HP Quality Center

Software Version: 10.00

Upgrade Preparation Guide

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Introduction

This guide shows you how to prepare your current HP Quality Center (QC) environment for an upgrade to QC 10.00. It explains how to use the Quality Center Upgrade Assessment tool to detect and repair problems in your environment before beginning the upgrade.

> The Quality Center Upgrade Assessment tool is integrated into Site Administration. To open, in Site Administration, click the **Site Projects** tab. Select a project and click the **Maintain Project** button. For more information, refer to the *HP Quality Center Administrator Guide*.

Audience

This guide is intended for administrators who are responsible for upgrading their current QC environment to QC 10.00.

Prerequisites

To use this guide, you should have some knowledge of database terms and QC administration.

Purpose

The purpose of this guide is to help administrators prepare for an upgrade to QC 10.00. The guide includes troubleshooting information and guidelines about possible problems that the Verify tool might encounter, as well as recommended solutions for repairing the problems. It shows you how to use the Quality Center Upgrade Assessment tool to detect and repair problems before you begin the upgrade. The guide also provides detailed information about problems and solutions in the process.

Structure

This guide is organized as follows:

Chapter 1. Upgrade Tools

This chapter describes the Quality Center Upgrade Assessment tool. This toolkit includes the Verify and Repair tools. These tools help optimize the upgrade process by minimizing downtime through proactive detection and repair of issues. They also help prevent future problems while working with QC.

Chapter 2. Verify Tool Warnings

This chapter describes schema and data inconsistencies that the Verify tool may detect. It suggests solutions for each such warning.

The chapter is divided to three sections, based on the different validations performed by the Verify tool:

- Verify Tool General Validators
- Schema Validation
  - Schema Issues
  - Internal QC Changes
- Data Validation

Appendix A. Quick Reference to Warnings

This appendix summarizes schema and data validation problems and solutions. Links to details about specific problems and solutions help you to resolve problems quickly.

Appendix B. Changing the QC Database User Schema

This appendix provides recommendations for solving problems that cannot be fixed by the Repair tool and that require manual repair.

Glossary

The glossary defines terms used in this guide.

1 Upgrade Tools

HP Quality Center (QC) 10.00 includes a new upgrade model. This upgrade model enables you to verify your current QC environment *before* you upgrade to QC 10.00. This pre-verification helps to ensure a successful upgrade procedure, and provides a healthy schema structure for future use.

The new upgrade tools help you to optimize the upgrade process, and to minimize upgrade downtime through the early detection of issues and repair mechanisms in your current QC environment. The tools also help you align your database user schema with the required configurations for future versions.

To upgrade a project, consider the flow shown in Figure 1.

Figure 1   Project Upgrade Process
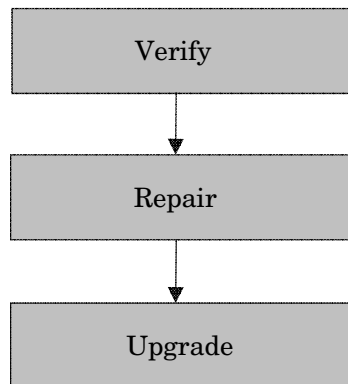
Upgrade Assessment Tool

The Quality Center Upgrade Assessment tool helps you do the following:

- Verify that your QC projects are in fact valid.

- Repair many of the inconsistencies detected by the Verify tool.

These capabilities reduce the risks involved in the upgrade process, and help prevent future problems while working with QC.

> ⚠ We recommend that you run the Verify and Repair tools on all of your QC projects before you upgrade to QC 10.00. However, this is not mandatory because the upgrade runs Verify and Repair before it starts the actual upgrade.

Verify Tool

The primary purpose of the Verify tool is to check the correctness of your project databases. It detects problems in your schema structure and data integrity that might cause the upgrade to fail.

The Verify tool also informs you about internal changes and settings that are required before upgrading to QC 10.00. Although your current project schema and data may be correct for the current version of QC, they may not be aligned with the requirements for QC 10.00. The Verify tool is an early warning system that alerts you to schema re-alignments you are required to perform before upgrading to QC 10.00. In the Verify tool, these re-alignments are called "internal QC changes."

> ▶ After you have verified your project, you can still use it with a previous Quality Center version (9.0 or 9.2).

You can begin upgrading to QC 10.00 only after the Verify tool runs successfully without any warnings. For this reason, it is very important to understand each warning that is displayed in the QCVerifyReport file, and to make sure that all of the issues or differences are repaired. This guide includes descriptions of the issues or differences that the Verify tool might encounter, as well as the recommended ways to solve these issues or differences.

Repair Tool

The Repair tool fixes many data and schema issues that are found by the Verify tool. The Repair tool also performs the alignment of the schema for the QC 10.00 upgrade. However, if the Verify tool finds a problem that can cause data loss, the Repair tool does not fix them automatically. You need to repair these problems manually. To find out whether a particular issue is handled automatically or manually, see "Quick Reference to Warnings" on page 39.

> After you have repaired your project, you can still use it with a previous Quality Center version (9.0 or 9.2).
>
> The Repair tool performs changes on the database user schema. For this reason, you must back up the schema before running the Repair tool. We recommend that you run the tool on a staging environment before running it on production.

