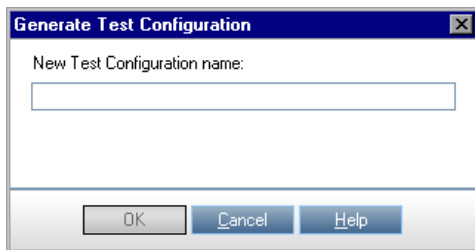
3 Enter a name for the new test configuration and click **OK**.

The test instance name in the Execution Grid is renamed to reflect the name of the new configuration with which this instance is now associated.

In the Test Plan module, a new static test configuration is added for the corresponding text in the Test Configurations tab.

13

Defining Run Conditions

This chapter describes how to define and work with run conditions for your flows.

This chapter includes:

➤ About Defining Run Conditions on page 369

➤ Adding Run Conditions on page 371

➤ Managing Run Conditions on page 374

➤ Running Tests with Run Conditions on page 375

About Defining Run Conditions

You can use run conditions to insert condition statements into your flows. A **run condition** checks the current value of a component parameter before running the component in a flow. Based on the parameter value and the run condition definition, HP Application Lifecycle Management (ALM) then determines whether to run the component, skip to the next component, or end the component run and set the component status to fail.

When you run business process tests containing flows with run conditions, the test run results display the results of run conditions in the test, and lists the components that did not run because a run condition was not met.

The following topics are discussed in this section:

➤ "Guidelines for Working with Run Conditions" on page 370

➤ "Run Condition Example" on page 370

Guidelines for Working with Run Conditions

➤ You can define only one run condition per business component.

➤ To set run conditions for a component, the component must reference at least one flow parameter, input component parameter, or output component parameter.

➤ Parameters with encrypted values cannot be chosen from the list when defining run conditions. We recommend that you do not use parameters whose default values are encrypted when defining run conditions.

➤ In some cases, it may be preferable to define different flows, rather than using a large number of run conditions within a particular flow.

➤ If you set run conditions, and later add or remove a component or change the component order within a flow, the parameters may no longer be relevant and the run condition may not work. For example, if Component B uses an output parameter value from Component A, and you change the order of the components so that Component B precedes Component A, then Component B cannot receive the output parameter value from Component A and the run fails.

Run Condition Example

Suppose you create a test called **Standard Sales Order**, which contains all the transactions necessary to complete the **Standard Sales Order** business process. The first transaction in this business process is **Create Standard Order**. The **Create Standard Order** transaction contains all the steps necessary to begin sales processing.

You would create a flow called **Create Standard Order**. This flow would contain the collection of components that perform the operations necessary to complete the **Create Standard Order** transaction.

In the **Create Standard Order** transaction, depending on the material being ordered, some screens may or may not open.

For example, when ordering item number 10, with material number **p-101**, the **Standard Order: Availability Control** screen is displayed. When ordering item number 10 with material number **p-103**, this extra screen is not displayed.

You can include the **Create Standard Order** flow in your **Standard Sales Order** test and test when either material number **p-101** or **p-103** is entered.

In the component that enters the material number, you promote the parameter containing the item number and the material number, to a test parameter. When running the test, you can then assign that parameter a value of either **p-101** or **p-103**.

You then create a run condition for the **Standard Order: Availability Control** component. The run condition checks the status of the parameter. If the value in the material number cell of the table parameter is **p-101**, the flow runs the component for the **Standard Order: Availability Control** screen. Otherwise, it skips to the next component and continues.

Adding Run Conditions

When you add a run condition to a flow, the condition is displayed in the **Run Condition** column of the Script pane in the Test Script tab.

For some additional considerations when working with run conditions, see "Guidelines for Working with Run Conditions" on page 370.
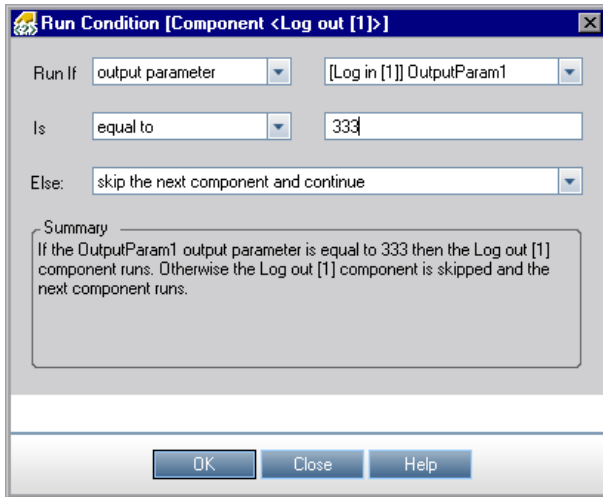
To add a run condition:

1 In the Test Script tab for a flow, select the component for which you want to add the run condition and click the **Add/Edit Run Condition** button.

   The Run Condition dialog box opens.

2 Specify the criteria for the component to run. For more information, see "The Run Condition Dialog Box" on page 372.

3 Click **OK**. The Run Condition dialog box closes and the run condition is added to the flow.

The Run Condition Dialog Box

The Run Condition dialog box defines which attributes must match for the component to run.

The Run Conditions dialog box contains the following sections. Unlabeled elements are listed between angle brackets < >.

Section	Description
Run If	A drop-down list of parameter types defined in that component. The following types are available:
	➤ **Input Parameter.** Available only if one or more input parameters are defined for this component.
	➤ **Output Parameter.** Available only if one or more output parameters are defined for one or more of the previous components in the flow.
	➤ **Flow Parameter.** Available only if one or more flow input parameters are defined.
<parameter name>	A drop-down list of available parameter names.
	Encrypted parameters are not listed.

Section	Description
Is	A drop-down list of conditions that need to be met for the component to run. The following conditions are available: ➤ **equal to** ➤ **not equal to** ➤ **less than** (not available for table parameters) ➤ **less than or equal** (not available for table parameters) ➤ **greater than** (not available for table parameters) ➤ **greater than or equal** (not available for table parameters)
<value>	An edit box in which you enter the valid value for the condition.
Else	Specifies what to do if the condition is not met. The following options are available: ➤ **skip to next component and continue.** If the condition is not met, the component for which the run condition is set does not run, and the test run continues with the next component in the flow. ➤ **End component run and fail.** If the condition is not met, the component for which the run condition is set does not run, but instead sets the status of the component run as **Failed**. The flow either continues to the next component or ends, depending on the failure condition set for the component. For more information on defining failure conditions for components, see "Defining Failure Conditions" on page 221.
Summary	A text description of the run condition you have defined for the component.

Prior to a component run, the condition and value are checked. If the condition and value are met, the component run continues. If the condition and value are not met, then the component does not run, and the run session proceeds according to your selection in the **Else** box.

Tip: Your selection in the **Else** box applies only if the run condition is not met. To specify whether to continue or end the entire run if a component run fails, set the failure condition for the component. You do this in the Test Script tab of the Test Plan module. For more information, see "Defining Failure Conditions" on page 221.

Managing Run Conditions

After you create a run condition, you can modify its settings. You can also remove a run condition from a flow.

To modify a run condition:

1 In the Test Script tab for a flow, right-click the component and select **Add/ Edit Run Condition**. Alternatively, click the relevant link in the Run Condition column. The Run Condition dialog box opens.

2 In the Run Condition dialog box, modify the attributes and alternative behavior as needed. For more information on the available options, see "The Run Condition Dialog Box" on page 372.

3 Click **OK**. The run condition is modified.

To remove a run condition:

1 In the Script pane of the Test Script tab select the component and click the **Delete Run Condition** button.

2 Click **Yes** in the confirmation box. The run condition is removed from the flow.

To troubleshoot run conditions:

If the run condition is not valid, the run condition link is displayed in red. This can happen, for example, if a reference parameter was deleted, a parameter value was encrypted, and so on.

Delete the run condition and define a new one.

