Rational Software Corporation®

Rational® TestManager

Extensibility Reference

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Rational®
the software development company

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Preface

About This Manual

This manual describes the APIs that you use to extend the capabilities of Rational TestManager. The manual is divided into two parts:

- *Part 1: Adding Custom Test Script Types*

  Part 1 describes the APIs you use if you want TestManager to manage and run custom test script types in addition to the standard test types that it supports (such as SQABasic, VU, Java, and Visual Basic test scripts as well as shell scripts and manual scripts).

- *Part 2: Adding Custom Test Input Types*

  Part 2 describes the APIs you use to introduce new test inputs (such as custom test requirements and other custom test assets) into the TestManager environment.

Audience

This manual is intended for developers who write TestManager adapters that interface with the TestManager C execution engine.

Other Resources

- This product contains online documentation. To access it, click **TestManager Extensibility** in the following default installation path (*ProductName* is the name of the Rational® product you installed, such as Rational TestStudio®).

  Start > Programs > Rational *ProductName* > Rational Test > API

- All manuals for this product are available online in PDF format. These manuals are on the *Rational Solutions for Windows* Online Documentation CD.

- For information about training opportunities, see the Rational University Web site: http://www.rational.com/university.

Integrations Between Rational Testing Tools and Other Rational Products

Rational TestManager Integrations		
Integration	**Description**	**Where it is Documented**
Rational TestManager–Rational Administrator	Use Rational Administrator to create and manage Rational projects. A Rational project stores software testing and development information. When you work with TestManager, the information you create is stored in Rational projects. When you associate a RequisitePro project with a Rational project using the Administrator, the RequisitePro requirements appear automatically in the Test Inputs window of TestManager.	▪ *Rational Suite Administrator's Guide* ▪ *Rational TestManager User's Guide* ▪ Rational TestManager Help
TestManager–Rational ClearQuest	Use ClearQuest with TestManager to track and manage defects and change requests throughout the development process. With TestManager, you can submit defects directly from a test log in ClearQuest. TestManager automatically fills in some of the fields in the ClearQuest defect form with information from the test log and automatically records the defect ID from ClearQuest in the test log.	▪ *Rational TestManager User's Guide* ▪ Rational TestManager Help
TestManager–Rational Rational Unified Change Management (UCM)	Use UCM with TestManager to: ▪ Archive test artifacts such as test cases, test scripts, test suites, and test plans. ▪ Maintain an auditable and repeatable history of your test assets. ▪ Create baselines of your test projects. ▪ Manage changes to test assets stored in the Rational Test datastore.	▪ *Rational TestManager User's Guide* ▪ Rational TestManager Help ▪ *Rational Suite Administrator's Guide* ▪ Rational Administrator Help ▪ *Using UCM with Rational Suite*

Rational TestManager Integrations		
Integration	**Description**	**Where it is Documented**
TestManager–Rational RequisitePro	Use RequisitePro to reference requirements from TestManager so that you can ensure traceability between your project requirements and test assets. Use requirements in RequisitePro as test inputs in a test plan in TestManager so that you can ensure that you are testing all the agreed-upon requirements.	▪ *Rational TestManager User's Guide* ▪ Rational TestManager Help ▪ *Rational Suite Administrators Guide*
TestManager–Rational Robot	Use TestManager with Robot to develop automated test scripts for functional testing and performance testing. Use Robot to: ▪ Perform full functional testing. Record test scripts that navigate through your application and test the state of objects through verification points. ▪ Perform full performance testing. Record test scripts that help you determine whether a system is performing within user-defined response-time standards under varying workloads. ▪ Test applications developed with IDEs (Integrated Development Environments) such as Java, HTML, Visual Basic, Oracle Forms, Delphi, and PowerBuilder. You can test objects even if they are not visible in the application's interface. ▪ Collect diagnostic information about an application during test script playback. Robot is integrated with Rational Purify, Rational Quantify, and Rational PureCoverage. You can play back test scripts under a diagnostic tool and see the results in the test log in TestManager.	▪ *Rational TestManager User's Guide* ▪ Rational TestManager Help ▪ *Rational Robot User's Guide* ▪ Rational Robot Help ▪ *Getting Started: Rational PurifyPlus, Rational Purify, Rational PureCoverage, Rational Quantify.* ▪ Rational PurifyPlus Help

Rational TestManager Integrations		
Integration	**Description**	**Where it is Documented**
TestManager–Rational Rose	Use as test inputs in TestManager. A test input can be anything that you want to test. Test inputs are defined in the planning phase of testing. You can use TestManager to create an association between a Rose model (called a test input in TestManager) and a test case. You can then create a test script to ensure that the test input is met. In TestManager, you can view the test input (the Rose model element) associated with the test case.	▪ *Rational TestManager User's Guide* ▪ Rational TestManager Help
TestManager–Rational SoDA	Use SoDA to create reports that extract information from one or more tools in Rational Suite. For example, you can use SoDA to retrieve information from different information sources, such as TestManager, to create documents or reports.	▪ *Rational SoDA User's Guide* ▪ Rational SoDA Help ▪ *Rational TestManager User's Guide*
TestManager–Rational Unified Process (RUP)	Use Extended Help to display RUP tool mentors for TestManager. RUP tool mentors provide practical guidance on how to perform specific process activities using TestManager and other Rational testing tools. Start Extended Help from the TestManager Help menu.	▪ *Rational TestManager User's Guide* ▪ Rational TestManager Help ▪ Rational Extended Help

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- Your computer's make and model
- Your operating system and version number
- Product release number and serial number
- Your case ID number (if you are following up on a previously reported problem)

Part 1: Adding Custom Test Script Types

Introduction to Custom Test Script Types 1

About Test Script Types

Part 1 of this manual explains how to customize Rational® TestManager so that it can execute a test script written in a new language. Part 1 is organized as described in the following table.

Section	Purpose
"Built-In Test Script Types" on page 2	Explains the role of test script types in execution and describes built-in test script types.
"Running a Test Script with the Command Line Adapter" on page 2	Explains how to run, from TestManager, any test script that can be executed from the command line.
"Adding Test Script Types" on page 4	Describes the two ways to extend TestManager to support a new test script type or testing environment.
"Adding a Command Line Test Script Type" on page 4	Gives the step-by-step procedure you follow to create a test script type that uses Rational's Command Line test script adapter.
"Adding a Custom Test Script Type" on page 11	Describes the tasks required to create a custom test script type.
"Using Test Script Options" on page 12	Describes how test script options are implemented and the various ways to edit options from TestManager.
"Using Test Tool Options" on page 15	Describes how to retrieve execution options from an external test tool.
"Component Description and Communication Overview" on page 16	Lists test script adapter components and presents a diagram describing their interaction during playback.
"Using the Command Line Execution Engine" on page 18	Explains how to use `rttsee` to execute test scripts from a command line.

Built-In Test Script Types

When a TestManager user plays back (executes) a test script, test case, or suite, the playback component of TestManager, the *Test Script Execution Engine* (TSEE), calls the *Test Script Execution Adapter* (TSEA) associated with each type of test script in the suite. As released, TestManager supports execution of the *test script types* listed and described in the table on the next page.

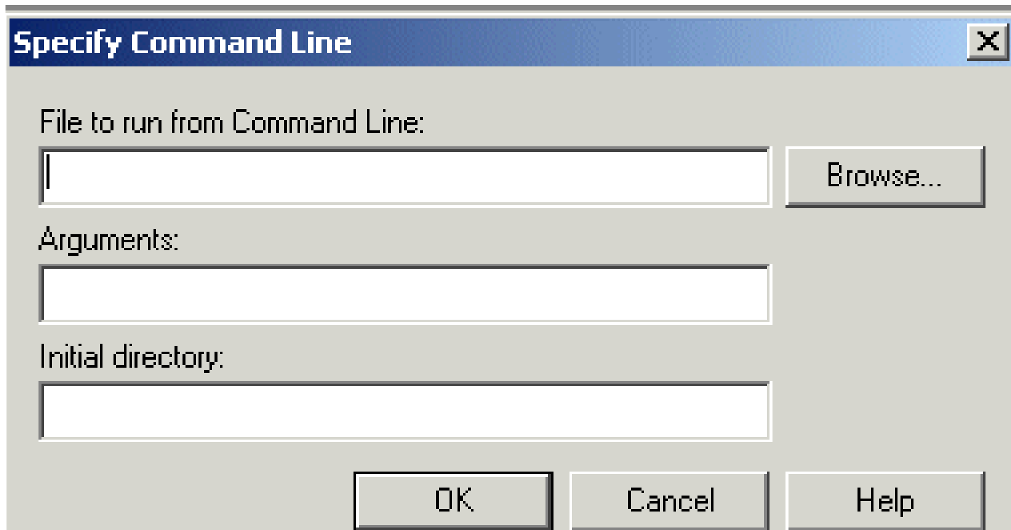
Test Script Type	Description
GUI	A functional test script written in SQABasic, a proprietary Basic-like scripting language.
VU	A performance test script written in VU, a proprietary C-like scripting language.
VB	A test script written in the Visual Basic language — for example, a test script for an application based on the Microsoft Component Object Model (COM).
Java	A test script written in the Java language — for example, a test script for a BEA WebLogic application.
Command Line	A test script (written in any language) that can be executed from the command line — for example, a DOS batch file, a Perl or Bourne shell script, or compiled C program.
Manual	A procedure explaining how to perform a test manually that, when executed, prompts a tester to verify the result of the test.

Running a Test Script with the Command Line Adapter

The built-in Command Line test script type uses a command line execution adapter included with TestManager. This adapter allows TestManager to run any test script (more precisely, any program) that can be executed from the command line. No customization is required for this extension feature. A test script run by the command line adapter can include any of the Test Script Service (TSS) calls documented in Chapter 3.

To run a test script using the command line execution adapter:

1 From TestManager, select **File > Run Test Script > Command Line**. The Specify Command Line dialog box opens.



2 In **File to run from Command Line**, type the test script filename (suffix not required), or browse to the file.

   This box can also name an installed program that executes the test script. For example, `perl myTestScript.pl`.

   If the program must be compiled or linked, you must do this outside TestManager.

   Note: If the program includes TSS calls, it must be linked with `%ratl_rthome%\rtsdk\c\lib\rttssremote.lib`. (The environment variable `%ratl_rthome%`, pointing to your installation path, is set during product installation.) Also, the program must connect to a TestManager listener port. Appendix A provides an example of a C program that makes TSS calls.

3 If the test script uses arguments, type them in the **Arguments** box.

4 If the test script must start from a specific location, specify it in the **Initial directory** box.

5 Click **OK**.

Adding Test Script Types

There are two ways to extend TestManager to support a new test script type. One way is to create a test script type that is based on the Command Line test script type and that uses the Command Line test script execution adapter (TSEA) provided with TestManager. The procedure for doing this is explained in *Adding a Command Line Test Script Type* on page 4. The advantage of this method is simplicity: it requires no custom programming. The only requirement is that the test scripts you want to run from TestManager can be executed from the command line. The drawback of these scripts is that, while TestManager can execute them individually and also in suites that include test scripts of other types, the scripts are not fully integrated into TestManager. For example:

- Test scripts that use the Command Line adapter require separate process invocations each time they are run. Custom test scripts do not, and so run more efficiently.
- Any procedures (such as compilation/linking) required to make these test scripts executable must be performed outside of TestManager.

If you extend TestManager in this way, see *The Command Line Interface to Rational Test Script Services*. This manual explains tsscmd, a utility that gives Command Line test scripts access to Rational Test Script Services. (The C bindings for these services are documented in Chapter 3). Command-line test scripts that do not use Test Script Services can be executed from TestManager but are not integrated into the TestManager logging, monitoring, and reporting framework.

The other way to extend TestManager is to create a custom test script type. This method, described in *Adding a Custom Test Script Type* on page 11, requires that you develop programs implementing the C APIs described in chapters 2 and 4 of this manual and, optionally, provide access to the Test Script Services documented in Chapter 3. For example, you can create adapters for currently unsupported scripting languages or software testing environments. Custom test script types are fully integrated into the TestManager framework, but they require considerably more effort to provide.

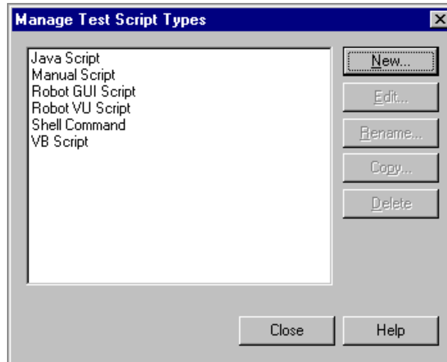
Adding a Command Line Test Script Type

This example illustrates how, without doing any programming, to extend TestManager so that it can support test scripts written in a new source language. After you have followed these procedures, TestManager can manage test scripts written in Perl. Specifically, a TestManager user can view, edit, or play back Perl source test scripts. Additionally, Perl test scripts can be added to TestManager suites that include test scripts of other types.

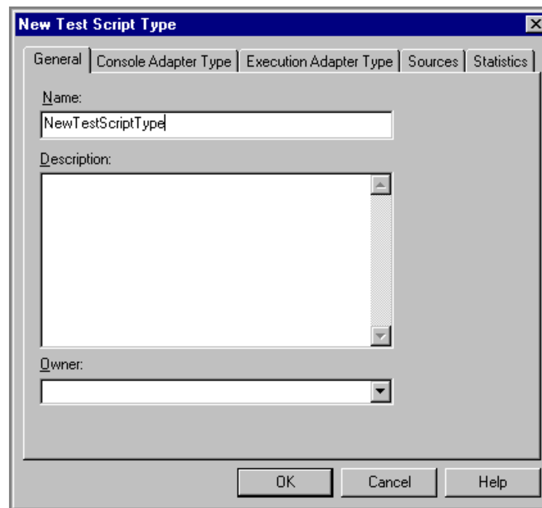
Note that you can execute test scripts that use the command line adapter without adding a new test script type: see "Running a Test Script with the Command Line Adapter" on page 2. The procedure below is an alternative that allows such test scripts to be mananged (created or modified as well as executed) from TestManager.

1 Create (or designate) a folder for Perl test scripts — for example, C:\testscripts\perl. The folder can be on a local or a network location.

2 From TestManager, click **Tools > Manage > Test Script Types**. The Manage Test Script Types dialog box appears.

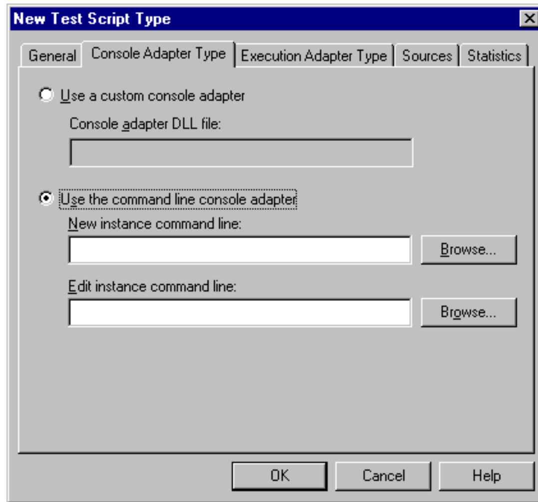


3 Click the **New** button. The New Test Script Type dialog box appears with the **General** tab selected.



In the **Name** box, type the name of the new test script type — for example, `Perl Script`. Optionally, type a description and select an owner. Only the owner can edit or delete this script type.

4 Click the **Console Adapter Type** tab. The dialog box changes as shown below.



Click **Use the command line console adapter** and fill in the boxes as follows:

- In the **New instance command line** box, type the command to execute in order to create a new test script — the name of your favorite editor. For example:

  ```
  notepad
  ```

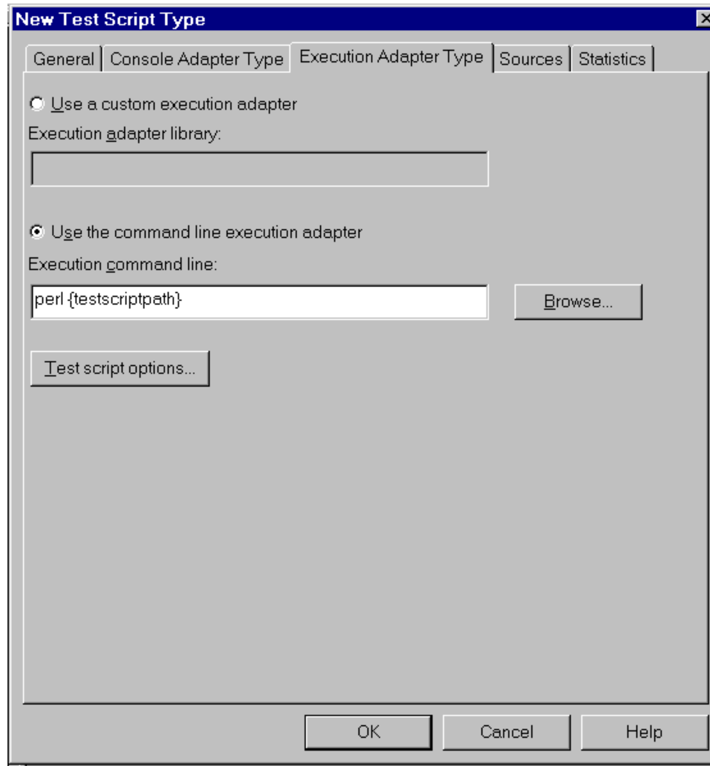
- In the **Edit instance command line** box, type the command to start in order to view or edit existing scripts of this type. For example:

  ```
  notepad {testscriptpath}
  ```

  Type `{testscriptpath}` exactly as shown.

The program you enter (in this case `notepad`) must be in your path.

5 Click the **Execution Adapter Type** tab. The dialog box changes as shown below.

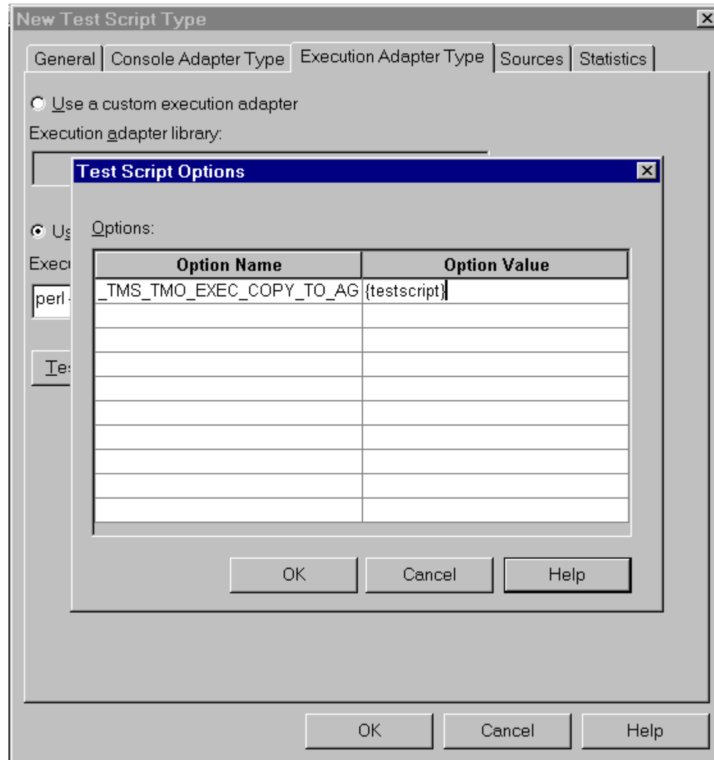


Click **Use the command line execution adapter.** In the **Execution command line** box, type the execution command line for a new script instance. In this example, type the following exactly as shown:

```
perl {testscriptpath}
```

The program (`perl`) must be in your path. (A copy that is released with TestManager is located in the Rational Test folder, which will be in your path by default.)

6 Click **Test Script Options**. The Test Script Options dialog box opens as shown below.

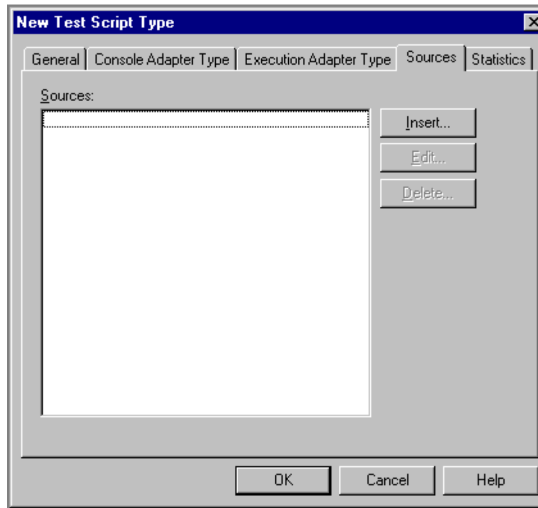


In the **Options** area, type the following Option Name and Option Value pair:

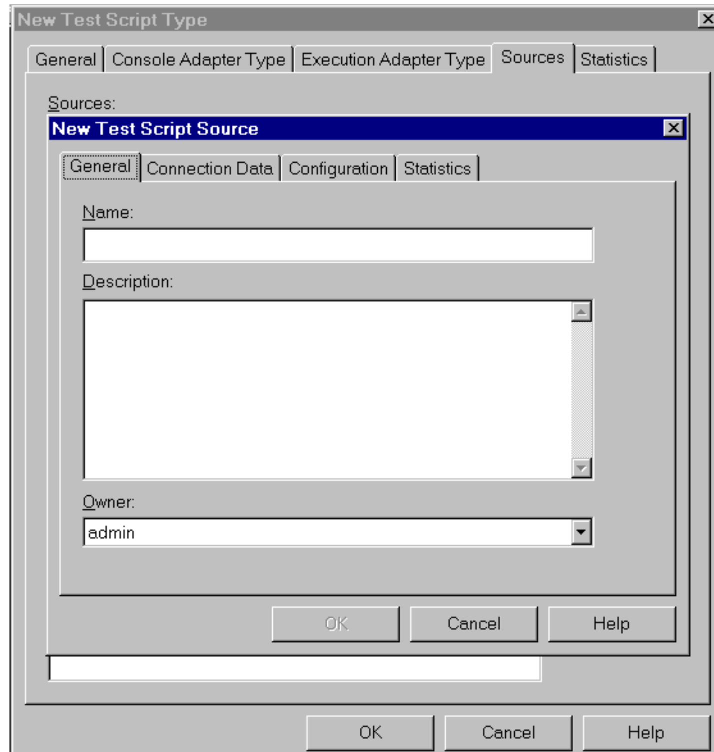
Option Name: `_TMS_TSO_EXEC_COPY_TO_AGENT_FILELIST`
Option Value: `{testscript}`

Click **OK**.

7 Click the **Sources** tab. The dialog box changes as shown below.



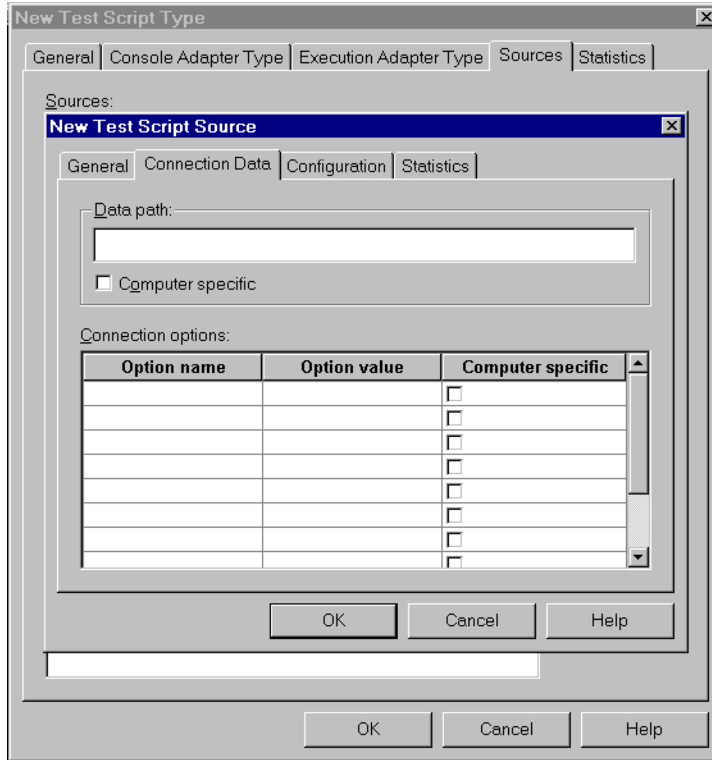
8 Click **Insert**. A popup appears telling you that the test script you are defining must be created before proceeding — answer **Yes**. The dialog box changes as shown below.



In the **Name** box, type a descriptive name for this source. Optionally, type a description and an owner. Only the owner can edit or delete this source.

The **Name** you type here is added to the TestManager **File > New Test Script**, **File > Open Test Script**, and **File > Run Test Script** lists. Select this name to create a new Perl script or edit, view, or run an existing Perl script.

9 Click the **Connection Data** tab. The dialog box changes as shown below.



In the **Data path** box, type the directory name (corresponding to **Name**) that you designated in step 1. This is where source files for test scripts of this type are located.

If the data path might vary from one local computer to another, click **Computer specific**. In this case, the TestManager user is prompted for the actual path of a script at the time of selection.

The **Connection options** box allows you to specify platform-specific execution options for the script type's executable file (in this case, for `perl`). No connection options are needed for this example. Click **OK** and close the dialog box to conclude the procedure.

Adding a Custom Test Script Type

The tasks required to support a new custom test script type are as follows:

- Write a program that supports the Test Script Execution Adapter (TSEA) API described in Chapter 2 of this manual.

  The TSEA API is the interface that allows TestManager to call a TSEA for a particular test script type.

- Add support for the *test script services* (TSS) described in Chapter 3.

  The TSS API gives scripts of the new type access to services such as:

  - Use of datapools to provide meaningful test data to scripts during execution
  - Insertion of timers and synchronization points
  - Monitoring of script playback progress
  - Logging for analysis and reporting
  - Exchange of information among virtual testers through environment, internal, and shared variables

- Write a Test Script Console Adapter (TSCA) for the new test script type as described in Chapter 4.

  The TSCA allows TestManager to locate scripts of the new type and associated programs needed to manipulate the scripts. If a new test script type is file-based and can be displayed or edited using standard file-based viewers and editors, you can use the built-in test script console adapter for the new type. Otherwise, a custom TSCA is required.

- Register adapter components with TestManager.

  Create the new test script type and give TestManager the names and locations of the TSCA, the TSEA, and the programs to be used to edit or view scripts of the new type. These procedures are explained in the TestManager online Help and in the *Rational TestManager User's Guide*. The procedures are similar to those described in *Adding a Command Line Test Script Type* on page 4.

Your code must reside in dynamic-link libraries (.dll in Windows, or .so in UNIX). During initialization, the TestManager TSEE dynamically links with the TSEA component of your adapter.

TSEA dlls must be placed in the Rational Test\tsea folder under the Rational installation directory.

Using Test Script Options

A TSEA can support test script options. The API calls that support options, documented in the next chapter, are: `SessionSetOption()`, `SessionGetOption()`, `TaskSetOption()`, and `TaskGetOption()`.

If a TSEA supports test script options, TestManager users can set or display the values of the options as explained below. Also, a test script (or other application) can get the current value of an option using `TSSGetScriptOption()`.

Whether or not a TSEA uses test script options, a TestManager user can define and use new options. For example, a user can:

- Define a new test script option named `repeat_count` and assign it the value 3.
- Query the option name from a test script with `TSSGetScriptOption()`, and branch based on the returned value of the option.

Test script options can be set at these levels of generality, where 1 is the highest:

1. Test Script Type
2. Test Script Source
3. Test Script
4. Test Script in a suite
5. Test Case implemented by a test script

The Test Script Execution Engine implements identically-named options hierarchically, with lower level settings overriding higher level settings. Thus, if you set the option named `repeat_count` to a different value at each of the levels listed above, the lower level settings override the higher level settings:

- 4 or 5 (mutually exclusive) override 3, 2, and 1
- 3 overrides 2 and 1
- 2 overrides 1

Conversely, if you set an option only at the Test Script Type level, that setting will apply globally for this type of test script. Thus, if you set the option named `repeat_count` to the value 3 and the Test Script Type level, the option will have this value in all instances.

Editing Test Script Options for a Test Script Type

To edit a test script option from Test Manager at the Test Script Type level:

1 From TestManager, click **Tools > Manage > Test Script Type**. The Manage Test Script Type dialog box opens.

2 From the list of existing test script types, click the type whose options you want to edit.

3 Click **Edit**. The Test Script Properties dialog box opens.

4 Click the **Execution Adapter Type** tab.

5 Click **Test Script Options ...** . The Test Script Options dialog box opens. Set or change the desired option values as explained in "Setting or Viewing Option Values" on page 14.

Editing Test Script Options for a Test Script Source

A test script source is a location where designated test scripts are stored. To edit a test script option at the Test Script Source level:

1 Perform steps 1-3 as described above in "Editing Test Script Options for a Test Script Type".

2 From the Test Script Properties dialog, click the **Sources** tab.

3 From the list of sources, click the appropriate source location.

4 Click **View**.

5 Click the **Configuration** tab.

6 Click **Test Script Options ...** . The Test Script Options dialog box opens. Set or change the desired option values as explained in "Setting or Viewing Option Values" on page 14.

Editing Test Script Options for a Test Script

To edit a test script option at the Test Script Asset level:

1 From TestManager, click **View > Test Scripts**. The Test Scripts dialog box opens.

2 Do one of the following:

   a Right-click a test script type folder and then click **Test Script Options ...**.

   b Open a test script type folder, browse to a test script, right-click and then click **Test Script Options ...**.

   The Test Script Options dialog box opens. Set or change the desired option values as explained in "Setting or Viewing Option Values" on page 14.

Editing Test Script Options for an Instance in a Suite

To edit a test script option for a script instance in a suite:

1. In TestManager, click **File > Open Suite ...**. The Open Suite dialog box opens.
2. From the list of existing suites, click the suite to open.
3. Click **OK**. The Suite dialog box opens.
4. Open the appropriate user group and browse to a test script.
5. Right-click the test script and then click **Run Properties**. The Run Properties of Test Script dialog box opens.
6. Click **Test Script Options ...** . The Test Script Options dialog box opens. Set or change the desired option values as explained in "Setting or Viewing Option Values" on page 14.

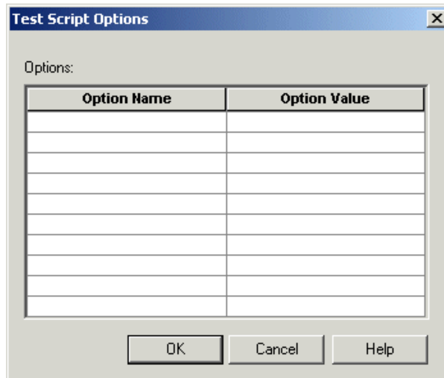
Editing Test Script Options for a Test Case Instance

To edit a test script option for a test case instance:

1. In TestManager, in the Planning view, expand the **Test Plans** folder.
2. Right-click the test plan containing the test case and then click **Open**. The Test Plan dialog box opens.
3. Expand the test cases folder containing the test case you want to edit.
4. Right-click the test case and then click **Properties ...**. The Test Case Properties dialog box opens.
5. Click the **Implementation** tab.
6. Click **Test Script Options ...** . The Test Script Options dialog box opens. Set or change the desired option values as explained in "Setting or Viewing Option Values" on page 14.

Setting or Viewing Option Values

You edit test script options from the Test Script Options dialog box. To open this dialog box, in TestManager, click **View > Test Scripts**. Right-click a test script type, test script source, or test script, and then click **Test Script Options**.



To set a new option value, type its name in the **Option Name** column and its value in the corresponding **Option Value** column, and click **OK**. To change an existing option setting, click the **Option Value** column of the appropriate row, type its value, and click **OK**.

Using Test Tool Options

As used here, the term *test tool* refers to an external program or application that creates tests of a type and behavior unknown to TestManager. A test tool might generate test scripts in a source that TestManager cannot access or connect to. If this is the case, a custom TSCA (see Chaper 4) must be developed that can access the foreign tests.

Additionally, a test script generated by a test tool might have special execution requirements. Before TestManager can execute tests generated by such a tool, the execution options need to be transferred from the test tool to the custom TSEA for the foreign test script type. The supported mechanism for this sort of transfer is as follows:

- The TSCA gets an array of option/value pairs from the test tool with the `TTGetTestToolOptions()` call.
- TestManager retrieves the execution data from the TSCA and makes it available to the execution engine. During execution, the TSEA processes test tool options on behalf of the foreign test script type with calls to `TSSGetTestToolOption()`.