Exception File

The Exception file instructs the upgrade to ignore warnings that require manual repair. You can define this file by project or site. You can use the Exception file only through the site administration area of QC 10.00.

> ⚠ The stability of the new database upgrade component depends on the validity of the QC database user schema. **We recommend that you *do not* use the Exception file to ignore the problems that the Verify tool encounters in the QC database user schema.**

You can use the Exception file to ignore the following types of warnings:

- Extra tables
- Extra views
- Extra columns
- Extra sequences

For any other problem that requires manual repair, consult with your database administrator (DBA). For details, see "Changing the QC Database User Schema" on page 43 or contact HP Support.

You can define the Exception file by project or site. To do so, you configure a site parameter that instructs the QC server to use the defined Exception file for all upgrades.

More information on how to set the Exception file is available in the *HP Quality Center Administrator Guide*.

Verification Report

The Verify tool generates a `QCverifyReport.html` file that summarizes all of the problems that were encountered during the QC schema and data validations. It includes an SQL section that displays the SQL commands that the repair tool will run to repair schema problems. Note that SQL queries that repair data problems are not displayed in this section.

2 Verify Tool Warnings

This chapter contains the following sections:

- Verify Tool General Validators
- Schema Validation
  — Schema Issues
  — Internal QC Changes
- Data Validation

Verify Tool General Validators

The Verify tool validates the following:

- Supported Database Version
- Valid Database User Schema Name
- Mixed Table Ownership
- "Repository over Database" Feature
- Legacy Version Control Validation
- Database Permissions
- Text Search Configuration

Supported Database Version

The Verify tool checks that the project schema is stored in a supported database server. If the Verify tool detects that the database server version is not supported in HP Quality Center (QC) 10.00, it displays a warning. For details about the database servers versions supported by QC 10.00, refer to the *HP Quality Center Installation Guide*.

Valid Database User Schema Name

The new upgrade mechanism does not support databases that include special characters in the database name. If the Verify tool finds special characters, you must remove them.

Removing Special Characters

To remove special characters from database names:

1 Deactivate the project.

2 Ask your DBA to rename the database user schema to a name that does not include special characters.

3 Remove the project from the site administration area of QC.

4 Update the Dbid.xml file to point to the new database user schema name.

5 Restore the project by using the updated Dbid.xml file.

6 Run the Verify tool again to make sure the problem is resolved.

Mixed Table Ownership

QC can connect to Microsoft SQL server by using SQL authentication or Windows authentication.

For each of these methods, a different user owns the project's tables:

- **SQL Authentication**

  Table owner is the user td.

- **Windows Authentication**

  Table owner is the user dbo (a user mapped to the operating system user that runs the QC server).

If you create a project with one type of authentication (for example, SQL), and then restore it to QC with the other type of authentication (for example, Windows), QC cannot access these tables. In this case, new tables are created with owners that are different from those of the old tables. You will not be able to work with the project. It is likely that the upgrade will fail.

To prevent this problem, the duplicate ownership validator checks that the owner of all of the tables in the QC project database user schema matches the connection method that QC is using to connect to the server.

Fixing Table Ownership Manually

To fix table ownership manually, do one of the following:

- **SQL Authentication**

  Run the following query to make td the table owner:

  EXEC sp_changeobjectowner '<table name>', 'td'

- **Windows Authentication**

  Run the following query to make dbo the table owner:

  EXEC sp_changeobjectowner 'td.<table name>', 'dbo'

"Repository over Database" Feature

The "Repository over Database" feature is *not* supported in QC 10.00. If you use this feature in QC 9.0 or QC 9.2, you should migrate the repository from the database to the file system (available from QC 9.0 Patch 26 and QC 9.2 Patch 12) *before* upgrading the project to QC 10.00. For more information about the tool for migrating the project repository from the database to the file system, see the ReadMe files for QC 9.0 Patch 26 and QC 9.2 Patch 12. One of the Verify tool validators checks whether the project is using the "Repository over Database" feature. If the project is using the feature, the validator displays a warning.

Legacy Version Control Validation

Integration with external version control tools is not supported in QC 10.00. Projects that are using version control can not be upgraded to QC10.00 as long as they are configured to support version control. The Verify tool will display a warning in case the project is configured to work with version control. QC 10.00 includes a built-in version control functionality to support your QC projects.

Database Permissions

To enable an upgrade to QC 10.00, the QC project schema requires a set of minimum required permissions. The Verify tool makes sure that both the project user and the QC administrator user have all the privileges needed to perform the upgrade. For more information about the minimum permissions required for a QC schema, see the *HP Quality Center Installation Guide*.

Text Search Configuration

QC 9.0 and higher supports the database text search feature. However, not all databases are configured to support this feature. If your database does, in fact, support text search, QC installs the required components when creating a new QC project database. QC also activates the text search for the new database. The Verify tool checks whether your QC project has the text search feature enabled, and that it is configured correctly.

The Verify tool validates the following:

- Validity of the Text Search Configuration
- Only Valid Fields Configured Under "Text Search"
- Text Search Validation for Oracle Database Server
- Text Search Validation for Microsoft SQL Database Server

Validity of the Text Search Configuration

The Verify tool checks that text search components are installed and are valid on the database server. If a database server is text search–enabled in the DB Servers tab in Site Administration, text search must also be enabled on the Oracle or SQL database server. If the Verify tool detects that text search is not enabled or configured incorrectly on the Oracle or SQL database server, the Upgrade process will not run until you manually repair the problem.