Running Tests with Run Conditions

You run a business process test containing flows with run conditions as you would a regular business process test. For more information on running business process tests, see Chapter 14, "Running Business Process Tests and Flows."

As with regular business process tests, you can view test results in the Last Run Report tab in the Test Lab module.

➤ If you select **skip to next component and continue** for a run condition, and the run condition you specify is not met, the test results list the run status for the component with the run condition as **Ignored**. The component is not displayed in the run results.

➤ If you select **end component run and fail** for a run condition, and the run condition you specify is not met, the test results list the run status for the component with the run condition as **Failed**.

If a run condition is not met, the test results also provide details about the condition that was not met to help you understand why the component run failed or did not run.

14

Running Business Process Tests and Flows

This chapter describes how to run business process tests and flows in
HP Application Lifecycle Management (ALM) and how to view the results.

This chapter includes:

About Running Business Process Tests and Flows

Business process tests and flows can contain manual and automated
components. You run business process tests and flows, and view run results
in the Test Plan module and Test Lab module of ALM.

The following topics are discussed in this section:

About Running Tests Manually

When working with tests that contain one or more manual components, use the Manual Runner or HP Sprinter.

For information, see "Running a Business Process Test or Flow Manually" on page 380.

About Running Tests Automatically

When working with automated tests, you can first check whether the individual automated business components run together successfully in the test by debugging it in the Test Plan module. Debugging enables you to check, for example, whether the component and flow order in the test is logical, or that components start where previous components in the test end. For information, see "Debugging Tests in the Test Plan Module" on page 400.

When a debug run is complete, the Test Plan module displays a summarized report that shows which of the business components passed or failed the test. These results are provided for debugging purposes only and are not stored in ALM.

After a test has been debugged and is ready for testing new builds of an application, you use the Test Lab module. Tests can be run individually, or they can be run as part of a test set containing multiple tests of all types. For more information, see "Running Automated Business Process Tests or Flows" on page 406.

Automated components can be used in the same test. When you run the test, the testing tool opens each component in the test. For more information, see "Working with Other Testing Products" on page 379.

Note: You can continue using the Manual Runner to run your business process test or flow manually even after automation. However, if even one of the components in a business process test is manual, you cannot run the test automatically.

About Viewing Run Results

When a test run is complete, the Test Lab module displays a detailed report that shows the pass or fail results of checkpoints and other tested points in the business components included in the test.

In addition, you can view a comprehensive report that displays many details about each of the steps performed during the test.

Working with Other Testing Products

Before you run an automated test containing keyword-driven components on a host computer, you must ensure that the relevant testing tool on the host allows ALM to run tests.

QuickTest Professional

To enable ALM access to a specific QuickTest Professional client, open QuickTest on the host computer, select **Tools > Options**, click the **Run** node, and ensure that **Allow other HP products to run tests and components** is selected in the Run pane.

To run a QuickTest component from ALM, you must have the necessary ALM permissions. For more information, see the *HP Application Lifecycle Management Administrator Guide*.

Note: When you run a QuickTest business process test from ALM, the test run may be influenced by QuickTest Remote Agent settings on the QuickTest computer. For more information on the QuickTest Remote Agent, see the *HP QuickTest Professional User Guide*.

Running a Business Process Test or Flow Manually

If you are working with one or more manual components in your business process test or flow, you can use:

➤ The HP Sprinter tool for enhanced functionality, including: the ability to create and annotate screen captures, automatically enter data into fields in your application, and automatically include the list of your steps or user actions in any defect you submit.

▷ Run ⏷   To run tests using Sprinter, In the Test Lab module, click the **Run** button in the Execution Grid tab toolbar and select **Run... (Sprinter)**.

For more information, refer to the *HP Sprinter User Guide*, available from the HP Application Lifecycle Management Adds-ins Page.

➤ The Manual Runner in the Test Lab module to run the test or flow manually. A manual run can include a combination of manual, keyword-driven components. You can also use the Manual Runner, for example, if you want to run an automated test manually, or when the automation of components has not yet been completed. This section describes how to work with this Manual Runner.

Note: You can use both the Manual Runner and HP Sprinter to run automated components manually.

Working with the Manual Runner for business process tests or flows is described in the following sections:

➤ "Understanding Manual Runs" on page 381

➤ "Running a Test or Flow Manually" on page 381

➤ "Understanding Run Statuses" on page 387

Note: The Manual Runner for business process tests and flows has additional features that the Manual Runner used for ALM manual tests does not have. For information on running ALM manual tests, see the *HP Application Lifecycle Management User Guide*.

Understanding Manual Runs

ALM enables you to run both manual and automated tests and flows manually, allowing you to follow the test steps and perform operations on the application you are testing. You use data from the Component Steps tab (manual steps from manual components, or step documentation from keyword-driven components).

Using the Manual Runner, you mark each step as passed or failed, depending on whether the actual application results match the expected results. You can also mark an entire component as passed or failed.

Note: Component steps created in versions prior to Quality Center version 9.0 are not displayed in the Manual Runner.

Running a Test or Flow Manually

When you run a business process test or flow manually, you follow the test steps and perform operations on the application you are testing. You can run a test or flow as many times as you want and register the results. Results are stored separately for each run.

To run a business process test or flow manually:

1 In the Test Lab module, select the relevant test set in the test set tree. The tests that comprise the test set are displayed in the Execution Grid tab.
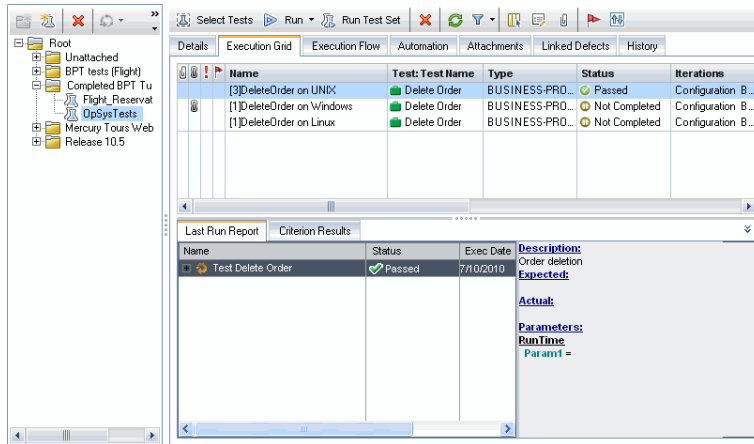
2 To iterate any test in the test set, select the test and right-click. Select **Test Instance Details** from the context menu. The Test Instance Details dialog box opens. If you do not want to iterate any test in the test set, proceed to step 7.

3 In the Test Instance Details dialog box, click **Execution Settings**.

4 In the Test Iterations tab, configure the number of iterations required for the selected test, and then define the values for each parameter in each iteration. These parameter values are displayed for any components that reference them during the manual running of the test.

Parameter values can either be defined:

➤ Manually, in the Test Iterations tab in the Test Lab module.

➤ For each test configuration in the Test Configurations tab in the Test Plan module.

For details on how to set values, see "How to Define Iterations to Run with Different Values" on page 334.

