HP Business Process Testing Enterprise Extension

Software Version: 10.00

User Guide

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To find more information about access levels, go to:

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Table of Contents

Welcome to This Guide

Welcome to HP Business Process Testing Enterprise Extension. Business Process Testing Enterprise Extension adds functionality to HP Quality Center and HP Business Process Testing that enables you to test enterprise applications.

This guide describes how to use Business Process Testing to create and debug business components, create flows, build and run business process tests, and report defects. HP Business Process Testing Enterprise Extension provides additional automated features, such as learning flows and change detection. Therefore, some sections in this guide that describe manual features and functionality, such as defining business components, or designing manual component steps, may not be part of recommended best practice when using Business Process Testing to test your enterprise application.

This chapter includes:

➤ How This Guide Is Organized on page 9

➤ Enterprise Extension Documentation Library on page 12

➤ Additional Online Resources on page 15

How This Guide Is Organized

This guide contains the following chapters:

Chapter 1   Introducing Business Process Testing Enterprise Extension

Provides an introduction to using Business Process Testing Enterprise Extension.

Chapter 2   Setting Up Business Process Testing Enterprise Extension

Describes the licensing, system requirements, and compatibility requirements of Business Process Testing, and describes the installation procedure for the QuickTest Professional Add-in for Business Process Testing. It also describes how to configure QuickTest to work with Business Process Testing Enterprise Extension.

Chapter 3   Getting Started with the Business Components Module

Provides an overview of the Business Components module in Quality Center, and describes the component tree and component grid views. 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 4   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 project documents that include component information.

Chapter 5   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 Design Steps tab.

Chapter 6   Working with Automated Component Steps

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

Chapter 7   Working with Flows

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

Chapter 8   Learning Flows

Describes how to learn a flow automatically by navigating your enterprise application.

Chapter 9   Getting Started with Business Process Testing in the Test Plan Module

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

Chapter 10   Managing Business Process Tests

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

Chapter 11   Working with Parameters

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

Chapter 12   Defining Run Conditions

Describes how to add run conditions to your flows, enabling you to run business components selectively, depending on parameter values of previous business components in a flow.

Chapter 13   Detecting and Resolving Changes

Describes how you can detect changes in your application that necessitate modifications to your flows, and how you can instruct Business Process Testing Enterprise Extension to make these modifications automatically.

Enterprise Extension Documentation Library

The Documentation Library is a help system that describes how to use the application. When using Business Process Testing Enterprise Extension in the Quality Center application, you can access the Quality Center Documentation Library or the Business Process Testing Enterprise Extension Documentation Library.

➤ **Quality Center Documentation Library.** When working in any module other than the **QuickTest Professional** module, you can access the Quality Center Documentation Library in the following ways:

➤ Select **Documentation Library** in the **Help** menu to open the Quality Center Documentation Library home page. The home page provides links to the Quality Center guides and references.

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

➤ **Business Process Testing Enterprise Extension Documentation Library.** When working in the Business Process Testing Enterprise Extension module, you can access the Business Process Testing Enterprise Extension Documentation Library by selecting **Help** > **BPT for Enterprise Extension Help**.

➤ **Business Process Testing Enterprise Extension Readme.** Provides last-minute news and information about Business Process Testing Enterprise Extension.

The Documentation Library is best viewed from a browser with Java support. If you do not have Java support on your browser, download the Sun Java plug in from the Sun Java Web site (http://java.com/en/index.jsp). Note that if Java support is not available, the Documentation Library automatically opens using the JavaScript implementation. The JavaScript implementation provides the same basic functionality as the Java implementation, but does not allow use of the Favorites tab within the navigation pane.

Quality Center Documentation Library Guides

The Quality Center 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*)*.

Getting Started explains how to use the Documentation Library and how it is organized. (Available online.)

What's New? describes the newest features in the latest versions of Quality Center. (Available online and in PDF format.)

You can also access the **What's New?** from the Quality Center **Help** menu. In addition, you can select **Help** > **Product Feature Movies** to view short movies which demonstrate the main product features.

Readme provides last-minute news and information about Quality Center.

Quality Center Guides

HP Quality Center User Guide explains how to use Quality Center to organize and execute all phases of the testing process. It describes how to define requirements, plan tests, run tests, and track defects. (Available online and in PDF format.)

HP Quality Center Administrator Guide explains how to create and maintain projects using Site Administration, and how to customize projects using Project Customization. (Available online and in PDF format.)

HP Quality Center Tutorial is a self-paced guide teaching you how to use Quality Center to manage the software testing process. (Available in PDF format.)

HP Quality Center Installation Guide explains how to install Quality Center on a server machine in a cluster environment or as a stand-alone application. (Available in PDF format.)

Business Process Testing Guides

HP Business Process Testing User Guide explains how to use Business Process Testing to create business process tests. (Available online and in PDF format.)

HP Business Process Testing Tutorial provides a self-paced guide that teaches you the basics of Business Process Testing in the Quality Center application. (Available in PDF format.)

API References

HP Quality Center Database Reference provides a complete online reference for the project database tables and fields. (Available online.)

HP Quality Center Open Test Architecture API Reference provides a complete online reference for the Quality Center COM-based API. You can use the Quality Center open test architecture to integrate your own configuration management, defect tracking, and home-grown testing tools with a Quality Center project. (Available online.)

HP Quality Center 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 Quality Center users, projects, domains, connections, and site configuration parameters. (Available online.)

HP Quality Center Custom Test Type Guide provides a complete online guide for creating your own testing tool and integrating it into the Quality Center environment. (Available online.)

Additional Online Resources

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

Troubleshooting & Knowledge Base accesses 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 accesses 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:

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HP Software Web site accesses 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.

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Introducing Business Process Testing Enterprise Extension

HP Business Process Testing Enterprise Extension enables Subject Matter Experts to create business process tests using reusable business components and flows.

This chapter introduces Business Process Testing Enterprise Extension in the HP Quality Center application.

It also describes a typical workflow for working with Business Process Testing Enterprise Extension.

Note: For information on installing and setting up Business Process Testing Enterprise Extension, and on configuring user permissions, see "Setting Permissions for Business Process Testing Enterprise Extension" on page 49 and the *HP Business Process Testing Enterprise Extension Installation Guide*.

This chapter includes:

➤ About Business Process Testing Enterprise Extension on page 18

➤ Understanding the Business Process Testing Model on page 20

➤ Understanding Business Process Testing Integration with QuickTest Professional on page 37

➤ Understanding Business Process Testing Integration with WinRunner on page 43

➤ Working with Scripted Components on page 46

About Business Process Testing Enterprise Extension

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 Enterprise Extension enables Subject Matter Experts to design quality assurance tests for an application early in the development cycle and in a script-free environment.

Note: Some of the functionality described in this guide may not be supported in the Quality Center edition you are using. For more information, see the *HP Quality Center User Guide*.

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

Benefits Of Business Process Testing Enterprise Extension

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

➤ Business process tests for Enterprise Extension 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 Enterprise Extension enables structured testing of an application by combining test automation and automatically generated, easy-to-understand, plain-language test documentation.

➤ Business Process Testing is not dependent on the completion of detailed testing scripts. Applications can be tested manually before automated tests are ready. 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.

➤ 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.

➤ Business Process Testing Enterprise Extension can automatically learn the actions you perform on your applications, and then generate a flow containing components based on the screens and transactions within your application. You can reuse learned components instead of creating new components in your flow.

➤ Business Process Testing Enterprise Extension enables you to run tests and flows on applications in Change Detection mode. This enables you to determine how the application has changed since the test or flow was built.

➤ You can import the application entity hierarchy from your application to the Application Model module within Quality Center. You can then plan your testing process based on the application entity hierarchy.

➤ 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 and WinRunner 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.

Understanding the Business Process Testing Model

Business Process Testing Enterprise Extension is based on the creation and implementation of business components and flows in tests using Quality Center's Business Components module and Test Plan module.

For an example of a common workflow using Business Process Testing Enterprise Extension, see "Business Process Testing Enterprise Extension Workflow" on page 32.

Note: The Business Components module is available only if your Quality Center license includes Business Process Testing. For more information, see "Connecting to Business Process Testing" on page 47.

Designing Business Components, Flows, and Business Process Tests

Business Process Testing Enterprise Extension 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 building blocks of Business Process Testing Enterprise Extension comprise Business Components, Flows, and Business Process Tests.

Business Components

A **Business Component** is a reusable unit that performs a specific task in a business process. 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.

You create business components in the Business Components module by defining the shell of the components, for example, their name, description, status, and implementation requirements. You can use these components to build business process tests and flows even before the application is ready for testing. For information, see Chapter 6, "Working with Business Components."

In addition, when Business Process Testing Enterprise Extension learns a flow, it creates a new business component for each screen or tab through which you navigate in your application. Business Process Testing Enterprise Extension also enables you to identify and reuse learned components instead of creating new components in your flow.

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.

➤ Before automated testing resources are available, you can add manual steps in the Design Steps tab of each component and you can run these steps using the Manual Runner. For information, see Chapter 4, "Designing Manual Component Steps."

➤ After automated testing resources are ready, you can convert your manual components to automated components and begin implementing the automated steps for each component. For information, see Chapter 5, "Working with Automated Component Steps."

Flows

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.

You create flows in the Test Plan module by defining flow details, such as a description and comments. You can also assign attachments to the flow, and associate the flow with other Quality Center records, such as requirements, application entities, and defects. In addition, you can create and configure manual and automatic business components and add them to the flow. For information, see Chapter 9, "Working with Flows."

If you have QuickTest Professional installed with the relevant Add-in, Business Process Testing Enterprise Extension enables you to learn the actions you perform on your application, and then generate a flow containing automated components based on these operations. Business components are generated within the flow, based on the screens and transactions within your application. This enables a Subject Matter Expert, who has a detailed knowledge of your application's systems, to create automated components for testing the applications. The Subject Matter Expert can create these automated components without the involvement of an Automation Engineer, who is an expert in programming and automated testing. For more information, see Chapter 7, "Learning Flows."

You can use **run conditions** to enhance the flexibility of a flow by enabling components to run selectively, based on earlier stages within the flow. For more information, see Chapter 12, "Defining Run Conditions."

Business Process Tests

The **Business Components** module enables Subject Matter Experts to create and manage reusable business components that perform specific tasks in a business process. For information, see Chapter 3, "Getting Started with the Business Components Module."

The **Test Plan** module enables Subject Matter Experts to build and configure business process tests and flows by combining business components into an effective testing structure representing the main tasks performed within a business process. For information, see Chapter 8, "Getting Started with Business Process Testing in the Test Plan Module."

Business Process Testing Enterprise Extension enables you to run flows and tests on applications in Change Detection mode. This enables you to determine how the application has changed since the test or flow was built, such as whether controls in the user interface were added, deleted, or changed. For each change detected, Business Process Testing Enterprise Extension offers you a choice of ways to resolve the change, such as opening a defect if the change detected in the application is a defect, or removing a step from one of the components in the test or flow if the change detected in the application is correct. Change detection and resolution simplify component maintenance, thereby reducing the effort needed to invest in automated testing. For more information, see Chapter 14, "Detecting and Resolving Changes."

Business Process Testing Enterprise Extension includes the Application Model module. You can import the application entity hierarchy from your application to the Application Model module, enabling you to model your application within Quality Center. You can then associate entities in the Application Model module with tests, flows, and business components, enabling you to plan your testing process based on the application entity hierarchy. For more information on the Application Model module, see Chapter 15, "Working with Application Model Entities in Quality Center."

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

Parameterization

Quality Center enables you to expand the scope of business components (both manual and automated), flows, and business process tests by replacing fixed values with component, flow, and run-time **parameters**. This process greatly increases the power and flexibility of your component, flow, or test. For information on component and flow parameterization, see Chapter 11, "Working with Parameters."

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

Parameterization Example

For example, if you wanted 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:

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).

This means that 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.

Running Business Process Tests and Viewing Results

Before automated parts of the test are ready, you can perform a manual run of the business process test or flow.

After you automate 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. Both QuickTest and WinRunner 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 or WinRunner.

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.

Understanding Version Control

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

For information on enabling version control for a project, see the *HP Quality Center Administrator Guide*.

In a version control enabled project, you can create and manage your business process tests, flows, and components while maintaining previous versions of these entities.

You check out an entity to make changes. When you check out an entity, Quality Center locks it, preventing other users from overwriting any changes you make. The checked out version of the entity is not visible to other users. Then you check in the entity to store the changes, and make the new version available to other users. You can view and compare previous versions of an entity, or restore a previous version.

When you create a new component, Quality Center automatically checks it out. When you create a new test or flow, you can choose whether to immediately check it out. A component version includes its properties (including user defined fields), text descriptions and comments, and screenshot. It does not include linked entities or the business process tests or flows that contain that component.

You can create and manage entities in a version control enabled project in both the tree and grid views.

Note: The option to check WinRunner components in and out of a version-controlled project in Quality Center is not available from the WinRunner menu. When working in a version-controlled project in Quality Center, WinRunner components can be checked in and checked out using Quality Center only (using the same process as with any other Quality Center entity). For more information on using the versioning functionality in Quality Center, see the *HP Quality Center User Guide*.

➤ In the Component Tree view, a component checked out by the current user is displayed with an open green lock icon . A component checked out by another user is displayed with a red lock icon , together with the name of the user. No lock icon indicates that the component is checked in.

➤ In the Component Grid view, you can include additional columns, such as **Version Number** and **Version Status**.

You work with version-controlled entities in Business Process Testing in the same way as you do with version-controlled entities in other Quality Center modules. For information on working with version control in Quality Center, see the *HP Quality Center User Guide*.

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 referred to in this guide:

➤ Subject Matter Expert

➤ Automation Engineer

However, these roles are flexible and depend on the abilities and time resources of the personnel using Business Process Testing Enterprise Extension. There are no product-specific rules or limitations controlling which roles must be defined in a particular organization, or which types of users can do 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, Quality Center enables you to configure access permissions for users. For more information, see "Setting Permissions for Business Process Testing Enterprise Extension" on page 49, or see the *HP Quality Center 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 and identify the key business activities that are common to multiple business processes.

Using the Business Components module, the Subject Matter Expert creates business components that describe the specific tasks that can be performed in the application, and the condition or state of the application before and after those tasks. The Subject Matter Expert then defines the individual steps for each business component comprising the business process in the form of manual, or non-automated steps.

These manual steps can later be automated by defining them as keyword-driven or WinRunner components and implementing the automated steps.

Using the Test Plan module, the Subject Matter Expert combines the business components into business process tests or flows, composed of a sequence of components.

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.

The Subject Matter Expert configures the values used for business process tests and flows, runs them in test sets, and reviews the results. The Subject Matter Expert is also responsible for maintaining the testing steps for each of the individual business components.

Automation Engineer

The Automation Engineer is an expert in QuickTest Professional or WinRunner 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 populates the shared object repository with objects that represent the different objects in the application being tested. The Subject Matter Expert then uses these objects to create steps in keyword-driven business components.

Automation Engineers can also create, debug, and modify business components in QuickTest or WinRunner if required. For more information, see the *HP QuickTest Professional for Business Process Testing User Guide* or the *HP WinRunner User's Guide*.

Introducing Business Process Testing Terminology

The following terminology, specific to Business Process Testing, is used in this 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 or WinRunner.

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 Run-Time 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.

Component Input Parameters. Variable values that a business component can receive and use as the values for specific, parameterized steps in the component.

Component Output 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.

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 Quality Center and the Automation Engineer in QuickTest or WinRunner.

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 Quality Center to create business components, flows, and business process tests.

Business Process Testing Enterprise Extension Workflow

This section provides an example of a common workflow using Business Process Testing Enterprise Extension, including automatic learning of flows. The actual workflow in an organization may differ for different projects, or at different stages of the application development life cycle. All stages in this workflow can be performed by a Subject Matter Expert, without the involvement of an Automation Expert.

The workflow consists of the following stages:
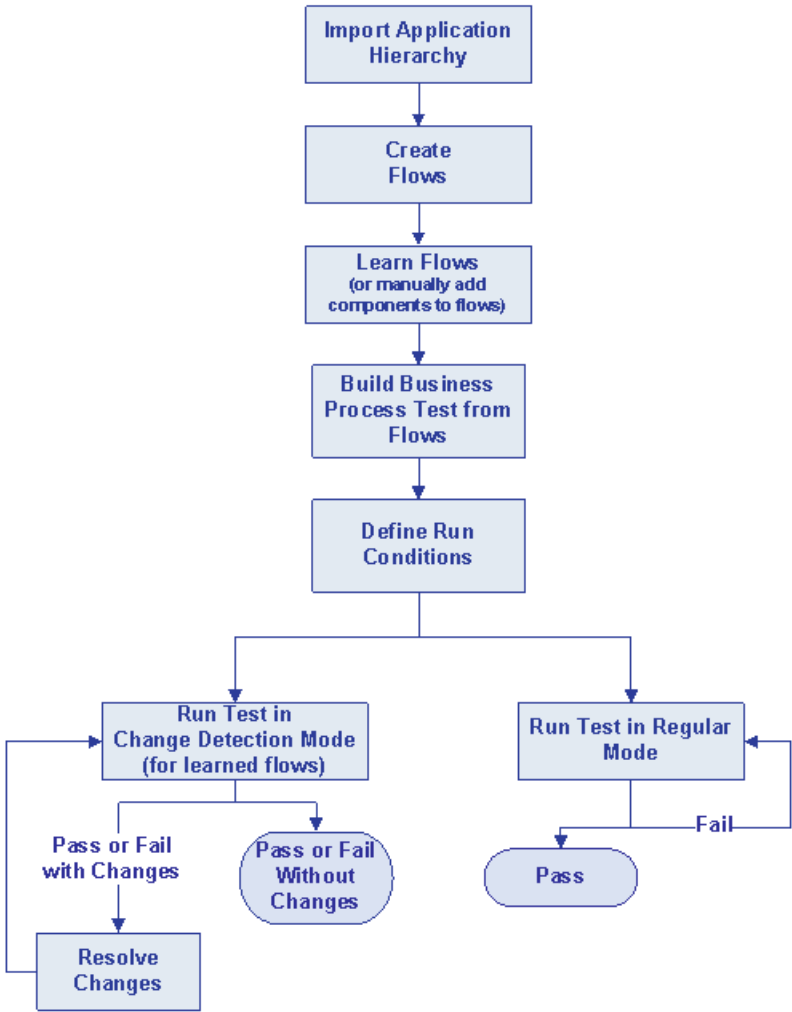
This section includes:

- ➤ "Importing the Application Hierarchy" on page 34
- ➤ "Creating Flows" on page 34
- ➤ "Learning Flows" on page 35
- ➤ "Building Tests from Flows" on page 35
- ➤ "Defining Run Conditions" on page 35
- ➤ "Running Tests in Regular Mode" on page 36
- ➤ "Running Tests in Change Detection Mode" on page 36
- ➤ "Resolving Changes" on page 36

Importing the Application Hierarchy

The Application Model module enables you to manage a hierarchical representation of the entities in your application. You can choose to import entities from your application, and add and modify application entities and folders. This enables Business Process Testing Enterprise Extension to create associations automatically between application entities in the Application Model module and the business components created when learning flows automatically.

For more information on importing the application hierarchy, see Chapter 15, "Working with Application Model Entities in Quality Center."

Creating Flows

You create flows in the Test Plan module. You can provide details to the flow, such as a description and comments. You can also assign attachments to the flow, and associate the flow with other Quality Center records, such as requirements, defects, and application entities. In addition, you can create and configure manual and automatic business components and add them to the flow.

For more information, see Chapter 9, "Working with Flows."

Learning Flows

Business Process Testing Enterprise Extension offers the option to automatically learn the steps that comprise a transaction, as you navigate your application. Business Process Testing Enterprise Extension creates automated business components corresponding to screens and transactions in your application, and creates component steps based on the operations you perform. These components are then added to the flow. During the learning process you can insert checkpoints and output values.

When you learn flows, Business Process Testing Enterprise Extension automatically creates component input parameters for controls in the user interface that require user input, such as text fields. The default value for these parameters is the value you insert in these fields during the Learn Flow process.

You also have the option to reuse existing components in your flow, instead of creating new components in your project.

For more information, see Chapter 7, "Learning Flows."

Building Tests from Flows

You build a business process test from the flows that were created in the Learn Flow process. In addition, you can include other flows, and manual and automatic business components.

For more information, see "Adding Flows to Business Process Tests" on page 277.

Defining Run Conditions

You can use run conditions to insert condition statements into your flows. A **run condition** checks the current value of a given parameter before running a component in a flow. Based on the parameter's value and the run condition's definition, Business Process Testing determines whether to run the component or flow, skip to the next component and continue, or end the run.

For more information, see Chapter 12, "Defining Run Conditions."

Running Tests in Regular Mode

You run a business process test containing flows as you would a regular business process test.

For more information on running business process tests, see Chapter 13, "Running Business Process Tests and Flows."

Running Tests in Change Detection Mode

If your test includes flows learned automatically, you can run the test in Change Detection mode. When you run a test in Change Detection mode, Business Process Testing Enterprise Extension checks whether elements in your application have changed since the flow was learned. This enables you to later update your flows to reflect these changes.

For more information on detecting changes, see "Detecting Changes" on page 451.

Resolving Changes

When a test or flow that ran in Change Detection mode is complete, you can view a report detailing the status of each flow, business component, and component step in your test, including whether objects used in your steps have changed in your application. If changes were detected during the test run, you are offered a variety of options for resolving them, such as removing an obsolete step from a component, or reporting a defect.

After you resolve the changes and update your flows and tests, you can run additional testing cycles to further test your application.

For more information on resolving changes, see "Resolving Changes" on page 465.

Understanding Business Process Testing Integration with QuickTest Professional

As already described, 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 Quality Center.

When QuickTest is connected to a Quality Center project with Business Process Testing Enterprise Extension, the Automation Engineer can define objects in the object repository and save them in Quality Center. The objects are then available for insertion into component steps by the Subject Matter Expert in Quality Center. In addition, all business component information is visible in QuickTest.

A number of options are recommended or must be set in QuickTest to take advantage of all Business Process Testing Enterprise Extension features. For more information, see "Configuring QuickTest to Work with Business Process Testing Enterprise Extension" on page 53.

Integration between the two applications 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 offers two types of automated components; keyword-driven components and scripted components. The automated steps of keyword-driven components can be created and edited by the Subject Matter Expert in Quality Center. Scripted component steps can be created and maintained only in QuickTest.

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 as follows:
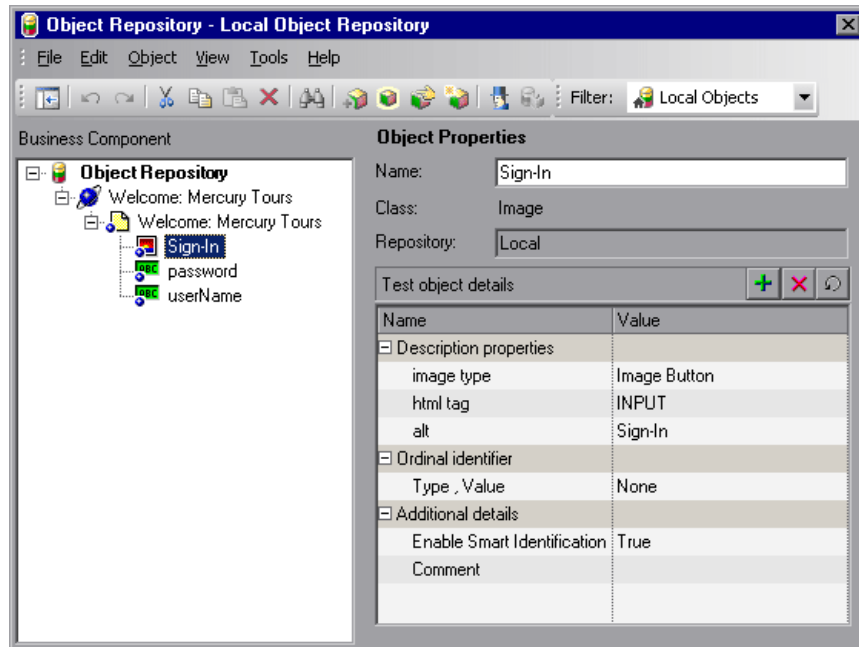
The Automation Engineer encapsulates all the activities and steps that require programming into a set of function libraries. These function libraries define the operations (or keywords) that your test needs to perform. With keyword-driven components, the Subject Matter Expert can use these operations to create the component steps in the Business Components module in Quality Center.

The object repository location and associated function libraries for each part of the application being tested are specified by the Automation Engineer in an **application area**. The application area contains all of the settings, configurations, 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.

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 based on a specific application area. Application areas include the resources and settings described in Business Component Resources and Settings, below.

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 (see page 40)

➤ Function Libraries (see page 40)

➤ Associated Add-ins (see page 40)

➤ Applications List (see page 41)

➤ Recovery Scenarios (see page 41)

The resources and settings in the application area apply to all components that are associated with it. The Automation Engineer can create multiple application areas for different purposes. Each QuickTest 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 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 Quality Center, 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 recognizes and that can be tested using that business component. Each add-in is associated with a development environment. For example, QuickTest 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 Quality Center runs the test. Add-ins associated with other components in the business process test are not loaded.

Note: Quality Center 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 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 "Understanding Application Areas" on page 136.

Applications List

QuickTest 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 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. The actual workflow in an organization may differ for different projects, or at different stages of the product development life cycle.
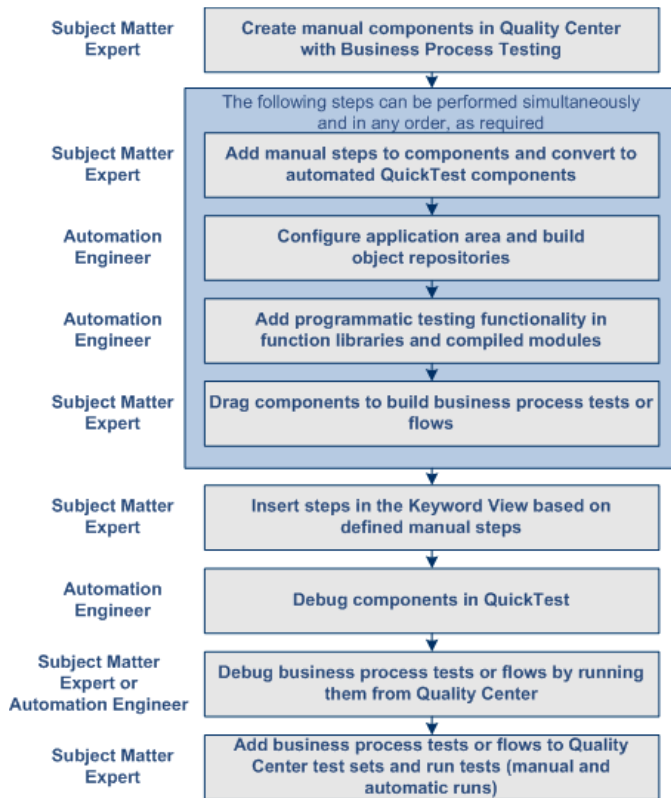
Understanding Business Process Testing Integration with WinRunner

When WinRunner is connected to a Quality Center project with Business Process Testing, you can create scripted components in WinRunner and save them in the component tree in the Business Components module. You can also save existing WinRunner tests as scripted components.

Integration between the two applications enables the Subject Matter Expert to convert manual components to WinRunner automated components and to include scripted components in business process tests. However, scripted components cannot be edited in Quality Center. You can open WinRunner directly from the Business Components module to view or edit the scripted component.

Note: The option to check WinRunner components in and out of a version-controlled project in Quality Center is not available from the WinRunner menu. When working in a version-controlled project in Quality Center, WinRunner components can be checked in and checked out using Quality Center only (using the same process as with any other Quality Center entity). For more information on using the versioning functionality in Quality Center, see the *HP Quality Center User Guide*.

Associated Add-ins

The specified set of WinRunner Add-ins that is associated with the business component determines the types of objects that WinRunner recognizes and that can be tested using that business component. Each add-in is associated with a development environment. For example, WinRunner includes built-in add-ins for testing in Web, ActiveX, PowerBuilder, and Visual Basic environments.
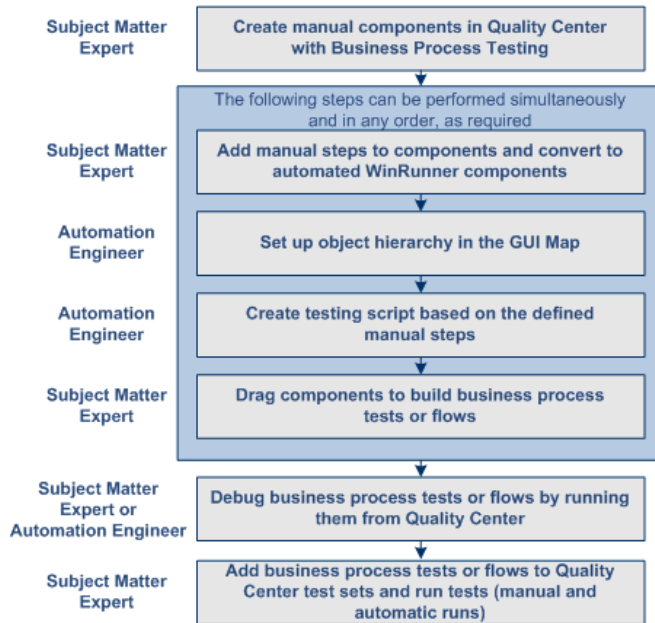
Note: Add-ins are not automatically associated with manual components in WinRunner. To associate one or more add-ins to a component, open the Add-ins tab from **File** > **Scripted Component Properties**, select the required add-in check box(es), and then save the component.

When you convert manual components to automated components, the add-ins associated with the first WinRunner component in a business process test are automatically loaded in WinRunner when Quality Center runs the test. Add-ins associated with other WinRunner components in the business process test are not loaded.

Note: Quality Center assumes that the add-ins associated with the first WinRunner component in a business process test are required for all the WinRunner components in the same test. Therefore, it is important to ensure that all required add-ins are associated with the first business component in the test.

Business Process Testing Workflow Using WinRunner

The following is an example of a common Business Process Testing workflow using WinRunner. 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 WinRunner components**
Automation Engineer	**Set up object hierarchy in the GUI Map**
Automation Engineer	**Create testing script based on the defined manual steps**
Subject Matter Expert	**Drag components to build business process tests or flows**
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)**

Working with Scripted Components

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 and WinRunner. They cannot be modified by the Subject Matter Expert in Quality Center, but you can include these scripted components in any business process tests.

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

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

For information on creating and editing scripted components in WinRunner, see the *HP WinRunner User's Guide* for version 8.2 or later.

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.

2

Setting Up Business Process Testing Enterprise Extension

This chapter describes how to set up procedures and settings for Business Process Testing Enterprise Extension in the Quality Center application.

It also describes how to configure QuickTest to work with Business Process Testing Enterprise Extension.

This chapter includes:

➤ Connecting to Business Process Testing on page 47

➤ Customizing Business Process Testing on page 48

➤ Setting Permissions for Business Process Testing Enterprise Extension on page 49

Connecting to Business Process Testing

You work with Business Process Testing Enterprise Extension by clicking the **Business Components** module button in the sidebar of Quality Center. If the **Business Components** module button is not displayed in the sidebar, one of the following may be the cause:

➤ You are connected to a Quality Center server without Business Process Testing. Disconnect from your current Quality Center server and reconnect to a server with Business Process Testing.

➤ No Business Process Testing licenses are currently available on the Quality Center server. Contact your Quality Center Site Administrator or see the *HP Quality Center Administrator Guide*.

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

Customizing Business Process Testing

You can customize your Business Process Testing project in Quality Center to suit your environment and unique testing requirements.

For more information, see:

➤ "Customizing Business Process Testing Entities" on page 48

➤ "Writing Workflow Scripts" on page 49

Customizing Business Process Testing Entities

Business Process Testing entities have system fields that contain information about components, such as name and status. You can modify the behavior of these fields by restricting users to selecting values only from associated lists, by making entry in certain fields mandatory, and by preserving a history of values entered in the fields.

You can also include data unique to your project by creating user-defined fields for components. User-defined fields added to business components are displayed in the Details tab of the component.

For more information on customizing projects in Quality Center, see the *HP Quality Center Administrator Guide*.

Writing Workflow Scripts

You can write workflow scripts to customize the actions that Business Process Testing users can perform, and the fields that are available to users in dialog boxes.

During a user session, as the user initiates various actions, Quality Center triggers event procedures. By adding VBScript code to the event procedures, you can write a workflow script that customizes the execution of the associated user actions. The code you add to the event procedures can access Quality Center objects.

The Script Editor (available in Quality Center from **Tools** > **Customize** > **Workflow** > **Script Editor**) lists the event procedures for each Quality Center module, and allows you to add your code to the appropriate procedure. For more information, see the *HP Quality Center Administrator Guide*.

Setting Permissions for Business Process Testing Enterprise Extension

Quality Center enables the Project Administrator to control access to a project by defining which users can log in to the project and by specifying the types of tasks each user may perform.

Each project user is assigned to one or more user groups. Each group has a set of permissions that provides access to certain Quality Center modules and tasks, for example, modifying components in the Business Components module. These settings are defined in Quality Center Project Customization.

Setting user group permissions for the Business Components module is described in this section. For more information on managing users, user groups, and permissions in projects in general, see the *HP Quality Center Administrator Guide* and the *HP Business Process Testing Enterprise Extension Installation Guide*.

When setting user group permissions, consider the following:

➤ To work with component steps, you must have the appropriate **Add Step**, **Modify Step**, or **Delete Step** permissions set. You do not need **Modify Component** permission to work with component steps. The **Modify Component** permission enables you to work with component properties (the fields in the component Details tab).

➤ To work with flows, you must have the same permission settings as those for working with tests. For more information on configuring user group permission settings, see the *HP Quality Center Administrator Guide*.

➤ To work with parameters in Quality Center or in a testing tool, you must have all the parameter task permissions set in Quality Center.

➤ To work with application areas in QuickTest, you must have **Add Step**, **Modify Step**, **Delete Step**, and **Modify Component** permissions in Quality Center. If you do not have permission for all four of these tasks, the application area opens in read-only format.

➤ When setting group permissions, you can limit the capabilities of modifying or deleting a field value, so that only the user who owns the record can change or delete the value. The default owner of the Quality Center Business Component object is defined in the **Created By** field.

➤ To learn a flow, a user must belong to a user group that has the following task permissions: **Modify Folder (Test Plan), Modify Test, Add Component Folder, Add Component, Add Step, Add Parameter, Modify Component, Modify Step, Modify Parameter**.

➤ To detect changes in **Change Detection** mode, a user must belong to a user group that has permissions for the **Run** task, and permissions to modify tests and business components.

To set user group permissions:

1 In Quality Center, select **Tools > Customize**. The Project Customization window opens.

2 Click the **Set Up Groups** link and access the applicable Permission Settings dialog box, as described in the *HP Quality Center Administrator Guide*.

3 Click the **Business Components** tab.

The tab displays the tasks available in the Business Components module.
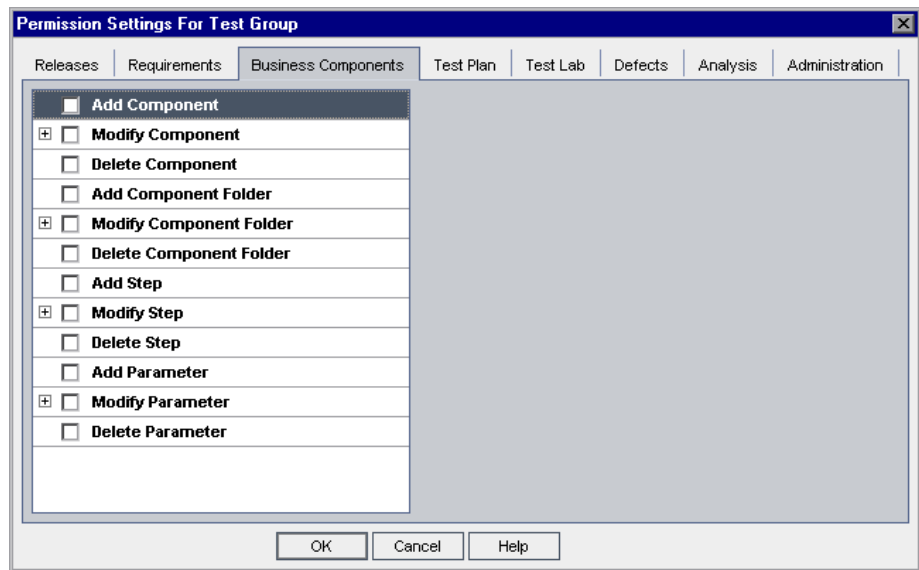
4 Select the tasks that the selected user group can use. For more information on the available tasks, see "Business Component Tasks" on page 52.

When you select a task with a sublevel, a list of associated fields is displayed below the task. All the associated fields are automatically selected. Select or clear the check boxes as required.

When you select a task that can be modified by the owner of the item only, an additional check box option is displayed on the right of the tab. Select this check box as required.

5 After you have defined permissions for the selected user group, click **OK** to close the Permission Settings dialog box.

6 Click **Apply** to save your changes, or click **Exit** to save your changes and close the Set Up Groups dialog box.

Business Component Tasks

The Business Components tab displays the tasks available to user groups in the module:

Task	Description
Add Component	Add components to the component tree.
Modify Component	Modify component properties. This task enables you to specify the properties (fields) that the selected user group can modify. To ensure that only the owner of the component can modify component properties, select the **Can be modified by owner only** check box.
Delete Component	Delete components from the component tree. To ensure that only the owner of the component can delete it, select the **Can be deleted by owner only** check box.
Add Component Folder	Add folders to the component tree.
Modify Component Folder	Modify folder properties in the component tree. This task enables you to specify the properties (fields) that the selected user group can modify.
Delete Component Folder	Delete folders from the component tree. To ensure that only the owner of the folder can delete it, select the **Can be deleted by owner only** check box.
Add Step	Add steps to the component.
Modify Step	Modify steps in the component. This task enables you to specify the fields that the selected user group can modify.
Delete Step	Delete steps in the component. To ensure that only the owner of the step can delete it, select the **Can be deleted by owner only** check box.

Task	Description
Add Parameter	Add parameters to the component.
Modify Parameter	Modify parameters in the component. This task enables you to specify the fields that the selected user group can modify.
Delete Parameter	Delete parameters in the component. To ensure that only the owner of the parameter can delete it, select the **Can be deleted by owner only** check box.

Configuring QuickTest to Work with Business Process Testing Enterprise Extension

A number of options are recommended or must be set in QuickTest to take advantage of all Business Process Testing Enterprise Extension features.

To enable QuickTest to work with Business Process Testing Enterprise Extension:

Open QuickTest. Select **Tools** > **Options** and click the **Run** node. Ensure that the **Allow other HP products to run tests and components** check box is selected in the Run pane.

For details on configuring QuickTest to work with enterprise applications, see "Configuring QuickTest to Work with Business Process Testing for Enterprise Extension Features" on page 486.

3

Getting Started with the Business Components Module

The Business Components module enables Subject Matter Experts with a high-level knowledge of their application to create and manage business components in Quality Center. These components provide the basis for Business Process Testing Enterprise Extension.

This chapter introduces the Business Components module. Chapter 6, "Working with Business Components" describes how to work with the features and other options available in the Business Components module.

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test applications in specific environments.

This chapter includes:

About Getting Started with the Business Components Module

You create and manage business components in Quality Center's Business Components module. Components perform specific tasks in a business process, and are used as the building blocks of business process tests and flows.

The Business Components module enables you to define the business component's shell, which comprises an overview of the information that is required at the test-creation level. You can also define manual steps for the component, and then choose whether to convert it to an automated QuickTest keyword-driven component, QuickTest scripted component, or WinRunner 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 access the Business Components module by clicking the **Business Components** module button in the Quality Center sidebar.

To access a business component in the Business Components module:

1 Log in to your Quality Center project as described in the *HP Quality Center User Guide*. The Quality Center window opens.

> **Note:** After login, Quality Center displays the module in which you last worked.

2 Click the **Business Components** module button in the sidebar. The Business Components module opens.

> **Note:** If the **Business Components** module button is not displayed in the sidebar, see "Connecting to Business Process Testing" on page 47.

3 If the Component Grid view is displayed, select **View > Component Tree**. For information on the component grid, see "Introducing the Component Grid" on page 101.

4 Expand a component folder in the component tree and select a business component. The Details tab of the component opens.

Tips:

➤ For information on how to expand folders in the component tree and view business components, see "Viewing and Modifying Business Components" on page 187.

➤ You can switch between the Quality Center modules using CTRL+SHIFT+<number> shortcut keys. The number represents the sequential order in which the module is displayed in the module sidebar. For example, if Requirements is the first module, press CTRL+SHIFT+1. If Business Components is the second module, press CTRL+SHIFT+2.

➤ You can view and work with all the business components in the current project simultaneously by switching from the Component Tree view to the Component Grid view. For more information, see "Introducing the Component Grid" on page 101.

Introducing 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.
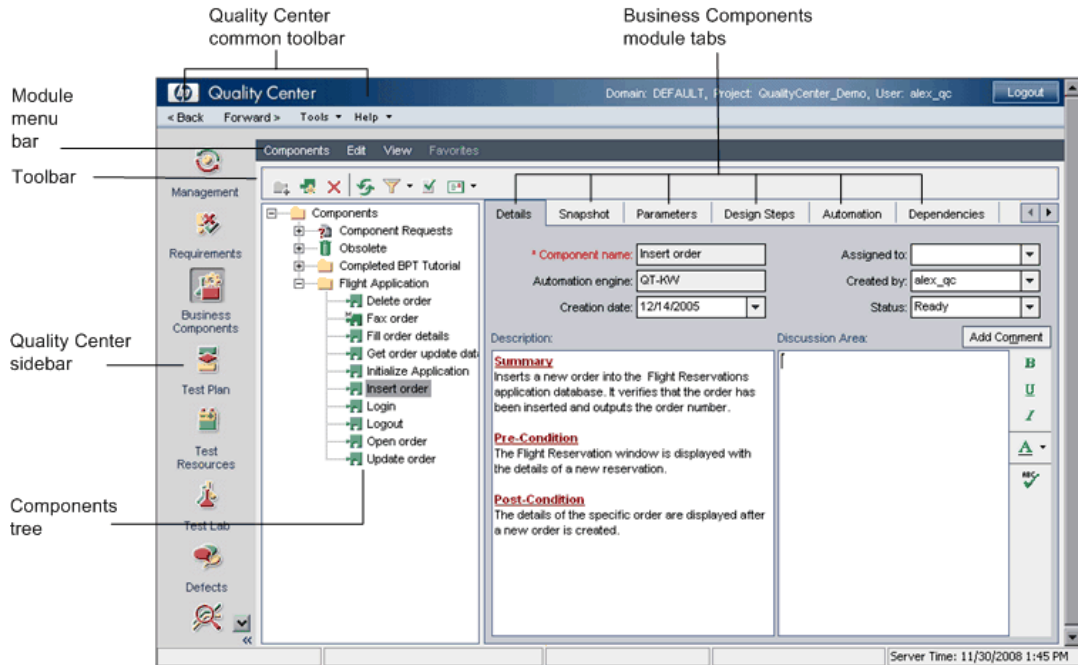
When a business component is selected in the component tree, the Business Components module contains the following key elements:

➤ **Components Module menu bar.** Contains menus with Business Components module commands. For more information, see "Components Module Menu Bar" on page 61.

➤ **Components 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, filter and sort the components displayed in the tree, and validate components. For more information, see "Components Toolbar" on page 61.

➤ **Component tree.** Enables you to construct and organize the hierarchy of your business component folders and individual business components. For more information, see "Component Tree" on page 63.

➤ **Business Components module tabs**:

- ➤ **Details tab.** Enables you to specify details and implementation requirements for the currently selected business component. For more information, see "Details Tab" on page 70.

- ➤ **Snapshot tab.** Enables you to capture a snapshot image from the application and attach it to the currently selected business component. For more information, see "Snapshot Tab" on page 72.

- ➤ **Parameters tab.** Enables you to define input and output component parameters and 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 more information, see "Parameters Tab" on page 73.

- ➤ **Design Steps tab.** Enables you to create or view the manual steps of your business component, and to automate it if required. For more information, see "Understanding the Design Steps Tab" on page 76.

- ➤ **Automation 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 Automation Tab" on page 84.

- ➤ **Dependencies tab.** Displays the dependency relationships between components, tests, flows, resources, and application areas. For more information, see "Understanding the Dependencies Tab" on page 92.

- ➤ **History tab.** Displays a log of changes made to the component. For more information, see "Understanding the History Tab" on page 95.

- ➤ Application Entities tab. Displays the application entities associated with the business component. For more information on the functionality provided by the Application Entities tab, see "Associating Application Entities with Business Components" on page 523.

Components Module Menu Bar

The Components Module menu bar in the Component Tree view contains the following menus:

➤ **Components.** Contains commands that enable you to create business components and folders, validate business components, 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, work with filters, and toggle between the Component Tree view and the Component Grid view.

➤ **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 210.

➤ **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 Quality Center, see the *HP Quality Center User Guide*.

Tip: You can access many of the menu and toolbar commands by right-clicking in panes or on items in the component tree to access context menus.

Components Toolbar

The Components toolbar above the component tree contains the following buttons:

➤ **New Folder.** Adds a new folder to the component tree below the currently selected item.

➤ **New Component.** Adds a new business component to the component folder below the currently selected item.

For more information on adding new folders and business components to the component tree, see "Creating a Component Tree" on page 177.

➤ **Delete.** (DELETE) Removes the currently selected folder or business component from the component tree. The contents of a removed folder are also removed.

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 199.

Tip: Business components that are being used by one or more business process tests or flows can be easily recovered from the **Obsolete** folder if they were deleted accidentally. For more information, see "Restoring Obsolete Business Components" on page 203.

➤ **Refresh All.** Refreshes the data for the currently selected folder or business component.

➤ **Set Filter/Sort.** Enables you to easily locate required component tree items by setting filter or sort preferences. For more information on filtering and sorting tree items, see the *Quality Center User Guide*.

➤ **Validate Component.** Checks the selected business component for any configuration errors and displays the results. For more information on validating components, see "Validating Business Components" on page 197.

➤ **Send E-Mail**. Enables you to send an e-mail about a component to another user. For more information, see "Mailing Components" on page 204.

In a version-controlled project, the Components toolbar displays the following additional buttons for checking in and checking out components.

➤ **Check Out**. Opens the Check Out dialog box, enabling you to check out the selected component.

➤ **Check In.** Opens the Check In dialog box, enabling you to check in the selected component.

For information on working with version control in Quality Center, see the *HP Quality Center User Guide*.

Component Tree

Business components created in the Business Components module, in the Learn Flow process, and in automated testing tools such as QuickTest or WinRunner are displayed graphically in a hierarchical tree. Component requests initiated in the Test Plan module are also displayed in the tree. You can organize components into folders, and filter and sort the components according to your requirements.

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

➤ **Folder.** Folders organize business components in the tree into logical groups.

➤ **Component Requests Folder.** The Component Requests folder contains requests that can be used to create business components.

➤ **Obsolete Folder.** The Obsolete folder contains deleted business components and component requests that are being used by one or more business process tests or flows.

➤ **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, .

Learned Business Component. Components that were created through the Learn Flow process.

For more information on the component icons used in the component tree, see "Business Component Statuses" on page 65.

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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 Quality Center, see the *HP Quality Center User Guide*.

Component Tree Context Menu

The right-click context menu in the component tree includes many of the commands from the menu bar menus and toolbar, as well as the following commands, which provide additional functionality:

➤ **Expand All** and **Collapse.** You can expand any of the folders in the component tree to display all its subfolders and business components, or collapse folders to display only the highest levels in the hierarchy. For information on how to expand and collapse folders, see "Viewing and Modifying Business Components" on page 187.

➤ **Rename.** You can rename folders and business components in the component tree if required. For information on how to rename folders and business components, see "Viewing and Modifying Business Components" on page 187.

➤ **Change Status.** You can change the status of a component without switching to the Details tab. For information on business component statuses, see "Business Component Statuses" on page 65.

➤ **Cut** and **Paste.** You can manage folders and business components in the component tree by using these functions. For information on how to cut and paste folders and business components, see "Viewing and Modifying Business Components" on page 187.

➤ **Copy.** You can copy folders and business components in the component tree if required. For information on how to copy folders and business components, see "Copying Folders and Business Components" on page 191.

In a version-controlled project, the **Versions** option in the right-click context menu includes **Undo Check Out**. This enables you to undo the checkout of a checked in entity and cancel your changes. For information on working with version control in Quality Center, see the *HP Quality Center User Guide*.

Business Component 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.

Knowing the status of a business component is important because it affects the status of any business process tests or flows of which it is a part. In general, 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.

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	Description
Ready		**Green**	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		**Yellow**	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		**Gray**	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.
Under Development		**Gray**	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 or WinRunner.

➤ The status of a learned component is represented similarly. For example, a learned component with a Ready status would be indicated by ▣.

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

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:
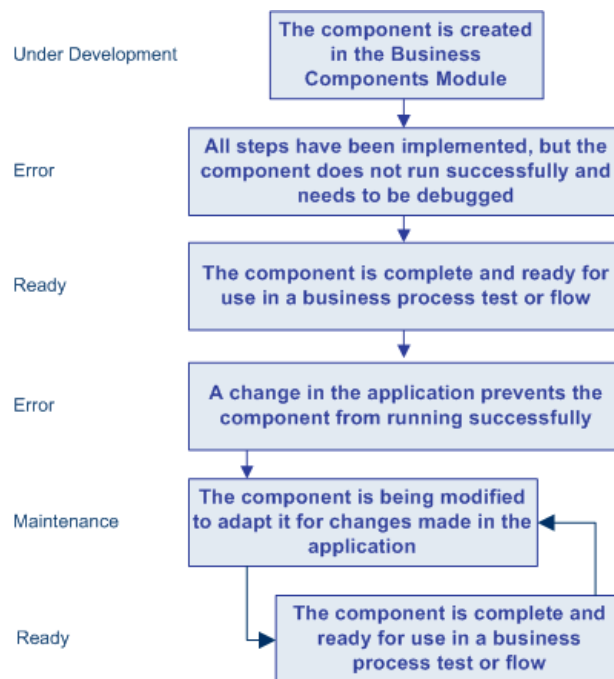
Business Component Tabs

Selecting a business component in the component tree displays several tabs, as described in "Working with Component Tabs" on page 70.

Note: Selecting a folder in the component tree displays a **Description** area that enables you to enter a textual description of the folder contents.

Component Requests

Component Requests are located in the Component Requests folder in the component tree of the Business Components module.
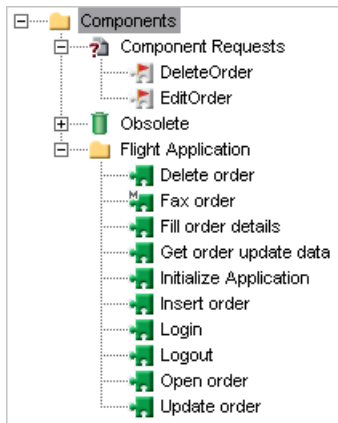
Component requests are initiated in the Test Plan module and are an indication that an additional business component is necessary for the business process test or flow.

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.

You can right-click a component request and then select to delete it. You can also select **Validate Component** from the menu to check whether the component request contains any configuration errors that could halt the successful running of a test or flow.

For more information on transferring component requests from the Component Requests folder to a component folder, see "Handling Component Requests" on page 207.

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 302.

Working with Component Tabs

The tabs in the Business Components module enable you to provide a complete overview of the component's content. You can detail its input and output parameters, design component steps, view changes, automate the component, and view the business process tests or flows for which it is used. You can also provide a snapshot associated with the component.

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 according to your requirements by choosing alternative selections from the drop-down lists.

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; **QT-KW** for a QuickTest keyword-driven component, **QT-SCRIPTED** for a QuickTest scripted component, **WR-AUTOMATED** for a WinRunner component, and **SERVICE-TEST-AUTOMATED** for a Service Test component. **MANUAL** is displayed for a component that has not been automated.

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

➤ **Creation Date.** The date that the business component was created.

➤ **Status.** The status of the business component. For information on business component statuses, see "Business Component Statuses" on page 65.

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

➤ **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 Quality Center.

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

➤ **Discussion Area.** The **Discussion 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.

For more information on the Details tab for a business component, see "Providing Component Details and Implementation Requirements" on page 180.

Snapshot Tab

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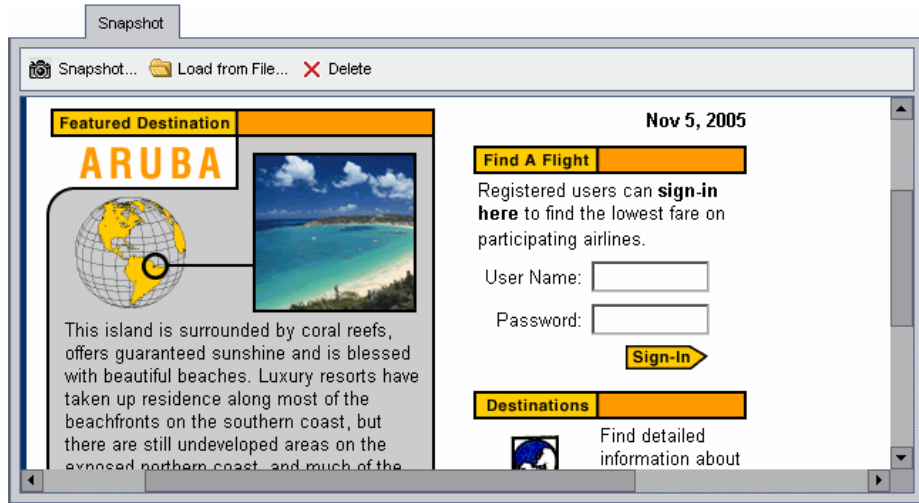
The Snapshot tab toolbar contains the following buttons:

➤ **Snapshot.** Opens the Snapshot dialog box. For information on how to use the Snapshot dialog box, see "Attaching an Image to a Business Component" on page 184.