We recommend that you ask your database administrator to reconfigure text search on the Oracle or SQL database server.

Alternatively, as a workaround, you can disable text search for the database server from Site Administration.

Disabling the Text Search

To disable the text search for the database server:

1   Run the following query on your Site Administration schema:

    ```
    update <SA Schema>.dbservers set db_text_search_enabled
    = null where dbserver_name = '<DB logical name>'
    ```

2   Restart the Quality Center server.

3   Run the Repair process for your projects.

4   When the Repair process completes, run the following query:

    ```
    update <SA Schema>.dbservers set db_text_search_enabled
    = 'Y' where dbserver_name = '<DB logical name>'
    ```

5   Restart the Quality Center server.

Only Valid Fields Configured Under "Text Search"

The Verify tool checks that only valid fields are defined as searchable. You can enable the text search only for specific entities, and only on fields of the type string or memo. The following entities are supported: BUG, COMPONENT, COMPONENT_STEP, DESSTEPS, REQ, TEST, BPTEST_TO_COMPONENT, and CYCLE. Any other configuration could cause functionality problems during a QC upgrade or customization. This problem is fixed automatically by the Repair tool.

Text Search Validation for Oracle Database Server

For an Oracle Database server, the Verify tool checks the following:

• Validity of Text Search Indexes

• Validity of Project Database User Permissions

Validity of Text Search Indexes

The Verify tool checks that database text search indexes are valid. Invalid text search indexes can cause functionality problems and even upgrade failure in QC. If the Verify tool detects an invalid index, try to recreate the index by dropping it from the schema and creating it again. In Site Administration, click the **Site Projects tab**. Select the relevant project and click the **Enable/Rebuild Text Search** button. If this procedure returns an error, consult your database administrator (DBA) or contact HP Support.

Validity of Project Database User Permissions

The Verify tool checks that the project database user has the required permissions to work with text search. When text search is installed on the database, the role CTXAPP is created automatically. QC requires that this role be granted to all projects database users that support text search. (QC grants the CTXAPP role automatically when creating the project or enabling the text search for a project.) If this role is not granted to the project database user (configured to support text search), the Verify tool returns a warning. In these cases, ask your DBA to grant the required role to the project database user.

Text Search Validation for Microsoft SQL Database Server

The Verify tool checks that the QC project database user schema enables the text search feature. To work with text search on SQL project, you need to enable the text search on the database.

Enabling the Text Search

To enable the text search on the database:

1 Select the database from the SQL server Enterprise Manager.

2 Right-click the database name.

3 Select **Properties/Files**.

4 Select **Use Full-Text Indexing**.

Schema Validation

One of the main functions of the Verify tool is to ensure that the QC project database user schema is correct and configured as expected.

The Verify tool performs two types of schema verifications:

- **Schema Correctness**

  Checks that all the required entities exist and are defined as expected.

- **Alignment to QC 10.00**

  Notifies you about differences in the QC project database user schema caused by internal QC changes. In this way, the Verify tool aligns the schema with the latest internal changes to the QC schema made in preparation for the QC 10.00 upgrade.

Schema Issues

The Verify tool checks that the QC project database schema includes all of the required schema objects, as defined in the expected database user schema for QC project. This verification ensures that all of the required entities exist and are defined as expected. It also ensures that there are no extra entities defined on top of the QC schema.

The Verify tool displays warnings in the QCVerifyReport file if it finds the following:

- Extra entities defined (for example, Table, Column, Trigger, View, and Sequence for an Oracle Database)
- Differences from the expected definitions (for example, Column Size and Index Attributes)
- Missing objects

Schema differences found by the Verify tool can cause QC upgrade failures or usage problems. As long as the Verify tool still finds these differences, an upgrade to QC 10.00 will not start.

Note that many of the schema changes can be repaired automatically by the Repair tool.

The following sections contain possible warnings, grouped by the different database objects that the Verify tool can output in the `QCVerifyReport` file:

- Tables
- Views
- Columns
- Indexes and Constraints
- Triggers
- Sequences

Tables

Database tables can contain the following warnings:

- Extra Table
- Missing Table

Extra Table

QC Schema should contain only the tables that are defined in the QC schema configuration file. Adding extra tables on top of QC schema is not supported and might cause future problems with QC.

Problem

If the Verify tool finds extra tables that were added manually to QC schema, it generates an "Extra Table" warning.

> This problem requires manual repair. The Repair tool cannot fix it.

Solution

Do one of the following:

- **Change the Schema**

  If you use the table, copy it to a different schema. If you do not use the table, delete it. Before taking either action, **back up the schema** and consult your DBA. For details, see "Changing the QC Database User Schema" on page 43.

- **Use the Exception File**

  Not recommended: Instruct the upgrade to ignore this problem. For more information about the Exception file, see "Exception File" on page 13.

Missing Table

The Verify tool checks that all of the tables defined for the QC project schema actually exist (according to the tables of each QC version).

Problem

If a table is missing, the Verify tool generates a "Missing Table" warning.

Solution

Do one of the following.

- See "Changing the QC Database User Schema" on page 43.

- Run the Repair tool to create the missing table. Although you can use the Repair tool to add these objects, we recommend that you contact HP Support to make sure that the missing objects are not just symptoms of a bigger problem.