**5** Repeat steps 2 through 4 for each test in the test set that you want to iterate.

6 Click **OK** to close the Test Instance Details dialog box.

7 Click the **Run** button in the Execution Grid tab toolbar and select **Run Manually**. The Manual Runner window opens.
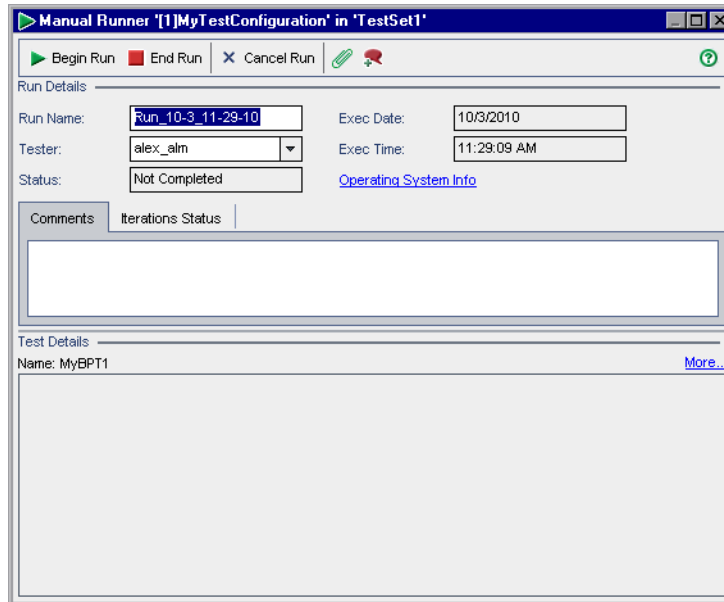
Note: For more information on this window, see "Understanding the Manual Runner Window" on page 388.

8 Click the **Begin Run** button to start the run.

The Manual Runner dialog box opens.
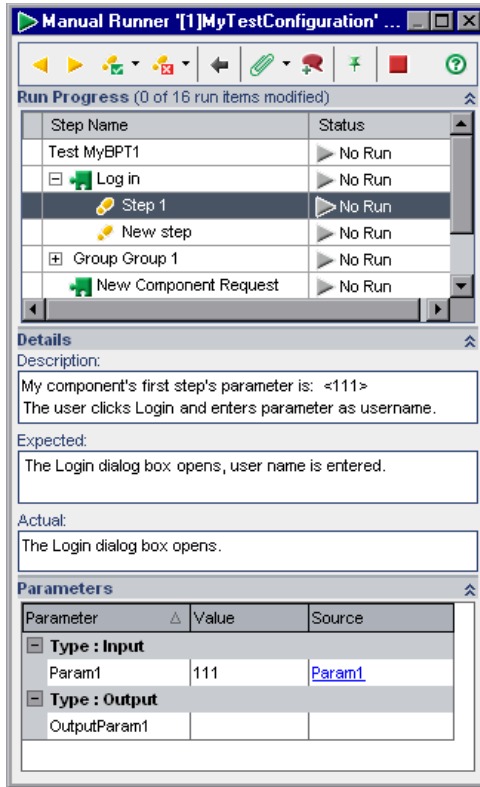
🔀   **Tip:** You can keep the Manual Runner dialog box visible while you work with an application by clicking the **Keep on Top** button. Click the button again if you do not want to keep the Manual Runner dialog box visible while you work. For more information on this dialog box, see "Understanding the Manual Runner Dialog Box" on page 391.

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9 If required, expand the first component in the test to view its steps. Select the first step in the component to see a detailed description of the step, its parameters and values, and its expected result. For more information, see "Understanding the Manual Runner Dialog Box" on page 391.

10 Open the application you are testing and perform the first step. If the selected step requires input parameters, use the values displayed in the **Value** cells under the **Type: Input** section in the Parameters pane. For more information, see "Working with the Parameters Pane" on page 395.

11 Indicate the result of the step:

➤ If the actual result is the same as the expected result when you perform the step, click the **Pass Selected** toolbar button, or select **Passed** from the list in the **Status** column. A green check mark is added to the step and the step status changes to Passed.

To pass the current step and all its sub-steps at once, click the **Pass Selected** arrow ▾ and select **Pass (Including Sub-Steps)**.

➤ If the actual result is different from the expected result when you perform the step, type the actual result in the **Actual** box. Click the **Fail Selected** toolbar button, or select **Failed** from the list in the **Status** column. A red **X** is added to the step and the step status changes to **Failed**.

To fail the current step and all its sub-steps at once, click the **Fail Selected** arrow ▾ and select **Fail (Including Sub-Steps)**. For example, if a dialog box does not open as expected during the test, you can perform none of the subsequent steps that are performed on that dialog box. In this case, select the specific component iteration node, click the **Fail Selected** arrow ▾, and select **Fail (Including Sub-Steps)**.

➤ If you are unable to complete the step, type the reason in the **Actual** box and select **Not Completed** from the list in the **Status** column.

Note: For a description of how test, component, and step statuses interact, see "Understanding Run Statuses" on page 387.

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12 If the step description indicates that you must manually return a value to an output parameter, enter the resulting value in the **Value** cell of the parameter **Type: Output** list. (Output values are populated automatically during automated runs, but not during manual runs.) This value may be used as the input value of one or more subsequent steps or components in the test, but you can possibly change the value during the component run.

13 If you detect an application flaw while running the test, click the **Add Defect** toolbar button. The Add Defect dialog box opens, enabling you to add the defect. ALM automatically creates an association between the run and the new defect. For more information on adding defects, see the *HP Application Lifecycle Management User Guide*.

14 If you want to attach an image or other file with more information about what happened when you performed the step, click the **Attach to Step** toolbar button. The Attachments dialog box opens, enabling you to add attachments. An icon to the left of the step indicates an attachment. Click the toolbar button to view any attachments. To add attachments to the entire run, click **Attach to Step** and select **Attach to Run**. For more information on adding attachments, see the *HP Application Lifecycle Management User Guide*.

15 Repeat steps 9 to 14 for each step in the component.

16 Click the **End Run** button when you complete the run.

17 Click the **Last Run Report** tab at the bottom of the Execution Grid tab and review the results of your test. For more information, see "Viewing Test Results in the Test Lab Module" on page 411.

Understanding Run Statuses

In certain instances, the test, component, and step statuses in the **Status** column of the Manual Runner dialog box change automatically, according to the status of their respective parent and child nodes in the test hierarchy.

In general, if a run item fails, all of that item's parent items fail. Similarly, if all the items of a particular type pass, their immediate parent also passes.

For example:

➤ If one or more steps receive a **Failed** or **Not Completed** status, all of its parent nodes (component iteration, component, flow, and test) also receive a **Failed** or **Not Completed** status.

➤ If all the steps pass in a component iteration, then their immediate parent (the component iteration) receives a **Passed** status.

➤ If all the iterations for a component receive a **Passed** status, the component receives a **Passed** status.

➤ If all the components within a test receive a **Passed** status, the test receives a **Passed** status.

Understanding the Manual Runner Window

The Manual Runner window enables you to view and edit run and test details. It also lets you begin a new manual run, which opens the Manual Runner dialog box.
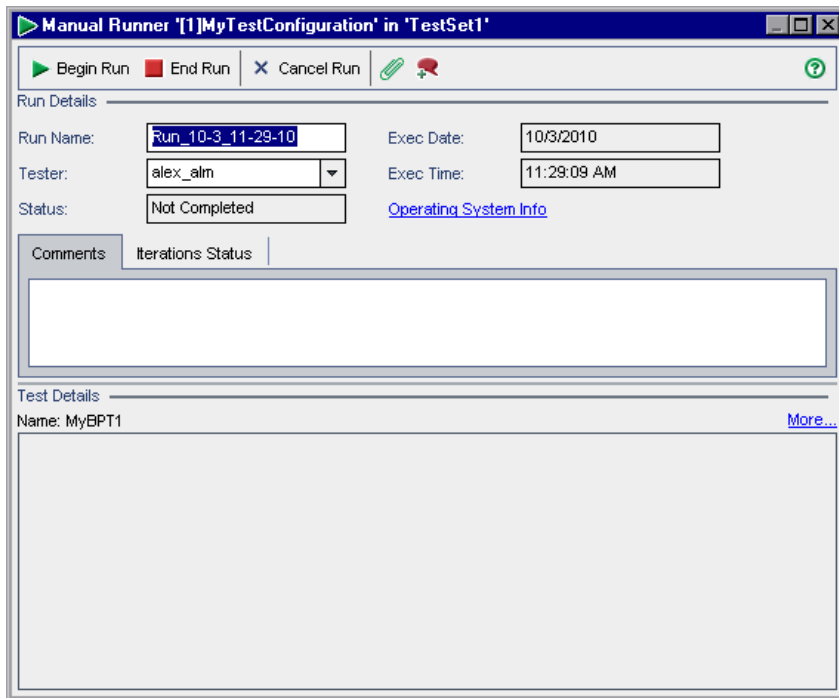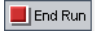

The name of the test you are running and the test set are shown in the title bar of the Manual Runner.