This extensibility mechanism allows TestManager to run a test script generated by a standalone test tool while also applying options that are persisted in that test tool. Every time TestManager runs the test script, it retrieves the *current* options persisted in the test tool, so statements in the test script might execute differently depending on

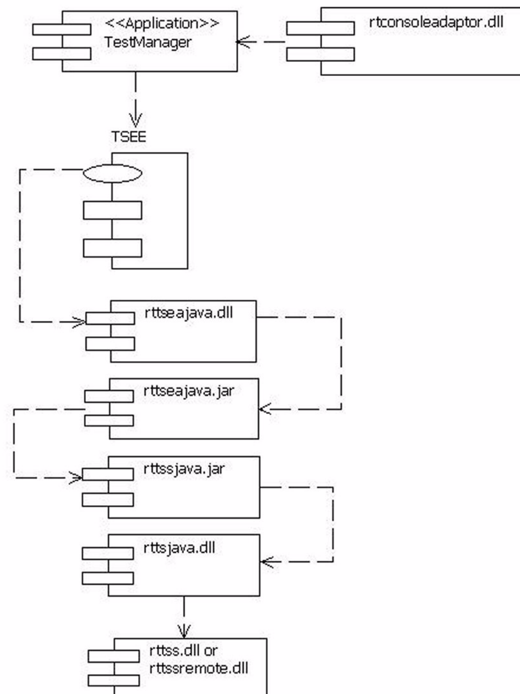
the values retrieved. And because this mechanism requires no modifications to the test script itself, nor duplicate maintenance in TestManager of the options persisted in the test tool, testers are not affected.

Component Description and Communication Overview

The following table lists and describes the test script adapter components on Windows NT systems. (UNIX systems have components of the same names but with appropriate suffixes.)

File	Path in Installation Directory	Description
rttss.dll	Rational Test\	The C Test Script Services library. Used for scripts executed inside TSEE process space.
rttssremote.dll	Rational Test\	The C proxy Test Script Services library. Used for scripts executed by a proxy server started by the TSEA.
rttsee.exe	Rational Test\	The command line TSEE. Used for testing a TSEA or TSS implementation.
tsea	Rational Test\	Directory where TSEA components must reside.
rttss.lib	Rational Test\rtsdk\c\lib\	The TSS LIB file for linking.
rttssremote.lib	Rational Test\rtsdk\c\lib\	The TSS proxy LIB file for linking.
rttss.h	Rational Test\rtsdk\c\include\	The header file defining the TSS calling interface.
tsea.h	Rational Test\rtsdk\c\include\	The header file defining the TSEA calling interface.
testtypeapi.h	Rational Test\rtsdk\c\include\	The header file defining the TSCA calling interface.

The following Rational Rose® diagram illustrates how the test script adapter components described in the previous table work together, using the Rational Java adapter components as an example.



A TestManager suite can contain many test scripts of different types. When a user runs a suite, TestManager relies on the Test Script Console Adapter (TSCA, described in Chapter 4) to locate scripts of the supported types, and to associate each script type with the programs(s) used to edit or view the scripts. The TSCA used for Java test script types is rtconsoleadapter.dll, located in the Rational Test folder under the Rational installation directory.

To play back test scripts, TestManager starts a Test Script Execution Adapter (TSEA) that knows how to execute each test script type. The Java TSEA is rttseajava.dll, located in the Rational Test\tsea folder under the Rational installation directory.

The design of a TSEA differs depending on the languages involved and on its scope. The Java TSEA in the diagram has four components:

- A C component (rttseajava.dll) implementing the TSEA API (described in Chapter 2). This is the component that receives and responds to calls from the TSEE and initializes a Java virtual machine. A session is opened and one or more tasks (scripts of type Java) are created. The TSEE remains in contact with the TSEA C component until the session is complete.
- A Java component (rttseajava.jar) that executes Java scripts, which may include calls to the rttssjava.jar component.
- A Java class library (rttssjava.jar) implementing, in Java, the TSS C library functions in rttss.dll (Chapter 3).
- A C component (rttssjava.dll). Calls from rttssjava.jar to rttss.dll go through this layer, which converts between Java and C data types and structures.

At the bottom of the diagram is the Test Script Services library, implemented by a dynamic-link C library. This is the layer where requested services are performed and integrated into the TestManager UI. The Java TSEA can be linked with rttss.dll for direct script execution or with rttssremote.dll for proxy execution.

Using the Command Line Execution Engine

The command-line execution engine, rttsee, lets you test your TSEA from the command line rather than from TestManager. The rttsee interface is especially useful on non-Windows platforms, and for testing your extension of the TSEE framework independently of the test scripts executed through the framework.

The following example illustrates the most common usage of rttsee. It runs a Java program named `hello.java` via the Java TSEA, `rttseajava.dll`.

```
rttsee -e rttseajava hello
```

The following example starts a TSS server listening on port 95 that continues running until explicitly stopped.

```
rttsee -k -P 95
```

The syntax of rttsee is:

```
rttsee [option [arg]]
```

The full options are described in the following table.

Option	**Description**
`-d` *dir*	Specifies the directory for result files — u-file (log), o-file, e-file. The default is the current directory.
`-e` *tsea*[*:type*] *script*[*:type*]	Specifies the TSEA to start and the test script to run. If *tsea* handles test scripts of more than on type, :*type* indicates the type of *script*. The :*type* may be specified with either or both the TSEA or script, but it must match if specified with both.
`-G` [I | i T | t]	Controls random number generation. Enter one choice (`I` or `i`, `T` or `t`) from either or both pairs: ▪ `I` Generate unique seeds for each virtual tester, using either the predefined seed or one specified with `-S` (default). ▪ `i` Use the same seed for all virtual testers, either the predefined seed or one specified with `-S`. ▪ `t` Seed the generator once for all tasks at the beginning, using either the predefined seed or one specified with `-S` (default). ▪ `T` Reseed the generator at the beginning of each task.
`-k`	Keep-alive. Use with `-P` to start a TSS server that keeps running after all test scripts have completed execution.
`-P` *portnumber*	Specifies the listening port for a TSS server that remains alive until explicitely stopped.
`-r`	Redirects stdio to the o-file and e-file (in the directory specified by `-d`).
`-S` *seed*	Specifies an alternative seed value for the predefined seed. Must be a positive integer except in conjunction with `-G i`.
`-u` *uid*	Specifies the ID of a virtual tester.
`-V`	Displays the `rttsee` version.

Test Script Execution Adapter API

2

About This API

This chapter describes the Rational Test Script Execution Adapter (TSEA) API. This API defines the C language calls that the TestManager Test Script Execution Engine (TSEE) uses to communicate with a Test Script Execution Adapter (TSEA). Your TSEA must respond to these calls as described in this chapter.

Communication Overview

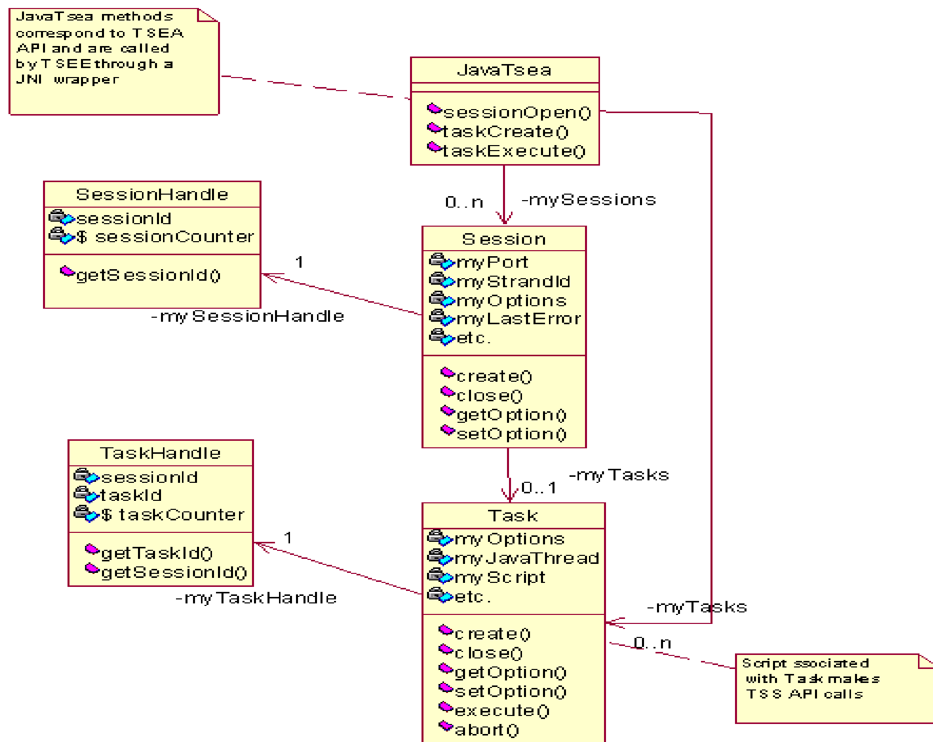
Communication between the TSEE and the TSEA occurs in three phases:

1. Initialization phase. The TSEE:
   - **a** Dynamically links in the DLL for your TSEA (located under the installation folder in Rational Test\tsea).
   - **b** Calls `SessionOpen()` to start a session; the TSEA returns a session handle.
   - **c** Optionally, calls `SessionSetOption()` to set one or more session options. Session options apply to all tasks (scripts) in a session. An option may be anything (such as a working directory or timer) needed during execution.
2. Execution phase. The TSEE:
   - **a** Calls `TaskCreate()`, which creates a test script of a type that the TSEA knows how to execute; the TSEA returns a task handle.
   - **b** Optionally, calls `TaskSetOption()` to set one or more task options.
   - **c** Calls `TaskExecute()`; the TSEA executes the task and upon completion returns the status.
   - **d** Closes the task handle.
   - **e** Repeats a–d until all tasks for this TSEA have been completed.

3 Cleanup phase. The TSEE calls `SessionClose()` to close the session.

At any time during task execution, the TSEE might call `TaskAbort()`. For example, if the TestManager user choses to stop an executing test script or suite run, the TSEE calls `TaskAbort()`. If this happens, `TaskExecute()` should return as soon as possible with a termination status. The TSEE then terminates the session as cleanly as possible.

The following diagram (generated using Rose) is a static diagram illustrating the interactions among the components of the Java TSEA provided with TestManager.



Data Types and C Header Files

The following table lists and describes the TSEA data types. Defined in the header file rttss.h, these are the types of data that your TSEA receives from and returns to the TSEE.

Type	Description
`s32`	Signed 32-bit integer.
`u16`	Unsigned 16-bit integer.
`SessionHandle`	Returned to the TSEE after a successful `SessionOpen()` call, and included with session calls and `TaskCreate()`.
`TaskHandle`	Returned to the TSEE after a successful `TaskCreate()` call, and included with all other task calls.
`TaskType`	Returned to the TSEE with a successful `TaskCreate()` call, specifying the TSEA's test script type.

Summary

The TSEA API includes the following calls.

Function	Description
`SessionClose()`	Closes a TSEA session.
`SessionGetOption()`	Gets TSEA session options.
`SessionOpen()`	Opens a TSEA session.
`SessionSetOption()`	Sets TSEA session options.
`TaskAbort()`	Aborts a task.
`TaskClose()`	Closes a TSEA task.
`TaskCreate()`	Opens a TSEA task.
`TaskExecute()`	Executes a task.
`TaskGetOption()`	Gets TSEA task options.
`TaskSetOption()`	Sets TSEA task options.
`TSEAError()`	Gets TSEA error information.

SessionClose()

Closes a TSEA session.

Syntax

```
s32 SessionClose (SessionHandle session)
```

Element	Description
session	The handle of the TSEA session to close.

Comments

TSEE makes this call when the last script of a playback request has completed. Your TSEA should perform any cleanup necessitated by the run.

See Also

`SessionOpen()`

SessionGetOption()

Gets the value of a session option.

Syntax

```
s32 SessionGetOption (SessionHandle session, char *optname,
   void *optval, s32 len)
```

Element	Description
session	The session handle, returned by `SessionOpen()`.
optname	The session option whose value is to be returned.
optval	The value of *optname* that is returned to the TSEE.
len	Storage buffer size. When TSEE makes the call, *optval* is an empty buffer of this size; on return, *len* is the size of the value pointed to by *optval*.

See Also

`SessionSetOption()`

SessionOpen()

Opens a session with a TSEA.

Syntax

```
SessionHandle SessionOpen (char *hostname, u16 port, s32
   strandID, char **message)
```

Element	Description
hostname	The name (or IP address in dot notation) of the TSEA host.
port	The listening port used by the TSEE for communication with proxy TSS processes. Not used by scripts that are directly executed by TSEE. Where a TSEA uses `TSSConnect()` to start a proxy script execution process, this *port* must be passed to the process.
strandID	Strand (thread) ID for TSS calls in this session.
message	A statement that, if the open fails, is included with the log.

Comments

On success, return to the TSEE a unique session identifier of type `SessionHandle`. On failure, return NULL. If NULL is returned, the failure is logged.

See Also

`SessionClose()`

SessionSetOption()

Sets the value of a session option.

Syntax

```
s32 SessionSetOption (SessionHandle session, char *optname,
   void *optval, s32 len)
```

Element	Description
session	The session handle, returned by `SessionOpen()`.
optname	The session option whose value is to be set.
optval	The new value of *optname*.
len	The size of buffer *optval*.

See Also

`SessionGetOption()`

TaskAbort()

Aborts a TSEA task.

Syntax

```
s32 TaskAbort (TaskHandle task)
```

Element	Description
task	The handle of the TSEA task to abort.

Comments

The TSEE makes this call (from another thread) to abort a task. Your TSEA should stop the task run as soon as possible and return a value greater than 0 indicating that the task has been aborted.

See Also

`TaskClose()`, `TaskCreate()`, `TaskExecute()`

TaskClose()

Closes a TSEA task.

Syntax

```
s32 TaskClose (TaskHandle task)
```

Element	Description
task	The handle of the TSEA task to close.

Comments

The TSEE makes this call when a task completes. Your TSEA should perform any cleanup necessitated by the task execution.

See Also

`TaskAbort()`, `TaskCreate()`, `TaskExecute()`

TaskCreate()

Creates a task.

Syntax

```
TaskHandle TaskCreate (SessionHandle session, TaskType type,
   char *sourcelocation, char *testScriptId)
```

Element	Description
session	The session handle, returned by `SessionOpen()`.
type	The test script type for scripts that this TSEA plays back.
sourcelocation	The location where source scripts of *type* are located.
testScriptId	The name of the file containing the test script.

Comments

On success, return to the TSEE a unique task identifier of type `TaskHandle`. On failure, return NULL.

See Also

`TaskAbort()`, `TaskClose()`, `TaskExecute()`

TaskExecute()

Executes a TSEA task.

Syntax

```
s32 TaskExecute (TaskHandle task)
```

Element	Description
task	The handle of the TSEA task to execute.

Comments

The TSEE makes this call to execute a task. Your TSEA should return 0 if the task completes successfully or a number greater than 0 if the task fails.

See Also

`TaskAbort()`, `TaskClose()`, `TaskCreate()`

TaskGetOption()

Gets the value of a task option.

Syntax

```
s32 TaskGetOption (TaskHandle task, char *optname, void
   *optval, s32 len)
```

Element	Description
task	The task handle, returned by `TaskCreate()`.
optname	The task option whose value is to be returned.
optval	The value of *optname* that is returned to the TSEE.
len	Storage buffer size. When TSEE makes the call, *optval* is an empty buffer of this size; on return, *len* is the size of the value pointed to by *optval*.

See Also

`TaskSetOption()`

TaskSetOption()

Sets the value of a task option.

Syntax

```
s32 TaskSetOption (TaskHandle task, char *optname, void
   *optval, s32 len)
```

Element	Description
task	The task handle, returned by `SessionOpen()`.
optname	The task option whose value is to be set.
optval	The new value of *optname*.
len	The size of buffer *optval*.

See Also

`TaskGetOption()`

TSEAError()

Gets a message following an error.

Syntax

```
s32 TSEAError (SessionHandle session, char **message)
```

Element	Description
session	The session handle, returned by `SessionOpen()`.
message	String explaining the cause of a TSEA call failure.

Comments

The TSEE makes this call whenever a TSEA call returns a value greater than 0. Your TSEA should allocate a message buffer for each open session and supply a message indicating the cause of a failure.

Test Script Services

3

About Test Script Services

This chapter describes the Rational Test Script Services (TSS). These services can be extended to other languages or test frameworks. If you wrap these calls in the language provided by your Test Script Execution Adapter, these services are available to test script developers in that language. The services can also be directly called from C or C++ tests: see "Using Test Script Services from an External C or C++ Program" on page 261. The services are divided into the following functional categories.

Category	Description
Datapool	Provide variable data to test scripts during playback.
Logging	Log messages for reporting and analysis.
Measurement	Manage timers and test variables.
Utility	Perform common test script functions.
Monitor	Monitor test script playback progress.
Synchronization	Synchronize virtual testers in multicomputer runtime environments.
Session	Manage the test suite runtime environment.
Advanced	Perform advanced logging and measurement functions.

Datapool Services

During testing, it is often necessary to supply an application with a range of test data. Thus, in the functional test of a data entry component, you may want to try out the valid range of data, and also to test how the application responds to invalid data. Similarly, in a performance test of the same component, you may want to test storage and retrieval components in different combinations and under varying load conditions.

A *datapool* is a source of data stored in a Rational project that a test script can draw upon during playback, for the purpose of varying the test data. You create datapools from TestManager, by clicking **Tools > Manage > Datapools**. For more information, see the datapool chapter in the *Rational TestManager User's Guide*. Optionally, you can import manually created datapool information stored in flat ASCII Comma Separated Values (CSV) files, where a row is a newline-terminated line and columns are fields in the line separated by commas (or some other field-delimiting character).

Summary

Use the datapool functions listed in the following table to access and manipulate datapools within your scripts.

Function	Description
`TSSDatapoolClose()`	Closes a datapool.
`TSSDatapoolColumnCount()`	Returns the number of columns in a datapool.
`TSSDatapoolColumnName()`	Returns the name of the specified datapool column.
`TSSDatapoolFetch()`	Moves the datapool cursor to the next row.
`TSSDatapoolOpen()`	Opens the named datapool and sets the row access order.
`TSSDatapoolRewind()`	Resets the datapool cursor to the beginning of the datapool access order.
`TSSDatapoolRowCount()`	Returns the number of rows in a datapool.
`TSSDatapoolSearch()`	Searches a datapool for the named column with a specified value.
`TSSDatapoolSeek()`	Moves the datapool cursor forward.
`TSSDatapoolValue()`	Retrieves the value of the specified datapool column.

TSSDatapoolClose()

Closes a datapool.

Syntax

```
s32 TSSDatapoolClose (s32 dpid)
```

Element	Description
dpid	The ID of the datapool to close. Returned by TSSDatapoolOpen().

Return Value

This function exits with one of the following results:

- TSS_OK. Success.
- TSS_NOSERVER. No previous successful call to TSSConnect().
- TSS_INVALID. The datapool identifier is invalid.

Example

This example opens the datapool custdata with default row access and closes it.

```
s32 dpid = TSSDatapoolOpen ("custdata",0,0,NULL);
if (dpid > 0)
   s32 retVal = TSSDatapoolClose (dpid);
```

See Also

TSSDatapoolOpen()

TSSDatapoolColumnCount()

Returns the number of columns in a datapool.

Syntax

```
s32 TSSDatapoolColumnCount (s32 dpid)
```

Element	Description
dpid	The ID of the datapool. Returned by TSSDatapoolOpen().

Return Value

On success, this function returns the number of columns in the specified datapool. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The datapool identifier is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Example

This example opens the datapool `custdata` and gets the number of columns.

```
s32 dpid = TSSDatapoolOpen ("custdata",0,0,NULL);
if (dpid > 0)
   s32 columns = TSSDatapoolColumnCount (dpid);
```

TSSDatapoolColumnName()

Gets the name of the specified datapool column.

Syntax

```
char * TSSDatapoolColumnName (s32 dpid, s32 columnNumber)
```

Element	Description
dpid	The ID of the datapool. Returned by `TSSDatapoolOpen()`.
columnNumber	A positive number indicating the number of the column whose name you want to retrieve. The first column is number 1.

Return Value

On success, this function returns the name of the specified datapool column. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The datapool identifier or column number is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Example

This example opens a three-column datapool and gets the name of the third column.

```
char *colName;
s32 dpid = TSSDatapoolOpen("custdata",0,0,NULL);
if (dpid > 0)
   if (TSSDatapoolFetch(dpid) == TSS_OK)
      colName = TSSDatapoolColumnName(dpid,3);
```

TSSDatapoolFetch()

Moves the datapool cursor to the next row.

Syntax

`s32 TSSDatapoolFetch (s32 dpid)`

Element	Description
dpid	The ID of the datapool. Returned by `TSSDatapoolOpen()`.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_EOF`. The end of the datapool was reached.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The datapool identifier is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This call positions the datapool cursor on the next row and loads the row into memory. To access a column of data in the row, call `TSSDatapoolValue()`.

The “next row” is determined by the *assessFlags* passed with the open call. The default is the next row in sequence. See `TSSDatapoolOpen()`.

After a datapool is opened, a `TSSDatapoolFetch()` is required before the initial row can be accessed.

An end-of-file (TSS_EOF) condition results if a script fetches past the end of the datapool, which can occur only if access flag TSS_DP_NOWRAP was set on the open call. If the end-of-file condition occurs, the next call to TSSDatapoolValue() results in a runtime error.

Example

This example opens datapool custdata with default (sequential) access and positions the cursor to the first row.

```
s32 dpid = TSSDatapoolOpen ("custdata",0,0,NULL);
if (dpid > 0)
   s32 retVal = TSSDatapoolFetch (dpid);
```

See Also

TSSDatapoolOpen(),TSSDatapoolSeek(),TSSDatapoolValue()

TSSDatapoolOpen()

Opens the named datapool and sets the row access order.

Syntax

```
s32 TSSDatapoolOpen(char *name, u32 accessFlags, s32
   overrideCount, NamedValue *overrides)
```

Element	Description
name	The name of the datapool to open. If *accessFlags* includes TSS_DP_NO_OPEN, no CSV datapool is opened; instead, *name* refers to the contents of *overrides* specifying a one-row table. Otherwise, the CSV file *name* in the Rational project is opened.

Element	Description
accessFlags	Optional flags indicating how the datapool is accessed when a script is played back. Specify at most one value from each of the following categories: **1** Specify the sequence in which datapool rows are accessed: TSS_DP_SEQUENTIAL – Physical order (default) TSS_DP_RANDOM – Any order, including multiple access or no access TSS_DP_SHUFFLE – Access order is shuffled after each access **2** Specify what happens after the last datapool row is accessed: TSS_DP_NOWRAP – End access to the datapool (default) TSS_DP_WRAP – Go back to the beginning **3** Specify whether the datapool cursor is shared by all virtual testers or is unique to each: TSS_DP_PRIVATE – Virtual testers each work from their own sequential, random, or shuffle access order (default) TSS_DP_SHARED – All virtual testers work from the same access order **4** TSS_DP_PERSIST specifies that the datapool cursor is persistent across multiple script runs. For example, with a persistent cursor, if the row number after a suite run is 100, the first row accessed in a subsequent run is numbered 101. Cannot be used with TSS_DP_PRIVATE. Ignored if used with TSS_DP_RANDOM. **5** TSS_DP_REWIND specifies that the datapool should be rewound when opened. Ignored unless used with TSS_DP_PRIVATE. **6** TSS_DP_NO_OPEN specifies that, instead of a CSV file, the opened datapool consists only of column/value pairs specified in a local array *overrides*[].
overrideCount	The number of columns in array *overrides*. Must be greater than 0 if access flag TSS_DP_NO_OPEN is specified; otherwise, must be 0.
overrides	A local, two-dimensional array of column/value pairs, where *overrides*[n].*name* is the column name and *overrides*[n].*value* is the value returned by TSSDatapoolValue() for that column name. Unless access flag TSS_DP_NO_OPEN is present, specify as NULL.

Return Value

On success, this function returns a positive integer indicating the ID of the opened datapool. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The *`accessFlags`* argument is or results in an invalid combination.
- `TSS_NOTFOUND`. No datapool of the given *`name`* was found.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

If the *`accessFlags`* argument is specified as 0, the rows are accessed in the default order: sequentially, with no wrapping, and with a private cursor. If multiple *`accessFlags`* are specified, they must be valid combinations as explained in the syntax table.

If you close and then reopen a private-access datapool with the same *`accessFlags`* and in the same or a subsequent script, access to the datapool is resumed as if it had never been closed.

If multiple virtual testers access the same datapool in a suite, the datapool cursor is managed as follows:

- The first open that uses the `TSS_DP_SHARED` option initializes the cursor. In the same suite run (and, with the `TSS_DP_PERSIST` flag, in subsequent suite runs), virtual testers that subsequently use the same datapool opened with `TSS_DP_SHARED` share the initialized cursor.
- The first open that uses the `TSS_DP_PRIVATE` option initializes the private cursor for a virtual tester. In the same suite run, a subsequent open that uses `TSS_DP_PRIVATE` sets the cursor to the last row accessed by that virtual tester.

The `NamedValue` data type is defined as follows:

```
typedef struct {
        char *Name;
        char *Value;
} NamedValue;
```

Example

This example opens the datapool named `custdata`, with a modified row access.

```
s32 dpid = TSSDatapoolOpen ("custdata",TSS_DP_SHUFFLE |
TSS_DP_PERSIST,0,NULL);
```

See Also

`TSSDatapoolClose()`

TSSDatapoolRewind()

Resets the datapool cursor to the beginning of the datapool access order.

Syntax

```
s32 TSSDatapoolRewind (s32 dpid)
```

Element	Description
dpid	The ID of the datapool. Returned by `TSSDatapoolOpen()`.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The datapool identifier is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The datapool is rewound as follows:

- For datapools opened `DP_SEQUENTIAL`, `TSSDatapoolRewind()` resets the cursor to the first record in the datapool file.
- For datapools opened `DP_RANDOM` or `DP_SHUFFLE`, `TSSDatapoolRewind()` restarts the random number sequence.
- For datapools opened `DP_SHARED`, `TSSDatapoolRewind()` has no effect.

At the start of a suite, datapool cursors always point to the first row.

If you rewind the datapool during a suite run, previously accessed rows are fetched again.

Example

This example opens the datapool `custdata` with default (sequential) access, moves the access to the second row, and then resets access to the first row.

```
s32 dpid = TSSDatapoolOpen ("custdata",0,0,NULL);
if (dpid > 0)
{
   TSSDatapoolSeek (dpid,2);
   TSSDatapoolRewind (dpid);
};
```

TSSDatapoolRowCount()

Returns the number of rows in a datapool.

Syntax

`s32 TSSDatapoolRowCount (s32 dpid)`

Element	Description
dpid	The ID of the datapool. Returned by `TSSDatapoolOpen()`.

Return Value

On success, this function returns the number of rows in the specified datapool. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The datapool identifier is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Example

This example opens the datapool `custdata` and gets the number of rows in the datapool.

```
s32 dpid = TSSDatapoolOpen ("custdata",0,0,NULL);
if (dpid > 0)
   s32 rows = TSSDatapoolRowCount (dpid);
```

TSSDatapoolSearch()

Searches a datapool for a named column with a specified value.

Syntax

```
s32 TSSDatapoolSearch(s32 dpid, s32 keyCount, NamedValue *keys)
```

Element	Description
dpid	The ID of the datapool. Returned by `TSSDatapoolOpen()`.
keycount	The number of columns in *keys*.
keys	An array containing values to be searched for.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_EOF`. The end of the datapool was reached.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The datapool identifier is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

When a row is found containing the specified values, the cursor is set to that row.

The `NamedValue` data type is defined as follows:

```
typedef struct {
        char *Name;
        char *Value;
} NamedValue;
```

Example

This example searches the datapool `custdata` for a row containing the column named `Last` with the value `Doe`:

```
NamedValue toFind[1];
toFind[0].Name = "Last";
toFind[0].Value = "Doe";
s32 dpid = TSSDatapoolOpen("custdata",0,0,NULL);
if (dpid > 0)
   if (TSSDatapoolFetch(dpid) == TSS_OK)
      s32 rowNumber = TSSDatapoolSearch(dpid,1,toFind);
```

TSSDatapoolSeek()

Moves the datapool cursor forward.

Syntax

`s32 **TSSDatapoolSeek** (s32 *dpid*, s32 *count*)`

Element	Description
dpid	The ID of the datapool. Returned by `TSSDatapoolOpen()`.
count	A positive number indicating the number of rows to move forward in the datapool.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_EOF`. The end of the datapool was reached.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The datapool identifier is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This call moves the datapool cursor forward *count* rows and loads that row into memory. To access a column of data in the row, call `TSSDatapoolValue()`.

The meaning of "forward" depends on the *accessFlags* passed with the open call; see TSSDatapoolOpen(). This call is functionally equivalent to calling TSSDatapoolFetch() *count* times.

An end-of-file (TSS_EOF) error results if cursor wrapping is disabled (by access flag TSS_DP_NOWRAP) and *count* moves the access row beyond the last row. If TSSDatapoolValue() is then called, a runtime error occurs.

Example

This example opens the datapool custdata with the default (sequential) access and moves the cursor forward two rows.

```
s32 dpid = TSSDatapoolOpen ("custdata",0,0,NULL);
if (dpid > 0)
   TSSDatapoolSeek (dpid, 2);
```

See Also

TSSDatapoolFetch(),TSSDatapoolOpen(),TSSDatapoolValue()

TSSDatapoolValue()

Retrieves the value of the specified datapool column in the current row.

Syntax

char * **TSSDatapoolValue**(s32 *dpid*, char **columnName*)

Element	Description
dpid	The ID of the datapool. Returned by TSSDatapoolOpen().
columnName	The name of the column whose value you want to retrieve.

Return Value

On success, this function returns the value of the specified datapool column in the current row. The function exits with one of the following results:

- TSS_OK. Success.
- TSS_EOF. The end of the datapool was reached.
- TSS_NOSERVER. No previous successful call to TSSConnect().

- `TSS_INVALID`. The specified *`columnName`* is not a valid column in the datapool.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This call gets the value of the specified datapool column from the current datapool row, which has been loaded into memory either by `TSSDatapoolFetch()` or `TSSDatapoolSeek()`.

By default, the returned value is a column from a CSV datapool file located in a Rational datastore. If the datapool open call included the `TSS_DP_NO_OPEN` access flag, the returned value comes from an override list provided with the open call.

This method	Generates
`booleanValue()`	The `boolean` representation of the datapool value.
`byteValue()`	The byte representation of the datapool value.
`charValue()`	The character representation of the datapool value.
`doubleValue()`	The `double` representation of the datapool value.
`floatValue()`	The `float` representation of the datapool value.
`getBigDecimal()`	The `BigDecimal` representation of the datapool value.
`intValue()`	The `int` representation of the datapool value.
`longValue()`	The `long` representation of the datapool value.
`shortValue()`	The `short` representation of the datapool value.
`toString()`	The `String` representation of the datapool value.

Example

This example retrieves the value of the column named `Middle` in the first row of the datapool `custdata`.

```
char *colVal;
s32 dpid = TSSDatapoolOpen("custdata",0,0,NULL)
if (dpid > 0)
   if (TSSDatapoolFetch(dpid) == TSS_OK)
      colVal = TSSDatapoolValue("Middle");
```

See Also

TSSDatapoolFetch(),TSSDatapoolOpen(),TSSDatapoolSeek()

Logging Services

Use the logging functions to build the log that TestManager uses for analysis and reporting. You can log events, messages, or test case results.

A logged event is the record of something that happened. Use the environment variable EVAR_LogEvent_control to control whether or not an event is logged.

An event that gets logged may have associated data (either returned by the server or supplied with the call). Use the environment variable EVAR_LogData_control to control whether or not any data associated with an event is logged.

Summary

Use the functions listed in the following table to write to the TestManager log.

Function	Description
TSSLogEvent()	Logs an event.
TSSLogMessage()	Logs a message event.
TSSLogTestCaseResult()	Logs a test case event.

TSSLogEvent()

Logs an event.

Syntax

```
s32 TSSLogEvent (char *eventType, s16 result, char
   *description, s32 propertyCount, NamedValue *property)
```

Element	Description
eventType	Contains the description to be displayed in the log for this event.

Element	Description
result	Specifies the notification preference regarding the result of the call. Can be one of the following: ▪ TSS_LOG_RESULT_NONE (default: no notification) ▪ TSS_LOG_RESULT_PASS ▪ TSS_LOG_RESULT_FAIL ▪ TSS_LOG_RESULT_WARN ▪ TSS_LOG_RESULT_STOPPED ▪ TSS_LOG_RESULT_INFO ▪ TSS_LOG_RESULT_COMPLETED ▪ TSS_LOG_RESULT_UNEVALUATED 0 specifies the default.
description	Contains the string to be put in the entry's failure description field.
propertyCount	Specifies the number of rows in the property array.
property	An array containing property name/value pairs, where property[n].name is the property name and property[n].value is its value.