Views

Database view can contain the following warning:

- Extra Views

Extra Views

QC schemas should contain only the views that are defined in the QC schema configuration file.

Problem

If the Verify tool detects extra views that were added manually to the QC schema, it displays an "Extra Views" warning. Adding extra views on top of the QC schema is not supported and could cause problems.

This problem requires manual repair. The Repair tool cannot fix it.

Solution

Do one of the following:

- **Change the Schema**

  If you use the view, copy it to a different schema. If you do not use the view, delete it. Before taking either action, **back up your schema** and consult your DBA. For details, see "Changing the QC Database User Schema" on page 43.

- **Use the Exception File**

  Not recommended: Instruct the upgrade to ignore this problem. For more information about the Exception file, see "Exception File" on page 13.

Columns

Database columns can contain the following warnings:

- Extra Column
- Column Size Mismatch
- Column Type Mismatch
- Column Nullability Attribute Mismatch
- Identity Column
- Missing Column

Extra Column

The Verify tool checks that each QC table includes the required columns, as defined for the expected QC database user schema and version. The QC schema should not include extra columns. Extra columns in a table might cause upgrade failure or functionality problems.

Problem

If the Verify tool detects an extra column (that does not exist in the QC database user schema definitions) in one of QC tables, it generates an "Extra Column" warning.

This problem requires manual repair. The Repair tool cannot fix it.

Solution

Do one of the following:

- **Change the Schema**

  If you have an internal implementation that requires extra columns in QC tables, move the extra columns to a different table in a different schema. If you do not use a particular column, delete it. Before taking either action, **back up your schema** and consult your DBA. For a more detailed explanation, see "Changing the QC Database User Schema" on page 43.

- **Use the Exception File**

  Not recommended: Instruct the upgrade to ignore this problem. For more information about the Exception file, see "Exception File" on page 13.

Column Size Mismatch

The Verify tool checks that all the columns in QC tables are defined as expected. This validation ensures that the column size matches the expected size as defined for each column on each QC table. This verification excludes user-defined fields, whose size can be customized through project customization.

Some column mismatch warnings are caused by internal QC changes that are repaired by the repair tool automatically. For details, see "Internal QC Changes" on page 33.

Problem A – Size is bigger than expected

If the column size is *bigger* than expected, decrease the column size to the required size manually. Because this operation can cause data loss, it is not performed automatically by Repair tool.

> This problem requires manual repair. The Repair tool cannot fix it.

Solution A

Consult your DBA to resolve this issue. For risks involved in changing the QC database user schema, see "Changing the QC Database User Schema" on page 43.

Problem B – Size is smaller than expected

If the column size is *smaller* than expected, the Repair tool fixes the problem automatically by increasing the column size to the expected size.

Solution B

Run the Repair tool to increase the current size to the required size.

Column Precision Mismatch

In an Oracle Database, "precision" is the term used to define the size of fields with the INTEGER type.

Problem

The Verify tool generates a warning if the precision defined for a certain column is *smaller* than expected.

Solution

Run the Repair tool to increase the current precision to the required precision.

Column Type Mismatch

Changing a column type can cause the QC upgrade to fail and can cause major functionality problems in QC.

Problem

The Verify tool generates a "Column Type" warning if the column type has changed.

> This problem requires manual repair. The Repair tool cannot fix it.

Solution

Consult your DBA to resolve this issue. For risks involved in changing the QC database user schema, see "Changing the QC Database User Schema" on page 43.

Column Nullability Mismatch

One of the attributes that is defined for a column is whether it can accept null values. A null is the absence of a value in a column of a row. Nulls indicate missing, unknown, or inapplicable data. If you have defined a NOT NULL or PRIMARY KEY integrity constraint for a particular column, you cannot insert rows into the column without adding a value.

Problem

The Verify tool compares the required definitions for each column in the expected QC database user schema to the QC project database user schema. If it encounters differences in the column NULL attribute definition, it generates a "Column Nullable" warning.

Solution

Run the Repair tool. The Repair tool runs a query to modify the column attributes to the expected attributes.

> ⚠️ If the column includes NULL values, the Repair tool cannot update the column attribute to NOT NULL (if this is the required attribute) for the column. Ask your DBA how to remove the NULL values from the column. After removing the NULL values, run the Repair tool again. For details, see "Changing the QC Database User Schema" on page 43.

Identity Column

The IDENTITY property is one of the attributes defined for columns in Microsoft SQL server.

Problem

As part of the verification for the columns attributes, the Verify tool might find a column Identity property that is not configured as expected.

> ➤ This problem requires manual repair. The Repair tool cannot fix it.

Solution

Change the IDENTITY property of the column to the expected configuration (according to the output from the verify tool report) manually. Consult your DBA to resolve this issue. For details, see "Changing the QC Database User Schema" on page 43.

Missing Column

If a column is missing from a QC table, run the Repair tool or contact HP Support.

Problem

If the Verify tool finds that a column is missing from one of QC tables, it generates a "Missing Column" warning.

Solution

Do one of the following:

- Run the Repair tool to fix the problem.

- See "Changing the QC Database User Schema" on page 43.

Indexes and Constraints

A database index is a data structure that improves the speed of operations in a table. You can create indexes using one or more columns, providing the basis for both rapid random lookups and efficient ordering of access to records. Database Constraints are constraints on the database that require relations to satisfy certain properties.