Toolbar

The Manual Runner window contains the following toolbar buttons:

Begin Run. Opens the Manual Runner dialog box.

End Run. Ends the current run.

Cancel Run. Cancels the current run.

Attach to Run. Enables you to add attachments to the test run, such as a file, URL, snapshot of your application, an image from the Clipboard, or system information. For more information on how to add attachments, see the *HP Application Lifecycle Management User Guide*.

Add Defect. Enables you to add a defect in the Defects module regarding this run. ALM automatically creates an association between the run and the new defect. For more information on how to add defects, see the *HP Application Lifecycle Management User Guide*.

Help. Opens the Online Help for the Manual Runner window.

For more information, see:

➤ "Working with the Run Details Pane" on page 389

➤ "Working with the Test Details Pane" on page 390

Tip: You can navigate the Manual Runner, and perform many commands, using shortcut keys. For a list of shortcut keys, see "Manual Runner Shortcuts for Business Process Testing" on page 417.

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Working with the Run Details Pane

The Run Details pane enables you to edit the following run information:

➤ **Run Name.** The name of the run.

➤ **Tester.** The user name of the person who initiated the run.

You can view the following run information:

➤ **Status.** The run status of the test, for example, Failed, or Not Complete.

➤ **Exec Date.** The date that the run was initiated.

➤ **Exec Time.** The time that the run was initiated.

You can also click the **Operating System Info** link in the Run Details pane to display or edit details about the operating system, operating system service pack and operating system build.
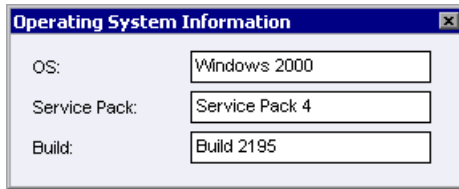
For more information on operating system information, see the *HP Application Lifecycle Management User Guide*.

Working with the Test Details Pane

The Test Details pane provides the description of the test or flow defined in the Test Plan module.

You can click the **More** link in the Test Details pane to open the Test
Properties dialog box and display test details and attachments.

➤ The Details tab displays a description of the test and contains the same
information as the Details tab in the Test Plan module. See "Details Tab"
on page 191.

➤ The Attachments tab displays the attachments that are added to the test
and contains the same information as the Attachments tab in the Test
Plan module. See the *HP Application Lifecycle Management User Guide*.

Understanding the Manual Runner Dialog Box

The Manual Runner dialog box enables you to manually progress through
each step of your business process test or flow and indicate a **Pass**, **Fail**, or
Not Completed result for each step.

The Manual Runner dialog box displays the run status, parameters,
description, and actual result of each step.

Tip: The various panes can be hidden or displayed. If a required pane is not visible, click **Show** ⯆ to the right of the pane name. Click **Hide** ⯅ to hide the pane.
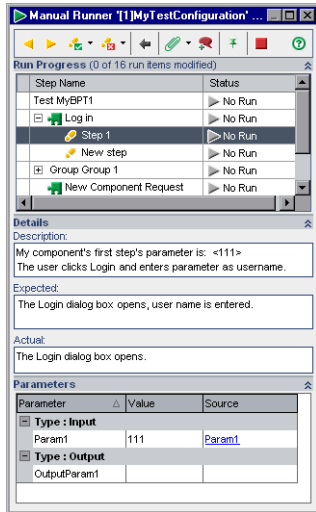
The name of the test you are running and the test set are shown in the title bar of the Manual Runner dialog box.

Toolbar

The Manual Runner dialog box contains the following toolbar buttons:

Previous Step. Jumps to the previous step.

Next Step. Jumps to the next step.

Pass Selected. Enables you to indicate that the actual result of the selected step, (test, or component iteration) is the same as the expected result. A green check mark is added to the step and the step status changes to Passed. (To pass the current step and all its sub-steps at once, click the **Pass Selected** arrow ⯆ and select **Pass All**.)

Fail Selected. Enables you to indicate that the actual result of the selected step or steps is different from the expected result, and to enter the actual result in the **Actual** box. A red X is added to the step and the step status changes to Failed. (To fail the current step and all its sub-steps at once, click the **Fail Selected** arrow [▾] and select **Fail All**.)

Return to previously clicked link. Enables you to jump back to the step containing the input parameter link you clicked previously.

Attach to Step. Enables you to add attachments to the step. To add attachments to the entire run, click the arrow and select **Attach to Run**. For more information on how to add attachments, see the *HP Application Lifecycle Management User Guide*.

Add Defect. Enables you to add a defect for the step in the Defects module. For more information on how to add defects, see the *HP Application Lifecycle Management User Guide*.

Keep On Top/Not On Top. Enables you to keep/not keep the Manual Runner dialog box visible while you work with the application you are testing.

End Run. Ends the current run.

Help. Opens the Online Help for the Manual Runner dialog box.

For more information, see:

➤ "Working with the Run Progress Pane" on page 393

➤ "Working with the Details Pane" on page 394

➤ "Working with the Parameters Pane" on page 395

➤ "Understanding the Run Progress Pane Hierarchy" on page 397

Working with the Run Progress Pane

The Run Progress pane in the Manual Runner dialog box displays a hierarchical tree of each test or flow iteration, business component, and component iteration contained in the business process test or flow.

Select a tree item to display its description, parameters and values, and expected result in the other panes. You can expand or collapse the nodes in the tree to display or hide the contents.

For more information on the tree hierarchy in the Run Progress pane, see "Understanding the Run Progress Pane Hierarchy" on page 397.

You can select the **Status** cell of each run item in the tree to modify its current status in the test, for example, Passed or Not Completed. For more information on statuses, see "Understanding Run Statuses" on page 387.

The number of run items modified during the current manual run, and the total number of run items in the test, is shown next to the Run Progress pane title.

Working with the Details Pane

The **Description** box in the Details pane of the Manual Runner dialog box provides the textual description of the selected test, flow, component, or step. This is the text originally entered in the Business Components or Test Plan modules.

In the **Expected** box, you can view the expected result of running the selected component. This is the text originally entered in the Component Steps tab of the component in the Business Components module.

Input and output parameters within the text in the Description and Expected boxes are indicated by sets of angle brackets:

➤ **Input parameters.** Input parameters are enclosed in one set of angle brackets. If a value has been assigned to the parameter, the value is enclosed in the angle brackets, for example, <mercury>, for the AgentName parameter. If no value has been assigned to the parameter, an empty set of angle brackets is shown, for example, <>.

➤ **Output parameters.** Output parameter names are enclosed in three sets of angle brackets, for example, <<<**Order_Number**>>>.

In the **Actual** box you can enter the actual result of running the step during the test or flow.

Working with the Parameters Pane

The Parameters pane in the Manual Runner dialog box displays the input parameter values for you to use when manually running the component selected in the run tree. The Parameters pane also enables you to enter values output by the application that you can use later in the test or flow run.

Input Parameter Values

You can view the input parameter values defined for the component selected in the tree in the **Value** cells of the **Type: Input** section. These input parameter values are provided by:

➤ **Parameters.** You can define parameters for use during a run for each iteration using the Test Iterations tab in the Test Instance Details dialog box before running the test.

Alternatively, you can set up values for each test configuration. For more information, see "How to Define Iterations to Run with Different Values" on page 334.

Parameter names are shown as links in the **Source** cells in the **Type: Input** section. You can click the link to jump to the component or iteration that provides the parameter value. You can click the **Return to previously clicked link** button to jump back to the step containing the link.