➤ **Load from File.** Enables you to load a previously saved **.png** or **.bmp** file containing the snapshot. For information on how to load snapshot files, see "Loading an Image" on page 185.

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

For more information on the Snapshot tab, see "Attaching Images" on page 184.

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.

The Parameters tab contains the following panes:

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

The value type, such as string, number, or date, defines the type of input value expected from the external source.

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

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

The Input and Output panes in the Parameters tab each contain the following buttons:

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

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

➤ **Move Parameter Up/Move Parameter Down.** Enables you to move the selected parameter up or down in the list.

For more information on the Parameters tab, see Chapter 11, "Working with Parameters."

Design Steps Tab

The Design 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 or WinRunner.

For more information on the functionality provided by the Design Steps tab, see "Understanding the Design Steps Tab" on page 76.

Automation Tab

The Automation tab enables you to add and modify the steps of a business component in a keyword-driven, table format. The appearance and functionality of the Automation tab depends on the development and use of the component selected in the component tree.

For more information on the functionality provided by the Automation tab, see "Understanding the Automation Tab" on page 84.

Dependencies Tab

The Dependencies tab displays the dependency relationships that exist between entities such as components, tests, flows, test resources, and application areas. The tab comprises the Resources, Used By Tests, and Application Area sub-tabs. For more information, see "Understanding the Dependencies Tab" on page 92.

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. For more information on the functionality provided by the History tab, see "Understanding the History Tab" on page 95.

Application Entities Tab

The Application Entities tab enables you to associate application entities directly with a business component. This automatically associates the application entity indirectly with every business process test and flow containing that business component. For more information on the functionality provided by the Application Entities tab, see "Associating Application Entities with Business Components" on page 523.

Understanding the Design Steps Tab

When the Design Steps tab for a new component is first opened in the Business Components module, an editable table is displayed in which you can add manual steps to the component. The new component is called a **manual** component, because it describes the steps that a tester could perform manually (as opposed to automated steps created in a testing tool).

You can include a manual component in a business process test or flow and run its steps manually if required. Alternatively, you can convert a manual component to an automated component and then add automated steps that can be run by a specific testing tool such as QuickTest or WinRunner.

	Step Name	Description	Expected Result
1	Launch Flight Application	Open the Flight Application from C:\Program Files\ QuickTest Professional	The Login dialog box opens.
2	Enter User Name	Enter <<<UserName>>> in the Agent Name box.	
3	Enter Password	Enter <<<Password>>> in the Password box.	
4	Close Login	Click the **OK** button.	The Login dialog box closes. The Flight Reservation page opens.

When an automated keyword-driven component is created in QuickTest, the Design Steps tab provides a view of the component's manual steps in read-only format. You can use these steps to run the component manually.

When an automated scripted component is created in QuickTest or WinRunner, the Design Steps tab provides an editable view of the component's manual steps. You can use and modify these steps to run the component manually.

Although the manual steps are read-only in the Design Steps tab after the component is automated in QuickTest, the content of the manual steps can be updated to match the steps in the automated test by adding special operations to the automated test. The content of manual steps is not updated when scripted components are modified in QuickTest or WinRunner.

The Design Steps tab also displays the steps of a keyword-driven component that was created in QuickTest and saved to the current project.

Working with Rows in the Design Steps Tab

You create each step in the business component as a row in the Design 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 result. When a business process test or flow runs in Quality Center, the steps defined in the associated business components are performed.

Working with Columns in the Design Steps Tab

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

- ➤ Step Name Column
- ➤ Description Column
- ➤ Expected Result Column

Step Name Column

The **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

In the **Description** column, you describe the step procedure to be performed on the application.

Expected Result Column

In the **Expected Result** column, you describe the expected result of performing the procedure described in the Description column.

Working with the Design Steps Tab Toolbar

The Design Steps tab toolbar for a manual component contains the following toolbar buttons:

➤ **Add New Step.** Opens the Component Step Editor, enabling you to add a step below the currently selected step. For more information, see "Understanding the Component Step Editor" on page 81.

➤ **Edit step.** (or double-click a step) Opens the Component Step Editor, enabling you to edit the selected manual step. For more information, see "Understanding the Component Step Editor" on page 81.

➤ **Delete selected steps.** (or press DELETE) Deletes the currently selected step.

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

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

➤ **Create/Select Parameter.** Includes the following options:

➤ **Select Parameter.** Opens the Select Parameter dialog box, enabling you to integrate existing parameters into a component step or expected result. This command is enabled only when your focus is in the **Description** or **Expected Result** cells. For more information, see "Working with the Select Parameters Dialog Box" on page 121.

➤ **Create Parameter.** Opens the Create Parameter dialog box, enabling you to create a new parameter. For more information, see "Working with the Create Parameter Dialog Box" on page 120.

➤ **Complete Parameter Name.** Automatically inserts an existing parameter into a component step description or expected result, based on the first character or characters of the parameter name that you have entered. The parameter is entered in the correct format, for example, <<<parameter_name>>>. This command is enabled only when your focus is in the Description or Expected Result cells.

➤ **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 "Working with the Find Dialog Box" on page 80.

➤ **Adjust row heights.** Enables you to change the row height of the step so that all 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 Design Steps tab. For more information, see "Saving Component Steps" on page 142.

➤ **Automate component.** Enables you to convert the manual component to an automated QuickTest keyword-driven business component, a QuickTest scripted component, or a WinRunner component. For information on how to automate components, see "Automating Components" on page 127.

Using Keyboard Commands in the Design Steps Tab

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Design Steps tab:

➤ ALT+N. Creates a new step

➤ ALT+E. Edits a step

➤ CTRL+P. Opens the Select Parameter dialog box

➤ CTRL+C. Copies the selected component step to the clipboard. Use this button in conjunction with Paste steps

➤ CTRL+V. Pastes the copied component step to a new location

➤ CTRL+R. Opens the Create Parameter dialog box

➤ CTRL+K. Completes the parameter name, based on the first character or characters of the parameter name that you have entered

➤ CTRL+S. Saves the steps that you have created or modified

➤ CTRL+F. Opens the Find dialog box

Working with the Find Dialog Box

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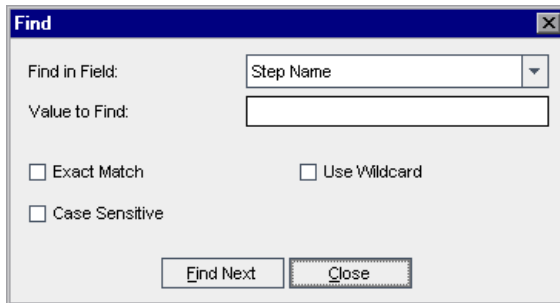
To find a value:

1 In the **Find in Field** box, select the column in which you want to search for a specific value. Select **Any Field** to search in all the columns.

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

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

4 Click the **Find Next** button. Quality Center 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.

Working with the Design Steps Tab Context Menu

You can right-click in the Design Steps tab of a manual component to display a context menu that includes the options from the toolbar. The following command in the context menu also provides additional functionality:

Export To. Enables you to export the information in the tab to several formats.

Exporting Data to a File

You can export the information in the Design 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 Design Steps tab and select **Export To**. Then select the format you require. The Export Grid Data dialog box opens.

2 In the **Save in** box, select a location for the 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 Component Step Editor

The Component Step Editor enables you to add manual steps to your component or edit a selected step. You open the editor from the Design Steps tab by clicking the **Add New Step** or **Edit Step** button in the toolbar or by double-clicking an existing step.

Step Editor Toolbar

Text Toolbar

Component Step Editor

* Step Name   Access Flight application

Description

Click the **OK** button.

Expected Result:

The Login dialog box closes and the Flight Reservation dialog box opens.

B
U
I
A ·

OK   Cancel
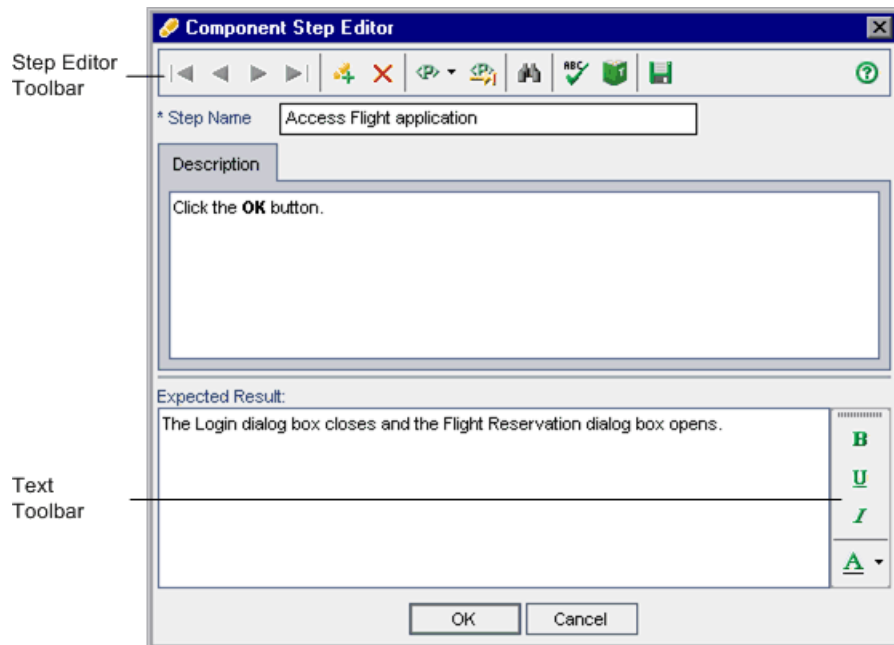
Note: The Component Step Editor provides a comprehensive selection of text editing and formatting commands to assist you in entering textual step information. Right-click in the **Description** or **Expected Result** column to access the commands from the context menu. By default, the **Text** toolbar is hidden. Select **Toolbar Visible** from the context menu to display (or hide) commonly used commands in the **Text** toolbar.

For information on working with the Component Step Editor, see "Designing Manual Steps" on page 113.

The Component Step Editor 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.** Enables you to add a new manual step to the component after the current step. For more information, see "Designing Manual Steps" on page 113.

➤ **Delete Step.** Deletes the currently open step.

➤ **Create/Select Parameter.** Includes the following options:

  ➤ **Select Parameter.** Opens the Select Parameter dialog box, enabling you to integrate parameters into a component step or expected result. This command is enabled only when your focus is in the Description or Expected Result cells. For more information, see "Working with the Select Parameters Dialog Box" on page 121.

  ➤ **Create Parameter.** Opens the Create Parameter dialog box, enabling you to create a new parameter. For more information, see "Working with the Create Parameter Dialog Box" on page 120.

➤ **Complete Parameter Name.** Automatically inserts an existing parameter into a component step description or expected result, based on the first character or characters of the parameter name that you have entered. The parameter is entered in the correct format, for example, <<<parameter name>>>. This command is enabled only when your focus is in the Description or Expected Result areas.

➤ **Find/Replace text.** Opens the Replace dialog box, enabling you to search for and replace data in the tab. Enter the value you want to find and, if relevant, the value with which to replace it. The Replace dialog box also provides **Match whole word only** and **Match case** features.

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

➤ **Thesaurus.** Opens the Thesaurus dialog box, and displays a synonym, antonym, or related word for the selected word. You can replace the selected word or look up new words.

➤ **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 click **OK** in the Component Step Editor. For more information, see "Saving Component Steps" on page 142.

➤ **Help.** (F1) Opens the Online Help for the Component Step Editor.

Using Keyboard Commands in the Component Step Editor

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Component Step Editor:

➤ CTRL+F. Opens the Replace dialog box

➤ F7. Performs a spell check

➤ ALT+HOME. Jumps to the first manual step in the component

➤ ALT+LEFT. Jumps to the previous manual step

➤ ALT+RIGHT. Jumps to the next manual step

➤ ALT+END. Jumps to the last manual step in the component

➤ ALT+N. Enables you to add a new manual step to the component after the current step

➤ CTRL+DELETE. Deletes the currently open step

➤ CTRL+P. Opens the Select Parameter dialog box

➤ CTRL+R. Opens the Create Parameter dialog box

➤ CTRL+K. Completes the parameter name, based on the first character or characters of the parameter name that you have entered

➤ CTRL+F. Opens the Replace dialog box

➤ CTRL+ALT+T. Opens the Thesaurus dialog box

➤ CTRL+S. Saves the component steps that you have created or modified

Understanding the Automation Tab

The content of the Automation tab depends whether the component is automated, and if so, the type of automated component. If the component is not automated, a message is displayed in the tab. You must convert the component to an automated component before using this tab.

The keyword view format of the Automation tab is displayed when:

➤ A business component is automated as a QuickTest keyword-driven component.

➤ A keyword-driven business component is created in QuickTest.

For other component types, such as WinRunner or QuickTest scripted components, the Automation tab does not display the steps but provides a **Launch** button. You can then launch the applicable testing tool and edit the component directly in the tool.

This section describes the different formats of the Automation tab for automated components, as follows:

➤ "Working with the Automation Tab - Keyword View" on page 85

➤ "Working with Columns in the Automation Tab" on page 88

➤ "Working with the Automation Tab - Scripted Components" on page 91

Keyboard shortcuts within the Automation tab are described in "Using Keyboard Commands in the Automation Tab" on page 92.

For more information on the Automation tab, see Chapter 5, "Working with Automated Component Steps."

Working with the Automation Tab - Keyword View

The Keyword View format of the Automation tab is displayed when a component is created in Quality Center and then automated as a QuickTest keyword-driven component, or is created as a business component in QuickTest. The Automation 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.
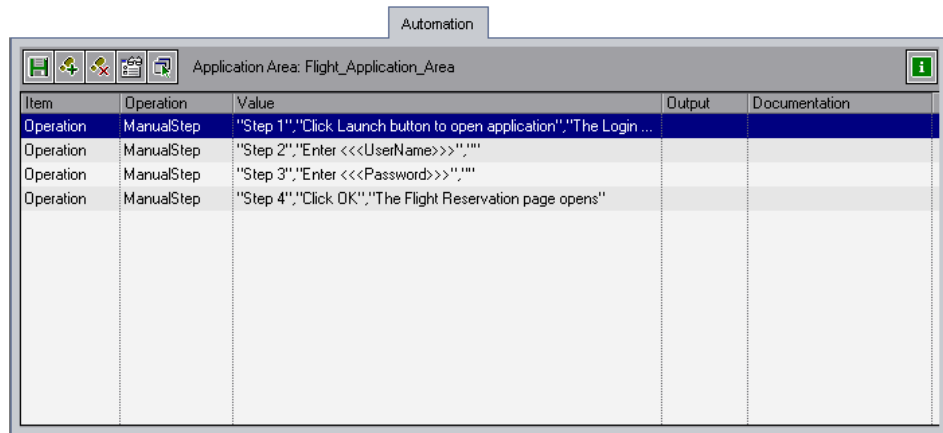
Each step or comment in the component is created as a row in the table. Columns separate the steps into individual parts, which you can modify if required. Each step of a keyword-driven component is automatically documented as you complete it, providing a plain-language textual description of the component. This information makes it easy to review the operations of an implemented (or under development) component.

When creating steps in a component, Automation Engineers working in 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 Quality Center. For more information, see "Checkpoints and Output Values" on page 165.
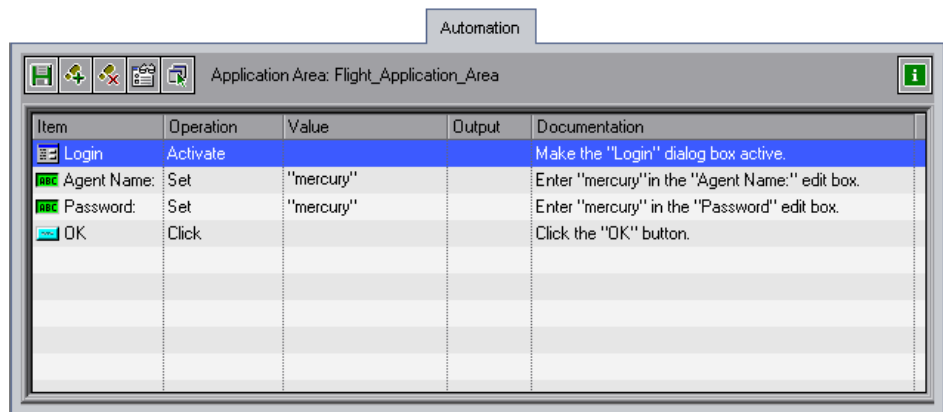
The steps of the following component were created in Quality Center. The component was then automated as a QuickTest keyword-driven component. You can see the automatic conversion of the manual steps that were created in the Design Steps tab before the component was automated:

		Automation			
		Application Area: Flight_Application_Area			
Item	Operation	Value	Output	Documentation	
Operation	ManualStep	"Step 1","Click Launch button to open application","The Login ...			
Operation	ManualStep	"Step 2","Enter <<<UserName>>>",""			
Operation	ManualStep	"Step 3","Enter <<<Password>>>",""			
Operation	ManualStep	"Step 4","Click OK","The Flight Reservation page opens"			

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

		Automation		
		Application Area: Flight_Application_Area		
Item	Operation	Value	Output	Documentation
Login	Activate			Make the "Login" dialog box active.
Agent Name:	Set	"mercury"		Enter "mercury"in the "Agent Name:" edit box.
Password:	Set	"mercury"		Enter "mercury" in the "Password" edit box.
OK	Click			Click the "OK" button.

Automation Tab Toolbar

The Automation tab toolbar for keyword-driven business components contains the following toolbar buttons:

➤ **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 tab. For more information, see "Saving Component Steps" on page 142.

➤ **Add Step.** Enables you to add a step or comment below the currently selected step. For more information, see "Creating Steps in the Keyword View" on page 139.

➤ **Delete Step.** Deletes the currently selected step or comment.

➤ **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 137, or "Changing the Application Area" on page 139.

➤ **View Options.** Opens the Keyword View Options dialog box, enabling you to specify which columns to display in the Automation tab and the order in which they are displayed. For more information, see "Setting Keyword View Options" on page 131.

➤ **Information.** Displays the QuickTest Professional Add-in for Quality Center version installed on your Quality Center client.

Automation Tab Context Menu

You can right-click a selected row in the keyword view Automation tab to display a context menu that includes some of the options from the toolbar, as well as the following commands, which provide additional functionality:

➤ **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.

➤ **Cut.** Deletes the selected row and stores it on the Clipboard.

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

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

Working with Columns in the Automation Tab

You can select which columns to display in the Automation tab, and their order in the tab, according to your requirements. 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 also 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 131.

Note: To view content in the Automation tab, the QuickTest Professional Add-in for Business Process Testing must be installed. For more information, see "Customizing Business Process Testing" on page 48.

The Automation 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 143.

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 161.

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 148.

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 "Working with Parameters in the Keyword View" on page 153.

➤ **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 11, "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 150.

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**.

Working with the Automation Tab - Scripted Components

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 Quality Center, QuickTest Professional, or WinRunner.

However, the individual steps in the scripted component are not shown in the Automation tab, and they can be edited only in QuickTest or WinRunner as appropriate. You can click the **Launch** button in the Automation 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*.

For more information on creating and editing scripted components in WinRunner, see the *HP WinRunner User's Guide* for version 8.2 or later.

Using Keyboard Commands in the Automation Tab

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Automation tab:

➤ CTRL+X. Deletes the selected row and stores it on the Clipboard (from Automation tab)

➤ CTRL+C. Copies the selected row to the Clipboard (from Automation tab)

➤ CTRL+V. Pastes a cut or copied row below the selected row in the tab (from Automation tab)

Understanding the Dependencies Tab

The Dependencies tab displays the dependency relationships that exist between entities such as components, tests, flows, test resources, and application areas. When analyzing the impact of a change proposed in a specific entity, the dependency links indicate the other entities that the change might affect. For example, when deleting a component that is being used by another test or flow.

For details on entity dependencies, see the *Quality Center User Guide*.

To display the Dependencies tab, select a component in the component tree and click the **Dependencies** tab. The Dependencies tab comprises the Resources Tab, the Used By Tests Tab, and the Application Area Tab.

Resources Tab

The Resources tab displays the application area that is used by the component in the Using grid, and entities that can potentially use the component in the Used By grid.

In the Resources tab, you can:

➤ Click the **Show/Hide** arrow to display or hide the Used By or Using grids.

➤ Click the **Refresh** button to refresh the grids.

➤ Select an entity in the grids and click the **Go To** button to view additional details on an entity. Clicking a resource opens the Test Resources module and displays the resource in the tree.

The Used By grid contains the following columns. (This grid does not normally contain any information.)

Column	Description
Owner ID	A unique numeric ID for the related entity. The ID is assigned automatically by Quality Center.
Owner Type	The type of the related entity using the selected component.
Owner Name	The name of the related entity using the selected component.
Owner Description	The description of the related entity using the selected component.

The Using grid contains the following columns:

Column	Description
Related ID	A unique numeric ID for the related application area. The ID is assigned automatically by Quality Center.
Related Type	Although the related entity is an application area, this column displays **Component**.
Related Name	The name of the application area that the selected component uses.
	Note: Quality Center treats application areas different from other entities. Clicking the application area link has no effect.
Related Description	The description of the application area.

Used By Tests Tab

The Used By Tests tab provides details of the business process tests and flows that include the currently selected business component. You can click the test or flow name to jump directly to the test or flow in the Test Plan module.

Application Area Tab

The Application Area tab displays the name of the application area used by the component, as well as Used By and Using grids, which display the entities that use the application area, and the resources that the application area uses.

Note: If the component is not a QuickTest Automated or QuickTest Scripted component, it will not have an application area associated with it.

In the Application Area tab, you can:

➤ Click the **Show/Hide** arrow to display or hide the Used By or Using grids.

➤ Click the **Refresh** button to refresh the grids.

➤ Select an entity in the grids and click the **Go To** button to view additional details on an entity. You can view additional details for the following:

  ➤ **Resources.** Goes to the Test Resources module and displays the resource in the tree.

  ➤ **Components.** Goes to the Business Components module and displays the component in the tree.

The Used By grid contains the following columns:

Column	Description
Owner ID	A unique numeric ID for each component using the application area. The ID is assigned automatically by Quality Center.
Owner Type	Component.
Owner Name	The name of the component using the application area. You can click the name to jump to the component in the Business Components module.
Owner Description	The description of the component using the application area, as specified in the Details tab (in this pane).

The Using grid contains the following columns:

Column	Description
Related ID	A unique numeric ID for each related entity, such as function library or shared object repository, that the application area uses. The ID is assigned automatically by Quality Center.
Related Type	Resource.
Related Name	The name of the related entity that the application area uses, such as a function library, shared object repository, or recovery scenario. You can click the name to jump to the resource in the Test Resources module.
Related Description	The description of the related entity that the application area uses.

Understanding the History Tab

The History tab comprises two sub tabs; the Audit Log Tab, and the Baselines Tab. The History tab is available from both the Component Tree view and the Component Grid view.

> **Note:** The baselines tab is named the **Versions and Baselines** tab in a version-controlled project. For information on working with version control in Quality Center, see the *HP Quality Center User Guide*.

Audit Log Tab

In the Audit Log tab, you can view a list of the changes made to the various fields of a component. For each change, the tab displays the date and time of the change, the name of the user who made the change, and the old and new value of the field.

You can expand each change, or all the changes to view a list of the fields that were modified, or specify which changes are displayed in the tab.

The following list describes the Business Process Testing entities and fields for components that can be viewed in the Audit Log tab. By default, all items in the list except for component Status are disabled, and if required for viewing must be enabled by the project administrator in Project Customization. The change histories of fields that are not on the list are not available for viewing.

For more information on enabling history options for a field, see the *HP Quality Center Administrator Guide*.

Component Entities

Field name	Description
Assigned to	The user to whom the component implementation is assigned.
Automation engine	The automation engine used to automate the component; **QT-KW** for a QuickTest keyword-driven component, **QT-SCRIPTED** for a QuickTest scripted component, **WR-AUTOMATED** for a WinRunner component, or **SERVICE-TEST-AUTOMATED** for a Service Test component. **MANUAL** is displayed for a manual component.
Change Status	Indicates (by displaying **Y** or **N**) whether a change was detected in the last run.
Comments	The comments entered in the Discussion Area of the Details tab.
Component Application Type	Indicates (by displaying **1000**) whether the component is a learnt component.
Component name	The component name.
Deleted on	The date and time that an obsolete component was deleted.
Description	The description of the component entered in the Details tab.
Has Picture	Indicates (by displaying **Y** or **N**) whether a snapshot is attached to the component.
Original Location	The folder in the Components tree in which the business component was located when it was deleted.
Status	The status of the business component. Component statuses are described in "Business Component Statuses" on page 65.

To view the history of changes made to a component:

1 Select a component in the component tree or component grid and click the **History** tab. Then click the **Audit Log** sub tab.

The history of changes made to the component is displayed in a table.

2 Expand a change to view a list of fields modified during the change. For each field, the table displays the old value and the new value. To expand all changes, click the **Expand All** button.

3 You can specify which changes are displayed in the table. In the **Field** list, select a field name to view changes made to that field only. Select **<All>** to view changes made to all fields.

Baselines Tab

In the Baselines tab, you can view the version history for a selected entity, including all previous versions, the name of the user who created each version, and the date each version was created. Baselines enable you to share entities with other Quality Center users in other Quality Center projects.

In a version-controlled project, this tab is named the Versions and Baselines tab, in which you can also view the baseline in which a version is stored.

For more information on working with baselines, see "Using Baselines" on page 100, and the *HP Quality Center User Guide*.

Sharing Entities in Libraries

You can share and reuse the component, test, and flow entities in your project, together with their resources, by using the Libraries tab in the Management module in Quality Center. A library represents a set of entities in a project and the relationships between them.

You can import a library from the same project, or from a different project. Importing a library from another project enables you to reuse an existing set of entities instead of having to recreate them. When you import a library, the library is added to your libraries tree and the library's selected entities, such as flows and components, are copied to the corresponding modules in your project. If the library includes associated entities, this relationship is also copied.

Note: Components in the **Obsolete** and **Component Requests** folders are not included in the library import process.

When changes are made to entities in a library, you can synchronize libraries to update the entities in an associated library. You can also create a baseline, which provides a record of the library at a specific point in time.

For more information on sharing entities in libraries, see the *HP Quality Center User Guide*.

Using Baselines

After you create a library, you can create a baseline, which provides a record of the library at a specific point in time. Baselines enable you to keep track of changes made to your project over time.

You can compare libraries and baselines at all stages of the application development life cycle. For example, you can compare baselines at different stages of development to assess the impact of changes made to requirements in your project. You can then update tests accordingly. You also can compare an imported library with the source library from which it was imported. This enables you to review changes and make decisions about updates to your project.

For more information on working with baselines, see the *HP Quality Center User Guide*.

Introducing the Component Grid

The component grid displays data for all the business components in the current Quality Center project in a single view. This enables advanced search and filtering capabilities. Each row in the grid displays a business component, and each column in the grid displays information about that component.

To view the component grid, select **View** > **Component Grid**.

In the component grid, you can arrange columns, filter and sort business components and their properties according to your needs, find and replace data, and save the component information displayed in the grid in various formats.

Tip: You can select more than one business component in the grid using standard Windows selection techniques (using the CTRL or SHIFT keys). Click to the left of the component row to ensure that the entire row is selected (the row is highlighted), before pressing the required keys.

From this view, you can also copy one or more components and paste them elsewhere in the current project or in another project on the same server, or you can delete several components at once.

Note: Obsolete business components cannot be copied or modified and are identified in the grid by an Obsolete icon to the left of the **Component Name** column.

The component grid contains the following key elements:

➤ **Grid menu bar.** Contains menus with grid commands. For more information, see "Working with the Component Grid Menu Bar" on page 104.

➤ **Grid toolbar.** Contains buttons for commands that are commonly used when working with business components and for modifying the component grid. For more information, see "Working with the Component Grid Toolbar" on page 104.

➤ **Grid columns.** Contain the same component information as the corresponding item in the component Details tab. In a version-controlled project, the Component Grid view can contain additional columns, such as **Version Status**, which indicates if the component is checked in or checked out. For more information, see "Working with Component Grid Columns" on page 107.

➤ **Grid filter boxes.** Display the filter that is currently applied to each column. For more information on filtering data, see the *Quality Center User Guide*.

➤ **Description tab.** Displays and enables you to edit the details and implementation requirements for the business component. For more information, see "Providing Component Details and Implementation Requirements" on page 180.

➤ **History tab.** Displays the changes made to a component. For each change, the tab displays the date and time of the change and the name of the user who made the change. For more information, see "Understanding the History Tab" on page 95.

➤ **Dependencies tab.** Displays the dependency relationships that exist between entities such as components, tests, test resources, and application areas. It comprises the Resources, Used By Tests, and Application Area sub-tabs. For more information, see "Understanding the Dependencies Tab" on page 92.

Note: If the Description, History, and Dependencies tabs are not visible in the Component Grid view, click the **Show** button ⌃ at the bottom-right of the Business Components module window. Click the **Hide** button ⌄ to hide the tabs.

Working with the Component Grid Menu Bar

The Component Grid menu bar in the grid view contains the following menus:

➤ **Edit.** Contains commands that enable you to work with, find, rename or delete business components.

➤ **View.** Contains commands that enable you to work with filters and toggle between the Component Tree view and the Component Grid view. For more information on filtering data, see the *Quality Center User Guide*.

➤ **Favorites.** Contains commands that enable you to work with favorite views. For more information, see the *Quality Center User Guide*.

Tip: You can also access many of the menu and toolbar commands by right-clicking in panes or on items in the component tree to access context menus.

Working with the Component Grid Toolbar

The Component Grid toolbar has the following buttons:

➤ **Delete Selected Components.** Deletes the selected business component from the Quality Center project.

➤ **Refresh.** Refreshes the grid so that it displays the most up-to-date business component information based on the filters and sort order you have selected.

➤ **Set Filter/Sort.** Enables you to locate required components in the grid by setting filter or sort preferences using the Filter dialog box. Any currently applied filters or sort orders are displayed under the Component Grid toolbar. For information on sorting data in the component grid by group, see "Sorting the Component Grid by Group" on page 189. For more information on filtering and sorting data in a grid, see the *Quality Center User Guide*.

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

For information on the columns available in the Component Grid view, see "Working with Component Grid Columns" on page 107. For more information on arranging columns in a grid, see the *Quality Center User Guide*.

➤ **Go to Component in Component Tree.** Closes the component grid and highlights the selected business component in the component tree.

➤ **Validate Component.** Checks the selected business component for any configuration errors and displays the results. For more information on validating components, see "Validating Business Components" on page 197.

➤ **Send E-Mail**. Enables you to send an email about a component to another user. For more information, see "Mailing Components" on page 204.

➤ **Favorite.** Enables you to select a favorite view. Use the **Favorites** menu to add or organize your favorite views. For more information, see the *Quality Center User Guide*.

In a version-controlled project, the Component Grid toolbar displays the following additional buttons for checking in and checking out components.

➤ **Check Out.** Opens the Check Out dialog box, enabling you to check out the selected component.

➤ **Check In.** Opens the Check In dialog box, enabling you to check in the selected component.

For information on working with version control in Quality Center, see the *HP Quality Center User Guide*.

Working with the Component Grid Context Menu

The right-click context menu in the component grid includes many of the functions in the toolbar, as well as the following commands, which provide additional functionality and information about the business component:

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

➤ **Paste.** Pastes the copied business component. You can also switch to the component tree (by choosing **View** > **Component Tree**) and paste the copied component to a new location in the component tree.

For more information on copying business components, see "Copying Business Components" on page 192.

➤ **Grid Filters.** Toggles to display or hide the grid filter boxes at the top of the data columns. If the filter box is empty, no filter is currently applied to the column. Type directly into the box, or click the box to display the browse button, which opens the Select Filter Condition dialog box. For more information on filtering data in a grid, see the *Quality Center User Guide*.

➤ **Select All.** Selects all the business components in the grid. This enables you to perform operations such as Copy or Delete on all the existing components simultaneously.

➤ **Find.** Includes the following options:

    ➤ **Find.** Opens the Find dialog box, enabling you to search for a business component in the grid. Select the field in which you want to search, and enter the value you want to find. If you have applied filters to the grid, the search is restricted to the currently displayed components.

    ➤ **Find Next.** Finds the next occurrence of the last string you searched for.

    ➤ **Replace.** Opens the Find/Replace dialog box, enabling you to search for and replace a specific field value in the grid.

For more information on Find and Replace functionality, see the *Quality Center User Guide*.

➤ **Properties.** Displays and enables you to edit the information in the Snapshot tab, the Parameters tab, and the Design Steps tab for the selected business component. For more information on the functionality of these tabs, see "Business Component Tabs" on page 68.

➤ **Export.** Enables you to export the grid data of the selected component or components, or of all the components, as a text file.

Working with Component Grid Columns

The component grid columns correspond to the information provided in the component's Details tab. You can select which columns to display in the component grid, and their order, by clicking **Select Columns** in the toolbar or context menu. You can also set the number of columns that remain stationary when you scroll horizontally.

For more information on selecting and arranging columns in a grid, see the *Quality Center User Guide*.

Available columns in the Component grid include:

Column	Description
Component Folder	The folder in which the component is located.
Component Name	The name of the business component.
Creation Date	The date on which the business component was created.
Created By	The user name of the person who created the business component.
Description	The implementation requirements for the business component, as entered in the Details tab.
Comments	The comments entered in the Discussion Area of the Details tab for the Automation Engineer, component users, or developers.
Status	The status of the business component. Component statuses are described in "Business Component Statuses" on page 65.

Column	Description
Assigned To	The Subject Matter Expert to whom the business component implementation is assigned.
Automation Engine	The automation engine used to automate the component; QT-KW for a QuickTest keyword-driven component, QT-SCRIPTED for a QuickTest scripted component, WR-AUTOMATED for a WinRunner component, and SERVICE-TEST-AUTOMATED for a Service Test component. MANUAL is displayed for a manual component.
Has Picture	Indicates whether an image is attached to the component. (**Y** or **N**)
Deleted on	The date on which the business component was deleted, if applicable. (For components contained in the Obsolete folder only.)
Original Location	The folder in which the business component was located when it was deleted, if applicable. (For components contained in the Obsolete folder only.)

When your project is version controlled, the following additional fields are available:

Column	Description
Version Number	The version number.
Version Status	The status of the version (**Checked Out** or **Checked In**).
Checked Out By	The name of the user who checked out the component.
Version Check Out Date and **Version Check Out Time**	The date and time the version was checked out.

For information on working with version control in Quality Center, see the *HP Quality Center User Guide*.

Business Components Module Shortcuts

You can perform the following commands in the Business Components module by pressing the corresponding shortcut keys:

Shortcut Key	Function
CTRL+N	Creates a new component.
CTRL+ALT+N	Creates a new components folder.
F8	Validates the selected component by checking for any configuration errors, and displays the results.
CTRL+DEL	Deletes the selected business component from the project.
CTRL+ALT+N	Adds a new folder to the component tree below the currently selected item.
CTRL+N	Adds a new business component to the component folder below the currently selected item.
F5	In the component tree, refreshes the data for the currently selected folder or business component.
F5	In the component grid, refreshes the grid so that it displays the most up-to-date business component information.
CTRL+F5	Refreshes all the folders and components in the component tree.
CTRL+F	Opens the Find dialog box (from the component grid). Ctrl+L finds the next occurrence of the last string you searched for.

For more information about working with keyboard shortcuts in Business Process Testing views and dialog boxes, see:

➤ "Using Keyboard Commands in the Design Steps Tab" on page 79

➤ "Using Keyboard Commands in the Component Step Editor" on page 83

➤ "Using Keyboard Commands in the Automation Tab" on page 92

➤ "Using Keyboard Commands in the Keyword View" on page 164

➤ "Using Keyboard Commands in the Snapshot Dialog Box" on page 184

➤ "Using Keyboard Commands in the Group Iterations Dialog Box" on page 298

➤ "Using Keyboard Commands in the Parameters Tab" on page 339

➤ "Using Keyboard Commands in the Component Iterations Dialog Box" on page 364

➤ "Using Keyboard Commands in the Test Iterations or Flow Iterations Dialog Box" on page 387

4

Designing Manual Component Steps

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

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test applications for other environments.

This chapter includes:

➤ About Designing Manual Component Steps on page 112

➤ Designing Manual Steps on page 113

➤ Working with Parameters in Manual Steps on page 119

About Designing Manual Component Steps

The Design 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.

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.

Quality Center enables you to create parameters directly from the Design Steps tab and insert them into your component steps.

When you finish designing your manual steps, you can manually perform the steps on the application and compare the expected results to the actual results.

Note: If required, 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."

Designing Manual Steps

In the Design Steps tab for manual components, you create each step in the component using the Component Step Editor. 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.

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 <<< >>> brackets. (Parameters that you insert into your steps using the Select Parameter feature are automatically displayed between <<< >>> brackets.)

The steps enable you to 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: Quality Center 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.

You can later convert your manual component to an automated component, if you choose to do so. After you automate a component, you can still view its steps in the Design Steps tab, and you can still run the tests containing this component, manually.

➤ If you convert to a scripted component, your manual steps remain editable in the Design Steps tab.

➤ If you convert to a keyword-driven component, the Design Steps tab is displayed in read-only format, but you can edit the content of your original manual steps from the Keyword View in the Automation tab. Additionally, the documented descriptions of your automated steps are displayed in the Design Steps tab, so you can use these descriptions to run your component manually.
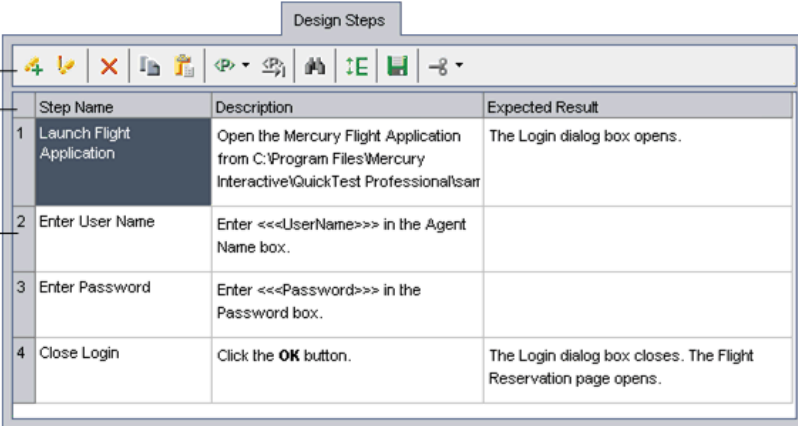
This means that you can update automated components in either Quality Center or a testing tool and still continue to run them manually using the Manual Runner when needed.

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

Each manual component step you create comprises a row in the Design 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:

➤ 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 Design Steps tab for the component is displayed as follows:

Designing Manual Steps in the Component Step Editor

You can use the Component Step Editor to create, modify, copy, and delete manual component steps.

To design manual component steps:

1 After you have created and defined a new business component, as described in Chapter 6, "Working with Business Components," select it in the component tree and click the **Design Steps** tab.

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

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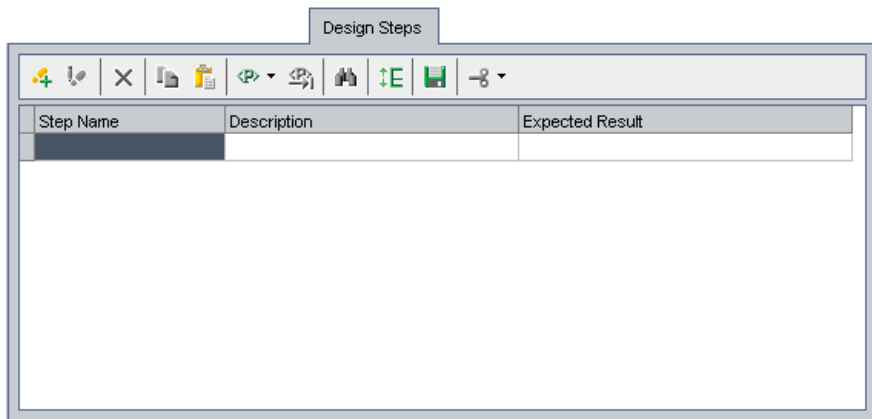
2 In the Design Steps tab toolbar, click the **Add New Step** button.

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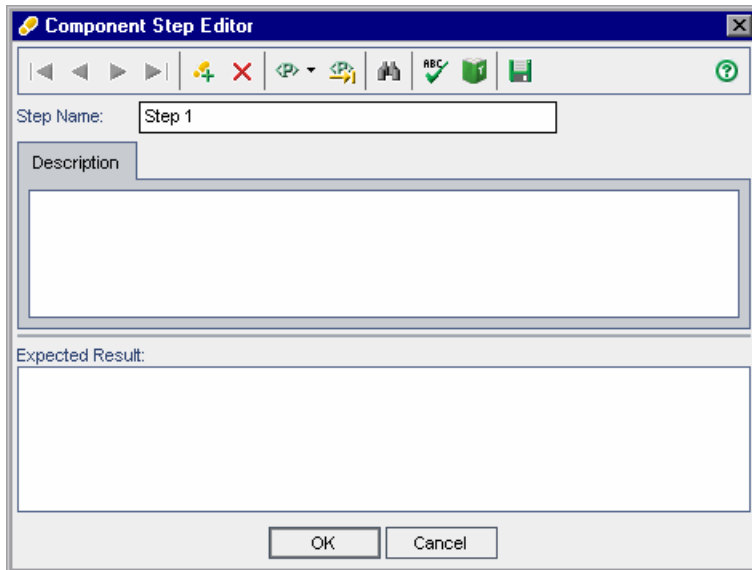
3 In the **Step Name** box, enter a descriptive name for the step.

4 In the **Description** 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 <<<>>> brackets. 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 <<<>>> brackets. If you do not, a validation error message opens when you close the step.

Alternatively, click the **Create/Select Parameter** button at the point in the text where you need to enter a parameter.

> ➤ Select **Select Parameter** to choose an existing parameter from a list. For more information on inserting parameters in the Design Steps tab, see "Working with the Select Parameters Dialog Box" on page 121.

> ➤ Select **Create Parameter** to create a new parameter for your component. For more information on creating parameters directly from the Design Steps tab, see "Working with the Create Parameter Dialog Box" on page 120.

Note: For more information on parameters, see Chapter 11, "Working with Parameters."

7 In the Component Step Editor toolbar, click the **New Step** button. The next step of the component opens in the Component Step Editor.

8 Repeat steps 3 to 7 until all the required steps in the component and their expected results are described.

9 In the Component Step Editor toolbar, you can click the **Save Steps** button while you work to ensure you do not lose any data.

10 Click **OK** in the Component Step Editor. The manual steps are displayed in the Design Steps tab.

11 In the Design Steps tab toolbar, click the **Save steps** button.

Modifying Manual Steps

In a manual component, you can modify any manual step in the Component Step Editor or directly in the Design Steps tab.

To modify a manual component step in the Component Step Editor:

1 In the Design Steps tab, select the step that you want to edit.

2 Click the **Edit Step** button in the toolbar. The Component Step Editor opens.

3 Edit the step name, description, or the expected result.

4 Click **OK**. The modified step is displayed in the Design Steps tab.

5 In the Design Steps tab toolbar, click the **Save steps** button.

To modify a manual component step in the Design Steps tab:

1 Select a cell in any of the columns in the Design Steps tab.

2 Click the cell again to modify the step directly in the tab.

You can press CTRL+Z to undo your most recent change, or press ESC to undo all the changes you made.

3 When you have finished modifying the component, click the **Save steps** button in the toolbar.

Copying Manual Steps

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

To copy a manual component step:

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

2 Right-click another step and select **Paste**. The step is positioned below the selected step.

3 In the Design Steps tab toolbar, click the **Save steps** button.

Tip: You can also press CTRL+C and CTRL+V to copy and paste your selection.

Deleting Manual Steps

You can delete manual steps if required.

To delete manual component steps:

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

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

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

4 In the Design Steps tab toolbar, click the **Save steps** button.

Working with Parameters in Manual Steps
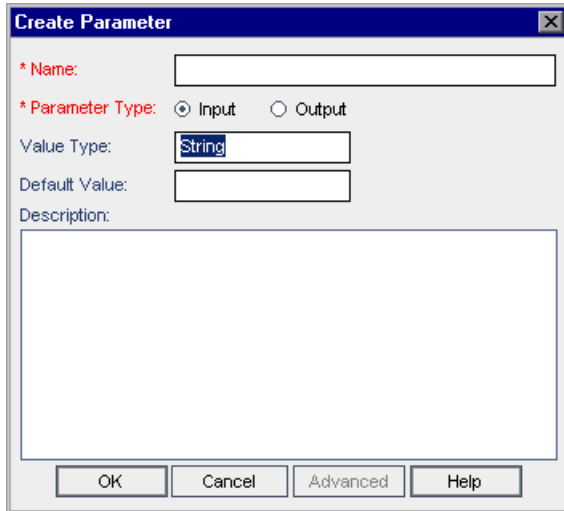
You can define input parameters that pass values into your business component, and output parameters that pass values from your component to later components in the business process test or flow, or from one step to another step later in the same business component. You can then use these parameters to parameterize input and output values in steps.

Generally, you define component parameters in the Parameters tab of the Business Components module. You can also create parameters, and insert them into your component steps, directly from the Design Steps tab.

This section describes how to configure parameters and parameterize input and output values from the Design Steps tab. For more information on component and flow parameters, see Chapter 11, "Working with Parameters."

Working with the Create Parameter Dialog Box

In addition to creating parameters in the Parameters tab, you can create parameters for your component by accessing the Create Parameter dialog box directly from the Design Steps tab, the Component Step Editor, or the Select Parameter dialog box.

The Select Parameter dialog box is shown here after clicking the Advanced button. The dialog box enables you to enter or select the following details for a new parameter:

➤ **Name.** A descriptive name for the parameter.

Note: Component parameter names must begin with a letter, include only English characters, and cannot include spaces or any of the following characters:
! @ # $ % ^ & * ( ) + = \ { } | ; ' : " , . / < > ? ~ ` [ ] – ~

➤ **Parameter Type.** Indicates whether the parameter is an input or output parameter.

You can click the **Advanced** button to define the following additional properties:

➤ **Value Type.** The appropriate value type of the parameter.

The following value types are available in the list:

➤ **String.** One or more characters

➤ **Boolean.** A True or False value

➤ **Date.** A date (in the date format of the local computer)

➤ **Number.** Any digit

➤ **Password.** An encoded string

➤ **Default Value.** An input parameter default value must correspond to the value type, and is used when the business component runs if no other value is supplied by the business process test or flow.

➤ **Description.** A description of the component parameter's purpose, or other descriptive text.

Working with the Select Parameters Dialog Box

You can use the Select Parameter dialog box to insert parameters into new or existing manual steps in the Description or Expected Result columns of the Design Steps tab.

The parameters that you insert are enclosed in three sets of triangle 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 mercury 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 mercury in the Agent Name box".

Note: For more information on working in the Design Steps tab, see "Designing Manual Steps" on page 113.

To insert parameters into manual steps:

1 In the Design Steps tab, click **Add New Step** or **Edit Step** to open the Component Step Editor dialog box.

2 Enter the appropriate text for your step in the **Description** area or **Expected Result** area.

3 At the point in the text where you need to enter a parameter, click the **Create/Select Parameter** button in the toolbar and select **Select Parameter**.

The Select Parameter dialog box opens. The dialog box contains a list of all the existing input and output parameters in the component.

Select Parameter		
℗ Create Parameter		⊘
Type name or select from list:		
Parameter Name	Input/Output	Description
UserName	Input	
Password	Input	

OK   Cancel
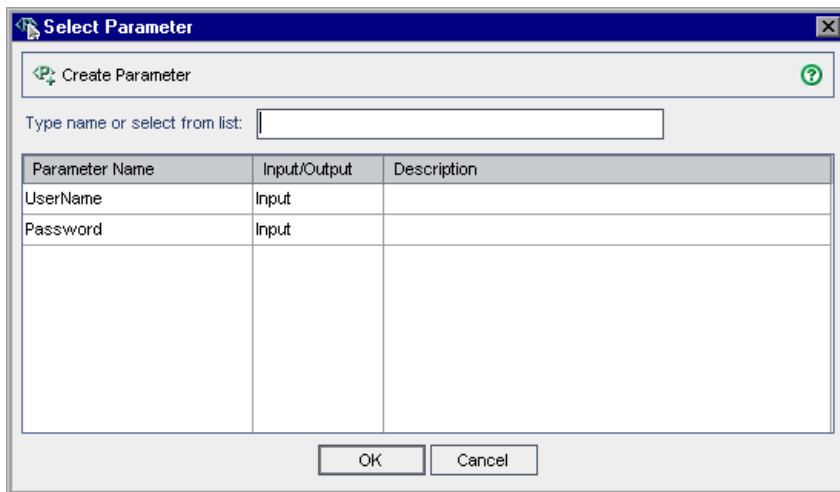
Note: You can search for the parameter you require by entering the name (or the first characters of the name) in the search box.

If the required parameter is not in the list, you can create it by clicking the **Create Parameter** button in the toolbar. For more information, see "Working with the Create Parameter Dialog Box" on page 120.

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

5 Click **OK** in the Component Step Editor dialog box. The step is inserted in the Design Steps tab.

Note: You can also add a parameter to an existing step directly in the Design Steps tab.

Enter the appropriate text for your step in the **Description** column or **Expected Result** column. At the point in the text where you need to enter the name of the parameter, click the **Create/Select Parameter** button in the Design Steps tab toolbar and select **Select Parameter**. Select the required parameter in the **Select Parameter** dialog box, and click **OK**.

Or,

If you know the exact name of the parameter, enter the first characters of the parameter name into your text in the **Description** or **Expected Result** column and press CTRL+K (or click the **Complete Parameter Name** button). The full name of the parameter is completed automatically and enclosed in <<<>>> brackets.

5

Working with Automated Component Steps

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

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test applications in other environments.

This chapter includes:

About Working with Automated Component Steps

The Automation tab provides a graphical format in which to create and modify automated keyword-driven business component steps. These steps represent the operations that are performed automatically on your application when you run the component using a testing tool.

Notes:

➤ The Automation 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*.

➤ When working with QuickTest scripted components or WinRunner components, the component steps can be viewed or modified only within the relevant testing tool. You can open the tool from the Automation tab.

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.

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.

Note: You can create manual components in the Design Steps tab. If required, you can automate the manual components using the applicable testing tool and then use the existing manual steps as guidelines to create automated steps. For more information on manual components and steps, see Chapter 4, "Designing Manual Component Steps."

Automating 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 business component steps required to test your application. You can automate any previously-created manual component steps using the applicable testing tool, and use the manual step operations as guidelines for your automated steps.

Note: The **BPT Resources** 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 tab in a new project, when you create a QuickTest automated component for the first time, or when QuickTest connects to Quality Center for the first time.

For more information, see "BPT Resources Folder" on page 129.

The conversion process from manual to automated components is irreversible. However, you can still use the steps in the Design Steps tab to run the component manually, as described in "Running a Business Process Test or Flow Manually" on page 412.

For keyword-driven components, you can update the contents of the manual steps in the Design Steps tab only by modifying the automated component in the Automation tab. For scripted components, you can update the steps directly in the Design Steps tab.

The content of the Design Steps tab can only be modified for **QuickTest Keyword-Driven** components by editing the automated component in the Automation tab or in QuickTest.

QuickTest Scripted and **WinRunner** components can be modified in the Design Steps tab. However, changes in the Design Steps tab are not reflected in the respective testing tool. Similarly, changes in the testing tool are not reflected in the Design Steps tab.

To automate manual components:

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

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

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2 In the toolbar, click the **Automate component** 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 format of the Automation tab changes to one of the following views, according to your selection.

➤ Selecting **QuickTest Keyword-Driven** converts the component to an automated QuickTest business component. The Automation tab displays the existing manual component steps as **Manual Step** operations in a keyword view format. For more information, see "Working with Keyword-Driven Automated Steps" on page 130.

➤ Selecting **WinRunner** converts the component to an automated WinRunner component. The Automation tab provides a **Launch** button that enables you to view or edit the steps in WinRunner. For more information, see "Viewing Scripted Components" on page 173.

➤ Selecting **QuickTest Scripted** converts the component to an automated QuickTest scripted component. The Automation 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 173.

➤ Selecting **Service Test** converts the component to an automated Service Test component. The Automation tab provides a **Launch** button that enables you to view or edit the steps in HP Service Test. For more information, see the *HP Service Test User's Guide*.

BPT Resources Folder

The **BPT Resources** folder is 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 tab in a new project, when you create a QuickTest automated component for the first time, or when QuickTest connects to a Quality Center project for the first time.

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

Note: In previous versions of Quality Center, the BPT Resources folder was created in the Test Plan module. When upgrading to Quality Center version 10.00, a BPT Resources folder that already exists in the Test Plan module is moved to the Test Resources module by 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:

➤ **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.

Working with Keyword-Driven Automated Steps

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 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 choose 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 Quality Center, the steps defined in the associated business components are performed automatically on the application being tested.

Columns in the tab 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 tab, providing a plain-language textual description of what the step does in the component.

Note: For information on selecting which columns to display in the Automation tab, see "Setting Keyword View Options" on page 131.

Creating business component steps in the Automation 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. For example, the Automation 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 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 tab.

For more information on the available columns, see "Working with Columns in the Automation Tab" on page 88.