Database indexes and constraints can cause the following validation warnings:

- Extra Index

- Extra Constraint

- Index Uniqueness Mismatch

- Index Clustered

- Missing Constraint

- Missing Index

- Index Changed

- Index Order Changed

Extra Index

The QC schema should include only those indexes defined in the required QC schema configurations.

Problem

If the Verify tool finds an index that is not defined in the required QC schema configuration, it generates an "Extra Index" warning.

> This problem requires manual repair. The Repair tool cannot fix it.

Solution

Remove the extra indexes manually. Consult with your DBA to resolve this issue. For details, see "Changing the QC Database User Schema" on page 43.

> Some "Extra Index" warnings are caused by internal QC changes. These extra indexes are no longer used by QC, and are removed by the Repair tool. For details, see "Internal QC Changes" on page 33.

Extra Constraint

The QC schema should include only those constraints defined in the required QC schema configurations.

Problem

If the Verify tool finds a constraint that is not defined in the required QC schema configuration, it generates an "Extra Constraint" warning.

> This problem requires manual repair. The Repair tool cannot fix it.

Solution

Remove the extra constraint manually. Consult with your DBA to resolve this issue. For details, see "Changing the QC Database User Schema" on page 43.

Index Uniqueness Mismatch

A unique index guarantees that the index key contains no duplicate values. As a result, every row in the table is unique. Specifying unique indexes on QC data tables ensures data integrity of the defined columns. In addition, it provides helpful information that is used as a query optimizer.

Problem

If the index `uniqueness` attribute does not have the expected value, the Verify tool generates an "Index Uniqueness Mismatch" warning.

You cannot create a unique index, unique constraint, or `PRIMARY KEY` constraint if duplicate key values exist in the data. The Verify tool performs these data validations. If a table has duplicate values or IDs, based on the index definitions on that table, the Verify tool also displays the duplication in the `QCVerifyReport` file. In this case, the Repair tool automatically fixes the duplication problem before creating the unique index.

Solution

Run the Repair tool to repair the problem.

Index Clustered

In Microsoft SQL, index type can be classified as clustered or non-clustered. The Verify tool compares the required definitions for each index in the expected QC database user schema to the QC project database user schema.

Problem

If the Verify tool finds differences in the index clustered attribute definition, it generates an "Index Clustered" warning.

Solution

Run the Repair tool to repair the problem.

Missing Constraint

Constraints are rules that the database enforces to improve data integrity.

Problem

If the Verify tool finds a constraint that should be defined as missing, it generates a "Missing Constraint" warning.

Solution

Run the Repair tool to repair the problem.

Missing Index

The Verify tool checks that all the required indexes (as defined in the expected QC database user schema) exist in the QC projects database user schema.

Problem

If the Verify tool does not find all the required indexes in the QC projects database user schema, it generates a "Missing Index" warning.

Solution

Run the Repair tool to repair the problem.

Index Changed

The Verify tool checks that the indexes are defined according to the expected database user schema.

Problem

If the Verify tool finds an index that is not defined according to the expected database user schema, it generates an "Index Changed" warning.

This warning can indicate the following problems:

- Function in a function-based index is different than expected.

- Index is not defined on the expected columns.

Solution

Run the Repair tool to repair the problem. The Repair tool removes the index, and then recreates it, based on the required definitions for this index.

Index Order Changed

The Verify tool checks that the order of the columns in the index definition has not changed.

Problem

If the order of the columns in the index definition has changed, the Verify tool generates an "Index Order Changed" warning.

Solution

Run the Repair tool to repair the problem. The Repair tool removes the index, and then recreates it, based on the required definitions for this index.

Triggers

A database trigger is procedural code that is automatically executed in response to certain events on a particular table in a database.

Database triggers can contain the following warning:

- Extra Trigger

Extra Trigger

Extra triggers can cause QC upgrade failures and functionality problems.

Problem

If the Verify tool finds an extra trigger, it generates an "Extra Trigger" warning.

> This problem requires manual repair. The Repair tool cannot fix it.

Solution

Before upgrading, back up your database schema and remove the extra triggers manually.

> Because extra triggers can cause upgrade failures, the upgrade process cannot ignore this warning by using the Exception file. For details, see "Changing the QC Database User Schema" on page 43.

Sequences

A sequence is an Oracle object that acts as a generator that provides a sequential series of numbers.

Database sequences can contain the following warnings:

- Extra Sequence
- Missing Sequence

Extra Sequence

QC schemas should contain only the sequences that are defined in the QC schema configuration file.

Problem

If the Verify tool finds an extra trigger, it generates an "Extra Sequence" warning.

This problem requires manual repair. The Repair tool cannot fix it.

Solution

Do one of the following:

- **Change the Schema**

  Move the sequence to a new database user schema. Before doing so, consult with your DBA. For details, see "Changing the QC Database User Schema" on page 43.

- **Use the Exception File**

  Not recommended: Instruct the upgrade to ignore this problem. For more information about the Exception file, see "Exception File" on page 13.

Missing Sequence

Problem

If the Verify tool finds that one of the sequences that should be defined on QC schema is missing, it generates a "Missing Sequence" warning.

Solution

Do the following:

- Run the Repair tool to fix the problem.