Return Value

This function exits with one of the following results:

- TSS_OK. Success.
- TSS_NOSERVER. No previous successful call to TSSConnect().
- TSS_INVALID. An unknown *result* was specified.
- TSS_ABORT. Pending abort resulting from a user request to stop a suite run.

Comments

The event and any data associated with it are logged only if the specified result preference matches associated settings in the EVAR_LogData_control or EVAR_LogEvent_control environment variables. Alternatively, the logging preference can be set with the EVAR_Log_leveland EVAR_Record_level environment variables. The TSS_LOG_RESULT_STOPPED, TSS_LOG_RESULT_COMPLETED, and TSS_LOG_RESULT_UNEVALUATED preferences are intended for internal use.

`NamedValue` is defined as follows:

```
typedef struct {
        char *Name;
        char *Value;
} NamedValue;
```

Example

This example logs the beginning of an event of type `Login Dialog`.

```
NamedValue scriptProp[2];
scriptProp[0].Name = "ScriptName";
scriptProp[0].Value = "Login";
scriptProp[1].Name = "LineNumber";
scriptProp[1].Value = "1";
s32 retVal = TSSLogEvent("Login Dialog",0,"Login script failed",
2,scriptProp);
```

TSSLogMessage()

Logs a message.

Syntax

```
s32 TSSLogMessage(char *message, s16 result, char *description)
```

Element	Description
message	Specifies the string to log.
result	Specifies the notification preference regarding the result of the call. Can be one of the following: ▪ `TSS_LOG_RESULT_NONE` (default: no notification) ▪ `TSS_LOG_RESULT_PASS` ▪ `TSS_LOG_RESULT_FAIL` ▪ `TSS_LOG_RESULT_WARN` ▪ `TSS_LOG_RESULT_STOPPED` ▪ `TSS_LOG_RESULT_INFO` ▪ `TSS_LOG_RESULT_COMPLETED` ▪ `TSS_LOG_RESULT_UNEVALUATED` `0` specifies the default.
description	Specifies the string to be put in the entry's failure description field.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

An event and any data associated with it are logged only if the specified *`result`* preference matches associated settings in the `EVAR_LogData_control` or `EVAR_LogEvent_control` environment variables.

Alternatively, the logging preference can be set with the `EVAR_Log_level` and `EVAR_Record_level` environment variables. The TSS_LOG_RESULT_STOPPED, TSS_LOG_RESULT_COMPLETED, and TSS_LOG_RESULT_UNEVALUATED preferences are intended for internal use.

Example

This example logs the following message: `--Beginning of timed block T1--`.

```
TSSLogMessage ("--Beginning of timed block T1--", 0, NULL);
```

TSSLogTestCaseResult()

Logs a test case result.

Syntax

```
s32 TSSLogTestCaseResult (char *testcase, s16 result, char
   *description, s32 propertyCount, NamedValue *property[])
```

Element	Description
testcase	Identifies the test case whose result is to be logged.

Element	Description
result	Specifies the notification preference regarding the result of the call. Can be one of the following: ▪ TSS_LOG_RESULT_NONE (default: no notification) ▪ TSS_LOG_RESULT_PASS ▪ TSS_LOG_RESULT_FAIL ▪ TSS_LOG_RESULT_WARN ▪ TSS_LOG_RESULT_STOPPED ▪ TSS_LOG_RESULT_INFO ▪ TSS_LOG_RESULT_COMPLETED ▪ TSS_LOG_RESULT_UNEVALUATED 0 specifies the default.
description	Contains the string to be displayed in the event of a log failure.
propertyCount	Specifies the number of rows in the property array.
property	An array containing property name/value pairs, where property[n].name is the property name and property[n].value is its value.

Return Value

This function exits with one of the following results:

- TSS_OK. Success.
- TSS_NOSERVER. No previous successful call to TSSConnect().
- TSS_ABORT. Pending abort resulting from a user request to stop a suite run.

Comments

A test case is a condition, specified in a list of property name/value pairs, that you are interested in. This function searches for the test case and logs the result of the search.

An event and any data associated with it are logged only if the specified *result* preference matches associated settings in the EVAR_LogData_control or EVAR_LogEvent_control environment variables. Alternatively, the logging preference may be set by the EVAR_Log_level and EVAR_Record_level environment variables. The TSS_LOG_RESULT_STOPPED, TSS_LOG_RESULT_COMPLETED, and TSS_LOG_RESULT_UNEVALUATED preferences are intended for internal use.

The `NamedValue` data type is defined as follows:

```
typedef struct {
        char *Name;
        char *Value;
} NamedValue;
```

Example

This example logs the result of a test case named `Verify login`.

```
NamedValue loginResult[1];
loginResult[0].Name = "Result";
loginResult[0].Value = "OK";
s32 retVal = TSSLogTestCaseResult("Verify login", 0, NULL,
1,loginResult);
```

Measurement Services

Use the measurement functions to set timers and environment variables to get the value of internal variables. Timers allow you to gauge how much time is required to complete specific activities under varying load conditions. Environment variables allow for the setting and passing of information to virtual testers during script playback. Internal variables store information used by the TestManager to initialize and reset virtual tester parameters during script playback.

Summary

The following table lists the measurement functions.

Function	**Description**
`TSSCommandEnd()`	Logs an end-command event.
`TSSCommandStart()`	Logs a start-command event.
`TSSEnvironmentOp()`	Sets an environment variable.
`TSSGetTime()`	Gets the elapsed time of a run.
`TSSInternalVarGet()`	Gets the value of an internal variable.
`TSSThink()`	Sets a think-time delay.
`TSSTimerStart()`	Marks the start of a block of actions to be timed.

Function	Description
`TSSTimerStop()`	Marks the end of a block of timed actions.

TSSCommandEnd()

Marks the end of a timed command.

Syntax

```
s32 TSSCommandEnd(s16 result, char *description, s32 starttime,
   s32 endtime, char *logdata, s32 propertyCount, NamedValue
   *property)
```

Element	Description
result	Specifies the notification preference regarding the result of the call. Can be one of the following: ▪ TSS_LOG_RESULT_NONE (default: no notification) ▪ TSS_LOG_RESULT_PASS ▪ TSS_LOG_RESULT_FAIL ▪ TSS_LOG_RESULT_WARN ▪ TSS_LOG_RESULT_STOPPED ▪ TSS_LOG_RESULT_INFO ▪ TSS_LOG_RESULT_COMPLETED ▪ TSS_LOG_RESULT_UNEVALUATED. 0 specifies the default.
description	Contains the string to be displayed in the event of failure.
starttime	An integer indicating a time stamp to override the time stamp set by `TSSCommandStart()`. To use the time stamp set by `TSSCommandStart()`, specify as 0.
endtime	An integer indicating a time stamp to override the current time. To use the current time, specify as 0.
logdata	Text to be logged describing the ended command.
propertyCount	Specifies the number of rows in the property array.
property	An array containing property name/value pairs, where `property[n].name` is the property name and `property[n].value` is its value.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The command name and label entered with `TSSCommandStart()` are logged, and the run state is restored to the value that existed before the `TSSCommandStart()` call.

An event and any data associated with it are logged only if the specified *`result`* preference matches associated settings in the `EVAR_LogData_control` or `EVAR_LogEvent_control` environment variables. Alternatively, the logging preference can be set with the `EVAR_Log_level` and `EVAR_Record_level` environment variables. The TSS_LOG_RESULT_STOPPED, TSS_LOG_RESULT_COMPLETED, and TSS_LOG_RESULT_UNEVALUATED preferences are intended for internal use.

The `NamedValue` data type is defined as follows:

```
typedef struct {
        char *Name;
        char *Value;
} NamedValue;
```

Example

This example marks the end of the timed activity specified by the previous `TSSCommandStart()` call.

```
s32 retVal = TSSCommandEnd(TSS_LOG_RESULT_PASS,"Command timer failed",
0, 0,"Login command completed", NULL);
```

See Also

`TSSCommandStart(), TSSLogCommand()`

TSSCommandStart()

Starts a timed command.

Syntax

```
s32 TSSCommandStart (char *label, char *name, RunState state)
```

Element	Description
label	The name of the timer to be started and logged, or NULL for an unlabeled timer.
name	The name of the command to time.
state	The run state to log with the timed command. See the run state table starting on page 90. You can enter 0 (MST_UNDEF) if you're uninterested in the run state.

Return Value

This function exits with one of the following results:

- TSS_OK. Success.
- TSS_NOSERVER. No previous successful call to TSSConnect().
- TSS_ABORT. Pending abort resulting from a user request to stop a suite run.

Comments

A *command* is a user-defined name appearing in the log of a test run. By placing TSSCommandStart() and TSSCommandEnd() calls around a block of lines in a script, you can log the time required to complete the actions in the block.

During script playback, TestManager displays progress for different virtual testers. What is displayed for a group of actions associated by TSSCommandStart() depends on the run state argument. Run states are listed in the run state table starting on page 90.

TSSCommandStart() increments IV_cmdcnt, sets the name, label, and run state for TestManager, and sets the beginning time stamp for the log entry. TSSCommandEnd() restores the TestManager run state to the run state that was in effect immediately before TSSCommandStart().

Example

This example starts timing the period associated with the string Login.

```
s32 retVal = TSSCommandStart("initTimer","Login",MST_WAITRESP);
```

See Also

`TSSCommandEnd()`, `TSSLogCommand()`

TSSEnvironmentOp()

Sets a virtual tester environment variable.

Syntax

```
s32 TSSEnvironmentOp(EvarKey envVar, EvarOp envOp, EvarValue
   *envVal)
```

Element	Description
envVar	The environment variable to operate on. See "Arguments of TSSEnvironmentOp()" on page 270for a list and description of environment variable constants.
envOp	The operation to perform. See "Arguments of TSSEnvironmentOp()" on page 270 for a list and description of the operation constants..
envVal	The value operated on as specified by *envOp* to produce the new value for *envVar*.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The timer label is invalid, or there is no unlabeled timer to stop.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

Environment variables define and control the environment of virtual testers. Using environment variables allows you to test different assumptions or runtime scenarios without re-writing your test scripts. For example, you can use environment variables to specify:

- A virtual tester's average think time, the maximum think time, and how the think time is mathematically distributed around a mean value.

- How long to wait for a response from the server before timing out.
- The level of information that is logged and available to reports.

See "Arguments of TSSEnvironmentOp()" on page 270 for a list and description of the values that can be used for argument `envVar`.

Environment control options allow a script to control a virtual tester's environment by operating on the environment variables. Every environment variable has, instead of a single value, a group of values: a default value, a saved value, and a current value.

- **default** – The value of an environment variable before any commands are applied to it. Environment variables are automatically initialized to a default value, and, like persistent variables, retain their values across scripts. The `reset` command resets the default value, as listed in the following table.
- **saved** – The saved value of an environment variable can be used as one way to retain the present value of the environment variable for later use. The `save` and `restore` commands manipulate the saved value.
- **current** – TSS supports a last-in-first-out "value stack" for each environment variable. The current value of an environment variable is simply the top element of that stack. The current value is used by all of the commands. The `push` and `pop` commands manipulate the stack.

See the table on page 276 for the values that can be used for argument `envOp`.

`EvarOP` is defined as follows:

```
typedef enum EvarOP EvarOP;
enum EvarOP {
   EVOP_eval,
   EVOP_pop,
   EVOP_push,
   EVOP_reset,
   EVOP_restore,
   EVOP_save,
   EVOP_set,
   EVOP_END
};
```

`EvarKey` is defined as follows:

```
typedef enum EvarKey EvarKey;
enum EvarKey {
   EVAR_Think_avg = 0,
   EVAR_Think_sd,
   EVAR_Think_dist,
   EVAR_Think_def,
   EVAR_Think_max,
   EVAR_Think_dly_scale,
```

```
    EVAR_Think_cpu_threshold,
    EVAR_Think_cpu_dly_scale,
    EVAR_Initial_dly_max,
    EVAR_Delay_dly_scale,
    EVAR_Log_level,
    EVAR_Record_level,
    EVAR_Suspend_check,
    EVAR_LogEvent_control
    EVAR_LogData_control
    EVAR_TSSDisable
    EVAR_END
};
```

`EvarValue` is defined as follows:

```
typedef union EvarValue EvarValue;
union EvarValue {
s32     envInt;
char    *envStr;
s32     envSet;
};
```

where:

- `envInt` is used for integer environment variables.
- `envStr` is used for string environment variables that may have unrestricted values.
- `envSet` specifies the index into a set of specific values used for string environment variables that have a predefined set of possible values.

Example

This example gets the current value of `EVAR_Think_dist`. For a more extensive illustration of environment variable manipulation, see "Example: Manipulating Environment Variables" on page 277.

```
char *cur_dist;
s32 retval = TSSEnvironmentOp (EVAR_Think_dist, EVOP_eval, cur_dist);
```

TSSGetTime()

Gets the elapsed time since the beginning of a suite run.

Syntax

```
s32 TSSGetTime(void)
```

Return Value

On success, this function returns the number of milliseconds elapsed in a suite run. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

For execution within TestManager, this call retrieves the time elapsed since the start time shared by all virtual testers in all test scripts in a suite.

For a test script executed outside TestManager, the time returned is the milliseconds elapsed since the call to `TSSSession.Connect()`, or since the value of `CTXT_timeZero` set by `TSSContext()`.

Example

This example stores the elapsed time in *etime*.

```
s32 etime = TSSGetTime();
```

TSSInternalVarGet()

Gets the value of an internal variable.

Syntax

```
s32 TSSInternalVarGet(IVKey internVar, IVValue *ivVal)
```

Element	Description
internVar	The internal variable to operate on. See “Arguments of TSSInternalVarGet()” on page 279 for a list and description of the internal variable constants.
ivVal	OUTPUT. The returned value of the specified *internVar*.

Return Value

This function returns one of the following values:

- `TSS_OK`. Success.

- TSS_NOSERVER. No previous successful call to TSSConnect().
- TSS_INVALID. The timer label is invalid, or there is no unlabeled timer to stop.
- TSS_ABORT. Pending abort resulting from a user request to stop a suite run.

Comments

Internal variables contain detailed information that is logged during script playback and used for performance analysis reporting. This function allows you to customize logging and reporting detail.

The data type IVKey is defined as follows:

```
typedef enum IVKey IVKey;
enum IVKey {
   IV_fcs_ts,
   IV_lcs_ts,
   IV_fcr_ts,
   IV_lcr_ts,
   IV_lineno,
   IV_cmdcnt,
   IV_uid,
   IV_ncxmit,
   IV_ncrecv,
   IV_ncnull,
   IV_nusers,
   IV_nkxmit,
   IV_nrows,
   IV_ncols,
   IV_row,
   IV_col,
   IV_fs_ts,
   IV_ls_ts,
   IV_fr_ts,
   IV_lr_ts,
   IV_nxmit,
   IV_nrecv,
   IV_button_no,
   IV_fuxe_ts,
   IV_luxe_ts,
   IV_uxe_cnt,
   IV_ig_fs_ts,
   IV_ig_ls_ts,
   IV_ig_eot_ts,
   IV_prev_ig_fs_ts,
   IV_prev_ig_ls_ts,
   IV_npixels_act,
   IV_npixels_exp,
   IV_npixels_diff,
   IV_xwin_diff_level,
   IV_screen,
   IV_error,
```

```
    IV_total_rows,
    IV_statement_id,
    IV_error_logs,
    IV_cursor_id,
    IV_fc_ts,
    IV_lc_ts,
    IV_total_nrecv,
    IV_error_type,
    IV_tux_tpurcode,
    IV_command,
    IV_response,
    IV_source_file,
    IV_task_file,
    IV_cmd_id,
    IV_mcommand,
    IV_alltext,
    IV_error_text,
    IV_column_headers,
    IV_total_response,
    IV_script,
    IV_version,
    IV_user_group,
    IV_host,
    IV_refURI,
    IV_END
};
```

The `IVValue` data type is defined as follows:

```
typedef union IVValue IVValue;
union IVValue {
s32     ivInt;
char    *ivStr;
};
```

where `ivInt` is used for integer internal variables and `ivStr` for string internal variables.

Example

This example stores the current value of the `IV_error` internal variable in `IVVal`.

```
s32 retVal = TSSInternalVarGet(IV_error,IVVal);
```

TSSThink()

Puts a time delay in a script that emulates a pause for thinking.

Syntax

```
s32 TSSThink(s32 thinkAverage)
```

Element	Description
thinkAverage	If specified as 0 , the number of milliseconds stored in the `Think_avg` environment variable is used as the basis of the calculation. Otherwise, the calculation is based on the value specified.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

A think-time delay is a pause inserted in a performance test script in order to emulate the behavior of actual application users.

For a description of environment variables, see `TSSEnvironmentOp()` on page 54.

Example

This example calculates a pause based on the value stored in the environment variable `Think_avg` and inserts the pause into the script.

```
s32 retVal = TSSThink(0);
```

See Also

`TSSThinkTime()`

TSSTimerStart()

Marks the start of a block of actions to be timed.

Syntax

```
s32 TSSTimerStart(char *label, s32 timeStamp)
```

Element	Description
label	The name of the timer to be inserted into the log. If specified as NULL, an unlabeled timer is created. Only one unlabeled timer is supported at a time.
timeStamp	An integer specifying a time stamp to override the current time. If specified as 0, the current time is logged.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This call associates a starting time stamp with *label* for later reference by `TSSTimerStop()`. The TestManager reporting system uses captured timing information for performance analysis reports.

Starting an unlabeled timer sets a start time for an event that you want to subdivide into timed intervals. See the example for `TSSTimerStop()`. You can get a similar result using named timers, but there will be a slight difference in the timing calculation due to the overhead of starting a timer.

Example

This example times actions designated `event1`, logging the current time.

```
TSSTimerStart("event1",0);
/* action to be timed */
TSSTimerStop("event1",0);
```

See Also

`TSSTimerStop()`

TSSTimerStop()

Marks the end of a block of timed actions.

Syntax

```
s32 TSSTimerStop(char *label, s32 timeStamp, u32 rmFlag)
```

Element	Description
label	The name to be logged.
timeStamp	An integer indicating the time stamp to log. If specified as 0, the current time is used.
rmFlag	Specify as 0to stop the timer without removing it; otherwise, specify as nonzero. A timer that is not removed can be stopped multiple times in order to measure intervals of this timed event.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The timer label is invalid, or there is no unlabeled timer to stop.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

Normally, this call associates an ending time stamp with a label specified with `TSSTimerStart()`. If the specified *`label`* was not set by a previous `TSSTimerStart()` but an unlabeled timer exists, this call logs an event using the specified label and the start time specified for the unlabeled timer with `TSSTimerStart()`. If `rmFlag` is specified as 0, multiple invocations of `TSSTimerStop()` are allowed against a single `TSSTimerStart()`. This usage (see the example) allows you to subdivide a timed event into separate timed intervals.

Example

This example stops an unlabeled timer without removing it. In the log, `event1` and `event2` will record the time elapsed since the `TSSTimerStart()` call.

```
TSSTimerStart(NULL,0);
/* action to be timed */
TSSTimerStop("event1",0,0);
/* another action to be timed */
TSSTimerStop("event2",0,0);
```

See Also

`TSSTimerStart()`

Utility Services

Use the utility functions to perform actions common to many test scripts.

Summary

The following table lists the utility functions.

Function	Description
`TSSApplicationPid()`	Gets the process ID of an application.
`TSSApplicationStart()`	Starts an application.
`TSSApplicationWait()`	Waits for an application to terminate.
`TSSDelay()`	Delays the specified number of milliseconds.
`TSSErrorDetail()`	Retrieves error information about a failure.
`TSSGetComputerConfiguration AttributeList()`	Gets the list of computer configuration attributes and their values.
`TSSGetComputerConfiguration AttributeValue()`	Gets the value of a computer configuration attribute.
`TSSGetPath()`	Gets a pathname.
`TSSGetScriptOption()`	Gets the value of a script playback option.
`TSSGetTestCaseConfiguration Attribute()`	Gets the value of a test case configuration attribute.
`TSSGetTestCaseConfiguration AttributeList()`	Gets the list of test case configuration attributes and their values.

Function	Description
`TSSGetTestCaseConfigurationName()`	Gets the name of the configuration (if any) associated with the current test case.
`TSSGetTestCaseName()`	Gets the name of the test case in use.
`TSSGetTestToolOption()`	Gets a test case tool option.
`TSSJavaApplicationStart()`	Starts a Java application.
`TSSNegExp()`	Gets the next negative exponentially distributed random number with the specified mean.
`TSSRand()`	Gets the next random number.
`TSSSeedRand()`	Seeds the random number generator.
`TSSStdErrPrint()`	Prints a message to the virtual tester's error file.
`TSSStdOutPrint()`	Prints a message to the virtual tester's output file.
`TSSUniform()`	Gets the next uniformly distributed random number in the specified range.
`TSSUniqueString()`	Returns a unique text string.

TSSApplicationPid()

Gets the process ID of an application.

Syntax

`s32` **`TSSApplicationPid`**`(TSSAppHandle` *`appHandle`*`)`

Element	Description
`appHandle`	The ID of the application whose PID you want to get. Returned by `TSSApplicationStart()` or `TSSJavaApplicationStart()`.

Return Value

On success, this function returns the system process ID of the specified application. On failure, it returns 0: call `TSSErrorDetail()` for information.

Comments

This function works for applications started by `TSSApplicationStart()` or `TSSJavaApplicationStart()`.

A successful invocation does not imply that the application whose PID is returned is still alive nor guarantee that the application is still running under this PID.

Example

This example returns the PID of application `myApp`.

```
TSSAppHandle myAppHandle = TSSApplicationStart("myAPP", "d:\myDir",
0);
s32 myAppPID = TSSApplicationPid (myAppHandle);
```

See Also

`TSSApplicationStart()`, `TSSApplicationWait()`, `TSSJavaApplicationStart()`

TSSApplicationStart()

Starts an application.

Syntax

```
TSSAppHandle TSSApplicationStart(char *appHandle, char
   *workingDir, u32 flags)
```

Element	Description
appHandle	The pathname of the application to be started, which can include options and arguments. The file suffix can be omitted.
workingDir	The directory in which to start the application. The current directory if specified as "".
flags	Reserved for future use. Specify as 0.

Return Value

On success, this function returns a handle for the started application. On failure, it returns 0: call `TSSErrorDetail()` for information.

Comments

`TSSAppHandle` is defined as: `typedef void *TSSAPPHandle`.

Example

This example starts application `myApp`.

```
TSSAppHandle myAppHandle = TSSApplicationStart("myAPP", "d:\myDir",
0);
```

See Also

`TSSApplicationPid()`, `TSSApplicationWait()`, `TSSJavaApplicationStart()`

TSSApplicationWait()

Waits for an application to terminate.

Syntax

```
s32 TSSApplicationWait(TSSAppHandle app, s32 *exitStatus, s32
   timeout)
```

Element	Description
app	The application that you are waiting for. Returned by `TSSApplicationStart()` or `TSSJavaApplicationStart()`.
exitStatus	OUTPUT. If not NULL, the exit status of *app*.
timeout	The number of milliseconds to wait for *app* to terminate or 0 to return immediately.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_FAIL`. The application was still running when the time-out expired.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_SYSERROR`. The system returned an error: call `TSSErrorDetail()` for information.

- `TSS_NOTFOUND`. The process indicated by *app* was not found. It may have terminated before this call or *app* may be an invalid handle.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This function works for applications started by `TSSApplicationStart()` or `TSSJavaApplicationStart()`.

If *app* is still running at the time this call returns, *exitStatus* contains NULL. If *app* has terminated at the time of return, *exitStatus* contains its termination code.

Example

This example waits 600 milliseconds for application `myApp` to terminate.

```
s32 termStatus;
TSSAppHandle myAppHandle = TSSApplicationStart("myAPP", "d:\myDir",
0);
s32 retval = TSSApplicationWait (myAppHandle, termStatus, 600);
```

See Also

`TSSApplicationPid()`, `TSSApplicationStart()`, `TSSJavaApplicationStart()`

TSSDelay()

Delays script execution for the specified number of milliseconds.

Syntax

```
s32 TSSDelay(s32 msecs)
```

Element	Description
msecs	The number of milliseconds to delay script execution.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The delay is scaled as indicated by the contents of the `EVAR_Delay_dly_scale` environment variable. The accuracy of the time delayed is subject to operating system limitations.

Example

This example delays execution for 10 milliseconds.

```
s32 retVal = TSSDelay(10);
```

TSSErrorDetail()

Retrieves error information about a failure.

Syntax

```
s32 TSSErrorDetail(char *errorText, s32 *len)
```

Element	Description
errorText	OUTPUT. Returned explanatory error message about the previous TSS call, or an empty string ("") if the previous TSS call did not fail.
len	The length of string *errorText*.

Return Value

This function returns `TSS_OK` if the previous call succeeded. If the previous call failed, TSSErrorDetail() returns one of the error codes listed below and corresponding *errorText*.

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

If the message is too long to fit in *errorText*, it is truncated to *len* and *len* is updated to the message length.

Example

This example opens a datapool and, if there is an error, displays the associated error message text.

```
char message[256];
s32  dpid, ecode, msglen = 256;
dpid = TSSDatapoolOpen ("custdata",0,0,NULL);
if (dpid < 0)
{
   /* open failed, report error */
   ecode = TSSErrorDetail(message, &msglen);
   fprintf(stderr, "TSSDatapoolOpen failed.  code: %d, message: %s\n",
ecode, message);
}
```

TSSGetComputerConfigurationAttributeList()

Gets the list of computer configuration attributes and their values.

Syntax

```
s32 TSSGetComputerConfigurationAttributeList (NamedValue[]
    **config, s32 *count)
```

Element	Description
config	OUTPUT. An array containing configuration name/value pairs, where `config[n].name` is the attribute name and `config[n].value` is its value.
count	OUTPUT. The number of rows in the *config* array.

Return Value

On success, this function returns an array of computer configuration attribute names and their values. It exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

You create and maintain computer configuration attributes from TestManager. This call returns the current settings.

The pointer to *config* is valid until the next call of this function. The `NamedValue` data type is defined as follows:

```
typedef struct {
        char *Name;
        char *Value;
} NamedValue;
```

Example

This example returns the current computer configuration attribute list.

```
s32 npairs;
NamedValue *config;
s32 retVal = TSSGetComputerConfigurationAttributeList (&config,
&npairs);
```

See Also

`TSSGetComputerConfigurationAttributeValue()`

TSSGetComputerConfigurationAttributeValue()

Gets the value of computer configuration attribute.

Syntax

```
char *TSSGetComputerConfigurationAttributeValue (char *name)
```

Element	Description
name	The `name` of the computer configuration attribute whose value is to be returned.

Return Value

On success, this function returns a handle for the started application. On failure, it returns NULL: call `TSSErrorDetail()` for information.

Example

This example returns the value of the configuration attribute `Operating System`.

```
char *OSVal = TSSGetComputerConfigurationAttributeValue("Operating
System");
```

See Also

`TSSGetComputerConfigurationAttributeList()`

TSSGetPath()

Gets the root path of a test asset.

Syntax

```
char *TSSGetPath (u32 pathKey)
```

Element	Description
pathKey	Specifies one of these values: ▪ `TSS_SOURCE_PATH` to get the root path of the test script source from which the currently executing test script was selected. On an agent, this is the root of the destination to which files are copied from the local computer. ▪ `TSS_ATTACHED_LOG_FILE_PATH` to get the root of files attached to the log.

Return Value

On success, this function returns the root of the currently executing test script or of the files attached to the log. On failure, it returns NULL: call `TSSErrorDetail()` for information.

Comments

The root path returned by this function might be the exact location where an asset is stored, but it need not be. For example, in the fully-qualified pathname C:\Datastore\TestScripts, C: might be the root path and Datastore\TestScripts a pathname relative to the root path.

For test scripts run from TestManager, the returned root path is a value in shared memory for the current virtual tester at the time of the call. For test scripts run stand-alone (outside TestManager), the returned root path is a value set by `TSSContext()`.

Example

This example returns the root path of the source from which the currently executing test script was selected.

```
char *scriptPath = TSSGetPath(TSS_SOURCE_PATH);
```

See Also

`TSSContext()`, `TSSUniqueString()`

TSSGetScriptOption()

Gets the value of a test script playback option.

Syntax

```
char *TSSGetScriptOption(char *optionName)
```

Element	Description
optionName	The name of the script option whose value is returned.

Return Value

On success, this function returns the value of the specified script option, or NULL if the value specified is not used by the execution adapter. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

TestManager users can set the values of test script playback options. These may be options specifically supported by a Test Script Execution Adapter (TSEA), or arbitrarily named user-defined options. The common way to use test script options in a test script is to query an option's value with this call and branch according to its returned value. For implementation details about test script options and instructions on how to set options from TestManager, see "Using Test Script Options" on page 12.

Example

This example gets the current value of a hypothetical script option named `repeat_count`. The returned pointer to *optVal* is valid until the next `TSSGetScriptOption()` call.

```
char *optVal;
if (optVal = TSSGetScriptOption("repeat_count"))
   printf("The value of repeat_count is %s\n", repeat_count);
```

See Also

SessionSetOption(), TaskSetOption()

TSSGetTestCaseConfigurationAttribute()

Gets the value of the specified test case configuration attribute.

Syntax

```
s32 *TSSGetTestCaseConfigurationAttribute (char *name,
   TestCaseConfigurationAttribute *config)
```

Element	Description
name	Specifies the name of the configuration attribute to be returned.
config	OUTPUT. The returned test case configuration value.

Return Value

On success, this function returns the value of the specified test case configuration attribute. It exits with one of the following results:

- `TSS_OK`. Success.

- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

You create and maintain test case configuration attributes from TestManager. This call returns the value of the specified attribute for the current test case.

The `TestCaseConfigurationAttribute` data type is defined as follows:

```
typedef struct {
        char *name;
        char *operator
        char *value;
} TestCaseConfigurationAttribute;
```

Example

This example returns the value of the configuration attribute `Operating System`.

```
TestCaseConfigurationAttribute OSVal =
TSSGetTestCaseConfigurationAttribute("Operating System");
```

See Also

`TSSGetTestCaseConfigurationAttributeList()`

TSSGetTestCaseConfigurationAttributeList()

Gets the list of test case configuration attributes and their values.

Syntax

```
s32 *TSSGetTestCaseConfigurationAttributeList
   (TestCaseConfigurationAttribute **config, s32 *count)
```

Element	Description
config	OUTPUT. An array containing configuration name/operator/value triplets, where `config[n].name` is the attribute name, `config[n].operator` is the operator, and `config[n].value` is the attribute value.
count	OUTPUT. The number of rows in the *config* array.

Return Value

On success, this function returns an array of test case configuration attribute names, base values, and operators. It exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

You create and maintain test case configuration attributes from TestManager. This call returns the current settings for the current test case.

The `TestCaseConfigurationAttribute` data type is defined as follows:

```
typedef struct {
        char *name;
        char *operator
        char *value;
} TestCaseConfigurationAttribute;
```

Example

This example returns the current test case configuration attribute list.

```
s32 nrows;
TestCaseConfigurationAttribute *config;
s32 retVal = TSSGetTestCaseConfigurationAttributeList (&config,
&nrows);
```

See Also

`TSSGetTestCaseConfigurationAttribute()`

TSSGetTestCaseConfigurationName()

Gets the name of the configuration (if any) associated with the current test case.

Syntax

```
char *TSSGetTestCaseConfigurationName(void)
```

Return Value

On success, this function returns the name of the configuration associated with the test case in use. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

A test case specifies the pass criteria for something that needs to be tested. A configured test case is one that TestManager can execute and resolve as pass or fail.

Example

This example retrieves the name of a test case configuration.

```
char *tcConfig = TSSGetTestCaseConfigurationName();
```

TSSGetTestCaseName()

Gets the name of the test case in use.

Syntax

```
char *TSSGetTestCaseName(void)
```

Return Value

On success, this function returns the name of the current test case. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

Created from TestManager, a test case specifies the pass criteria for something that needs to be tested.

The returned pointer to *`testcase`* is valid until the next `TSSTestCaseName()` call.

Example

This example stores the name of the test case in use in `tcName`.

```
char *tcName;
if (tcName = TSSGetTestCaseName())
   printf("The test case is %s\n, tcName");
```

TSSGetTestToolOption()

Gets the value of a test tool execution option.

Syntax

```
char *TSSGetTestToolOption(char *optionName)
```

Element	Description
optionName	The name of the test tool execution option whose value is returned.

Return Value

On success, this function returns the value of the specified test tool execution option. On failure, it returns NULL: call `TSSErrorDetail()` for information.

Comments

If you develop adapters for a new test script type that support options, you can use this call to get the value of a specified option.

Example

This example returns the value of an option called `persist`.

```
char *optval = TSSGetTestToolOption ("persist");
```

TSSJavaApplicationStart()

Starts a Java application.