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

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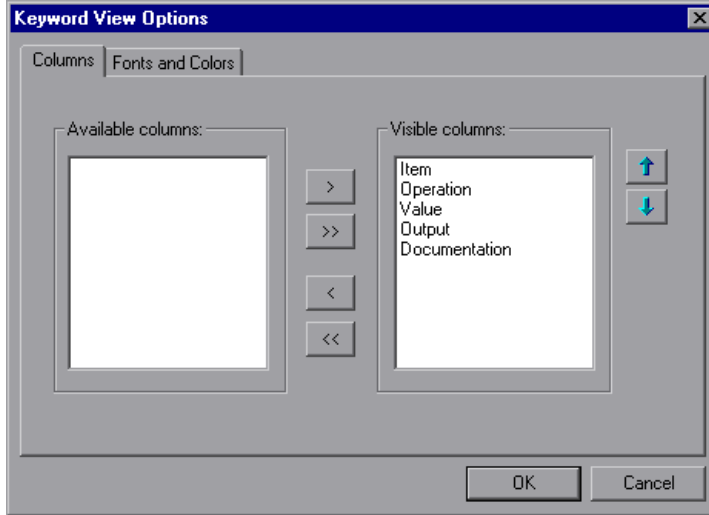
In the Columns tab, the **Available columns** box lists columns not currently displayed in the Automation tab. The **Visible columns** box lists columns currently displayed in the Automation tab.

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.

Tip: Click the double arrow buttons (>> and <<) to move all the column names from one list to the other. Select multiple column names (using the SHIFT and/or CTRL keys on your keyboard) and click the arrow buttons (> and <) to move only the selected column names from one list to the other.

3 In the **Visible columns** box, set the order in which columns appear in the Automation 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 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:
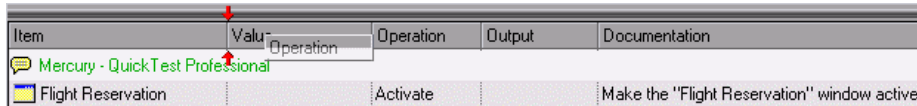
➤ Display a hidden column by right-clicking the column header row and then selecting the required column name from the displayed menu.

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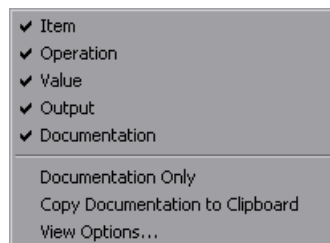
> **Tip:** You may want to display only the **Documentation** column, for example, if you want to use the steps as instructions for manual testing. You can do this by selecting **Documentation Only**. The **Documentation** column and any comments defined in the business component are displayed.

To rearrange columns in the Automation 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.

To set font and color options for the Automation tab:

1 In the Automation tab, click the **View Options** button in the toolbar. The Keyword View Options dialog box opens. Click the **Fonts and Colors** tab.
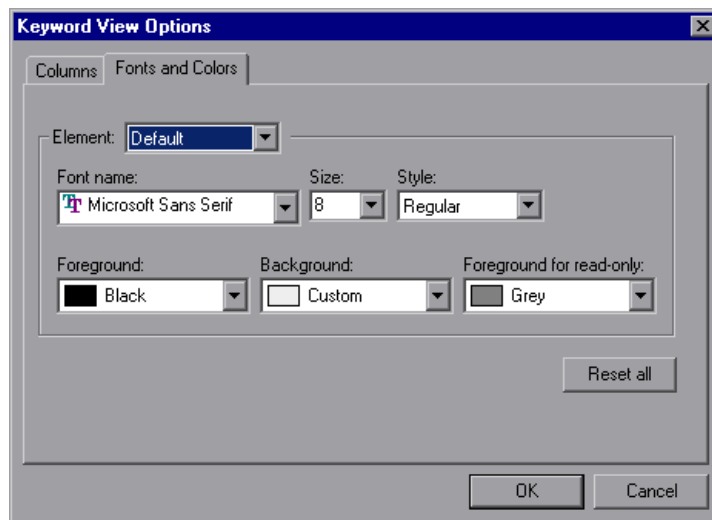
2 Set the display options according to your preferences.

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

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

  - ➤ **Selected Rows.** 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.

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3 Click **OK** to save your settings.

Understanding Application Areas

The Automation Engineer creates the application area in QuickTest Professional. It contains 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. All application area settings are automatically inherited by the business components that are based on that application area.

Depending on your specific requirements, the Automation Engineer may have created 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 Quality Center. 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.

Working with application areas is described in the following sections:

➤ "Choosing the Application Area" on page 137

➤ "Changing the Application Area" on page 139

For more information on working with application areas in QuickTest, see the *HP QuickTest Professional for Business Process Testing User Guide*.

Choosing the Application Area

The first stage in adding content to a 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 tab:

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

Note: You can start to create an automated business component before its application area has been created by the Automation Engineer, 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 choose the application area:

1 In the Automation tab, click the **Select Application Area** button in the toolbar. The Select Application Area dialog box opens.
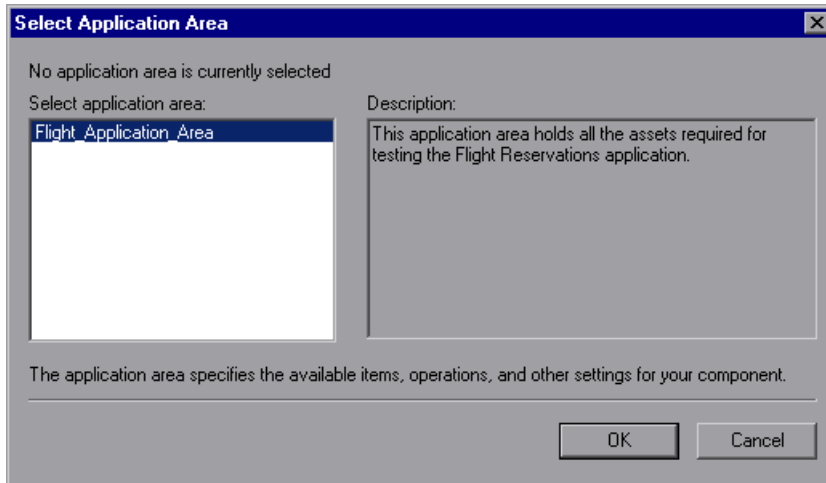
2 Select the required application area.

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 creating your component steps in the Automation tab.

Changing the Application Area

Quality Center enables you to change the application area on which your business component is based, if required.

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 will fail.

To change the application area:

1 In the Automation tab, click the **Select Application Area** button in the toolbar. The Select Application Area dialog box opens.

The currently selected application area is displayed at the top of the dialog box.

2 Select a different application area.

3 Click **OK** to base the component on the currently selected application area.

All of the application objects in the new application area, and any user-defined operations, are now available for you to choose when creating your component steps in the Automation tab.

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, the following steps must first be performed:

➤ The application must be opened

and

➤ 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 tab.

To create a new step in a business component:

1 In the Automation 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.
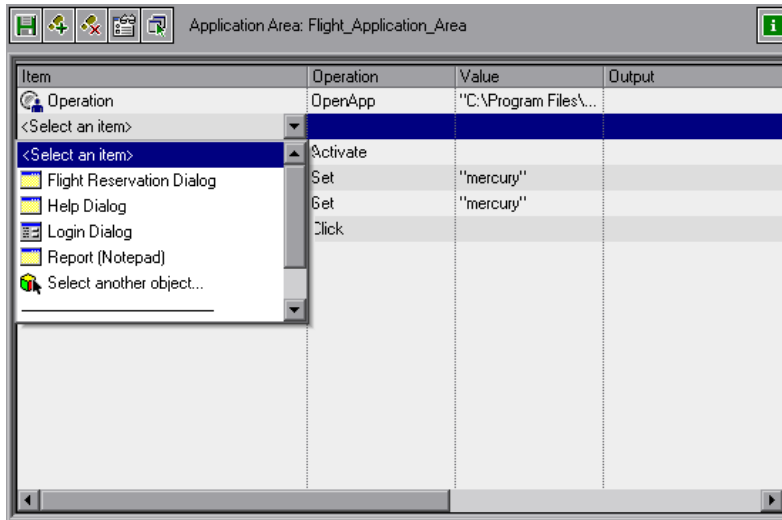
Tip: If no steps are currently defined for your business component, you can click in any of the columns to display the **Select an Item** list and add a new step. If you want to add a step at the end of your component, you can click in any of the columns below the existing steps to add a new step.

You can also press F8 or INSERT on your keyboard to open the **Select an item** menu and add a new step.

 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 143.

Alternatively, you can choose to add a **Comment**, which enables you to add a manual step or other free text information between steps. For more information, see "Entering Comments in the Keyword View" on page 161.

➤ **Operation.** The operation to be performed on the item. For more information, see "Selecting an Operation for a Step" on page 148.

➤ **Value** (if relevant). The argument values for the selected operation. For more information, see "Defining Values for Operations" on page 149.

➤ **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 150.

 3 Save the steps as described in "Saving Component Steps" on page 142.

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.

The information in Documentation cells is also displayed in the Description column of the Design Steps tab. You can use these Documentation descriptions to run your automated components manually. For more information, see "Running a Test or Flow Manually" on page 413.

Saving Component Steps

You must save your component steps and any other changes that you make in the Automation tab. Since changes you make in the Automation tab are not saved automatically, it is recommended that you save them periodically.

To save component steps:

Click the **Save** button in the Automation tab toolbar.

Or

Select another tab in the component, another location in the component tree, or another module.

Tip: You can also export your component steps to a text file, Excel sheet, Word document, or HTML document. Right-click in the **Design Steps** tab, select **Export To** and select the appropriate format from the list.

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 148.

This section describes:

➤ "Selecting an Object from the Item List" on page 144

➤ "Selecting an Object from the Shared Object Repository" on page 145

➤ "Selecting an Operation Item from the Item List" on page 147

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 161.

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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.
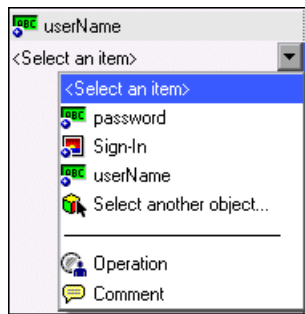
Notes:

➤ 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 will fail. Objects that are missing from the shared object repository are indicated in the Automation tab by the ⟦?⟧ icon.

To select an object from the displayed Item list:

1 In the Automation tab, 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 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 148.

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 by the Automation Engineer in QuickTest Professional. 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 Object for Step 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 Object for Step dialog box opens.

![Select Object for Step dialog box showing Name and Type fields with a tree listing Login Dialog (Cancel Button, Help Button, OK Button, Agent Name:, Password:), Flight Reservation Dialog, Help Dialog, and Report (Notepad), with OK and Cancel buttons]
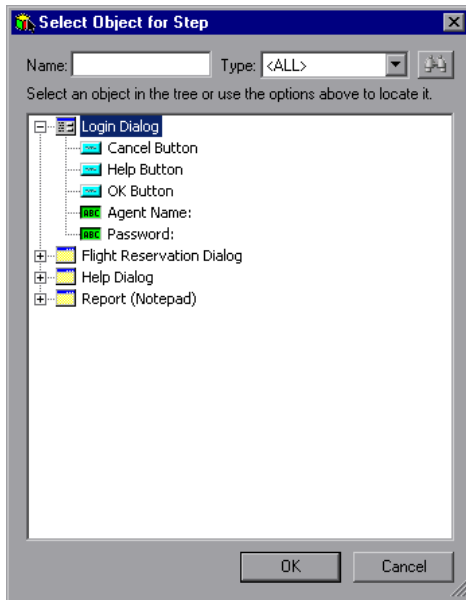
🔍 **Tip:** You can search for the object you require by entering the object name (or the beginning letters of the name) in the **Name** box and clicking the **Find Next** button. You can also limit the number of objects displayed in the list by selecting the type of object you require from the **Type** list, for example, Check Box, or Button.

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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 148.

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 will fail. Operations that are missing from the application area are indicated in the Automation 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 by the QuickTest Automation Engineer 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:
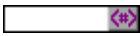
In the Automation tab, click in the **Operation** cell, then click the arrow button and select the operation to be performed on the item. The operation can be either a built-in operation or an operation from a function library, depending on the item you selected.

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.
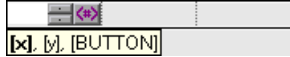
You can parameterize the value for an argument using a local or component parameter. For more information, see "Working with Parameters in the Keyword View" on page 153.

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 "Working with Parameters in the Keyword View" on page 153.

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 152.

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 or press CTRL+F11. The Output Options dialog box opens.
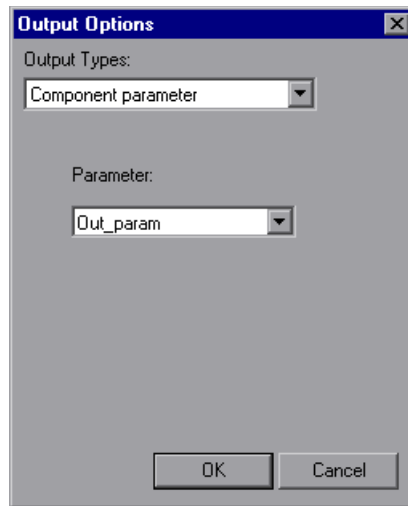
Note: The default output type is **Component parameter** if at least one output parameter is defined in the business component Parameter tab. If you select **Local parameter**, the dialog box changes to the Output Options dialog box for a local parameter.

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 158.

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 or press DELETE on the keyboard to cancel output for the parameter.

Working with Parameters 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 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 11, "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:
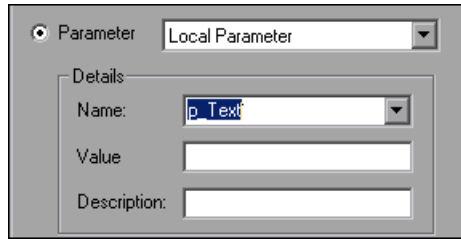
1 In the **Value** cell, click the **Configure the value** button or press CTRL+F11. The Value Configuration Options dialog box opens.
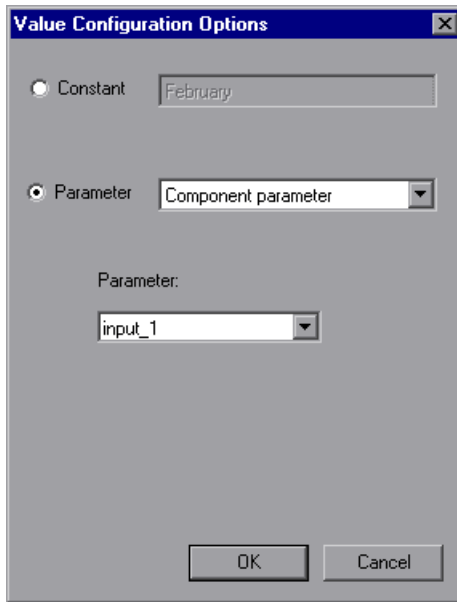
If at least one input component parameter is defined in the component, the default input type is **Component parameter**.

2 Select the **Parameter** radio button and then select **Local Parameter** from the list.

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. If you do not specify a value, Quality Center assigns a default value, as follows:

Value Type	QuickTest Default Value
String	Empty string
Boolean	True
Date	The current date
Number	0
Password	Empty string

> ➤ **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 or press CTRL+F11. 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 11, "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 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 or press CTRL+F11. The Output Options dialog box opens.
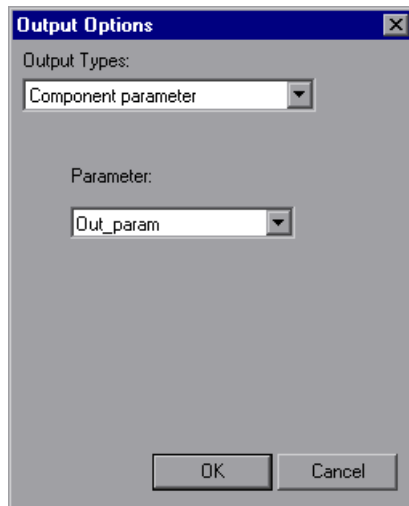
If at least one output component parameter is defined in the business component, the default output type is **Component parameter** and the default output name is the first output parameter from the Parameters tab of the Business Components module.

2 In the **Output Types** box, select **Local parameter**. The details for the local parameter type are displayed.
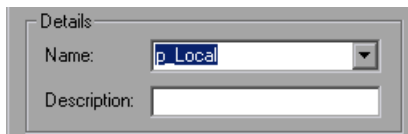
3 Specify the property details for the local parameter:

> ➤ **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.
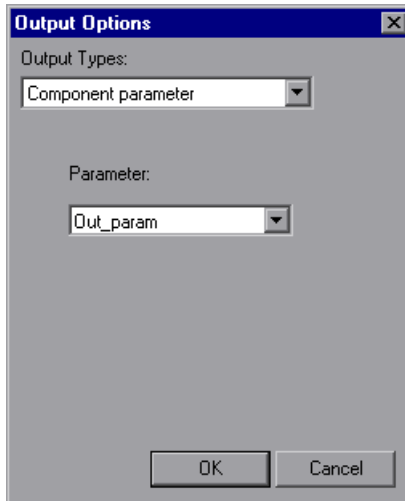
4 Click **OK**. The local parameter is displayed in the **Output** cell of your step. When the business component runs, it outputs the value to the output parameter specified for the step.

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 or press CTRL+F11. 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 11, "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.

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.

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 tab.

The 💬 icon indicates a comment in the Automation 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, which acts as a toggle, making the comment either editable or read-only.

To delete a comment:

Select the comment and click the **Delete Step** button in the toolbar, press the DELETE key on your keyboard, or right-click and select **Cut** or **Delete** from the context-sensitive menu. The comment is permanently removed from the business component.

Modifying Component Steps in the Keyword View

You can modify any part of a step in the Automation 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 Quality Center or in QuickTest or WinRunner are locked and open in read-only mode.

When working in the Automation 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.

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. You can also use CTRL+X to cut the step and CTRL+V to paste the step.

➤ 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. You can also use CTRL+C and CTRL+V to copy and paste the step.

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 tab:

1 Select the step that you want to delete.

2 Click the **Delete Step** button in the toolbar, press the DELETE key on the keyboard, or right-click and select **Cut** or **Delete**. A warning message is displayed.

> **Note:** A warning message is not displayed when a comment is deleted.

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

Using Keyboard Commands in the Keyword View

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Automation tab:

➤ You can change the item that is selected by using the up and down arrow keys.

➤ You can press F8 or INSERT on your keyboard to open the **Select an item** menu and add a new step below the selected step.

➤ You can use the TAB key to move the focus to the right within a single row. In the last cell in the row, the TAB key moves the focus back to the first cell in the same row.

➤ You can use the left and right arrow keys to move the focus one cell to the left or right, with the following exceptions:

  ➤ In the last cell in a row, the right arrow key moves the focus to the first cell in the next row.

  ➤ In the first cell in a row, the left arrow key moves the focus to the last cell in the row above (if any).

➤ When a **Value** cell is selected, press CTRL+F11 to open the Value Configuration Options dialog box.

➤ When a row is selected (not a specific cell), you can type a letter to jump to the next row that starts with that letter.

➤ When the **Select an item** menu is open, you can type a letter or sequence of letters to move to an object that starts with the typed letter or letters. The typed sequence is highlighted white.

Checkpoints and Output Values

When creating steps in a component, Automation Engineers working in QuickTest can add checkpoint and output value steps. In Quality Center, you can view details of, and sometimes edit, these steps.

This section contains the following:

➤ "Checkpoints" on page 165

➤ "The Checkpoint Properties Dialog Box" on page 166

➤ "Output Value Steps" on page 169

➤ "The Output Value Properties Dialog Box" on page 170

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 Quality Center, 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.

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 Test Results window. For more information, see "Viewing Run Results of Business Process Tests or Flows" on page 442.

The Checkpoint Properties Dialog Box

Description	Enables you to accept or modify the property values of the checkpoint.
How to Access	Select a component in the business components module, open the Automation tab, and click the **Checkpoint Properties** button ☑ in the Value column of a checkpoint step.
Learn More	**Conceptual overview**: "Checkpoints" on page 165
	Related tasks:
	➤ "Editing the Expected Value of an Object Property" on page 167
	➤ "Viewing Run Results of Business Process Tests or Flows" on page 442

Below is an image of the Checkpoint Properties dialog box.
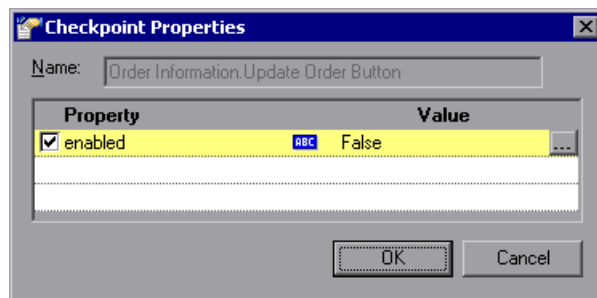
The dialog box displays the following information about the checkpoint:

Information	Description
Name	The name assigned to the checkpoint.
Value Type	The expected value type of the property. ➤ The ![icon] icon indicates that the value of the property is currently a constant. ➤ The ![icon] icon indicates that the value of the property is currently a parameter. ➤ The ![icon] 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 167.

Additional References

Related Concepts	"Output Value Steps" on page 169

Editing the Expected Value of an Object Property

When you click the **Browse** button for a property ![...] 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**.
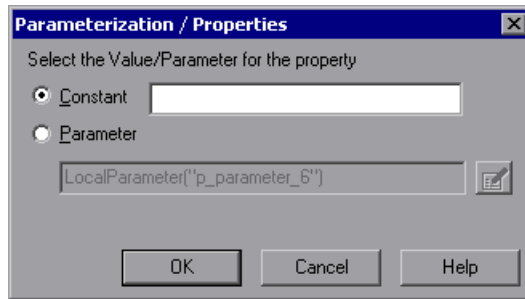
➤ **Constant.** A value that is defined directly in the step and remains unchanged when the component runs.

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 by selecting a different parameter type or modifying the parameter value settings. For more information on using parameters in your components, see "Working with Parameters" on page 327.

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 442.

The output value step is visible and editable in Quality Center 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.
How to Access	Select a component in the business components module, open the Automation tab, and click the **Output Value Properties** button ![icon] in the Value column for an output value operation.
Learn More	**Conceptual overview**: "Output Value Steps" on page 169
	Related tasks:
	➤ "Defining Output Values for Steps" on page 150
	➤ "Parameterizing Output Values" on page 158
	➤ "Specifying the Output Settings for a Property Value" on page 172
	Additional related topic: "Additional References" on page 171

Below is an image of the Output Value Properties dialog box.
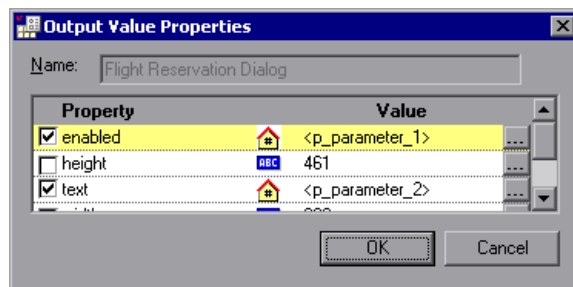
The dialog box displays the following information about the checkpoint:

Item	Description
Name	The name assigned to the output value.
Value Type	The expected value type of the property. The ⬛ 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 172

Additional References

Related Tasks	"Viewing Run Results of Business Process Tests or Flows" on page 442
Related Concepts	"Checkpoints" on page 165

Specifying the Output Settings for a Property Value

When you click **Browse** for a property $\cdots$ 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.
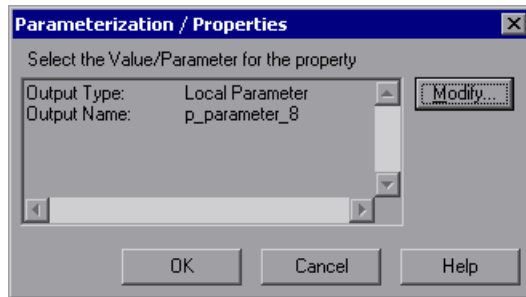
When you select a property value to output, you can:

➤ 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 150.

➤ Accept the displayed output definition by clicking **OK**.

Viewing Scripted Components

The automated steps of scripted components can be edited only in the applications in which the components were automated. They cannot be modified by the Subject Matter Expert in Quality Center.

You can click the **Launch** button in the Automation tab to open the applicable testing tool and edit the scripted component.

Note: The manual steps of a scripted component that was created in Quality Center can be modified in the Design Steps tab and used in manual tests if required.

When you convert a manual component to a scripted component in QuickTest (using the **Automate component** button in the Design 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.

When you convert a manual component to a WinRunner scripted component (using the **Automate component** button in the Design Steps tab), your manual step descriptions are displayed as comments in the script in WinRunner.

Note: If you are planning to convert a manual component to a WinRunner component, ensure that no individual manual step exceeds 500 characters.

6

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 8, "Getting Started with Business Process Testing in the Test Plan Module."

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test applications in specific environments.

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

This chapter includes:

➤ About Working with Business Components on page 176

➤ Creating a Component Tree on page 177

➤ Defining Business Components on page 179

➤ Viewing and Modifying Business Components on page 187

➤ Mailing Components on page 204

➤ Handling Component Requests on page 207

➤ Analyzing Your Project on page 210

> **Note:** To control access to various modules and tasks, Quality Center 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 "Setting Permissions for Business Process Testing Enterprise Extension" on page 49, or see the *HP Quality Center Administrator Guide*.

About Working with Business Components

You create business components in the Business Components module by defining the details of the component's shell, 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, using the Learn Flow process, or by using other testing tools such as QuickTest Professional and WinRunner, 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 QuickTest or WinRunner.

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, and in the Scripted Component Properties dialog box in WinRunner.

Note: For more information on the Business Component Settings dialog box, see the *HP QuickTest Professional for Business Process Testing User Guide.* For more information on the Scripted Component Properties dialog box, see the *HP WinRunner User's 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, learned, or manual component. This enables you to easily organize all the components in your project. You can group related components in folders and subfolders, and drag and drop folders or subfolders to other folders in the tree. You can filter the component tree to display only those components you want to view, and you can sort the tree according to your requirements.

At the top level of the component tree is the **Components** root folder, which contains the **Component Requests** folder, the **Obsolete** folder and the business components folders. The **Component Requests** folder contains requests for new components. The **Obsolete** folder 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.

The **Components** root folder, the **Component Requests** folder, and the **Obsolete** folder cannot be renamed or deleted.

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

To create a component folder in the component tree:

1 Access the Business Components module, as described in "About Getting Started with the Business Components Module" on page 56.

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

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

New Folder	
Folder Name :	
OK	Cancel
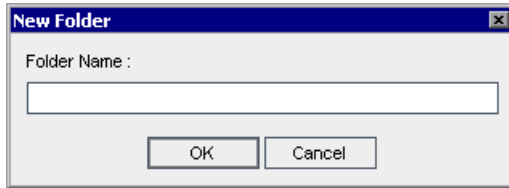
4 Enter a descriptive name in the **Folder Name** box and click **OK**.

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 2.

➤ To create additional folders at the main level, select the **Components** root folder and repeat steps 3 and 4.

➤ To create a subfolder below an existing folder, select the existing folder and repeat steps 3 and 4.

To add a new business component to a folder:

1 Select the folder and click the **New Component** button in the tree toolbar, or right-click the folder and select **New Component**. The New Component dialog box opens.
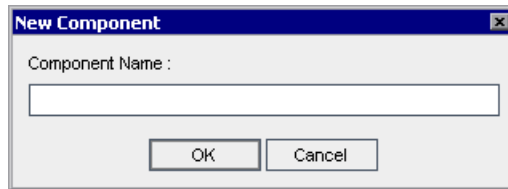
2 Enter a descriptive name in the **Component Name** box and click **OK**. The new business component is displayed under the folder in the component tree. Components in a folder are displayed in alphabetical order. New components are automatically assigned the status of **Under Development**.

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.

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3 To add additional business components at this folder level, select the folder and repeat steps 1 and 2.

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

Defining Business Components

After you create or learn a business component and select it in the component tree, the component tabs are displayed. You define the shell of the component by entering the relevant details into the Details, Snapshot, and Parameters tabs, work with manual and automated component steps in

the Design Steps or Automation tabs, and view test and flow information in the Dependencies tab. More information on working with these tabs is provided as follows:

➤ **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 more information, see "Providing Component Details and Implementation Requirements" on page 180.

➤ **Snapshot tab.** Enables you to capture an image that helps to describe the business component. For more information, see "Attaching Images" on page 184.

➤ **Parameters tab.** Enables you to define input and output component parameters for the component. For more information, see "Defining Input and Output Component Parameters for a Business Component" on page 186.

➤ **Design Steps tab.** Enables you to create and view the manual steps of your component. For more information, see "Designing Manual Steps" on page 113.

➤ **Automation tab.** Enables you to view and work with the automated steps of your component. For more information, see Chapter 5, "Working with Automated Component Steps."

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 a summarized description and the implementation requirements of the component in the Description area. You can also enter additional comments in the Discussion Area.

The following details are entered automatically in the Details tab:

➤ **Component Name.** The name of the component in the component tree.

➤ **Created By.** The login name of the user who created the component.

➤ **Creation Date.** The date that the component was created in the component tree.

➤ **Automation Engine.** How the component was converted to an automated component; QT-KW for a QuickTest keyword-driven component, QT-SCRIPTED for a QuickTest scripted component, WR-AUTOMATED for a WinRunner component, and SERVICE-TEST-AUTOMATED for a Service Test component. MANUAL is displayed for a component that has not been automated.

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

To specify general component details:

1 In the **Assigned To** box, enter or select the name of the Subject Matter Expert 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. For more information on selecting a name from a user list, see the *HP Quality Center User Guide*.

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 Statuses" on page 65.

The status can also be modified by the Automation Engineer in the Business Component Settings dialog box in QuickTest, or in the Scripted Component Properties dialog box in WinRunner.

To specify implementation requirements:

In the **Description** area, enter a description of the business component's purpose or contents, and the implementation requirements of the component, such as the pre-conditions and post-conditions of the application before and after running the component.

For keyword-driven and WinRunner 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.

Note: The Description area provides a comprehensive selection of text editing and formatting commands to assist you in entering the component description. Right-click in the **Description** area to access the commands from the context menu. Select **Toolbar Visible** from the context menu to display (or hide) commonly used commands in the toolbar.

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

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 Details Pane" on page 263.

By default, the Description area provides a basic template of section headings, which can be modified if required.

The default section headings are:

➤ **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.

To add comments to the Discussion Area:

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

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.

You can click the **Add Comment** button to automatically insert your user name and the current server date into the **Discussion Area** as an introduction to your comments.

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 261.

Note: The Discussion Area provides a comprehensive selection of text editing and formatting commands to assist you in entering your comments. Right-click in the **Discussion Area** to access the commands from the context menu. Select **Toolbar Visible** from the context menu to display (or hide) commonly used commands in the toolbar.

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** or **.bmp** image from your local drive.

➤ Attaching an image is described in "Attaching an Image to a Business Component" on page 184.

➤ Loading a saved image is described in "Loading an Image" on page 185.

Using Keyboard Commands in the Snapshot Dialog Box

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Snapshot dialog box:

➤ ALT+S. Takes a snapshot of an image

➤ ALT+L. Loads an image from a file

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

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

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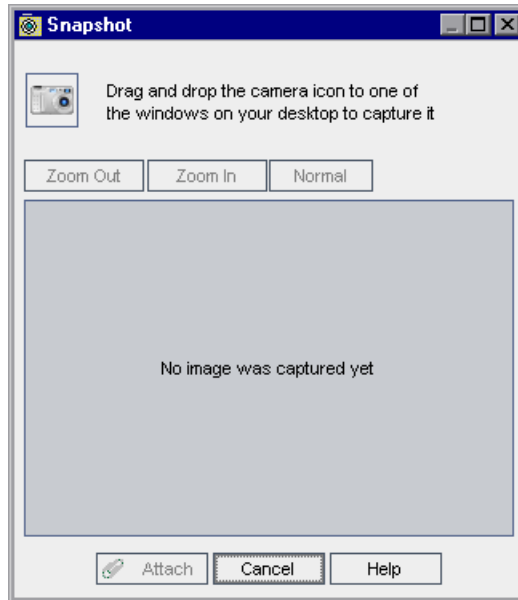
3 Display the object you want to capture on your desktop. The Snapshot dialog box remains in view.

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 Test Plan 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 255.

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

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, value types, 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 and run-time component parameter values are assigned in the Test Lab module.

For more information on working with business component parameters, see Chapter 11, "Working with Parameters."

Viewing and Modifying Business Components

You can view and modify business components, and component folders, in the component tree or in the component grid. You can also validate components that are included in business process tests or flows to locate any configuration errors.

Note: Component folders are used in the component tree hierarchy, and are not shown in the component grid. References to component folders in these sections are therefore relevant only in the component tree view.

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.

➤ To expand a folder in the tree, click the expand symbol ⊞ to the left of the folder name, or double-click the folder. You can also select the folder, and then right-click and select **Expand All**, or press the asterisk key (*****) on the keyboard number pad. If your project contains many entities, expanding all folders might take some time.

➤ To collapse a folder in the tree, click the collapse symbol ⊟ to the left of the folder name, or double-click the folder. You can also select the folder, and then right-click and select **Collapse**, or press the minus key (-) on the keyboard number pad.

➤ To rename a folder or business component, select the folder or component in the tree and click it, or press F2. Alternatively, right-click it and select **Rename**. Then edit the item name and press ENTER.

➤ To move a folder or business component in the tree:

   ➤ Drag and drop the folder or component to the required position in the tree.

   Or

   ➤ Right-click the folder or component, and select **Cut**. Then right-click the required folder in which to paste the folder or component and select **Paste**.

➤ To modify a component, select it in the tree and then edit the data in the displayed tabs. For more information, see "Defining Business Components" on page 179.

➤ 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 refresh all the folders and components in the tree, select the **Components** root folder and click the **Refresh All** button in the toolbar. Alternatively, you can press F5 on the keyboard to refresh the selected folder or component, or CTRL+F5 to refresh all the folders and components in the tree.

➤ To filter or sort the business components in the tree, click the **Set Filter/Sort** button in the toolbar to open the Filter 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** section of the Filter Condition tab. This is an advanced, second filter on fields in the Business Components module. For example, you can define the cross filter for components that have the status of **Ready**. This ensures that only components that have this status are displayed in the component tree.

   For more information on filtering and sorting a tree, and on using a cross filter, see the *Quality Center User Guide*.

Viewing and Modifying Business Components in the Component Grid

When the Business Components module is first accessed, components are displayed in the component tree view. To view the component grid, select **View** > **Component Grid**.

➤ To rename a business component, select the component cell in the **Component Name** column. Then edit the item name and click another cell.

➤ To modify other data for a component, perform one of the following:

   ➤ Double-click anywhere in the component row. The Component dialog box opens. Modify the component in the Snapshot, Parameters, or Design Steps tabs. For more information, see "Defining Business Components" on page 179.

   ➤ Select the relevant cell in the component grid. You can then enter data directly in the cell, or click the arrow button and enter the appropriate data in the box that opens, or select it from the displayed list or calendar.

➤ To filter or sort the business components, click the **Set Filter**/**Sort** button in the toolbar. You can view any currently applied filters in the filter boxes below the component grid toolbar. If the filter boxes are not displayed, select **Grid Filters** from the right-click menu.

For more information on filtering and sorting a grid, or using a cross filter, see the *Quality Center User Guide*.

You can also access specific data that you want to view by sorting the components in the component grid into groups.

Sorting the Component Grid by Group

You can sort the components in the component grid into groups according to the values that are displayed in the **Assigned to**, **Automation engine**, **Created by**, and **Status** columns. For example, you could sort by the **Created by**, **Status**, and **Assigned to** values to group and display components that you have created, have the status of **Ready**, and that are assigned to a specific Automation Engineer. You can also sort according to **Version Status** and the name of the user that checked out the component.

To sort the component grid by group:

1 In the component grid, click the **Set Filter/Sort** button in the toolbar. The Filter dialog box opens.

2 Click the **Group** tab.
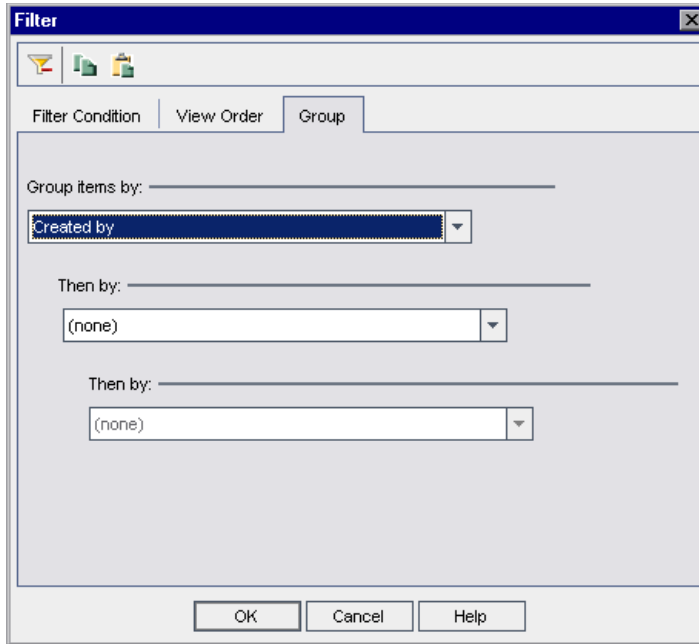
3 Select a value from the first sort list.

4 If required, select values from the second and third sort lists. Selecting values in this step sorts the data into subgroups.

5 Click **OK**. The component grid displays all the components according to your sort specifications.

The example below displays the three components in a project that have status **Error** and were created by the user with the user name **alex_qc**.

	Component Name	Status	Assigned To	Created By	Creation Date	Description		Script Type
	Status : Error (3 records)							
	☐ Created By : alex_qc (3 records)							
	Fax order	Error		alex_qc	12/13/2005	Summary	Faxes an existing order	MANUAL
	Logout	Error	admin	alex_qc	12/13/2005	Summary	Closes the Flight Reserv	QT-KW
	Open order	Error		alex_qc	12/13/2005	Summary	Uses information about	QT-KW
	Status : Maintenance (6 records)							
	Status : Not Implemented (3 records)							
	Status : Ready (15 records)							
	Status : Under Development (20 records)							

➤ To expand a group or subgroup, click the expand symbol ⊞ to the left of the name, or double-click the row. You can also select the group and press the asterisk key (*****) on the keyboard number pad to expand the group and all its subgroups.

➤ To collapse a group or subgroup, click the collapse symbol ⊟ to the left of the name, or double-click the row. You can also select the group and press the minus key (**-**) on the keyboard number pad to collapse the group and all its subgroups.

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 component grid, or to another project or server. You can also share all the components in a project across multiple projects.

For more information, see:

➤ "Considerations When Copying Components or Folders to Other Projects" on page 192

➤ "Copying Components or Component Folders in the Current Project" on page 194

➤ "Copying Components or Component Folders between Projects" on page 195

➤ "Sharing Components and Component Resources" on page 197

Considerations When Copying Components or Folders to Other Projects

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

➤ Both servers must be running the same version of Quality Center.

➤ The source and target projects must be opened in separate browsers.

➤ 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.

➤ 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 "Connecting to Business Process Testing" on page 47, and the *HP Quality Center Administrator Guide*.

Copying 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 you copy and paste a component in the component grid, the component is copied to the same folder in the component tree as the original component. When you paste a component in the component grid of another project, the same folder structure is created, if it does not already exist.

Copying 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 "Considerations When Copying Components or Folders to Other Projects" on page 192

To copy an existing folder or business component:

1 Select the component or component folder that you want to copy in the component tree or component grid. To copy more than one component in the component grid, use the CTRL key.

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

3 If you are working 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.

If you are working in the component grid, right-click anywhere in the grid and select **Paste**. The component is copied to the component grid. The position of a new component pasted to the grid is determined by the currently defined sort order.

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, or double-click the component in the grid, and modify the settings in the tabs as described in "Defining Business Components" on page 179.

Copying Components or Component Folders between Projects

You can copy components or component folders from one project to another. For more information, see "Considerations When Copying Components or Folders to Other Projects" on page 192.

If the components or component folders have related entities, you can instruct Quality Center 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 component or component folder that you want to copy in the component tree or component grid. To copy more than component or component folder, use the CTRL key.

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

4 Open another instance of Quality Center 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.
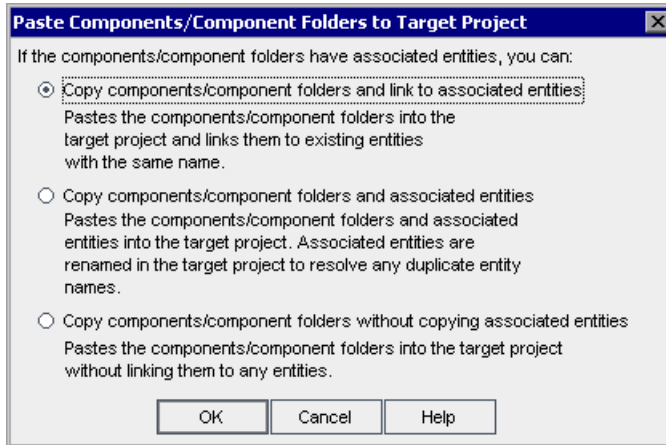
7 Select one of the following options:

➤ **Copy components/component folders and link to associated entities.** Quality Center 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, Quality Center copies it to the target project and links it to the component.

➤ **Copy components/component folders and associated entities.** Quality Center 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.** Quality Center 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.

8 Click **OK**.

Sharing Components and Component Resources

You can also share all the components in a project across multiple projects. Quality Center 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 "Sharing Entities in Libraries" on page 99, and the *HP Quality Center User Guide*.

Validating Business Components

You can validate components that are included in business process tests or flows to locate any configuration errors that could halt the successful running of the tests and flows.

Validating a business component in the Business Components module checks all instances and iterations of the component that are contained in business process tests or flows.

Note: You can also check business process tests or flows for configuration errors. Clicking the **Validate Test** button in the Test Script tab of a business process test or flow in the Test Plan module checks the test or flow and all its instances within all test sets. For more information, see "Validating Business Process Tests and Flows" on page 312.

The validation process for business components and business process tests or flows reports the following:

➤ **Value type mismatch errors.** Resulting from mismatched input and output component parameter types. For example, an output component parameter defined as a string and the corresponding input component parameter in a subsequent component defined as a number.

➤ **Empty parameter value errors.** Resulting from date or number type input component parameters that do not have specified values. For example, an input component parameter without a specific date value.

➤ **Iteration range mismatch errors.** Resulting from a difference in the number of iterations in components. For example, where iterations 1 through 4 are selected to run in a component that receives input from a previous component that is iterated only three times.

➤ **Not in use warning.** Where there are no business process tests or flows using the currently selected component.

To validate a business component:

1 Select the business component in the component tree or component grid.

2 Click the **Validate Component** button in the toolbar, or right-click and select **Validate Component**.

Quality Center validates all instances of the component in all business process tests and flows and reports the results in the Validate Component dialog box, as shown in the example below.
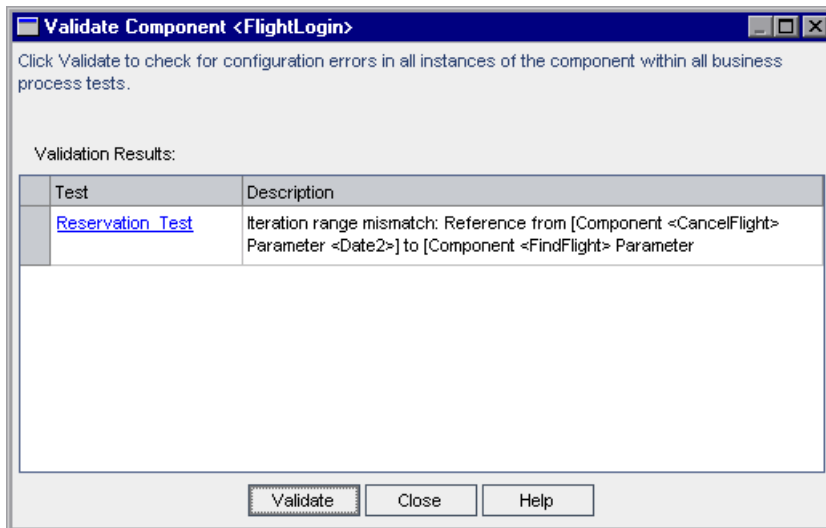
3 If a validation error is reported, click the link in the **Test** column to jump directly to the Test Script tab of the relevant business process test or flow in the Test Plan module.

The Validate Component dialog box remains in view, enabling you to fix the displayed errors.

In the Test Script tab, errors are indicated in red text in the **Status** column of the component. In addition, the icon in the **Status** column changes to a yellow icon, as shown in the **FindFlight** component below.

	Component	Status	Input	Output	On Failure
1	**Log in**	Ready	2 Component iterations UserName	Name OP2	Continue
▶2	**FindFlight**	Ready Iterations error	Input1: [Log in] OP2 Input2: _		Continue

Note: In the case of a value type mismatch, the error is indicated in the component containing the input component parameter. In the case of an iteration range mismatch, the error is indicated in the later of the components.

4 Open the Component Iterations dialog box of the component causing the error, and modify the component parameters as required. For more information on working with business component parameters, see Chapter 11, "Working with Parameters."

5 When you have completed your corrections, click the **Validate** button in the Validate Component dialog box to repeat the validation test. If the error has been resolved, a message is displayed indicating that the validation was successfully completed.

6 Click **Close** to close the Validate Component dialog box.

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 or modified. For more information on the **Obsolete** folder, see "Understanding the Obsolete Folder" on page 202.

The deletion date and original location of a removed business component in the **Obsolete** folder are shown in the component's Details tab. Obsolete components are identified in the component grid by an Obsolete icon to the left of the **Component Name** column.

In addition, the component status is shown as Obsolete 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 or component grid and click the **Delete** button in the toolbar, or right-click the folder or component and select **Delete**. A warning message is displayed.

Tip: In the component grid, you can select and then delete more than one business component simultaneously using standard Windows selection techniques (using the CTRL or SHIFT keys). Click to the left of the component row to ensure that the entire row is selected (the row is highlighted), before pressing the required keys. Otherwise, the selection operation does not work.

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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.

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 and cannot be modified, but they can be restored to their original location using the **Restore** option, as described in "Restoring Obsolete Business Components" on page 203. 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 component requests that were not previously located in the component tree, can be transferred from the **Obsolete** folder 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**.

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** box in the component Details tab. The date that the component was deleted is also displayed in the tab.

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. This enables you to inform other personnel about new and existing components, including component design steps, history, and snapshot.

Quality Center includes a **Go To** link in the e-mail, which enables the recipient to go directly to the component in the Business Components module.
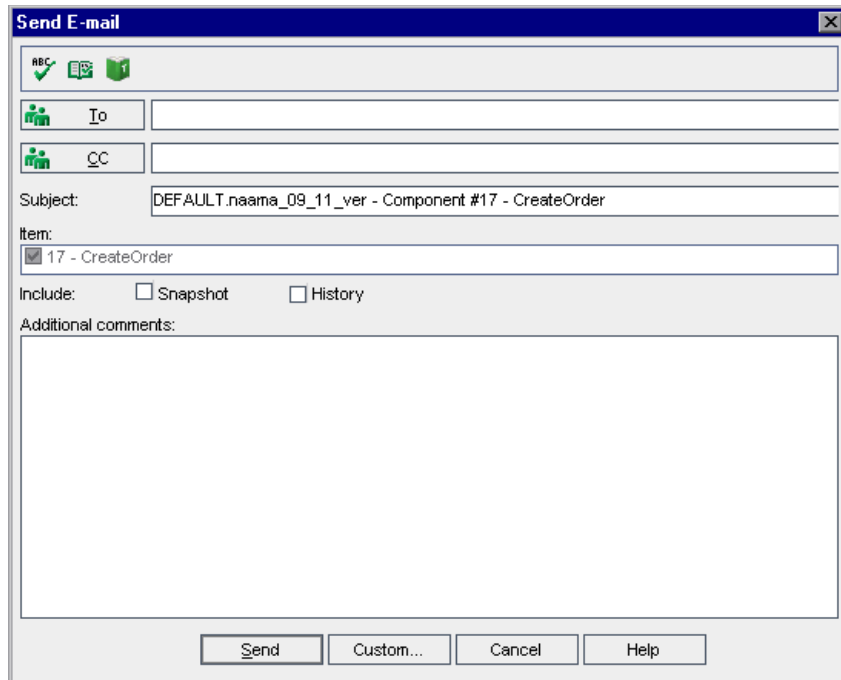
Note: By default, Quality Center sends e-mail in HTML format. To send e-mail as plain text, edit the **MAIL_FORMAT** parameter in the **Site Configuration** tab in Site Administration. For more information, see the *HP Quality Center Administrator Guide*.

To mail a component:

1 In the component tree, select a component and click the **Send E-mail** button. Alternatively, click the **Send E-mail** arrow and select **Send E-Mail to Designer** if you want to send the e-mail to the user who created the component.

The Send E-mail dialog box opens.

2 Type a valid e-mail address or user name. If you selected **Send E-Mail to Designer** in the previous step, the address of the user who created the component appears in the To box. Alternatively, click the **To** button or **CC** button to select users.

The Select Recipients dialog box opens.

You can sort the users list, search for users, group users by user groups, and select users from the list or from a group tree. For more information, see the section on selecting users in the *HP Quality Center User Guide*.

Select the users or user groups to which you want to send the e-mail, and click **OK**.

3 If required, you can add additional descriptive information to the e-mail in the **Subject** box. By default, the domain, project, component ID, and component name are displayed in the Subject box.

4 Select whether you want to include a **Snapshot** and/or the **History** of the component. **Snapshot** refers to any snapshot in the Snapshot tab.

5 In the **Additional comments** box, add any comments you have.

6 You can check your wording in the e-mail:

➤ Click the **Check Spelling** button to check the spelling for the selected word or text box. If there are no errors, a confirmation message opens. If errors are found, the Spelling dialog box opens and displays the word that is misspelled together with replacement suggestions.

➤ Click the **Spelling Options** button to open the Spelling Options dialog box, enabling you to configure the way Quality Center checks spelling.

➤ Click the **Thesaurus** button to open the Thesaurus dialog box and display a synonym, antonym, or related word for the selected word. You can replace the selected word or look up new words.

7 Click **Custom** to customize the e-mail. In the Select Fields dialog box, you can specify fields to include in the e-mail.

8 Click **Send** to send the e-mail.

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 created 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.

For more information on creating a component request in the Test Plan module, see "Requesting New Components for Business Process Tests or Flows" on page 302.

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 or modified in the Component Requests folder.

You can then add the requested business component to a component folder in the component tree, and edit its properties if required. 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.

Adding Component Requests to the Component Tree

If no existing business component answers the needs defined in the component request, you can drag and drop the request into the appropriate position in the component tree. You can then define the component in the Details, Snapshot, and Parameters tabs, and create component steps in the Design Steps tab, as described in "Defining Business Components" on page 179.

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.

Deleting Component Requests

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

➤ Component requests that are not being used by a business process test or flow are permanently deleted.

➤ Component requests that are being used by one or more business process tests or flows are automatically transferred to the **Obsolete** folder in the component tree.

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

Quality Center 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 210

➤ "Generating Project Documents" on page 214

Generating Reports and Graphs

The options in the **Analysis** menu of the Business Components module enable you to create a variety of predefined reports and graphs about the components in your project.

You can create standard reports and graphs in the Business Components module or in the Quality Center Dashboard module. 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.

Standard reports are reports that display data from the Business Components module. You can use these reports for one-time reference, or you can save them in the Dashboard module, where you can continue to configure their data and appearance.

For a list of available predefined reports and graphs, see "Predefined Reports" on page 211, and "Predefined Graphs" on page 212.

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 Quality Center modules. For more information, see the *HP Quality Center User Guide*.

For future reference and modification, you can save the standard reports and graphs you create in the Dashboard module. For more information on the Dashboard module, see the *HP Quality Center User Guide*.

This section contains the following:

➤ "Predefined Reports" on page 211

➤ "Predefined Graphs" on page 212

➤ "Creating Reports and Graphs in the Business Components Module" on page 213

Predefined Reports

When you create business process testing reports, you can choose from a list of predefined reports in the **Analysis** > **Reports** sub-menu of the Business Components and Test Plan modules.

The following reports are available in the Business Components module:

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

➤ **Standard Hierarchy Report.** Shows the components currently in the Quality Center 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 Quality Center project, including some detail fields, the component descriptions, and each component's design steps.

➤ **Components Used By.** Shows all the components currently in the Quality Center 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 Quality Center project, including some detail fields, the component descriptions, and the application area (if any) used by each component.

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 Quality Center 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 Graphs

When you create business process testing graphs, you can choose from a list of predefined reports in the **Analysis** > **Graphs** sub-menu of the Business Components module.

The following graphs are available:

➤ **Components Summary - Group by 'Status'.** Shows how many components are currently in the Quality Center 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 Quality Center groups the data. By default, the graph appears as a bar chart.

➤ **Components Progress - Group by 'Status'.** Shows how many components existed in a Quality Center 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 Quality Center 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 Quality Center 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.

Creating Reports and Graphs in the Business Components Module

This section describes how to create standard predefined reports and graphs in the Business Components module.

You can define what data appears in a graph, and how the data is organized. For more information on configuring graphs, see the *HP Quality Center User Guide*.

To create a standard report or graph in the Business Components module:

1 Select **Analysis** > **Reports**, or **Analysis** > **Graphs**, and then choose the type of report or graph you want to create.

➤ For more information on available predefined report and graph types, see "Predefined Reports" on page 211, and "Predefined Graphs" on page 212.