➤ **Output parameters.** You can enter a value provided by a step in the application you are testing in the **Value** cell of the parameter **Type: Output** list. You can then use this value as an input value in a subsequent step.

Input parameters derived from the output parameter of a previous step are shown as links in the **Source** cells in the **Type: Input** section.

The name of the link indicates the name of the source component and the name of the relevant output parameter, for example, [Component1] Order_Number.

To retrieve the output parameter value, you can click the link to jump to the step that provides the value.

You can click the **Return to previously clicked link** button to jump back to the step containing the link.

➤ **Default values.** Default values can be defined for input parameters in the component Parameters tab in the Business Components module. Default values are used if no other value is provided from a parameter or output parameter during the test. For more information, see "Defining Parameters and Setting Default Values" on page 273.

Input parameter values that are defined as the default values in the Parameters tab of the component in the Business Components module do not have any associated link.

Output Parameter Values

Output parameters allow you to retrieve values from a step in one business component (the source component) and insert them as input parameters in a subsequent component (the target component) in the business process test or flow.

Note: The output parameter must already have been created in the component Parameters tab in the Business Components module. In addition, the output parameter must have been linked to the input parameter in the Component Iterations dialog box. For more information, see "Defining Parameters and Setting Default Values" on page 273.

You manually type in the relevant value provided by the application you are testing in the **Value** cell of the parameter **Type: Output** list when you run the step. A link to the source component is displayed when the target component is run. You can click the link to retrieve the required value. This value may be used as the input value of one or more subsequent steps or components in the test.

Understanding the Run Progress Pane Hierarchy

The Run Progress pane displays a tree hierarchy of all the components and steps in your business process test or flow in the order that the steps should be performed on the application. Component groups, and iterations of groups and components, are also displayed in the tree in the defined order. This enables you to manually perform each of the individual component steps in the correct testing sequence.

For example, consider a business process test named Reservation_Test, that contains four business components; Component1 (C1), Component2 (C2), Component3 (C3), and Component4 (C4). The test requires that components C2 and C3 be grouped and that the components and group are then run and iterated as follows:
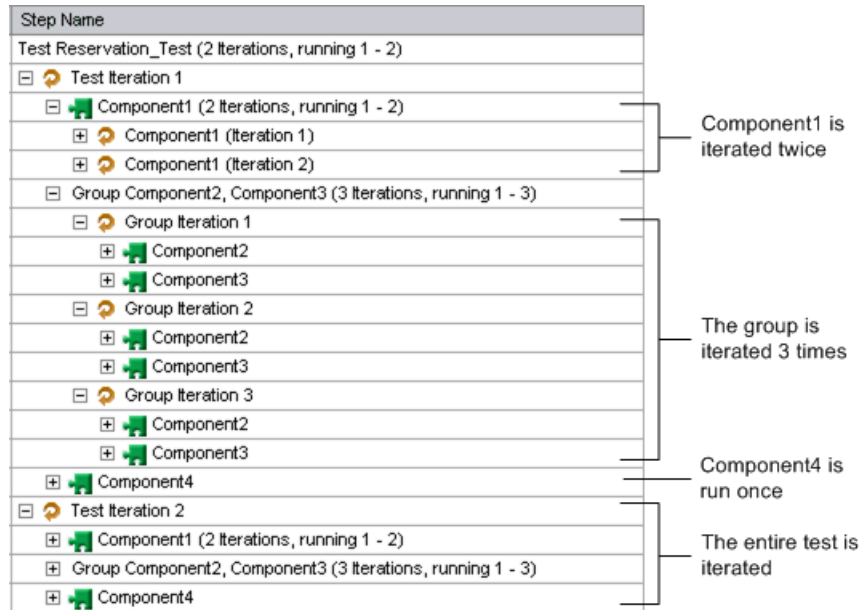
➤ the first iteration of C1, then the second iteration of C1, followed by

➤ the first iteration of the group comprising C2 and C3, followed by

➤ the second iteration of the group, followed by

➤ the third iteration of the group, followed by the component C4.

This is illustrated as follows:
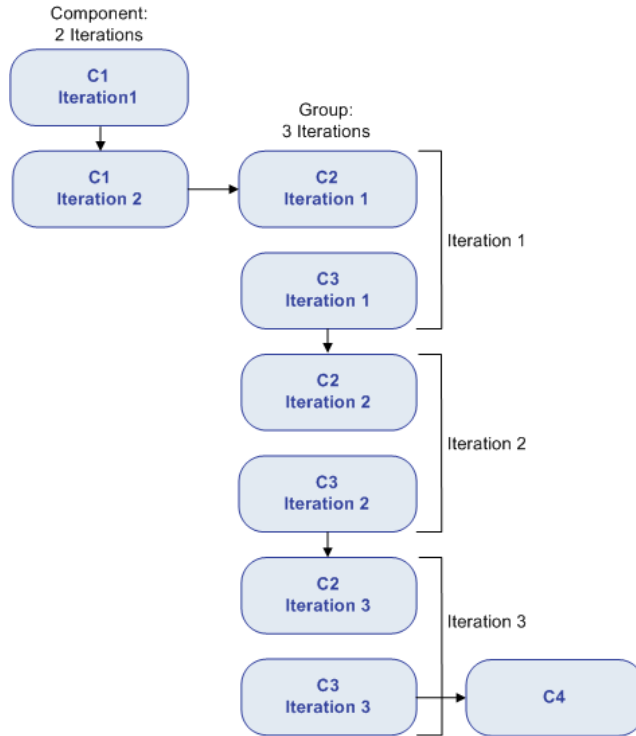
In addition, the entire test is iterated twice.

The test is displayed in the Manual Runner as follows:

Step Name	
Test Reservation_Test (2 Iterations, running 1 - 2)	
☐ ↻ Test Iteration 1	
☐ 🧩 Component1 (2 Iterations, running 1 - 2)	Component1 is iterated twice
⊞ ↻ Component1 (Iteration 1)	
⊞ ↻ Component1 (Iteration 2)	
☐ Group Component2, Component3 (3 Iterations, running 1 - 3)	
☐ ↻ Group Iteration 1	
⊞ 🧩 Component2	
⊞ 🧩 Component3	
☐ ↻ Group Iteration 2	The group is iterated 3 times
⊞ 🧩 Component2	
⊞ 🧩 Component3	
☐ ↻ Group Iteration 3	
⊞ 🧩 Component2	
⊞ 🧩 Component3	
⊞ 🧩 Component4	Component4 is run once
☐ ↻ Test Iteration 2	
⊞ 🧩 Component1 (2 Iterations, running 1 - 2)	The entire test is iterated
⊞ Group Component2, Component3 (3 Iterations, running 1 - 3)	
⊞ 🧩 Component4	

Note: For clarity, the components in the tree have not been expanded to display their individual steps.

Debugging Tests in the Test Plan Module

You can debug a business process test or flow comprised of one or more automated business components by running the components in Debug mode in the Test Plan module. Debugging is usually performed after the automation engineer has ensured that the individual components can run successfully in QuickTest Professional or other testing tools, and all the components have a **Ready** status.

Tip: You can also access QuickTest to run and debug individual business components.

For more information on running and debugging components in QuickTest, see the *HP QuickTest Professional for Business Process Testing User Guide*.

Debugging ensures that the test runs properly, and locates any possible errors that may have occurred during the building of the test. For example, you can check the logical order of business components in the test, the pre-conditions and post-conditions required by each component, and the suitability of component parameter values, especially where output values are used as input values in other components.

You use the Run or Debug Test dialog box to choose whether to run each of the business components in the test in **Debug** mode or in **Normal** mode.

➤ When you run an automated component in Debug mode, the component opens and immediately pauses, enabling you (or an automation engineer) to use the debug tools available in QuickTest to debug the component. When one component ends, the next one immediately opens.

➤ When you run in Normal mode, the testing tool runs all the steps in the component consecutively, and then opens the next component. You cannot access debug options while a component runs in Normal mode.