Syntax

```
TSSAppHandle TSSJavaApplicationStart(char *app, char
   *workingDir, char *classPath, char *JVM, char *JVMOptions)
```

Element	Description
app	The pathname of the application to be started, which can include options and arguments. The file suffix can be omitted.
workingDir	The directory in which to start the application.
classPath	The Java CLASSPATH or NULL. The specified value replaces the current CLASSPATH.
JVM	The pathname of Java Virtual Machine. If specified as NULL, java.exe is used on Windows machines and java on UNIX agent platforms.
JVMOptions	Any valid JVM options or NULL.

Return Value

On success, this function returns a handle for the started application. On failure, it returns NULL: call `TSSErrorDetail()` for information.

Comments

TSSAppHandle is defined as: `typedef void *TSSAPPHandle`.

Example

This example starts application `myJavaApp`.

```
TSSAppHandle myAppHandle = TSSJavaApplicationStart("myJavaAPP", "",
"", "", "");
```

See Also

`TSSApplicationPid()`, `TSSApplicationStart()`, `TSSApplicationWait()`

TSSNegExp()

Gets the next negative exponentially distributed random number with the specified mean.

Syntax

```
s32 TSSNegExp(s32 mean)
```

Element	Description
mean	The mean value for the distribution.

Return Value

This function returns the next negative exponentially distributed random number with the specified mean, or –1 if there is an error. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The behavior of the random number generator routines is affected by the settings of the **Seed** and **Seed Flags** options in a TestManager suite. By default, TestManager sets unique seeds for each virtual tester, so that each has a different random number sequence.

If the error return value –1 is a legitimate value for the specified mean, then `TSSErrorDetail()` returns `TSS_OK`.

Example

This example seeds the generator and gets a random number with a mean of 10.

```
s32 retVal = TSSSeedRand(10);
s32 next = TSSNegExp(10);
```

See Also

`TSSRand()`, `TSSSeedRand()`, `TSSUniform()`

TSSRand()

Gets the next random number.

Syntax

```
s32 TSSRand(void)
```

Return Value

This function returns the next random number in the range 0 to 32767, or –1 if there is an error. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The behavior of the random number generator routines is affected by the settings of the **Seed** and **Seed Flags** options in a TestManager suite. By default, TestManager sets unique seeds for each virtual tester, so that each has a different random number sequence.

Example

This example gets the next random number.

```
s32 next = TSSRand();
```

See Also

`TSSSeedRand()`, `TSSNegExp()`, `TSSUniform()`

TSSSeedRand()

Seeds the random number generator.

Syntax

```
s32 TSSSeedRand(u32 seed)
```

Element	Description
seed	The base integer.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.

- TSS_NOSERVER. No previous successful call to TSSConnect().
- TSS_ABORT. Pending abort resulting from a user request to stop a suite run.

Comments

The behavior of the random number generator routines is affected by the settings of the **Seed** and **Seed Flags** options in a TestManager suite. By default, TestManager sets unique seeds for each virtual tester, so that each has a different random number sequence.

TSSSeedRand() uses the argument *seed* as a seed for a new sequence of random numbers to be returned by subsequent calls to the TSSRand() routine. If TSSSeedRand() is then called with the same seed value, the sequence of random numbers is repeated. If TSSRand() is called before any calls are made to TSSSeedRand(), the same sequence is generated as when TSSSeedRand() is first called with a seed value of 1.

Example

This example seeds the random number generator with the number 10:

```
s32 retVal = TSSSeedRand(10);
```

See Also

TSSRand(), TSSNegExp(), TSSUniform()

TSSePrint()

Prints a message to the virtual tester's error file.

Syntax

```
s32 TSSePrint(char *message)
```

Element	**Description**
message	The string to print.

Return Value

This function exits with one of the following results:

- TSS_OK. Success.

- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Example

This example prints to the error file the message `Login failed`.

```
s32 retVal = TSSePrint("Login failed");
```

See Also

`TSSPrint()`

TSSPrint()

Prints a message to the virtual tester's output file.

Syntax

```
s32 TSSPrint(char *message)
```

Element	Description
message	The string to print.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Example

This example prints the message `Login successful`.

```
s32 retVal = TSSPrint("Login successful");
```

See Also

`TSSePrint()`

TSSUniform()

Gets the next uniformly distributed random number.

Syntax

```
s32 TSSUniform(s32 low, s32 high)
```

Element	Description
low	The low end of the range.
high	The high end of the range.

Return Value

This function returns the next uniformly distributed random number in the specified range, or –1 if there is an error. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The behavior of the random number generator routines is affected by the settings of the **Seed** and **Seed Flags** options in a TestManager suite. By default, TestManager sets unique seeds for each virtual tester, so that each has a different random number sequence.

If the error return value –1 is a legitimate value for the specified range, then `TSSErrorDetail()` exits with value `TSS_OK`.

Example

This example gets the next uniformly distributed random number between –10 and 10.

```
int next = TSSUniform(-10,10);
```

See Also

`TSSRand()`, `TSSSeedRand()`, `TSSNegExp()`

TSSUniqueString()

Returns a unique text string.

Syntax

```
char *TSSUniqueString(void)
```

Return Value

On success, this function returns a string guaranteed to be unique in the current test script or suite run. On failure, it returns NULL: call `TSSErrorDetail()` for information.

Comments

You can use this call to construct the name for a unique asset, such as a test script source file.

Example

This example returns a unique text string.

```
char *str = TSSUniqueString();
```

Monitor Services

When a suite of test cases or test scripts is played back, TestManager monitors execution progress and provides a number of monitoring options. The monitoring functions support the TestManager monitoring options.

Summary

The following table lists the monitoring functions.

Function	Description
`TSSDisplay()`	Sets a message to be displayed by the monitor.
`TSSPositionGet()`	Gets the script source file name or line number position.

Function	Description
`TSSPositionSet()`	Sets the script source file name or line number position.
`TSSReportCommandStatus()`	Gets the runtime status of a command.
`TSSRunStateGet()`	Gets the run state.
`TSSRunStateSet()`	Sets the run state.

TSSDisplay()

Sets a message to be displayed by the monitor.

Syntax

```
s32 TSSDisplay(char *message)
```

Element	Description
message	The message to be displayed by the progress monitor.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOOP`. The TSS server is running proxy.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This message is displayed until overwritten by another call to `TSSDisplay()`.

Example

This example sets the monitor display to `Beginning transaction`.

```
s32 retVal = TSSDisplay("Beginning transaction");
```

TSSPositionGet()

Gets the test script file name or line number position.

Syntax

```
s32 TSSPositionGet(char **srcFile, u32 *lineNumber)
```

Element	Description
srcFile	OUTPUT. The name of a source file. After a successful call, this variable contains the name of the source file that was specified with the most recent `TSSPositionSet()` call.
lineNumber	OUTPUT. The name of a local variable. After a successful call, this variable contains the current line position in *srcFile*.

Return Value

On success, this function returns *srcFile* and *lineNumber* as explained in the preceding table. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

TestManager monitoring options include Script View, causing test script lines to be displayed as they are executed. `TSSPositionSet()` and `TSSPositionGet()` partially support this monitoring option for TSS scripts: if line numbers are reported, they are displayed during playback but not the contents of the lines.

The line number returned by this function is the most recent value that was set by `TSSPositionSet()`. A return value of 0 for line number indicates that line numbers are not being maintained.

Example

This example gets the name of the current script file and the number of the line to be accessed next.

```
char ** scriptFile;
u32 *lineNumber;
s32 retVal = TSSPositionGet(scriptFile,lineNumber);
```

See Also

`TSSPositionSet()`

TSSPositionSet()

Sets the test script file name or line number position.

Syntax

```
s32 TSSPositionSet(char *srcFile, u32 lineNumber)
```

Element	Description
srcFile	The name of the test script, or NULL for the current test script.
lineNumber	The number of the line in *srcFile* to set the cursor to, or 0 for the current line.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

TestManager monitoring options include Script View, causing test script lines to be displayed as they are executed. `TSSPositionSet()` and `TSSPositionGet()` partially support this monitoring option for TSS scripts: if line numbers are reported, they are displayed during playback but not the contents of the lines.

Example

This example sets access to the beginning of test script `checkLogin`.

```
s32 retVal = TSSPositionSet("checkLogin",0);
```

See Also

`TSSPositionSet()`

TSSReportCommandStatus()

Reports the runtime status of a command.

Syntax

```
s32 TSSReportCommandStatus(s32 status)
```

Element	Description
status	The status of a command. Can be one of the following: ▪ TSS_CMD_STAT_FAIL ▪ TSS_CMD_STAT_PASS ▪ TSS_CMD_STAT_WARN ▪ TSS_CMD_STAT_INFO

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOOP`. The TSS server is running proxy.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The entered *status* is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Example

This example reports a failure command status.

```
s32 retVal = TSSReportCommandStatus(TSS_CMD_STAT_FAIL);
```

TSSRunStateGet()

Gets the run state.

Syntax

```
s32 TSSRunStateGet(void)
```

Return Value

On success, this function returns one of the run state values listed in the run state table starting on page 90. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This call is useful for storing the current run state so you can change the state and then subsequently do a reset to the original run state.

Example

This example gets the current run state.

```
s32 orig = TSSRunStateGet();
```

See Also

`TSSRunStateSet()`

TSSRunStateSet()

Sets the run state.

Syntax

```
s32 TSSRunStateSet(RunState state)
```

Element	Description
state	The run state to set. Enter one of the run state values listed in the run state table starting on page 90.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.

- `TSS_INVALID`. Invalid run state.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

RunState is defined as follows:

```
typedef u32 RunState;
```

TestManager includes the option to monitor script progress individually for different virtual testers. The run states are the mechanism used by test scripts to communicate their progress to TestManager. Run states can also be logged and can contribute to performance analysis reports.

The following table lists the TestManager run states.

Run State	Meaning
MST_BIND	iiop_bind in progress
MST_BUTTON	X button action
MST_CLEANUP	cleaning up
MST_CPUDLY	cpu delay
MST_DELAY	user-requested delay
MST_DSPLYRESP	displaying response
MST_EXITED	exited
MST_EXITSQABASIC	exited SQABasic code
MST_EXTERN_C	executing external C code
MST_FIND	find_text find_point
MST_GETTASK	waiting for task assignment
MST_HTTPCONN	waiting for http connection
MST_HTTPDISC	waiting for http disconnect
MST_IIOP_INVOKE	iiop_invoke in progress
MST_INCL	mask including above basic states
MST_INIT	doing startup initialization
MST_INITTASK	initializing task

Run State	Meaning
MST_ITDLY	intertask delay
MST_MOTION	X motion
MST_PMATCH	matching response (precv)
MST_RECV_DELAY	line_speed delay in recv
MST_SATEXEC	executing satellite script
MST_SEND	httpsocket send
MST_SEND_DELAY	line_speed delay in send
MST_SHVBLCK	blocked from shv access
MST_SHVREAD	V_VP: reading shared variable
MST_SHVWAIT	user requested shv wait
MST_SOCKCONN	waiting for socket connection
MST_SOCKDISC	waiting for socket disconnect
MST_SQABASIC_CODE	running SQABasic code
MST_SQLCONN	waiting for SQL client connection
MST_SQLDISC	waiting for SQL client disconnect
MST_SQLEXEC	executing SQL statements
MST_STARTAPP	SQABasic: starting app
MST_SUSPENDED	suspended
MST_TEST	test case, emulate
MST_THINK	thinking
MST_TRN_PACING	transactor pacing delay
MST_TUXEDO	Tuxedo execution
MST_TYPE	typing
MST_UNDEF	user's micro_state is undefined
MST_USERCODE	SQAVu user code
MST_WAITOBJ	SQABasic: waiting for object
MST_WAITRESP	waiting for response

Run State	Meaning
MST_WATCH	interactive -W watch record
MST_XCLNTCONN	waiting for http connection
MST_XCLNTCONN	waiting for socket connection
MST_XCLNTCONN	waiting for SQL client connection
MST_XCLNTCONN	waiting for X client connection
MST_XCLNTDISC	waiting for http disconnect
MST_XCLNTDISC	waiting for socket disconnect
MST_XCLNTDISC	waiting for SQL client disconnect
MST_XCLNTDISC	waiting for X client disconnect
MST_XMOVEWIN	X move window
MST_XQUERY	X query function
MST_XSYNC	X sync state during X query
MST_XWINCMP	xwindow_diff comparing windows
MST_XWINDUMP	xwindow_diff dumping window
N_MST_INCL	number of above states

Example

This example sets the run state to `MST_WAITRESP`.

```
s32 retVal = TSSRunStateSet(MST_WAITRESP);
```

See Also

`TSSRunStateGet()`

Synchronization Services

Use the synchronization functions to synchronize virtual testers during script playback. You can insert synchronization points and wait periods, and you can manage variables shared among virtual testers.

Summary

The following table lists the synchronization functions.

Function	Description
`TSSSharedVarAssign()`	Performs a shared variable assignment operation.
`TSSSharedVarEval()`	Gets the value of a shared variable and operates on the value as specified.
`TSSSharedVarWait()`	Waits for the value of a shared variable to match a specified range.
`TSSSyncPoint()`	Puts a synchronization point in a script.

TSSSharedVarAssign()

Performs a shared variable assignment operation.

Syntax

```
s32 TSSSharedVarAssign(char *name, s32 value, ShVarOp op, s32
   *returnVal)
```

Element	Description
name	The name of the shared variable to operate on.
value	The right-side value of the assignment expression.
op	Assignment operator. Can be one of the following: ▪ `SHVOP_assign` ▪ `SHVOP_add` ▪ `SHVOP_subtract` ▪ `SHVOP_multiply` ▪ `SHVOP_divide` ▪ `SHVOP_modulo` ▪ `SHVOP_and` ▪ `SHVOP_or` ▪ `SHVOP_xor` ▪ `SHVOP_shiftleft` ▪ `SHVOP_shiftright`

Element	Description
returnVal	OUTPUT. If not specified as NULL, the resulting value of *name* after application of *op value*.

Return Value

On success, this function retrieves the value of the specified shared variable before and after it has been operated on. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The entered *name* is not a shared variable.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The data type `ShVarOp` is defined as follows:

```
typedef enum ShVarOp ShVarOp;
enum ShVarOp {
   SHVOP_assign,
   SHVOP_add,
   SHVOP_subtract,
   SHVOP_multiply,
   SHVOP_divide
   SHVOP_modulo,
   SHVOP_and,
   SHVOP_or,
   SHVOP_xor,
   SHVOP_shiftleft
   SHVOP_shiftright
   SHVOP_END
}
```

`TSSSharedVarAssign("myVar",5,SHVOP_add,NULL)` is equivalent to `myVar += 5`.

Example

This example adds 5 to the value of the shared variable `lineCounter` and puts the new value of `lineCounter` in `returnval`.

```
s32 returnval = 5;
s32 retVal = TSSSharedVarAssign("lineCounter", val, SHVOP_add,
returnVal);
```

See Also

`TSSSharedVarEval()`, `TSSSharedVarWait()`

TSSSharedVarEval()

Gets the value of a shared variable and operates on the value as specified.

Syntax

```
s32 TSSSharedVarEval(char *name, s32 *value, ShVarAdj op)
```

Element	Description
name	The name of the shared variable to operate on.
value	OUTPUT. A local container into which the value of *name* is retrieved.
op	Increment/decrement operator for the returned value: Can be one of the following: ▪ `SHVADJ_none` `SHVADJ_pre_inc` ▪ `SHVADJ_post_inc` ▪ `SHVADJ_pre_dec` ▪ `SHVADJ_post_dec`

Return Value

On success, this function returns the new value of the specified shared variable as described above. The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The entered *name* is not a shared variable.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The data type `ShVarAdj` is defined as follows:

```
typedef enum ShVarAdj ShVarAdj;
enum ShVarAdj {
   SHVADJ_none,
   SHVADJ_pre_inc,
   SHVADJ_post_inc,
```

```
    SHVADJ_pre_dec,
    SHVADJ_post_dec
}
```

Example

This example post-decrements the value of shared variable `lineCounter` and stores the result in `val`.

```
s32 val;
s32 retVal = TSSSharedVarEval("lineCounter",val,SHVADJ_post_inc);
```

See Also

`TSSSharedVarAssign()`, `TSSSharedVarWait()`

TSSSharedVarWait()

Waits for the value of a shared variable to match a specified range.

Syntax

```
s32 TSSSharedVarWait(char *name, s32 min, s32 max, s32 adjust,
   s32 timeout, s32 *returnVal)
```

Element	Description
name	The name of the shared variable to operate on.
min	The low range for the value of *name*.
max	The high range for the value of *name*.
adjust	The value to increment/decrement the named shared variable by once it meets the *min* – *max* range.
timeout	The time-out preference (how long to wait for the condition to be met). Enter one of the following: ▪ A negative number for no time-out. ▪ 0 to return immediately with an exit value of `1` (condition met) or `0` (not met). ▪ The number of milliseconds to wait for the value of *name* to meet the criteria, before timing out with and returning an exit value of `1` (met) or `0` (not met).
returnVal	OUTPUT. The value of *name* at the time of the return, before any possible adjustment. If *timeout* expired before the return, the value is not adjusted. Otherwise, *returnVal* is incremented/decremented by *adjust*.

Return Value

On success, this function returns `1` (condition was met before time-out) or `0` (time-out expired before the condition was met). The function exits with one of the following results:

- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The entered *`name`* is not a shared variable.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This call provides a method of blocking a virtual tester until a user-defined global event occurs.

If virtual testers are blocked on an event using the same shared variable, TestManager guarantees that the virtual testers are unblocked in the same order in which they were blocked.

Although this *alone* does not ensure an exact multiuser timing order in which statements following a `wait` are executed, the additional proper use of the arguments *`min`*, *`max`*, and *`adjust`* allows control over the order in which multiuser operations occur. (UNIX or Windows NT determines the order of the scheduling algorithms. For example, if two virtual testers are unblocked from a wait in a given order, the tester that was unblocked last might be released before the tester that was unblocked first.)

If a shared variable's value is modified, any subsequent attempt to modify this value — other than through `TSSSharedVarWait()` — blocks execution until all virtual testers already blocked have had an *opportunity* to unblock. This ensures that events cannot appear and then quickly disappear before a blocked virtual tester is unblocked. For example, if two virtual testers were blocked waiting for *`name`* to equal or exceed *`N`*, and if another virtual tester assigned the value *`N`* to *`name`*, then TestManager guarantees both virtual testers the opportunity to unblock before any other virtual tester is allowed to modify *`name`*.

Offering the *opportunity* for all virtual testers to unblock does not guarantee that all virtual testers actually unblock, because if `TSSSharedVarWait()` is called with a nonzero value of *`adjust`* by one or more of the blocked virtual testers, the shared variable value changes during the unblocking script. In the previous example, if the first user to unblock *had* called `TSSSharedVarWait()` with a negative *`adjust`* value, the event waited on by the second user would no longer be true after the first user unblocked. With proper choice of *`adjust`* values, you can control the order of events.

Example

This example returns `1` if the shared variable `inProgress` reaches a value between 10 and 20 within 60000 milliseconds of the time of the call. Otherwise, it returns `0`. `svVal` contains the value of `inProgress` at the time of the return, before it is adjusted. (In this case, the adjustment value is 0 so the value of the shared variable is not adjusted.)

```
s32 svVal = 0;
s32 retVal = TSSSharedVarWait("inProgress",10,20,0,60000,svVal);
```

See Also

`TSSSharedVarAssign()`, `TSSSharedVarEval()`

TSSSyncPoint()

Puts a synchronization point in a script.

Syntax

```
s32 TSSSyncPoint(char *label)
```

Element	Description
label	The name of the synchronization point.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOOP`. The TSS server is running proxy.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The synchronization point *label* is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

A script pauses at a synchronization point until the release criteria specified by the suite have been met. If the criteria are met, the script delays a random time specified in the suite and then resumes execution.

Typically, it is better to insert a synchronization point into a suite from TestManager rather than use the `TSSSyncPoint()` call inside a script.

If you insert a synchronization point into a suite, synchronization occurs at the beginning of the script. If you insert a synchronization point into a script with `TSSSyncPoint()`, synchronization occurs at the point of insertion. You can insert the command anywhere in the script.

Example

This example creates a sync point named `BlockUntilSaveComplete`.

```
s32 retVal = TSSSyncPoint("BlockUntilSaveComplete");
```

Session Services

This section documents functions that may be required by applications. They are not typically used by test scripts.

A suite can contain multiple test scripts of different types. When TestManager executes a suite, a separate *session* is started for each type of script in the suite. Each session lasts until all scripts of the type have finished executing. Thus, if a suite contains three Visual Basic test scripts and six VU test scripts, two sessions are started and each remains active until all scripts of the respective types finish.

In a given suite run, a session can be run directly (inside the TestManager process space) or by a separate TSS server process (proxy). The latter happens only if the following two conditions are met:

- The test script(s) is executed by a stand-alone process (outside of TestManager) and is linked with the link library rttssremote.lib.
- The first script of a given type in a suite that can be executed by a TSS proxy server calls `TSSServerStart()`.

Summary

Applications can use the session functions listed in the following table to manage proxy TSS servers and sessions on behalf of test scripts. These functions are not needed for sessions that are directly executed by TestManager.

Function	Description
`TSSConnect()`	Connects to a TSS proxy server.
`TSSContext()`	Passes context information to a TSS server.
`TSSDisconnect()`	Disconnects from a TSS proxy server.
`TSSServerStart()`	Starts a TSS proxy server.
`TSSServerStop()`	Stops a TSS proxy server.
`TSSShutdown()`	Stops logging and initializes TSS.

TSSConnect()

Connects to a TSS proxy server.

Syntax

```
s32 TSSConnect (char *host, u16 port, s32 id)
```

Element	Description
host	The name (or IP address in quad dot notation) of the host on which the proxy TSS server process is running.
port	The listening port for the TSS server on *host*, or `0` (recommended) to let TestManager select the port.
id	The connection identifier.

Return Value

This function exits with one of the following results:

- TSS_OK. Success.
- `TSS_NOOP`. A connection and ID had already been established for this execution thread.
- `TSS_NOSERVER`. No TSS server was listening on *port*.
- `TSS_SYSERROR`. A system error occurred. Call `TSSErrorDetail()` for information.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

For scripts that are executed by a proxy process rather than directly by the TSEE, this function must be called before any other TSS functions. This function is also required when a script (or TSEA) starts a new thread of execution.

The proxy TSS DLL uses *host* and *port* (the host and port parameters passed to `SessionOpen()` in the TSEA) to establish a connection with the correct TSEE.

The direct TSS DLL ignores *host* and *port*, and associates the *id* with the current execution thread. If the thread already had an ID, *id* is ignored. (You cannot change *id*.)

Example

This example connects to a TSS server running on host 192.36.25.107. The *port* is defined in the example for `TSSServerStart()`.

```
s32 retVal = TSSConnect ("192.36.25.107",port,0);
```

See Also

`TSSServerStart()`

TSSContext()

Passes context information to a TSS server.

Syntax

```
s32 TSSContext(ContextKey ctx, void *value)
```

Element	Description
ctx	The type of context information to pass: Can be one of the following: ▪ CTXT_workingDir ▪ CTXT_datapoolDir ▪ CTXT_timeZero ▪ CTXT_todZero ▪ CTXT_logDir ▪ CTXT_logFile ▪ CTXT_logData ▪ CTXT_testScript ▪ CTXT_style ▪ CTXT_sourceUID
value	The information of type *ctx* to pass.

Return Value

This functionexits with one of the following results:

- TSS_OK. Success.
- TSS_NOSERVER. No previous successful call to TSSConnect().
- TSS_INVALID. The specified *ctx* is invalid.
- TSS_ABORT. Pending abort resulting from a user request to stop a suite run.

Comments

This call is useful for test scripts that are executed by a stand-alone process — outside the TestManager framework — and that also make TSS calls. The call passes information, such as the log file name, that would be passed through shared memory if the script were executed by TestManager.

Test scripts that are executed by a proxy TSS server process should make this call immediately after TSSConnect(), before accessing any other TSS services. Otherwise, inconsistent results can occur.

ContextKey is defined as follows:

```
enum ContextKey {
   CTXT_workingDir,
   CTXT_datapoolDir,
   CTXT_timeZero,
```

```
    CTXT_todZero,
    CTXT_logDir
    CTXT_logFile
    CTXT_logData
    CTXT_testScript
    CTXT_style
    CTXT_sourceUID
    CTXT_END
};
typedef enum ContextKey ContextKey;
```

Example

This example passes a working directory to the current proxy TSS server.

```
s32 retVal = TSSContext(CTXT_workingDir,"C:\temp");
```

TSSDisconnect()

Disconnects from a TSS proxy server.

Syntax

```
void TSSDisconnect (void)
```

Return Value

None.

Comments

This call closes the connection established by `TSSCconnect()` and performs any required cleanup operations.

Example

This example disconnects from the TSS server.

```
TSSDisconnect();
```

TSSServerStart()

Starts a TSS proxy server.

Syntax

```
s32 TSSServerStart (u16 *port)
```

Element	Description
port	The listening port for the TSS server. If specified as `0` (recommended), the system chooses the port and returns its number to *port*.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOOP`. A TSS server was already listening on *port*.
- `TSS_NOSERVER`. Start failure. Call `TSSErrorDetail()` for information.
- `TSS_SYSERROR`. A system error occurred. Call `TSSErrorDetail()` for information.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

No TSS server is started if one is already running. A test script that is to be executed by a proxy server and that might be the first to execute should make this call.

Example

This example starts a proxy TSS server on a system-designated port, whose number is returned to *port*.

```
u16 port = 0;
s32 retVal = TSSServerStart (&port);
```

See Also

`TSSServerStop()`

TSSServerStop()

Stops a TSS proxy server.

Syntax

```
s32 TSSServerStop (u16 port)
```

Element	Description
port	The port number that the TSS server to be stopped is listening on.

Return Value

This functionexits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOOP`. No TSS server was listening on *port*.
- `TSS_INVALID`. No proxy TSS server was found or stopped.
- `TSS_SYSERROR`. A system error occurred. Call `TSSErrorDetail()` for information.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

In a test suite with multiple scripts, only the last executed script should make this call.

Example

This example stops a proxy TSS server that was started by the example for `TSSServerStart()`.

```
s32 retval = TSSServerStop (port);
```

See Also

`TSSServerStart()`

TSSShutdown()

Stops logging and initializes TSS.

Syntax

```
s32 TSSShutdown (void)
```

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The specified *`ctx`* is invalid.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

This call stops logging functions, pauses a playback session, and initializes TSS to resume logging and executing the next task.

Example

This example shuts down logging during session execution so that logging can be restarted for the next task.

```
s32 retval = TSSShutdown ();
```

Advanced Services

You can use the advanced functions to perform timing calculations, logging operations, and internal variable initialization functions. TestManager performs these operations on behalf of scripts in a safe and efficient manner. Consequently, the functions need not and usually should not be performed by individual test scripts.

Summary

The following table lists the advanced functions.

Function	Description
`TSSInternalVarSet()`	Sets the value of an internal variable.
`TSSLogCommand()`	Logs a command event.
`TSSThinkTime()`	Calculates a think-time average.

TSSInternalVarSet()

Sets the value of an internal variable.

Syntax

```
s32 TSSInternalVarSet(IVKey internVar, IVValue ivVal)
```

Element	Description
internVar	The internal variable to operate on. Internal variables and their values are listed in the table startingon page 178. See page 58 for the IVKey and page 59 for the IVValue definitions.
ivVal	The new value for *internVar*.

Return Value

The function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.
- `TSS_INVALID`. The timer label is invalid, or there is no unlabeled timer to stop.
- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The values of some internal variables affect think-time calculations and the contents of log events. Setting a value incorrectly could cause serious misbehavior in a script.

Example

This example sets `IV_cmdcnt` to 0.

```
s32 retVal = TSSInternalVarSet (IV_cmdcnt,0);
```

See Also

`TSSInternalVarGet()`

TSSLogCommand()

Logs a command event.

Syntax

```
s32 TSSLogCommand(char *name, char *label, s16 result, char
   *description, s32 starttime, s32 endtime, char *logdata, s32
   propertyCount, NamedValue *property)
```

Element	Description
name	The command name.
label	The event label.
result	Specifies the notification preference regarding the result of the call. Can be one of the following: ▪ `TSS_LOG_RESULT_NONE` (default: no notification) ▪ `TSS_LOG_RESULT_PASS` ▪ `TSS_LOG_RESULT_FAIL` ▪ `TSS_LOG_RESULT_WARN` ▪ `TSS_LOG_RESULT_STOPPED` ▪ `TSS_LOG_RESULT_INFO` ▪ `TSS_LOG_RESULT_COMPLETED` ▪ `TSS_LOG_RESULT_UNEVALUATED` `0` specifies the default.
description	Contains the string to be displayed in the event of failure.
starttime	An integer indicating a time stamp. If specified as 0, the logged time stamp is the later of the values contained in internal variables `IV_fcs_ts` and `IV_fcr_ts`.
endtime	An integer indicating a time stamp. If specified as 0, the time set by `TSSCommandEnd` is logged.
logdata	Text to be logged describing the ended command.
propertyCount	Specifies the number of rows in the property array.
property	An array containing property name/value pairs, where `property[n].name` is the property name and `property[n].value` is its value.

Return Value

This function exits with one of the following results:

- `TSS_OK`. Success.
- `TSS_NOSERVER`. No previous successful call to `TSSConnect()`.

- `TSS_ABORT`. Pending abort resulting from a user request to stop a suite run.

Comments

The value of `IV_cmdcnt` is logged with the event.

The command name and label entered with `TSSCommandStart()` are logged, and the run state is restored to the value that existed prior to the `TSSCommandStart()` call.

An event and any data associated with it are logged only if the specified *`result`* preference matches associated settings in the `EVAR_LogData_control` or `EVAR_LogEvent_control` environment variables. Alternatively, the logging preference may be set with the `EVAR_Log_level` and `EVAR_Record_level` environment variables. The TSS_LOG_RESULT_STOPPED, TSS_LOG_RESULT_COMPLETED, and TSS_LOG_RESULT_UNEVALUATED preferences are intended for internal use.

NamedValue is defined as follows:

```
typedef struct {
        char *Name;
        char *Value;
} NamedValue;
```

Example

This example logs a message for a login script.

```
s32 retVal = TSSLogCommand("Login", "initTimer",
TSS_LOG_RESULT_PASS,"Command timer failed", 0, 0,"Login command
completed", NULL);
```

See Also

`TSSCommandStart()`, `TSSCommandEnd()`

TSSThinkTime()

Calculates a think-time average.

Syntax

```
s32 TSSThinkTime(s32 thinkAverage)
```

Element	Description
thinkAverage	If specified as 0, the number of milliseconds stored in the `ThinkAvg` environment variable is entered. Otherwise, the value specified overrides `ThinkAvg`.

Return Value

On success, this function returns a calculated think-time average. A negative exit value indicates an error. Call `TSSErrorDetail()` for more information.

Comments

This call calculates and returns a think time using the same algorithm as `TSSThink()`. But unlike `TSSThink()`, this call inserts no pause into a script.

This function could be useful in a situation where a test script calls another program that, as a matter of policy, does not allow a calling program to set a delay in execution. In this case, the called program would use `TSSThinkTime()` to recalculate the delay requested by `TSSThink()` before deciding whether to honor the request.

Example

This example calculates a pause based on a think-time average of 5000 milliseconds.

```
ctime = ‘tsscmd GetTime‘IVValue iv;
iv.ivInt = TSSGetTime;
TSSInternalVarSet (IV_fcs_ts, iv);
TSSInternalVarSet (IV_lcs_ts, iv);
TSSInternalVarSet (IV_fcr_ts, iv);
TSSInternalVarSet (IV_lcr_ts, iv);
s32 pause = TSSThinkTime(5000);
```

See Also

`TSSThink()`

Test Script Console Adapter API 4

This chapter describes the Test Script Console Adapter (TSCA) and explains how to build a custom TSCA.

This chapter contains the following sections:

- About the Test Script Console Adapter
- Building a TSCA: Workflow and Implementation Issues
- Registering the TSCA DLL with TestManager

About the Test Script Console Adapter

A Test Script Console Adapter (TSCA) is a C or C++ dynamic-link library (DLL) that integrates with TestManager. By so doing, it enables additional test script types to be available for operations.

Each test script type is associated with a particular TSCA. A TSCA is required to allow the user to access a test script through the user interface.

Note: The TSCA does not support test script execution; this function is carried out by the TSEA and TSEE, as described in Chapter 2.

TSCA Functionality

A TSCA must, at a minimum:

- Connect to and disconnect from the test script source.
- Provide a way for the user to select a test script from the source.

In addition to these basic functions, many TSCAs are designed to support more sophisticated functions. A more robust TSCA might support such operations as:

- Displaying a directory hierarchy of test scripts.
- Filtering test scripts within the Test Script view.
- Displaying the properties of a test script.
- Configuring a test script source.

- Performing source control operations against the contents of a test script source.
- Executing a custom action against the test script source or the test script, for example, providing multiple editors for the same test script type.