➤ To create a report of a single component, select the component in the component tree and choose **Analysis** > **Report Selected**.

The report or graph opens and displays data from the selected component or components. Use the buttons in the report toolbar to adjust the report view. For more information, see the *HP Quality Center User Guide*.

2 Save your report or graph, if required.

➤ To save the report or graph Web page in the file system, click the **Save** button in the toolbar.

➤ To save the report in the Dashboard module, click the **Save** button at the bottom of the report.

The New Standard Report or New Graph dialog box opens.

➤ In the Standard Report Name or Graph Name box, enter a descriptive name.

➤ In the Select Folder box, select the folder in the Analysis tree in which to save the report, or click **New Folder** to create a new folder. For more information on folders in the analysis tree, see the *HP Quality Center User Guide*.

➤ Click **Save**. The Dashboard module opens in the Analysis View, and the report or graph opens under the View tab.

After you save the report or graph, you can configure the content, and adjust its viewing settings. For more information, see the *HP Quality Center User Guide*.

Generating Project Documents

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

Note: This section describes how to include information about the project's business components in a document using the Quality Center Document Generator. For detailed information on how to generate project documents, see the *Quality Center User Guide*.

Business component documentation can include the following details for each component in the project:

Description. A descriptive summary of each component, including its pre-conditions and post conditions, and its status.

Details. The component's details, including its creation details, status, and whether iterations are allowed.

Snapshot. The snapshot attached to the selected component.

Parameters. Input and output parameter names, descriptions, types, and default values (for input component parameters).

Steps. The steps of the business component.

Used By. Details of the business process tests or flows that include the business component, including status, creation details, path, and links to the relevant business process tests or flows in the Test Plan module.

You use the Components page of the Document Generator to specify the business component information that should appear in the Component section of the project document.

To specify business component data in a generated document:

1 Click the **Tools** button on the upper-left side of the Quality Center window. Select **Document Generator**. The Document Generator opens, displaying a tree comprising check boxes and links.

2 Select the **Business Components** check box to add a components section to the document.

3 Click the **Business Components** link in the Document Generator tree.

The Components page opens.
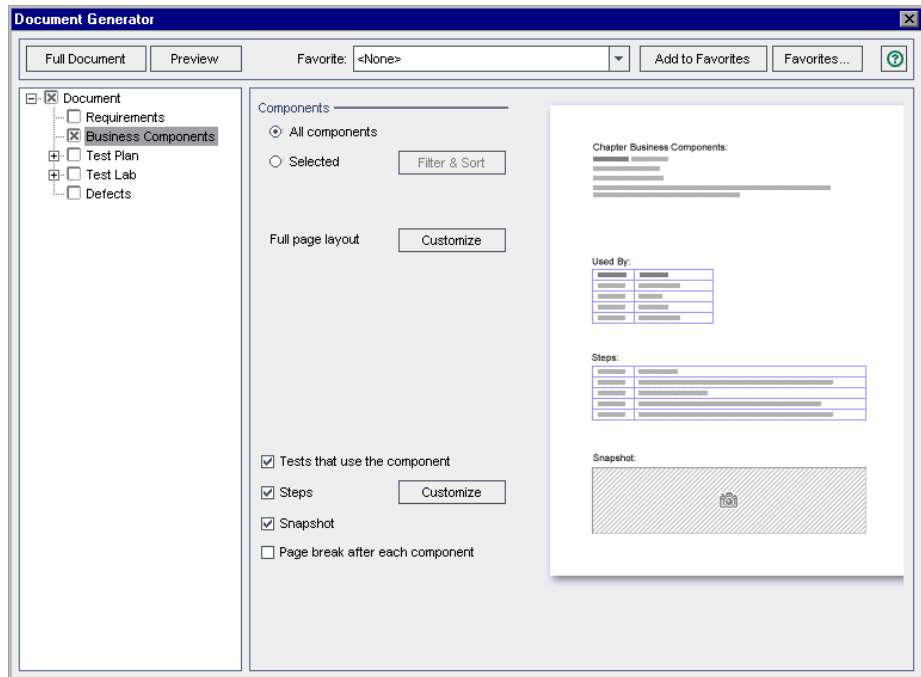
4 Under **Components**, select one of the following options:

➤ **All components.** Includes all the components in the project.

> ➤ **Selected.** Includes only selected components. Click the **Filter & Sort** button to specify the criteria for selecting components. For more information on using the Filter dialog box, see the *Quality Center User Guide*.

5 Next to **Full 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.

6 To include a list of business process tests or flows that use the component, select **Tests that use the component**.

7 To include all the steps of the selected components, select **Steps**.

8 Next to **Steps**, 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.

9 To include any snapshots that are attached to the components, select **Snapshot**.

10 To insert a page break after the component section of the project document, select **Page break after each component**.

11 Click **Full Document** at the top left of the Components page to continue the document generation and saving procedure. For more information, see the *Quality Center User Guide*.

Tip: You can also generate a preview project document to see how the document will look, without all the detail included. To generate a preview document, click the **Preview** button. Quality Center opens Microsoft Word and displays the preview project document.

7

Learning Flows

This chapter describes how to learn flows automatically by navigating through your environment-specific applications.

This chapter includes:

About Learning Flows

If you are testing an application and you have QuickTest Professional installed on your computer, Business Process Testing Enterprise Extension enables you to learn a flow automatically, as you navigate through your application. You first create an empty flow or select an existing flow, and start the Learn Flow process. You then perform the operations in your application that you want Business Process Testing Enterprise Extension to learn.

After you finish learning the flow, Business Process Testing Enterprise Extension breaks down the learned flow into a sequence of automated QuickTest keyword-driven business components, each representing a screen or tab in your application. Parameters are automatically created for the steps in the components, based on values entered in the user interface controls in the application. You can use these learned flows as the basis for creating business process tests to test your application. For more details on how Business Process Testing Enterprise Extension breaks up a learned flow into components and creates parameters, see "How Enterprise Extension Creates Components" on page 219.

If you are working with the Application Model, the learned components are associated with the Application Model entities. For more information on working with the Application Model module, see "Learned Flow Associations in the Application Model Module" on page 240, and Chapter 15, "Working with Application Model Entities in Quality Center."

Note: During the Learn Flow process resources are created in the BPT Resources folder in the Test Resources module. For business process tests or flows to perform properly, this folder and its subfolders should not be renamed, moved, or deleted.

You learn flows from the Test Plan module. For more information on learning flows, see "Learning Flows Automatically" on page 219.

How Enterprise Extension Creates Components

When Business Process Testing Enterprise Extension learns a flow, it creates a new business component for each screen or tab through which you navigate in your application.

For details for your application environment, see Appendix A, "Environment-specific Information."

Learning Flows Automatically

You learn flows automatically from the Test Plan module. As you navigate your application during a Learn Flow process, Business Process Testing Enterprise Extension creates automated business components corresponding to screens, transactions, and so on, in your application. It creates component steps based on the operations you perform. These components are then added to the flow. During the learning process you can insert checkpoints and output values.

When you learn flows, Business Process Testing Enterprise Extension automatically creates component input parameters for controls in the application's user interface that require user input, such as text fields. The default value for these parameters is the value you insert in these fields during the Learn Flow process. For more information, see Chapter 11, "Working with Parameters."

This section includes:

➤ "Considerations for Learning Flows" on page 219

➤ "Learning a Flow" on page 220

Considerations for Learning Flows

➤ QuickTest Professional must be closed when learning a flow.

➤ You must log in to your application before you start to learn the flow. Business Process Testing Enterprise Extension is not able to learn the login procedure.

➤ To learn a flow, a user must belong to a user group that has the following task permissions: **Modify Folder (Test Plan), Modify Test, Add Component Folder, Add Component, Add Step, Add Parameter, Modify Component, Modify Step, Modify Parameter**. For more information on configuring user group permission settings, see "Setting Permissions for Business Process Testing Enterprise Extension" on page 49, and the *HP Quality Center Administrator Guide*.

➤ To enable more efficient component reuse, it is recommended that you perform the same operation in the same manner, each time you learn a flow. For example, clicking the **Enter** button or pressing the ENTER key on the keyboard results in different learned steps. Therefore, if you are not consistent when performing such operations, two otherwise identical components might be considered only similar rather than identical. For information on component reuse, see "Understanding Component Reuse" on page 233.

➤ Using keyboard input to navigate your application instead of clicking buttons outside your screen or tab results in fewer learned components in your flow. For example, clicking the **Enter** button during the Learn Flow process results in the creation of a new component for the **Enter** button, whereas pressing ENTER results in an additional step in the existing component. For more information, see "How Enterprise Extension Creates Components" on page 219.

Learning a Flow

You learn flows automatically from the Test Plan module. You can create a new flow or insert components created during the Learn Flow process into an existing flow.

If you selected the **Start learn flow wizard after flow is created** check box in the Create New Test dialog box, in order to learn a flow immediately, proceed to step 6 on page 222. For information on creating a flow, see "Creating Flows" on page 270.

To learn a flow:

1 Open and log into the application for which you want to learn the flow, and navigate to the point at which you want to start learning the flow.

If you want to insert learned components into a flow that already contains one or more components, you can use the option described in step 5 to run the initial components to navigate to the correct location in your application.

2 In the Test Plan module, create a new flow or select an existing flow. For more information on creating flows, see "Creating Flows" on page 270.

3 Click the **Test Script** tab.

4 If there are already components in the flow, and you want to insert the new components between existing components, select the component after which you want to insert the new components.

For example, suppose your flow contains the components Comp_1, Comp_2, and Comp_3. If you want to insert the new components between Comp_2 and Comp_3, select Comp_2.

Note: To insert the new components at the beginning of the flow (before existing components), you must first insert the new components to a different location, and then change the order of the components in the flow manually after the learn process is finished.

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5 In the Test Script tab toolbar, click the **Learn Flow** button.

If you do not have the correct permissions to learn a flow, the **Learn Flow** button is disabled. For information on the permissions needed to learn a flow, see the section on customizing the Enterprise Extension in the *HP Business Process Testing Enterprise Extension Installation Guide*.

If there are already business components in the flow, the Learn Flow dialog box opens.
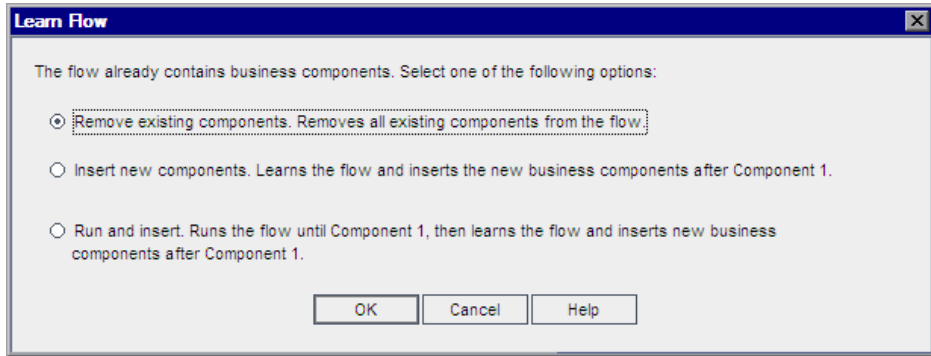
Select one of the following options for handling the existing components, and click **OK**. The Learn Flow dialog box closes.

Option	Description
Remove existing components	Removes all the existing business components from the flow and learns the components in the emptied flow.
Insert new components	Learns the flow and inserts the resulting components after the selected existing component.
Run and insert	Runs the existing components in the flow until the selected component, then learns the flow, and inserts the resulting components after the selected existing component.

A message box reminds you that you must open your application. Click **Learn Flow** to continue. If you do not want to receive this reminder in the future, select the **Don't show this again** check box.

6 The Learn Flow toolbar opens.
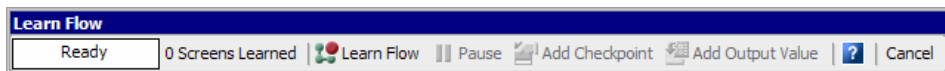
In the Learn Flow toolbar, click the **Learn Flow** button. The button changes to **Stop Learn**, and the status in the toolbar changes from **Ready** to **Learning**.

7 Perform the operations that you want to learn. In general, the operations you perform for a single flow should represent those of a single screen or transaction in your application. While Business Process Testing Enterprise Extension is learning the flow, you can control the Learn Flow process using the Learn Flow toolbar. For more information, see "Understanding the Learn Flow Toolbar" on page 224.

8 When you finish performing the operations that you want to learn, click the **Stop Learn** button in the Learn Flow toolbar. The Learn Flow Summary dialog box opens.
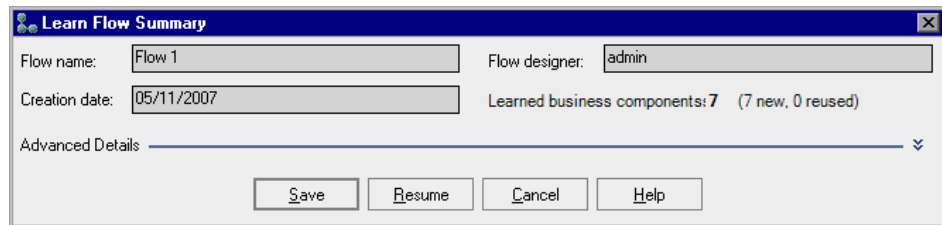
9 You can use the Learn Flow Summary dialog box to view details of the learned steps. The **Advanced Details** area of the Learn Flow Summary dialog box enables you to reuse existing components in your project in place of creating new components for your flow. It also enables you to change the default location for newly created components. For more information, see "Understanding the Learn Flow Summary Dialog Box" on page 228 and "Understanding the Select Business Components Folder Dialog Box" on page 232.

10 Click **Save**. The Learn Flow Summary dialog box closes. The components created as a result of the Learn Flow process are added to the Business Components module, and these components are added to the flow. Components that are created through the Learn Flow process are indicated with a special learned component icon .

Note: Creation of business components for a learned flow may take some time.

Understanding the Learn Flow Toolbar

The following table describes the features of the Learn Flow toolbar, which enables you to control the Learn Flow process.
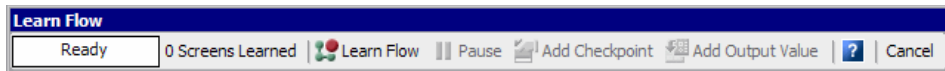
For more information on learning flows, see "Learning Flows Automatically" on page 219.

Button	Description
Status	Displays **Ready** when Business Process Testing Enterprise Extension is not learning a flow, and **Learning** during the Learn process.
Screens Learned	Indicates the number of screens learned during the Learn process. (Available only when Business Process Testing Enterprise Extension is learning a flow.)
Learn Flow	Starts learning a flow. (Available only when Business Process Testing Enterprise Extension is not learning a flow.)
Stop Learn	Stops learning a flow. (Available only when Business Process Testing Enterprise Extension is learning a flow.)

Button	Description
Pause	Pauses learning a flow. When the Learn Flow process is paused, any actions you perform on your application are not learned. To resume learning actions, click the **Resume** button. (Available only when Business Process Testing Enterprise Extension is learning a flow.)
Resume	Resumes learning after a pause. (Available only when the Learn Flow process is paused.)
Add Checkpoint	Inserts a checkpoint into the automated component. A checkpoint is a verification point that compares a current value for a specified property with the expected value for that property. This enables you to identify whether your application is functioning correctly. For more information, see the "Adding Checkpoints to Flows" on page 226.
Add Output Value	Enables you to add an output value to the automated component. An output value is a step in which one or more values are captured at a specific point in your test and stored for later use. For more information, see "Adding Output Values to Flows" on page 227.
Cancel	Cancels the current Learn Flow process. If you cancel the Learn Flow process, all flows learned during that session are not saved.

Adding Checkpoints to Flows

You can add object property checkpoints to a component during the Learn Flow process. Object property checkpoints enable you to check object property values during a test run to determine if they match expected values. The test results provide information about which object property checkpoints failed during a test run, and why.

To insert a checkpoint during the Learn Flow process:

1 During the Learn Flow process, perform the operations you want to learn up to the point that you want to insert a checkpoint. Click the **Add Checkpoint** button on the Learn Flow toolbar. The cursor changes to a pointing hand and the Learn Flow toolbar is hidden.

2 Point to the object in your application for which you want to create an object property checkpoint. The Checkpoint Properties dialog box opens.
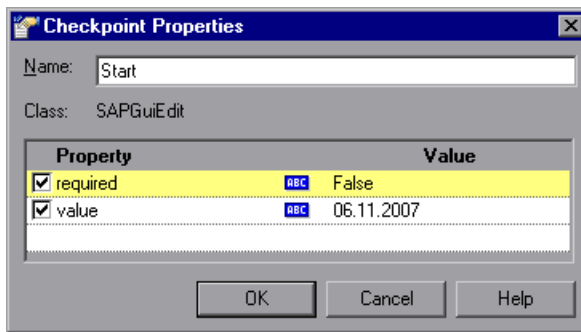
3 By default, all the properties in the dialog box are selected for verification. Clear the check box for any values you that do not want to check and click **OK**. The object property checkpoint is added to the component.

4 Continue performing operations in your application to continue learning the flow.

Adding Output Values to Flows

You can add an object property output value step to a component during the Learn Flow process. Object property output value steps allow you to capture and store values during your test. These values can later be used as input at a different point in the run session.

To insert an object property output value during the Learn Flow process:

1 During the Learn Flow process, perform the operations you want to learn up to the point that you want to insert a checkpoint. Click the **Add Output Value** button on the Learn Flow toolbar. The cursor changes to a pointing hand and the Learn Flow toolbar is hidden.

2 Point to the object on the screen for which you want to create an output value. The Output Value Properties dialog box opens.
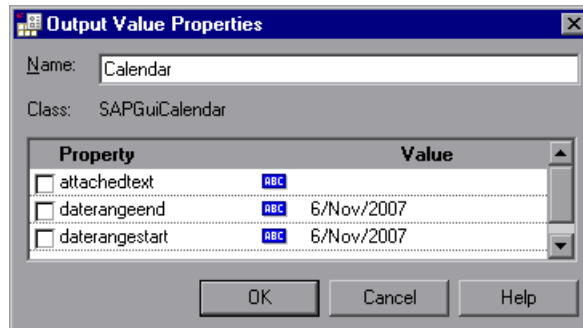
3 By default, none of the properties are selected for the Output. Select those properties whose values you want to output and click **OK**. The output value is created and the object property output value step is added to the component.

4 Continue performing operations in your application to continue learning the flow.

Understanding the Learn Flow Summary Dialog Box

The Learn Flow Summary dialog box displays information about the steps performed during the Learn Flow process and the components created as a result. For more information on learning flows, see "Learning Flows Automatically" on page 219.

The Learn Flow Summary dialog box is displayed with the **Advanced Details** section collapsed by default.
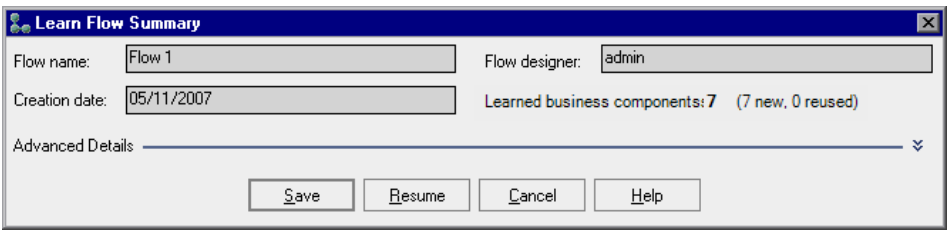
The default view of the Learn Flow Summary dialog box contains the following elements:

Element	Description
Flow name	The name of the flow.
Flow designer	The Quality Center user name of the user who designed the flow.
Creation date	The date on which the flow was created.
Learned business components	The number of learned components. Indicates how many components will be created as new components and how many will reuse existing components in the project. For more information, see "Understanding Component Reuse" on page 233.
Advanced Details	Displays additional information about the learned flow and enables component reuse. Collapsed by default. Click the **Expand** button ⯠ at the far right to expand and collapse this area.

Element	Description
Save	Saves the new components to the Business Component module, and adds them to the flow.
Resume	Resumes learning the flow without saving the learned components.
Cancel	Cancels learning the flow. All the learned components are deleted.

Click the **Expand** button to the far right of **Advanced Details** to expand and display the Learn Flow details.
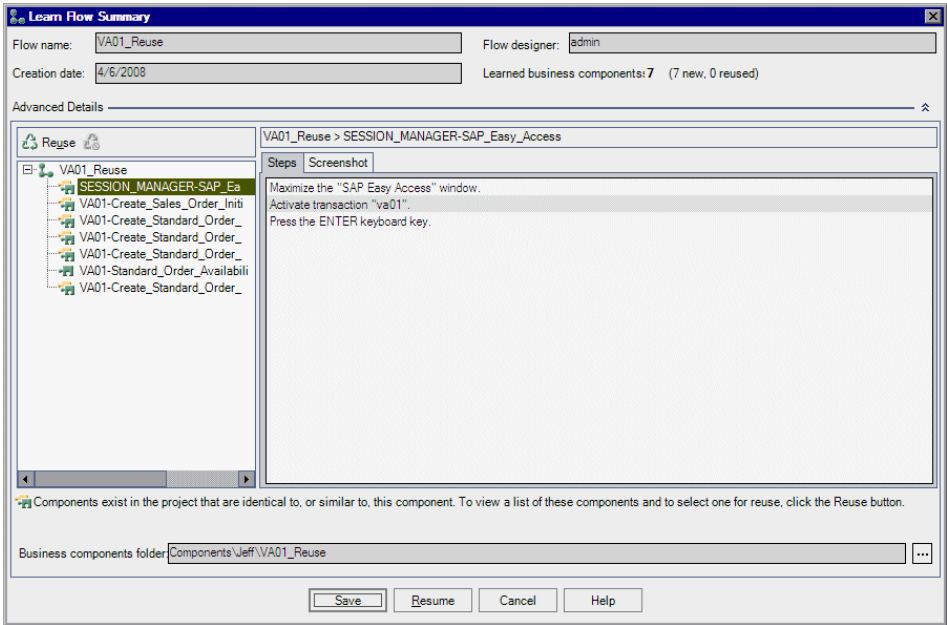
The **Advanced Details** area contains the following elements:

Element	Description
Reuse button	Opens the Available Components for Reuse dialog box. Enabled only if components exist in the project that are identical to, or similar to the component selected in the flow tree. For more information, see "Understanding Component Reuse" on page 233.
Cancel Reuse button	Enabled only for reused components. Cancels reuse for the selected component. A new component is created for the selected component. For more information, see "Understanding Component Reuse" on page 233.
Remove Component from Flow button	Deletes the selected component from the learned flow.
flow tree	Displays the business components learned as part of the flow. When you select a component you can view its steps in the **Steps** tab, and a screenshot of the application as it appeared at the beginning of the component's execution in the **Screenshot** tab.
	The component icon in the flow tree indicates the component's reuse status:
	➤ indicates that the component has no identical or similar components in the project. The component cannot be substituted with a reused component.
	➤ indicates that the component has identical or similar components in the project. The component can be substituted with a reused component.
	➤ indicates that component reuse has been applied to this component.
component name	The full name of the component including its flow.

Element	Description
Steps tab	➤ For a learned component, the Steps tab displays a description of the steps in the currently selected business component. ➤ For a reused component the Steps tab displays a description of the steps in the reused component. ➤ For a reused component that is identical to the learned component, the **Steps** tab displays the steps and values of the component that will be saved with the flow. For information on which values will be saved with the flow, see "About Business Process Testing Enterprise Extension Component Reuse Customization" on page 239.
Screenshot tab	Displays a screenshot of your application as it appeared at the beginning of the selected component in the flow. For a reused component, the **Screenshots** tab displays the screenshot of the reused component.
reuse summary	Displays the reuse status of the selected component in the flow tree.
Business components folder	Displays the default location where the learned components will be stored. You can change the location by clicking the browse button and browsing to the new location. For more information, see "Understanding the Select Business Components Folder Dialog Box" on page 232.

Understanding the Select Business Components Folder Dialog Box

By default, learned components are added to the Business Component tree in a folder with a path parallel to the path of the flow in the Test Plan Tree. For example, if the flow MyFlow is located in the folder Subject\MyFlows in the Test Plan Tree, the learned business components are, by default, created in the folder Components\MyFlows\MyFlow. You can change the default location for learned components.

To select a Business Component folder for learned components:

1 In the **Advanced Details** area of the Learn Flow Summary dialog box, click the browse button next to **Business components folder.** The Select Business Component Folder dialog box opens.
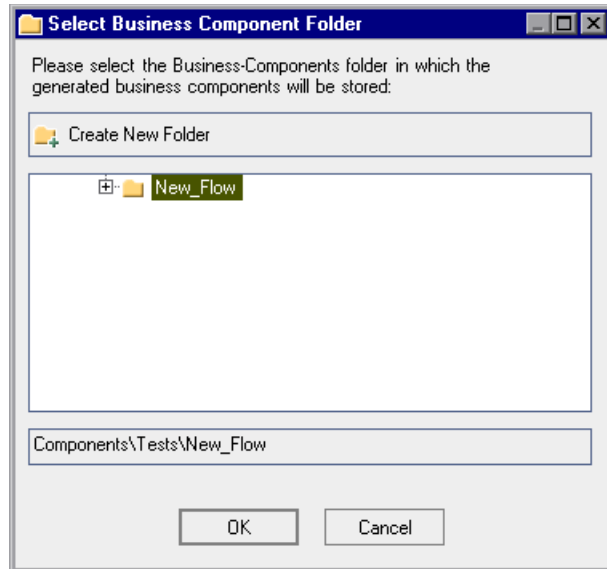
2 Select the folder in which to create the business components.

3 You can create a new folder in the business component tree. To create a new folder, select the folder under which you want to create the new folder and click the **Create New Folder** button. In the Create New Folder dialog box that opens, type a name for the new folder. Click **OK**.

4 Click **OK**. The Select Business Component Folder dialog box closes.

Understanding Component Reuse

When Business Process Testing Enterprise Extension learns a flow, it analyzes each of the components in the flow to see if there exists within the project, one or more components that are similar to, or identical to the learned components. If such a component exists, you can reuse the existing component instead of creating a new component in your flow.

This section includes:

➤ "Considerations for Working with Component Reuse" on page 233

➤ "Reusing Components" on page 235

➤ "The Available Components for Reuse Dialog Box" on page 236

➤ "About Business Process Testing Enterprise Extension Component Reuse Customization" on page 239

Considerations for Working with Component Reuse

➤ Existing components in the project are compared to the learned component using the following criteria:

a **Both components represent the same screen.**

b **Both components represent the same screen with exactly the same objects.** Checkpoints and Output objects must also be identical for this criterion to match.

c **Both components contain the same steps.** Steps are considered identical when they perform the same action, and refer to the same objects.

d **Both components contain the same steps in the same order.**

Percentage similarity is defined as follows:

Percentage	Definition
100	All four criteria are met.
75	Criteria **a**, **b**, and **c** are met.
50	Criteria **a** and **b** or **a** and **c** are met.
25	Criterion **a** is met.

➤ Checkpoints and Output objects are considered identical when they refer to the same properties.

➤ Steps that reference table parameters are considered identical when they reference the same table object and use the Input operation. The structure of the table parameter (columns, rows) and the contents of individual cells within the tables are not compared.

➤ Steps that reference methods are considered identical when they refer to the same objects and methods, and contain the same number of arguments. The values of the arguments are not compared.

➤ Only components in the project that were created through the Learn Flow process are analyzed for similarity with the learned component.

➤ A component that is substituted with a reused component is not listed in the flow folder of the Business Components module. A flow folder is not created in the Business Components module for flows that use only reused components. To find the location of a reused component, right-click the component in the **Test Script** tab of the **Test Plan** module and select **Edit Component**. The Business Component module opens and displays the selected component.

Reusing Components

You can reuse an existing component in your learned flow in place of a new component.

To reuse an existing component in your flow:

1 In the Learn Flow Summary dialog box, select a component that can be substituted with a reused component, from the flow tree. For information on selecting a component that can be substituted with a reused component, see "Understanding the Learn Flow Summary Dialog Box" on page 228.

2 Click the **Reuse** button. The Available Components for Reuse dialog box opens. For more information, see "The Available Components for Reuse Dialog Box" on page 236.

3 Select an existing component from the **Available Components** list in the Available Components for Reuse dialog box. Click **OK**.

4 To select an alternate component for reuse, click the **Reuse** button again.

5 To cancel the reuse of an existing component and create a new component in the flow, click the **Cancel Reuse** button.

The Available Components for Reuse Dialog Box

Description	Enables you to reuse an existing component in the project, instead of using the newly learned component.
How to Access	In the Learn Flow Summary dialog box, select a component and click the **Reuse** button.
Important Information	Component reuse is customizable via the **BPT Enterprise Extension** page in the **Project Customization** screen (**Tools > Customize**). For more information, see "About Business Process Testing Enterprise Extension Component Reuse Customization" on page 239.
Learn More	**Conceptual overview**: "Understanding Component Reuse" on page 233. **Primary task**: "Understanding Component Reuse" on page 233. **Additional related topics**: ➤ "Available Components for Reuse Dialog Box Options" on page 238. ➤ "About Business Process Testing Enterprise Extension Component Reuse Customization" on page 239.

Below is an image of the Available Components for Reuse dialog box:

Available Components for Reuse Dialog Box Options

Option	Description
Available Components	A list of all the components in the project that are identical to, or similar to, the learned component. Percentages indicate the degree to which the existing component is similar to the learned component. For more information, see "Considerations for Working with Component Reuse" on page 233.
General	Displays general information about the selected component. ➤ **Path.** The location of the existing component. ➤ **Designer.** The Quality Center user name of the user who designed the flow. ➤ **Creation Date.** The date and time on which the flow was created.
Similarity Criteria	The criteria by which the existing component is found to be similar to the learned component. A check mark next to the criterion indicates that the criterion was met. For more information on how components are compared, see "Considerations for Working with Component Reuse" on page 233.
Steps tab	Displays the steps in the component selected in Available Components.
Used-by tab	Displays details for all the flows and tests that use the selected component. The details include the flow name, path, status, owner, and creation date.
Screenshot tab	Displays a screenshot of the selected component, at the beginning of its execution.

About Business Process Testing Enterprise Extension Component Reuse Customization

The project administrator can customize the way Business Process Testing Enterprise Extension reuses components. Component reuse is customizable via the **BPT Enterprise Extension** page in the **Project Customization** screen (**Tools > Customize**).

BPT Enterprise Extension

Component Reuse ───────────────────────────────────────

Reuse Mode:
- ⊙ Manually select components for reuse
- ○ Automatically reuse identical components

Learned Flow Parameter Values (Relevant only for identical components):
- ⊙ Use the values from the learned flow as the default values for the flow parameters
- ○ Use the values from the reused components as the default values for the flow parameters

The **BPT Enterprise Extension** page contains the following options:

Option	Description
Reuse Mode	➤ **Manually select components for reuse.** (Default) The user must manually select which components he wants to reuse. ➤ **Automatically reuse identical components.** If a component is found in the project that is identical (100% similar) to a learned component, it is automatically set for reuse.
Learned Flow Parameter Values (Relevant only for identical components)	For identical components only, you can choose to use the values from the learned flow or the reused component, as the default values for the flow parameters. If the components are not exactly identical, the values for the flow parameters will be taken from the reused component. ➤ **Use the values from the learned flow as the default values for the flow parameters.** (Default) ➤ **Use the values from the reused components as the default values for the flow parameters.**

Considerations for Selecting a Component Reuse Mode

A full analysis of all components to determine their similarity to the learned component is performed in both **Manual** and **Automatic** mode.

➤ In **Manual** mode, the analysis is performed only when the user clicks the **Reuse** button.

➤ In **Automatic** mode, the analysis is performed at the end of the Learn Flow process. Any learned component, for which an identical component exists in the project, will have component reuse already selected, with the identical component selected for reuse. The user is presented with the Learn Flow Summary dialog box, with reuse applied for all components for which identical components exist. The user can click the **Cancel Reuse** button to cancel component reuse, or click the **Reuse** button to select a different component for reuse.

If there is more than one identical component, the component that is used most often in other flows and business process tests is selected. If one identical component is equal in its frequency of use to another identical component, the older component is selected. If the two components are still identical, the selection is random.

Learned Flow Associations in the Application Model Module

After a flow is learned and its components are created, each component is automatically associated with an application entity in the Application Model module.

The Application Model module allows you to manage a representation of your application's components and entities. Application entities in the Application Model module can represent application entities such as transactions such as Create Sales Order, Change Sales Order, or Create Invoice List. For more information on working with the Application Model module, and for information regarding other entity types (beyond your application's transactions), see Chapter 15, "Working with Application Model Entities in Quality Center."

This section includes:

➤ "Associating Business Components with Application Entities" on page 241

➤ "Directly and Indirectly Associated Tests and Flows" on page 242

Associating Business Components with Application Entities

There are two scenarios in which a learned component is associated with an application entity:

➤ **The Application Model module contains the application entity corresponding to the learned component.** The learned component is associated with the application entity that exists in the Application Model tree, at the end of the Learn Flow process.

Note: For Supported Environments Only: The application hierarchy has to be imported into the Application Model module for the application entity to appear in the Application Model tree. For information, see "Importing the Application Hierarchy" on page 475.

➤ **The Application Model module does not contain the application entity corresponding to the learned component.** A new application entity is created in the Application Model tree in the **Miscellaneous Transactions** folder and is associated with the learned component, at the end of the Learn Flow process.

Note: If you learn a flow when the Application Model module does not contain the application hierarchy, and then import the application hierarchy, the previously learned components are associated with the entities in the **Miscellaneous Transactions** folder. Any components learned in the future are associated with the entities in the imported application hierarchy.

After a flow is learned, and its business components are associated with application entities, you can view this association in Quality Center from the:

➤ Application Tab in the Business Components module

➤ Linked Components tab in the Application Model module

For an application-specific example of associating business components with application entities, see Appendix A, "Environment-specific Information."

Once you have learned flows, built business process tests from these flows and other components, and associated them to the appropriate application entities, your tests are linked with the application model. This association allows you to determine which tests need to be run to test changes to a particular application area. For an application-specific example of associating business components with application entities, see Appendix A, "Environment-specific Information."

Directly and Indirectly Associated Tests and Flows

Entities in the Application Model tree can be associated with test and flows in the following ways:

➤ **Direct Association.** You can associate tests and flows with entities in the Application Model tree directly, in the Test Plan module and the Application Model module. For more information, see "Associating Application Entities with Tests and Flows" on page 519.

➤ **Indirect Association.** During the Learn Flow process, components are associated with application entities in the Application Model tree. Test and flows that contain these components are indirectly associated with the same application entity in the Application Model tree. A test can also be indirectly associated with an application entity through one of its flows.

You can view the indirect associations of tests and flows in the Application Entities tab of the **Test Plan** module. In the **Show Entities** drop-down box, select **Linked Through Other Assets** to display the application entities which are linked to the current test or flow, through their components.

8

Getting Started with Business Process Testing in the Test Plan Module

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 10, "Managing Business Process Tests" describes how to work with the features and other options available in the Test Plan module.

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test enterprise applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test your other applications.

This chapter includes:

➤ About Business Process Testing in the Test Plan Module on page 244

➤ Introducing the Test Plan Module Window on page 246

➤ Test Plan Module Tabs on page 250

About 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 6, "Working with Business Components." For information on creating flows in the Test Plan module, see Chapter 9, "Working with Flows."

Business process tests and flows are used to challenge the application logic by testing the processes on which the whole application is based.

Note: The Test Plan module can be used to design flows, manual tests, manual or automated business process tests, and automated tests using other products, such as HP WinRunner and 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 Enterprise Extension as well. For more information on using the Test Plan module, see the *HP Quality Center User Guide*.

You access the Test Plan module by clicking the **Test Plan** module button in the Quality Center sidebar.

To access a business process test or a flow in the Test Plan module:

1 Log in to your Quality Center project as described in the *HP Quality Center User Guide*. The Quality Center window opens.

Note: After login, Quality Center displays the module in which you last worked.

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2 Click the **Test Plan** module button in the sidebar. The Test Plan module opens.

Tip: You can switch between the Quality Center modules using CTRL+SHIFT+<number> shortcut keys. The number represents the sequential order in which the module is displayed in the module sidebar. For example, if Requirements is the first module, press CTRL+SHIFT+1. If Business Components is the second module, press CTRL+SHIFT+2.

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.

3 Select a business process test or a flow in the Test Plan tree. The Test Plan tabs are displayed.

Note: The data in the tabs is read-only if no Business Process Testing license is available. In addition, business process tests that are currently open in another session of Quality Center are locked and can be opened only in read-only mode.

Introducing the Test Plan Module Window

The Test Plan module window is shown below, with the Test Script tab selected.
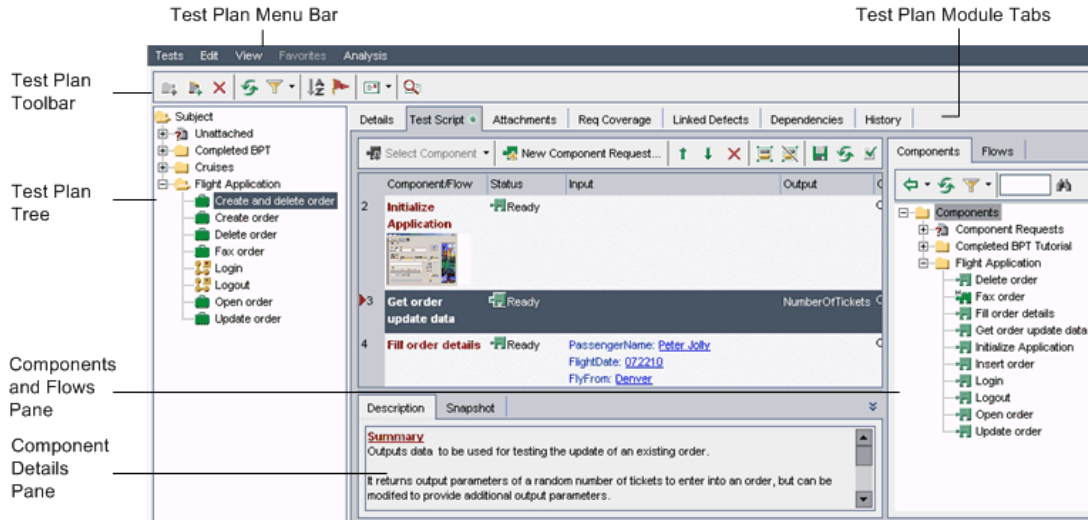
When a business process test or flow is selected in the Test Plan tree, the Test Plan module interface contains the following key elements:

➤ "Test Plan Menu Bar" on page 247

➤ "Test Plan Toolbar" on page 247

➤ "Test Plan Tree" on page 248

➤ "Test Plan Module Tabs" on page 250

Test Plan Menu Bar

The Test Plan menu bar contains the **Tests**, **Edit**, **View** and **Analysis** menus, from which you can perform Test Plan module commands, such as those for creating and modifying tests (including business process tests and flows), changing the displayed view, and generating reports.

For more information on the Test Plan menu bar, see the *Quality Center User Guide*.

Tip: You can also access many of the menu and toolbar commands by right-clicking in panes or on items in the Test Plan tree to access context menus.

Test Plan 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 *Quality Center User Guide*.

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 319.

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.
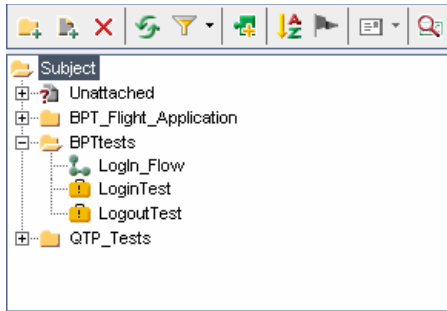
The top level in the Test Plan tree is the **Subject** root folder, which contains the **Unattached** folder and the test folders.

The **Unattached** folder contains tests whose folders have been removed from the tree and which have not been assigned to any other folder.

The **Subject** folder and **Unattached** folder cannot be renamed or deleted. You can click the **Set Filter/Sort** or **Sort Folders** buttons in the toolbar to sort the other folders in the tree according to your requirements.

Note: The **BPT Resources** 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 tab in a new project, when you create a QuickTest automated component for the first time, or when QuickTest connects to Quality Center for the first time. 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, this folder and its subfolders should not be renamed, moved, or deleted.

Selecting a subject 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 *Quality Center User Guide*.

Notes:

➤ 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 253.

➤ Tests and flows in the Test Plan tree to which an alert has been sent are indicated by a red exclamation mark ❗ 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.

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 business process test by dragging business components and flows from the component tree and dropping them in the test. You build the content of a flow by dragging business components from the component tree and dropping them in the test. flow. For more information, see Chapter 9, "Working with Flows," and Chapter 10, "Managing Business Process Tests."

You then configure the test run details such as input and output component parameter values and iteration preferences. For more information, see Chapter 11, "Working with Parameters."

Test Plan Module Tabs

Selecting a business process test or flow in the Test Plan tree displays tabs that provide a complete overview of the business process test or flow, and its status.

The tabs are described in this section. For general information on the Test Plan module, see "Introducing the Test Plan Module Window" on page 246.

➤ "Details Tab" on page 251

➤ "Test Script Tab" on page 255

➤ "Attachments Tab" on page 264

➤ "Req Coverage Tab" on page 264

➤ "Linked Defects Tab" on page 265

➤ "Dependencies Tab" on page 265

➤ "History Tab" on page 265

➤ "Application Entities Tab" on page 266

Details Tab

The Details tab provides a general description of the business process test or flow.

The following information is displayed in the Details tab:

Field/Tab	Description
Test Name	The current name of the business process test or flow. 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.

Field/Tab	Description
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 63. For more information on test or flow statuses, see "Understanding Business Process Test and Flow Statuses" on page 253.
Test ID	A unique numeric ID automatically assigned by Quality Center to the business process test or flow. This field is read-only.
Description tab	A free 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 free 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.

In a version-controlled project, the current version number is also displayed in the top part of the tab.

Note: The Details tab provides a comprehensive selection of text editing and formatting tools to assist you in entering text in the Description or Comments tabs. Right-click in the Description or Comments tabs to access the formatting commands from the context menu. Select **Toolbar Visible** from the context menu to display (or hide) commonly used commands in the toolbar.

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.
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 Quality Center, 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 *Quality Center Administrator Guide*.

Test Script Tab

The Test Script tab enables you to build the structure of the business process test or flow.

You use this tab to:

➤ Add business components (created in the Business Components module or in a testing tool such as QuickTest Professional or WinRunner) to a business process test or flow.

➤ Group components in a business process test or flow.

➤ Add flows to a business process test.

➤ Configure values for input, output, and run-time component parameters.

➤ Define flow parameters and their default values.

➤ Define failure conditions.

➤ Add run conditions to the flow.

➤ Create iterations of components 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 creation needs.
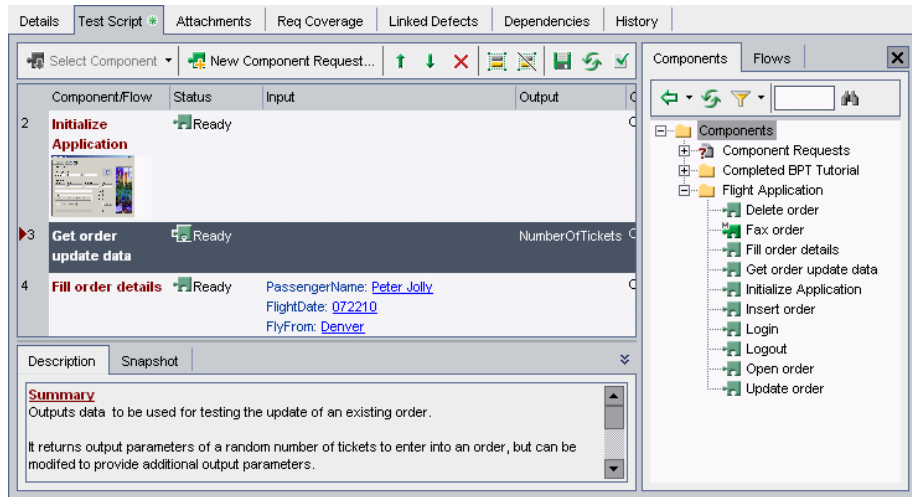
An icon ✳ next to the Test Script tab name indicates that the selected business process test contains one or more business components or flows, or the selected flow contains one or more business components.

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 272.

The Test Script tab comprises the Test Pane, the Components and Flows Pane, and the Component Details Pane.

Test Pane

For each business component in the business process test or flow, the Test pane displays the name, status, input and output component parameters, and whether the test will continue if the component fails during the test run.

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For each business component in the business process test or flow, the Test pane displays the name, status, input and output component parameters, and whether the test will continue if the component fails during the test run.

The Test pane toolbar contains the following toolbar buttons:

➤ **Select Component.** Opens the Components tab on the right side of the Test pane. The tab displays a tree of the business components defined for the project. This is the same tree as is shown on the left side of the Business Components module. For more information on building a business process test using these components, see "Building Business Process Tests" on page 283.

When you select a business process test in the Test Plan tree, clicking the down arrow on the right side of the **Select Component** button provides the following additional option:

➤ **Select Flow.** Opens the Flows tab on the right side of the Test pane. The tab displays the flows defined for the project. For more information on building a business process test using these flows, see "Adding Flows to Business Process Tests" on page 277.

➤ **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 302.

➤ **Move Component Up/Move Component Down.** Enables you to change the testing order in the business process test or flow by moving a selected component or flow up or down in the order. If you select a group border, you can move the border to include or exclude an adjacent business component or flow.

➤ **Remove Selected Components from Test.** Removes the selected business component from the business process test or flow. The component is still available for future use, if required, from the component tree pane.

➤ **Group Components/Flows.** Creates a new group that includes the selected business components and flows. For more information, see "Working with Component Groups" on page 293.

➤ **Ungroup Components/Flows.** Removes the selected group, or the grouping in which the selected business component or flow is a member.

➤ **Save.** Saves the business process test. The business process test is also saved automatically when another tab is opened, another location is selected in the Test Plan tree, or another module is opened.

➤ **Refresh.** Updates the data, such as the component parameter data and snapshot, for each business component in the business process test or flow. 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 configuration errors. For more information, see "Validating Business Process Tests and Flows" on page 312.

➤ **Run-Time Parameters.** Enables you to view or edit run-time component parameters. For more information, see Chapter 11, "Working with Parameters."

➤ **Run or Debug Test.** Enables you to run and debug a business process test or flow. For more information, see "Debugging Tests in the Test Plan Module" on page 432.

When you select a flow in the Test Plan tree, the Test Script tab includes the following toolbar buttons:

➤ **Learn Flow.** Enables you to learn a flow automatically by navigating your enterprise application. For more information, see Chapter 7, "Learning Flows."

➤ **Flow Input Parameters.** Enables you to define default values for your flow input parameters. For more information, see "Defining Default Flow Input Parameter Values" on page 358.

➤ **Flow Output Parameters.** Enables you to define flow output parameters. For more information, see "Working with Flow Output Parameters" on page 332.

➤ **Add Run Condition.** Enables you to add run conditions to your flow. For more information, see "Adding Run Conditions" on page 403.

➤ **Remove Run Condition.** Enables you to remove an existing run condition from your flow. For more information, see "To remove a run condition:" on page 407.

Test Pane Context Menu

The right-click context menu in the Test 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:

➤ **Edit Component** or **Edit Flow.** Jumps to the selected component or flow, so that you can view or modify its details. If you select a component request, opens the component request tab so that you can edit the request.

➤ **Iterations.** Opens the Iterations dialog box for the selected business component or flow.

➤ **Output Parameters.** Opens the Output Parameters dialog box for the selected business component or flow.

➤ **Component Grouping.** Opens a submenu with the following options:

   ➤ **Group Components/Flows.** Creates a new group that includes the selected business components and flows.

   ➤ **Ungroup Components/Flows.** Removes the selected group, or the grouping in which the selected business components and flows are members.

   ➤ **Move Group Up** (CTRL+U). Moves the selected group up in the test or flow.

   ➤ **Move Group Down** (CTRL+D). Moves the selected group down in the test or flow.

   For more information, see "Working with Component Groups" on page 293.

➤ **Hide Snapshots.** Toggles to display or hide the thumbnail snapshot images (if any) attached to the business components in the pane. Click the thumbnail to view the image at normal size.

➤ **Parameter Display.** For a business process test with flows, enables you to display parameters in different groupings. For more information, see "Setting Your Display Preference for Flow Parameters Within a Business Process Test" on page 277.

➤ **Display All Parameters.** By default, a maximum of three input or output component parameters for each business component or flow is displayed in the pane. More than three defined component parameters is indicated by an ellipsis (**...**) in the **Input** or **Output** columns. You can select **Display All Parameters** to expand the space allocated to each business component or flow in the Test pane and ensure that all component parameters are visible. Select **Display All Parameters** again to return to the default.

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 Component** button in the Test Script tab toolbar.

An example of the Components and Flows pane is shown below:
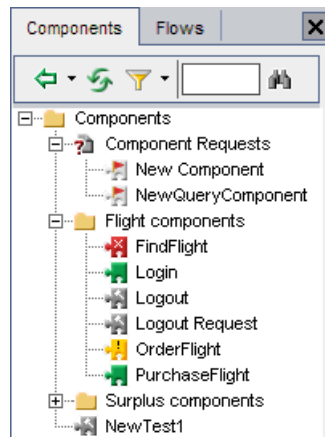
In the Components tab, you can right-click any of the business components in the tree and select **Properties** to open the Component dialog box. This dialog box comprises several tabs that provide a read-only view of the settings defined in the Business Components module. In the Details tab, you can see any additional comments that were provided by the Subject Matter Expert.

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 Test pane (or by clicking the **Add to Test** button in the tab toolbar).

The Components tab and the Flows tab each contain the following toolbar buttons:

➤ **Add Component to Test / Add to Test.** Adds the selected business component or flow after the component or flow selected in the Test Script pane (or at the end of the test if no component or flow is selected). You can also click the down arrow and choose whether to open the Promote Parameters dialog box.

➤ **Refresh Selected.** Updates the data in the Components tab or Flows tab.

➤ **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 *Quality Center User Guide*.

➤ **Close.** Closes the Components and Flows pane.

Component Details Pane

The Component Details pane can be optionally displayed at the bottom of the Test Script tab. This pane contains the Description and Snapshot tabs.

⯅⯆ If the Component Details pane is not visible at the bottom of the Test Script tab, click the **Show/Hide** button at the bottom-right of the Test Script tab. Click the button again to hide the pane.

➤ The **Description** tab displays the defined description of the business component 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 180.

➤ The **Snapshot** tab displays the full-sized image of the snapshot attached to the business component. For more information on adding a component snapshot image, see "Attaching Images" on page 184.

For more information on the Test Script tab for Business Process Testing, see "Building the Test Structure" on page 284. For more information on other test types, see the *Quality Center User Guide*.

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.

An 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 *Quality Center User Guide*.

Req Coverage Tab

The Req Coverage tab enables you to define requirements coverage by linking your business process tests to requirements. Requirements specify the testing objectives in Quality Center by describing what must be tested in the application to assess its operation or usability. Testing requirements are created in the Requirements module of Quality Center.

The tab provides a list of all the testing requirements defined in the Requirements module, and enables you to map the specific requirements that are covered by the currently selected business process test to that test. This enables you to methodically build your business process tests according to preplanned requirements, and also to review the extent to which your tests cover these testing requirements.

An icon ✳ next to the Req Coverage tab name indicates that the selected test includes requirements 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 *Quality Center User Guide*.

Linked Defects Tab

The Linked Defects tab enables you to add and link defects to your business process tests.

An icon ✳ next to the Linked Defects tab name indicates that the selected test 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 more information on linking defects to a test, see the *Quality Center User Guide.*

Dependencies Tab

The Dependencies tab displays the dependency relationships that exist between entities such as test resources and tests. When analyzing the impact of a change proposed in a specific entity, the dependency links indicate the other entities that the change might affect. For example, when deleting or copying an entity that is being used by another entity.

The tab contains the Used By and Using grids. The **Used By** grid displays entities that depend on a selected entity. The **Using** grid displays the entities that a selected entity depends on.

The Dependencies tab in the Test Plan module provides the same functionality for tests and flows as the Dependencies tab does for components in the Business Components module. For more information, see "Understanding the Dependencies Tab" on page 92.

History Tab

The History tab in the Test Plan module comprises two sub-tabs; the Baselines tab and the Audit Log tab.

➤ The Baselines tab displays the version history of the item selected in the Test Plan tree. For information on working with version control in Quality Center, see the *HP Quality Center User Guide*.

➤ The Audit Log tab displays changes made to specified fields in a test or flow. For each change, the tab displays the date and time of the change and the name of the user who made the change. You can expand a change to view a list of fields modified during the change. For each field, the tab displays the old value and the new value.

The Audit Log tab in the Test Plan module provides the same functionality for tests and flows as the History tab does for components in the Business Components module. For more information, see "Understanding the History Tab" on page 95.

Application Entities Tab

The Application Entities tab enables you to associate the selected flow with the application entities stored in the Application Model module. These entities represent elements of your application hierarchy. For more information on the Application Model module, see Chapter 15, "Working with Application Model Entities in Quality Center."

9

Working with Flows

This chapter describes how to create, build, and manage flows manually in the Test Plan module of Quality Center, and how to add flows to business process tests.

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test enterprise applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test your application.

For information on how to learn flows automatically, see Chapter 7, "Learning Flows."

This chapter includes:

About Working With Flows

A flow is a collection of business components in a fixed 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 269.

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 Quality Center records, such as requirements and defects. These associations provide real-time visibility into modifications for interrelated, application-quality elements.

You can also learn a flow automatically by navigating your application. When your flow is ready, you can add it to business process tests, together with other flows and business components. For more information, see Chapter 7, "Learning Flows."