Note: When you run a business process test or flow in Debug mode in the Test Plan module, no results or other test data is saved to the ALM database.

Working with the Run or Debug Test Dialog Box

When you choose to run a business process test or flow from the Test Plan module, the Run or Debug Test dialog box opens.
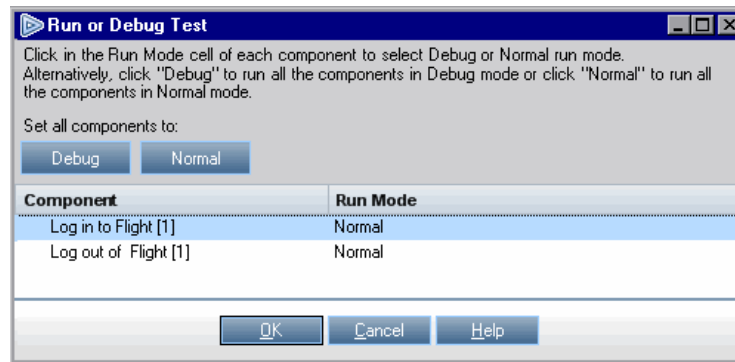
The dialog box displays the business components that make up the selected business process test or flow, and enables you to choose whether to run each component in the test in **Debug** mode or in **Normal** mode.

➤ **Debug** mode adds a breakpoint that causes the test to pause before running the first step in the specified business component. The position of the breakpoint in the test is indicated by a red spot icon in the left margin of the Keyword View or Expert View in QuickTest. This enables you to use all the debug options of QuickTest to check the performance of one or more specific steps in the component. You can then continue the run.

For more information on QuickTest debugging options, see the *HP QuickTest Professional for Business Process Testing User Guide*.

➤ **Normal** mode runs the selected business component from start to finish without pausing.

Clicking the relevant cell in the **Run Mode** column enables you to select the required run mode from a list. You can also click the appropriate button to set all the components to **Debug** mode or to **Normal** mode simultaneously.

When you initiate a test to debug a business component or a complete test, ALM opens QuickTest directly from the Test Plan module. The requested test is then run on your local computer, and the results are exported back to ALM for your viewing.


Note: Tests can contain both automated and manual components. Initiating a test to debug a manual component or test containing one or more manual components will display a warning message. To run tests that contain manual components, use the Manual Runner. For information on the Manual Runner, see "Running a Business Process Test or Flow Manually" on page 380.

To run a test or flow using Debug mode:

1 In the ALM sidebar, click **Test Plan** to open the Test Plan module.

2 Select the relevant test in the Test Plan tree, and click the **Test Script** tab.

3 Ensure that all the necessary applications for the test are set up to meet the pre-conditions required by the first business component. For example, close unnecessary instances of applications, or open the application at the required window.

4 Ensure that default values are set for the parameters, as described in Chapter 9, "Working with Parameters."

5 In the Script pane of the Test Script tab, click the **Run or Debug Test** button in the toolbar.

The Run or Debug Test dialog box opens, which lists all the business components that make up the selected test.
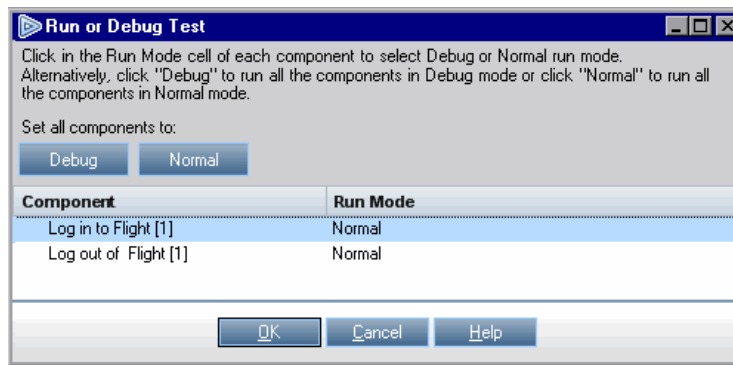
6 For each component, click in the **Run Mode** column and select **Debug** or **Normal** from the list.

Tip: Click the **Debug** button to set all the components to run in Debug mode or click the **Normal** button to set all the components to run in Normal mode.

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7 Click **OK** to close the Run or Debug Test dialog box. QuickTest opens on your computer and runs the first business component in the test.

Note: You should close all browsers before running a test on a Web browser. QuickTest must load the Web Add-in (as defined in the application area in QuickTest) before a step in the test opens the browser.

If the test contains QuickTest components, the test should include a QuickTest component at the beginning of the test before the browser opens.

From your task bar, you can toggle between the Test Plan module, QuickTest, and the application you are testing.

➤ With the first keyword-driven or scripted component in the test, ALM opens QuickTest and loads the add-ins from the application area that is associated with that component. It assumes that these are the required add-ins for all the components in the test.

➤ In the Test Plan module, the status of the test and the name of the component currently being run are shown below the toolbar in the Test Script tab, for example, Running(OrderStart). You can click the **Stop Run** button to stop the run at any time.

➤ In QuickTest, the status of the test being run, for example **Running**, or **Ready**, is shown in the status bar at the bottom of the window.

➤ In QuickTest, all the debugging functions from the **Debug** menu, for example, **Step Over** or **Step Into**, are enabled for use. For more information on applicable debug options, see the *HP QuickTest Professional for Business Process Testing User Guide*.

8 If you selected a business component to run in **Debug** mode, the test pauses after opening the component in QuickTest. Use the QuickTest debug options to control the continuation of the run through the displayed component. When you are ready to proceed with the run, continue the run in QuickTest.

When one component finishes running, it closes and the next component in the test opens in QuickTest.

When the debug run is complete, ALM imports the results from QuickTest and displays summary information in the Debug Run Information dialog box in the Test Plan module.
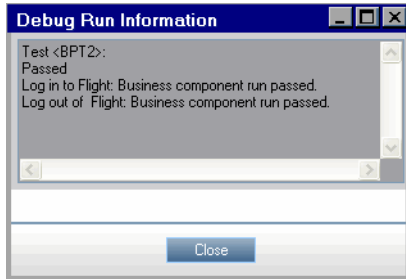
This report details the results of the debug run for each business component in the test and includes all relevant QuickTest messages.

9 Click **Close** to complete the run.

Running Automated Business Process Tests or Flows

When a business process test or flow has been debugged and parameters have been configured, you can run the test or flow, or a test set containing several tests and flows, from the Test Lab module.

**To run a business process test or flow in the Test Lab module:**

1 In the Test Lab module, select the relevant test set in the test set tree. The tests and flows in the test set are displayed in the Execution Grid tab.
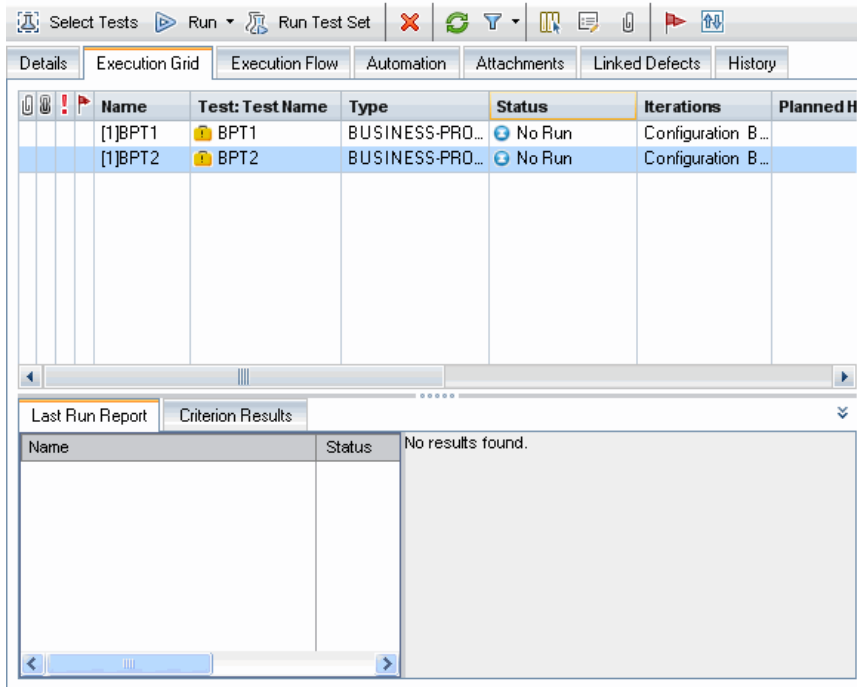
2 Perform one of the following:

➤ Select the specific test in the Execution Grid tab and click the **Run** button in the tab toolbar.