Built-In and Custom Test Script Types

As described in Chapter 1, you can implement a test case with a test script that is either a built-in test script type or a custom test script type.

If you create a custom test script type, you must extend TestManager to support this new type. To extend TestManager, do one of the following:

- Use the built-in Command Line TSCA or other console adapters provided by Rational.

  The Command Line TSCA works for any file-based test script, for example, PERL scripts. File-based means that the individual test scripts can be accessed by their names or paths using the standard Microsoft File Open dialog box.

  Because Rational provides this console adapter, you do not need to do any programming; you only need to specify the executable commands for creating and editing a test script.

  Although this TSCA requires no custom programming, it is not fully integrated into TestManager. (For more information about using the TestManager built-in console adapter, see the TestManager online Help.)

- Create a custom test script console adapter.

  A custom TSCA is required to integrate the custom test type with TestManager. Once you write the TSCA, TestManager recognizes these new test script types.

  A custom TSCA is required for test scripts that are:

  - Created with a test tool that does not provide a command-line interface for creating and editing test scripts.
  - Not file based, that is, cannot be opened with the standard File Open dialog box— for example, Rational ManualTest test scripts.

  A custom TSCA can also be used with file-based test scripts.

  Unlike the command-line TSCA, you can fully integrate a custom TSCA into TestManager.

The TSCA Function Calls

The TSCA applications programming interface (API) consists of 31 functions that are organized into nine functional groupings.

Functional Groupings of TSCA Functions

The Test Script Console Adapter (TSCA) functions are summarized in the following table, which shows:

- The functional groupings and their purposes.
- The functions within each group.

Function Group and Purpose	Functions in Group
Connection Supports connection and disconnection from the test script source.	`TTConnect()` `TTDisconnect()`

Data Access
Provides access to the test scripts within the source:
▪ Hierarchical data
▪ Nonhierarchical data
▪ Sources with different test script types
▪ Functions providing icons for source and test scripts
	`TTGetRoots()`
	`TTGetChildren()`
	`TTGetNode()`
	`TTGetName()`
	`TTGetTypeIcon()`
	`TTGetSourceIcon()`
	`TTGetIcon()`

Editor Integration Provides integration between TestManager and the editor or IDE used to create and edit test scripts.	`TTNew()` `TTEdit()`

Filtering
Provides support to filter out test scripts that do not meet user-defined criteria.
	`TTSetFilterEx()`
	`TTGetFilterEx()`
	`TTClearFilter()`

UI Support Provides the ability to expose components that display test script properties. This facilitates the use of preexisting user interfaces.	`TTShowProperties()` `TTSelect()`
Source Configuration Support Supports the ability to provide custom user interfaces to aid in the configuration of the test script source.	`TTGetConfiguration()` `TTSetConfiguration()`

Function Group and Purpose	Functions in Group
Custom Action Execution Provides the ability to perform custom operations on the test script source.	`TTGetSourceActions()`
	`TTGetNodeActions()`
	`TTExecuteSourceAction()`
	`TTExecuteNodeAction()`
Source Control Provides the ability to support source control operations in the test script view on the test scripts within a source.	`TTAddToSourceControl()`
	`TTCheckIn()`
	`TTCheckOut()`
	`TTUndoCheckout()`
	`TTGetSourceControlStatus()`
Execution Supports execution of the test script.	`TTGetTestToolOptions()`
Miscellaneous Infrastructure Provides infrastructure support	`TTGetIsFunctionSupported()`

Required and Optional Functionality

A TSCA must, at a minimum, provide the ability to:

- Connect to a test script source.
- Select a test script.

To enable these actions, you must implement the following functions when building a basic TSCA:

- `TTConnect()`
- `TTDisconnect()`
- `TTSelect()`

In addition, to enable users to view test scripts in Test Script View, you must include the following functions:

- `TTGetRoots()`
- `TTGetChildren()`

Other functions are optional; they enable the user to work with the user interface to perform additional operations on the test script. The advantages of using these additional functions are described in *Building a TSCA: Workflow and Implementation Issues* on page 120.

Some functions work in pairs. For example, because TestManager calls `TTConnect()` to make the connection to the test script source, it must subsequently call `TTDisconnect()` to disconnect from the test script source.

For information about specific declarations, see the following required header file:

...\Rational Test\rtsdk\c\include\testypeapi.h

Mapping of User Actions to TSCA Function Calls

A TestManager end user may want to carry out various actions on the test script source. Following is a list of common test script operations that the user might perform. The order in which these operations are listed represents a plausible sequence in which the user might execute them.

1. Defining or modifying the configuration of a test script source.
2. Opening the Test Script view.
3. Setting a filter for test scripts.
4. Creating a new test script.
5. Selecting a test script for operations.
6. Editing test script properties.
7. Editing test script text.
8. Performing custom actions on the test script or test script source.
9. Integrating with source control.

To aid the user in carrying out these actions, you should build the TSCA to support the test script view that enables the user to perform these operations.

When the user makes a selection in the GUI to carry out an operation on the test script source, TestManager typically calls the TSCA function or functions that support the user's action.

To help you understand which functions you need to implement in order to provide support for specific actions, the following sections explain the mapping between the user’s actions and the TSCA functions called by TestManager to implement those actions.

Note: Based on the current state of TestManager (including which test-script-related operations it has already performed), TestManager may not call some of the functions listed in the following sequences.

Defining or Modifying the Configuration of a Test Script Source

When the user defines or modifies a configuration for a test script source (for example, specifying the operating system), TestManager calls the following functions from the **Source Configuration** group in the order listed.

Typical Sequence of Function Calls	Operation
1 `TTGetConfiguration()`	Exposes user interface elements that collect data access and data format information from the user when registering the test script source. The TSCA passes that information back to TestManager to be persisted as a property of the test script source.
2 `TTSetConfiguration()`	When a connection is made to the test script source, TestManager passes the configuration information obtained from the `TTGetConfiguration()` function into this function.

Opening the Test Script View

When the user opens up the Test Script view, TestManager calls the following functions from the **Connection** group in the order listed below.

,

Typical Sequence of Function Calls	Operation
1 `TTConnect()`	Establishes a connection to the test script source.
2 `TTGetSourceIcon()`	Returns the path to the bitmap containing the icon that represents the test script source. Note that implementation of this function is optional.

Setting a Filter for Test Scripts

When the user sets a filter on the test script source, TestManager calls the following functions, in the order shown below.

Typical Sequence of Function Calls	Operation
1 `TTGetFilterEx()`	Exposes user interface elements that collect filtering specifications from the user registering the test script source.
2 `TTSetFilterEx()`	When a connection is made to the test script source, TestManager passes the filtering specifications obtained from `TTGetFilterEx()` into the TSCA.
3 `TTGetRoots()`	Returns the array of nodes comprising the root elements of the test script source.

Creating a New Test Script

When the user creates a new test script, TestManager calls the following function from the **Editor Integration** group.

Function Call	Operation
`TTNew()`	Enables the tester to create a new test script for this type of test using the hosted tool.

Selecting a Test Script for Operations

Before carrying out any operations on a test script, the user selects the test script from a list of available test scripts in the Test Script view. To display these test scripts, TestManager calls the following functions from the **Data Access** group, typically in the sequence that follows.

Typical Sequence of Function Calls	Operation
1 `TTGetSourceIcon()`	Returns the path of the bitmap that represents the test script source.
2 `TTGetRoots()`	Returns the array of nodes comprising the roots of the test script source.

Typical Sequence of Function Calls	Operation
3 `TTGetChildren()`	Returns an array of nodes that are the children of the specified node. TestManager calls this function for each node returned by `TTGetRoots()`.
4 `TTGetTypeIcon()`	Returns the path of the bitmap that represents the test script node.

Editing Test Script Properties

When users want to edit the properties of a test script, they must:

1. Select the test script from the Test Script view.
2. Bring up the **Test Script Properties** dialog box to view and modify the test script properties.

To enable these actions, TestManager calls the following function, which comes from the **UI Support** group.

Function Call	Operation
`TTShowProperties()`	Displays the properties of a selected test script.

Editing Test Script Text

When the user selects operations to edit a test script, TestManager calls `TTEdit()`, which comes from the **Editor Integration** group.

Function Call	Operation
`TTEdit()`	Displays a test script in the appropriate editor for modification by the user.

Performing Custom Actions on the Test Script or the Test Script Source

You can implement the TSCA to support custom actions on the test script or on the test script source. If the TSCA supports these custom actions, TestManager displays them in a custom menu so that the user can select these actions.

To enable display and execution of custom actions on the test script source, TestManager calls these functions from the **Custom Action Execution** group, typically in the following sequence.

Typical Sequence of Function Calls	Operation
1 `TTGetSourceActions()`	Returns a pointer to an array of actions that can be applied to the test script source.
2 `TTExecuteSourceAction()`	Executes the specified action against the test script source.

To enable display and execution of custom actions on a test script, TestManager calls these functions from the **Custom Action Execution** group, typically in the following sequence.

Typical Sequence of Function Calls	Operation
1 `TTGetNodeActions()`	Returns a pointer to an array of actions that can be applied to the test script.
2 `TTExecuteNodeAction()`	Executes the specified action against the test script.

Integrating with Source Control

When the user makes selections in the UI to integrate a test script with source control, TestManager calls the following functions from the TSCA. These functions come from the **Source Control** group. TestManager typically calls `TTGetSourceControlStatus()` first and then calls the other functions in an order that corresponds to the order of the user's selections in the UI.

Typical Sequence of Function Calls	Operation
1 `TTGetSourceControlStatus()`	Returns the current source-control status of the test script.
2 One of the following:	
▪ `TTAddToSourceControl()`	Adds the appropriate files for the specified test script to source control.
▪ `TTCheckOut()`	Checks out the appropriate files for the specified test script from source control.
▪ `TTCheckIn()`	Checks in the appropriate files for the specified test script to source control.
▪ `TTUndoCheckout()`	Undoes the checkout of the appropriate files for the specified test script.

Building a Custom Test Script Console Adapter

This section describes:

- Skills you need to build a custom TSCA.
- Implementation issues that arise when you create this adapter.

Prerequisite Skills

To build a custom TSCA using TestManager's C/C++ API, you need the following skills:

- A working knowledge of the tool used to create test scripts of the given type. Especially important is a knowledge of how to programmatically access the test scripts within the test script source.
- An ability to build a C or C++ DLL that exposes the functions called by TestManager.
- Familiarity with the TSCA API.

Building a TSCA: Workflow and Implementation Issues

This section discusses the general workflow that you should follow when building a TSCA and the implementation issues that arise at each phase of this workflow. The phases are:

- Making a connection.
- Accessing the data.
- Integrating with source control.
- Displaying properties.
- Filtering.
- Custom action support.

Making a Connection

The most critical phase in developing a TSCA is determining how to use the functions in the Data Access group to access the data (that is, the test scripts stored in a source) and return this data to TestManager. In most cases, the data is accessed using a common API or directly by accessing the physical representation of the data. This physical representation can be a file, a database, or some other source.

To work efficiently, the TSCA should maintain an active connection to the test script source rather than reconnecting each time the user makes a request from TestManager.

Given these considerations, you, the TSCA developer, must determine the answers to the following connection issues at the beginning, before you create the TSCA. The decisions you make regarding the connection issues are the most critical decisions you make in the process of building the TSCA. Once you have determined satisfactory solutions to the following issues, you are likely to be successful in your development of the TSCA.

1. How can the TSCA gain access to the test scripts in the source? If an existing API performs this function, you should probably use it. If an appropriate API does not exist, is there a way to gain access to the data directly?
2. How can the adapter uniquely identify the test script source? If the test scripts are stored in the file system, the preferred form of identification is the root path to the files. The test script source identification that you develop is passed to the `TTConnect()` function when TestManager calls it.
3. Is any additional information needed for connecting to the source? If so, you should specify that information as a connection option when registering the test script source. The connection options are passed to the `TTGetTestToolOptions()` function when TestManager calls it.
4. How can the TSCA uniquely identify a test script? If the tool used to create the test script has a feature that is analogous to a unique ID, it is optimal to use this feature.

   Note: Each test script must have its own unique ID for each test script source, because that identifier is used to associate test cases with it.
5. Does the test script source require any configuration data in addition to the data needed for connection? If so, what data is needed? In developing solutions to these issues, you should implement the functions `TTSetConfiguration()` and `TTGetConfiguration()`.

Accessing the Data

The next phase in building a TSCA is to develop support for the needed functions in the Data Access group.

Once this support is developed, the user should be able to do the following after a new test script type has been registered to use the TSCA:

- Register the test script source.
- Use Test Script view to view the test scripts in that source.

The issues to resolve in developing support for needed functions in the Data Access group are as follows:

1 What is the organizational structure for the test scripts that the TSCA accesses? Is the data organized in a hierarchical structure or in a flat list?

   If the test scripts are organized in a flat list, you need the following functions to return data:

   - `TTGetRoots()`
   - `TTGetNode()`

   If the test scripts are stored hierarchically, you need the following functions to return data:

   - `TTGetRoots()`
   - `TTGetNode()`
   - `TTGetChildren()`

2 Are the items contained in the test script source all of the same type? Are they all valid implementations that can be executed? (Examples of items that cannot be implemented are verification points and low-level test scripts contained in Rational Robot® GUI test scripts.) Even if certain items cannot be executed, you may want to make them visible to TestManager by implementing the following functions:

   - `TTGetRoots()`
   - `TTGetChildren()`

3 Is there an easily recognized bitmap that represents the test script source?

   Because Windows users are accustomed to recognizing software components by icons, you should support the function `TTGetSourceIcon()`. This function returns the path of the bitmap that represents the test script source.

4 Are there easily recognized bitmaps that represent the different elements comprising test scripts in the test script source?

   Because Windows users are accustomed to recognizing software components by icons, you should support the function `TTGetTypeIcon()`. This function returns the path of the bitmap that represents the test script node.

Integration with Source Control

To support integration with source control, TestManager needs the TSCA to support the following functions:

- `TTCheckIn()`
- `TTCheckOut()`
- `TTAddToSourceControl()`
- `TTUndoCheckout()`
- `TTGetSourceControlStatus()`

You must decide which files need to be placed under source control.

Displaying Properties

By default, the only test script information displayed by the TestManager user interface is the test script's name. If you want to enable the user to view other associated data about the test script, implement the function `TTShowProperties()`. If possible, use the underlying tool's property sheet if it is appropriate for display and can be called by the TSCA.

Supporting User Configuration of the Test Script Source

The formats of different test script sources vary as to how the adapter accesses the information in them. For example, if test scripts are stored in a database, the test scripts may be stored in different tables for different test script sources.

Therefore, you may want the TSCA to provide a GUI that enables the user to provide configuration information when registering the test script source. By specifying configuration data, the user is informing TestManager about how to locate and identify the desired test scripts in the test script source.

If you decide that you need to provide this configuration ability to the user, you must decide:

- What kind of configurability the user needs.
- What kind of user interface to provide to the user for specifying the configuration.

Thus, when the test script sources are highly variable, write the TSCA to display a GUI that enables the user to specify the test script storage configuration and communicate it to TestManager. To enable this functionality, implement the following functions:

- `TTGetConfiguration()`

  This function prompts the user with a user interface that collects the information needed to configure the adapter. This function must return that information in a buffer so that TestManager can persist it with the test script source.

- `TTSetConfiguration()`

  This function enables TestManager to pass the test script source configuration information that is collected by TTGetConfiguration into the TSCA. The TSCA needs this information to know how to access the data in the test script source.

In summary, consider the type of test script source when deciding whether to provide configurability to the user.

Filtering

If a test script source contains an enormous number of test scripts, you should provide filtering support. Filtering enables the user to use the Test Script view to selectively view the test scripts in the test script source. If the test script is created in a tool that supports filtering, take advantage of it.

If you implement the following functions, TestManager can use filtering in the Test Script view:

- `TTSetFilterEx()`
- `TTGetFilterEx()`

Custom Action Support

TestManager enables a TSCA to expose operations in the Test Script view that the test designer can use when building test scripts. For example, a test designer working with a Robot test script as a test script source would probably want to carry out an operation that opens the Robot application.

You, the adapter writer, can build the adapter so that the user can implement an operation to open Robot from the GUI. You can also support custom operations for specific test scripts.

To support custom actions against a test script source, implement the following functions:

- `TTGetSourceActions()`
- `TTExecuteSourceAction()`

To support custom actions against a test script, implement the following functions:

- `TTGetNodeActions()`
- `TTExecuteNodeAction()`

Registering the TSCA DLL with TestManager

If you have created your own TSCA, you must let TestManager know it exists. To register a DLL:

1. In TestManager click **Tools** > **Manage** > **Test Script Types**. The Console Adapter Type dialog box appears.
2. Click **Use a custom console adapter**.
3. Type the path to the DLL in the space provided, labeled **Console adapter DLL file**.

For more information, see the TestManager online Help.

TSCA Function Reference

This section of the Test Script Console Adapter chapter provides reference information for all functions in the TSCA API. For each function, the following information is presented:

- Definition
- Syntax
- Return values
- Comments (if any)
- Example
- See Also (links to related functions)

Note: The following functions are not currently used but are defined in the header file and reserved for future use.

```
TTCompile()
TTGetIsChild()
TTGetIsParent()
TTGetIsValidSource()
TTGetName()
TTGetParent()
TTGetType()
TTGetTypes()
TTRecord()
```

TTAddToSourceControl()

Adds the appropriate files for the specified test script to source control.

Syntax

```
HRESULT TTAddToSourceControl(const TCHAR
   SourceID[TTYPE_MAX_PATH], const TCHAR NodeID[TTYPE_MAX_ID],
   long lWindowContext, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	**Description**
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
ErrorDescription	OUTPUT. An error description that is returned by the adapter.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_CANCEL. The user pressed the Cancel button.
- TTYPE_ERROR_INVALID_SOURCEID. The test script source was incorrectly identified.

- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTAddToSourceControl(const TCHAR
SourceID[TTYPE_MAX_ID], const TCHAR NodeID[TTYPE_MAX_ID], long
lWindowContext, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     try
     {
        /* CODE OMITTED: Retrieve assets associated with NodeID.
        Perform add to source control on
          assets. */

     }
     catch (_com_error &e)
     {
        rc = TTYPE_ERROR;
        CString sError = (BSTR) e.Description();
        tcscpy(ErrorDescription, (LPCTSTR) sError );
     }
     return eResult;
}
```

See Also

`TTCheckIn()`, `TTCheckOut()`, `TTGetSourceControlStatus()`, `TTUndoCheckout()`

TTCheckIn()

Checks in the appropriate files for the specified test script to source control.

Syntax

```
HRESULT TTCheckIn(const TCHAR SourceID[TTYPE_MAX_PATH], const
    TCHAR NodeID, long lWindowContext, TCHAR
    ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_CANCEL. The user pressed the Cancel button.
- TTYPE_ERROR_INVALID_SOURCEID. The test script source was incorrectly identified.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*****************************************************************
TESTTYPEAPI_API HRESULT TTCheckIn(const TCHAR SourceID[TTYPE_MAX_ID],
const TCHAR NodeID[TTYPE_MAX_ID], long lWindowContext, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;
     CConnectionContext *pContext=0;
```

```
        // lookup the context information for the specified SourceID
        CString sSourceID = SourceID;
        m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

        if (pContext == 0)
           return TTYPE_ERROR_INVALID_SOURCEID;

        try
        {
           /* CODE OMITTED: Retrieve assets associated with NodeID.
           Perform source control CheckIn on
             assets. */

        }
        catch (_com_error &e)
        {
           rc = TTYPE_ERROR;
           CString sError = (BSTR) e.Description();
           tcscpy(ErrorDescription, (LPCTSTR) sError );
        }
        return rc;
}
```

See Also

`TTAddToSourceControl()`, `TTCheckOut()`, `TTGetSourceControlStatus()`, `TTUndoCheckout()`

TTCheckOut()

Checks out, from source control, the appropriate files for the specified test script.

Syntax

```
HRESULT TTCheckOut(const TCHAR SourceID[TTYPE_MAX_PATH], const
   TCHAR NodeID, long lWindowContext, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	**Description**
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.

Element	Description
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_CANCEL. The user pressed the Cancel button.
- TTYPE_ERROR_INVALID_SOURCEID. The test script source was incorrectly identified.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*********************************************************************
TESTTYPEAPI_API HRESULT TTCheckOut(const TCHAR SourceID[TTYPE_MAX_ID],
const TCHAR NodeID[TTYPE_MAX_ID], long lWindowContext, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     try
     {
        /* CODE OMITTED: Retrieve assets associated with NodeID.
        Perform source control CheckOut on assets. */

     }
     catch (_com_error &e)
     {
        rc = TTYPE_ERROR;
```

```
        CString sError = (BSTR) e.Description();
        tcscpy(ErrorDescription, (LPCTSTR) sError );
    }
    return rc;
}
```

See Also

`TTAddToSourceControl()`, `TTCheckIn()`, `TTGetSourceControlStatus()`, `TTUndoCheckout()`

TTClearFilter()

Clears the filter for the test script source.

Syntax

```
HRESULT TTClearFilter(const TCHAR SourceID[TTYPE_MAX_ID], TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle that the client uses to identify the connection to the datastore.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTClearFilter(const TCHAR
SourceID[TTYPE_MAX_ID], TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
    AFX_MANAGE_STATE(AfxGetStaticModuleState());

    HRESULT rc = TTYPE_SUCCESS;
```

```
    CConnectionContext *pContext=0;

    // lookup the context information for the specified SourceID
    CString sSourceID = SourceID;
    m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

    if (pContext == 0)
       return TTYPE_ERROR_INVALID_SOURCEID;

    /* The following lines are for a file-based filter mechanism.
    The filter buffer is first cleared, followed by replacing the
    derived list of supported file extensions with *.*   */

    // Clear the filter buffer
    pContext->m_sFilter = "";

    pContext->m_asFilterFileExtensions.RemoveAll();
    pContext->m_asFilterFileExtensions.Add("*.*");

    return rc;
}
```

See Also

`TTSetFilterEx()`, `TTGetFilterEx()`

TTConnect()

Creates a connection to the script source identifies by the contents of the ConnectInfo paramater. It returns a handle to the client for subsequent calls to the adapter.

Syntax

```
HRESULT TTConnect(const char ConnectInfo[TTYPE_MAX_PATH], const
   char UserID[TTYPE_MAX_ID], ConnectOption *pConnectOptions[],
   int nOptions, char SourceID[TTYPE_MAX_ID], char
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
ConnectInfo	INPUT. Contains the data path to the test script source.
UserID	INPUT. The ID of the user to connect to the datastore.
pConnectOptions	INPUT. A pointer to the defined connect options.
nOptions	INPUT. An integer that specifies the total number of connection options.

Element	Description
SourceID	OUTPUT. The handle that TestManager uses to identify the connection to the datastore in subsequent calls to the adapter.
ErrorDescription	OUTPUT. An message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR_UNABLE_TO_CONNECT. The connection failed for some unknown reason.
- TTYPE_ERROR_INVALID_CONNECTINFO. The adapter was unable to use the connection information.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The data type ConnectOption is defined as:

```
struct ConnectOption
{
   char Name[TTYPE_MAX_NAME];
   char Value[TTYPE_MAX_NAME];
}ConnectOptionType;
```

The connection information is specified by an administrative user in the TestManager New Test Script Source property page and then passed into this function in *ConnectInfo*. After the connection has been established, the TSCA assigns a unique identifier for the test source to *SourceID*. TestManager uses this identifier for subsequent calls to the adapter to identify the connection. Be sure to document the format of this string.

Example

```
//*********************************************************************
TESTTYPEAPI_API HRESULT TTConnect (const char
ConnectInfo[TTYPE_MAX_PATH], char UserID[TTYPE_MAX_ID], ConnectOption
*pConnectOptions, int nOptions, char SourceID[TTYPE_MAX_ID], char
ErrorDescription[TTYPE_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());
```

```
HRESULT rc = TTYPE_SUCCESS;

if (_tcslen(ConnectInfo) == 0)
{
   CString sError;
   sError.LoadString(IDS_EMPTY_PATH);
   memset(ErrorDescription, _T('\0'), sizeof (ErrorDescription) ) ;
   _tcsncpy(ErrorDescription, sError, TTYPE_MAX_ERROR - 1);
   rc = TTYPE_ERROR;
}
else
{
   CFileFind finder;
   BOOL bExists = finder.FindFile(ConnectInfo);
   if (!bExists)
   {
      CString sError;
      AfxFormatString1(sError, IDS_ERROR_NOSOURCE, ConnectInfo);
      memset(ErrorDescription, _T('\0'), sizeof (ErrorDescription);
      _tcsncpy(ErrorDescription, sError, TTYPE_MAX_ERROR - 1);
      rc = TTYPE_ERROR;
      return rc;
   }

   // Need to go through pConnectionOption the identifier names to
   // for the edit and new
   CString sNewCommand = pConnectOptions[0].Value;
   CString sEditCommand = pConnectOptions[1].Value;
   CString sUID = pConnectOptions[2].Value;

   // Generate a unique connection id for this connection context
   CString sConnectionIdentifier;
   GUID newGuid;
   CoCreateGuid(&newGuid); // note: this method is Windows-only
   sConnectionIdentifier.Format("%x-%x-%x-%x%x%x%x%x%x%x%x",
      newGuid.Data1, newGuid.Data2, newGuid.Data3,
      newGuid.Data4[0],newGuid.Data4[1],newGuid.Data4[2],
      newGuid.Data4[3],
      newGuid.Data4[4],newGuid.Data4[5],newGuid.Data4[6],
      newGuid.Data4[7] );

   CConnectionContext *pExistingContext = 0;


   // Not connected yet.
   try
   {
      CString sUserName, sPassword;

      //For this example, assume that connection options include
      //the UserName and Password necessary for connecting to the
      //datastore.
```

```
         // Retreive the UserID and Password.
         for (int iIndex = 0; iIndex < nOptions; iIndex++)
         {
            if (_tcsicmp(pConnectOptions[iIndex].Name, " UserName")
                  == 0)
            {
               sUserName = pConnectOptions[iIndex].Value;
            }
            else
            {
               if (_tcsicmp(pConnectOptions[iIndex].Name, "Password")
                     == 0)
               {
                  sPassword = pConnectOptions[iIndex].Value;
               }
            }

         /* CODE OMITTED: Attempt to establish a connection to test
         script data store using the UserName and Password connection
         options. In some cases, connecting to a data store may not
         require any connection options.*/

         // Store the connection context in the connection map.
         m_ServerConnections.SetAt(sConnectionIdentifier, pContext);

         } // for loop
      catch (_com_error)
      {
         rc = TTYPE_ERROR_UNABLE_TO_CONNECT;
         _tcscpy(ErrorDescription, (LPCTSTR) "Connection failure -
         Bad username and Password");
      }
   } // else

   return rc;
}
```

See Also

TTDisconnect()

TTDisconnect()

Disconnects from an existing script source.

Syntax

```
HRESULT TTDisconnect(char SourceID[TTYPE_MAX_ID], char
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle that the client uses to identify the connection to the datastore.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TTYPE_SUCCESS`. The function completed successfully.
- `TTYPE_ERROR_INVALID_SOURCEID`. The specified source information was not correct.
- `TTYPE_ERROR_UNABLE_TO_DISCONNECT`. There was no existing connection to disconnect from.
- `TTYPE_ERROR`. The adapter is using a customized error message. TestManager displays the contents of *`ErrorDescription`* to the tester.

Comments

After TestManager calls `TTDisconnect()`, no further operations are allowed on this test script source.

Example

```
//*********************************************************************
HRESULT TTDisconnect(const CHAR SourceID[TTYPE_MAX_ID],  CHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TTYPE_SUCCESS;

   CConnectionContext *pContext=0;
```

```
    // Lookup the context information for the specified SourceID.
    CString sSourceID = SourceID;
    m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

    // If the context was found, then continue else indicate SourceID is
    // invalid.
    if (pContext)
    {
    /* CODE OMITTED: Disconnect from test script datastore.
       If unable to disconnect, return
       TTYPE_ERROR_UNABLE_TO_DISCONNECT.*/

    }
    else
       rc = TTYPE_ERROR_INVALID_SOURCEID;

    return rc;
}
```

See Also

TTConnect()

TTEdit()

Launches the editor for a specific test script.

Syntax

HRESULT **TTEdit**(const char *SourceID*[TTYPE_MAX_ID], const char *ScriptID*[TTYPE_MAX_ID], int *LineNumber*, ScriptOption *p*ScriptOptions*[], int **nScriptOptions*, char *ErrorDescription*[TTYPE_MAX_ERROR], long *lWindowContext*)

Element	Description
SourceID	INPUT. A string that identifies the connection.
ScriptID	INPUT. A string that identifies the test script.
LineNumber	INPUT. An integer that specifies where the cursor is placed when the file is opened for editing.
pScriptOptions	INPUT. The test script options passed from TTSelect(). Any changes made to the test script options are passed back and made available to the test case or suite.
nScriptOptions	INPUT. An integer that specifies the number of test script options.

Element	Description
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.
lWindowContext	INPUT. An integer that specifies the handle for the parent window (HWND)

Return Values

This function typically returns one of the following values:

- `TTYPE_SUCCESS`. The function completed successfully.
- `TTYPE_ERROR_INVALID_SOURCEID`. The test source was incorrectly identified.
- `TTYPE_ERROR_INVALID_ID`. The adapter could not find a test script with this identification.
- `TTYPE_ERROR`. The adapter is using a customized error message. TestManager displays the contents of *`ErrorDescription`* to the tester.

Comments

Script options are settings that can sometimes be important for the test script to execute properly. The TSCA can specifiy and modify script options that TestManager saves as part of the test case. The data type `ScriptOption` is defined as:

```
struct ScriptOption
{
   char Name[TTYPE_MAX_NAME];
   char Value[TTYPE_MAX_NAME];
}ScriptOptionType;
```

Example

```
//*********************************************************************
HRESULT TTEdit(const CHAR SourceID[TTYPE_MAX_ID],const CHAR
ScriptID[TTYPE_MAX_ID], ScriptOption *pScriptOptions[], int
*nScriptOptions, CHAR ErrorDescription[TTYPE_MAX_ERROR], long
lWindowContext)
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TTYPE_SUCCESS;

   CConnectionContext *pContext=0;

// Lookup the context information for the specified SourceID.
   CString sSourceID = SourceID;
```

```
   m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

   // If the context was found, continue.
   if (pContext)
   {

   /* CODE OMITTED: Open the test script identified by the value of
      parameter ScriptID. This could be as simple as executing a
      command line call to your favorite text editor or a more complex
      interaction with a test tool.*/

   }
   else
      rc = TTYPE_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

`TTNew(), TTShowProperties(), TTSelect()`

TTExecuteNodeAction()

Executes the specified action against the specified test script.

Syntax

```
HRESULT TTExecuteNodeAction(const TCHAR SourceID[TT_MAX_PATH],
   const TCHAR Node[TT_MAX_ID], int nActionID, long
   lWindowContext, TCHAR ErrorDescription[TT_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test script source.
Node	OUTPUT. The ID that identifies the selected test script in the test script source.
nActionID	INPUT. The ID of the action to be executed.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this function.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TT_SUCCESS. The function completed successfully.
- TT_ERROR. The function did not complete successfully.

See Also

`TTGetSourceActions()`, `TTGetNodeActions()`, `TTExecuteSourceAction()`

TTExecuteSourceAction()

Executes the specified action against the test script source.

Syntax

```
HRESULT TTExecuteSourceAction(const TCHAR
   SourceID[TTYPE_MAX_PATH], int nActionID, long
   lWindowContext, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
nActionID	INPUT. The ID of the action to be executed.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The adapter executes the specified action against the test script source.

The following structure supports this function:

```
#define TTYPE_ACTION_NAME     100

struct Action
{
   char    Name[TTYPE_ACTION_NAME]:
   int       Action ID;
} ActionType;
```

Example

```
//*****************************************************************
TESTTYPEAPI_API HRESULT TTExecuteSourceAction(const TCHAR
SourceID[TTYPE_MAX_ID], int nActionID, long lWindowContext, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     switch (nActionID)
      {
        case 1:
           /* CODE OMITTED: Execute custom action 1. */
              break;
        case 2:
           /* CODE OMITTED: Execute custom action 2. */
           break;

        default:
           rc = TTYPE_ERROR;
           _tcscpy(ErrorDescription, _T("Unrecognized action
           received"));
           break;
     }
     return rc;

}
```

See Also

`TTGetNodeActions(), TTExecuteNodeAction(), TTExecuteSourceAction()`

TTGetChildren()

Returns an array of nodes that are the children of the specified node.

Syntax

```
HRESULT TTGetChildren(const TCHAR SourceID[TTYPE_MAX_PATH],
   const TCHAR NodeID[TTYPE_MAX_ID], struct Node
   *pChildNodes[], long *plNodeCount, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.
plChildNodes	OUTPUT. An array of populated Node structures, each of which is a root of the source.
plNodeCount	OUTPUT. The number of nodes returned by this function.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The following structure supports this function.

```
struct ScriptNode
{
   TCHAR   Name[TTYPE_MAX_NAME];
   TCHAR   NodeID[TTYPE_MAX_ID];
   TCHAR   Type[TTYPE_MAX_TYPE];
   BOOL    IsOnlyContainer;
   BOOL    IsImplementation;

};
```

Example

```
//**********************************************************************
TESTTYPEAPI_API HRESULT TTGetChildren(const TCHAR
SourceID[TTYPE_MAX_ID], const TCHAR NodeID[TTYPE_MAX_ID], struct
ScriptNode *pChildNodes[], long* plNodeCount, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{

     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     // In this example, insert a single child node
     *pNodeArray = new struct ScriptNode[1];
     *plNodeCount = 1;
     *pChildNodes = 0;

     (*pNodeArray)[0].IsImplementation = TRUE;
     (*pNodeArray)[0].IsOnlyContainer = FALSE;
     _tcscpy((*pNodeArray)[0].Type, _T("Node"));
     _tcscpy((*pNodeArray)[0].Name, sName);
     _tcscpy((*pNodeArray)[0].NodeID, _T("C:\\RootFolder\\Node"));

     return rc;
}
```

See Also

`TTGetNode(), TTGetRoots(), TTGetSourceIcon(), TTGetTypeIcon()`

TTGetConfiguration()

Returns a pointer to a buffer that contains a persistable configuration for the test script source.