Notes:

➤ Much of the functionality available in Quality Center when working with flows is the same as the functionality when working with business process tests. For more information, see Chapter 10, "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 Quality Center 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 supplying 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 Business Process Testing in the Test Plan Module" on page 244.

To create a flow:

1 If necessary, click **Test Plan** on the sidebar. The Test Plan module opens.

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 Create New Test dialog box opens.

4 From the **Test 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 Select the **Start learn flow wizard after flow is created** check box if you want to start learning the flow after you click **OK**. The Learn Flow toolbar is displayed. If QuickTest Professional is running, this check box is disabled. For details, see step 6 in "Learning a Flow" on page 220.

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 251.

➤ **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, or by learning the flow automatically by navigating your application. For more information, see "Understanding the Test Script Tab for Flows" on page 272 or "Learning a Flow" on page 220.

➤ **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 *Quality Center 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 Quality Center 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 Quality Center 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 *Quality Center 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 more information, see "History Tab" on page 265.

➤ **Application Entities tab.** Enables you to associate the flow with the application entities stored in the Application Model module. These entities represent elements of your application hierarchy. For more information on the Application Model module, see Chapter 15, "Working with Application Model Entities in Quality Center."

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 255.

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, or by learning the flow automatically. Components that are created through the Learn Flow process are indicated by a specific learned component icon ![icon] in the Status column.

You can also use the tab to:

➤ Define flow parameters and their default values.

➤ Display parameters for flows in business process tests in different groupings. For more information, see "Setting Your Display Preference for Flow Parameters Within a Business Process Test" on page 277.

➤ Add run conditions to the flow.

➤ Validate the flow.

➤ Run the flow in Debug mode.

In addition to the standard functionality available for business process tests, the Test Script tab for flows includes the following toolbar buttons:

➤ **Learn Flow.** Enables you to learn a flow automatically by navigating your enterprise application. For more information, see Chapter 7, "Learning Flows."

➤ **Flow Input Parameters.** Enables you to define default values for your flow input parameters. For more information, see "Defining Default Flow Input Parameter Values" on page 358.

➤ **Flow Output Parameters.** Enables you to define flow output parameters. For more information, see "Working with Flow Output Parameters" on page 332.

➤ **Add Run Condition.** Enables you to add run conditions to your flow. For more information, see "Adding Run Conditions" on page 403.

➤ **Remove Run Condition.** Enables you to remove an existing run condition from your flow. For more information, see "To remove a run condition:" on page 407.

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.

Notes:

➤ In addition to manually adding existing business components to a flow, you can create a flow comprising components created automatically by recording your operations as you navigate an enterprise application. For more information, see Chapter 7, "Learning Flows."

➤ You can group components in a flow as you would in a business process test. However, it is recommended that you do not group components in a flow for compatibility with future versions of Business Process Testing Enterprise Extension.

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 Component** button. The Component Tree opens in the right pane.
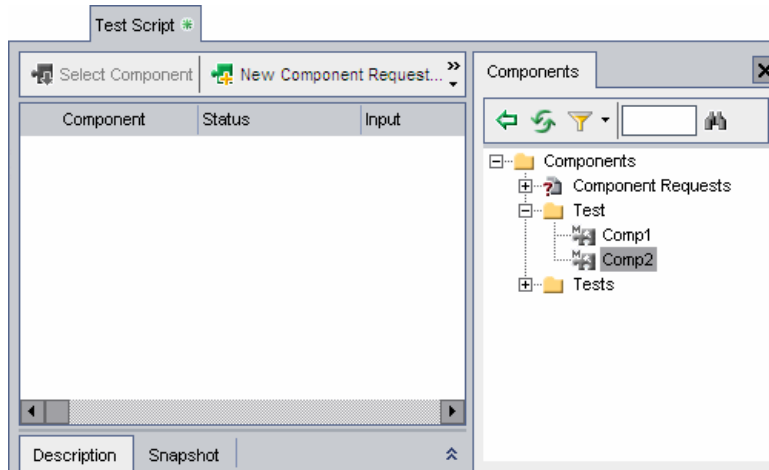
3 In the Component Tree, expand the folder containing the business component that you want to add to the flow.

Tips:

➤ You can search for a component by entering the name of the component (or part of the name) in the search box located in the Components tab toolbar, and clicking the **Find** button.

➤ 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 207.

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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 **Add Component to Test** button. You can also click the down arrow and choose whether to open the Promote Parameters dialog box.

If the selected component or flow has parameters, the Promote Parameters dialog box opens. This dialog box enables you to choose whether to promote component or flow parameters to the next level.

5 In the Promote Parameters dialog box, select the parameters you want to promote. For more information, see "Understanding the Promote Parameters Dialog Box" on page 288.

6 To add additional components to the flow, repeat steps 3 and 4 for each additional component.

7 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.

8 You can add flow parameters and run conditions to increase the flexibility of your flow. For information on flow parameters, see Chapter 11, "Working with Parameters." For information on run conditions, see Chapter 12, "Defining Run Conditions."

Managing Flows

You can use flows in business process tests. A business process test can comprise only business components, only flows, or a combination of business components and flows. For more information, see "Adding Flows to Business Process Tests" on page 277.

In a business process test with flows in Test Plan, you can display flow parameters in different groupings. For more information, see "Setting Your Display Preference for Flow Parameters Within a Business Process Test" on page 277.

You can also 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 10, "Managing Business Process Tests."

Adding Flows to Business Process Tests

You add flows to business process tests in the same way as you add components. For more information on adding flows and business components to business process tests, see "Building Business Process Tests" on page 283.

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 10, "Managing Business Process Tests."

You can also display parameters for the flows in a business process test in different groupings. For more information, see "Setting Your Display Preference for Flow Parameters Within a Business Process Test" on page 277.

Setting Your Display Preference for Flow Parameters Within a Business Process Test

When the Test pane of the Test Script tab displays a business process test with flows, it displays the parameters for the flows. You can display these parameters in different groupings.

When displaying flow parameters in different groupings, consider the following:

➤ Parameter Display options are available only when working in flows contained in business process tests.

➤ When you select a **Parameter Display** option, the selection applies to all the flows you view in this project.

➤ When viewing a business process test in the Test pane of the Test Script tab, only those parameters that were promoted to flow parameters are displayed.

➤ The default setting is **Group by Iteration**.

To set your display preference for flow parameters in the Test Script tab:

Right-click a flow in the Test pane, select **Parameter Display** and select one of the following options:

Display Option	Effect
Group by Component	Displays the parameters grouped according to the components from which they were promoted. Within the component, parameters are displayed according to the order in which they were created.
Group by Iteration	Displays the parameters grouped according to the components from which they were promoted, and within each component according to the iterations in which they appear.
No Grouping	Displays all the parameters according to the order in which they were created.

10

Managing Business Process Tests

This chapter describes how to manage business process tests in the Test Plan module of Quality Center. The Test Plan module also enables you to convert existing manual tests to manual components.

Note: This chapter describes using several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, features that enable you to test enterprise applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test your other applications.

This chapter includes:

About Managing Business Process Tests

You create and manage business process tests in the Test Plan module of Quality Center.

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. You can also define whether a business process test run continues or ends if a specific component in the test fails.

Input and output parameters allow business components and flows to pass variable values between the components and flows in a business process test. These values can affect the results of the test. You can configure input and output values for individual components and flows in the test, and the number of iterations for each component, in the Test Plan module.

You can also define global input parameters, called **run-time parameters**, in a business process test or flow. Run-time iterations, at the test or flow level, enable you to iterate the entire business process test or flow using different values for component parameters that affect the entire run.

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.

Quality Center 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.

Note: Much of the functionality available in Quality Center when working with tests is also available when working with flows. For more information about flows, see Chapter 9, "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. Business components can be created in the Business Components module or a testing tool such as QuickTest Professional. You can also attach appropriate files and link the test to project requirements.

In a version-controlled project, you can choose whether to check the business process test out immediately, and if so, you can add a comment to the check out.

To create a business process test:

1 Access the Test Plan module, as described in "About Business Process Testing in the Test Plan Module" on page 244.

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 Select the **Subject** root folder, or another folder or subfolder in the Test Plan tree in which you want to create a new folder.

3 Click the **New Folder** button in the toolbar above the tree, or right-click a folder and select **New Folder**. The New Folder dialog box opens.
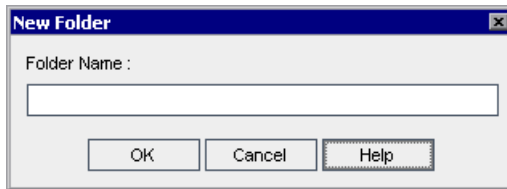
4 In the **Folder Name** box, enter a descriptive name for the folder and click **OK**.

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 above the Test Plan tree, or right-click the folder and select **New Test.** The Create New Test dialog box opens.

6 From the **Test Type** list, select **BUSINESS-PROCESS**.
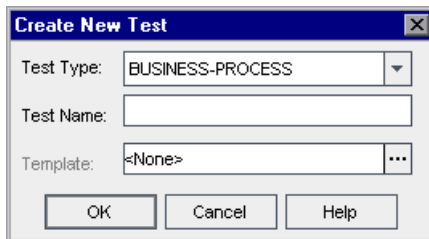
In a version-controlled project, you can choose whether to check the business process test out immediately, and if so, you can add a comment to the check out.

7 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: \ / : " ' ? ' < > | * %

---

8 Click **OK**. The new business process test is added to the selected folder in the Test Plan tree.

Building Business Process Tests

After you create a business process test and select it in the Test Plan tree, you can use the following tabs to plan and design the test.

➤ **Details tab.** Enables you to enter details and a description of the currently selected business process test. For more information, see "Details Tab" on page 251.

➤ **Test Script tab.** Enables you to build the structure of the business process test by adding business components and flows. For more information, see "Building the Test Structure" on page 284.

➤ **Attachments tab.** Enables you to associate any file with a business process test as an attachment. For more information, see the *Quality Center User Guide*.

➤ **Req Coverage tab.** Enables you to link predefined testing requirements to your business process tests. For more information, see the *Quality Center User Guide*.

➤ **Linked Defects tab.** Enables you to link defects to your business process tests. For more information, see the *Quality Center User Guide*.

➤ **Dependencies tab.** Displays a list of entities that are linked to the currently selected business component. The Dependencies tab for a test or flow in Test Plan has the same features and functionality as the Dependencies tab for a component in the Business Components module. For more information, see "Dependencies Tab" on page 75.

➤ **History tab.** Displays a log of changes made to an entity. The History tab for a test or flow in Test Plan has the same features and functionality as the History tab for a component in the Business Components module. For more information, see "History Tab" on page 75.

➤ **Application Entities tab.** Enables you to associate the test with the application entities stored in the Application Model module. These entities represent elements of your application hierarchy. For more information on the Application Model module, see Chapter 15, "Working with Application Model Entities in Quality Center."

Building the Test Structure

In the Test Script tab, you build the structure of the business process test by selecting one or more previously created flows or business components (or component requests) and adding them to the test, configuring their parameter settings, and defining what the test does if a component fails.

Tip: Flows can also be added directly to test sets in the Test Lab module.

For more information, see:

➤ "Adding Components and Flows to a Business Process Test" on page 285

➤ "Configuring Component Input Parameter Settings" on page 292

➤ "Defining Failure Conditions" on page 293

You can also group business components so that they can be iterated together. For more information, see "Working with Component Groups" on page 293.

In the following example, the **OrderFlight** component has been added to the business process test as the first component. The **Request for Logout Component** has also been added to the test.
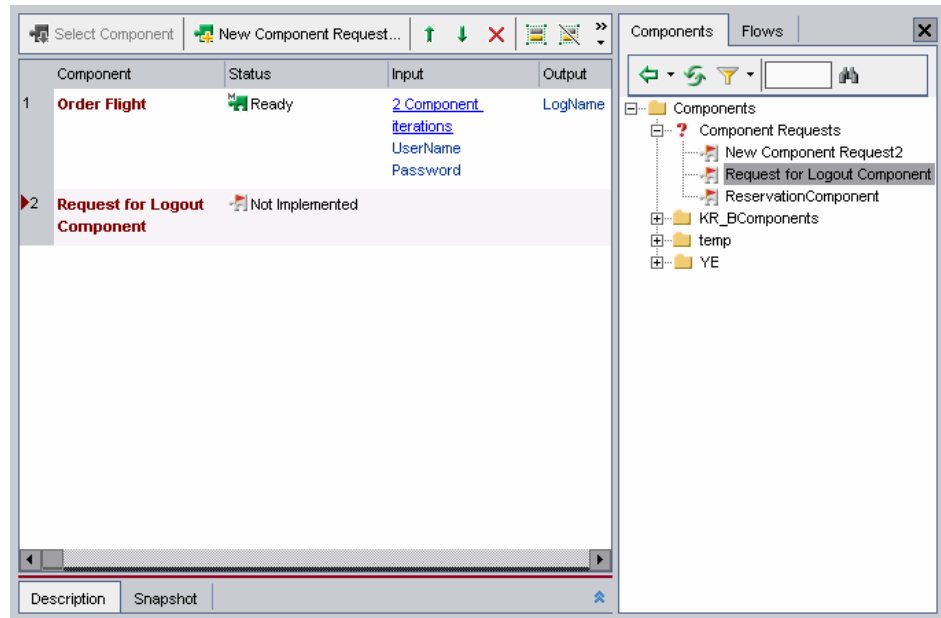
Adding Components and Flows to a Business Process Test

The first step in building a business process test is to select the business components and flows that you want to include in 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 302.

To select business components and flows:

1 Select the relevant business process test in the Test Plan tree. The test tabs are displayed.

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 Component** button in the Test pane toolbar, or click the **Select Component** down arrow and select **Select Flow**.

The Components and Flows pane comprises a Components tab, filtered to show available components in the component tree, and a Flows tab, filtered to show available flows in the Test Plan tree.
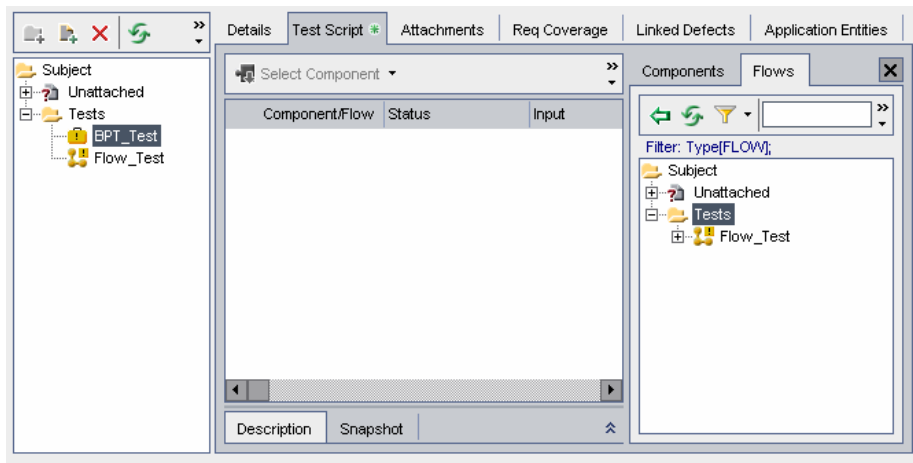
3 In the relevant tab, expand the folder that contains the business component or flow required for the business process test.

Tips:

➤ To expand a folder in the component tree, click the expand symbol to the left of the folder name, or double-click the folder. You can also select the folder, and then right-click and select **Expand All**, or press the asterisk key (*****) on the keyboard number pad.

➤ You can search for a component or flow by entering its name (or part of the name) in the search box located in the tab toolbar, and clicking the **Find** button.

➤ You can right-click a business component in the Component Tree pane and then select **Properties** from the context menu to view the component's description, component parameters, and other details.

4 Drag the required business component or flow from the relevant tree and drop it in the Test pane of the Test Script tab. To add the required component or flow to the Test pane, you can also:

➤ double-click the component or the flow.

➤ select the component in the component tree and click the **Add Component to Test** button in the toolbar.

➤ select the flow in the Flows tree and click the **Add to Test** button in the toolbar.

➤ You can also click the down arrow on the right side of the **Add Component to Test** / **Add to Test** button in the toolbar. Then select **Add to test. Open the Promote Parameters dialog box**.

If the selected component or flow has parameters, the Promote Parameters dialog box opens. This dialog box enables you to choose whether to promote component or flow parameters to the next level. If the selected component does not have parameters, or the component parameters in the selected flow were not promoted to the flow level, proceed to step 6.

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5 In the Promote Parameters dialog box, select the parameters you want to promote. For more information, see "Understanding the Promote Parameters Dialog Box" on page 288.

6 If required, you can select business components and flows in the Test Script pane and use the arrows in the toolbar, or use the **Move Component Up** and **Move Component Down** options in the right-click context menu to arrange them into a logical testing sequence.

Understanding the Promote Parameters Dialog Box

Using the Promote Parameters dialog box, 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 more information, see "The Promote Parameters Dialog Box" on page 289.

For information on promoting parameters to the flow or test level at a later time, see Chapter 11, "Working with Parameters."

The Promote Parameters Dialog Box

Description	Enables you to promote:
	➤ Component parameters to the flow or test level.
	➤ Flow parameters to the test level.
How to Access	In the Test Plan module, display the Components and Flows pane to the right of the Test Script tab by clicking the **Select Component** button. Then, for a component or flow containing parameters, you can do one of the following:
	➤ Drag the component or flow from the Components tab or the Flows tab and drop it in the Test pane.
	➤ Select the component in the Components tab and click the **Add Component to Test** button in the toolbar.
	➤ Select the flow in the Flows tab, and click the **Add to Test** button in the toolbar.
	➤ Double-click the component or flow.
	Note: You can choose not to display the Promote Parameters dialog box the next time you add a component or flow, by selecting the check box at the bottom of the dialog box. If you previously chose not to show the Promote Parameters dialog box again, select the component or flow in the Components tab or the Flows tab, and click the down arrow on the right side of the **Add Component to Test** / **Add to Test** button in the toolbar. Then select **Add to test / flow and display promote parameter 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.
	➤ The option you select, to promote some parameters, all the parameters, or no parameters, becomes the default option when the dialog box is opened again. If you choose not to show the Promote Parameters dialog box again, the option you select becomes the default behavior the next time you add a component or flow to the Test pane.
	➤ Clicking **Cancel** or pressing the ESC key closes the dialog box but still adds the component or flow, without promoting any parameters.
Learn More	**Conceptual overview**: "About Working with Parameters" on page 328
	Primary task: Selecting the business components and flows that you want to include in the test. See "To select business components and flows:" on page 286.

Below is an image of the Promote Parameters dialog box:
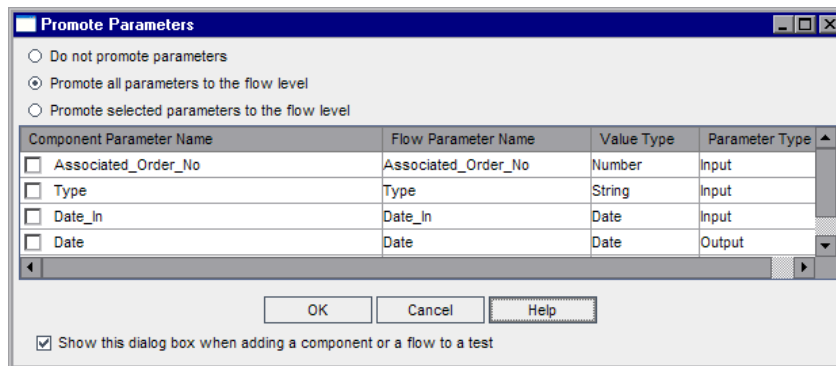
Notes:

➤ The content and wording of the Promote Parameters dialog box depends on whether you are adding a business component to a flow or test, or a flow to a test.

➤ The Parameter Type column is shown only when adding a business component to a flow.

Promote Parameters Dialog Box Options

Option	Description
Do not promote parameters	No parameters are promoted when you add the component to a test or flow, or the flow to a test. The check boxes for the parameters are disabled.
Promote all parameters to the test/flow level	Promotes all parameters when you add the component to a test or flow, or the flow to a test. The check boxes for the parameters are disabled.
Promote selected parameters to the test/flow level	Enables the check boxes for available parameters. The parameters you select are promoted when you add the component to a test or flow, or the flow to a test.
Component Parameter Name column	Displays the parameters of the component or flow.
Test/Flow Parameter Name column	Displays the names assigned to the promoted parameters.
Value Type column	Displays the type of parameter value, **String**, **Number**, **Date**, **Boolean**, or **Password**.
Parameter Type column	Displays the type of parameter, **Input** or **Output**. **Note:** This column is shown only when adding a component to a flow.

Option	Description
Show this dialog when adding a component or a flow to a test	Enables you to choose not to display the Promote Parameters dialog box when you add a component to a test or flow, or a flow to a test.
	The option you select, to promote some parameters, all the parameters, or no parameters, becomes the default behavior when adding a component to a test or flow, or a flow to a test.
	Note: This check box is checked and disabled when you choose to promote selected parameters.
Cancel	Closes the dialog box but still adds the component or flow, without promoting any parameters.

Configuring Component Input Parameter Settings

If one or more business components in the business process test have input component parameters defined, then you can configure the settings that determine how the component should run in the test. For example, a business component can be configured to use various component input parameter values (entered for the test, entered by the tester during runtime, or returned by a previously run component), or run a different number of iterations.

Component parameter names, descriptions, and value types, and default values are initially defined in the Business Components module. For more information, see Chapter 6, "Working with Business Components."

Input and output values for individual business components, and the number of iterations for each component, are configured in the Test Plan module. For more information, see "Defining Input and Output Component Parameters for a Business Component" on page 186.

Run-time component parameter values, and the number of test iterations, are defined in the Test Lab module. For more information on component parameter and iteration settings, see Chapter 11, "Working with 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 Test pane of the Test Script tab, click in the **On Failure** column for the business component. A down arrow is displayed.

	Component	Status	Input	Output	On Failure
▶1	**Order Flight**	Ready	2 Component iterations UserName Password	LogName	Continue
2	**Request for Logout Component**	Not Implemented			Continue
3	**Log out from Flight**	Ready			Continue

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.

Working with Component Groups

It may be logical in certain business process tests or flows to iterate several business components together as a group.

For example, 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:
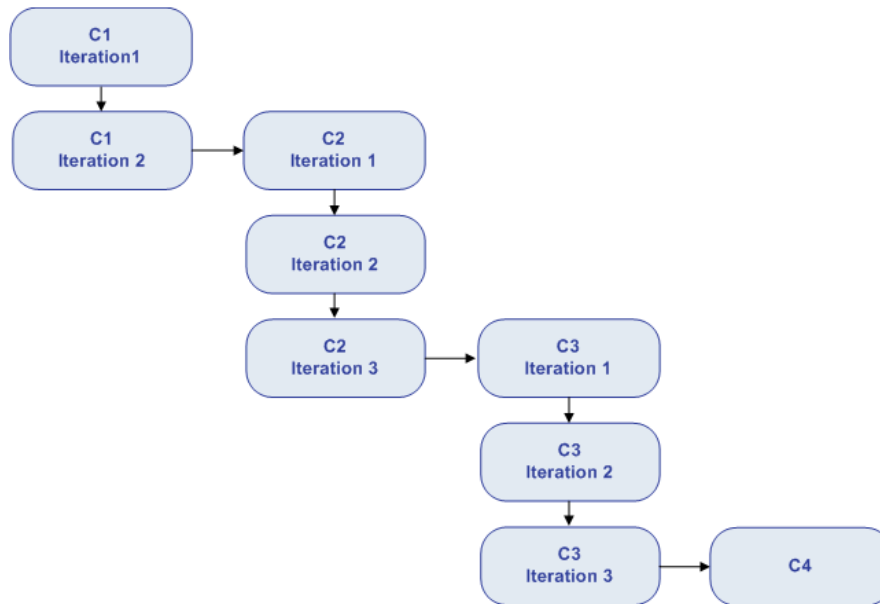
Instead of running all the iterations of component C2 followed by all the iterations of component C3, you could group these two components together, enabling the business process test to run:

➤ 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:
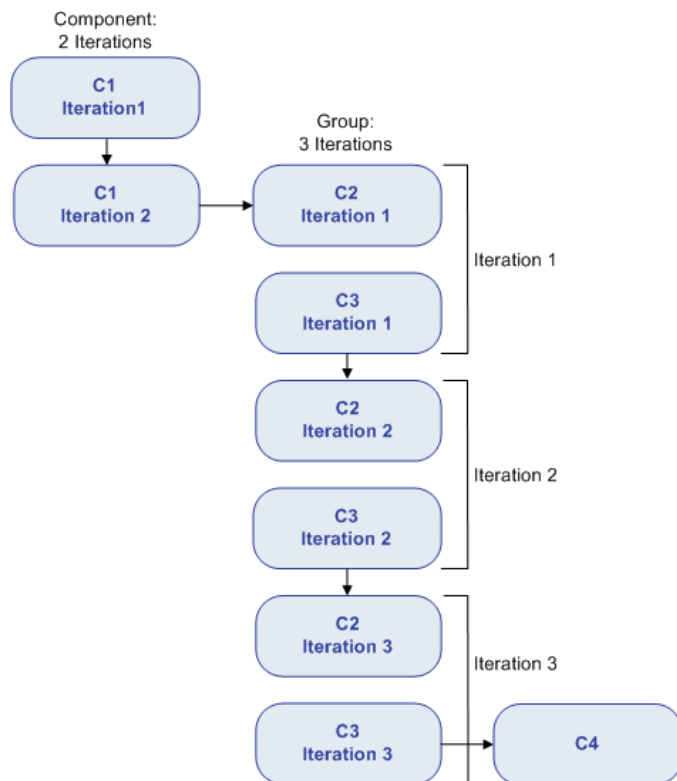
Component groups in the Test Script tab are identified by a brown border surrounding the member components. The text **Begin Group** and **End Group** in the border indicate the start and end of the group.

In addition, the number of iterations and the iteration range are displayed in the **Begin Group** border, as shown in the example below.

	Component	Status	Input	Output	On Failure
1	**Log in to Flight**	Ready	3 Component iterations (Selected for running 1 - 2) UserName Password	LogName	Exit
	Begin Group		3 Group iterations (Selected for running 2 - 3)		
▶2	**Order Flight**	Ready	UserName Password	LogName	Continue
3	**Enter CC Details**	Maintenance	CCnumber ExpDate	Status	Continue
4	**Enter Address Details**	Maintenance	Address1		Continue
	End Group				
5	**Log out from Flight**	Ready			Continue

➤ 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.

Creating Component Groups

You create groups of business components in the Test Script tab of the Test Plan module. You can combine any number of components in the business process test into a group, providing they comply with the following requirements:

➤ A component can belong to one group only.

➤ Components must be contiguous to be included in the same group.

➤ All components in the group must have the same number of iterations and the same iteration range, for example, they are set to run iterations 2 to 3.

➤ For iterations of a component group to be successful, the state of the application at the end of the last component in the group must match the state of the application before the first component in the group.

To create a component group:

1 Select the business process test in which you want to create one or more component groups and click the **Test Script** tab.

2 In the Test pane, select two or more contiguous components. The selected business components are highlighted.

Note: You can select contiguous components in the tab using the SHIFT key. Click to the left of the component row to ensure that the entire row is selected (the row will then be highlighted). Press the SHIFT key and click the last contiguous component to be included in the group.

---

3 Right-click, and select **Grouping** > **Group Components**. The group is created as indicated by the border around the components.

	Component	Status	Input	Output	On Failure
1	**Log in to Flight**	Ready	3 Component iterations (Selected for running 1 - 2) UserName Password	LogName	Exit
	Begin Group		3 Group iterations (Selected for running 2 - 3)		
▶2	**Order Flight**	Ready	UserName Password	LogName	Continue
3	**Enter CC Details**	Maintenance	CCnumber ExpDate	Status	Continue
4	**Enter Address Details**	Maintenance	Address1		Continue
	End Group				
5	**Log out from Flight**	Ready			Continue

All business components to be included in the group must have the same number of iterations and the same iteration range, or a warning message will be displayed.

4 Click the iterations link in the **Begin Group** border to view the iterations for each of the member components in the Group Iterations dialog box.

Using Keyboard Commands in the Group Iterations Dialog Box

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Group Iterations dialog box:

➤ Press F2 to enter Edit mode.

➤ Use the up and down arrow keys to move the focus one iteration up or down.

➤ You can press TAB to move the focus one cell to the right, or to the first cell in the next row.

➤ Use the left and right arrow keys to move the focus one cell to the left or right, with the following exceptions:

  ➤ In the last cell in a row, the right arrow key moves the focus to the first cell in the next row.

  ➤ In the first cell in a row, the left arrow key moves the focus to the last cell in the row above.

➤ When a cell is in Edit mode, the left and right arrow keys move within the edited cell.

➤ When a cell containing a list is selected, you can press ALT+DOWN arrow to open the list for that cell.

➤ You can select the last row and press ALT+A to add another group iteration row.

Modifying a Component Group

You can add and remove business components from component groups as required, change the order of groups in a business process test or flow, and change the order of components inside a group. In addition, you can add or delete iterations for all components in the group, and select a partial iteration range for all components in the group.

If a group or a group component is selected in the Test pane, the **Grouping** submenu in the right-click context menu includes **Move Group Up** (CTRL+U) and **Move Group Down** (CTRL+D) options.

Note: Moving a component group or a component within a group could cause a parameter reference conflict, for example, where a group is moved to a position preceding the component providing an input component parameter for that group.

If the resulting warning message is ignored, the conflicting link to the source parameter is deleted. This will cause the iteration to fail, and the link must be reinstated if necessary in the Group Iterations dialog box.

To modify a component group:

The following table describes the procedures you can perform when working with groups:

To...	Perform the following:
Add a business component to a group	Drag the component from the Component Tree pane to the relevant position within the group.
	Select a component in the group or the **Begin Group** border. Double-click the required component in the Component Tree pane.
	Select the component. Drag the selection marker up or down into the group, and drop it at the required location.
Move a business component into an adjacent group	Select the component, and select **Move Component Up** or **Move Component Down** in the context menu to include the component.
	Select the **Begin Group** or **End Group** border. Drag the selection marker up or down to include the component.
	Select the **Begin Group** or **End Group** border, and click **Move Up** or **Move Down** in the toolbar or context menu to include the component.
Remove a business component from a group	Select the component. Drag the selection marker up or down out of the group, and drop it at the required location.
	Select the **Begin Group** or **End Group** border. Drag the selection marker down or up to exclude the component.
	Select the **Begin Group** or **End Group** border, and click **Move Down** or **Move Up** in the toolbar or context menu to exclude the component.
	Select the **Begin Group** or **End Group** border, and press CTRL+U or CTRL+D to exclude the component.

To...	Perform the following:
Move a group up or down in the test	Select any component in the group, or the **Begin Group** or **End Group** border, right-click, and then select **Grouping** > **Move Group Up** or **Grouping** > **Move Group Down**.
	Select any component in the group, or the **Begin Group** or **End Group** border, and press CTRL+U to move the group up or CTRL+D to move the group down.
Add group iterations	Click the iterations link in the **Begin Group** border to open the Group Iterations dialog box. Click the **Add Iteration** button in the toolbar to add a new iteration for all the components in the group. Adding and configuring group iterations is similar to adding and configuring component iterations, as described in "Working with Iterations" on page 341.
Delete group iterations	Click the iterations link in the **Begin Group** border to open the Group Iterations dialog box. Select one or more iteration rows and click the **Delete Iteration** button in the toolbar.
Select a partial iteration range	Click the iterations link in the **Begin Group** border to open the Group Iterations dialog box. Click the **Select Iterations** button in the toolbar. Selecting a partial iteration range for the components in a group is similar to selecting a partial iteration range for a single component, as described in "Selecting a Partial Iteration Range for a Component" on page 359.

Removing a Component Group

Components can be ungrouped if required.

The following table describes several procedures you can perform to ungroup components:

To...	Perform the following:
Remove a component grouping	Right-click any business component in the group, and select **Grouping > Ungroup Components**.
	Right-click the **Begin Group** or **End Group** border, and select **Grouping > Ungroup Components**.
	Select the **Begin Group** border. Drag the selection marker to the **End Group** border. Alternatively, select the **End Group** border, and drag the selection marker to the **Begin Group** border.
Completely remove a component group	Select all the business components in the group and click the **Remove Selected Components 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 component requests generated in the Test Plan module in the Component Tree pane on the right of the Test Script tab, and 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. Alternatively, 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.

For more information on adding component requests to the component tree, see "Handling Component Requests" on page 207.

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
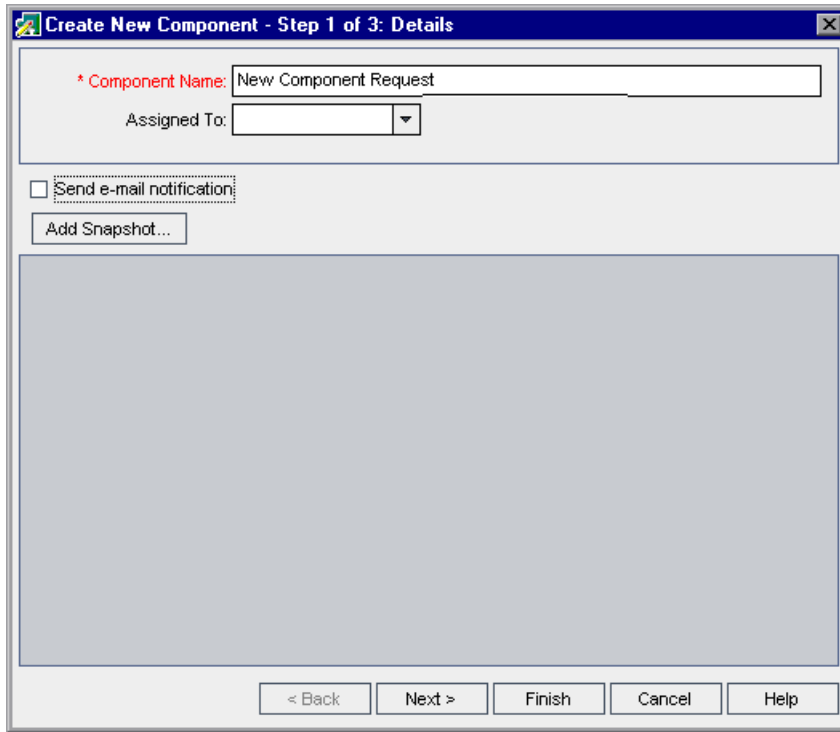
If a necessary business component has not been defined in the Business Components module, you can create and submit a component request from the Test Plan module.

To create a component request:

1 Click the **Test Plan** module button in the Quality Center sidebar 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 first step of the new component request wizard opens.

4 In the **Name** box, enter a unique name for the request.

5 From the **Assigned to** list, select the Subject Matter Expert to whom the request is assigned. The **Send e-mail notification** check box is enabled.

6 If required, select the **Send e-mail notification** check box to automatically send a notification of the new request to the person specified in the **Assigned to** box.

7 If required, you can click the **Add Snapshot** button to capture and attach an image associated with the component request. For more information on attaching an image, see "Attaching Images" on page 184.

8 If you do not want to define any additional properties for the component request at this time, proceed to step 13.

Or

Click **Next** if you want to add description details or define input or output component parameters for the component request.

The second step of the new component request wizard opens.

9 In the **Description** area, enter a summary description of the requested business component, as follows:

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

- ➤ **Pre-Condition.** Describe the state of the application at which the current business component should start.

➤ **Post-Condition.** Describe the state of the application at which the current business component should end.

Note: The component request wizard provides a comprehensive selection of text editing and formatting tools to assist you in entering the component description. Right-click in the **Description** area to access the commands from the context menu. Select **Toolbar Visible** from the context menu to display (or hide) commonly used commands in the toolbar.

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10 In the Input and Output panes, define the input and output component parameters you want the requested business component to receive and return. For more information on defining input and output component parameters, see Chapter 11, "Working with Parameters."

11 If you do not want to describe any steps for the component at this time, proceed to step 13.

Or

Click **Next** if you want to add a description of the steps in the required component.

The third step of the new component request wizard opens.
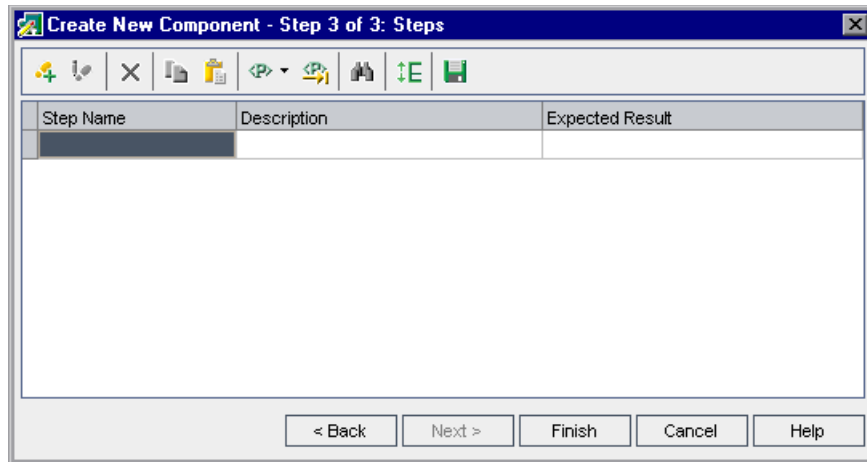
The third step of the wizard provides the same functionality as the Design Steps tab for a manual component.

12 Enter the steps that should comprise the component. For information on how to enter steps, see "Designing Manual Steps" on page 113.

13 Click **Finish**. 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 207.

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 Test pane of the Test Script tab, and select **Edit Component**. The Component 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 it has been deleted, the **Edit Component** option is not available from the context menu. If the component request has been moved to the **Obsolete** folder, the properties in the Component dialog box are displayed in read-only format.

2 Edit the properties in the tabs, as required, and click **Close**.

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 208.

Working with Business Process Tests

You can view and modify the business process tests in your project, copy and paste tests to other locations, or delete existing tests from your project. You can also check your business process tests for configuration errors.

Working with business process tests is described in the following sections:

➤ "Working with Business Process Tests in the Test Plan Tree" on page 309

➤ "Copying Business Process Tests" on page 311

➤ "Validating Business Process Tests and Flows" on page 312

➤ "Deleting Business Process Tests" on page 314

Working with Business Process Tests in the Test Plan Tree

You can work with the business process tests in the tree according to your testing needs.

To work with business process tests in the Test Plan tree:

When the Test Plan module is first accessed, the Test Plan tree displays only the highest level folders in the hierarchy.

➤ To expand a folder in the tree and view its contents, click the expand symbol ⊞ to the left of the folder name, or double-click the folder. You can also select the folder, and then right-click and select **Expand All**, or press the asterisk key (*****) on the keyboard number pad.

➤ To collapse a folder in the tree, click the collapse symbol ⊟ to the left of the folder name, or double-click the folder. You can also select the folder, and then right-click and select **Collapse**, or press the minus key (-) on the keyboard number pad.

➤ To rename a folder or business process test, select the folder or test in the tree and click it. Alternatively, right-click it and select **Rename**. Then edit the item name and press ENTER.

➤ To modify the details of a business process test, change attached files, or link the test to other project requirements, see "Building Business Process Tests" on page 283.

➤ To move a folder or business process test in the tree, do one of the following:

   ➤ Drag and drop the folder or test to the required position in the tree.

   ➤ Right-click the folder or test, and select **Cut**. Then right-click the required folder in which to paste the folder or test, and select **Paste**.

Note: Business process tests can be moved or pasted only to a folder or subfolder below the **Subject** node in the Test Plan tree.

➤ To refresh a folder or business process test in the tree, select the folder or test and click the **Refresh All** button in the toolbar. To refresh all the folders and tests in the tree, select the **Subject** root folder and click the **Refresh All** button in the toolbar. Alternatively, you can press F5 on the keyboard to refresh the selected folder or test, or CTRL+F5 to refresh all the folders and tests in the tree.

➤ To filter or sort the business process tests in the tree, click the **Set Filter/Sort** button in the toolbar. Any currently applied filters or sort orders are displayed under the Test Plan tree toolbar. For more information on filtering and sorting a tree, see the *Quality Center User Guide*.

Copying Business Process Tests

You can easily duplicate an existing business process test as the basis for a new test in the current project, or in another project, and then position the new test anywhere in the Test Plan tree of that project.

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 Business Components" on page 192.

To copy an existing business process test:

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 that you want to copy and select **Copy**.

3 Right-click the folder in which you want to paste the new business process test (in the current project or in another project on the same server) and select **Paste**. The test is copied to the new position in the Test Plan tree.

> **Note:** If a copied business process test 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 is copied to the new position in the Test Plan tree and a suffix, for example _Copy_1, is automatically added to the test name to create a unique test name within the folder.

4 If you want to modify the business process test name, select the test in the tree and click again to activate the test label for editing. Alternatively, right-click the new test and select **Rename**. Then enter a new name for the test.

5 If required, select the new business process test in the tree and modify the test settings in the tabs. For more information on business process test settings, see "Test Plan Module Tabs" on page 250.

Validating Business Process Tests and Flows

You can check your business process tests and flows to locate any component configuration 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.

> **Note:** You can also check individual business components for configuration errors. Clicking the **Validate Component** button in the Business Components module checks all instances of the selected component in applicable business process tests or flows. For more information, including the error types that are reported by the component and test or flow validation processes, see "Validating Business Components" on page 197.

To validate a business process test or flow:

1 Select the business process test or flow in the Test Plan tree 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 Validate Test dialog box, as shown in the example below.
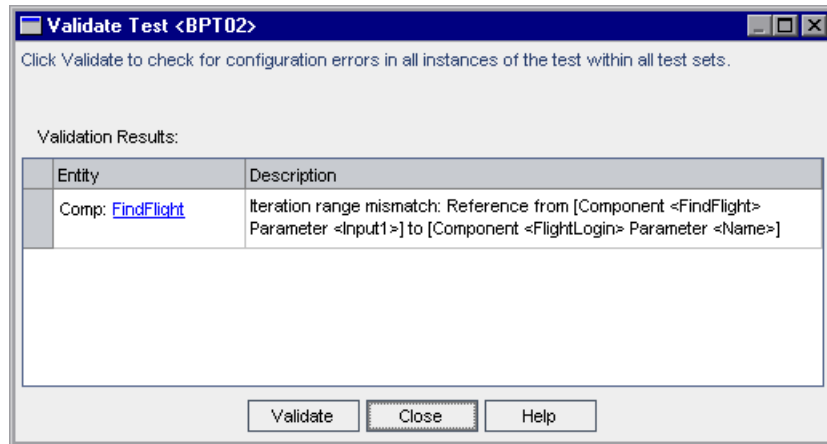
3 If a validation error is reported, you can click the link in the **Entity** column to jump directly to the business component causing the error. Errors are indicated in red text in the **Status** column of the component.

Note: In the case of a value type mismatch, the error is indicated in the component containing the input component parameter. 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 11, "Working with Parameters".

4 The Validate Test dialog box remains in view, enabling you to fix the displayed error (or errors). When you are finished, click the **Validate** button in the Validate Test dialog box to repeat the validation check. If the error has been resolved, a message is displayed indicating that the validation was successfully completed.

5 Click **Close** to close the Validate Test dialog box.

Deleting Business Process Tests

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, Quality Center 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 Quality Center 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 Select the business process test or flow in the Test Plan tree 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 Select the test folder in the Test Plan tree and click the **Delete** button in the tree toolbar, or right-click the folder and select **Delete**. The Confirm Delete Folder dialog box opens.
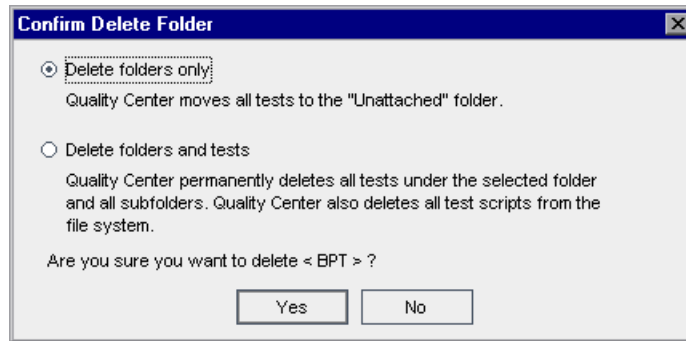
2 Select:

➤ **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. This enables you to inform other personnel about new or existing business process tests or flows, including their history, their attachments, and the design steps of each of their components. For example, the e-mail of a business process test could include a flow, the components that flow contains and their design steps, followed by a component and its design steps.

Quality Center includes a **Go To** link in the e-mail, which enables the recipient to go directly to the test or flow in the Test Plan module.
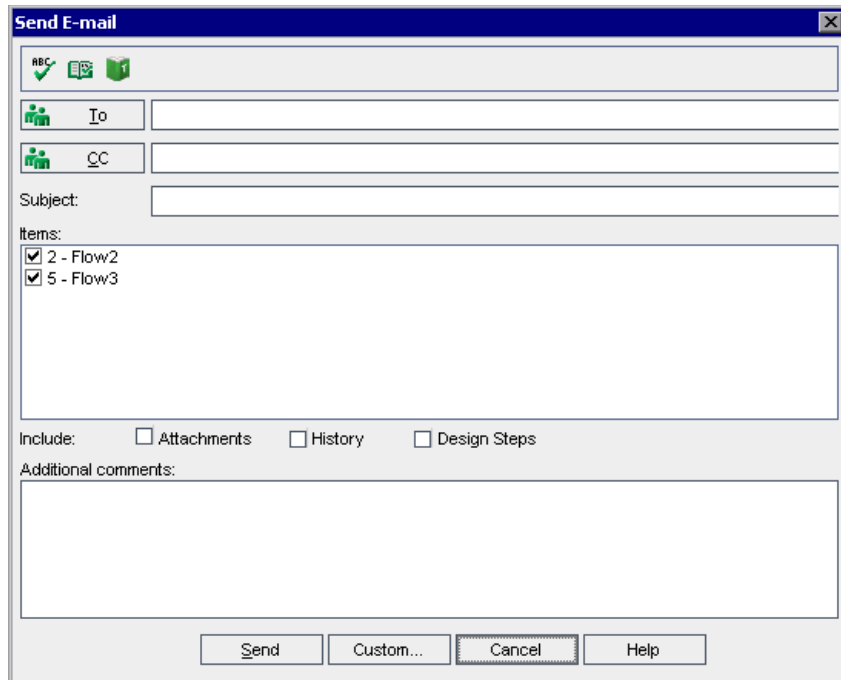
Note: By default, Quality Center sends e-mail in HTML format. To send e-mail as plain text, edit the **MAIL_FORMAT** parameter in the **Site Configuration** tab in Site Administration. For more information, see the *HP Quality Center Administrator Guide*.

To mail a business process test or flow:

1 In the Test Plan Tree, select one or more business process tests or flows and click the **Send by E-mail** button. Alternatively, click the **Send by E-mail** arrow and select **Send E-Mail to Designer** if you want to send the e-mail to the user who created the tests or flows.

The Send E-mail dialog box opens.

2 Type a valid e-mail address or user name. If you selected **Send E-Mail to Designer** in the previous step, the address of the user who created the component appears in the **To** box. Alternatively, click the **To** button or **CC** button to select users.

The Select Recipients dialog box opens.

You can sort the users list, search for users, group users by user groups, and select users from the list or from a group tree. For more information, see the section on selecting users in the *HP Quality Center User Guide*.

Select the users or user groups to which you want to send the e-mail, and click **OK**.

3 If required, you can add additional descriptive information to the e-mail in the **Subject** box. By default, if you select only one test or flow, the domain, project, test or flow ID, and name are displayed in the Subject box.

4 In the **Items** area, you can clear the check boxes of any items you do not want to include in the e-mail.

5 Select whether you want to include the **Attachments**, **History** and **Design Steps** of the tests or flows.

6 In the **Additional comments** box, add any comments you have.

7 You can check your wording in the e-mail:

➤ Click the **Check Spelling** button to check the spelling for the selected word or text box. If there are no errors, a confirmation message opens. If errors are found, the Spelling dialog box opens and displays the word that is misspelled together with replacement suggestions.

➤ Click the **Spelling Options** button to open the Spelling Options dialog box, enabling you to configure the way Quality Center checks spelling.

➤ Click the **Thesaurus** button to open the Thesaurus dialog box and display a synonym, antonym, or related word for the selected word. You can replace the selected word or look up new words.

8 Click **Custom** to customize the e-mail. In the Select Fields dialog box, you can specify additional fields to include in the e-mail.

9 Click **Send** to send the e-mail.

Converting Manual Tests to Components

In the Test Plan module, you can convert existing manual tests to manual components using the Select Destination Folder dialog box.

To access the Select Destination Folder dialog box, select one or more manual tests or a test folder in the Test Plan tree, 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 **Convert to Component** button is also available from the grid view.

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 321

➤ "Considerations When Converting Manual Tests to Components" on page 324

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.

➤ **Discussion Area.** 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. The folder you select is automatically entered in the **Destination Folder** box.
How 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 323.
Learn More	**Conceptual overview**: "Converting Manual Tests to Components" on page 319. **Additional related topics**: ➤ "Select Destination Folder Dialog Box Options" on page 323. ➤ "Considerations When Converting Manual Tests to Components" on page 324.

Below is an image of the Select Destination Folder dialog box:
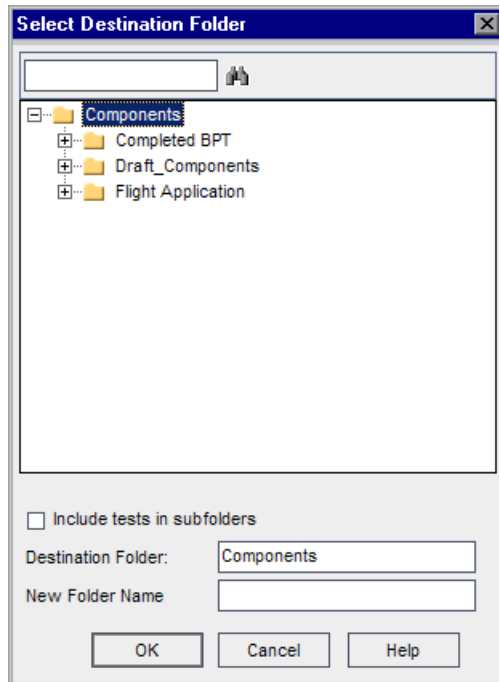
The example shown above opens when a folder is selected in the Test Plan tree.

➤ When a single test is selected:

   ➤ The **New Folder Name** box is displayed as **New Component Name**.

   ➤ The **Include tests in subfolders** check box is not displayed

➤ When more than one test is selected, only the **Destination Folder** box is displayed.

Select Destination Folder Dialog Box Options

Option	Description
Find button	Enables you to search for a folder in the component tree. Full or partial folder names can be entered.
Include tests in subfolders (displayed when a test folder is selected in the Test Plan Tree)	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.
Destination Folder (displayed when a test folder or more than one test is selected in the Test Plan Tree)	Displays the destination folder you selected for your converted components in the component tree. This box is read-only. **Note:** When more than one test is selected, component names are copied from the test names.
New Folder Name (displayed when a test folder is selected in the Test Plan Tree)	Enables you to create a new folder for your converted components below the selected Destination Folder in the component tree.
New Component Name (displayed when a single test is selected in the Test Plan Tree)	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).

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 value type is always set to **String** in the component parameter.

➤ The parameter default value is copied from the test parameter.

➤ The parameter description is copied from the test parameter.

Design Steps

In the Design Steps tab of the new component:

➤ Step names and expected results are copied from the design 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 design 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.

Generating Documents for Business Process Tests and Flows

The Quality Center 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 *Quality Center User Guide*.

Note: For more information on including component data in project documents, see "Generating Project Documents" on page 214.

11

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 input and output parameter types in Quality Center at both the component and the flow level. For information on parameters that are generated during the Learn Flow process, see "How Enterprise Extension Creates Components" on page 219.

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test enterprise applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test your other applications.

This chapter includes:

➤ About Working with Parameters on page 328

➤ Defining Component Parameters on page 333

➤ Configuring Input Parameter Values and Iterations on page 340

➤ Importing and Saving Parameter Values on page 365

➤ Working with Run-Time Parameters on page 378

➤ Understanding Date Parameters on page 389

About Working with Parameters

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. This greatly increases the power and flexibility of your tests, flows and components. For more information, see "Parameterization Example" on page 329.

Note: You can also define input and output parameters for a business component in QuickTest or WinRunner. For more information, see the *HP QuickTest Professional for Business Process Testing User Guide* or the *HP WinRunner User's Guide*.

There are two types of parameters: input parameters and output parameters. You can use parameters at both the component and the flow level, and at run-time.

➤ **Input parameters** enable you to define data used by a component or flow that is provided from an external source. Component input values and flow input values are described in "Understanding Input Parameters" on page 329.

➤ **Output parameters** enable you to define data that is retrieved and stored by a component or flow and can be used in subsequent components or flows. Component output values and flow output values are described in "Understanding Output Parameters" on page 332.

Parameterization Example

Suppose you create three flows corresponding to different stages in processing a customer order:

➤ **ReceiveOrder.** Receives a customer order and generates a unique order number when the customer authorizes the order.

➤ **SendOrder.** Sends the customer the goods the customer ordered.

➤ **BillOrder.** Sends the customer a bill for the goods.

In this example, you want to define a business process test to test the entire order processing workflow from receiving the order to billing it. You could therefore define an output parameter from the flow ReceiveOrder called OrderNumber, which stores the value of the order number generated when the order is placed. You could then use this value as an input parameter for subsequent components or flows in the business process test.

Understanding Input Parameters

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 test.

➤ An output parameter value from a component earlier in the same flow.