Or

➤ Click the **Run Test Set** button in the Execution Grid tab toolbar.

Note: Clicking the **Run** button enables you to run a test manually using either the standard manual runner or HP Sprinter. For more information on using the standard manual runner, see "Running a Business Process Test or Flow Manually" on page 380.

The Automatic Runner dialog box opens.
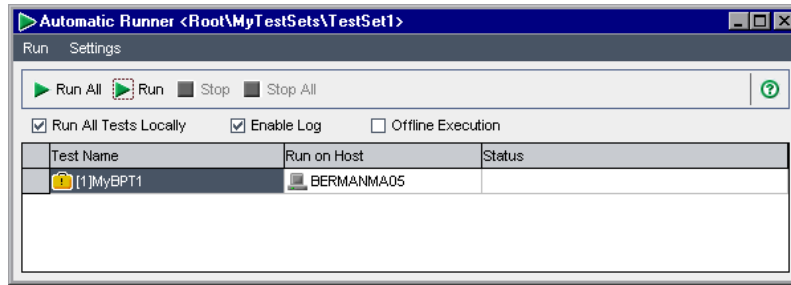
The Automatic Runner dialog box lists the specific tests selected in the Execution Grid, or all the tests in the test set if you clicked the **Run Test Set** button.

3 Select the **Run All Tests Locally** check box if you want to run the selected
flow, test, or test set using QuickTest on your local computer. If you want
to run the test or test set on a host computer, select the cell in the **Run on
Host** column, click the browse button, and select a host from the list.

...

Notes:

If you select **Run All Tests Locally**, you must have QuickTest Professional
version 10.00 or above installed on your computer.

If you select a remote host, make sure that the HP ALM Client
Registration Add-in is installed on the remote host before running the
flow, test, or test set.

For information on choosing a different host computer, see the
HP Application Lifecycle Management User Guide.

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4 Select the **Enable Log** check box to enable QuickTest to record an
execution log of the run. For more information on the execution log, see
"Viewing the Execution Log" on page 413.

5 Select a test in the list and click the **Run** button to run the selected test, or
click the **Run All** button to run all the tests in the test set. The testing tool
required for each component, such as QuickTest, opens and runs the
applicable business components in the test or test set. From your task bar,
you can toggle between the Test Lab module, QuickTest, and the
application you are testing.

➤ The status of the test run, for example, Connecting, or Running, is
shown in the **Status** column of the Automatic Runner dialog box. You
can click the **Stop** button in the toolbar to stop the run at any time.
You can click the **Stop All** button in the toolbar to stop all the
currently running tests.

➤ The status of the run is shown in the status bar at the bottom of the
QuickTest window.

After the test or test set run ends, the overall result of the run is shown in
the **Status** column of the Automatic Runner dialog box.

6 Close the Automatic Runner dialog box to return to the Test Lab window.

Tip: You can view an execution log of the test or test set run. For more information, see "Viewing the Execution Log" on page 413.

Note: For improved performance when running tests or flows that contain only QuickTest automated components, ALM creates and runs a BPT wrapper test in QuickTest. The BPT wrapper test is recreated each time the test or flow runs. By default, the wrapper test is not saved with the run.

For auditing purposes, you can instruct ALM to save the BPT wrapper test as an attachment to the test or flow run. In Site Administration, add the **BPT_WRAPPER_TEST_AUDIT** parameter to the list of parameters and set the value to **Y**. For more information on setting parameters, see the *HP Application Lifecycle Management Administrator Guide*.

To view the contents of a BPT wrapper test, from the Test Lab module's Test Runs tab, double-click the attachment icon next to the business process test or flow run in the grid.

Viewing Run Results of Business Process Tests or Flows

After you run a business process test or flow from the Test Lab module, you can view the results in various formats:

➤ For automated and manual tests, you can view the summarized results of the run in the Last Run Report tab. This pane lists each step of all the business components in the test, and, where applicable, the summarized results of main events reported by QuickTest. For more information, see "Viewing Test Results in the Test Lab Module" on page 411.

➤ For automated tests, you can view a complete QuickTest report. The hierarchical report contains details on all the steps for all the different iterations and business components within the automated test run. For more information, see "Viewing Reports for Automated Business Process Tests" on page 412.

➤ For automated and manual tests, you can view an execution log of the tests run. From this log you can view summarized or detailed results of any test or test set run. For more information, see "Viewing the Execution Log" on page 413.

Note: Results are stored in ALM only when the business component runs from the Test Lab module as part of a test. They are not stored in ALM when you run the test in Debug mode from the Test Plan module, or when running components directly from QuickTest.

Viewing Test Results in the Test Lab Module

You can view the results of the latest automated or manual test run in the Test Lab module in the Last Run Report tab at the bottom of the Execution Grid.

The pane displays a hierarchical tree of each business component contained in the test, the test run date and time, and the overall result obtained when the component or step ran, such as **Passed**, or **Failed**. If one or more steps within a component receive a **Failed** result, the component itself displays a **Failed** status.

Note: The results of automated steps run in previous versions of ALM are not displayed in the Last Run Report tab.

To view the results of the last test run:

1 Ensure that the Last Run Report tab is displayed at the bottom of the Execution Grid tab.

If the Last Run Report tab is not visible, click the **Show** button at the bottom-right of the Execution Grid tab. After clicking this button, it changes to a **Hide** button that you can later use to hide the pane.

Expand and collapse the tree entities in the Name column as necessary to see more or less details.

2 Select steps in the pane to view a description of the events in the test or the reason for a failed event.

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Viewing Reports for Automated Business Process Tests

If you have QuickTest Professional or the QuickTest Professional Add-in for ALM installed on your computer, you can view a full report of an automated business process test run in the Test Lab module.

To view a report of an automated business process test:

1 After you run a business process test from the Test Lab module, open the **Last Run Report** tab at the bottom of the Execution Grid tab, as described in "Viewing Test Results in the Test Lab Module" on page 411.

2 Click the link to the report about each iteration in the **Status** column of the pane. The Run Results Viewer opens.

The Run Results Viewer displays a graphical representation of the result of each step or event in the selected iteration of the test.

By selecting a node in the tree, you can view the details of how the step or node performed in the test.

For more information on viewing and analyzing the results of tests in the Run Results Viewer, see the *HP QuickTest Professional for Business Process Testing User Guide*.

Viewing the Execution Log

The Execution Log provides a log of the automated test or tests run in a test set. The log includes the date and time that each test ran, the host on which it ran, and summary results of the selected test.

Note: The Execution Log is created only if the **Enable Log** check box is selected in the Automatic Runner dialog box before the test or test set runs. For more information, see "Debugging Tests in the Test Plan Module" on page 400.