Syntax

```
HRESULT TTGetConfiguration(const TCHAR
   SourceID[TTYPE_MAX_PATH], long lWindowContext, TCHAR
   **pConfigurationBuffer, int *pnConfigurationBufferLength,
   TCHAR ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
pConfigurationBuffer	OUTPUT. A pointer to the buffer that contains the streamed configuration.
pnConfigurationBufferLength	OUTPUT. The length of the configuration buffer.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The adapter returns the buffer configuration as a stream of characters. This data is interpreted by the adapter only.

It is assumed that the configuration buffer is allocated by the adapter and deleted by TestManager.

The adapter can display a user interface if necessary.

TestManager is responsible for persisting the data.

Example

```
//*********************************************************************
TESTTYPEAPI_API HRESULT TTGetConfiguration(const TCHAR
SourceID[TTYPE_MAX_ID], long lWindowContext, TCHAR
**pConfigurationBuffer, int* pnConfigurationBufferLength, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified
     // SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
     return TTYPE_ERROR_INVALID_SOURCEID;

     *pFilterBuffer = new char[_MAX_PATH];

     CWnd ParentWnd;
     ParentWnd.FromHandle((HWND)lWindowContext);

     /* You have to create a class (A dialog with an embedded
     list control to perform configuration selection is used here)*/
     CSelectConfigDialog Dialog(pContext, &ParentWnd);

     if (Dialog.DoModal() == IDOK)
     {
        _tcscpy(*pConfigurationBuffer,
        Dialog.m_sSelectedConfigurationName);
        *pnConfigurationBufferLength =
        Dialog.m_sSelectedConfigurationName.GetLength();
     }
     else
     {
        // Put in blanks to indicate no filter set
```

```
            CString sEmpty;
            _tcscpy(*pConfigurationBuffer, sEmpty);
            *pnConfigurationBufferLength = sEmpty.GetLength();
        }

        return rc;
    }
```

See Also

`TTSetConfiguration()`

TTGetFilterEx()

Returns a buffer containing a filter for the test script source.

Syntax

```
HRESULT TTGetFilterEx(const TCHAR SourceID[TTYPE_MAX_PATH],
   long lWindowContext, TCHAR *pFilterBuffer, int
   *pnFilterBufferLength, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
pFilterBuffer	OUTPUT. A pointer to the buffer that contains the streamed filter.
pnFilterBufferLength	OUTPUT. The length of the filter buffer.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The filter contained in the buffer is returned as a stream of characters.

The data is interpreted only by the adapter.

TestManager is responsible for persisting the data.

The adapter can display a user interface if desired.

Example

```
//*********************************************************************
TESTTYPEAPI_API HRESULT TTGetFilterEx(const TCHAR
SourceID[TTYPE_MAX_ID], long lWindowContext, TCHAR **pFilterBuffer,
int* pnFilterBufferLength, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     *pFilterBuffer = new char[_MAX_PATH];

     CWnd ParentWnd;
     ParentWnd.FromHandle((HWND)lWindowContext);

     /* You have to create a class (Typically a dialog with an
     embedded list control to perform filter selection here) */
     CSelectQueryDialog Dialog(pContext, &ParentWnd);

     if (Dialog.DoModal() == IDOK)
     {
        _tcscpy(*pFilterBuffer, Dialog.m_sSelectedQueryName);
         *pnFilterBufferLength =
        Dialog.m_sSelectedQueryName.GetLength();
     }
     else
     {
        // Put in blanks to indicate no filter set
        CString sEmpty;
        _tcscpy(*pFilterBuffer, sEmpty);
        *pnFilterBufferLength = sEmpty.GetLength();
     }
```

```
        return rc;
}
```

See Also

TTSetFilterEx()

TTGetIcon()

Returns the path of the bitmap that represents test scripts in the source.

Syntax

```
HRESULT TTGetIcon(const char SourceID[TTYPE_MAX_ID], char
   IconPath[TTYPE_MAX_PATH], char
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. A string that identifies the connection.
IconPath	OUTPUT. A string that specifies the path where the image file of the icon is located. The file must contain a 16 x 16 bitmap image.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR_INVALID_SOURCEID. The test script source was incorrectly identified.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//**********************************************************************
TESTTYPEAPI_API HRESULT TTGetIcon(char SourceID[TTYPE_MAX_ID], char
IconPath[TTYPE_MAX_PATH], char ErrorDescription[TTYPE_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());
```

```
    HRESULT rc = TTYPE_SUCCESS;

    DWORDdwError;
    CString sIcon;
    char szModuleFileName[_MAX_PATH+1];
    char szModuleFilePath[_MAX_PATH+1];
    char szDir[_MAX_DIR+1];
    char szDrive[_MAX_DRIVE+1];

    // In this sample, the icon is assumed to be in the same location as
    // the adapter
    dwError=GetModuleFileName((HMODULE)AfxGetInstanceHandle(),
    szModuleFileName, _MAX_PATH);
    _splitpath(szModuleFileName, szDrive, szDir, NULL, NULL);

    _tcscpy(szModuleFilePath, szDrive);
    _tcscat(szModuleFilePath, szDir);

    sIcon.LoadString(IDS_ICON_NAME);
    _tcscat(szModuleFilePath, sIcon);
    _tcscpy(IconPath, szModuleFilePath);

    return rc;
}
```

See Also

TTEdit(), TTNew()

TTGetIsFunctionSupported()

Indicates whether a specified function is supported by the adapter for an active connection.

Syntax

HRESULT **TTGetIsFunctionSupported**(const TCHAR *SourceID*[TTYPE_MAX_PATH], long *lFunctionID*, BOOL **pbSupported*, TCHAR *ErrorDescription*[TTYPE_MAX_ERROR])

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
lFunctionID	INPUT. The constant definition of the function.

Element	Description
pbSupported,	OUTPUT. A Boolean indicating whether the specified function is supported.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The adapter supports *lFunctionID*.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

Following are the values for the parameter `lFunctionID`:

```
TTYPE_FUNCTION_TTAddToSourceControl
TTYPE_FUNCTION_TTCheckIn
TTYPE_FUNCTION_TTCheckOut
TTYPE_FUNCTION_TTCompile
TTYPE_FUNCTION_TTConnect
TTYPE_FUNCTION_TTDisconnect
TTYPE_FUNCTION_TTEdit
TTYPE_FUNCTION_TTExecuteNodeAction
TTYPE_FUNCTION_TTExecutionSourceAction
TTYPE_FUNCTION_TTGetChildren
TTYPE_FUNCTION_TTGetConfiguration
TTYPE_FUNCTION_TTGetFilterEx
TTYPE_FUNCTION_TTGetIcon
TTYPE_FUNCTION_TTGetName
TTYPE_FUNCTION_TTGetNode
TTYPE_FUNCTION_TTGetNodeActions
TTYPE_FUNCTION_TTGetRoots
TTYPE_FUNCTION_TTGetSourceActions
TTYPE_FUNCTION_TTGetSourceControlStatus
TTYPE_FUNCTION_TTGetSourceIcon
TTYPE_FUNCTION_TTGetTestToolOptions
TTYPE_FUNCTION_TTGetTypeIcon
TTYPE_FUNCTION_TTNew
TTYPE_FUNCTION_TTRecord
TTYPE_FUNCTION_TTSelect
TTYPE_FUNCTION_TTSetConfiguration
TTYPE_FUNCTION_TTSetFilterEx
TTYPE_FUNCTION_TTShowProperties
TTYPE_FUNCTION_TTUndoCheckOut
```

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTGetIsFunctionSupported(const TCHAR
SourceID[TTYPE_MAX_ID], const TCHAR NodeID[TTYPE_MAX_ID], long
lFunctionID, BOOL *pbIsSupported, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
      AFX_MANAGE_STATE(AfxGetStaticModuleState());

      /* The following is a sample for a minimal adapter with no source
      control support. */

      switch (lFunctionID)
      {
         case TTYPE_FUNCTION_TTConnect:
         case TTYPE_FUNCTION_TTDisconnect:
         case TTYPE_FUNCTION_TTEdit:
         case TTYPE_FUNCTION_TTGetIcon:
         case TTYPE_FUNCTION_TTGetName:
         case TTYPE_FUNCTION_TTNew:
         case TTYPE_FUNCTION_TTRecord:
         case TTYPE_FUNCTION_TTSelect:
         case TTYPE_FUNCTION_TTShowProperties:
            *pbIsSupported = TRUE;
            break;

         default:
            *pbIsSupported = FALSE;
            break;
      }

      return TTYPE_SUCCESS;
}
```

TTGetName()

Returns the name of the specified test script.

Syntax

```
HRESULT TTGetName(const char SourceID[TTYPE_MAX_ID], const char
   ScriptID[TTYPE_MAX_ID], char ScriptName[TTYPE_MAX_ID], char
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. A string that identifies the connection.

Element	Description
ScriptID	INPUT. A string that identifies the test script.
ScriptName	OUTPUT. A string that specifies the name of a test script.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns on of the following values:

- `TTYPE_SUCCESS`. The function completed successfully.
- `TTYPE_ERROR_INVALID_SOURCEID`. The test script source was incorrectly identified.
- `TTYPE_ERROR`. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*********************************************************************
HRESULT TTGetName(const CHAR SourceID[TTYPE_MAX_ID], const CHAR
ScriptID[TTYPE_MAX_ID], CHAR ScriptName[TTYPE_MAX_NAME], CHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TTYPE_SUCCESS;

   CString sScriptName;

   /* CODE OMITTED: Obtain name of script and store in variable
      sScriptName.*/

   _tcscpy(ScriptName, sScriptName);

   return rc;
}
```

See Also

`TTEdit(), TTProperties()`

TTGetNode()

Returns information about the node that is identified by the unique ID.

Syntax

```
HRESULT TTGetNode(const TCHAR SourceID[TTYPE_MAX_PATH], const
   TCHAR NodeID[TTYPE_MAX_ID], struct ScriptNode **pNode, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.
pNode	OUTPUT. A pointer to a populated ScriptNode structure.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The following structure supports this function.

```
struct ScriptNode
{
      TCHAR  Name[TTYPE_MAX_NAME];
      TCHAR  NodeID[TTYPE_MAX_ID];
      TCHAR  Type[TTYPE_MAX_TYPE];
      BOOL   IsOnlyContainer;
      BOOL   IsImplementation;
};
```

Example

```
//*****************************************************************
TESTTYPEAPI_API HRESULT TTGetNode(const TCHAR SourceID[TTYPE_MAX_ID],
const TCHAR NodeID[TTYPE_MAX_ID], struct ScriptNode** pNode, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = S_OK;
     *pNode = 0;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     *pNode = new struct ScriptNode;

     // This adapter example is assuming that there is not a node
     // hierarchy.
     _tcsncpy((*pNode)->Name, (const char *)NodeID, TTYPE_MAX_NAME);

     (*pNode)->IsOnlyContainer = FALSE;
     (*pNode)->IsImplementation = TRUE;

     _tcscpy((*pNode)->NodeID, NodeID);

     // copy the name of node type into the node structure for all
     // nodes
     _tcscpy((*pNode)->Type, pContext->m_sType);

return rc;
}
```

See Also

TTGetChildren(),TTGetNodeActions(), TTGetSourceControlStatus(), TTGetTypeIcon()

TTGetNodeActions()

Returns a pointer to an array of test script actions.

Syntax

```
HRESULT TTGetNodeActions(const TCHAR SourceID[TT_MAX_PATH],
   const TCHAR Type[TT_MAX_TYPE], struct Action *pActions[],
   int *pnActionCount, TCHAR ErrorDescription[TT_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test script source.
Type	INPUT. The name of a node type.
pActions	OUTPUT. A local array containing action structures for node *Type*.
pnActionCount	OUTPUT. The number of actions in *pActions*.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TT_SUCCESS. The function completed successfully.
- TT_ERROR. The function did not complete successfully.

Comments

The *Type* parameter is empty if no types have been returned.

See Also

TTGetSourceActions(), TTExecuteNodeAction(),
TTExecuteSourceAction()

TTGetRoots()

Returns the array of nodes comprising the roots of the test script source.

Syntax

```
HRESULT TTGetRoots(const TCHAR SourceID[TTYPE_MAX_PATH], struct
   Node *pRootNodes[], long *plNodeCount, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
pRootNodes	OUTPUT. A handle to a window that can be the parent of a dialog displayed by this method.
plNodeCount	OUTPUT. The number of nodes returned by this method.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The following structure supports this function.

```
struct ScriptNode
{
      CHAR     Name[TTYPE_MAX_NAME];
      TCHAR    NodeID[TTYPE_MAX_ID];
      TCHAR    Type[TTYPE_MAX_TYPE];
      BOOL     IsOnlyContainer;
      BOOL     IsImplementation;
};
```

Example

```
//*****************************************************************
TESTTYPEAPI_API HRESULT TTGetRoots(const TCHAR SourceID[TTYPE_MAX_ID],
struct ScriptNode *pRootNodes[], long* plNodeCount, TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{

     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
          return TTYPE_ERROR_INVALID_SOURCEID;

     // In this example, insert a single folder as a root node
     *pNodeArray = new struct ScriptNode[1];
     *plNodeCount = 1;
     *pChildNodes = 0;

     *pNodeArray)[0].IsImplementation = FALSE;
     (*pNodeArray)[0].IsOnlyContainer = TRUE;
     _tcscpy((*pNodeArray)[0].Type, _T("RootFolder"));
     _tcscpy((*pNodeArray)[0].Name, sName);
     _tcscpy((*pNodeArray)[0].NodeID, _T("C:\\RootFolder\\"));

     return rc;
}
```

See Also

`TTGetChildren(),TTGetNode(), TTGetSourceControlStatus(), TTGetTypeIcon()`

TTGetSourceActions()

Returns a pointer to an array of actions that can be applied to the test script source.

Syntax

```
HRESULT TTGetSourceActions(const TCHAR
   SourceID[TTYPE_MAX_PATH], struct Action *pActions[], long
   *plActionCount, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
pActions	OUTPUT. An array of populated Action structures, each of which defines an action.
plActionCount	OUTPUT. The number of actions returned.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The adapter returns an array of actions that apply to the test script source.

It is assumed that the action array is allocated by the adapter and deleted by TestManager.

The following structure supports this function:

```
#define TTYPE_ACTION_NAME     100

struct Action
{
   char    Name[TTYPE_ACTION_NAME]:
   int       ActionID;
} ActionType;
```

Example

```
//*********************************************************************
TESTTYPEAPI_API HRESULT TTGetSourceActions(const TCHAR
SourceID[TTYPE_MAX_ID], struct TTAction *pActions[], int
*pnActionCount, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;
```

```
    CConnectionContext *pContext=0;

    // lookup the context information for the specified SourceID
    CString sSourceID = SourceID;
    m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

    if (pContext == 0)
       return TTYPE_ERROR_INVALID_SOURCEID;

    *pActions = new TTAction[2];

    _tcscpy((*pActions)[0].Name, _T("Custom Action 1"));
    ((*pActions)[0].ActionID = 1

    _tcscpy((*pActions)[1].Name, _T("Custom Action 2"));
    ((*pActions)[1].ActionID = 2

    return rc;

}
```

See Also

`TTExecuteNodeAction()`, `TTGetNodeActions()`, `TTExecuteSourceAction()`

TTGetSourceControlStatus()

Returns the current source-control status of the test script.

Syntax

```
HRESULT TTGetSourceControlStatus(const TCHAR
   SourceID[TTYPE_MAX_PATH], const TCHAR NodeID, long
   *p1Status, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.

Element	Description
p1Status	OUTPUT. The returned source control status of the specified test script source: TTYPE_SCSTATUS_NOTCONTROLLED. The source file is not under source control. TTYPE_SCSTATUS_CHECKEDOUT. The source file is checked out. TTYPE_SCSTATUS_CHECKEDIN. The source file is checked in.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_CANCEL. The user pressed the Cancel button.
- TTYPE_ERROR_INVALID_SOURCEID. The test script source was incorrectly identified.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*********************************************************************
TESTTYPEAPI_API HRESULT TTGetSourceControlStatus(const TCHAR
SourceID[TTYPE_MAX_ID], const TCHAR NodeID[TTYPE_MAX_ID], long
*plStatus, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;
     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     try
     {
        long lResult;
```

```
         /* CODE OMITTED: Retrieve assets associated with NodeID.
         Retrieve source control status on assets and set lResult
         accordingly. */

         *plStatus = lResult;

      }
      catch (_com_error &e)
      {
         rc = TTYPE_ERROR;
         CString sError = (BSTR) e.Description();
         tcscpy(ErrorDescription, (LPCTSTR) sError );
      }
      return rc;
}
```

See Also

`TTAddToSourceControl()`, `TTCheckIn()`, `TTCheckOut()`, `TTUndoCheckout()`

TTGetSourceIcon()

Returns the path to the icon that represents the test script source.

Syntax

```
HRESULT TTGetSourceIcon(const TCHAR SourceID[TTYPE_MAX_PATH],
   TCHAR IconPath[TTYPE_MAX_PATH], TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
IconPath	INPUT. The path to the icon that represents the test script source.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTGetSourceIcon(const TCHAR
SourceID[TTYPE_MAX_ID], TCHAR IconPath[TTYPE_MAX_PATH], TCHAR
ErrorDescription[TTYPE_MAX_ERROR])
{
  AFX_MANAGE_STATE(AfxGetStaticModuleState());

  HRESULT rc = TTYPE_SUCCESS;

  DWORDdwError;
  CString sIcon;
  char szModuleFileName[_MAX_PATH+1];
  char szModuleFilePath[_MAX_PATH+1];
  char szDir[_MAX_DIR+1];
  char szDrive[_MAX_DRIVE+1];

  // In this sample, the icon is assumed to be in the same location
  // as the adapter
  dwError=GetModuleFileName((HMODULE)AfxGetInstanceHandle(),
  szModuleFileName, _MAX_PATH);
  _splitpath(szModuleFileName, szDrive, szDir, NULL, NULL);

  _tcscpy(szModuleFilePath, szDrive);
  _tcscat(szModuleFilePath, szDir);

  sIcon.LoadString(IDS_SOURCE_ICON);
  _tcscat(szModuleFilePath, sIcon);
  _tcscpy(IconPath, szModuleFilePath);

  return rc;
}
```

See Also

TTGetChildren(), TTGetNode(), TTGetIcon(), TTGetTypeIcon()

TTGetTestToolOptions()

Returns the test tool options associated with the specified test script.

Syntax

```
HRESULT TTGetTestToolOptions(const TCHAR
   SourceID[TTYPE_MAX_PATH], const TCHAR NodeID[TTYPE_MAX],
   long lWindowContext, struct ScriptOption *pOptions[], int
   *piCount, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
pOptions	OUTPUT. An array of adapter-provided test tool options.
piCount	OUTPUT. The number of test tool options.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_CANCEL. The user pressed the Cancel button.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.
- TTYPE_ERROR_INVALID_SOURCEID. The test script source was incorrectly identified.

Comments

The adapter returns an array of name-value pairs containing the test tool options for the specified test script.

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTGetTestToolOptions(const TCHAR
SourceID[TTYPE_MAX_ID], const TCHAR NodeID[TTYPE_MAX_ID], long
lWindowContext, struct ScriptOption *pOptions[], int* piCount, TCHAR
ErrorDescription[TTYPE_MAX_ERROR]);
      AFX_MANAGE_STATE(AfxGetStaticModuleState())
{
      HRESULT rc = TTYPE_SUCCESS;

      CConnectionContext *pContext=0;

      // lookup the context information for the specified SourceID
      CString sSourceID = SourceID;
      m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

      if (pContext == 0)
         return TTYPE_ERROR_INVALID_SOURCEID;

      try
      {
         long lResult;

         /* In this example, the username and password are provided as
         connection options.  They are needed for the test tool as well,
         but in a slightly different format. */

         CString sUserName;
         CString sPassword;
         // Retrieve the UserID and Password
         for (int iIndex = 0; iIndex < nOptions; iIndex++)
         {
            if (_tcsicmp(pConnectOptions[iIndex].Name, " UserName")
            == 0)
            {
               sUserName = pConnectOptions[iIndex].Value;
            }
            else
            if (_tcsicmp(pConnectOptions[iIndex].Name, "Password")
            == 0)
            {
               sPassword = pConnectOptions[iIndex].Value;
            }
         }

         *pOptions = new ScriptOption[ 2 ];
         *piCount = 2;

         _tcscpy((*pOptions)[0].Name, _T("USR"));
         _tcscpy((*pOptions)[0].Value, sUserName);

         _tcscpy((*pOptions)[0].Name, _T("PSWD"));
```

```
         _tcscpy((*pOptions)[0].Value, sPassword);

      }
      catch (_com_error &e)
      {
         rc = TTYPE_ERROR;
         CString sError = (BSTR) e.Description();
         tcscpy(ErrorDescription, (LPCTSTR) sError );
      }
      return rc;
}
```

TTGetTypeIcon()

Returns the path to the bitmap that represents the node type.

Syntax

```
HRESULT TTGetTypeIcon(const TCHAR SourceID[TTYPE_MAX_PATH],
   const TCHAR Type[TTYPE_MAX_TYPE], TCHAR
   IconPath[TTYPE_MAX_PATH], TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
Type	INPUT. The type of node for which the icon is being requested.
IconPath	INPUT. The path to the icon that represents the test script type.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The following structure supports this function.

```
struct ScriptNode
{
      TCHAR  Name[TTYPE_MAX_NAME];
      TCHAR  NodeID[TTYPE_MAX_ID];
      TCHAR  Type[TTYPE_MAX_TYPE];
      BOOL   IsOnlyContainer;
      BOOL   IsImplementation;
};
```

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTGetTypeIcon(const TCHAR
SourceID[TTYPE_MAX_ID], const TCHAR Type[TTYPE_MAX_TYPE], TCHAR
IconPath[TTYPE_MAX_PATH], TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TTYPE_SUCCESS;

   DWORDdwError;
   CString sIcon;
   char szModuleFileName[_MAX_PATH+1];
   char szModuleFilePath[_MAX_PATH+1];
   char szDir[_MAX_DIR+1];
   char szDrive[_MAX_DRIVE+1];

   // In this sample, the icon is assumed to be in the same location
   // as the adapter.
   dwError=GetModuleFileName((HMODULE)AfxGetInstanceHandle(),
   szModuleFileName, _MAX_PATH);
   _splitpath(szModuleFileName, szDrive, szDir, NULL, NULL);

   _tcscpy(szModuleFilePath, szDrive);
   _tcscat(szModuleFilePath, szDir);

   sIcon.LoadString(IDS_TYPE_ICON);
   _tcscat(szModuleFilePath, sIcon);
   _tcscpy(IconPath, szModuleFilePath);

   return rc;
}
```

See Also

`TTGetChildren(), TTGetNode(), TTGetRoots()`

TTNew()

Enables the tester to create a new test script using the hosted tool.

Syntax

```
HRESULT TTNew(const char SourceID[TTYPE_MAX_ID], char
   ScriptID[TTYPE_MAX_ID], char Name[TTYPE_MAX_NAME],
   ScriptOption *pScriptOptions[], int* nScriptOptions, char
   ErrorDescription[TTYPE_MAX_ERROR], long lWindowContext)
```

Element	Description
SourceID	INPUT. A string that identifies the test source.
ScriptID	OUTPUT. A string that identifies the test script.
Name	OUTPUT. A string that specifies the name of a test script.
pScriptOptions	OUTPUT. Reserved for future use.
nScriptOptions	OUTPUT. Reserved for future use.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.
lWindowContext	INPUT. An integer that specifies the handle for the parent window (HWND).

Return Values

This function typically returns one of the following values:

- `TTYPE_SUCCESS`. The function completed successfully.
- `TTYPE_ERROR_INVALID_SOURCEID`. The test script source was incorrectly identified.
- `TTYPE_ERROR`. The adapter is using a customized error message. TestManager displays the contents of *`ErrorDescription`* to the tester.

Comments

After the tester creates the new test script, this function passes the ID and test script name to Test Manager. TestManager then passes this information to the `TTEdit()` and `TTShowProperties()` functions of this adapter as well as to the Test Script Execution Adapter (TSEA).

Example

```
//*********************************************************************
HRESULT TTNew(const CHAR SourceID[TTYPE_MAX_ID], CHAR ScriptID
[TTYPE_MAX_ID], CHAR Name[TTYPE_MAX_NAME], ScriptOption
*pScriptOptions[], int* nScriptOptions, CHAR
ErrorDescription[TTYPE_MAX_ERROR], long lWindowContext)
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TTYPE_SUCCESS;

   CConnectionContext *pContext=0;

   // Lookup the context information for the specified SourceID.
   CString sSourceID = SourceID;
   m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

   // If the context was found, continue.
   if (pContext)
   {

      /* CODE OMITTED: Create a new Test Script.  This could be as
       simple as executing a command line call to your favorite text
       editor or a more complex interaction with a Test Tool.*/

       /* The Name and ID of the new script must be
         returned in the variables ScriptID and ScriptName.*/

      _tcscpy(ScriptID, (const char *)sScriptID);
      _tcscpy(ScriptName, (const char *)sScriptName);

   }
   else
      rc = TTYPE_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

TTEdit(), TTShowProperties()

TTSelect()

Displays a UI that allows a user to select a test script and then returns information that identifies the selected script.

Syntax

```
HRESULT TTSelect(const char SourceID[TTYPE_MAX_ID], char
   ScriptID[TTYPE_MAX_ID], char ScriptName[TTYPE_MAX_ID],
   ScriptOption *pScriptOptions[], int* nScriptOptions, char
   ErrorDescription[TTYPE_MAX_ERROR], long lWindowContext)
```

Element	Description
SourceID	INPUT. A string that identifies the connection.
ScriptID	OUTPUT. A string that identifies the test script.
ScriptName	OUTPUT. A string that specifies the name of a test script.
pScriptOptions	OUTPUT. A structure that specifies options for running the test script.
nOptionOptions	OUTPUT. An integer that specifies the number of test script options.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.
lWindowContext	INPUT. An integer that specifies the handle for the parent window (HWND)

Return Values

This function typically returns one of the following values:

- `TTYPE_SUCCESS`. The function completed successfully.
- `TTYPE_ERROR_INVALID_SOURCEID`. The test script source was incorrectly identified.
- `TTYPE_ERROR`. The adapter is using a customized error message. TestManager displays the contents of *`ErrorDescription`* to the tester.

Comments

Use this function to provide a UI for the user to select a test script. The function returns the ID and name of the test script to TestManager. These parameters are passed to the `TTEdit()` and `TTShowProperties()` functions and are also passed to the Test Script Execution Adapter (TSEA).

Script options are settings that may be important for the test script to execute properly. The TSCA can specify and modify script options, which are saved by TestManager as part of the test case or suite. The data type `ScriptOption` is defined as follows:

```
struct ScriptOption
{
   char Name[TTYPE_MAX_NAME];
   char Value[TTYPE_MAX_NAME];
}ScriptOptionType;
```

Example

```
//*****************************************************************
TESTTYPEAPI_API HRESULT TTSelect(const char SourceID[TTYPEMAX_ID],
char ScriptID[TTYPE_MAX_ID], char ScriptName[TTYPE_MAX_NAME],
ScriptOption *pScriptOptions[], int *nScriptOptions, char
ErrorDescription[TTYPE_MAX_ERROR], long lWindowContext)
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

   // lookup the context information for the specified SourceID
   m_ServerConnections.Lookup(SourceID, (void *&)pContext);

   // if the context was found, then continue
   if (pContext)
   {
     // remove the connection from the list of "live" connections
     m_ServerConnections.RemoveKey(SourceID);
     // Now delete it
     delete pContext;
   }

   return rc;
}
```

See Also

`TTEdit()`, `TTShowProperties()`

TTSetConfiguration()

Sets the configuration for the test script source based on the specified configuration buffer.

Syntax

```
HRESULT TTSetConfiguration(const TCHAR
   SourceID[TTYPE_MAX_PATH], TCHAR *pConfigurationBuffer, int
   nConfigurationBufferLength, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
pConfigurationBuffer	INPUT. A pointer to the buffer that contains the streamed configuration.
nConfigurationBufferLength	INPUT. The length of the configuration buffer.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The adapter sets the configuration for the test script source.

TestManager passes the data returned by a previous call to the method `TTGetConfiguration()` as an input parameter.

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTSetConfiguration(const TCHAR
SourceID[TTYPE_MAX_ID], TCHAR *pConfigurationBuffer, int
nConfigurationBufferLength, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;
```

```
        // lookup the context information for the specified SourceID
        CString sSourceID = SourceID;
        m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

        if (pContext == 0)
           return TTYPE_ERROR_INVALID_SOURCEID;

        // Persist the raw filter buffer for possible future use by
        // TTGetConfigurationEx or TTCompile, TTEdit, etc...
        pContext->m_sConfiguration = pConfigurationBuffer;

        /* CODE OMITTED: Handle any configuration application actions
        needed by the adapter */

        return rc;
}
```

See Also

`TTGetConfiguration()`

TTSetFilterEx()

Sets the filter for the test script source based on the specified filter buffer.

Syntax

HRESULT **TTSetFilterEx**(const TCHAR *SourceID*[TTYPE_MAX_PATH], TCHAR **pFilterBuffer*, int *nFilterBufferLength*, TCHAR *ErrorDescription*[TTYPE_MAX_ERROR])

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
pFilterBuffer	INPUT. A pointer to the buffer that contains the streamed filter.
nFilterBufferLength	INPUT. The length of the filter buffer.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

The adapter sets the filter for the test script source.

TestManager passes, as an input parameter, the data returned by a previous call to the method `TTGetFilterEx`.

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTSetFilterEx(const TCHAR
SourceID[TTYPE_MAX_ID], TCHAR *pFilterBuffer, int nFilterBufferLength,
TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     /* The remainder of this code is an example of filtering file
     based script source. In this sample, the TTGetFilterEx returned
     a list of file extensions that were to be hidden from the user.
     This example merely parses the filter buffer and
     stores the results in the adapter's connection context.
     TTGetRoots and TTGetChildren
     would then use this to determine their output. */

     // Persist the raw filter buffer for possible future use by
     // TTGetFilterEx
     pContext->m_sFilter = pFilterBuffer;

     TCHAR szBuffer[512];
     _tcscpy(szBuffer, pFilterBuffer);
     char seps[] = ";";
     char *token;

    pContext->m_asFilterFileExtensions.RemoveAll();

     // establish string and get the first token:
```

```
        token = strtok(szBuffer, seps );
        while( token != NULL )
        {
           CString sToken = token;
           sToken.TrimLeft();
           sToken.TrimRight();
           pContext->m_asFilterFileExtensions.Add(sToken);

        // Get next token:
        token = strtok( NULL, seps );

        }  //  end while

        return rc;
}
```

See Also

TTGetFilterEx()

TTShowProperties()

Displays the properties of a test script.

Syntax

```
HRESULT TTShowProperties(const char SourceID[TTYPE_MAX_ID],
   const char ScriptID[TTYPE_MAX_ID], ScriptOption
   *pScriptOptions[], int *nScriptOptions, char
   ErrorDescription[TTYPE_MAX_ERROR], long lWindowContext)
```

Element	**Description**
SourceID	INPUT. A string that identifies the connection.
ScriptID	INPUT. A string that identifies the test script.
pScriptOptions	INPUT.The test script options passed in from `TTSelect()`. Any changes made to the test script options must be passed back and made available to the test case or suite.
nScriptOptions	INPUT. An integer that specifies the number of test script options.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.
lWindowContext	INPUT. An integer that specifies the handle for the parent window (HWND)

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_ERROR_INVALID_SOURCEID. The test source was incorrectly identified.
- TTYPE_ERROR_INVALID_ID. The adapter could not find a test script with this identification.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Comments

Script options are settings that may be important for the test script to execute properly. The TSCA can specifiy and modify script options, which are saved by TestManager as part of the test case or suite. The data type ScriptOption is defined as follows:

```
struct ScriptOption
{
   char Name[TTYPE_MAX_NAME];
   char Value[TTYPE_MAX_NAME];
}ScriptOptionType;
```

Example

```
//*****************************************************************
HRESULT TTShowProperties(const CHAR SourceID[TTYPE_MAX_ID],const CHAR
ScriptID [TTYPE_MAX_ID], ScriptOption
*pScriptOptions[], int nScriptOptions, long lWindowContext , char
ErrorDescription[TTYPE_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TTYPE_SUCCESS;

   CConnectionContext *pContext=0;

   // Lookup the context information for the specified SourceID.
   CString sSourceID = SourceID;
   m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

   // If the context was found, continue.
   if (pContext)
   {

   /* CODE OMITTED: Display the test script property sheet.*/

   }
```

```
   else
      rc = TTYPE_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

`TTSelect(), TTEdit()`

TTUndoCheckout()

Undoes the checkout of the appropriate files for the specified test script.