➤ A parameter value that is supplied at the test level, or when the flow runs in a business process test.

You define the name, description, value type, and default value of the input parameters that components can receive in the Business Components module, as described in "Defining Component Parameters" on page 333.

If one or more business components in the business process test or flow have input parameters defined, you can configure the component to run a specified number of iterations during a single run, using different values for individual input parameters in the component. For example, using different departure locations for each flight itinerary in a test for an online flight booking application. For more information, see "Understanding Iterations" on page 330.

You configure input values for individual business components, and the number of iterations of each component, in the Test Plan module, as described in "Configuring Input Parameter Values and Iterations" on page 340.

You can also define global input parameters, called **run-time parameters**, in a business process test or flow. If you select to use a run-time parameter as the value for a component parameter value, then you can configure how many iterations the entire business process test or flow runs. Each time that the test or flow runs, it sends different values to subsequent components or flows for each run-time parameter.

Run-time iterations, at the test or flow level, enable you to iterate the entire business process test or flow using different values for component parameters that affect the entire run. For example, using a specific exchange rate for monetary calculations. For more information, see "Working with Run-Time Parameters" on page 378.

Understanding Iterations

When you define input parameters, you can define the number of iterations that the component or flow runs. Defining iterations enables you to automatically run business components or flows multiple times, each time using different input parameter values.

When you run your business component or flow, one iteration is run for each value. For example, a test or flow with ten sets of run-time data will run ten times, and a component with six sets of component parameter values will run six times, before proceeding to the next component in the run.

➤ You define component parameters as run-time parameters in the Test Plan module, as described in "Creating Run-Time Parameters for Business Process Tests or Flows" on page 379.

➤ You configure input values for individual run-time parameters and the number of iterations of the business process test in the Test Lab module, as described in "Configuring Run-Time Parameter Values" on page 383.

Iteration Example

Consider the following business process test for a flight reservation application comprising three business components, Login, Order Flight, and Logout:
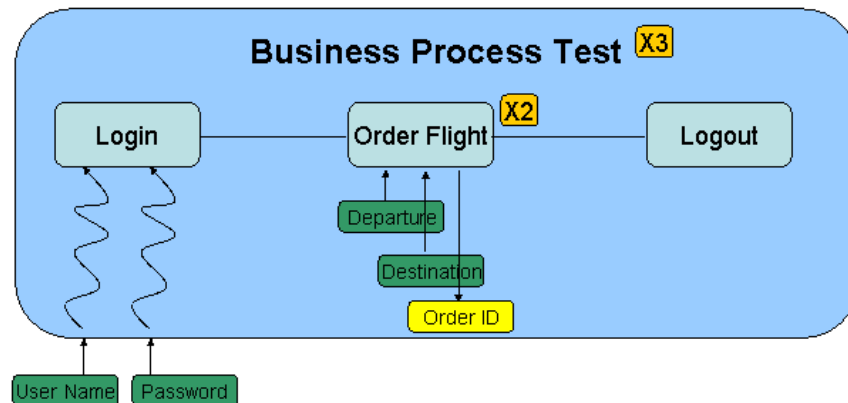
➤ The entire business process test is iterated three times.

➤ Different values for the run-time parameters **User Name** and **Password** are used for each test iteration.

➤ Within each test iteration, the **Order Flight** component is iterated twice.

➤ Different values for the **Departure** and the **Destination** input parameters are used for each iteration of the **Order Flight** component.

➤ The **Order Flight** component provides an output value for the **Order ID** parameter for each iteration.

Working with Flow Input Parameters

A flow input parameter must be assigned as an input parameter of a component in the flow. By default, the value of the flow parameter is then used as the value for the component input parameter. For more information on component input parameters, see "Understanding Input Parameters" on page 329.

You can generate flow input parameters based on existing component input parameters, or manually define a new flow input parameter as the value for a component input parameter

You can define flow input parameters manually by specifying a new flow input parameter as the value for a component input parameter, or generate flow input parameters automatically, based on existing component input parameters.

Understanding Output Parameters

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.

You define component output parameter names, descriptions, and value types for the business component in the Business Components module, as described in "Defining Component Parameters" on page 333. You configure output values in the Test Plan module, as described in "Using Returned Output Parameter Values" on page 360.

Working with Flow Output Parameters

A flow output parameter must be promoted from an output parameter of a business component that is included in the flow.

When you create a flow output parameter from a specific component output parameter, it 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.

By default, output parameters that are added during the Learn Flow process are promoted to flow parameters. You may want to remove an output parameter from the flow level and define it as a component output parameter if it is used only within its flow.

For information on creating, renaming, and removing flow output parameters, see "Understanding the Flow Output Parameters Dialog Box" on page 376.

Defining Component Parameters

You define both input and output component parameters in the Business Components module Parameters tab.

Tip: You can also create parameters directly from the Design Steps tab, Component Step Editor or Select Parameter dialog box using the Create Parameter dialog box. For more information, see "Working with the Create Parameter Dialog Box" on page 120.

➤ **Name.** A descriptive name for the parameter.

Note: Component parameter names must begin with a letter, include only English characters, and cannot include spaces or any of the following characters:
! @ # $ % ^ & * ( ) + = \ { } | ; ' : " , . / < > ? ~ ` [ ] – ~

➤ **Parameter Type.** Indicates whether the parameter is an input or output parameter.

In addition, for input parameters, you can define a **default value**. This value must correspond to the value type, and is used when the component runs if no other value is supplied by the business process test or flow.

You define value types as follows:

➤ **String.** One or more characters. When you enter a component parameter as a string, numbers are treated in the same way as any other character. For example, "1" and "1.0" are treated as different strings.

➤ **Boolean.** A True or False value.

➤ **Date.** A date (in the date format of the local computer). Once entered, this date is a fixed value. It does not automatically update to the current date each day.

➤ **Number.** Any digit. When you use the **Number** value type, component parameters with the same numeric value are treated as equal, for example, 1 and 1.0 are treated as the same value.

➤ **Password.** An encoded string. The characters you enter for a password are encrypted and displayed as asterisks.

You can insert these parameters into your steps in the Design Steps tab.

The component parameters that you define can be viewed and modified in the Test Script tab of the Test Plan module, as described in "Test Script Tab" on page 255.

Notes for users of QuickTest or WinRunner:

➤ In **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 Quality Center and are not affected by the Data Table.

➤ In **WinRunner**, parameters for WinRunner automated components can be viewed and modified in the Scripted Component Properties dialog box. If you enter and parameterize test data values in more than one row of the Data Table, then each component iteration run will perform the relevant data table loop according to the number of rows in the data table (in addition to component iterations according to the data set for the component parameters).

To define input and output component parameters in the Parameters tab:

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

2 In the Input pane or Output pane toolbar, click the **New** button.

The New Parameter dialog box opens:
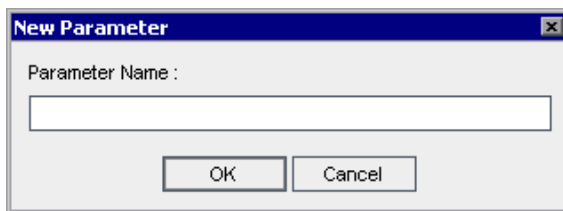
3 Enter a descriptive name in the **Parameter Name** box and click **OK**.

Note: Component parameter names must begin with a letter and cannot include any of the following characters:
! @ # $ % ^ & * ( ) + = \ { } | ; ' : " , . / < > ? ~ ` [ ] –

A line for the new input or output component parameter is added in the relevant parameter list.

4 Select the **Value Type** cell for the component parameter and select the appropriate value type from the list. For component input parameters, a default value is automatically entered in the **Default Value** column.

5 For component input parameters, modify the default input value in the **Default Value** cell, if required. The default value must correspond to the value type entered in step 4.

Note: Do not begin and end a parameter value with curly brackets.

➤ **String.** If **String** is selected as the value type, an empty string is entered in the **Default Value** column. You can click the cell and enter any string.

➤ **Boolean.** If **Boolean** is selected as the value type, True is automatically entered in the **Default Value** column. You can click the cell and enter **False**, if required.

➤ **Date.** If **Date** is selected as the value type, the current date is automatically entered in the **Default Value** column. You can click the cell and select another date from the calendar, if required.

➤ **Number.** If **Number** is selected as the value type, 0 is automatically entered in the **Default Value** column. You can click the cell and enter another valid number, if required.

➤ **Password.** If **Password** is selected as the value type, an empty string is entered in the **Default Value** column. You can click the cell and enter any password string.

6 In the **Description** cell, enter a description of the component parameter's purpose, or other descriptive text. This will assist other users to understand how the parameter is used.

Tips:

➤ Specific values or ranges of values that can be supplied for the component parameter, such as a range of dates, a range of numerical values, or a set of valid strings, should be included in this description when appropriate.

➤ For long descriptions, click the down button in the cell and enter the description in the text box. Click **OK** or press CTRL+ENTER to save the description and close the box.

7 Repeat steps 2 to 6 to define additional input or output component parameters.

Tip: To change the order of the parameters in the Parameters tab, you can drag and drop the parameters in the list, or select a parameter and click the up or down arrows in the pane toolbar.

8 Exit from the component by selecting another business component in the component tree. Parameter data is saved when the business component is closed.

If the component had a **Ready** status before a component parameter was added, a popup dialog box enables you to choose whether to modify the component status to **Maintenance**.

Note: You can delete input and output component parameters by selecting the parameter in the Input or Output pane 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**.

Deleting a component parameter may prevent a business process test that contains that component from running successfully. Therefore, a specific warning message is displayed if the parameter is contained in a component that is used by one or more business process tests.

Using Keyboard Commands in the Parameters Tab

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Parameters tab:

➤ ALT+N. Creates a new input parameter.

➤ ALT+D. Deletes an input parameter.

➤ ALT+W. Creates a new output parameter.

➤ ALT+L. Deletes an output parameter.

➤ Use the up and down arrow keys to move the focus up or down.

➤ You can press TAB to move the focus one cell to the right, or to the first cell in the next row.

➤ Use the left and right arrow keys to move the focus one cell to the left or right, with the following exceptions:

　➤ In the last cell in a row, the right arrow key moves the focus to the first cell in the next row.

　➤ In the first cell in a row, the left arrow key moves the focus to the last cell in the row above (if any).

➤ When a cell is in Edit mode, for example, when modifying a name, value or description, the left and right arrow keys move within the edited cell.

➤ When a cell containing a list is selected:

➤ You can press ALT+DOWN arrow to open the list for that cell, or to open the text box in the Description cell.

➤ You can select an item in the list by using the up and down arrow keys to move to the item and then clicking ENTER. You can also move to the item by typing its first letter or letters.

➤ In the Description cell text box, you can press ALT+O to save and close the box, or press ALT+N to cancel your entry.

Configuring Input Parameter Values and Iterations

You can configure the parameter values for a business component parameter or flow. The values you supply affect the way a component or a flow containing that component runs. You can also enter multiple values to instruct a business process test or flow to run a component multiple times within the test or flow, and use a different value in each iteration.

For example, consider an online airline ticket booking application. As part of the flight booking process, you supply the departure and arrival locations and click the **Continue** button. The site returns the available flights for the requested itinerary.

You could conduct a business process test that logs into the Web site, books numerous itineraries comprising various departure and arrival locations, and logs out. This is a slow, laborious, and inefficient solution. Instead of creating a different business component for each itinerary, Business Process Testing enables you to use one component that searches for a ticket, and then use component parameters to run multiple iterations of the component, each time using different departure and arrival locations.

Working with Iterations

In order for a business component to run iterations successfully, it is essential that the post-condition, meaning the state of the application after the last step in the component is run, matches the pre-condition, meaning the state of the application before the first step in the component is run.

Iterations of a component in a business process test or flow can result in multiple parameter output values. In these cases, each iteration passes its value as input to the corresponding target component or flow.

The linking of one or more output parameters in a source component or flow to one or more input parameters of a target component or flow can occur successfully only where one of the following two conditions exist:

➤ **Condition 1.** The source component or flow has one iteration and the target component or flow has one or more iterations (a 1 to n relationship).

➤ **Condition 2.** The source component or flow and the target component or flow have the same number of iterations (an n to n relationship).

Notes:

➤ When a source or target component is a member of a group, the number of iterations is that of the group.

➤ Iterations of a source component in a business process test or flow can result in multiple parameter output values. In these cases, the value provided by each iteration run is passed as input to the corresponding iteration of the target component or flow.

Condition 1: Example

The source component has one iteration and the target component has one or more iterations. In this case, the same output value of the source component is used in each iteration of the target component.
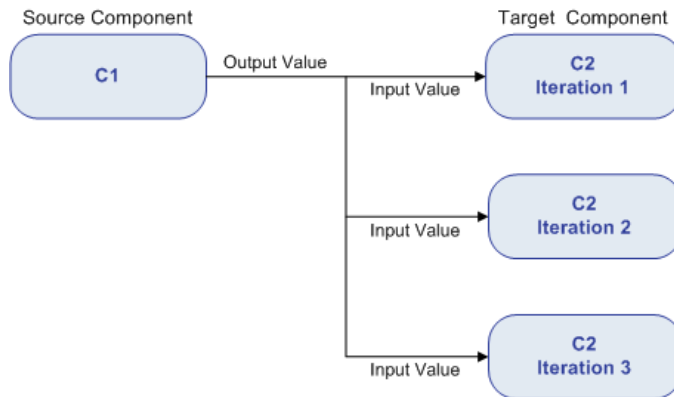
Condition 2: Example

The source component and the target component have the same number of iterations. 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.
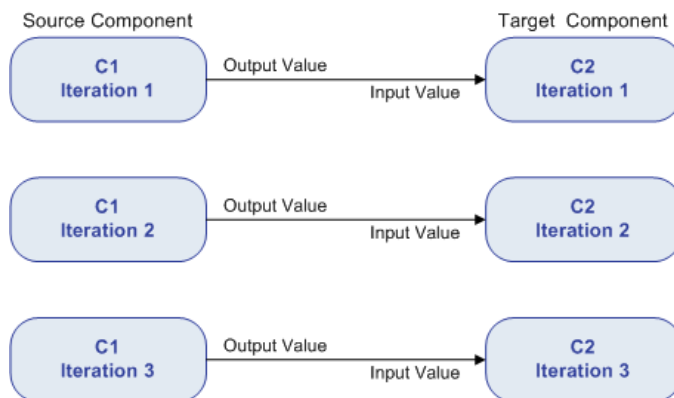
If the components are not represented by a 1 to n or n to n relationship, a warning message is displayed.

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 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 "Selecting a Partial Iteration Range for a Component" on page 359.

To define component output parameters, you define the output data that a subsequent business component can use as input values in a business process test.

When a component input parameter is linked to a component output parameter, all the input parameter iterations are automatically filled in the Component Iterations dialog box, in read-only format, with the name of the component, the component parameter, and the relevant number of iterations, as shown below.

In the above example, the source component (FindFlight) has an n to n (3 to 3) relationship with the target component (CancelFlight). For each iteration of component input parameter OrderNumber in CancelFlight, there is a corresponding iteration of component output parameter OrderNum from FindFlight.

Conversely, the source component (Login) has a 1 to n (1 to 3) relationship with the target component (CancelFlight). Each iteration of component input parameter Name in the CancelFlight component uses the same component output parameter (LogName) from the Login component.

Note: Moving a business component or group 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 will cause the iteration to fail, and the link must be reinstated in the target Component 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 Component Iterations or Group Iterations dialog box.

Where there is a value type mismatch between input and output component parameters, the relevant iterations in the grid are displayed in red text.

Note: Iteration errors will cause a business process test that contains the relevant components to fail. These errors are indicated in the Test Script t ab in the Test Plan module, and reported when the component or test is validated. For more information, see "Validating Business Components" on page 197, and "Validating Business Process Tests and Flows" on page 312.

Configuring Input Parameter Values

You use the Component Iterations dialog box to configure the parameter values that a component will use for each iteration in a business process test or flow.

You can define a new flow input parameter from the Component Iterations dialog box, by promoting an existing component input parameter to a flow input parameter. For more information, see "Defining Flow Input Parameters Manually" on page 355. You can also define default values for flow input parameters. For more information, see "Defining Default Flow Input Parameter Values" on page 358.

Note: The **Add Iteration**, **Delete Iteration** and **Select Iterations** buttons in the Component Iteration dialog box are disabled for a component in a group. These are common functions for all group members and can be accessed by clicking the link in the group border to open the Group Iterations dialog box. All other functions in the Component Iteration dialog box remain enabled.

To configure input parameter values:

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 Test pane of the Test Script tab, click the input parameter link for the component in the **Input** column, or right-click the component for which you want to configure component input parameter values and select **Iterations**.

The Component Iterations dialog box opens.

Tip: Click a cell under a component input parameter or click the column header to view its description in the **Parameter description** area.

3 If you want the business component to run only once within the business process test, proceed to step 5.

If you want the business component to run more than one iteration, click the **Add Iteration** button. An additional iteration row is added to the Component Iterations dialog box. The component input parameter values in the previous row are automatically duplicated in the new row.

4 Repeat step 3 to add additional iterations for the component.

Tips:

➤ You can drag and drop iterations in the list to change the order in which they are used in the business process test.

➤ You can delete an iteration by selecting it and clicking the **Delete Iteration button** in the toolbar.

➤ You can select more than one iteration in the list using standard Windows selection techniques (using the CTRL and SHIFT keys).

➤ For a list of keyboard commands to navigate within the Component Iterations dialog box, see "Using Keyboard Commands in the Component Iterations Dialog Box" on page 364.

5 Configure the value of each component input parameter for each iteration.

➤ To use a fixed value, enter the value manually in the column cell, or keep the default value.

➤ For fixed date values, you can select a date from a calendar. For more information, see "Selecting a Date for a Component Input Parameter" on page 350.

➤ For fixed string values, you can also enter XML code. For more information, see "Entering XML for a Component Input Parameter" on page 351.

➤ To use a run-time value (a value supplied when the business process test runs), see "Creating Run-Time Parameters for Business Process Tests or Flows" on page 379.

➤ To use a value returned from a previous business component in the business process test, see "Using Returned Output Parameter Values" on page 360.

For guidance about when to use component parameter values or run-time parameter values, see "Guidelines for Choosing Component or Flow Parameter Values and Run-Time Parameter Values" on page 388.

Note: The value type defined for each component parameter, for example, String or Number, is displayed in parentheses at the top of the relevant column. The value you configure for a parameter must match the value type of the parameter. For more information on specifying component value types, see "Defining Component Parameters" on page 333.

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6 If you want the business component to run only one or 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 "Selecting a Partial Iteration Range for a Component" on page 359.

7 Click **OK** to close the Component Iterations dialog box.

Selecting a Date for a Component Input Parameter

You can select a date value for a component input parameter in the Component Iterations dialog box. The date can be a fixed date from a calendar, or you can choose to use a run-time value for the date (a date supplied when the business process test runs).

Business Process Testing also supports the use of dynamic date values for flow and run-time parameters. It is not supported at the component level. For more information, see "Understanding Date Parameters" on page 389.

To select a date value:

1 Open the Component Iterations dialog box as described in "Configuring Input Parameter Values and Iterations" on page 340.

2 Click the cell for the component input parameter for which you want to select a date value. A browse button is displayed.

3 Click the browse button to open the Set Calendar Value dialog box.
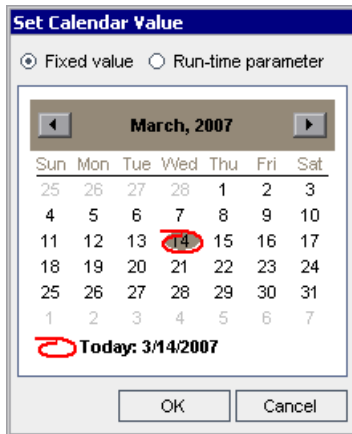
4 Select the date value you require.

➤ To enter a fixed date, select **Fixed value** and then select a date in the calendar.

➤ To enter a run-time parameter for the date, select **Run-time parameter**. A list of the available run-time date parameters is displayed. Select the required run-time date parameter from the list or create a new one by clicking the **Add Run-Time Parameter** button. For more information on run-time parameters, see "Creating Run-Time Parameters for Business Process Tests or Flows" on page 379.

5 Click **OK**. The component parameter is displayed in the input parameter cell in the Component Iterations dialog box.

6 Click **OK** to close the Component Iterations dialog box.

Entering XML for a Component Input Parameter

You can set a fixed value or a run-time value in the Set String Value dialog box. You can also specify XML as multi-line string values. You can format the XML and check that the it conforms to XML coding standards.

To enter XML for a fixed value component input string parameter:

1 Open the Component Iterations dialog box as described in "Configuring Input Parameter Values and Iterations" on page 340.

... **2** Click the cell for the component input string parameter for which you want to enter XML. A browse button is displayed.

3 Click the browse button to open the Set String Value dialog box. For more information, see "The Set String Value Dialog Box" on page 353.
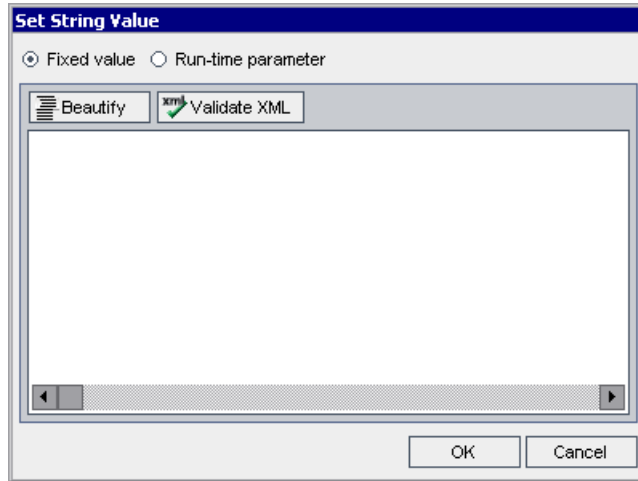
4 Select **Fixed value** and enter the required XML code. If required, you can click the **Beautify** button to format the code so that it is more readable and conforms to XML coding standards. You can click the **Validate XML** button to check that the XML code does not contain any errors.

Note: You can also enter a run-time parameter from the Set String Value dialog box by selecting **Run-time parameter**. For more information on run-time parameters, see "Creating Run-Time Parameters for Business Process Tests or Flows" on page 379.

5 Click **OK**. The component parameter is displayed in the input parameter cell in the Component Iterations dialog box.

6 Click **OK** to close the Component Iterations dialog box.

The Set String Value Dialog Box

Description	Enables you to define a fixed value or run-time value for a string listed in the Component Iterations dialog box.
How to Access	In the Component Iterations dialog box, click in the cell of the parameter you want to define, and then click the **Browse** button ⋯ .
Important Information	When a component step invokes a service call, for example, a component that is automated using HP Service Test, or using the QTP Web Services Add-in, the service call may require XML as input data. You can specify XML as multi-line string values in the Set String Value dialog box.
Learn More	**Conceptual overview**: "Configuring Input Parameter Values and Iterations" on page 340.
	Primary tasks:
	➤ "Entering XML for a Component Input Parameter" on page 351
	➤ "Creating Run-Time Parameters for Business Process Tests or Flows" on page 379
	Additional related topics: "Defining Flow Input Parameters Manually" on page 355

Below is an image of the Set String Value dialog box.

Set String Value Dialog Box Options

Option	Description
Fixed Value	Enables you to enter a fixed value for the string listed in the Component Iterations dialog box. The value can be XML code. Also displays the **Beautify** and **Validate XML** buttons, that enable you to format any XML code you enter, and check that the code is error-free.
Run-time parameter	Displays the **Add Run-Time Parameter** button, that enables you to enter a run-time value for the string listed in the Component Iterations dialog box. For more information, see "Creating Run-Time Parameters for Business Process Tests or Flows" on page 379.
Flow Parameter (displayed when the component is included in a flow)	Displays the **Add Flow Parameter** button, that enables you to enter a flow parameter for the string listed in the Component Iterations dialog box.
Beautify (displayed when **Fixed value** is selected)	If required, you can click the **Beautify** button to format the XML code you enter so that it is more readable and conforms to XML coding standards.
Validate XML (displayed when **Fixed value** is selected)	You can click the **Validate XML** button to check that the XML code does not contain any errors.

Defining Flow Input Parameters Manually

You can manually define a new flow input parameter from the Component Iterations dialog box, by promoting an existing component input parameter to a flow input parameter.

Tip: You can also define flow input parameters from the Group Iterations dialog box. You define flow input parameters from the Group Iterations dialog box as you would from the Component Iterations dialog box. For more information, see "Working with Component Groups" on page 293.

To configure flow input parameter values:

1 Open the Component Iterations dialog box, as described in steps 1 and 2 in the procedure "To configure input parameter values:" on page 346.

2 The process for creating a flow input parameter at this stage, depends on the value type of the parameter.

For **number**, **boolean**, or **password** value type parameters: Click the relevant cell, click the down arrow, and select **<New Flow Parameter>**. Type the name of the flow input parameter you want to create.

For **string** or **date** value type parameters: Click the relevant cell and click the browse button. The Set String Value or Set Calendar Value dialog box opens. For information on date parameters, see "Understanding Date Parameters" on page 389.

Note: If a date value parameter appears as a **String** value type, you need to manually define the date value as a **Date** type. For more information, see "Defining Date Parameters Manually" on page 396.

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3 Select **Flow parameter**. A list of existing flow input parameters is displayed.
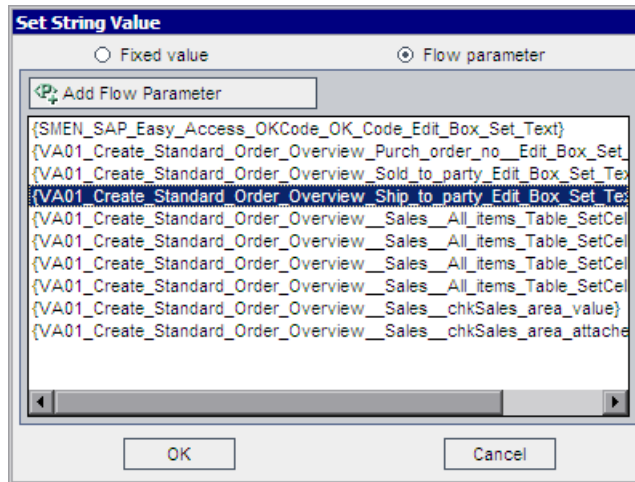
4 Click the **Add Flow Parameter** button. The New Flow Parameter dialog box opens.
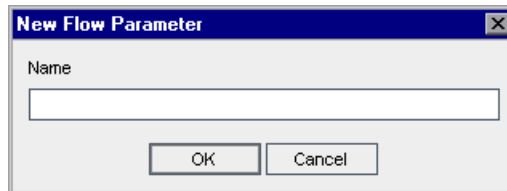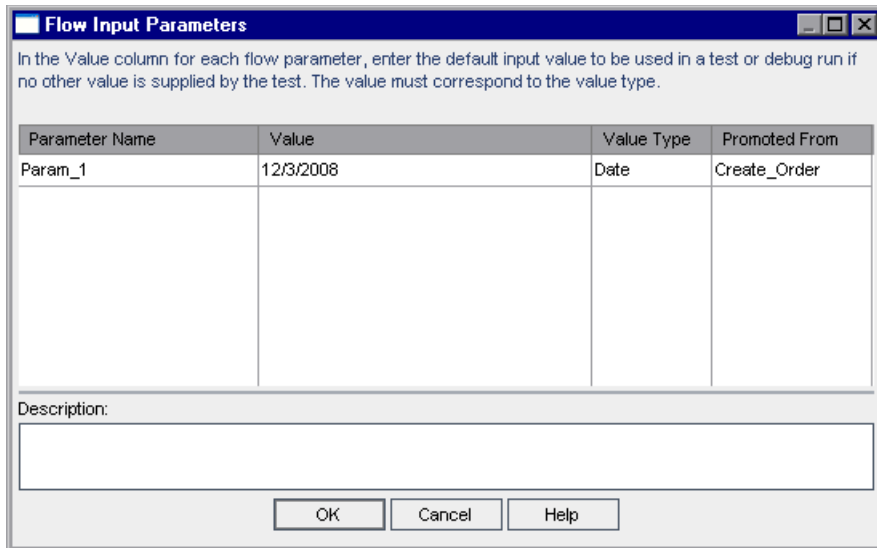
5 In the **Name** box, type a name for the flow input parameter you want to create and click **OK**. The New Flow Parameter dialog box closes.

6 Click **OK**. If you are defining a string or date parameter, click **OK**. The Set String Value or Set Calendar Value dialog box closes.

7 Click **OK**. The Component Iterations dialog box closes.

Defining Default Flow Input Parameter Values

You can define default values for flow input parameters. When you run a test containing a flow, and no value is supplied to the flow input parameter from some other source, or when you run a flow directly from the Test Plan module, the default value is used.

To define a default flow input parameter value:

1 In the Test Plan Tree, select a flow that has at least one flow input parameter.

2 In the Test Script tab, click the **Flow Input Parameters** button. The Flow Input Parameters dialog box opens.

Parameter Name	Value	Value Type	Promoted From
Param_1	12/3/2008	Date	Create_Order

Flow Input Parameters

In the Value column for each flow parameter, enter the default input value to be used in a test or debug run if no other value is supplied by the test. The value must correspond to the value type.

Description:

OK   Cancel   Help

3 Select the parameter for which you want to define a default value and click the **Value** column.

4 Type or select the default value you want to use for the parameter. This value must be consistent with the value type displayed in the **Value Type** column. You can enter a dynamic date value for date type parameters. For more information, see "Understanding Date Parameters" on page 389.

Note: If a date value parameter appears as a **String** value type, you need to manually define the date value as a **Date** type. For more information, see "Defining Date Parameters Manually" on page 396.

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5 In the **Description** box, you can type a description of the parameter.

6 Click **OK**. The Flow Input Parameters dialog box closes.

Selecting a Partial Iteration Range for a Component

You can specify a single component iteration or a partial 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 for the business component.

You define which component iterations to run in the Select Iterations dialog box.

To select a component iteration range:

1 In the Component Iterations dialog box, click the **Select Iterations** button. The Select Iterations dialog box opens.
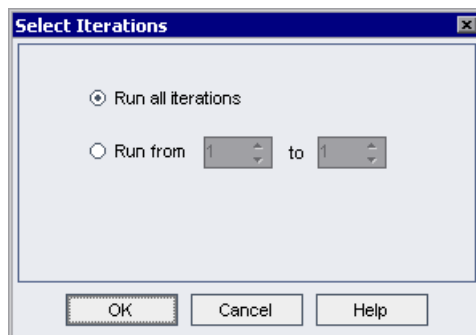
2 Select the second radio button. The **from** and **to** spin boxes are enabled.

3 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 component iteration only, enter or select the same iteration number in both the **from** and **to** spin boxes.

---

4 Click **OK**. The iterations that are not selected for inclusion in the run are grayed. When the component runs, only the defined iterations run.

Note: The selected range of component iterations is displayed in the top left cell of the Component Iterations dialog box.

Using Returned Output Parameter Values

The Select Output Parameter dialog box lists output parameters with the appropriate value type from each business component in the business process test prior to the current component.

You can specify to use a value returned from an output parameter of a previous business component as an input parameter value for the current component in a business process test.

You can view the details of the component output parameters for any business component. For more information, see "Viewing Output Parameter Details for a Business Component or Flow" on page 363.

Note: When you choose to use the output of a previous component as the value for a component input 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.

To use a component output parameter:

1 In the Test Plan module, select the relevant business process test in the Test Plan tree, and click the **Test Script** tab.

2 In the Test pane, right-click the business component for which you want to configure a component input parameter value, and select **Iterations**, or click the input parameter link for the component in the **Input** column.

The parameters are listed in the Component Iterations dialog box.

Component <Select Itinerary> Iterations			
Specify the parameter values that the business component will use for each iteration during a business process test run. Alternatively, select the Output parameter check box to use an output parameter value from a previous business component as input for this component.			
Add Iteration X Delete Iteration ≡ Select Iterations Import... Export...			
	Destination (string)	Departure (string)	Date (date)
	☐ Output of previous component	☐ Output of previous component	☐ Output of previous component
Parameter Value	London	New York	10/31/2005

3 In the relevant parameter column, select the **Output of previous component** check box. The Select Output Parameter dialog box opens.
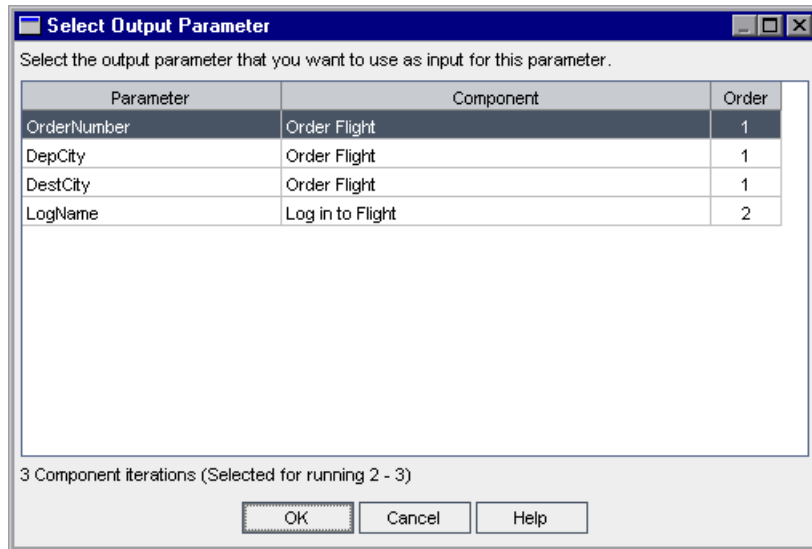
4 Select the component output parameter that you want to use as input for this parameter and click **OK**. Each iteration (row) of the component parameter in the Component Iterations dialog box is populated with the output parameter value from the corresponding iteration of the source component.

Note: Differences between the number of output and component input parameter iterations will result in an error, and an error message is displayed. If you choose to continue, the component parameter name in the Component Iterations dialog box is displayed in red text, indicating an iteration range mismatch.

Viewing Output Parameter Details for a Business Component or Flow

You can view the output parameters that have been defined for a business component or flow from the Test Script tab in the Test Plan module.

Each defined output parameter for the business component or flow is displayed in the Output Parameters dialog box. The value type is also displayed.

To view output parameters for a business component or flow:

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 Test pane, right-click the business component or flow for which you want to view output parameters, and select **Output Parameters**. The Output Parameters dialog box for the component or flow opens.

Tip: Select an output parameter to view its description in the Description area. Parameter descriptions are initially entered in the Business Components module, in QuickTest, or in WinRunner. For more information on defining component output parameter details, see "Defining Input and Output Component Parameters for a Business Component" on page 186.

3 Click **OK** to close the Output Parameters dialog box.

Using Keyboard Commands in the Component Iterations Dialog Box

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Component Iterations dialog box:

➤ Press F2 to enter Edit mode.

➤ Use the up and down arrow keys to move the focus one iteration up or down.

➤ You can press TAB to move the focus one cell to the right, or to the first cell in the next row.

➤ Use the left and right arrow keys to move the focus one cell to the left or right, with the following exceptions:

   ➤ In the last cell in a row, the right arrow key moves the focus to the first cell in the next row.

   ➤ In the first cell in a row, the left arrow key moves the focus to the last cell in the row above (if any).

   ➤ When a cell is in Edit mode, the left and right arrow keys move within the edited cell.

➤ When a cell containing a list is selected, you can press ALT+DOWN arrow to open the list for that cell.

➤ You can select the last row and press ALT+A to add another component iteration row.

Importing and Saving 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 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.

➤ The subsequent rows contain the parameter values that are used in iterations of the business process test or flow.

You map the parameters in the Output Parameters dialog box 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 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 Quality Center. Conversely, the parameter values in Quality Center 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 "Importing and Saving Parameter Values" on page 365.

To import saved component or flow parameter values:

1 Click the **Test Plan** module button in the Quality Center sidebar 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.

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.

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4 Click the **Import** button. The Select CSV (Comma Delimited) File dialog box opens.
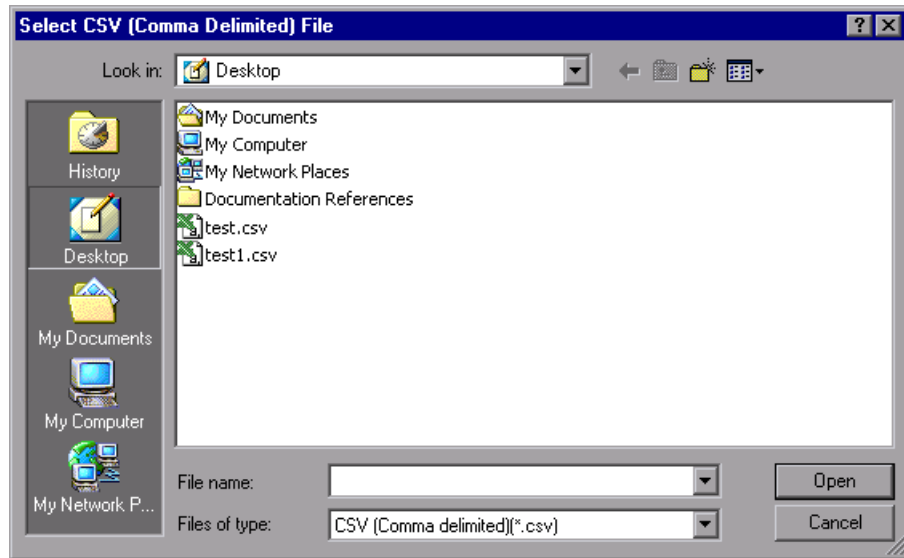
5 Specify or browse to the **.csv** file that contains the required data and click **Open**. The Map Import Data dialog box opens.
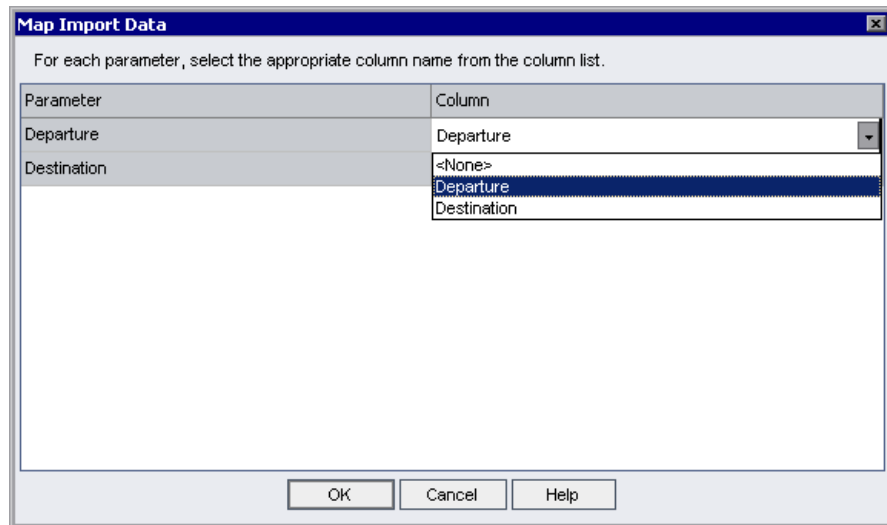
6 If you need to select or modify the mapped column header, click in the **Column** cell for the relevant parameter. A down arrow is displayed.

7 Click the down arrow and select the column header from the list.

8 Repeat steps 6 and 7 for each mapping you need to set.

9 Click **OK**. A confirmation message is displayed.

10 Click **Yes**. The values from the **.csv** file are imported and displayed in the Component Iterations or Flow 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.

---

11 Click **OK** to close the Component Iterations or Flow Iterations dialog box.

Saving 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 "Importing Parameter Values from a File" on page 366.

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 Quality Center. Conversely, the parameter values in Quality Center do not change dynamically when you make changes to the **.csv** file. It is important therefore, to check the parameter values in Quality Center before saving them to a **.csv** file to ensure that they contain up-to-date values.

To save component or flow parameter values:

1 Click the **Test Plan** module button in the Quality Center sidebar 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 Test 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 Component Iterations or Flow Iterations dialog box.

Generating Flow Input Parameters for Existing Components

You can generate flow input parameters based on existing input parameters for a component within the flow. When the component runs, these component input parameters take the values assigned to the corresponding flow input parameters.

There are several criteria you can define when generating flow input parameters. For example, you can:

➤ Specify whether to use the same or unique flow parameters for each iteration.

➤ Configure the naming convention for your flow parameters.

➤ Generate flow parameters for all component parameters.

➤ Specify the cells in the Component Iterations or Group Iterations dialog box for which you want to generate flow parameters.

Flow parameters are also generated automatically during the Learn Flow process. For more information, see "How Enterprise Extension Creates Components" on page 219.

To generate flow input parameters:

1 In the Test Plan Tree, select the flow for which you want to generate flow input parameters. Click the **Test Script** tab.

2 In the Test Script tab, right-click the component whose component input parameters you want to use as a basis for generating flow input parameters and select **Iterations**, or click the parameter name. The Component Iterations dialog box opens.

Most of the functionality available in the Component Iterations dialog box for flows is the same as that available for regular components. For more information on this functionality, see "Working with Iterations" on page 341.

Tip: You can also generate flow input 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 "Working with Component Groups" on page 293.

---

3 Click the **Flow Parameters** button. The Define Flow Parameters dialog box opens. Define the criteria for creating and naming flow parameters. For more information, see "Understanding the Define Flow Parameters Dialog Box" on page 374.

4 Click **OK**. The Define Flow Parameters dialog box closes and flow input parameters are generated for the flow, based on the criteria you selected.

Understanding the Define Flow Parameters Dialog Box

The Define Flow Parameters dialog box defines the way generated flow parameters are created and named.

The Define Flow Input Parameters dialog box contains the following options:

Option	Description
Define the criteria for creating flow parameters	➤ **Use the same flow parameter for each iteration.** Clears the flow 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 parameter for each iteration.** Automatically creates a new flow parameter for each iteration. The parameter values are saved with each iteration run.
Include component name before flow parameter name	Adds the component name as a prefix preceding the generated flow parameter name.
Example	Provides an example of the flow parameter name based on the selected criteria.

The **Advanced Options** link expands the dialog box to display the following options:

Option	Cells for which flow parameters are generated
Create flow parameters for	**Empty cells only.** Creates flow parameters only for cells that do not contain any value (default). **Empty cells and cells with default values.** Creates flow parameters for all cells that either do not contain a value or contain the default value defined in the component parameter. **All cells.** Creates flow parameters for all cells in the Component Iterations or Group Iterations dialog box.

Understanding the Flow Output Parameters Dialog Box

The Flow Output Parameters dialog box controls the creation, naming, and removal of flow output parameters.

The Flow Output Parameters dialog box contains the following sections:

Section	Description
Available Component Output Parameters	Displays the output parameters of the components in the flow that are not already promoted to flow output parameters. The components are listed using the following naming convention: **[<ComponentName>:<ComponentIndex>] <ParameterName>** or **[<ComponentName>:<ComponentIndex>] <ParameterName> (Iteration <IterationNumber>)**
Flow Output Parameters	Displays the output parameters of components in the flow that are already promoted to flow output parameters.

To define a flow output parameter:

In the **Available Component Output Parameters** list, select the component output parameter that you want to promote to a flow output parameter and click the **Add** button. You can click the **Add All** button to promote all component output parameters in the flow to flow output parameters.

To rename a flow output parameter:

Select the parameter in the **Flow Output Parameters** list, and click the **Rename** button or double-click the **Flow Parameter Name** cell. Type the new name and press ENTER. Renaming a flow output parameter does not rename the corresponding component output parameter.

Consider the following when renaming a flow output parameter:

➤ The parameter name must be unique within the flow.

➤ The parameter name must begin with a letter. If the first character of the component name is not a letter, the prefix **comp_** is added.

➤ The parameter name must not contain non-English characters nor any of the following characters: **! @ # $ % ^ & * ( ) + = \ { } | ; ' : " , . / < > ? ~ ` [ ] –** Any invalid character is automatically replaced by an underscore (_).

➤ You can resize or maximize the Flow Output Parameters dialog box to display the entire parameter name.

To remove a defined flow output parameter:

In the **Flow Output Parameters** list, select the flow output parameter and click the **Remove** button. You can click the **Remove All** button to remove all defined flow parameters.

Working with Run-Time Parameters

Before running a business process test or flow, you can define run-time parameter values and test or flow iterations in the Test Lab module. These run-time parameter values are then used as the input values for any business components or flows that reference them in the run.

You can also define run-time parameter values in the Test Plan module to act as default values, and for use with debug runs.

Note: The Test Lab module can be used for other tests, such as WinRunner and QuickTest tests. The information and procedures described in this chapter are relevant only to Business Process Testing, and are viewed using the Execution Grid tab of the Test Lab module.

The standard functionality in the Test Lab module applies to Business Process Testing as well.

For more information on using the Test Lab module and the Execution Grid tab, see the *Quality Center User Guide*.

Creating Run-Time Parameters for Business Process Tests or Flows

You can create run-time parameters for a business process test or flow by specifying a run-time parameter name as the value for the parameter. When you create a new run-time parameter, it automatically uses the value type of the parameter for which it is created.

After you create a run-time parameter, you can select it for any other parameter of the same value type in any business component or flow in the business process test.

To create a run-time parameter:

1 Click the **Test Plan** module button in the Quality Center sidebar 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 Test pane, right-click the business component or flow for which you want to create a run-time parameter, and select **Iterations**.

4 The Component Iterations, or Flow Iterations, dialog box opens.

5 Click the relevant Parameter Value cell.

   ➤ For string or date value type parameters, skip to step 7.

➤ For number, boolean, or password value type parameters, click the down arrow in the Parameter Value cell and select **{New Run-Time Parameter}** from the list. **{Enter param name}** is displayed in the cell.

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.

6 Overwrite the Enter param name text between the **{ }** brackets with a descriptive name for the run-time parameter. Ensure that you do not delete the **{ }** brackets, as they instruct Quality Center to treat the parameter as a run-time parameter and not as a fixed value.

Skip to step 8.

7 For string or date value type parameters, click the browse button in the relevant Parameter Value cell to display the Set String Value or Set Calendar Value dialog box.

Select **Run-time parameter**. A list of the available run-time parameters is displayed. Select the required run-time parameter from the list and click **OK**. If required, you can create a new run-time parameter by clicking the **Add Run-Time Parameter** button.

8 Repeat steps 5 or 7 for any other parameters or iteration rows for which you want to use run-time parameter values.

9 Click **OK** to close the Component Iterations or Flow Iterations dialog box.

Working with the Run-Time Parameters Dialog Box

In the Run-Time Parameters dialog box in the Test Plan module, you can configure run-time component and flow input parameter values to be used as default values for test runs.

The dialog box displays each run-time parameter that is defined for any of the business components and flows in the business process test.

➤ The **Parameter Name** column displays the names of the parameters.

➤ The **Value** column enables you to enter the run-time parameter value to use as the default value for each run-time parameter.

➤ The **Value Type** column displays the value type defined for each business component, for example, String or Number. The value you supply must match the value type for the component parameter. For more information on specifying component value types, see "Defining Component Parameters" on page 333.

➤ The **Promoted From** column displays the component or flow from which the run-time parameter was promoted.

➤ The **Description** area enables you to enter text that can guide the person running the test or flow about the purpose of the run-time parameter and its possible values, if relevant.

To configure run-time parameter values in the Test Plan module:

1 Click the **Test Plan** module button in the Quality Center sidebar 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 Test pane toolbar, click the **Run-Time Parameters** button. The Run-Time Parameters dialog box opens.

4 In the **Value** column, enter the run-time parameter value to use as the default value for each run-time parameter in the dialog box.

5 Enter a description of the run-time parameter in the **Description** area.

Tip: Valid values or ranges of valid values for a run-time parameter, such as a range of dates, a range of numerical values, or a set of valid strings, should be included in this description when appropriate.

---

6 Click **OK** to close the Run-Time Parameters dialog box.

Configuring Run-Time Parameter Values

Before running a business process test or flow within a test set, you can specify the values for any run-time parameters defined for the test or flow. If you do not specify values, and valid default values have not been specified in the Run-Time Parameters dialog box in the Test Plan module, the test run may fail.

For information on setting run-time default values, see "Working with the Run-Time Parameters Dialog Box" on page 381.

To configure run-time parameter values:

1 Click the **Test Lab** module button in the sidebar. By default, the Test Lab module opens with the Execution Grid tab displayed. Each line in the Execution Grid represents a separate test record in the test set tree.

2 In the test set tree, select the test set containing the business process test or flow for which you want to configure the run-time parameter.

The tests and flows in the test set are listed in the Execution Grid tab. Business process tests and flows are identified in the grid in the **Plan: Type** column and by the icons in the **Plan: Test Name** column.

Note: The specific icon displayed in the Execution Grid tab depends on the current status of the test or flow. For more information, see "Understanding Business Process Test and Flow Statuses" on page 253.

---

3 In the Execution Grid tab, right-click the business process test or flow for which you want to configure run-time parameter values, and select **Iterations**. Alternatively, click the link in the **Iterations** column of the tab.

> **Note:** By default, the **Iterations** column is not displayed in the Execution Grid tab. You must add it using the Select Columns dialog box, if required. For information on how to add or arrange columns in Quality Center, see the *Quality Center User Guide*.

The Test Iterations dialog box opens.
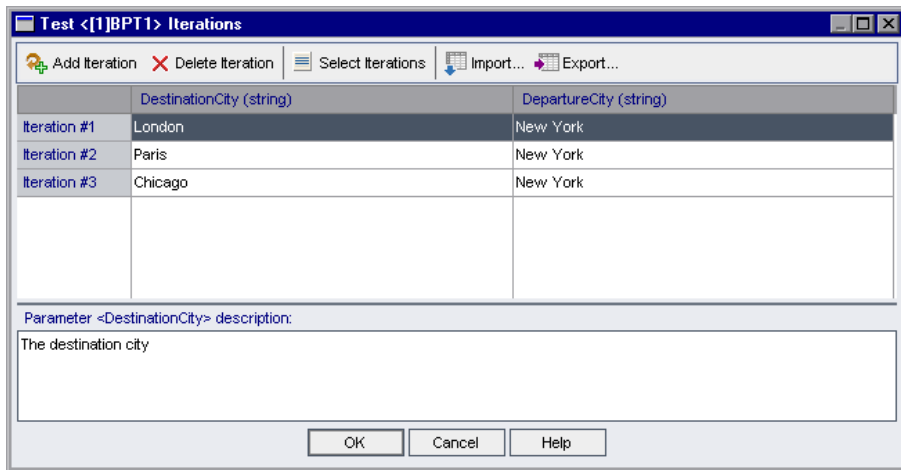
4 Select the value cell of the run-time parameter you want to configure, and enter the run-time parameter value to use in the business process test or flow. The value that is entered in a cell must correspond to the value type defined for the parameter. The value type is displayed in parentheses in the column header for each parameter.

Tip: Select a cell in a parameter column to view the parameter description in the **Parameter description** area. Run-time parameter descriptions are initially entered in the Run-Time Parameters dialog box in the Test Plan module. For more information, see "Working with the Run-Time Parameters Dialog Box" on page 381.

5 If you want to run more than one iteration of the test or flow, click the **Add Iteration** button in the toolbar. An additional iteration row is added to the dialog box. The previous run-time parameter value row is automatically duplicated.

6 Modify the run-time parameter value for the test or flow iteration.

Tips:

➤ You can drag and drop iterations in the list to change the order in which they are used in the test or flow.

➤ You can delete an iteration by selecting it and clicking the **Delete Iteration** button in the toolbar.

➤ You can select more than one iteration in the list using standard Windows selection techniques (using the CTRL and SHIFT keys).

7 Repeat steps 4 to 6 to add additional test or flow iterations.

8 If you want the test to run only one iteration or a specific range of iterations, click the **Select Iterations button** and then select the relevant iterations in the Select Iterations dialog box.

For more information on specifying which iterations to run, see "Selecting a Partial Iteration Range for a Test or Flow" on page 386.

9 Click **OK** to save the run-time parameters values and close the Test Iterations dialog box.

Selecting a Partial Iteration Range for a Test or Flow

You can specify a single iteration or a partial range of iterations to run for 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 for the test or flow. 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.

You define the iterations to run in the Select Iterations dialog box.

To select an iteration range for a test or flow:

1 In the Test Iterations or Flow Iterations dialog box, click the **Select Iterations** button. The Select Iterations dialog box opens.
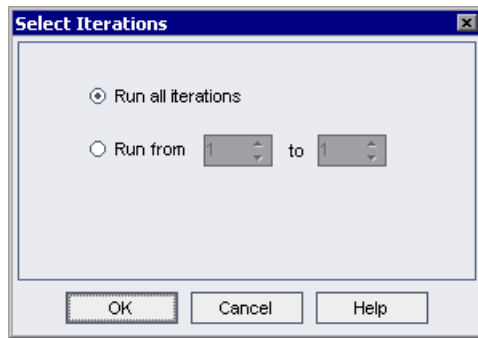
2 Select the second radio button. The **from** and **to** spin boxes are enabled.

3 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 choose the same iteration number in both the **from** and **to** spin boxes.

---

4 Click **OK**. The iterations that are not selected for inclusion in the run are grayed in the Test Iterations or Flow Iterations dialog box. When the business process test or flow runs, only the defined iteration range is included.

Note: The selected range of iterations is displayed in the top left cell of the Test Iterations or Flow Iterations dialog box, and the iterations that are not included in the range are grayed in the iteration list. The values of these iterations can still be modified or deleted if required.

Using Keyboard Commands in the Test Iterations or Flow Iterations Dialog Box

If you prefer to use your keyboard, you can use the following keyboard commands to navigate within the Test Iterations or Flow Iterations dialog box:

➤ Press F2 to enter Edit mode.

➤ Use the up and down arrow keys to move the focus one iteration up or down.