- See "Changing the QC Database User Schema" on page 43.

Internal QC Changes

As a result of internal QC changes, a set of updates needs to be applied to the schema as part of the preparation for the QC 10.00 upgrade.

If the Verify tool finds any internal differences, it generates warnings in the QCVerifyReport.html file. These differences are displayed in a separate "Internal QC Changes" table, as shown in Table 1 on page 34. They are repaired by the Repair tool automatically.

Table 1   Internal QC Changes

Type	Problem	Element	Comment
Column	Size mismatch	COMMON_SETTINGS.CSET_NAME	Expected column size is 240. Actual size is 70.
		REQ.RQ_REQ_PRIORITY	Expected column size is 255. Actual size is 70.
		REQ.RQ_REQ_PRIORITY	
		REQ.RQ_REQ_TYPE	
		REQ.RQ_REQ_AUTHOR	
		REQ.RQ_REQ_PRODUCT	
		REQ.RQ_REQ_REVIEWED	
		REQ.RQ_REQ_STATUS	
Index	Missing	ALL_LISTS.AL_ABS_PATH_COV_IDX	—
		BUG.BG_COMPOUND_IDX	
		CYCLE.CY_FOLDER_IDX	
		REQ.RQ_REQ_STATUS_IDX	
		RUN.RN_CYCLE_IDX	
		STEP.ST_RUN_IDX	
		TEST.TS_SUBJECT_IDX	
	Extra	BUG.BG_DETECTED_BY_LWR_IDX	
		BUG.BG_STATUS_LWR_IDX	
		BUG.BG_PRIORITY_LWR_IDX	
		BUG.BG_RESPONSIBLE_LWR_IDX	
	Index changed	REQ_COVER.RC_ENTITY_ID_IDX	
		RUN.RN_TEST_ID_IDX	
		RUN.RN_TESTCYCLE_IDX	
Function-based indexes – relevant only for SQL server	Extra index	COMMON_SETTINGS.CS_COVER_LWR_IDX	—
		HOSTS.HOSTS_LWR_IDX	
		HOSTS_IN_GROUP. HG_COVER_LWR_IDX	
		HOST_GROUP. GH_LWR_IDX	
		USERS.US_USERS_LWR_IDX	

These internal changes are repaired automatically by the Repair tool in the following way:

- **Column Size**

  Increases the size of columns to the required size.

- **Index Definition**

  Removes extra indexes. It also recreates missing indexes and indexes that were defined differently.

- **Extra Function-based Indexes** (Microsoft SQL Server only)

  Removes obsolete function-based indexes.

Before beginning the QC 10.00 upgrade, run the Repair tool on every QC project.

Data Validation

One of the main functions of the Verify tool is to ensure that the QC project database contains valid data.

The Verify tool helps you find and fix the following problems:

- Duplicate Values
- Duplicate IDs
- Tree Inconsistencies

Duplicate Values

Some fields (or a combination of fields) must be unique in given tables. This constraint is enforced by the creation of a unique index on these fields. For example, the combination of fields TS_SUBJECT and TS_NAME, which represent the ID of the test's parent folder and test name, must be unique. It is not possible to create two tests with the same name under the same folder. In rare cases, a corrupted database contains duplicate values in these fields.

Problem

The Verify tool checks that all unique indexes exist (and therefore enforce unique values). If the Verify tool finds duplicate values, it does not permit the upgrade to run on the project.

The `QCVerifyReport` file specifies the fields in which there are duplications and number of duplicate values found, as shown in Figure 2.

Figure 2   Summary of Duplicate Values

#	Table	Columns	# Duplicate items
Duplicate Values			
Looks for records in selected tables that have duplicate field values. Values must be unique.			
The Repair tool automatically handles duplicate values.			
1	TEST	TS_SUBJECT LOWER("TS_NAME")	2

Solution: Automatic Repair

Run the Repair tool to automatically handle the duplicate values. The Repair tool renames the duplicate values to resolve the problem

Duplicate IDs

Most tables have a unique primary key, usually a unique single column. If there are duplicate values in this field, the primary key is not created.

For example, in a table called `test`, the column `TS_TEST_ID` represents the test ID, which is unique. In rare cases, a corrupted database contains duplicate IDs.

Problem

The Verify tool checks that all IDs in a table are unique. If it finds duplicate IDs, it does not permit the upgrade to run on the project.

The `QCVerifyReport` file specifies the fields in which there are duplicate items and values, as shown in Figure 3.

Figure 3   Summary of Duplicate IDs

#	Table	Column	# Duplicate Items
Duplicate IDs			
Looks for records in selected tables that have duplicate ID field values.			
The Repair tool automatically deletes the duplicate records.			
1	TEST	TS_TEST_ID	2

Solution: Automatic Repair

The Repair tool automatically deletes one of the records with a duplicate ID.

> ⚠️ This option assumes that the entire record is duplicated, and that the duplicated record is not accessible from the QC user interface. Because there can be exceptions, we recommend that you use this option only after verifying manually that this record deletion will not cause data loss.

Tree Inconsistencies

The Verify tool checks four different entity trees (hierarchical representation of entities):

- Test Plan tree
- Business Components tree
- Requirement tree
- Test Lab tree

The Verify tool checks that the data in the tree tables is correct.