To view the Execution Log:

1 After the test or test set run is completed, the results of the run are shown in the **Status** column of the Automatic Runner dialog box.
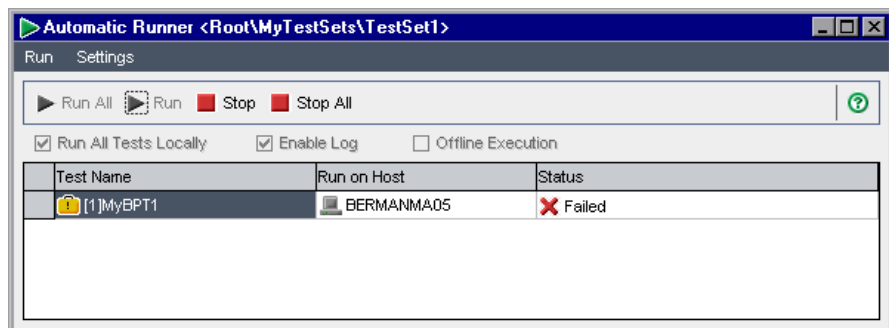
2 Double-click a test name in the Automatic Runner dialog box, or select a
test and select **View Execution Log** from the **Run** menu.

The Execution Log window opens and displays the results of the test or
test set run.

3 If required, you can filter the list to display fewer entries by:

➤ Selecting the specific test you want to view from the **Test** list, and
clicking the **Refresh** button.

➤ Selecting your local computer or the specific host on which the test
was run from the **Host** list, and clicking the **Refresh** button.

4 In the list of test runs for the selected test set, select the test whose results
you want to view. The results of the run are displayed in the box at the
bottom of the log window.

A

Business Process Testing Keyboard Shortcuts

You can navigate HP Business Process Testing, and perform many Business Process Testing commands, using shortcut keys.

This chapter includes:

➤ General Keyboard Shortcuts on page 415

➤ Business Component Module Shortcuts on page 415

➤ Test Plan Module Shortcuts for Business Process Testing on page 417

➤ Manual Runner Shortcuts for Business Process Testing on page 417

General Keyboard Shortcuts

You can navigate ALM, and perform common commands, by pressing the shortcut keys described in the *HP Application Lifecycle Management User Guide*.

Business Component Module Shortcuts

You can perform the following commands in the Business Components module by pressing the corresponding shortcut keys:

Shortcut Key	Function
CTRL+ALT+N	Creates a new component folder.
CTRL+N	Creates a new component.

Shortcut Key	Function
DELETE	Deletes an entity (component, component step).
F5	Refreshes.
ALT+G	Opens the Go To Component dialog box.
CTRL+U	Copies a URL.
ALT+S	**Snapshot tab:** Creates a snapshot.
ALT+L	**Snapshot tab:** Loads a snapshot from file.
ALT+D	**Snapshot tab:** Deletes a snapshot.
Alt+N	**Manual Steps tab:** Adds a new step. **Parameters tab**: Adds a new parameter.
CTRL+C	**Manual Steps tab:** Copies steps.
CTRL+V	**Manual Steps tab:** Pastes steps.
CTRL+P	**Manual Steps tab:** Inserts a parameter.
CTRL+DELETE	**Parameters tab:** Deletes a parameter.
CTRL+F	**Manual Steps tab:** Finds a test.
CTRL+F11	**When positioned in the Output cell from the Keyword View of the Component Steps tab:** Opens the Output Options dialog box. **When positioned in the Value cell from the Keyword View of the Component Steps tab:** Opens the Value Configuration Options dialog box.

Test Plan Module Shortcuts for Business Process Testing

You can perform the following commands in the Test Plan module for business process tests and flows by pressing the corresponding shortcut keys:

Shortcut Key	Function
CTRL+S	**Test Script tab:** Opens the Select Component pane.
CTRL+R	**Test Script tab:** Creates a new component request.
DELETE	**Test Script tab:** Removes the selected item (component, flow business process test, group).
F5	Refreshes.
F8	Validates the test.

Manual Runner Shortcuts for Business Process Testing

You can perform the following commands in the Manual Runner for business process tests and flows by pressing the corresponding shortcut keys:

Shortcut Key	Function
CTRL+R	Begins run.
CTRL+Q	Ends run.
CTRL+K	Cancels run.
CTRL+U	Attaches to run.
CTRL+B	Adds a defect.
CTRL+UP ARROW	Goes to previous step.
CTRL+DOWN ARROW	Goes to next step.
CTRL+P	Passes selected steps.
CTRL+ALT+A	Passes (including sub-steps).

Shortcut Key	Function
CTRL+F	Fails selected steps.
CTRL+G	Fails (including sub-steps).
ALT+LEFT ARROW	Returns to previously clicked link.
ALT+S	Attaches to step.
F12	Toggles the **Always on Top** option.

B

Business Process Testing Glossary

This glossary describes terminology specific to Business Process Testing.

See also: The glossary in the *HP Application Lifecycle Management User Guide*.

Application Area. Application areas contain all of the settings and resources required to create the content of keyword-driven business components for a particular application or part of an application. These include representations of the objects from your application contained in the shared object repository, and user-defined operations, contained in function libraries.

Automation Engineer. An expert in an automated testing product, such as QuickTest Professional.

Business Component (or **Component**). An easily-maintained, reusable unit comprising one or more steps that perform a specific task. You can use business components in multiple tests and flows. A business component can be defined as a manual or automated component. Business components may require input values from an external source or from other components, and they can return output values to other components.

Business Process Test. A scenario comprising a sequence of business components or flows, designed to test a specific business process of an application.

Business Process Test Parameters. Variable values that a business process test or flow can receive and then pass to business components or flows for use as input values.

Dynamic data for configurations. Values for a test configuration specified in an external Microsoft Excel file, which is then uploaded as a test resource and mapped to a test configuration in ALM.

input component parameters. Variable values that a business component can receive and use as the values for specific, parameterized steps in the component.

output component parameters. Values that a business component can return. These values can be viewed in the business process test results and can also be used as input for a component or flow that is used later in the test.

Component Request. A request for the creation of a new business component, when no existing component answers the needs of a business process test or flow. Component requests are initiated in the Test Plan module and can be viewed in the Component Requests folder in the Business Components module.

Flow. A reusable collection of business components in a fixed sequence that performs a specific task. You can use flows in multiple business process tests. Flows may require input values from an external source or from other components or flows, and they can return output values to other components or flows.

Flow input parameters. Variable values that enable you to define data used by a flow that is provided to the flow from an external source.

Flow output parameters. Values that enable you to define data that is retrieved and stored by a flow and can be used in subsequent components in a flow.

Group. A combination of contiguous components that you can iterate together in a business process test or flow.

Implementation requirements. Details and information, written by the subject matter expert that creates a business component, describing a general overview of the business component's purpose or goals, and the condition of the application before and after a component is run (the pre-conditions and post-conditions).

Iterations. The number of times that an individual business component, group of components, or flow, runs within a single test run, or the number of times that an entire business process test runs within a test set.

Pre-Condition and **Post-Condition.** The state of the application before the first step in a business component, and the state of the application after the last step in a business component. For example, the pre-condition for a component may state that all applications should be closed, or a specific application should be open to a specific screen or with a specific dialog box displayed. A post-condition may state that an application should be open to a particular screen, or be closed.

If you want the business component to allow iterations, the post-conditions should specify that the application's end state must match its state at the beginning of the component. The pre-conditions and post-conditions provide a guide when implementing the steps for the business component.

Roles. The various types of users who are involved in Business Process Testing.

Run condition. A conditional statement you can insert into a flow to check the current value of a given parameter before running a component in a flow. The run condition determines whether to run the component, skip the component run, or skip and set the component status to fail.

Static data for configurations. Values for a test configuration specified from within ALM.

Status (Component). A status value that indicates whether a business component is fully implemented, debugged, and ready to be run in a business process test or flow. The component with the most severe status determines the status of the entire test or flow. The status can be modified by the subject matter expert in ALM and the automation engineer in QuickTest.

Status (Business Process Test, or **Flow).** A status value that is automatically generated based on the status values of all the business components in the business process test or flow.

Steps. Individual operations in a component. These can be manual steps or detailed automated testing steps and are designed and implemented in a business component to test the workings of a specific task in an application.

Subject Matter Expert. The subject matter expert who uses ALM to create business components, flows, and business process tests.