Syntax

```
HRESULT TTUndoCheckout(const TCHAR SourceID[TTYPE_MAX_PATH],
   const TCHAR NodeID, long lWindowContext, TCHAR
   ErrorDescription[TTYPE_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The adapter-provided handle that identifies the connection to the test script source.
NodeID	INPUT. The unique ID that identifies the selected test script in the source.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this method.
ErrorDescription	OUTPUT. A message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TTYPE_SUCCESS. The function completed successfully.
- TTYPE_CANCEL. The user pressed the Cancel button.
- TTYPE_ERROR_INVALID_SOURCEID. The test script source was incorrectly identified.
- TTYPE_ERROR. The adapter is using a customized error message. TestManager displays the contents of *ErrorDescription* to the tester.

Example

```
//*******************************************************************
TESTTYPEAPI_API HRESULT TTUndoCheckOut(const TCHAR
SourceID[TTYPE_MAX_ID], const TCHAR NodeID[TTYPE_MAX_ID], long
lWindowContext, TCHAR ErrorDescription[TTYPE_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TTYPE_SUCCESS;
     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
        return TTYPE_ERROR_INVALID_SOURCEID;

     try
     {
        /* CODE OMITTED: Retrieve assets associated with NodeID.
        Perform source control UndoCheckOut on assets. */

     }
     catch (_com_error &e)
     {
        rc = TTYPE_ERROR;
        CString sError = (BSTR) e.Description();
        tcscpy(ErrorDescription, (LPCTSTR) sError );
     }
     return rc;
}
```

See Also

TTAddToSourceControl(), TTCheckIn(), TTCheckOut(),
TTGetSourceControlStatus()

Part 2: Adding Custom Test Input Types

Introduction to the Test Input Adapter API 5

This chapter describes the Test Input Adapter (TIA) API and explains how to build a custom TIA.

This chapter contains the following sections:

- About the Test Input Adapter API
- Building a TIA: Workflow and Implementation Issues

About Test Input Adapters

A Test Input Adapter (TIA) is a C or C++ dynamic-link library (DLL) that integrates with TestManager to enable additional test input types to be available for planning test cases. Test cases define what a tester will test, based on this newly defined test input.

Each test input source is associated with a particular TIA. Without a TIA, the user would be unable access a test input through the user interface.

TIA Functionality

A TIA must, at a minimum:

- Connect to and disconnect from the test input source.
- Return a list of test inputs to TestManager.

In addition to these basic functions, many TIAs are designed to support more sophisticated actions. A more robust TIA might support such operations as:

- Filtering test inputs within the Test Input view.
- Displaying the properties of a test input.
- Performing impact analysis (suspicion) based on changes to test inputs.
- Configuring a test input source.
- Executing a custom action against the test input source or the test input.

Built-In and Custom TIAs

Test inputs consist of any data that the test designer identifies as needing validation. (For more information about built-in test input types, see the *Rational TestManager User's Guide*.)

TestManager comes with three built-in test input types. Built-in TIAs support these test input types, enabling TestManager to access these test inputs. The built-in test input types are:

- Requirements in the RequisitePro project
- Elements in a Rose model
- Rows or columns in a Microsoft Excel spreadsheet

If you want TestManager to support a new test input type, you must implement a custom TIA. That is, you can *extend* the TestManager functionality to support test inputs generated by non-Rational tools. You can define and manage as a test input type any kind of intermediary object needed for testing. Examples are:

- Microsoft Project files
- C++ project files

  Each C++ source module associated with a C++ project file can have its own language restrictions, for example, permitted depth of inheritance. You can create test cases that determine whether specific source modules adhere to these restrictions.

Because a TIA must provide connection with the test input source, the following functions are required for building a basic TIA:

- `TIConnectEx()`

  Note: This function supersedes `TIConnect()`, which should only be used if `TIConnectEx()` is not supported.

- `TIDisconnect()`

In addition, the TIA must provide access to the test inputs in the source by implementing some of the following functions:

- `TIGetRoots()`
- `TIGetNode()`
- `TIGetChildren()`

Other functions are optional; they enable the user to work with the user interface to perform additional operations on the test input. The advantages of using these additional functions are described in *Building a TIA: Workflow and Implementation Issues* on page 189.

Some functions work in pairs. For example, because `TIConnectEx()` is called to make the connection to the test input source, `TIDisconnect()` must subsequently be called to disconnect from the test input source.

For information about specific declarations, see the required header file:

...\Rational Test\rtsdk\c\include\testinputapi.h

The TIA Function Calls

The TIA applications programming interface (API) consists of 34 functions that are organized into eight functional groupings.

Functional Groupings of TIA Functions

The Test Input Adapter (TIA) functions are summarized in the following table, which shows:

- The functional groupings and their purposes.
- The functions within each group.

Notes:

1 TestManager does not currently call the functions preceded by an asterisk (*).

2 The following extended function calls supersede the corresponding nonextended calls:
   - `TIConnectEx()`
   - `TISetFilterEx()`

Function Group and Purpose	Functions in Group
Connection Supports connection and disconnection from the test input source.	`TIConnect()`
	`TIConnectEx()`
	`TIDisconnect()`

<table>
<tr><th>Function Group and Purpose</th><th>Functions in Group</th></tr>
<tr><td rowspan="10">Data Access
Provides access to the source's test inputs:
▪ Hierarchical data
▪ Nonhierarchical data
▪ Sources with different test input types
▪ Functions providing icons for source and test inputs</td><td>TIGetRoots()</td></tr>
<tr><td>TIGetChildren()</td></tr>
<tr><td>TIGetIsNode()</td></tr>
<tr><td>*TIGetParent()</td></tr>
<tr><td>*TIGetName()</td></tr>
<tr><td>*TIGetType()</td></tr>
<tr><td>*TIGetTypes()</td></tr>
<tr><td>TIGetTypeIcon()</td></tr>
<tr><td>TIGetSourceIcon()</td></tr>
<tr><td>TIGetNeedsValidation()</td></tr>
<tr><td rowspan="7">State Access
Provides information about test input states.</td><td>*TIGetIsParent()</td></tr>
<tr><td>*TIGetIsChild()</td></tr>
<tr><td>*TIGetIsNode()</td></tr>
<tr><td>*TIGetIsModified()</td></tr>
<tr><td>*TIGetIsModifiedSince()</td></tr>
<tr><td>*TIGetModified()</td></tr>
<tr><td>TIGetModifiedSince()</td></tr>
<tr><td rowspan="4">Filtering
Provides support to filter out test inputs that do not meet user-defined criteria</td><td>TISetFilter()</td></tr>
<tr><td>TISetFilterEx()</td></tr>
<tr><td>TIGetFilterEx()</td></tr>
<tr><td>*TISetValidationFilter()</td></tr>
<tr><td rowspan="2">UI Support
Provides the ability to create custom user interface components that display the properties of a test input.</td><td>TIShowProperties()</td></tr>
<tr><td>*TIShowSelectDialog()</td></tr>
<tr><td rowspan="2">Source Configuration Support
Provides the ability to produce a custom user interface to aid in configuring the test input source</td><td>TISetConfiguration()</td></tr>
<tr><td>TIGetConfiguration()</td></tr>
</table>

Function Group and Purpose	Functions in Group
Custom Action Execution Provides the ability to expose custom operations from the TestManager Test Input view	TIExecuteSourceAction()
	TIExecuteNodeAction()
	TIExecuteSourceAction()
	TIGetNodeActions()
Miscellaneous Infrastructure Provide infrastructure support	*TIGetIsValidSource()
	TIGetIsFunctionSupported()

Mapping of User Actions to TIA Function Calls

A TestManager end user may want to carry out various actions on the test input source. Following is a list of common test input operations that the user might perform in the Test Input view. The order in which these operations are listed represents a plausible sequence in which the user might execute them.

1. Defining or modifying the configuration of a test input source.
2. Opening the Test Input view.
3. Setting a filter for a test input source.
4. Selecting a test input from a test input source.
5. Displaying properties of a test input.
6. Performing custom actions (if any) on the test input source

Note: Based on the current state of TestManager (including which test-input-related operations it has already performed), TestManager may not call some of the functions listed in the following sequences.

Defining or Modifying the Configuration of a Test Input Source

When the user defines or modifies the configuration of a test input source, TestManager calls the following two functions from the **Source Configuration** group in the order listed below.

Typical Sequence of Function Calls	Operation
1 `TIGetConfiguration()`	Exposes user interface elements that collect data access and data format information from the user when registering the test input source. The TIA passes that information back to TestManager to be persisted as a property of the test input source.
2 `TISetConfiguration()`	When a connection is made to the test input source, TestManager passes the configuration data obtained from the `TIGetConfiguration()` function into this function.

Note: Test inputs from different sources demonstrate great variability in:

- Data access
- Data format

For example, test inputs from a RequisitePro project are relatively stable. TestManager treats all requirements in a RequisitePro test input source as potential test inputs. Therefore, you do not need to write a custom TIA to collect any additional user input.

On the other hand, test inputs from an Excel-based input source tend to be highly variable regarding the test input location (column or row) and the data format, making it undesirable to build a specialized adapter for each possible condition.

Opening the Test Input View

When the user opens up the Test Input view, TestManager calls the following functions from the **Connection** group in the order listed below.

Note: `TIConnectEx()` supersedes `TIConnect()`.

Typical Sequence of Function Calls	Operation
1 `TIConnectEx()`	Establishes a connection to the test input source.
2 `TIGetSourceIcon()`	Returns the path to the bitmap containing the icon that represents the test input source in Test Input view. Note that implementation of this function is optional.

Setting a Filter for a Test Input Source

When the user sets a filter on the test input source, TestManager calls the following functions from the **Filtering** group in the order listed below.

Typical Sequence of Function Calls	Operation
1 `TIGetFilterEx()`	Exposes user interface elements that collect filtering specifications from the user. The TIA passes those filtering specifications back to TestManager to be persisted with the Test Input view or test coverage reports.
2 `TISetFilterEx()`	When a connection is made to the test input source, TestManager passes into the TIA the filtering specifications obtained from `TIGetFilterEx()`.

Selecting a Test Input from a Test Input Source

Many operations, including associating a test case to a test input, require that the user select a test input from a test input source. To display the contents of a test input source, TestManager calls these functions from the **Data Access** group, typically in the following sequence:

Typical Sequence of Function Calls	Operation
1 `TIGetSourceIcon()`	Returns the path to the bitmap that represents the test input source.
2 `TIGetRoots()`	Returns the array of nodes comprising the roots of the test input source.

Typical Sequence of Function Calls	Operation
3 `TIGetChildren()`	Returns an array of nodes that are the children of the specified node. TestManager calls this function once for each test input returned by the function `TIGetRoots()`.
4 `TIGetTypeIcon()`	Returns the path to the bitmap that represents the test input type for each test input added to the view.

Displaying Properties of a Test Input

When the user makes a UI selection to view the properties of a test input, TestManager calls the following function, which comes from the **UI Support** group.

Function Call	Operation
`TIShowProperties()`	Displays the properties of a selected test input.

Performing Custom Actions on the Test Input Source

You can implement the TIA to support custom actions on the test input source. If the TIA supports these custom actions, TestManager displays them in a custom menu so that the user can select them. To enable display and execution of custom actions on the test input source, TestManager calls these functions from the **Custom Action Execution** group, typically in the following sequence:

Typical Sequence of Function Calls	Operation
1 `TIGetSourceActions()`	Returns a pointer to an array of actions that can be applied to the test input source.
2 `TIExecuteSourceAction()`	Executes the specified action on the test input source.

Performing Custom Actions on a Test Input Node

You can implement the TIA to support custom actions on a test input node. If the TIA supports these custom actions, TestManager displays them in a custom menu so that the user can select them. To enable display and execution of custom actions on the test input node, TestManager calls these functions from the **Custom Action Execution** group, typically in the following sequence:

Typical Sequence of Function Calls	Operation
1 `TIGetNodeActions()`	Returns a pointer to an array of actions that can be applied to a node of a particular type.
2 `TIExecuteNodeAction()`	Executes the specified action on the specified node.

Building a Custom Test Input Adapter

This section first describes the skills you need to build a custom TIA and then describes the implementation issues that arise when you create this adapter.

Prerequisite Skills

To build a custom TIA using the TestManager C/C++ API, you need the following skills:

- A working knowledge of the tool or format used to persist test inputs of that type. This knowledge must include details of how to programmatically access the data within the test input source.
- An ability to build a C or C++ DLL that exposes the functions called by TestManager.
- Familiarity with the TIA API.

Building a TIA: Workflow and Implementation Issues

This section discusses the general workflow that you should follow when building a TIA and the implementation issues that arise at each phase of this workflow. The phases are as:

- Making a connection.
- Accessing the data.
- Supporting impact analysis.
- Displaying properties.

- Supporting user configuration of the Test Input source.
- Filtering.
- Custom action support.

Making a Connection

The most critical phase in developing a TIA is determining how to use the functions in the Data Access group to access the data (that is, the test inputs stored in a source) and return this data to TestManager. In most cases, the data is accessed using a common API or directly by accessing the physical representation of the data. This physical representation can be file, a database, or some other source.

It is most efficient if the TIA maintains an active connection to the test input source rather than reconnecting each time the user makes a request from TestManager. It is possible that some test input sources do not require a connection to access the test inputs contained within it.

Given these considerations, you, the TIA developer, must determine the answers to the following connection issues at the beginning, before you create the TIA. The decisions you make regarding the connection issues are the most critical decisions you make in the process of building the TIA. Once you have determined satisfactory solutions to the following issues, you are likely to be successful in your development of the TIA.

1. How can the TIA gain access to the test input data in the source? If an existing API performs this function, use it. If an appropriate API does not exist, is there a way to gain access to the data directly? Alternatively, is there a consistent way to export the data to CSV or some other common format for which an adapter exists or can be written?

2. How can the adapter uniquely identify the test input source? If the test inputs are stored in a file, the preferred form of identification is the path to the file. If the test inputs are not stored in a file, you must create a logical name. The test input source identification that you develop is passed to the `TIConnectEx()` function when TestManager calls it.

3. Is any additional information needed for connecting to the source? If not, the `TIConnect()` function is probably adequate. If, however, additional data is needed, the user can specify it as connection options when registering the test input source. These connection options are passed to `TIConnectEx()`.

4. How can the TIA uniquely identify a test input? If the tool used to create the test input supports the concept of a unique ID for each test input, it is optimal to use it. If not, the adapter needs to derive a unique identifier. Each test input needs its own unique ID per source, which is used as a key for association with a test case.

5. Does the test input source require any configuration data in addition to the data needed for connection? If so, what data is needed? The major decision you face here is which data to hard code into the TIA itself and which data to have the user specify.

   For example, if you are building a general TIA to support general database access of test inputs, you can do one of the following:

   - Write a table-specific TIA in which you hard code the table and column names into the TIA itself.
   - Write a more general TIA that has functionality enabling users to specify the table and column names each time they register a new test input source.

   The first option, while requiring less initial work on your part, is not reusable when the test input configuration changes — for example, a new table is used to store the test input data. In this case, you would have to write a new TIA for the new table.

   The second option, in which you write the TIA so that the user can specify the table and column names, is more flexible and reusable. To enable the user to specify this information, you must implement the functions `TISetConfiguration()` and `TIGetConfiguration()`. `TIGetConfiguration()` must provide a UI to collect the configuration information.

Accessing the Data

The next phase in building a TIA is to develop support for the functions in the Data Access group.

Once this support is developed, the TIA should be ready for partial use by TestManager. If a new test input type has been registered to use the TIA, the user should be able to:

- Register and, if necessary, configure a test input source.
- Use the Test Input view to view the test inputs in that source.
- Associate a test case with any of the test inputs from that source.

The issues to resolve in developing support for functions in the Data Access group are:

1. What is the organizational structure for the test input data that the TIA will access? Is the data organized in a hierarchical structure or in a flat list?

   If the test input data is organized in a flat list, you need the following functions to return data:

   - `TIGetRoots()`
   - `TIGetNode()`

   If the test input data is organized hierarchically, you need the following functions to return data:

   - `TIGetRoots()`
   - `TIGetNode()`
   - `TIGetChildren()`

2. Are the items contained in the test input source all of the same type, or does the source support multiple types? A Rose model is an example of a test input source that contains many different types of test inputs.

3. Is there an easily recognized bitmap or icon that represents the test input source?

   Because Windows users are accustomed to recognizing software components by icons, you should support the function `TIGetSourceIcon()`. This function returns the path of the bitmap that represents the test input source.

4. Are there easily recognized bitmaps or icons that represent the different elements that comprise test inputs in the test input source?

   Because Windows users are accustomed to recognizing software components by icons, you should support the function `TIGetTypeIcon()`. This function returns the path of the bitmap that represents the node type.

Supporting Impact Analysis

A key TestManager feature is its ability to support impact analysis based on changes to test inputs. For this feature to work, you must implement the function `TIGetModifiedSince()`, which returns a list of test inputs that have been modified since a specified date and time. To determine which test inputs have changed, the TIA needs to access a test input source containing a last-modified date/time for each test input. Without such a source, it is unlikely that you can create a TIA that supports impact analysis.

Displaying Properties

By default, the only test input information displayed by the TestManager user interface is the input name. To enable the user to view other associated data about the test input from the TestManager user interface, you should implement the function `TIShowProperties()`. Try to use the underlying tool's property sheet if it is appropriate for display and can be called by the TIA.

Supporting User Configuration of Test Input Data

In designing a TIA, you need to decide whether to implement the TIA in a way that enables the test designer to specify how the adapter should interpret the test input data. If the test designer can specify data interpretation, you must determine the kind of user interface to provide for specifying the configuration.

You may want to support user configuration of test input data because test inputs from different sources vary in data access, data format, and data stability.

For example, test inputs from a RequisitePro project are relatively stable. The built-in Test Input Adapter is hard coded to understand the configuration of RequisitePro projects. Therefore, the test designer does not need to specify a configuration to the adapter.

In contrast, a test input type can be highly variable. For example, the data configuration in a Microsoft Excel spreadsheet is variable, and therefore the TIA does not intrinsically understand this data configuration, such as whether the data is arranged horizontally or vertically. Given the variable nature of test inputs, you cannot build a specialized adapter for each possible condition.

To enable user configuration of test input data, you should implement the following functions:

- `TIGetConfiguration()`

  This function prompts the user with a user interface that collects the information needed to configure the adapter. This function must return that information in a buffer so that TestManager can persist it with the test input source.

- `TISetConfiguration()`

  This function enables TestManager to pass into the TIA the test input source configuration information found in the buffer. (The content of this buffer is the same as the configuration information collected from the user.) The TIA needs this information to know how to access the data in the test input source.

In summary, consider the variability in format of the test input source when deciding whether to provide configurability to the user.

Filtering

A test input source can contain an enormous number of test inputs. For example, a RequisitePro project can have 10,000 or more requirements, each of which is a possible test input. In cases like this, you must provide filtering support so that only test inputs meeting certain criteria are displayed to the user in Test Input view or in test case distribution reports. If the test input is created in a tool that supports filtering, you should take advantage of it.

If you implement the functions `TISetFilterEx()` and `TIGetFilterEx()`, TestManager can set and get a filter.

Custom Action Support

TestManager enables you to expose operations in the GUI that are useful for the test designer when working with test inputs. For example, a test designer working with a Requisite Pro project as a test input source would probably want to carry out an operation that opens the Requisite Pro project.

You, the adapter writer, can build the adapter so that the test designer can execute an operation to open Requisite Pro from the GUI. You can also support custom operations for specific test inputs.

To support custom actions against the Test Input source, implement the following functions:

- `TIGetSourceActions()`
- `TIExecuteSourceAction()`

To support custom actions against a test input, implement the following functions:

- `TIGetNodeActions()`
- `TIExecuteNodeAction()`

Registering a New Test Input Adapter

After you have implemented the Test Input Adapter and created the DLL file, do the following:

- Compile the DLL using the `__cdecl*` calling convention.
- Use the following procedure to register the DLL with TestManager.

To register the DLL with TestManager:

1. From TestManager click **Tools > Manage > Test Input Types.**
2. Click **New** in the Manage Test Inputs dialog box. (If the button is disabled, you do not have write privileges. See the *Using the Rational Administrator* manual or Help.)
3. Enter the path to the DLL in the space provided for the adapter.
4. Click the **Sources** tab.
5. Click **Insert**.
6. If a message appears asking if the type should be created, click **Yes**.
7. In the New Test Input Source dialog box, enter a name of the source (40 characters maximum).
8. Enter a description.
9. Select an owner from the list.
10. In the **Connect Information** field, enter the connection information required for this test input source.
11. Click **OK**.

You can also edit, rename, copy, and delete a test input source from the Manage Test Input Types dialog box.

For detailed information about managing extensible test inputs, see the TestManager online Help.

Test Input Adapter Reference

6

This chapter provides reference material for the test inputs applications programming interface (API), including examples that use code from the RequisitePro adapter. For information about specific declarations, see the following header file:

...Rational Test\rtsdk\c\include\testinputapi.h

Summary of TIA Functions

The Test Inputs Adapter (TIA) functions are summarized in the following table.

Note:

- TestManager does not currently call the functions preceded by an asterisk (*).
- The following extended function calls supersede the corresponding nonextended calls:
  - `TIConnectEx()`
  - `TISetFilterEx()`

Function	Definition
`TIConnect()`	Connects to the test input source.
`TIConnectEx()`	Connects to the test input source and supports additional parameters for connection options.
`TIDisconnect()`	Disconnects from the test input source.
`TIExecuteNodeAction()`	Executes the specified action against the specified test input node.
`TIExecuteSourceAction()`	Executes the specified action against the test input source.
`TIGetChildren()`	Fills an array with the children of a specified parent node.

Function	Definition
TIGetConfiguration()	Returns a pointer to a buffer that contains a configuration for the test input source.
TIGetFilterEx()	Returns a pointer to a filter for the test input source.
TIGetIsFunctionSupported()	Indicates whether a specific function is supported by the adapter for an active connection.
TIGetModifiedSince()	Fills an array with input elements modified since a specified date.
TIGetNeedsValidation()	Determines whether an input element requires validation.
TIGetNode()	Returns information about the specified node.
TIGetNodeActions	Returns a pointer to an array of test input actions.
TIGetRoots()	Fills an array with root elements extracted from the input source.
TIGetSourceActions()	Returns a pointer to an array of actions that can be applied to the test input source.
TIGetSourceIcon()	Points to the location of the 16 x 16 bitmap containing the icon that represents the input source in Test Input view.
TIGetTypeIcon()	Points to the location of the bitmap file of the icon that identifies nodes of a specified type.
TISetConfiguration()	Sets the configuration for the test input source based on the specified configuration buffer.
TISetFilter()	Filters display of test input elements.
TISetFilterEx()	Sets the filter for the test input source based on the specified filter buffer.
TIShowProperties()	Displays the property page or dialog box of an input element.
*TIGetIsChild()	Not currently supported.
*TIGetIsModified()	Not currently supported.

Function	Definition
*TIGetIsModifiedSince()	Determines whether an input element has been modified since a specified date.
*TIGetIsNode()	Determines whether a specified input element exists.
*TIGetIsParent()	Determines whether an input element is a parent node.
*TIGetIsValidSource()	Determines whether a specified input source exists.
*TIGetModified()	Fills an array of structures with input elements that have been modified since the last call to TIGetModified().
*TIGetName()	Extracts the user-readable name of an input element.
*TIGetParent()	Finds the parent node of an input element.
*TIGetType()	Extracts the name of the type of an input element.
*TIGetTypes()	Fills an array with an identifier for each type of input element.
*TISetValidationFilter()	Filters operations according to validation status.
*TIShowSelectDialog()	Displays the selection dialog for choosing elements from the input source.

Using the Type Node Structure

Many of the functions in this API make use of parameters of type Node, which is defined as:

```
struct Node
{
   char Name[TI_MAX_NAME];
   char NodeID[TI_MAX_ID];
   char Type[TI_MAX_TYPE];
   BOOL IsOnlyContainer;
   BOOL NeedsValidation;
} NodeType;
```

Name is the name of the input element displayed in the test input view.

NodeID is the unique identifier for this input element, assigned by the adapter.

`Type` is used for associating this input element with a type (for test inputs that subdivide into types).

If `IsOnlyContainer` is set to `TRUE`, the input element contains other test input elements and cannot have test cases associated with it.

If `NeedsValidation` is set to `TRUE`, the input element needs to be tested.

Note on Memory Allocation

The TIA that you develop is responsible for allocating memory for functions that use pointer-to-pointer parameters, for example `TIGetRoots()`. TestManager is responsible for deallocating the memory.

TIConnect()

Connects to the test input source.

Syntax

```
HRESULT TIConnect(const TCHAR ConnectInfo[TI_MAX_PATH], const
   TCHAR UserID[TI_MAX_ID], TCHAR SourceID[TI_MAX_ID], TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
ConnectInfo	INPUT. A string that specifies the location of the test input source, often defined as a path.
UserID	INPUT. A string that identifies the current tester.
SourceID	OUTPUT. A string that identifies the input source. The ID is used in subsequent calls to the adapter.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_UNABLE_TO_CONNECT`. No connection with the input source was possible.
- `TI_ERROR_INVALID_CONNECTINFO`. The adapter was unable to use the connection information.

Comments

This call has been superseded by `TIConnectEx()`.

After the connection to an input source has been established, the TIA assigns a unique identifier *`SourceID`*, which can be any string of characters. TestManager uses this identifier for subsequent calls to the adapter. Be sure to document the format of this string. This is particularly important when there are multiple, simultaneous connections.

Example

```
//*****************************************************************
HRESULT TIConnect(const TCHAR ConnectInfo[TI_MAX_PATH], const TCHAR
UserID[TI_MAX_ID], TCHAR SourceID[TI_MAX_ID], TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   // Look in the connection map to determine whether a connection with
   // the specified RQS file is already established.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(ConnectInfo, (void *&)pContext);

   // If there is no active connection for the specified ReqPro
   // Project, attempt to connect.
   if (!pContext)
   {
      CFileStatus FileStatus;
      // Determine whether a ReqPro RQS project file exists.
      if (CFile::GetStatus(ConnectInfo, FileStatus) == TRUE)
      {
         try
         {

            /* CODE OMITTED: Establish a connection to the ReqPro
            project using the ReqPro COM Server.*/
```

```
            // If the connection was successful, add the new connection
            // context to the connection map.
            m_ProjectConnections.SetAt(ConnectInfo, pContext);

            // Use the ConnectionInfo as the SourceID.
            _tcscpy(SourceID, ConnectInfo);
         }
         catch (_com_error &e)
         {
            // If ReqPro COM Server throws an exception, return the
            // error using a built in error processing routine.
            PopulateErrorDescription(IDS_ERROR_UNABLE_TO_CONNECT,
            e.WCode(), e.ErrorMessage(), ErrorDescription);
         }
      else
      {
         // The RQS file does not exist, return the appropriate error
         // code.
         rc = TI_ERROR_INVALID_CONNECTINFO;
      }
   }
   // The connection already exists.
   else
   {
      _tcscpy(SourceID, ConnectInfo);
   }

   return rc;
}
```

See Also

TIConnectEx(), TIDisconnect()

TIConnectEx()

Creates a connection to a test input source. This method supersedes `TIConnect();` it supports additional parameters for connection options.

Syntax

```
HRESULT TIConnectEx(const TCHAR ConnectInfo[TI_MAX_PATH], const
   TCHAR UserID[TI_MAX_ID], const TIConnectOption
   *pConnectOptions, int nOptions, TCHAR SourceID[TI_MAX_ID],
   TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
ConnectInfo	INPUT. A string that specifies the location of test inputs, often defined as a path.
UserID	INPUT. A string that identifies the A string that identifies the current tester.
pConnectOption	INPUT. An array of test input source connection options that the user defined using TestManager.
nOptions	INPUT. The number of connection options.
SourceID	OUTPUT. A string that identifies the input source. The ID is used in subsequent calls to the adapter.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_UNABLE_TO_CONNECT`. No connection with the input source was possible.
- `TI_ERROR_INVALID_CONNECTINFO`. The adapter was unable to use the connection information.

Comments

The TIA calls this function before calling any other function. After the connection to an input source has been established, the TIA assigns a unique identifier *`SourceID`*, which can be any string of characters. TestManager uses this identifier for subsequent calls to the adapter. *`SourceID`* must remain valid until `TIDisconnect()` is called.

Example

```
//******************************************************************
HRESULT TIConnectEx(const char ConnectInfo[TI_MAX_PATH], const char
UserID[TI_MAX_ID], const struct TIConnectOption *pConnectOptions, int
nOptions, char SourceID[TI_MAX_ID], char
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   // Look in the connection map to determine whether a connection
   // with the specified RQS file is already established.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(ConnectInfo, (void *&)pContext);

   // If there is no active connection for the specified ReqPro
   // Project, attempt to connect.
   if (!pContext)
   {
      CFileStatus FileStatus;
      // Determine whether a ReqPro RQS project file exists.
      if (CFile::GetStatus(ConnectInfo, FileStatus) == TRUE)
      {
         try
         {
            // If ReqPro used connection options, which it does not
            for (int i=0; i<nOptionCount; i++)
            {
               // Then process the connection options
            }

            /* CODE OMITTED: Establish a connection to the ReqPro
                  project using the ReqPro COM Server.*/

            // If the connection was successful, add the new connection
            // context to the connection map.
            m_ProjectConnections.SetAt(ConnectInfo, pContext);

            // Use the ConnectionInfo as the SourceID.
            _tcscpy(SourceID, ConnectInfo);
         }
         catch (_com_error &e)
         {
```

```
            // If ReqPro COM Server throws an exception, return the
            // error using a built in error processing routine.
            PopulateErrorDescription(IDS_ERROR_UNABLE_TO_CONNECT,
            e.WCode(), e.ErrorMessage(), ErrorDescription);
         }
      }
      else
      {
         // The RQS file does not exist, return the appropriate error
         // code.
         rc = TI_ERROR_INVALID_CONNECTINFO;
      }
   }
   // The connection already exists.
   else
   {
      _tcscpy(SourceID, ConnectInfo);
   }

   return rc;
}
```

See Also

`TIConnect()`, `TIDisconnect()`

TIDisconnect()

Disconnects from the test input source.

Syntax

```
HRESULT TIDisconnect(const TCHAR SourceID[TI_MAX_ID], TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The specified source information was not correct.
- TI_ERROR_UNABLE_TO_DISCONNECT. There was no existing connection to disconnect from.

Comments

After TestManager calls TIDisconnect(), no further calls to this input source are allowed without another call to TIConnect() or TIConnectEx().

Example

```
//*********************************************************************
HRESULT TIDisconnect(const TCHAR SourceID[TI_MAX_ID], TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   // Look in the connection map to determine whether a connection with
   // the specified RQS file is already established. Note that the
   // ReqPro adapter also uses the path of the RQS file as the
   // SourceID.

   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(ConnectInfo, (void *&)pContext);

   // If the context was found, then continue.
   if (pContext)
   {
      /* CODE OMITTED: Close connection to the ReqPro Project by using
         the ReqPro COM Server.*/

      // Remove the connection from the list of active connections.
      m_ProjectConnections.RemoveKey(SourceID);
   }
   return rc;
}
```

See Also

TIConnect(), TIConnectEx()

TIExecuteNodeAction()

Executes the specified action against the specified test input node.