> ⚠️ Do not fix any problems related to tree data manually. The Repair tool fixes them automatically.

Problem

The Verify tool checks for the following types of problems:

- **Corrupted Path**

  This is an internal QC field that contains a string that represents the order of each node in the tree.

- **Wrong Number of Children**

  This is an internal QC field that contains the number of children for each node in the tree.

- **Orphan Records in Trees**

  By definition, orphan records do not have father records. As a result, you cannot access them through the QC user interface.

Solution: Automatic Repair

Run the Repair tool to automatically fix any problems related to tree data.

⚠️ Before beginning the automatic repair, review each orphan record carefully. **If the Verify tool finds an orphan record, it deletes it (and all its descendants) from the tree automatically**.

Sequences Warning

QC has an internal mechanism for managing IDs and other system numerators. The table SEQUENCES holds the name of the table or other entity whose numeration is being tracked as well as it highest current value.

Problem

If one of the records is missing in this table, or if one of the values is incorrect, the Verify tool generates a "Sequences Error" warning.

Solution

The Repair tool repairs the problem automatically.

⚠️ We strongly recommend that you *not* attempt to fix the problem manually.

A   Quick Reference to Warnings

This appendix lists schema and data issues found in warnings generated by the Verify tool.

Schema Issues

Table 2 lists schema issues found in Verify tool warnings. Some schema issues are repaired by the Repair tool automatically. Other schema issues require that you repair them manually.

Table 2   Schema Issues

No.	Type	Problem	Element	Resolution	Details
1	Table	Extra table	—	Manual repair	"Extra Table" on page 22
2	Table	Missing table	—	Repair tool	"Missing Table" on page 23
3	Views	Extra view	—	Manual repair	"Extra Views" on page 23
4	Views	Missing view	—	Repair tool	"Views" on page 23
5	Column	Extra column	—	Manual repair	"Extra Column" on page 24
6	Column	Missing column	—	Repair tool	"Missing Column" on page 28
7	Column	Size mismatch – column size bigger than expected	—	Manual repair	"Column Size Mismatch" on page 25

No.	Type	Problem	Element	Resolution	Details
8	Column	Size mismatch – column size smaller than expected	—	Repair tool	"Column Size Mismatch" on page 25
9	Column	Size mismatch – internal QC change	COMMON_SETTINGS.CSET_NAME REQ.RQ_REQ_TYPE REQ.RQ_REQ_AUTHOR REQ.RQ_REQ_PRODUCT REQ.RQ_REQ_REVIEWED REQ.RQ_REQ_STATUS	Repair tool	"Column Size Mismatch" on page 25
10	Column	Type mismatch	—	Manual repair	"Column Type" on page 26
11	Column	Precision	—	Repair tool	"Column Precision" on page 26
12	Column	Nullable (column can accept NULL values)	—	Repair tool	"Column Nullability" on page 26
13	Index	Uniqueness	—	Repair tool	"Index Uniqueness Mismatch" on page 29
14	Index	Clustered	—	Repair tool	"Index Clustered" on page 30
15	Index	Extra	—	Manual repair	"Internal QC Changes" on page 33
16	Index	Extra – internal QC changes	BUG.BG_DETECTED_BY_LWR_IDX BUG.BG_STATUS_LWR_IDX BUG.BG_RESPONSIBLE_LWR_IDX BUG.BG_DETECTED_BY_LWR_IDX	Repair tool	"Internal QC Changes" on page 33

No.	Type	Problem	Element	Resolution	Details

17	Function-based index	Extra – internal QC changes	`COMMON_SETTINGS.CS_COVER_LWR_IDX`
			`HOSTS.HOSTS_LWR_IDX`
			`HOSTS_IN_GROUP. HG_COVER_LWR_IDX`
			`HOST_GROUP. GH_LWR_IDX`
			`USERS.US_USERS_LWR_IDX`
				Repair tool	"Internal QC Changes" on page 33

18	Index	Missing	—	Repair tool	"Missing Index" on page 31

19	Index	Missing – internal QC changes	`ALL_LISTS.AL_ABS_PATH_COV_IDX`
			`BUG.BG_COMPOUND_IDX`
			`CYCLE.CY_FOLDER_IDX`
			`REQ.RQ_REQ_STATUS_IDX`
			`RUN.RN_CYCLE_IDX`
			`STEP.ST_RUN_IDX`
			`TEST.TS_SUBJECT_IDX`
				Repair tool	"Internal QC Changes" on page 33

20	Constraint	Missing	—	Repair tool	"Missing Constraint" on page 30
	Constraint	Extra		Manual repair	"Missing Constraint" on page 30

21	Index	Index changed internal	`REQ_COVER.RC_ENTITY_ID_IDX`
			`RUN.RN_TEST_ID_IDX`
			`RUN.RN_TESTCYCLE_IDX`
				Repair tool	"Index Changed" on page 31

22	Index	Changed	—	Repair tool	"Index Changed" on page 31
23	Triggers	Extra	—	Manual repair	"Extra Trigger" on page 32
24	Sequence	Missing	—	Repair tool	"Missing Sequence" on page 33
25	Sequence	Extra	—	Manual repair	"Extra Sequence" on page 32

Data Issues

Table 3 lists data issues found in Verify tool warnings. All data issues are repaired by the Repair tool automatically.