➤ You can press TAB to move the focus one cell to the right, or to the first cell in the next row.

➤ Use the left and right arrow keys to move the focus one cell to the left or right, with the following exceptions:

  ➤ In the last cell in a row, the right arrow key moves the focus to the first cell in the next row.

  ➤ In the first cell in a row, the left arrow key moves the focus to the last cell in the row above (if any).

  ➤ When a cell is in Edit mode, the left and right arrow keys move within the edited cell.

➤ You can select the last row and press ALT+A to add another iteration row.

Guidelines for Choosing Component or Flow Parameter Values and Run-Time Parameter Values

For each of the parameters defined in the components and flows in your business process test, you need to decide whether the value is determined within the test (either as a fixed value or as a value returned by a previous component or flow), or whether it is specified by the tester at the time of the test run. Run-time parameters enable you to input data into a test that affects how the business components and flows that use the run-time parameters are run.

To make this decision, consider the following:

Component or Flow Input Parameters...	Run-Time Parameters...
➤ Allow multiple iterations of a business component or flow. ➤ Enable the Subject Matter Expert to control the values used.	➤ Allow multiple iterations of an entire business process test or flow, with different values in each iteration. ➤ Enable the person running the business process test to determine the values of the component and flow parameters at runtime. ➤ Use the same value for a particular purpose in all business components and flows that reference the same run-time parameter.

Understanding Date Parameters

A date parameter can be defined as a static value from a calendar, or a dynamic value. A dynamic date value consists of a date string, which represents a time relative to the current date. The date string can be customized by the addition or subtraction of a time period. Business Process Testing Enterprise Extension supports the use of dynamic date values for flow and run-time parameters. It is not supported at the component level.

This section includes:

➤ "The Set Calendar Value Dialog Box" on page 390

➤ "Defining Date Parameters Manually" on page 396

The Set Calendar Value Dialog Box

Description	Enables you to enter a static or dynamic date value for a date parameter or to create a flow or run-time parameter as the value for a date parameter.
How to Access	Click the cell containing the date parameter in one of the following dialog boxes, and then click the button on the right side of the cell: ➤ Component Iterations dialog box ➤ Flow Iterations dialog box ➤ Flow Input Parameters dialog box ➤ Test Iterations dialog box
Important Information	➤ The Set Calendar Value dialog box can be used to assign a fixed value to the parameter or to create a flow or run-time parameter, by selecting one of the radio buttons on the top of the dialog box. The structure of the dialog box changes depending on which radio button is selected. Additionally, the radio buttons may not be available, depending on the location from which you opened the dialog box. For more information, see "The Set Calendar Value Dialog Box (Set Value Variation)" on page 391, and "The Set Calendar Value Dialog Box (Promote Parameter Variation)" on page 395. ➤ If a date parameter appears as a **String** value type, you need to manually define the date as a **Date** type. For more information, see "Defining Date Parameters Manually" on page 396.
Learn More	**Conceptual overview**: "Understanding Date Parameters" on page 389. **Primary tasks**: ➤ "Defining Flow Input Parameters Manually" on page 355. ➤ "Defining Default Flow Input Parameter Values" on page 358.

The Set Calendar Value Dialog Box (Set Value Variation)

The image below displays the dialog box as it appears when setting the value for the parameter, with the **Custom Date** area expanded. To expand or collapse the **Custom Date** area, click the **Custom Date** link.
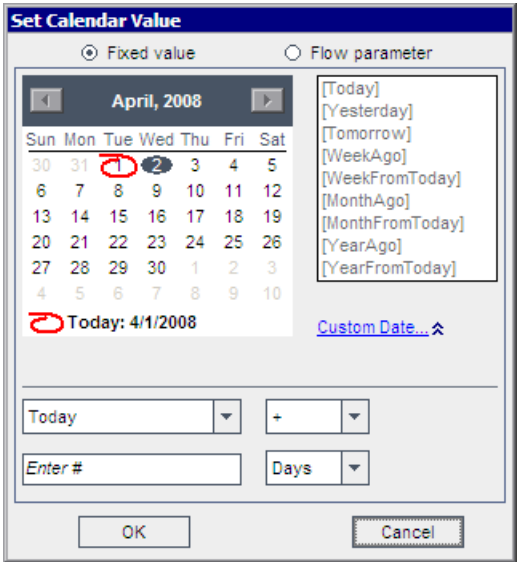
The radio button options and button labels shown above may be different or not available, depending on the location from which you opened the dialog box.

Set Calendar Value Dialog Box Options (Set Value Variation)

The options below are relevant when the top of the dialog box does not contain radio buttons or when the **Fixed value** radio button is selected.

Option	Description
calendar area	Enables you to select a static date in the calendar. Click the right or left arrow to scroll through the calendar. Click a date to select it.
date string area	Enables you to provide a time relative to the current date (such as **Today** or **WeekAgo**) as the fixed value for the parameter.
Custom Date area (to expand or collapse, click **Custom Date**)	Enables you to provide a customized date string as the fixed value for the parameter. **1** Select a date string from the drop-down list. **2** Select + or - from the drop-down list. **3** Enter the number in the edit box by which you want to adjust the date string. **4** Select a time period from the drop-down list that you want to use to customize the date string. For example, to specify a date 10 days before the current date, the custom date should be: **WeekAgo-3 days**

You can also set the value for a dynamic date parameter directly in the relevant Parameter or Iterations dialog box. Dynamic date parameters must be enclosed by square brackets. You can provide a date string as the dynamic date value of the date parameter, or you can customize the date string.

The following are the valid date strings you can enter manually for a date value parameter:

[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 for Working with Dynamic Date Values

➤ 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.

➤ When you run a test or flow, either automatically or manually, the dynamic dates are converted to the actual dates they represent.

➤ When a test or flow run ends, the run-time parameters displayed in **Last Run Result** show the actual date used in the run and not the dynamic date value.

➤ You can create a run condition on a date parameter that is defined as a dynamic date. The run condition must be defined as a static date (for example 12/10/2009), which will be compared to the actual date used in the run.

➤ When the Learn Flow process generates parameters automatically, it does not create dynamic date values. These parameters are created as strings. You must manually change them to the Date value type in the Business Components module. For more information, see "Defining Date Parameters Manually" on page 396.

➤ If you copy a flow that contains a dynamic date parameter value to a project that does not support Business Process Testing Enterprise Extension, the value of the parameter will be converted to a fixed value with the current date.

➤ Dynamic date values use the date as it is set on the server machine and not the client machine.

The Set Calendar Value Dialog Box (Promote Parameter Variation)

The image below displays the dialog box as it appears when promoting the parameter to a higher level.
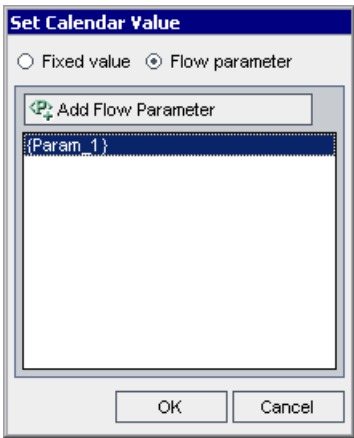
The button options shown above may be different depending on the location from which you opened the dialog box.

Set Calendar Value Dialog Box Options (Promote Parameter Variation)

Option	Description
Add Parameter button	Enables you to create a new parameter in order to promote the definition of the date parameter value to the next level.
	1 Click the button. The New Parameter dialog box opens.
	2 Enter a name for the new parameter and click **OK**.
Existing parameters area	Displays a list of all existing date parameters.

Defining Date Parameters Manually

When Business Process Testing Enterprise Extension learns a screen with a date field, it creates a string value type parameter for that field. To create a date parameter, you need to manually define the parameter as a date value type.

To manually define a parameter as a date value type:

1 In the **Business Components** module, click the component containing the string value type parameter that you want to define as a date type parameter.

2 Click the **Parameters** tab. Click in the **Value Type** cell for the parameter whose value you want to change and select **Date** from the drop-down list.

3 In the **Test Plan** module, select the flow containing the modified parameter and click the **Refresh** button. The Test Script tab displays the parameter in red with a **Type mismatch** message. (This is because the defined component parameter value type no longer matches the value type defined for the flow parameter.)

4 Click the parameter. The Component Iterations dialog box opens.

5 Click the cell containing the modified parameter and click the browse button. The Set Calendar Value dialog box opens.

6 Click the **Add Flow Parameter** button. Enter a name for the new flow parameter and click **OK**.

7 Click **OK** in the Set Calendar Value dialog box.

8 Click **OK** in the Component Iterations dialog box. The parameter is defined as a date value type parameter and the **Type mismatch** message is no longer displayed.

Understanding Table Parameters

A **table parameter** is a component input parameter that enables you to use a single parameter to set multiple table cells for a table in your enterprise application instead of using separate parameters for each table cell.

When you enter data to a table in your application while learning a flow automatically, Business Process Testing Enterprise Extension creates a table parameter. A table parameter can be created only when learning flows automatically.

You can export the table parameter definition to a **.csv** (comma separated values) file or import data from an existing **.csv** file.

Considerations for Working with Table Parameters

➤ To create table parameters during the Learn Flow process, you must enable QuickTest to create table parameters. For details on enabling QuickTest to create table parameters in your supported business applications environments, see Appendix A, "Environment-specific Information."

➤ Empty columns are ignored when comparing table parameters. For example, suppose table parameter Alpha has columns A, B, and C, with content in all three columns, and table parameter Beta has columns A, B, C, and D but column C is empty. If the content of the three columns with content in table parameter Beta (A, B, and D) matches that of the three columns in table parameter Alpha, the two table parameters are seen as equal.

➤ When you import data to a table parameter, ensure that each column has a unique name.

The Set Table Value Dialog Box

The table parameter definition includes the table structure and default values.
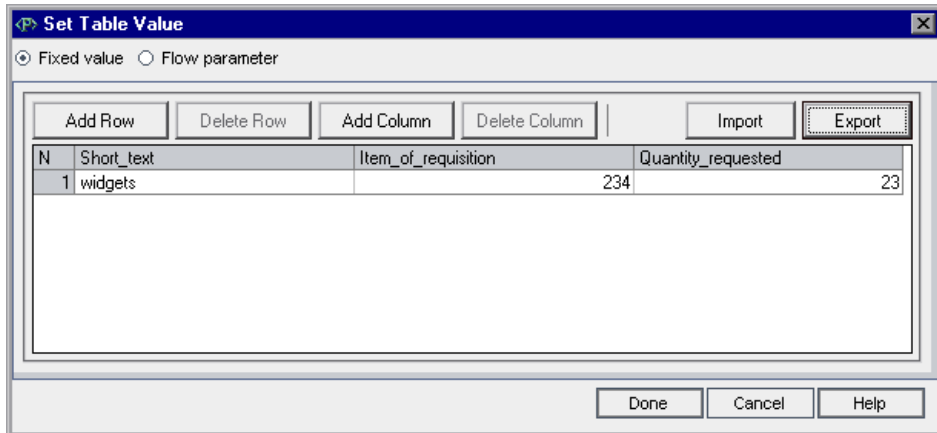
You can access the Set Table Value dialog box:

➤ **On the component level.** When setting default values of parameters, a Table Parameter is displayed as **[Table Data]**. Click this link to open the Set Table Value dialog box.

➤ **On the flow level.** When setting parameter values for component iterations, a Table Parameter is displayed as **[Table Data].** Click this link to open the Set Table Value dialog box.

➤ **On the test level.** When setting parameter values for flow iterations, a Table Parameter is displayed as **[Table Data].** Click this link to open the Set Table Value dialog box.

➤ **On the test set level.** When setting parameter values for test iterations, a Table Parameter is displayed as **[Table Data].** Click this link to open the Set Table Value dialog box.

➤ **In the Run Condition dialog box.** When specifying criteria for run conditions, a Table Parameter is displayed as **[Table Data]** in the **Value** edit box. Click this link to open the Set Table Value dialog box.

The Set Table Value dialog box contains the following options:

Option	Description
Fixed value	Available only when accessing the Set Table Value dialog box via a flow in the **Test Plan** module. Enables you to enter fixed values in the individual cells of the table parameter.
Flow parameter	Available only when accessing the Set Table Value dialog box via a flow in the **Test Plan** module. Enables you to define the table parameter as a flow parameter.
Run-time parameter	Available only when accessing the Set Table Value dialog box via a business process test in the **Test Plan** module. Enables you to define the table parameter as a run-time parameter.
Add Row	Adds a row to the table parameter grid. The row is added below the row in which the cursor is currently located. If the cursor is not in any row, the row is added at the end.
Delete Row	Deletes the selected row from the table parameter grid.
Add Column	Adds a column to the table parameter grid. The column is added to the right of the column in which the cursor is currently located. If the cursor is not in any column, the column is added at the end. Each column must have a unique header name.
Delete Column	Deletes the selected column from the table parameter grid.
Import	Imports a table parameter definition from a **.csv** file. Ensure that the file is in the proper format. Use the export option to generate the **.csv** file and then edit or add data as necessary. This ensures the proper format of the **.csv** file.
Export	Exports the table parameter definition to a **.csv** (comma separated values) file.

Option	Description
column headers	Enables renaming of columns. Click on the header to rename the column. Column names must match the column names in the supported business application environment application. Column headers cannot be blank or a duplicate of an existing column name. You can also use the index of a column with the # sign to name a column. For example, #3.
table cell	Enables editing of the default value for a table cell. Select the cell and enter the default value.

12

Defining Run Conditions

This chapter describes how to define and work with run conditions for your flows.

This chapter includes:

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 given parameter before running a component in a flow. Based on the parameter value and the run condition definition, it 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.

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 contain at least one input parameter or output parameter, or, alternatively, the flow should contain at least one flow input or flow output parameter.

➤ 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, suppose 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 run-time 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 Test pane in the Test Script tab. For some additional considerations when working with run conditions, see "Guidelines for Working with Run Conditions" on page 402.

To add a run condition:

1 In the Test Script tab for a flow, do one of the following:
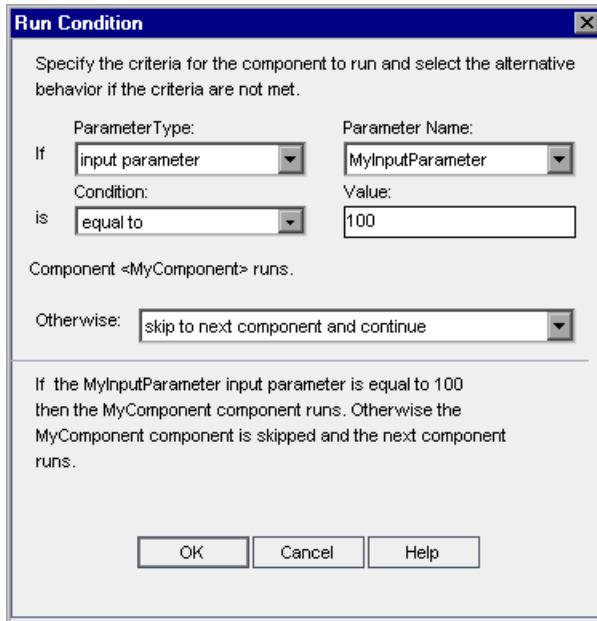
➤ Select the component for which you want to add the run condition and click the **Add Run Condition** button.

➤ Right-click the component for which you want to add the run condition and select **Run condition**.

The Run Condition dialog box opens.

2 Specify the criteria for the component to run. For more information, see "Understanding the Run Conditions Dialog Box" on page 404.

3 Click **OK**. The Run Condition dialog box closes and the run condition is added to the flow.

Understanding the Run Conditions Dialog Box

The Run Conditions dialog box defines the criteria that need to be met for the component to run.

The Run Conditions dialog box contains the following sections:

Section	Description
Parameter Type	A drop-down list of parameter types. 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. For more information on flow input parameters, see "Working with Flow Input Parameters" on page 332.
Parameter Name	A drop-down list of available parameter names.
Condition	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 to** (not available for table parameters) ➤ **Greater than** (not available for table parameters) ➤ **Greater than or equal to** (not available for table parameters)
Value	An edit box in which you enter the valid value for the condition. **Note**: If the parameter selected in the **Parameter Name** box is a table parameter, **[Table Data]** is displayed in the **Value** box. Click this link to open the Set Table Value dialog box and set the cell values required for your condition. For more information, see "Understanding Table Parameters" on page 397.

Section	Description
Otherwise	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 293.
description area	A text description of the run condition criteria 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 **Otherwise** box.

Tip: Your selection in the **Otherwise** 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 293.

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 **Run Condition**. The Run Condition dialog box opens.

2 In the Run Condition dialog box, modify the criteria and alternative behavior as needed. For more information on the available options, see "Understanding the Run Conditions Dialog Box" on page 404.

3 Click **OK**. The run condition is modified.

To remove a run condition:

1 In the Test pane of the Test Script tab, do one of the following:

➤ Select the component and click the **Remove Run Condition** button.

➤ Right-click the component and select **Remove run condition**.

2 Click **Yes** in the confirmation box. The run condition is removed from the flow.

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 13, "Running Business Process Tests and Flows."

As with regular business process tests, you can view test results in the Last Run Result pane 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.

13

Running Business Process Tests and Flows

This chapter describes how to run business process tests and flows in Quality Center and how to view the results.

Note: This chapter describes how to use several Business Process Testing features. HP Business Process Testing Enterprise Extension provides additional, automated features that enable you to test enterprise applications. Therefore, some procedures described in this chapter may not be part of recommended best practice when using Business Process Testing to test your other applications.

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 Quality Center.

When working with tests that contain one or more manual components, use the Manual Runner. For information on the Manual Runner, see "Running a Business Process Test or Flow Manually" on page 412.

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 432.

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 Quality Center.

After a test has been debugged and is ready to test 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 438.

Both QuickTest and WinRunner automated components can be used in the same test. When you run the test, QuickTest Professional or WinRunner opens each component in the test. For more information, see "Working with Other Testing Products" on page 411.

Note: If required, you can continue using the Manual Runner to run your test manually even after the test has been automated.

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 or WinRunner components on a host computer, you must ensure that the relevant testing tool on the host allows Quality Center to run tests.

QuickTest Professional

To enable Quality Center 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 Quality Center, you must have the necessary Quality Center permissions. For more information, see "Setting Permissions for Business Process Testing Enterprise Extension" on page 49, or see the *HP Quality Center Administrator Guide*.

Note: When you run a QuickTest business process test from Quality Center, 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*.

WinRunner

To enable Quality Center access to a specific WinRunner client, open WinRunner on the host computer, select **Tools** > **General Options**, select **Run**, and ensure that **Allow other HP products to run tests remotely** is selected.

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 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, and WinRunner 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.

Working with the Manual Runner for business process tests or flows is described in the following sections:

➤ "Understanding Manual Runs" on page 412

➤ "Running a Test or Flow Manually" on page 413

➤ "Understanding Run Statuses" on page 418

The Manual Runner for business process tests and flows is somewhat different from the Manual Runner used for Quality Center manual tests. For information on running Quality Center manual tests, see the *Quality Center User Guide*.

Understanding Manual Runs

Quality Center 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 Design 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.

Note: Component steps created in versions prior to Quality Center 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.
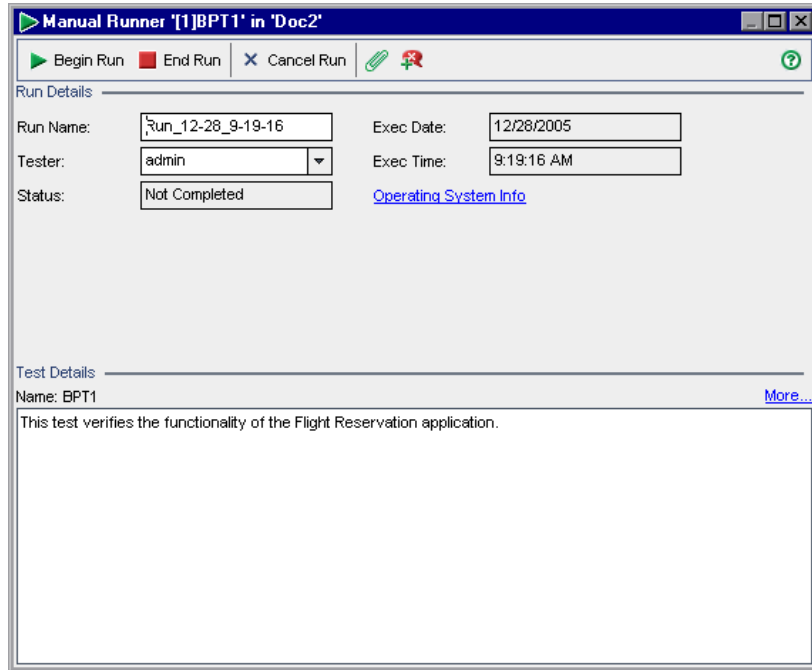
To run a business process test or flow manually:

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.
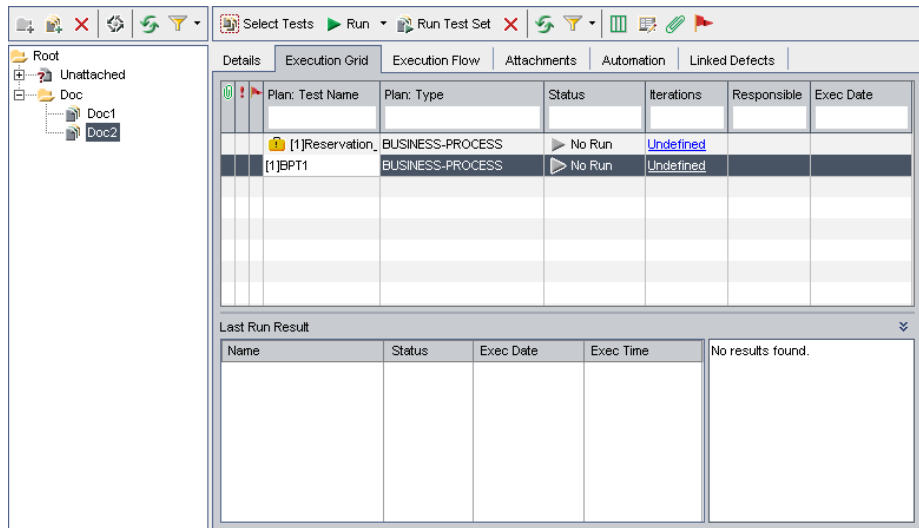
2 If you want to iterate any test in the test set, select the test and right-click. Select **Iterations** from the context menu. The Test Iterations dialog box opens. If you do not want to iterate any test in the test set, proceed to step 5.

3 In the Test Iterations dialog box, configure the number of iterations required for the selected test, and then define the run-time values for each parameter in each iteration. These run-time parameter values are automatically displayed for any components that reference them during the manual running of the test. For more information, see "Configuring Run-Time Parameter Values" on page 383.

4 Repeat steps 2 and 3 for each test in the test set that you want to iterate.

5 Click the arrow ⏷ next to 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 419.

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6 Click the **Begin Run** button to start the run.

The Manual Runner dialog box opens.
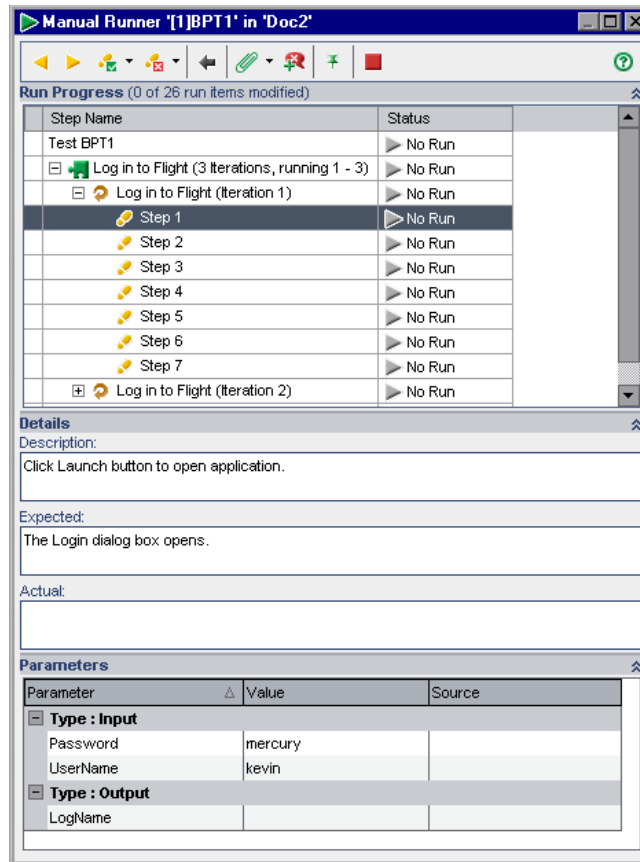
Tip: You can keep the Manual Runner dialog box visible while you work with an application by clicking the **Keep on Top** button. Click the button again if you do not want to keep the Manual Runner dialog box visible while you work. For more information on this dialog box, see "Understanding the Manual Runner Dialog Box" on page 423.

7 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 423.

8 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 427.

9 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 418.

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10 If the step description indicates that you must return a value to an output parameter, enter the resulting value in the **Value** cell of the parameter **Type: Output** list. 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.

11 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. Quality Center automatically creates an association between the run and the new defect. For more information on adding defects, see the *HP Quality Center User Guide*.

12 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 the **Attach to Step** arrow and select **Attach to Run**. For more information on adding attachments, see the *HP Quality Center User Guide*.

13 Repeat steps 7 to 12 for each step in the component.

14 Click the **End Run** button when you complete the run.

15 Open the **Last Run Result** pane 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 443.

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 Quality Center User Guide*.

Add Defect. (CTRL+B) Enables you to add a defect in the Defects module regarding this run. Quality Center automatically creates an association between the run and the new defect. For more information on how to add defects, see the *HP Quality Center User Guide*.

Help. (F1) Opens the Online Help for the Manual Runner window.

For more information, see:

➤ "Working with the Run Details Pane" on page 420
➤ "Working with the Test Details Pane" on page 421

Working with the Run Details Pane
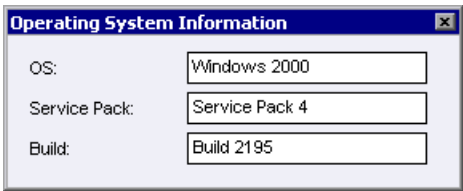
The Run Details pane enables you to edit the following run information:

➤ **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 Quality Center 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. It contains the same information as the Details tab in the Test Plan module. For more information, see "Details Tab" on page 251.

➤ The Attachments tab displays the attachments that are added to the test. It contains the same information as the Attachments tab in the Test Plan module. For more information, see the *HP Quality Center User Guide*.

➤ The Test Run Details tab displays details of the test. It contains the same information as the Details tab in the Test Set Properties dialog box in the Test Lab module. For more information, see the *HP Quality Center 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 a hierarchical tree of the test, and includes, where applicable, the run status, parameters, description, and expected result of each step.
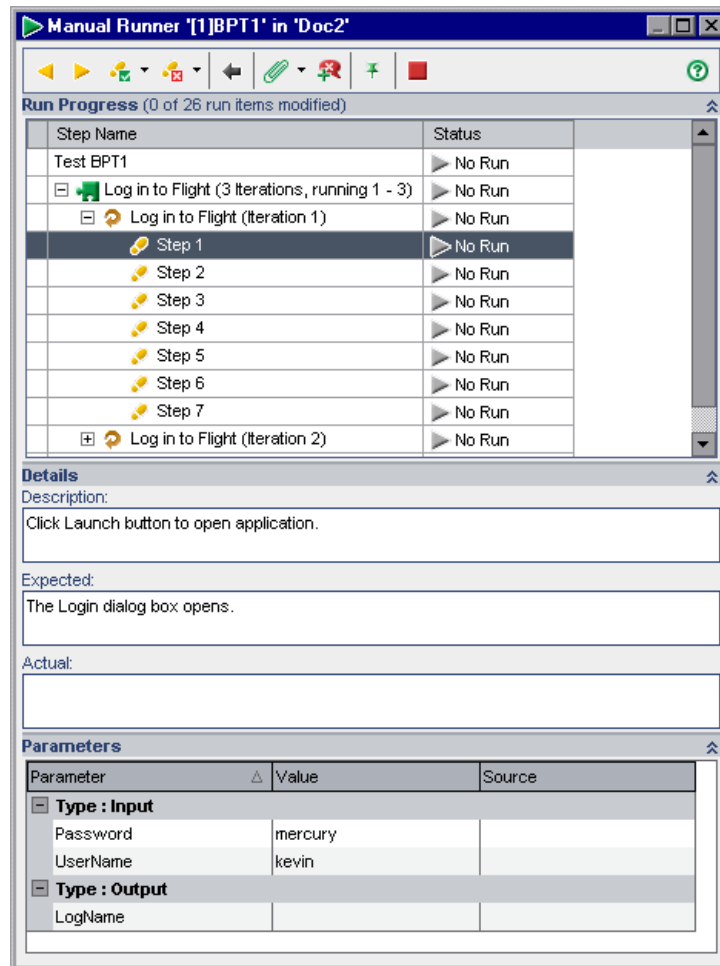
The name of the test you are running and the test set are shown in the title bar of the Manual Runner dialog box.

The Run Progress, Details, and Parameters panes can be hidden or displayed. If a required pane is not visible in the Manual Runner dialog box, click the **Show** button ⌄ to the right of the pane name. Click the **Hide** button ⌃ to hide the pane if required.

Toolbar

The Manual Runner dialog box contains the following toolbar buttons:

Previous Step. (CTRL+UP) Jumps to the previous step.

Next Step. (CTRL+DOWN) Jumps to the next step.

Pass Selected. (CTRL+P) 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. (CTRL+F) 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. (ALT+LEFT) 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 Quality Center User Guide*.

Add Defect. (CTRL+B) Enables you to add a defect for the step in the Defects module. For more information on how to add defects, see the *HP Quality Center User Guide*.

Keep On Top. (F12) Enables you to keep the Manual Runner dialog box visible while you work with the application you are testing.

End Run. (CTRL+Q) Ends the current run.

Help. (F1) Opens the Online Help for the Manual Runner dialog box.

For more information, see:

➤ "Working with the Run Progress Pane" on page 425

➤ "Working with the Details Pane" on page 426

➤ "Working with the Parameters Pane" on page 427

➤ "Understanding the Run Progress Pane Hierarchy" on page 429

➤ "Understanding Run Statuses" on page 418

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.

➤ To expand a test, group, component or iteration, click the expand symbol ⊞ to the left of the item name, press the plus key (+) on the keyboard number pad, or double-click the component.

➤ To collapse a test, group, component or iteration, click the collapse symbol ⊟ to the left of the item name, press the minus key (-) on the keyboard number pad, or double-click the component.

For more information on the tree hierarchy in the Run Progress pane, see "Understanding the Run Progress Pane Hierarchy" on page 429.

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 418.

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 Design 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 brackets:

➤ **Input parameters.** Input parameters are enclosed in one set of brackets. If a value has been assigned to the parameter, the value is enclosed in the brackets, for example, <mercury>, for the AgentName parameter. If no value has been assigned to the parameter, an empty set of brackets is shown, for example, <>.

➤ **Output parameters.** Output parameter names are enclosed in three sets of 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:

➤ **Run-time parameters.** You can define run-time parameters for each component in each iteration using the Test Iterations dialog box before running the test. For more information, see "Configuring Run-Time Parameter Values" on page 383.

Run-time 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 run-time 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 run-time parameter or output parameter during the test. For more information, see "Defining Component Parameters" on page 333.

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 Component Parameters" on page 333.

You enter 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:
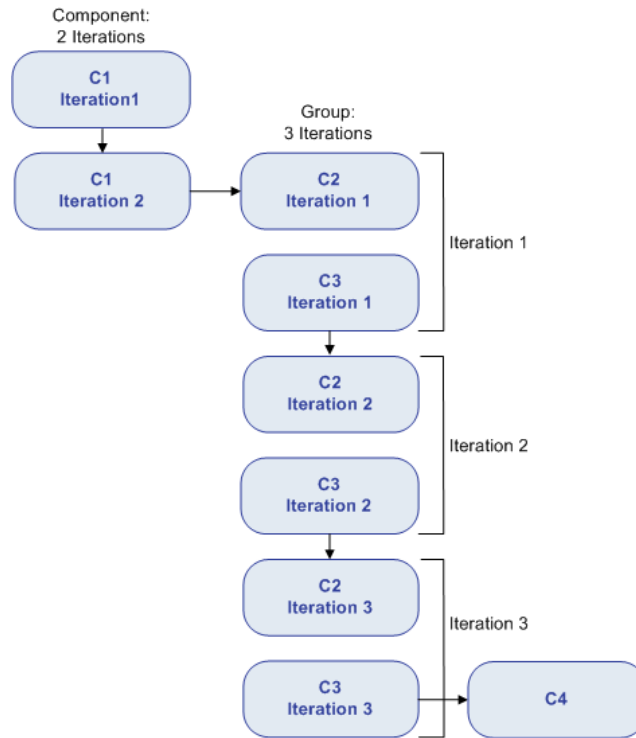
In addition, the entire test is iterated twice.

The test is displayed in the Manual Runner as follows:
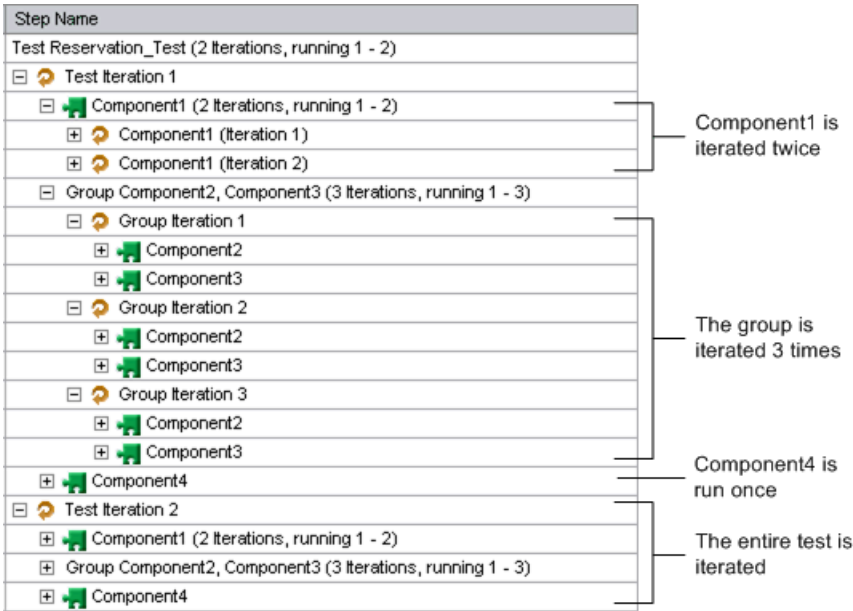
Note: For clarity, the components in the tree have not been expanded to display their individual steps.

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 WinRunner, and all the components have a **Ready** status.

Tip: You can also access QuickTest or WinRunner 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*. For more information on running and debugging components in WinRunner, see the *HP WinRunner User's 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 or WinRunner 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 Quality Center 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.
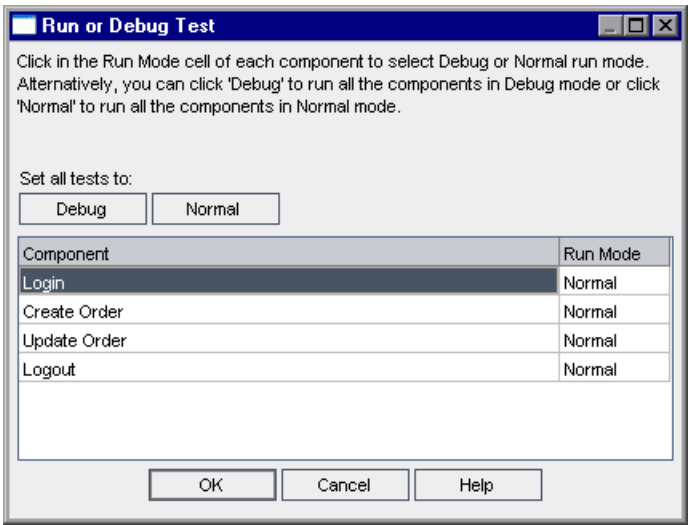
➤ **Debug** mode adds a breakpoint that causes the test to pause before running the first step in the specified business component. The position of the breakpoint in the test is indicated by a red spot in the left margin of the Keyword View or Expert View in QuickTest or of the test window in WinRunner. This enables you to use all the debug options of QuickTest or WinRunner to check the performance of one or more specific steps in the component. You can then continue the run.

For more information on QuickTest or WinRunner debugging options, see the *HP QuickTest Professional for Business Process Testing User Guide* or the *HP WinRunner User's 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, Quality Center opens QuickTest or WinRunner directly from the Test Plan module. The requested test is then run on your local computer, and the results are exported back to Quality Center 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 412.

To run a test or flow using Debug mode:

1 Click the **Test Plan** module button in the sidebar 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 run-time parameters, as described in Chapter 11, "Working with Parameters."

5 In the Test 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.
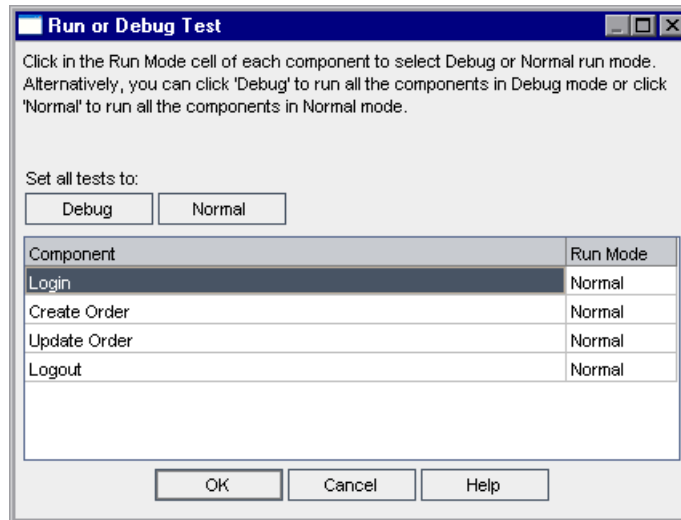
6 For each component, click in the **Run Mode** column and select **Debug** or **Normal** from the list.

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.

---

7 Click **OK** to close the Run or Debug Test dialog box. QuickTest or WinRunner 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 or WinRunner must load the Web Add-in (or the WebTest Add-in for WinRunner) before a step in the test opens the browser.

If the test contains both QuickTest and WinRunner components, then the test should include both a QuickTest and a WinRunner component at the beginning of the test before the browser opens.

For example, you can add an empty WinRunner component (based on a template that loads the WebTest Add-in) with a comment stating that the component's purpose is just to load the add-in. You can then add a QuickTest component that loads the Web Add-in. The second component can contain steps that open a Web browser.

From your task bar, you can toggle between the Test Plan module, QuickTest or WinRunner, and the application you are testing.

➤ With the first keyword-driven or scripted component in the test, Quality Center 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.

The same is true regarding the first WinRunner component that appears in a test, when Quality Center opens WinRunner and loads the add-ins associated with that component. Quality Center assumes that these are the required add-ins for all the WinRunner 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 or WinRunner, 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 or WinRunner, 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* or the *HP WinRunner User's Guide*.

8 If you selected a business component to run in **Debug** mode, the test pauses after opening the component in QuickTest or WinRunner. Use the QuickTest or WinRunner 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 or WinRunner.

When one component finishes running, it closes and the next component in the test opens in QuickTest or WinRunner.

When the debug run is complete, Quality Center imports the results from QuickTest and/or WinRunner and displays summary information in the Debug Run Information dialog box in the Test Plan module.
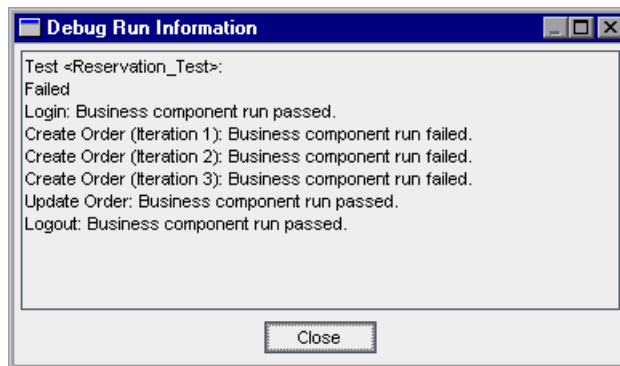
This report details the results of the debug run for each business component in the test and includes all relevant QuickTest or WinRunner messages.

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 run-time 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.
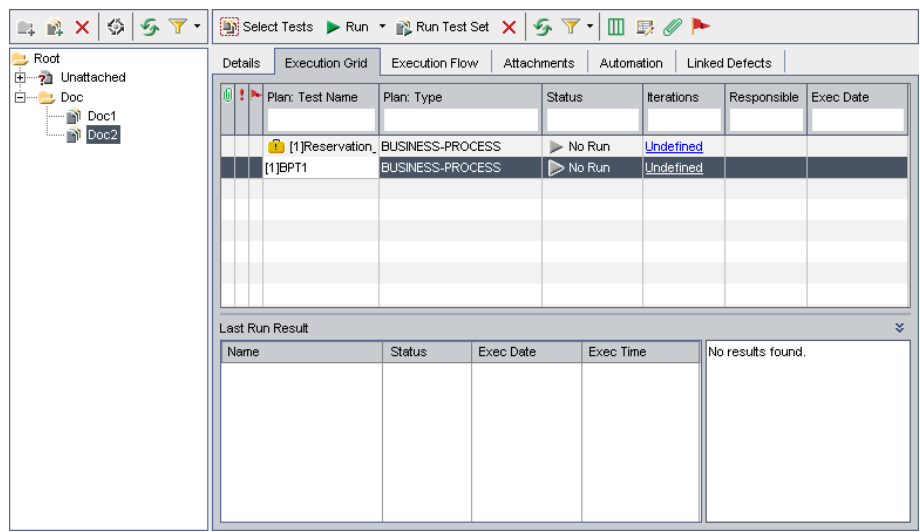
2 Confirm that run-time parameter values have been configured for all tests you want to run. For more information, see "Working with the Run-Time Parameters Dialog Box" on page 381.

3 To run a specific test, or run all the tests in a test set, 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.

The Automatic Runner dialog box opens.
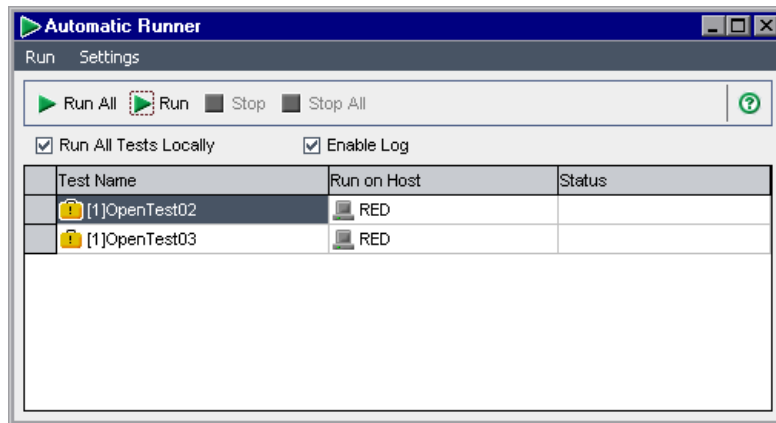
The Automatic Runner dialog box lists the specific tests selected in the Execution Grid, or all the tests in the test set if you clicked the **Run Test Set** button.

4 Select the **Run All Tests Locally** check box if you want to run the selected test or test set using QuickTest or WinRunner 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, and select a host from the list.

Note: If you select **Run All Tests Locally**, you must have QuickTest Professional version 10.00, or WinRunner version 9.0, installed on your computer.

For information on choosing a different host computer, see the *Quality Center User Guide.*

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5 Select the **Enable Log** check box to enable QuickTest or WinRunner to record an execution log of the run. For more information on the execution log, see "Viewing the Execution Log" on page 446.

6 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, QuickTest or WinRunner, 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, or WinRunner, 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 or WinRunner 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.
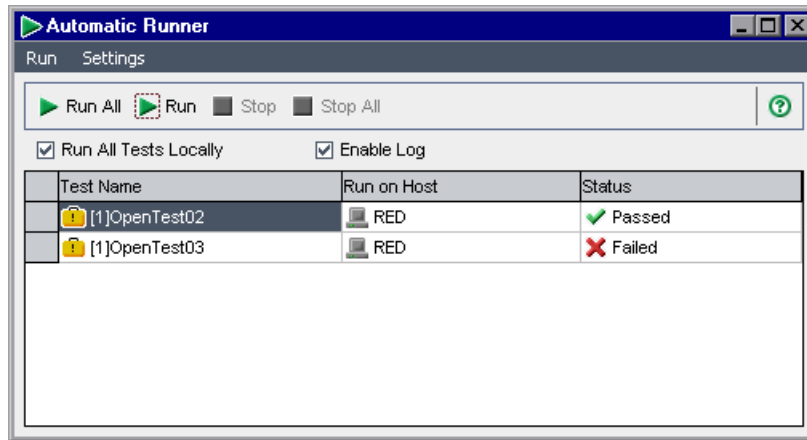
7 Close the Automatic Runner dialog box to return to the Test Lab window.

Tip: You can view an execution log of the test or test set run. For more information, see "Viewing the Execution Log" on page 446.

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 Result pane. 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 or WinRunner. For more information, see "Viewing Test Results in the Test Lab Module" on page 443.

➤ For automated tests, you can view a complete QuickTest or WinRunner 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 444.

➤ 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 446.

Note: Results are stored in Quality Center only when the business component runs from the Test Lab module as part of a test. They are not stored in Quality Center when you run the test in Debug mode from the Test Plan module, or when running components directly from QuickTest or WinRunner.

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 Result pane 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 Quality Center are not displayed in the Last Run Result pane.

To view the results of the last test run:

1 Ensure that the Last Run Result pane is displayed at the bottom of the Execution Grid tab.

If the Last Run Result pane 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. You can also click the **Last Run Result** title to show or hide the pane.

When the Last Run Result pane is first accessed, the tree displays only the business components in the test.

➤ To expand a component to view the run result of iterations and steps in that component, click the expand symbol ⊞ to the left of the component name, press the plus key (+) on the keyboard number pad, or double-click the component.

➤ To collapse a component, click the collapse symbol ⊟ to the left of the component name, press the minus key (-) on the keyboard number pad, or double-click the component.

2 Select steps in the pane to view a description of the events in the test or the reason for a failed event.

Viewing Reports for Automated Business Process Tests

If you have QuickTest Professional, WinRunner, or the QuickTest Professional Add-in for Quality Center 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 Result** pane at the bottom of the Execution Grid tab, as described in "Viewing Test Results in the Test Lab Module" on page 443.

2 Click the link to the report about each iteration in the **Status** column of the pane.

The Test Results window opens.
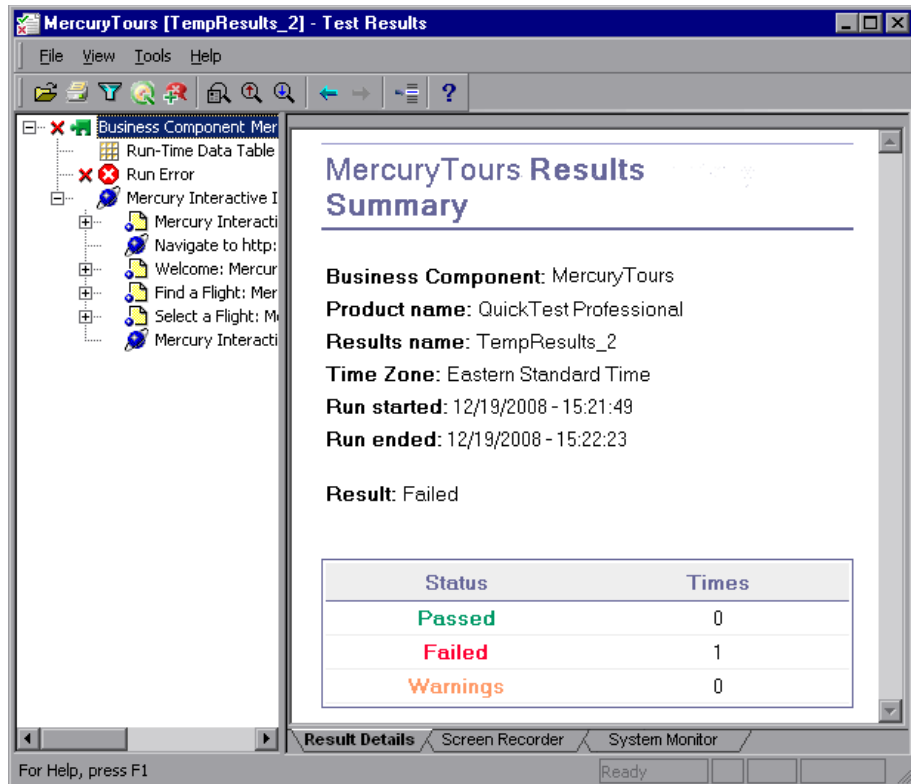
The Test Results window displays a graphical representation of the result of each step or event in the selected iteration of the test.

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 Test Results window, see the *HP QuickTest Professional for Business Process Testing User Guide* or the *HP WinRunner User's 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 432.

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.
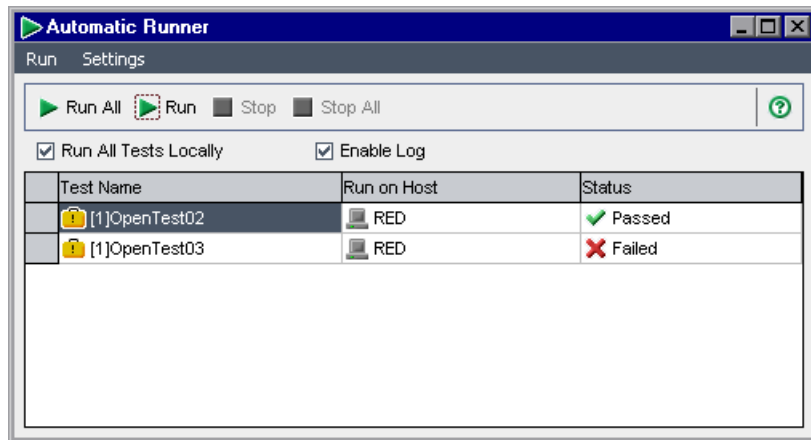
2 Double-click a test name in the Automatic Runner dialog box, or select a test and select **View Execution Log** from the **Run** menu.

The Execution Log window opens and displays the results of the test or test set run.
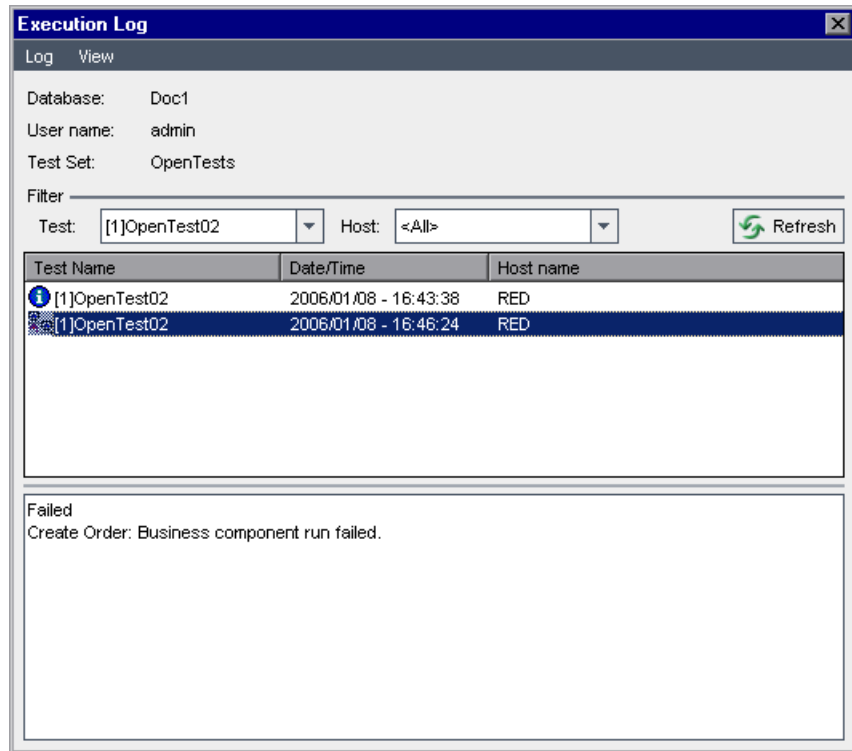
3 If required, you can filter the list to display fewer entries by:

➤ 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.

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Detecting and Resolving Changes

This chapter describes how to use Business Process Testing Enterprise Extension to automatically detect changes in your enterprise application, and update the relevant business process tests accordingly.

This chapter includes:

➤ About Detecting and Resolving Changes on page 449

➤ Detecting Changes on page 451

➤ Change Detection Results on page 457

➤ Resolving Changes on page 465

➤ Changes and Resolutions on page 468

About Detecting and Resolving Changes

You can run business process tests and flows in **Change Detection** mode. When a test or flow is run in Change Detection mode, Business Process Testing Enterprise Extension checks for changes made in the application since the test or flow was last updated. When the test or flow run is finished, you can view the details of these changes in the Change Detection Report. This provides an indication of the modifications you should make to your test or flow to make sure that it is up-to-date.

For each change that is detected in Change Detection mode, Business Process Testing Enterprise Extension offers possible resolutions. These enable you to make updates to your test or flow automatically. You can also choose to resolve a change manually, or to open a defect for handling a change. For a list of supported changes and resolutions, see "Changes and Resolutions" on page 468.