Table 3   Data Issues

No.	Type	Problem	Element	Resolution	Details
1	Duplicate data	Duplicate values	—	Repair tool	"Duplicate Values" on page 35
2	Duplicate data	Duplicate IDs	—	Repair tool	"Duplicate IDs" on page 36
3	Trees	Wrong number of children	`Tables REQ/ALL_LISTS/CYCL_FOLD`	Repair tool	"Tree Inconsistencies" on page 37
4	Trees	Corrupted path	`Tables REQ/ALL_LISTS/CYCL_FOLD`	Repair tool	"Tree Inconsistencies" on page 37
5	Trees	Orphan records	`Tables REQ/ALL_LISTS/CYCL_FOLD`	Repair tool	"Tree Inconsistencies" on page 37
6	Sequences	Sequence mismatch	`Table SEQUENCES`	Repair tool	"Sequences" on page 32

B Changing the QC Database User Schema

This section describes the problems that require manual repair (cannot be repaired automatically by the Repair tool), and recommends solutions for these problems. If you encounter any of the problems mentioned below, consult with your DBA or contact HP Support for further guidelines to resolve these problems before upgrading to HP Quality Center (QC) 10.00.

The stability of the new database upgrade component depends on the validity of the QC database user schema validity. We recommend that you *not* change the QC database user schema by using the Exception file.

Missing Database Objects

Missing database objects can be symptoms of a bigger problem.

Problem

Missing database objects (for example, tables and indexes) can yield unexpected and unwanted behavior.

Solution

Although you can use the Repair tool to add these objects, we recommend that you contact HP Support to make sure that the missing objects are not just symptoms of a bigger problem.

Changed Database Objects

Any of the following cases is defined as a Changed Database Object:

- Data type of a column was changed.

- Length of a column was changed.

- Nullability of a column was changed.

- Column is defined as identity although it should not be defined as such (or vice versa).

Problem

A changed column data type can result in incorrect behavior on the QC server side.

Solution

To avoid this behavior, make sure that you have resolved all data type and length concerns before beginning the upgrade.

For every changed database object that is found, do the following:

1 Create a new column with the required attributes as originally defined by the QC server.

2 Move the data from the old column to the new one.

   If you cannot move the data (for example, move strings to numeric columns, or move large data to smaller fields), contact HP Support.

3 Remove the old column.

4 Rename the new column to the original column name.

Extra Database Objects

QC has various customization options. One option is to add user-defined fields (UDFs). You can add a UDF by using either the project customization user interface or through OTA (Open Test Architecture).

Problem

Any other addition to the QC database user schema (for example, defining extra objects on top of QC schema) can result in a failure, such as the following:

- **Name Conflict**

    If the next version of QC happens to include a name that you added for a proprietary database object (for example, a table, view, or column), the two names will be in conflict.

- **Copy and Synchronize Failure**

    If the database user schema contains extra or missing database objects, some QC mechanisms for copying and synchronizing might fail.

- **Extra Triggers**

    If the database contains extra triggers, some update operations might fail.

Solution

For each extra database object that is found, we recommend that you do the following:

1 **Move extra columns to newly created tables.**

    To make sure a new table has a one-to-one relationship with the original table, define the primary key of the new column in the new table with the value of the primary key of the original column in the original table.

2 **Move extra tables to a different database user schema.**

    These extra tables include those tables created in Step 1.

    You might need to amend the proprietary application data access of these tables. You can still access these tables from within the QC database connection by specifying the full name.

Examples:

— Oracle

  <schema name>.<table name>

— SQL Server

  <database name>.td.*<table name>*

To be able to see these tables, you must grant the necessary permissions for the QC database user schema.

3 **Move extra views to a different database user schema.**

Like extra tables, these views can be moved to a different database user schema. In addition, you must grant reading permissions to the newly created database user schema on the QC database user schema objects.

4 **Remove referential integrity between customer database objects and QC database objects.**

This removal includes no data loss.

5 **Remove extra triggers before the upgrade and (only if truly necessary) restore them after the upgrade.**

No data loss is involved. The QC upgrade includes data upgraders that perform some data manipulations (for example, removing duplicate values, fixing tree structures, and so on).

Your triggers will not be invoked on these update events.

As a result, you need to do the following:

a Ask HP Support for information about the data upgrader activity.

b Review the information about the data upgrader activity.

c Decide on which proprietary updates you need to perform.

6 **Remove extra indexes.**

You can log all indexes before the upgrade, and (only if truly necessary) restore them after the upgrade. No data loss is involved.

7 *Oracle Database only:* **Move extra sequences to a newly created database user schema.**

To access the extra sequences from the QC database user schema, you must grant QC the required permissions. When moving these sequences, set them to start with the number they reached at the time of the move.

Glossary

Database User Schema

Database in SQL Server and a user schema in Oracle. This term is used for both cases because QC can be deployed over SQL Server and Oracle. Both cases are logical sets of database objects (for example, tables, indexes, and so on) owned by the same logical owner.

Expected Database User Schema

QC Database User Schema configurations, as defined in the configuration file for a new QC Database User Schema. As a preparation for QC 10.00, each QC project database user schema should be aligned with the latest configurations, as defined in this schema.

QC

HP Quality Center

QCverifyReport file

HTML file generated by the Verify tool that summarizes the results of the verification. Also know as the `QCVerifyReport` file.