For example, suppose you are testing a screen for inputting contact information for new customers. The screen contains the fields Name, Address, and Phone Number. You create a test that verifies that information entered in these fields is correctly added to your customer database. Suppose you now add an E-mail Address field to the screen. If you run your test in regular mode, the test may pass and you may not notice that there is an additional field that should be tested. However, if you run the test in Change Detection mode, Business Process Testing Enterprise Extension notices that the field was added to the screen and suggests adding a step to the component corresponding to the new field. You can then run an updated version of the test that includes verification of the additional field.

Similarly, if a field was removed from the screen, Business Process Testing Enterprise Extension notices that the field was removed, even if no step in the component corresponds to the field. The Change Detection Report suggests updating the component to the changed screen.

Considerations When Detecting Changes

➤ To detect changes in **Change Detection** mode, a user must belong to a user group that has permissions for the **Run** task, and permissions to modify tests and business components. For more information on configuring user group permission settings, see "Setting Permissions for Business Process Testing Enterprise Extension" on page 49, and the *HP Quality Center Administrator Guide*.

➤ Tests and flows that are run in Change Detection mode run only the first iteration of the selected range of iterations of any component, flow, or test, even if multiple iterations are defined.

➤ Only business components created using the Learn Flow process can run in Change Detection mode. You can choose whether other components run in regular mode, or are skipped during the run. For more information about the Learn Flow process, see Chapter 7, "Learning Flows."

➤ When changes to a component are detected while running a test or flow in **Change Detection** mode, Business Process Testing also checks if there are components similar to those containing the changes in other tests or flows in the project. Components are considered similar if they at least represent the same learned screen. If Business Process Testing finds similar components, it sends alerts to the tests and flows that are using the components. After the Test Plan tree is refreshed, the tests and flows to which alerts were sent are indicated by a red exclamation mark ❗ to the left of the test or flow name. Clicking the red exclamation mark opens the alert, which recommends that change detection be run to detect possible changes. The alert is removed after the test or flow is run in Change Detection mode.

Detecting Changes

You can detect changes to an individual flow, test, or test set.

This section includes the following:

Detecting Changes for a Flow

You can detect changes for an individual flow from within the Test Plan and the Test Lab modules.

To detect changes to a flow from the Test Plan module:

1 In the Test Plan module, right-click the flow for which you want to detect changes and select **Detect Changes**. The Select Test Set dialog box opens.
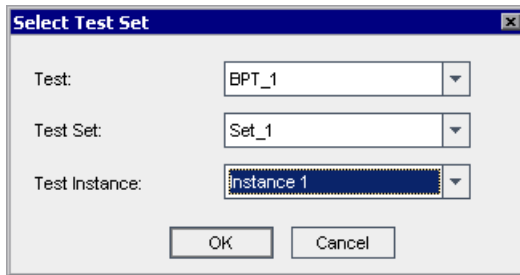
Notes:

➤ The **Test** list is displayed only if the flow is included in more than one test set in the Test Lab module.

➤ If the flow is included only once in one test set and it is included directly (not from within a test), the Select Test Set dialog box does not open.

➤ If the flow is not included in any test set, when you select **Detect Changes** it is automatically added directly to the **default** test set in the **Unattached** folder. The Select Test Set dialog box does not open and the Automatic Runner dialog box opens instead.

2 Select from the **Test**, **Test Set**, and **Test Instance** lists to define which instance of the flow you want to run. For more information, see "Understanding the Select Test Set Dialog Box" on page 464.

3 Click **OK**. The Automatic Runner dialog box opens.
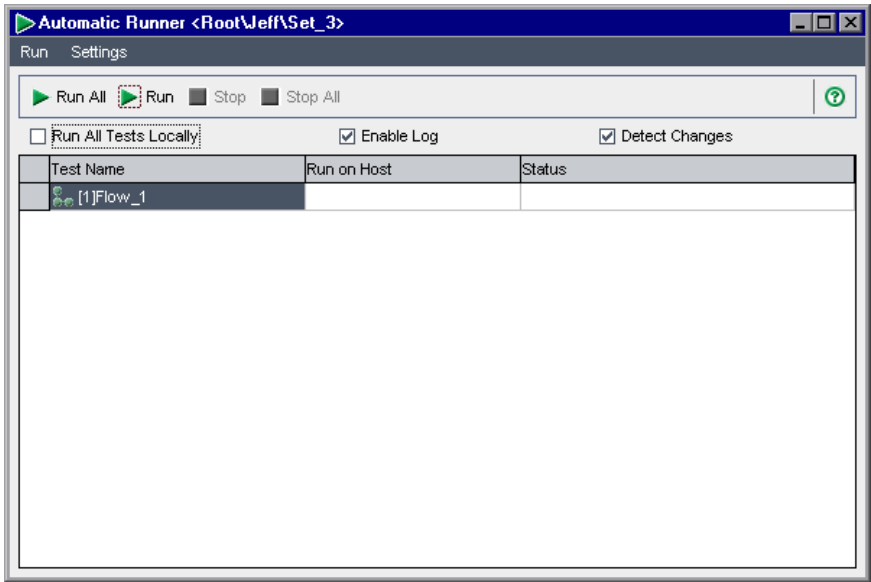
4 Ensure that the **Detect Changes** check box is selected.

➤ Select the flow you want to run and then click **Run**. Components in the flow that were not created using the Learn Flow process cannot be run in Change Detection mode. You can choose whether these components are run in regular mode, or are skipped during the run.

For more information about the Learn Flow process, see Chapter 7, "Learning Flows." For more information on the Automatic Runner dialog box and running tests automatically, see the *HP Quality Center User Guide*.

To detect changes for a flow from the Test Lab module:

1 In the Test Lab module select the test set that includes the flow for which you want to detect changes. Click the **Run** button. The Automatic Runner dialog box opens.

2 Select the **Detect Changes** check box and then click **Run**. Components in the flow that were not created using the Learn Flow process cannot be run in Change Detection mode. You can choose whether these components are run in regular mode, or are skipped during the run. For more information on the Automatic Runner dialog box and running tests automatically, see the *HP Quality Center User Guide*

Detecting Changes for a Business Process Test

You can detect changes for a business process test from the Test Plan and Test Lab modules.

To detect changes for a business process test from the Test Plan module:

1 In the Test Plan module, right-click the business process test for which you want to detect changes and select **Detect Changes**. The Select Test Set dialog box opens.
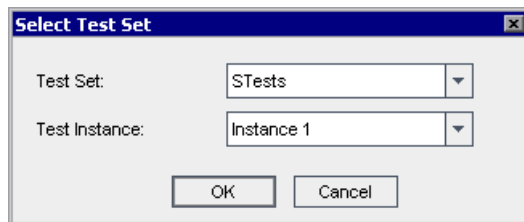
Note: If there is only one instance of the business process test, the Select Test Set dialog box does not open.

2 Select from the **Test Set** and **Test Instance** lists to define which instance of the test you want to run. For more information, see "Understanding the Select Test Set Dialog Box" on page 464. Click **OK**. The Automatic Runner dialog box opens.

3 Ensure that the **Detect Changes** check box is selected.

4 Select the business process test you want to run. Click **Run**. For more information on the Automatic Runner dialog box and running tests automatically, see the *HP Quality Center User Guide*.

To detect changes for a business process test from the Test Lab module:

1 In the Test Lab module, select the test set that includes the business process test for which you want to detect changes. Click the **Run** button. The Automatic Runner dialog box opens.

2 Select the business process test you want to run.

3 Select the **Detect Changes** check box. Click **Run**. For more information on the Automatic Runner dialog box and running tests automatically, see the *HP Quality Center User Guide*.

Detecting Changes for a Test Set

You detect changes for a test set in the Test Lab module.

To detect changes for a test set:

1 In the Test Lab module select the test set for which you want to detect changes. Click the **Run Test Set** button. The Automatic Runner dialog box opens.
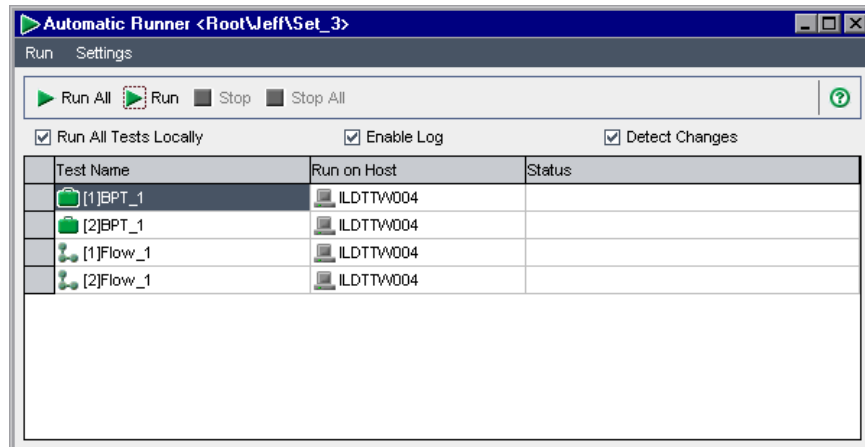
2 Ensure that the **Detect Changes** check box is selected and click **Run All**. For more information on the Automatic Runner dialog box and running tests automatically, see the *HP Quality Center User Guide*.

Change Detection Results

This section describes how to view results of a test or flow run in Change Detection mode. The section includes the following topics:

➤ "Viewing Change Detection Results" on page 457

➤ "Understanding the Change Detection Report" on page 459

➤ "Understanding the Select Test Set Dialog Box" on page 464

Viewing Change Detection Results

You view the results of a test or flow run in Change Detection mode in the Change Detection Report screen. You can open the Change Detection Report screen from the Test Plan module or the Test Lab module.

To open the Change Detection Report screen from the Test Plan module:

1 In the Test Plan Tree, right-click the test or flow and select **Update Changes**. The Select Test Set dialog box opens.
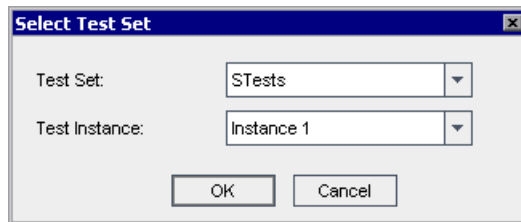
Notes:

➤ If a test or flow was run in Change Detection mode, but no changes were detected, **Update Changes** is disabled. You can view the Change Detection Report screen from the Test Lab module only.

➤ If a test or flow has changes detected for only one test set, the Change Detection Report screen opens directly. If the test or flow appears in more than one test set, but was already resolved and rerun from one test set, the last results open.

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2 Select from the **Test Set** and **Test Instance** lists to define which report you want to open. For more information, see "Understanding the Select Test Set Dialog Box" on page 464. Click **OK**. The Change Detection Report screen opens.

To open the Change Detection Report screen from the Test Lab module:

1 In the Test Sets Tree, select the test set containing the test for which you want to open the Change Detection Report screen.

2 Click the **Execution Grid** tab.

3 In the Execution Grid tab, select the test for which you want to open the Change Detection Report screen.

Tests or flows whose last run was in Change Detection mode are indicated with a **Y** in the **Change Detection** column. Tests and flows that were run in Change Detection mode whose changes are unresolved, are indicated with a delta symbol in the lower right corner of the test icon ![test icon] or flow icon ![flow icon] . A test or flow indicates unresolved changes if it contains any flows or components with unresolved changes.

4 In the Last Run Results pane, in the **Status** column, click the link for the test. The Change Detection Report screen opens.

Tip: You can open the regular Test Results window by right-clicking the link in the **Status** column and selecting **Open Regular Report**.

Understanding the Change Detection Report

You view the results of a test run in Change Detection mode in the Change Detection Report screen. You can also resolve detected changes in this screen.

For an example of an application-specific Change Detection Report screen, see Appendix A, "Environment-specific Information."

The Change Detection Report screen contains the following elements:

Element	Description
Details area	Located at the top of the Change Detection Report screen. Displays basic details about the test. The pane contains the following fields: ➤ **Test Name.** The name of the test. ➤ **Creation Date.** The date on which the test was created. ➤ **Owner.** The user who is the current owner of the test. ➤ **Test Status.** The status of the test run. The following statuses are possible: ➤ **Passed.** The test run passed and no changes were detected. ➤ **Failed.** The test run failed, but no changes were detected. ➤ **Passed with changes.** The test run passed, but changes were detected. ➤ **Failed with changes.** The test run failed and changes were detected. ➤ **Run started.** The date and time on which the test run began. ➤ **Run ended**. The date and time on which the test run ended.
Status area	Located at the top of the Change Detection Report screen, under the Details pane. ➤ **Business Components**. Graphically displays the number of business components in the test, and the breakdown of these components by their status. You can click a component status to show only components with that status in the changes tree. ➤ **Resolved**. Displays the number of components that have been resolved from the total components in the test.

Element	Description

Changes tree	Located at the left of the **Entities** area. Displays a hierarchical representation of your test, flows, business components, and component steps.
	
	You can filter the **Status** or the **Resolved** column by clicking the **Set Filter** button ▼ for the column and selecting the values you want to display. To clear the filters, click the **Clear Filter** button ▼ .
	
	The following columns are displayed.
	
	➤ **Entity Name.** The name of the test, flow, business component, or step. A reuse indicator ⟳ in the component's icon indicates that the component is a reused component. For more information on reused components, see "Understanding Component Reuse" on page 233.
	
	➤ **Status.** The status of the entity. The following statuses are possible:
	  ➤ ✓ The entity passed, and no changes were detected.
	  ➤ ✗ The entity failed, but no changes were detected.
	  ➤ ✓! The entity passed, but changes were detected.
	  ➤ ✗! The entity failed, and changes were detected.
	
	➤ **Resolved.** For an entity in the changes tree with associated changes, displays **Y** if the changes were resolved and **N** if the changes were not resolved. If there are no changes associated with the node, --- is displayed.
	
	If a component was changed outside of the Change Detection Report (for example, in QuickTest), it is displayed as read-only. A message is displayed in the Changes tab that the component was changed by another testing tool after the run of the report.

Entity details	Located at the top right of the **Entities** area. Displays details of the entity selected in the changes tree.

Element	Description
Changes tab	Located at the bottom right of the **Entities** pane.
	Displays a description of any changes detected in selected component, flow, or step, and offers possible resolutions. For more information on resolving changes, see "Resolving Changes" on page 465.
Used by tab (displayed only for flows and components)	Located at the bottom right of the Change Detection Report screen. The Used By tab contains the following sections:
	➤ Used By table
	For a flow, displays the tests in which the flow is used. For a component, displays the tests and flows in which the component is used.
	➤ **Reused Component Options** (displayed only for components that contain a change)
	For reused components, enables modifying the way in which change resolutions are handled. These options apply only to resolutions that affect the component. For example, the **Reused Component Options** are not relevant for the **Open a defect** resolution. The **Reused Component Options** area contains the following options:
	➤ **Apply changes to the original component. All flows and tests sharing this component will reflect the changes.** Resolutions to the component will be reflected in all flows and tests using the component.
	➤ **Apply the changes to a new, local copy of the component and use the new component in this flow.** All other flows and tests using the original component will be unaffected by the resolution. The flow will contain a local copy of the component and will not reuse the existing component. The copy of the component is saved in the default folder for the flow.
	For more information on component reuse, see "Understanding Component Reuse" on page 233.

Element	Description
Screenshot tab	Located at the bottom right of the Change Detection Report screen. Displayed only for components that have changes detected.
	Displays a screenshot of your application for the selected component in the flow before and after the change. For a step, displays the screenshots for the component containing the step.
Save	Closes the Change Detection Report screen and implements the change resolutions that you selected.
Cancel	Closes the Change Detection Report screen without implementing the change resolutions that you selected.

Understanding the Select Test Set Dialog Box

The Select Test Set dialog box enables you to specify a business process test or flow for which you want to detect changes or view the Change Detection report.
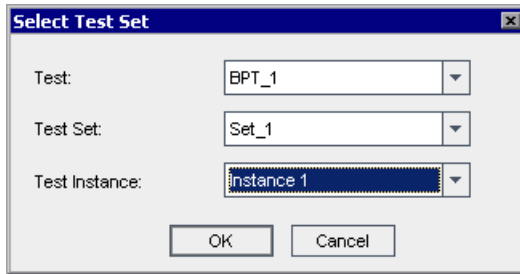
The Select Test Set dialog box contains the following lists:

List	Description
Test	The list of tests containing the flow. Displayed only if the flow is included in more than one test set in the Test Lab module. If the flow is included in a test set directly and not from within a test, **<directly>** is displayed as a choice in the Test list.
Test Set	➤ **For flows.** The list of test sets containing the test selected in the **Test** list. If **<directly>** is selected in the Test list, the Test Set list includes only those test sets that include the flow directly and not from within a test. ➤ **For business process tests.** The list of test sets that include the test you selected.
Test Instance	The list of instances of the business process test or flow in the test set selected in the **Test Set** list.

Considerations for Working with the Select Test Set Dialog Box when Detecting Changes

➤ If a flow is not contained in any test set, it is added directly to the **default** test set in the **Unattached** folder. The Select Test Set Dialog box does not open and the Automatic Runner dialog box opens instead.

➤ If a flow is not contained directly in any test set but only as part of a test, it is automatically added directly to the **default** test set in the **Unattached** folder.

➤ If a flow is included only once in one test set, and it is included directly and not from within a test, the Select Test Set dialog box does not open and the Automatic Runner dialog box opens instead.

Resolving Changes

You can resolve the changes detected by Business Process Testing Enterprise Extension when running business process tests in Change Detection mode. The resolution options depend on the type of change detected, and may include opening a defect, or adding, removing, or modifying business components and flows in the test.

If the component in which a change was detected is a reused component, or the step in which the change was detected is within a reused component, you need to decide where to apply the change resolution. You can choose to apply the resolution to the original component, in which case all tests and flows using that component will be affected. You can alternatively choose to apply the resolution to a copy of the component, and use that copy in your flow instead of the reused component.

It is not necessary to resolve detected changes in every component in the Change Detection Report at one time. You can open a saved report and update it multiple times. In a reopened report, components in which one or more changes were previously resolved are shown as read-only. However, the components in which changes were not resolved are active, and resolution options are displayed for selection.

Tests and flows whose changes were resolved will have the delta symbol removed from their icon in the Test Plan and Test Lab modules. A test or flow will change its status only when all its flows or components have had their changes resolved.

Considerations When Resolving Changes

➤ To resolve changes, a user must belong to a user group that has permissions for the **Modify Test** and the **Modify Component** tasks. For more information on configuring user group permission settings, see "Setting Permissions for Business Process Testing Enterprise Extension" on page 49 and the *HP Quality Center Administrator Guide*.

➤ A component in a version controlled project is checked out when a resolution option for a detected change in the component is executed in the Change Detection Report screen. The component is checked in again when the Change Detection Report screen is saved.

➤ Components in the Change Detection Report can be displayed as read-only for several reasons. For example:

➤ Changes to the component were already resolved.

➤ The component is duplicated in the flow and changes in the duplicate were resolved.

➤ The component is checked out.

➤ The component was removed from the flow.

➤ The component was changed outside of the Change Detection Report (for example, in QuickTest).

➤ A new report was run and the component is not up to date.

To resolve changes:

1 Open the Change Detection Report screen. For more information, see "Change Detection Results" on page 457.

2 Select the element in the changes tree for which you want to resolve changes.

3 In the Changes tab, under **Resolve**, select the change resolution you want to use. The following resolutions are available for all changes:

➤ **Ignore and mark as resolved.** Marks the change as resolved without taking any action to resolve it.

➤ **Open a defect.** Opens the New Defect dialog box, enabling you to open a defect for the change. Note that if you open a defect for a change, you can also select another resolution for the change. For more information on opening defects, see the *HP Quality Center User Guide*.

Note: If the change detected is that there are new objects in the screen or tab, the new objects are inserted in the shared object repository for that screen or tab when you select **Ignore and mark as resolved** or **Open a defect**.

In addition, there may be additional possible resolutions, depending on the type of change. For a list of available change resolutions for each type of change, see "Changes and Resolutions" on page 468.

4 If the change was detected in a reused component, a warning message is displayed in the **Resolve** section of the **Changes** tab, indicating how the resolution will be applied. If the change was not detected in a reused component, skip to step 5.

To change the resolution options for a reused component:

a Select the component from the **Changes** tree.

b Click the **Used By** tab.

c Select a radio button from the **Reused Component Options**. For more information, see "Understanding the Change Detection Report" on page 459.

5 Click the **Execute** button. The change is marked as resolved. Note that for change resolutions other than **Open a defect**, the resolution is not implemented until you click **Save**, as described in step 8.

6 Click the **Next Change** button to select the next node in the changes tree with a detected change that was not yet resolved.

7 Repeat steps 3 to 6 until all changes in the test are resolved. You can view the number of changes resolved and the total number of changes in the **Status** pane.

8 Click the **Save** button. The Change Detection Results screen closes and your tests, flows, business components and object repositories are updated according to the resolutions you selected.

Changes and Resolutions

This section lists the possible changes detected for flows, business components, and component steps. It also lists the resolutions offered by Business Process Testing Enterprise Extension for each change type.

Note: In addition to the options described in this section, the resolutions **Ignore and mark as resolved** and **Open a defect** are always available. For more information on these resolutions, see "Resolving Changes" on page 465.

Changes and Resolutions for Flows

Change	Resolutions Offered
A screen corresponding to a component was removed.	➤ **Remove the business component from the flow.** Removes the component representing the removed screen from the current test or flow only. ➤ **Remove the component from all flows.** Removes the component representing the removed screen from all tests or flows in which it is used.

Changes and Resolutions for Business Components

Change	Resolutions Offered
New controls were added to the screen corresponding to the component.	**Select the steps you want to add.** Adds new steps to the component for the new controls, and the component is updated to reflect the changed screen. Each new control has a suggested step that can be added to your component. Select a check box for each step you want to add to your component. Controls are added before the last step of the component. Steps are added with the default operation for the control.
A control was added, removed, or changed in the screen corresponding to the component. (The control was not included in any step.)	**Update the component to the changed screen.** The component is updated to reflect the changed screen. You can also select the step or steps you want to add to reflect the addition or change.
One or more controls could not be found in the shared object repository.	**Update the component to the changed screen.** The shared object repository is updated.
No controls matching the steps in the component were found. All steps in the component failed.	**Change the status of the business component to Maintenance.** The user can update the component at a later time.
The component did not open because all steps in the previous component failed.	**Set the previous component to Maintenance status.** The user can update the component at a later time.
The screen number was recorded on a previous version of the application.	Relearn the flow to update the screen number and run Change Detection again.

Changes and Resolutions for Steps

Change	Resolutions Offered
The control corresponding to the step was removed from the screen.	**Remove the step from the business component.** Removes the step from the component.
The type of the control corresponding to the step changed.	**Update the step.** Updates the step to reflect the new control type.

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Application Model Entities in Quality Center

The Application Model module enables you to manage a hierarchical representation of the entities in your application.

For supported environments: You can import application entities from your application, and add and modify application entities and folders.

If your Quality Center server has a license for Business Process Testing and Business Process Testing Enterprise Extension, you can associate application entities with flows or with business components, as well as other tests.

This chapter includes:

About Application Model Entities in Quality Center

You use the Application Model module to manage a representation of your SAP application components and entities. For example, if you link your SAP application components and application entities to tests or flows, you can see which tests or flows you need to run when changes affecting these components and entities are made in your application.

Adding Components and Application Entities

You can add components and application entities from your application by:

➤ **For SAP applications only**: Importing SAP application components and application entities directly from your SAP application.

When you import directly from your SAP application, the hierarchy of the elements in the application and the basic data for each business entity are preserved. If you want to extend the scope at any stage, you can import the application hierarchy again, without overwriting existing entities in the Application Model module. If you choose to manually add and modify application entities, corresponding application entities in your SAP application are not affected.

➤ Adding and modifying the components and application entities manually.

Associating Entities with Tests

After you develop your application model tree, you can associate each application entity with tests in the Test Plan module. You can also associate an application entity with a business component or flow. Each business process test containing that business component or flow is then associated with all of the application entities associated with that component or flow. When you learn a flow automatically, the components created are automatically associated with related application entities in the Application Model module. For more information, see "Learned Flow Associations in the Application Model Module" on page 240.

> **Note:** You can customize permission settings for the Application Model module. You can also customize application entities and application entity folders. For more information, refer to the *HP Business Process Testing Enterprise Extension Installation Guide.*

Viewing Application Entities

You import, add, and modify application entities using the Application Model module. To open the Application Model module, click the **Application Model** button on the sidebar.

You can view your application entities in The Application Model Tree or the The Application Model Grid.

The Application Model Tree
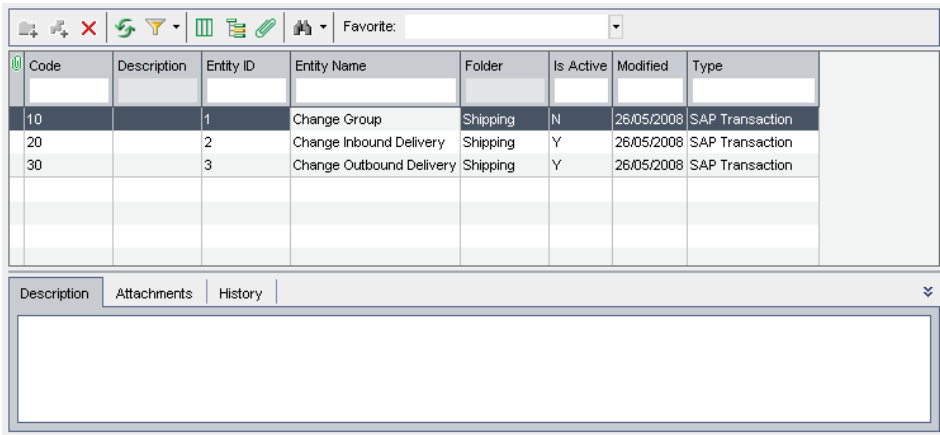
You can view a hierarchical representation of your application entities in the application model tree. To view the application model tree, select **View > Application Model Tree**.
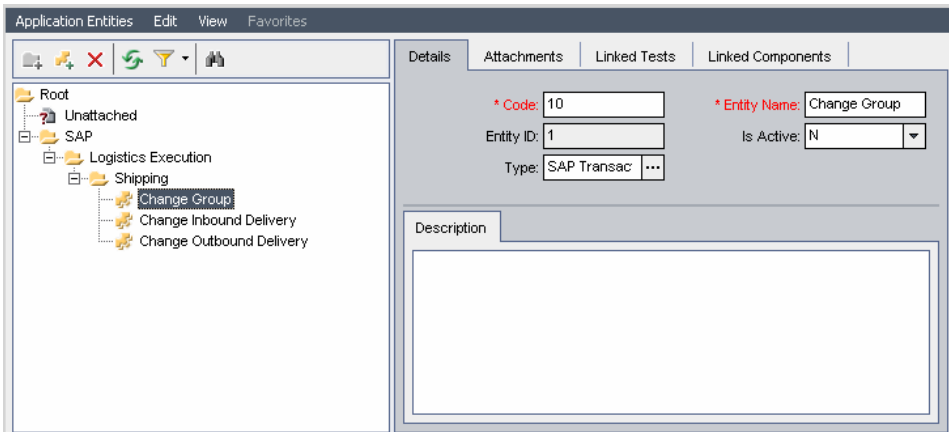
By default, each folder item 📁 in the application model tree represents an application component in your application. During the Learn Flow process, a folder with the name of the flow is created for any flow representing a transaction whose application entity is not in the application model tree. Each application entity item 🧩 represents an application entity in your application.

The Application Model Grid

You can view all the application entities in a Quality Center project from the Application Model Grid. Each row displays a separate application entity. Each column represents a separate data item. To view the Application Model Grid, select **View** > **Application Model Grid**.

The following columns are displayed for each entity:

Column	Description
Code	The code of the entity in the application.
Description	The description of the entity in the application.
Entity ID	A unique numerical ID assigned by Quality Center to the application entity. This ID cannot be modified.
Entity Name	The name of the entity in the application.

Column	Description
Folder	The folder in the application model tree in which the application entity is located. Each folder represents an application element.
Is Active	This column is relevant only for Change Impact Testing module for SAP applications. For more information, see the *HP Change Impact Testing module for SAP applications User's Guide*.
Modified	The date and time when the application entity was last modified.
Type	The type of application entity, for example, *<application>* Transaction.

Importing the Application Hierarchy

For SAP applications only: You can import the application hierarchy to the Application Model module. For details, see "Importing the SAP Application Hierarchy" on page 493.

Adding Folders and Application Entities Manually

You can add folder and application entities manually.

To add a folder:

1 In the application model tree, select a folder and click the **New Folder** button, or select **Application Entities** > **New Folder**. The New Folder dialog box opens.
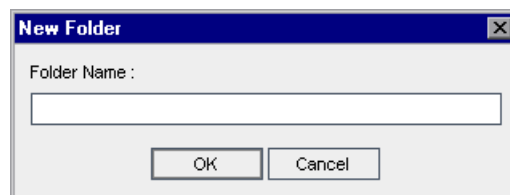
2 In the **Folder Name** box, type a name for the folder and click **OK**. The new folder is added to the application model tree under the folder you selected in step 1.

3 You can add a description for the new folder in the Description tab in the right pane.

4 You can add an attachment to the new folder in the Attachments tab. For more information on adding attachments, see the *HP Quality Center User Guide*.

To add an application entity:

1 In the application model tree, select a folder and click the **New Entity** button, or select **Application Entities > New Entity**. The New Application Entity dialog box opens.

2 In the **Application Entity Name** box, type the name of the application entity. This is a required field.

3 In the **Application Entity Code** box, type the unique code of the application entity. This is a required field.

4 In the **Description** box, type a description of the application entity.

5 Click **OK**. The new application entity is added to the application model tree under the folder you selected in step 1.

Modifying Folders and Application Entities

You can rename and delete folders and application entities in the Application Model module.

Renaming Folders and Application Entities

You can rename a folder or application entity in the Application Model module.

To rename a folder or application entity:

➤ To rename a folder or application entity in the application model tree, select a folder or application entity and select **Edit** > **Rename**. Alternatively, right-click the folder or application entity and select **Rename**. Edit the name and press ENTER.

➤ To rename an application entity in the Application Model Grid, click the name of the application entity and type the new name.

Deleting Folders and Application Entities

You can delete a folder or application entity from the application model tree. When you delete a folder, you can choose to delete the folder and its subfolders, or you can choose to delete the folder, its subfolders, and application entities.

➤ If you delete a folder with its subfolders, all of the application entities are moved to the **Unattached** folder in the application model tree.

➤ If you delete a folder with its subfolders and application entities, all subfolders and application entities under the selected folder are deleted permanently.

To delete a folder:

1 Select a folder from the application model tree.

2 Click the **Delete** button, or select **Edit** > **Delete**. Alternatively, right-click the folder and select **Delete**. The Confirm Delete Folder dialog box opens.
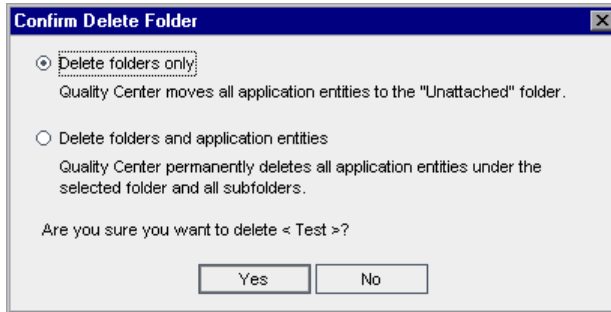
3 Select **Delete folders only** or **Delete folders and application entities.**

4 Click **Yes**.

To delete an application entity:

1 Select an application entity from the application model tree or Application Model Grid.

2 Click the **Delete** button, or select **Edit** > **Delete**. Alternatively, right-click the application entity and select **Delete**.

3 Click **Yes** to confirm.

Associating Application Entities with Tests and Flows

You can associate the application entities you created in the Application Model module with tests and flows from the Test Plan module. You can perform this task from the Application Model module or from the Test Plan module.

Associating Application Entities Using the Application Model Module

You can associate application entities with tests or flows using the Application Model module.

To associate application entities with tests or flows using the Application Model module:

1 In the application model tree, select an application entity and click the **Linked Tests** tab. The Linked Tests tab displays the coverage grid for the selected application entity.
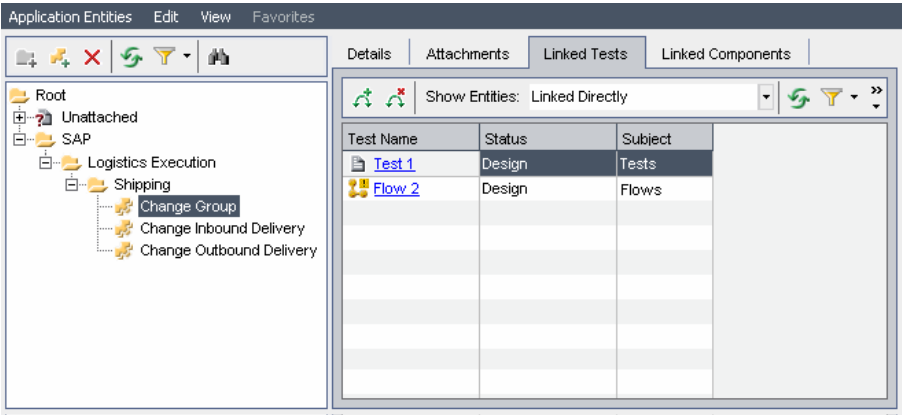
For information on the columns in the Linked Tests tab, see the *HP Quality Center User Guide*.

2 In the Linked Tests tab, click the **Select Tests** button to show the test plan tree on the right.
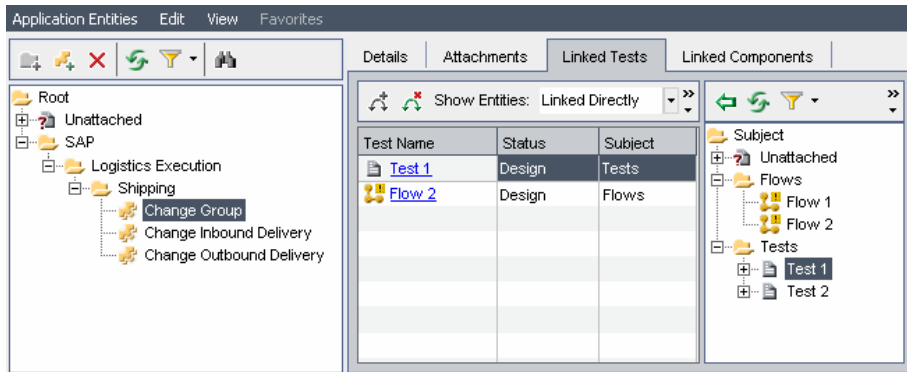
3 To search for a specific test or flow in the tree, type the name (or part of the name) of the test or flow in the **Find** box and click the **Find** button . If the search is successful, the test or flow is highlighted in the tree.

4 To refresh all of the tests and flows in the test plan tree, click the **Refresh All** button.

5 Select a test, test folder, or flow to add to the application entity's test coverage. Click the **Link Tests To Application Entity** button . The test or flow is added to the coverage grid.

6 To refresh the application entities in the coverage grid, click the **Refresh All** button above the grid.

7 To filter the application entities displayed in the coverage grid, choose one of the following options from the **Show Entities** box:

➤ **Linked Directly.** Displays those tests or flows that are associated directly with the application entity.

➤ **Linked Through Other Assets.** Displays those tests that are associated with the application entity via business components or flows, and flows that are associated with the application entity via business components.

➤ **All.** Displays all of the application entities that are associated with the test or flow.

8 Click the **Close** button to hide the test plan tree.

Notes:

➤ To modify the data in the coverage grid columns or to remove tests or flows from the coverage grid, you must first select **Linked Directly** in the **Show Entities** box.

➤ To remove test or flow coverage from the Application Model module, verify that **Linked Directly** is displayed in the **Show Entities** box. Then select the test or flow you want to remove from coverage and click the **Remove Link** button. Click **Yes** to confirm.

Associating Application Entities Using the Test Plan Module

You can associate application entities with tests or flows using the Test Plan module.

To associate application entities with tests using the Test Plan module:

1 In the test plan tree, select the test or flow you want to associate with one or more entities, and click the **Application Entities** tab. The application entities associated with the selected test or flow are displayed.
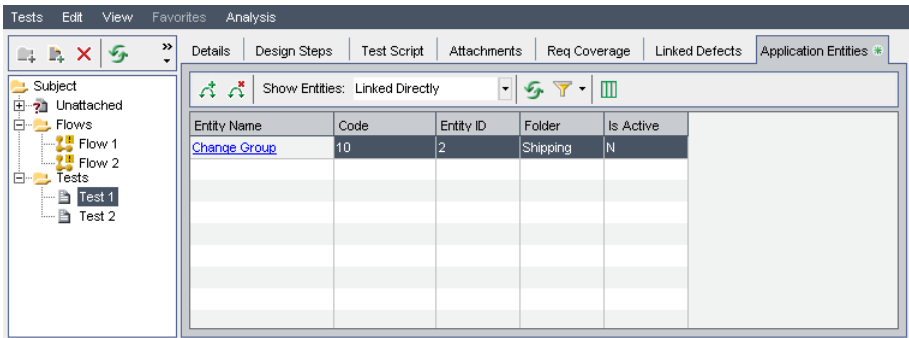
2 In the Application Entities tab, click the **Select Application Entities** button to show the application model tree on the right.

3 To search for a specific application entity in the tree, type the name (or part of the name) of the application entity in the **Find** box and click the **Find** button. If the search is successful, the application entity is highlighted in the tree.

4 To refresh all of the application entities in the application model tree, click the **Refresh All** button.

5 Select an application entity or application folder to add to the application entity coverage for the test or flow. Click the **Add Entity to Linkage** button. The application entity is added to the coverage grid.

6 To refresh the application entities in the coverage grid, click the **Refresh All** button above the grid.

7 To filter the application entities displayed in the coverage grid, choose one of the following options from the **Show Entities** box:

➤ **Linked Directly.** Displays those application entities that are associated directly with the test or flow.

➤ **Linked Through Other Assets.** Displays those application entities that are associated with business components via business process tests or flows, or are associated with flows via business process tests.

➤ **All.** Displays all of the application entities that are associated with the test or flow.

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8 Click the **Close** button to hide the application model tree.

Notes:

➤ To modify the data in the coverage grid columns or to remove application entities from the coverage grid, you must first select **Linked Directly** in the **Show Entities** box.

➤ To remove application entity coverage from the Test Plan module, verify that **Linked Directly** is displayed in the **Show Entities** box. Then select the application entity you want to remove from coverage and click the **Remove Link** button. Click **Yes** to confirm.

Associating Application Entities with Business Components

In addition to associating application entities with tests and flows, you can associate application entities directly with a business component. This automatically associates the application entity indirectly with every business process test and flow containing that business component. For details on including business components in a business process test, see "Building Business Process Tests" on page 283.

You associate application entities with business components using the Business Components module. After they are associated, you can manage your associated application entities either from the Application Model module or from the Business Components module.

Note: When you learn a flow automatically, business components created are automatically associated with related application entities in the Application Model module. For more information, see "Learned Flow Associations in the Application Model Module" on page 240.

To manually associate application entities with business components:

1 In the component tree, select the component you want to associate with one or more application entities, and click the **Application Entities** tab. The application entities associated with the selected business component are displayed. For a description of each column displayed, see "The Application Model Grid" on page 474.

2 In the Application Entities tab, click the **Select Application Entities** button to show the application model tree on the right.

3 To search for a specific application entity in the tree, type the name (or part of the name) of the application entity in the **Find** box and click the **Find** button. If the search is successful, the application entity is highlighted in the tree.

4 To refresh all of the application entities in the application model tree, click the **Refresh All** button.

5 Select an application entity or application folder to add to the business component's application entity coverage. Click the **Add Entity to Linkage** button. The test is added to the coverage grid.

6 Click the **Close** button to hide the application model tree.

Note: To remove application entity associations from the Business Components module, select the application entity for which you want to remove an association, click the **Remove Link** button, and click **Yes** to confirm.

A

Environment-specific Information

This appendix provides environment-specific user information for HP
Business Process Testing Enterprise Extension.

This chapter includes:

➤ Supported Environments for Enterprise Extension on page 485

➤ Using Enterprise Extension with Support for SAP on page 485

Supported Environments for Enterprise Extension

In this version, Enterprise Extension supports SAP. Additional environments
will be supported in future versions.

Using Enterprise Extension with Support for SAP

The following information is relevant if your supported enterprise
environments include SAP.

➤ "Configuring QuickTest to Work with Business Process Testing for
Enterprise Extension Features" on page 486

➤ "How Business Process Testing Enterprise Extension Creates Components
in Your SAP Application" on page 487

➤ "Learning Flows Automatically in Your SAP Application" on page 489

➤ "Example: SAP-specific Change Detection Report" on page 493

➤ "Importing the SAP Application Hierarchy" on page 493

Configuring QuickTest to Work with Business Process Testing for Enterprise Extension Features

To configure QuickTest to take work with all Business Process Testing for SAP Applications features:

1 Open QuickTest.

2 Select **Tools** > **Options** and click the **SAP** node. In the SAP pane:

➤ Under **SAP GUI for Windows** > **Record settings** ensure that:

➤ the **Auto-parameterize table and grid controls** check box is selected.

➤ the **Record only the selected value when using a Possible Entries (F4) list** check box is checked.

➤ Under **SAP GUI for Windows** > **Run settings** ensure that the **Session cleanup** check box is not selected.

3 If your SAP application contains objects from environments other than SAP and Web, you may configure Business Process Testing Enterprise Extension to recognize these objects.

Note: Only users who are comfortable editing XML files should perform this operation.

a Open the **Bpt4ErpCrmCfg**.xml file in the **Dat** folder of your QuickTest Professional installation folder.

b Add the following line to the **Settings** section:

<Config name="additional_addins" value="**add-in name**"/>

where the **add-in name** is the name of the add-in as it appears in the **Add-in Manager** of QuickTest Professional. You separate multiple add-ins with a semicolon, with no additional spaces.

For example <Config name="additional_addins" value="Java;ActiveX"/>

How Business Process Testing Enterprise Extension Creates Components in Your SAP Application

When Business Process Testing Enterprise Extension learns a flow, it creates a new business component for each screen or tab through which you navigate in your SAP application. Each screen or tab within a particular transaction is represented as a separate business component.

The name of a learned component is of the form **<Transaction code>-<Screen name>**. If the transaction code or screen name contains spaces or characters that are not valid in the names of business components, these characters are replaced by underscores (_). For example, if a learned component corresponds to the screen Create Sales Order: Initial Screen in the VA01 transaction, the component is named VA01-Create_Sales_Order_Intial_Screen.

If you navigate from one screen to a different screen or tab, and then return to the original screen, a new component is created with the same name as the component corresponding to the original screen, with a numerical suffix appended to differentiate between the components. For example, suppose the component corresponding to a screen is named VA01_Test. If you return to the screen, a new component is created named VA01_Test_01. Reusing existing components in your learned flow minimizes the number of learned components for similar or identical screens. For more information, see "Understanding Component Reuse" on page 233.

For each user operation within a screen that requires data specified by the user, a component input parameter is created for that step. The component input parameters that are created during the **Learn Flow** process are automatically set as flow parameters. The value input during the Learn Flow process is used as the default parameter value. For example, a parameter would be created for a value entered in a text field.

The name of an automatically generated parameter is the same as the name of the relevant field in the application. For example, in a Display Sales Order transaction, the parameter name of the order number would be **Order**. If a flow contains several components that have the same parameter name, an incremental suffix is added to subsequent parameter names (for example, Order_1, Order_2) in order to differentiate between them.

Note: In previous versions of Business Process Testing Enterprise Extension, the name of an automatically generated parameter was in the format **<name of object_class type_name of method_name of argument>**. For example, the parameter used to set the value of the Sales Organization edit box was named Sales_organization_Edit_Box_Set_Text. Old parameter names are not changed to the new format during the upgrade process.

The description of a generated parameter includes the type of control and the name of the screen in which it appears, for example, "The 'Order' control is of type 'Edit Box'. The control is a part of the 'Display Sales Order: Initial Screen' screen."

If you add data to a table in your SAP application while learning a component, a component table parameter is created. Table parameters enable you to use one parameter for an entire table, rather than using separate parameters for each table cell. For more information on working with table parameters, see "Understanding Table Parameters" on page 397.

Notes:

➤ During the Learn Flow process the table parameter saves the data only after you move the focus out of the table. If the table data is the last step in a learn process, ensure that you move the focus out of the table before stopping the learn.

➤ To create table parameters during the Learn Flow process, you must enable QuickTest to create table parameters. In QuickTest, select **Tools** > **Options** > **SAP** node. Under **SAP GUI for Windows** > **Record settings** ensure that the **Auto-parameterize table and grid controls** check box is checked. For more information, see "Understanding Table Parameters" on page 397.

If a screen contains a tab strip, one component is created for the common area on the screen, and a separate component is created for each tab opened. The status bar is included in each component created for the screen. For example, consider the screen below:

When you learn a flow containing this screen, operations performed on the upper area of the screen containing the menus, toolbars, and common fields (such as **Standard Order** and **Net value**) comprise a single business component. Operations performed in each of the **Sales**, **Item overview**, **Item detail**, **Ordering party**, **Procurement**, **Shipping**, and **Reason for rejection** tabs result in the creation of separate business components.

Learning Flows Automatically in Your SAP Application

This topic contains information specifically related to learning flows in your SAP application.

Example: Associating Business Components with Application Entities in Your SAP Application

Suppose you imported the application hierarchy for **Sales and Distribution** into the Application Model module. All the transactions in the **Sales and Distribution** SAP module exist in the Application Model module. Included in the Application Model tree is the **Create Sales Order** transaction with code **VA01**.
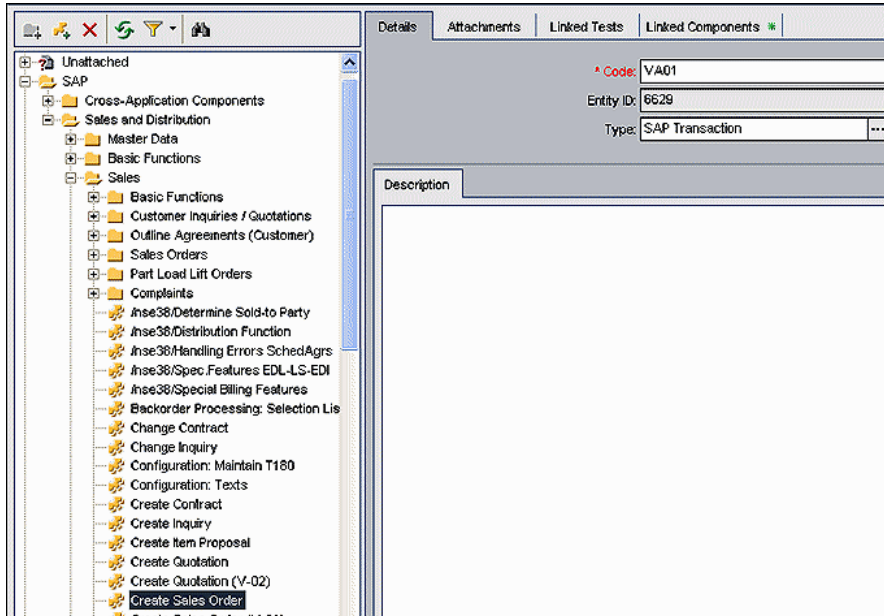
If you then learn a flow for the **Create Sales Order** process, the flow will consist of a number of components, one of which will be the **VA01-Create_Sales_Order_Initial_Screen** component.
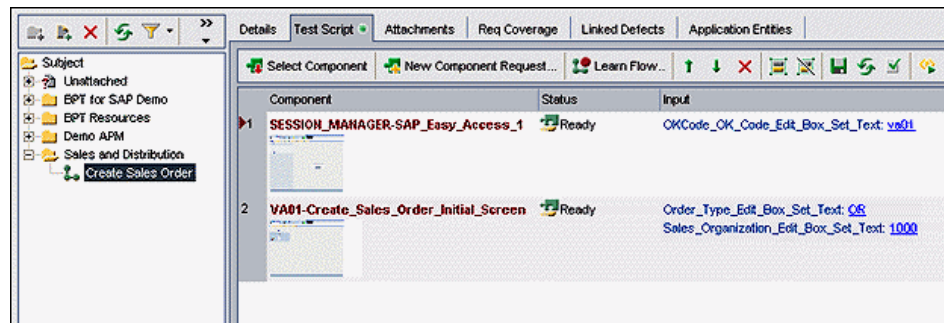
This component is automatically associated with the **Create Sales Order** entity in the Application Model at the end of the Learn Flow process. You can view this association in the **Application Entities** tab of the **Business Components** module.
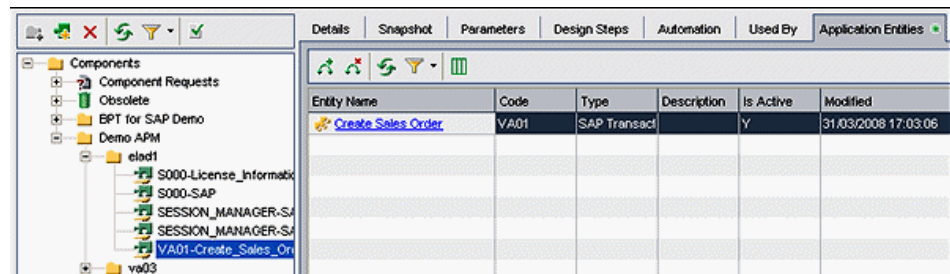
Example: Determining Which Tests Need to Run in Your SAP Application

Suppose you make changes to the VA01 transaction screen and would like to run all the tests that are associated with that transaction. You can find these tests by selecting the **Linked Tests** tab of the **Create Sales Order** application entity in the **Application Model** module.
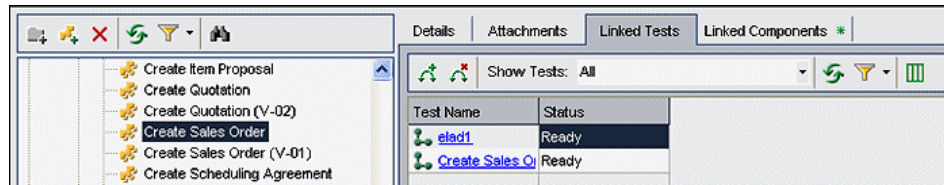
Note: To see both directly and indirectly associated tests, select **All** in the **Show Tests** drop-down box. For more information, see "Directly and Indirectly Associated Tests and Flows" on page 242.

To automatically determine which application entities are affected by each change you make to your SAP application, use the **HP Change Impact Testing module for SAP applications**. HP Change Impact Testing enables you to run tests associated with the affected application entities for each change made to an SAP application. HP Change Impact Testing integrates with the Application Model module, and provides seamless integration with Business Process Testing Enterprise Extension. For more information, see the *HP Change Impact Testing module for SAP applications User's Guide*.

Example: SAP-specific Change Detection Report

The Change Detection Report screen enables you to view the results of a test
run in Change Detection mode and resolve the detected changes.

Importing the SAP Application Hierarchy

You can import the application hierarchy to the Application Model module.

This maps the entities in your SAP application to application entities in the
Application Model module, reproducing the same hierarchical structure.
Each SAP application element is represented as a folder. Each folder contains
representations of the application entities that are included in the SAP
application element in your SAP application.

You can import the application hierarchy more than once. For example, if you add new entities to your SAP application, you may want to include them in the application hierarchy, or you may decide to include application entities that were previously out of scope. When you import application entities that are already in the Application Model module, the data that you entered for each application entity is not overwritten. Any associations you created with tests, flows, and business components are also preserved.

To import the application hierarchy:

1 In the Application Model module, display the application model tree and select **Application Entities** > **Import Application Model**. The Import Application Model Wizard dialog box opens.

2 Type the login details for your SAP application and click **Next**.
Quality Center connects to your SAP application and the Select Application Components dialog box opens, displaying the SAP components in your SAP application. (You can view the same hierarchy in your SAP application using the **SE81** transaction.)
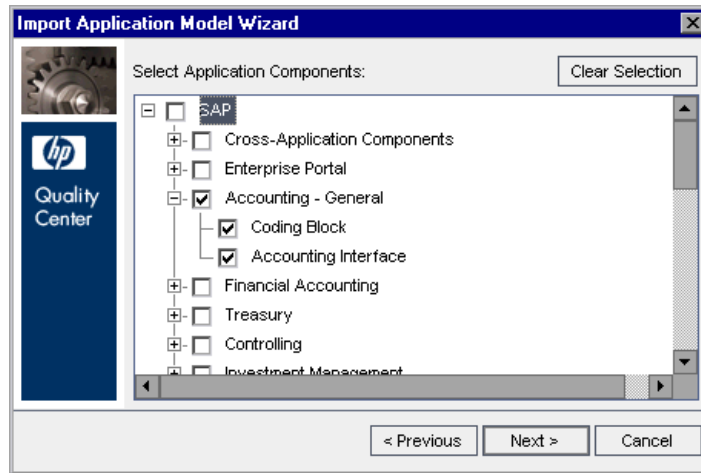
3 Select the SAP application elements you want to import to the Application Model module. When these application components are imported, all child application entities are also imported. Note that you can also import user transactions that are not assigned to any application element. To import these transactions, select the **User Transactions (Unassigned)** node in the Select Application Components dialog box. Click **Next**.

4 Click **Import** to import the SAP components and application entities to the Application Model module. Note that this process may take some time. When the import process is finished, a confirmation message displays. Click **OK**.

5 Click **Close** to close the Import Application Model Wizard.

The application components you selected are imported to the Application Model module. The hierarchical structure of the SAP application components is reproduced in the Application Model module, with the top-level components located under the **SAP** folder.

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