Syntax

```
HRESULT TIExecuteNodeAction(const TCHAR SourceID[TI_MAX_PATH],
   const TCHAR Node[TI_MAX_ID], int nActionID, long
   lWindowContext, TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
Node	OUTPUT.
nActionID	INPUT. The ID of the action to be executed.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this function.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.

Example

```
//********************************************************************
HRESULT TIExecuteNodeAction(const TCHAR SourceID[TI_MAX_ID], const
TCHAR Node[TI_MAX_ID], int nActionID, long lWindowContext, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TI_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
```

```
        CString sSourceID = SourceID;
        m_ServerConnections.Lookup (sSourceID, (void *&)pContext);

        if (pContext == 0)
             return TI_ERROR_INVALID_SOURCEID;

        switch (nActionID)
        {
             case 0:
                  /* CODE OMITED: Execute custom action 1. */
                  break;
             case 1:
                  /* CODE OMITED: Execute custom action 2. */
                  break;

             default:
                  rc = TI_ERROR;
                  _tcscpy(*ErrorDescription,
                   _T("Unrecognized action received"));
                  break;
        }
        return rc;

}
```

See Also

`TIGetSourceActions()`, `TIGetNodeActions()`, `TIExecuteSourceAction()`

TIExecuteSourceAction()

Executes the specified action against the test input source.

Syntax

HRESULT **TIExecuteSourceAction**(const TCHAR *SourceID*[TI_MAX_PATH], int *nActionID*, long *lWindowContext*, TCHAR *ErrorDescription*[TI_MAX_ERROR])

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
nActionID	INPUT. The ID of the action to be executed.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this function.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.

Example

```
//**********************************************************************
HRESULT TIExecuteSourceAction(const TCHAR SourceID[TI_MAX_ID], int
nActionID, long lWindowContext, TCHAR ErrorDescription[TI_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TI_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup (sSourceID, (void *&)pContext);

     if (pContext == 0)
          return TI_ERROR_INVALID_SOURCEID;

     switch (nActionID)
     {
          case 0:
               /* CODE OMITED: Execute custom action 1. */
               break;
          case 1:
               /* CODE OMITED: Execute custom action 2. */
               break;
```

```
            default:
                 rc = TI_ERROR;
                 _tcscpy(*ErrorDescription,
          _T("Unrecognized action received"));
                 break;
       }
       return rc;

}
```

See Also

TIGetSourceActions(), TIGetNodeActions(), TIExecuteNodeAction()

TIGetChildren()

Fills an array with the children of a specified parent node.

Syntax

```
HRESULT TIGetChildren(const TCHAR SourceID[TI_MAX_ID], const
   TCHAR NodeID[TI_MAX_ID], struct Node *pChildNodes[], long
   *plNodeCount, TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies a parent node.
pChildNodes	OUTPUT. A pointer to a structure containing the child elements of parent *NodeID*.
plNodeCount	OUTPUT. A pointer to the number of child elements in *pChildNodes*.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

For the definition of type Node, see "Using the Type Node Structure."

Return Values

This function typically returns TI_SUCCESS when the function completes successfully and returns TI_ERROR_INVALID_SOURCEID if the input source was incorrectly identified.

Comments

This function fills *pChildNodes* with child elements of a parent node specified by *NodeID*. If the parent has no children, *pChildNodes* is empty.

You assign the total number of elements written to *pChildNodes* to *plNodeCount*.

Example

```
//*****************************************************************
HRESULT TIGetChildren(const TCHAR SourceID[TI_MAX_ID], const TCHAR
NodeID[TI_MAX_ID], struct Node *pChildNodes[], long* plNodeCount,
TCHAR ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   struct Node *pNodeArray=0;
   *plNodeCount = 0;
   *pChildNodes = 0;
   CConnectionContext *pContext=0;

   // Lookup the connection information for the ReqPro Project
   // identified by SourceID.
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   // Determine whether a connection exists with the specified
   // SourceID.
   if (pContext)
   {
      CPtrArray PtrArray;

      /* CODE OMITTED: Obtain a collection of child requirements using
         ReqPro COM server and store the data for each child requirement
         in an instance of class CReqInfo. CReqInfo is a ReqPro adapter
         specific class which stores info about each ReqPro
         requirement. The instances of CReqInfo are stored in a
         pointer array (CPtrArray).*/

      // Allocate enough Node data structures for all the children in
      // the point array.
      pNodeArray = new struct Node[PtrArray.GetSize()];

      // Populate the array of Nodes with the data returned by using
      // the ReqPro COM server.
      for (long lIndex=0; lIndex < PtrArray.GetSize(); lIndex++)
      {
         // Get an instance of CReqInfo.
         CReqInfo *pReqInfo = (CReqInfo *)PtrArray.GetAt(lIndex);

         // Copy the requirement name.
         _tcscpy(pNodeArray[lIndex].Name, (const char *)
```

```
            pReqInfo->m_sName);

            // Copy the Container and NeedsValidation attributes.
            pNodeArray[lIndex].IsOnlyContainer = pReqInfo->m_bContainer;
            pNodeArray[lIndex].NeedsValidation =
            pReqInfo->m_bNeedsValidation;

            // Copy the Requirement NodeID (which is a GUID for a ReqPro
            // requirement).
            _tcscpy(pNodeArray[lIndex].NodeID, pReqInfo->m_sGUID);

            char szNodeType[TI_MAX_TYPE+1];

         /* CODE OMITTED: Obtain the name of the requirement type by using
            the ReqPro COM server.*/

            // Copy the name of requirement type into the node structure.
            _tcscpy(pNodeArray[lIndex].Type, (char *) szNodeType);

            delete pReqInfo;
         }

         // Set the return pointer for the node array.
         *pChildNodes = pNodeArray;

         // Set the count for the number of returned nodes.
         *plNodeCount = PtrArray.GetSize();
      }
      else
         rc = TI_ERROR_INVALID_SOURCEID;

      return rc;
   }
```

See Also

`TIGetParent()`

TIGetConfiguration()

Returns a pointer to a buffer that contains a configuration for the test input source.

Syntax

```
HRESULT TIGetConfiguration(const TCHAR SourceID[TI_MAX_PATH],
   long lWindowContext, TCHAR **pConfigurationBuffer, int
   *pnConfigurationBufferLength, TCHAR ErrorDescription)
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
lWindowContext	INPUT. A string that identifies an input element.
pConfigurationBuffer	OUTPUT. A pointer to the buffer that contains the streamed configuration.
pnConfigurationBufferLength	OUTPUT. The length of the configuration buffer.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was identified incorrectly.

Comments

Typically, the adapter displays a user interface to collect the configuration data.

TestManager is responsible for persisting the data.

Example

```
//*********************************************************************
 HRESULT TIGetConfiguration(const TCHAR SourceID[TI_MAX_ID], long
lWindowContext, TCHAR **pConfigurationBuffer, int*
pnConfigurationBufferLength, TCHAR ErrorDescription[TI_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TI_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
     return TI_ERROR_INVALID_SOURCEID;

     *pFilterBuffer = new char[_MAX_PATH];

     CWnd ParentWnd;
     ParentWnd.FromHandle((HWND)lWindowContext);

     /* You have to create a class (A dialog with an embedded
     list control to perform configuration selection is used here) */
     CSelectConfigDialog Dialog(pContext, &ParentWnd);

     if (Dialog.DoModal() == IDOK)
     {
          _tcscpy(*pConfigurationBuffer,
             Dialog.m_sSelectedConfigurationName);
          *pnConfigurationBufferLength =
             Dialog.m_sSelectedConfigurationName.GetLength();
     }
     else
     {
          // Put in blanks to indicate no filter set
          CString sEmpty;
          _tcscpy(*pConfigurationBuffer, sEmpty);
          *pnConfigurationBufferLength = sEmpty.GetLength();
     }

     return rc;
}
```

See Also

TISetConfiguration()

TIGetFilterEx()

Returns a pointer to a buffer that contains a filter for the test input source.

Syntax

```
HRESULT TIGetFilterEx(const TCHAR SourceID[TI_MAX_PATH],
    longlWindowContext, TCHAR **pFilterBuffer, int
    *pnFilterBufferLength, TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
lWindowContext	INPUT. A handle to a window that can be the parent of a dialog displayed by this function.
pFilterBuffer	OUTPUT. A pointer to the buffer that contains the streamed filter.
pnFilterBufferLength	OUTPUT. The length of the filter buffer.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was identified incorrectly.

Comments

The filter is returned as a stream of characters.

The data is interpreted only by the adapter.

Typically, the adapter displays a user interface to collect the filter data.

TestManager is responsible for persisting the data.

Example

```
//*****************************************************************
HRESULT TIGetFilterEx (const TCHAR SourceID[TI_MAX_PATH], long
lWindowContext, TCHAR **pFilterBuffer, int *pnFilterBufferLength,
TCHAR ErrorDescription[TI_MAX_ERROR] )
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());
   HRESULT rc = TI_SUCCESS;


      CConnectionContext *pContext=0;

      // lookup the context information for the specified SourceID
      CString sSourceID = SourceID;
      m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

      if (pContext == 0)
         return TI_ERROR_INVALID_SOURCEID;

      /* The rest of this code simply displays a dialog that shows the
      filter options. It assumes that the dialog saves the filter
      settings to the Context pointer. */
      if (pContext->m_lpDispatchProject)
      {
         try
         {
            CFilterDialog FilterDialog(pContext, NULL);
            if (FilterDialog.DoModal() == IDOK)
            {
               *pnFilterBufferLength =
               pContext->GetFilterSettings(pFilterBuffer);
            }
            else
               rc = TI_ERROR;
            FilterDialog.DestroyWindow();
         }
         catch (_com_error)
         {
            rc = TI_ERROR;
         }
      }
   else
         rc = TI_ERROR_INVALID_SOURCEID;
   }

return rc;
}
```

See Also

TISetFilterEx()

TIGetIsChild()

Note: This function is not currently called.

Determines whether an input element is a child node.

Syntax

```
HRESULT TIGetIsChild(const TCHAR SourceID[TI_MAX_ID], const
   TCHAR NodeID[TI_MAX_ID], BOOL* pbIsChild, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
pbIsChild	OUTPUT. A pointer to a Boolean value that specifies whether the node is a child.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was incorrectly identified.
- TI_NODE_NOT_FOUND. The adapter was unable to locate the specified input element.

Comments

Set the Boolean value *pbIsChild* to TRUE if the element identified in *NodeID* is a child. Set the value to FALSE if the element is not a child.

See Also

TIGetIsParent()

TIGetIsFunctionSupported()

Indicates whether a specific function is supported by the adapter for an active connection.

Syntax

```
HRESULT TIGetIsFunctionSupported(const TCHAR
   SourceID[TI_MAX_PATH], long lFunctionID, BOOL *pbSupported,
   TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
lFunctionID	INPUT. The constant definition of the function.
pbSupported	OUTPUT. A Boolean indicating whether the specified function is supported.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.

Comments

The *lFunctionID* argument can be one of the following:

```
TI_FUNCTION_TIClearFilter
TI_FUNCTION_TIConnect
TI_FUNCTION_TIConnectEx
TI_FUNCTION_TIDisconnect
TI_FUNCTION_TIExecuteNodeAction
TI_FUNCTION_TIExecutionSourceAction
TI_FUNCTION_TIGetChildren
TI_FUNCTION_TIGetConfiguration
TI_FUNCTION_TIGetFilterEx
TI_FUNCTION_TIGetIsChild
TI_FUNCTION_TIGetIsModified
TI_FUNCTION_TIGetIsNode
TI_FUNCTION_TIGetIsParent
TI_FUNCTION_TIGetIsValidSource
TI_FUNCTION_TIGetModified
TI_FUNCTION_TIGetModifiedSince
TI_FUNCTION_TIGetName
TI_FUNCTION_TIGetNeedsValidation
TI_FUNCTION_TIGetNode
TI_FUNCTION_TIGetNodeActions
TI_FUNCTION_TIGetParent
TI_FUNCTION_TIGetRoots
TI_FUNCTION_TIGetSourceActions
TI_FUNCTION_TIGetSourceIcon
TI_FUNCTION_TIGetType
TI_FUNCTION_TIGetTypeIcon
TI_FUNCTION_TIGetTypes
TI_FUNCTION_TISetConfiguration
TI_FUNCTION_TISetFilter
TI_FUNCTION_TISetFilterEx
TI_FUNCTION_TISetValidationFilter
TI_FUNCTION_TIShowProperties
TI_FUNCTION_TIShowSelectDialog
```

Example

```
//**********************************************************************

 HRESULT TIGetIsFunctionSupported(const TCHAR SourceID[TI_MAX_ID],
const TCHAR NodeID[TI_MAX_ID], long lFunctionID, BOOL *pbIsSupported,
TCHAR ErrorDescription[TI_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     /* The following is a sample for a minimal adapter with no source
        control support. */

     switch (lFunctionID)
     {
```

```
            case TI_FUNCTION_TIConnect:
            case TI_FUNCTION_TIDisconnect:
            case TI_FUNCTION_TIEdit:
            case TI_FUNCTION_TIGetIcon:
            case TI_FUNCTION_TIGetName:
            case TI_FUNCTION_TINew:
            case TI_FUNCTION_TISelect:
            case TI_FUNCTION_TIShowProperties:
                 *pbIsSupported = TRUE;
      break;
            default:
                *pbIsSupported = FALSE;
      break;
      }

      return TI_SUCCESS;
}
```

TIGetIsModified()

Note: This function is not currently called.

Determines whether an input element has been modified since the last call to `TIGetModified()`.

Syntax

HRESULT **TIGetIsModified**(const TCHAR *SourceID*[TI_MAX_ID], const TCHAR *NodeID*[TI_MAX_ID], BOOL* *pbIsModified*, TCHAR *ErrorDescription*[TI_MAX_ERROR])

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
pbIsModified	OUTPUT. A pointer to a Boolean value that specifies whether the input element has been modified.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.

- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

An element is considered modified if certain properties have changed, particularly properties that affect the way the element is associated with or validated by test cases — for example, the element's type or its user-readable name.

Set the Boolean value *`pbIsModified`* to `TRUE` if the element has been modified since the last call to `TIGetModified()`, and set the value to `FALSE` if the element has not been modified.

See Also

`TIGetModified()`, `TIGetIsModifiedSince()`

TIGetIsModifiedSince()

Note: This function is not currently called.

Determines whether an input element has been modified since a specified date.

Syntax

```
HRESULT TIGetIsModifiedSince(const TCHAR SourceID[TI_MAX_ID],
   const TCHAR NodeID[TI_MAX_ID], struct tm tmDate, BOOL*
   pbIsModified, TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
tmDate	INPUT. The date, defined in time.h, which is part of the C-language Standard Library.
pbIsModified	OUTPUT. A pointer to a Boolean value that specifies whether the input element has been modified.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

For the definition of type `Node`, see “Using the Type Node Structure.”

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

An element is considered modified if certain properties have changed, particularly properties that affect the way the element is associated with or validated by test cases — for example, the element’s type or its user-readable name.

See Also

`TIGetIsModified()`

TIGetIsNode()

Note: This function is not currently called.

Determines whether a specified input element exists.

Syntax

```
HRESULT TIGetIsNode(const TCHAR SourceID[TI_MAX_ID], const
   TCHAR NodeID[TI_MAX_ID], BOOL* pbIsNode, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
pbIsNode	OUTPUT. A pointer to a Boolean value that specifies whether the input element exists.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was identified incorrectly.
- TI_NODE_NOT_FOUND. The adapter was unable to locate the specified input element.

Comments

Set the Boolean value *pbIsNode* to TRUE if the element is there, and set the value to FALSE if the element is not there.

Example

```
//*********************************************************************
HRESULT TIGetIsNode(const TCHAR SourceID[TI_MAX_ID], const TCHAR
NodeID[TI_MAX_ID], BOOL* pbIsNode, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;
   *pIsNode = FALSE;

   // Look in the connection map to determine whether a connection with
   // the specified RQS file exists. Note that the ReqPro adapter also
   // uses the path of the RQS file as the SourceID.

   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(ConnectInfo, (void *&)pContext);

   if (pContext)
   {
   /* CODE OMITTED: Determine whether specified NodeID is valid and set
      value of *pIsNode based on its validity.*/
   }
   else
      rc = TI_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

TIGetIsChild(), TIGetIsParent()

TIGetIsParent()

Determines whether an input element is a parent node.

Syntax

```
HRESULT TIGetIsParent(const TCHAR SourceID[TI_MAX_ID], const
   TCHAR NodeID[TI_MAX_ID], BOOL* pbIsParent, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
pbIsParent	OUTPUT. A pointer to a Boolean value that specifies whether the input element is a parent node in a hierarchical tree.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

Set the Boolean value *pbIsParent* to `TRUE` if the specified input element (*NodeID*) is a parent. Set the value to `FALSE` if the input element is not a parent.

Example

```
//*****************************************************************
HRESULT TIGetIsParent(const TCHAR SourceID[TI_MAX_ID], const TCHAR
NodeID[TI_MAX_ID], BOOL* pIsParent, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());
```

```
   HRESULT rc = TI_SUCCESS; //

   // Look in the connection map to determine whether a connection with
   // the specified RQS file exists. Note that the ReqPro adapter also
   // uses the path of the RQS file as the SourceID.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

if (pContext)
   {

   /* CODE OMITTED: Determine if specified NodeID is a parent and set
      value of *pbIsParent.*/

   }
   else
      rc = TI_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

`TIGetIsChild()`, `TIGetIsNode()`

TIGetIsValidSource()

Note: This function is not currently called.

Determines whether the specified test input source exists.

Syntax

`BOOL` **`TIGetIsValidSource`**`(const TCHAR` *`SourceID`*`[TI_MAX_ID])`

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.

Return Values

This function returns a value of `TRUE` if the input source exists and returns a value of `FALSE` if the input source is not valid.

Example

```
//******************************************************************

BOOL TIGetIsValidSource(const TCHAR SourceID[TI_MAX_ID])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   BOOL bValidSource = FALSE;

   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   if (pContext)
      bValidSource = TRUE;

   return bValidSource;
}
```

See Also

`TIConnect()`, `TIDisconnect()`

TIGetModified()

Note: This function is not currently called.

Fills an array of structures with input elements that have been modified since the last call to `TIGetModified()`.

Syntax

```
HRESULT TIGetModified(const TCHAR SourceID[TI_MAX_ID], struct
   Node ModifiedNodes[], long* plNodeCount, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
ModifiedNodes	OUTPUT. An array containing elements that have been modified since the last invocation of this call.
plNodeCount	OUTPUT. A pointer to a long integer that specifies the number of elements assigned to *ModifiedNodes*.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

For the definition of type `Node`, see “Using the Type Node Structure.”

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.

Comments

This function determines which elements have been modified since the last call to `TIGetModified()`. An element is considered modified if certain properties have changed, particularly properties that affect the way the element is associated with or validated by test cases — for example, the element’s type or its user-readable name. Modified elements are assigned to *`ModifiedNodes`*.

You assign the total number of modified elements to *`plNodeCount`*.

See Also

`TIGetIsModified()`, `TIGetModifiedSince()`

TIGetModifiedSince()

Fills an array of node structures with input elements modified since a specified date.

Syntax

```
HRESULT TIGetModifiedSince(const TCHAR SourceID[TI_MAX_ID],
   struct tm tmDate, struct Node *pModifiedNodes[], long*
   plNodeCount, TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
tmDate	INPUT. The date, defined in time.h, which is part of the C-language Standard Library.
pModifiedNodes	OUTPUT. A pointer to an array containing elements that have been modified since *tmDate*.

Element	Description
plNodeCount	OUTPUT. A pointer to a long integer that specifies the total number of elements written to *ModifiedNodes*.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

For the definition of type `Node`, see “Using the Type Node Structure.”

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.

Comments

An element is considered modified if certain properties have changed, particularly properties that affect the way the element is associated with or validated by test cases — for example, the element’s type or its user-readable name. You assign modified elements to *ModifiedNodes*.

You assign the total number of modified elements to *plNodeCount*.

Example

```
//*****************************************************************
HRESULT TIGetModifiedSince(const char SourceID[TI_MAX_ID], struct tm
tmDate, struct Node *pModifiedNodes[], long* plNodeCount, char
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;
   try
   {
      CTIAConnection *pConnection = 0;

      // lookup the context information for the specified SourceID
      if (!theApp.m_ConnectionMap.Lookup(SourceID, (void
           *&)pConnection))q
         return TI_ERROR_INVALID_SOURCEID;

      // if the context was found, then continue
      if (pConnection)
      {
```

```
        // Convert the passed in time
        COleDateTime DateTime;
        DateTime.SetDateTime(tmDate.tm_year+1900,tmDate.tm_mon+1,
           tmDate.tm_mday,tmDate.tm_hour,tmDate.tm_min,tmDate.tm_sec);

        /* CODE OMITTED: Process the new date to see if any of the
           input has been modified since this date.
        And populate the NodeArray to return*/
        *pModifiedNodes = pNodeArray;
        *plNodeCount = PtrArray.GetSize();
     }
     else
        rc = TI_ERROR;
  }
  catch(COleException *e)
  {
     sprintf(ErrorDescription, "COleException. SCODE: %08lx.",
        (long)e->m_sc);
     return TI_ERROR;

  }

  catch(COleDispatchException *e)
  {
     sprintf(ErrorDescription,
     "COleDispatchException. SCODE: %08lx,Description: \"%s\".",
     (long)e->m_wCode, (LPSTR)e->m_strDescription.GetBuffer
        (TI_MAX_ERROR));
     return TI_ERROR;
  }

  catch(...)
  {
     return TI_ERROR;
  }


  return rc;
}
```

See Also

TIGetModified(), TIGetIsModified(), TIGetIsModifiedSince()

TIGetName()

Note: This function is not currently called.

Extracts the name of an input element.

Syntax

```
HRESULT TIGetName(const TCHAR SourceID[TI_MAX_ID], const TCHAR
   NodeID[TI_MAX_ID], TCHAR Name[TI_MAX_NAME], TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
Name	OUTPUT. A string that specifies the name of the input element.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

You assign the name of the input element identified in *NodeID* to *Name*.

Example

```
//*********************************************************************
HRESULT TIGetName(const TCHAR SourceID[TI_MAX_ID], const TCHAR
NodeID[TI_MAX_ID], TCHAR Name[TI_MAX_NAME], TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;
```

```
    // Look in the connection map to determine whether a connection with
    // the specified RQS file exists.
    CConnectionContext *pContext=0;
    m_ProjectConnections.Lookup(ConnectInfo, (void *&)pContext);

    // Determine whether a connection exists with the specified
    // SourceID.
    if (pContext)
    {
        CString sReqName;

    /* CODE OMITTED: Obtain the name for the requirement whose ID is the
        value of NodeID and store it in local variable sReqName.
        If value of NodeID is not a valid test input, return
        TI_NODE_NOT_FOUND.*/

        // Copy the name into the return buffer.
        _tcsncpy(Name, (const char *)sReqName, TI_MAX_NAME);
    }
    else
        rc = TI_ERROR_INVALID_SOURCEID;

    return rc;
}
```

See Also

TIGetParent(), TIGetNode()

TIGetNeedsValidation()

Note: This function is not currently called.

Determines whether an input element requires validation.

Syntax

```
HRESULT TIGetNeedsValidation(const TCHAR SourceID[TI_MAX_ID],
   const TCHAR NodeID[TI_MAX_ID], BOOL* pbNeedsValidation,
   TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.

Element	Description
pbNeedsValidation	OUTPUT. A pointer to a Boolean value that specifies whether the input element requires validation.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

Set the value of Boolean *pbNeedsValidation* to `TRUE` if the input element needs to be validated, and set the value to `FALSE` if the input element does not need to be validated.

See Also

`TIGetModified()`, `TIGetModifiedSince()`, `TISetValidationFilter()`

TIGetNode()

Returns information about the specified node.

Syntax

```
HRESULT TIGetNode(const TCHAR SourceID[TI_MAX_ID], const TCHAR
    NodeID[TI_MAX_ID], struct Node **pNode, TCHAR
    ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies a parent node.

Element	Description
pNode	OUTPUT. A pointer to the node specified in *NodeID*.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns `TI_SUCCESS` when the function completes successfully and returns `TI_ERROR_INVALID_SOURCEID` if the input source was incorrectly identified.

Comments

The definition of type `Node` is as follows:

```
struct Node
{
   char Name[TI_MAX_NAME];
   char NodeID[TI_MAX_ID];
   char Type[TI_MAX_TYPE];
   BOOL IsOnlyContainer;
   BOOL NeedsValidation;
} NodeType;
```

Example

```
HRESULT TIGetNode(TCHAR SourceID[TI_MAX_ID], TCHAR NodeID[TI_MAX_ID],
struct Node **pNode, TCHAR ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = S_OK;

   // Look in the connection map to determine if a connection with the
   //specified .RQS file exists.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);


   if (pContext)
   {
   …
   //CODE OMITTED: Obtain the Requirement identified by NodeID and
   //store data in instance of CReqInfo.
   //CReqInfo is a ReqPro adapter-specific class that stores info
   //about a ReqPro requirement.
   …
   //If value of NodeID is not a valid TestInput, TI_NODE_NOT_FOUND is
```

```
    //returned.
      …

      // populate Node structure
      *pNode = new struct Node;

      // copy Requirement Name
      _tcscpy((*pNode)->Name, (const char *)pReqInfo->m_sName);

      (*pNode)->IsOnlyContainer = pReqInfo->m_bContainer;
      (*pNode)->NeedsValidation = pReqInfo->m_bNeedsValidation;

      // copy the Requirement NodeID (which is a GUID for a ReqPro
      // requirement)
      _tcscpy((*pNode)->NodeID, pReqInfo->m_sGUID);

      TCHAR szNodeType[TI_MAX_TYPE+1];
    …
    // CODE OMITTED: Obtain the name of the Requirement Type via the
    // ReqPro COM server
    …

      // copy the name of requirement type into the node structure
      _tcscpy((*pNode)->Type, (char *) szNodeType);
    }
    else
      rc = TI_ERROR_INVALID_SOURCEID;


    return rc;
}
```

See Also

TIGetIsNode()

TIGetNodeActions()

Returns a pointer to an array of test input actions.

Syntax

HRESULT **TIGetNodeActions**(const TCHAR *SourceID*[TI_MAX_PATH], const TCHAR *Type*[TI_MAX_TYPE], struct *Action *pActions*[], int **pnActionCount*, TCHAR *ErrorDescription*[TI_MAX_ERROR])

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
Type	INPUT. The name of a node type.
pActions	OUTPUT. A local array containing action structures for node *Type*.
pnActionCount	OUTPUT. The number of actions in *pActions*.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.

Comments

The *Type* parameter is empty if no types have been returned.

Example

```
//*********************************************************************
HRESULT TIGetNodeActions(const TCHAR SourceID[TI_MAX_ID], const TCHAR
Type[TI_MAX_TYPE], struct TIAction *pActions[], int *pnActionCount,
TCHAR ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   CConnectionContext *pContext=0;

   // lookup the context information for the specified SourceID
   CString sSourceID = SourceID;
   m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

   if (pContext == 0)
      return TI_ERROR_INVALID_SOURCEID;
```

```
    struct TIAction *pTempActions;
    pTempActions = new struct TIAction [2];
    if ( Type == "FEAT")
    {
      _tcscpy(pTempActions[0].Name, "Custom Action for features 1\0");
      pTempActions[0].ActionID = 0;

      _tcscpy(pTempActions[1].Name, "Custom Action features 2\0");
      pTempActions[1].ActionID = 1;
    }
    *pActionCount = 2;
    *pActions = pTempActions;
    return rc;
}
```

See Also

`TIGetSourceActions()`, `TIExecuteNodeAction()`, `TIExecuteNodeAction()`

TIGetParent()

Note: This function is not currently called.

Finds the parent node of an input element.

Syntax

```
HRESULT TIGetParent(const TCHAR SourceID[TI_MAX_ID], const
   TCHAR NodeID[TI_MAX_ID], struct Node** pParentNode, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
pParentNode	OUTPUT. A pointer to a structure that receives the parent node.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

For the definition of type `Node`, see "Using the Type Node Structure."

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was identified incorrectly.
- TI_NODE_NOT_FOUND. The adapter was unable to locate the specified input element.

Comments

You assign a pointer to the parent node in *pParentNode*. If there is no parent for the specified input element, assign a null pointer.

Example

```
//*******************************************************************
HRESULT TIGetParent(const TCHAR SourceID[TI_MAX_ID], const TCHAR
NodeID[TI_MAX_ID], struct Node **pParentNode, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   // Look in the connection map to determine whether a connection with
   // the specified RQS file exists.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   if (pContext)
   {
   /* CODE OMITTED: Obtain the parent of the Requirement identified by
      NodeID and store data in instance of CReqInfo.
      If value of NodeID is not a valid test input,
      TI_NODE_NOT_FOUND is returned.*/

      // Populate Node structure.
      *pParentNode = new struct Node;

      // Copy test input name.
      _tcscpy((*pParentNode)->Name, (const char *)pReqInfo->m_sName);

      (*pParentNode)->IsOnlyContainer = pReqInfo->m_bContainer;
      (*pParentNode)->NeedsValidation = pReqInfo->m_bNeedsValidation;

      // Copy the Requirement NodeID (which is a GUID for a ReqPro
      // requirement).
      _tcscpy((*pParentNode)->NodeID, pReqInfo->m_sGUID);
```

```
      char szNodeType[TI_MAX_TYPE+1];

   /* CODE OMITTED: Obtain the name of the requirement type by using
      the ReqPro COM server.*/


      // Copy the name of requirement type into the node structure.
      _tcscpy((*pParentNode)->Type, (char *) szNodeType);
   }
   else
      rc = TI_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

TIGetIsNode(),TIGetIsChild()

TIGetRoots()

Fills an array with root elements extracted from the input source.

Syntax

HRESULT **TIGetRoots**(const TCHAR *SourceID*[TI_MAX_ID], struct Node **pRootNodes*[], long **plNodeCount*, TCHAR *ErrorDescription*[TI_MAX_ERROR])

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
pRootNodes	OUTPUT. A string of structures of type Node that receives the root nodes.
plNodeCount	OUTPUT. A pointer to a long integer that specifies the total number of root nodes.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

For the definition of type `Node`, see “Using the Type Node Structure.”

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

You assign nodes that are root elements to *pRootNodes*. If the input source is not hierarchical, fill *RootNodes* with all of the elements of the input source.

You assign *plNodeCount* the total number of nodes written out to *pRootNodes*.

Example

```
//*****************************************************************
HRESULT TIGetRoots(const TCHAR SourceID[TI_MAX_ID], struct Node
*pRootNodes[], long* plNodeCount, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   struct Node *pNodeArray=0;
   *pNodeCount = 0;
   *pRootNodes = 0;
   CConnectionContext *pContext=0;

   // Lookup the connection information for the ReqPro Project
   // identified by SourceID.
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   // Determine whether a connection exists with the specified
   // SourceID.
   if (pContext)
   {
      CPtrArray PtrArray;

      /* CODE OMITTED: Obtain a collection of root nodes using ReqPro
         COM server and store the data for Requirement in an instance of
         class CReqInfo. CReqInfo is a ReqPro adapter specific class
         that stores info about each ReqPro requirement. The instances
         of CReqInfo are stored in a pointer array (CPtrArray).*/

      // Allocate enough Node data structures for all the root nodes in
      // the pointer array.
```

```
        pNodeArray = new struct Node[PtrArray.GetSize()];

        // Populate the array of Nodes with the data returned by using
        // the ReqPro COM server.
        for (long lIndex=0; lIndex < PtrArray.GetSize(); lIndex++)
        {
           // Get an instance of CReqInfo.
           CReqInfo *pReqInfo = (CReqInfo *)PtrArray.GetAt(lIndex);

           // Copy the requirement name.
           _tcscpy(pNodeArray[lIndex].Name, (const char
           *)pReqInfo->m_sName);

           // Copy the Container and NeedsValidation attributes.
           pNodeArray[lIndex].IsOnlyContainer = pReqInfo->m_bContainer;
           pNodeArray[lIndex].NeedsValidation =
              pReqInfo->m_bNeedsValidation;

           // Copy the Requirement NodeID (which is a GUID for a ReqPro
           // requirement).
           _tcscpy(pNodeArray[lIndex].NodeID, pReqInfo->m_sGUID);

           char szNodeType[TI_MAX_TYPE+1];

        /* CODE OMITTED: Obtain the name of the requirement type by using
           the ReqPro COM server.*/

           // Copy the name of requirement type into the node structure.
           _tcscpy(pNodeArray[lIndex].Type, (char *) szNodeType);

           delete pReqInfo;
        }

        // Set the return pointer for the node array.
        * pRootNodes = pNodeArray;

        // Set the count for the number of returned nodes.
        *plNodeCount = PtrArray.GetSize();
     }
     else
        rc = TI_ERROR_INVALID_SOURCEID;

     return rc;
  }
```

See Also

TIGetIsNode(), TIGetIsParent(), TIGetParent(), TIGetChildren()

TIGetSourceActions()

Returns a pointer to an array of actions that can be applied to the test input source.

Syntax

```
HRESULT TIGetSourceActions(const TCHAR SourceID[TI_MAX_PATH],
   struct Action *pActions[], int *pnActionCount, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
pActions	OUTPUT. An array of populated action structures, each of which defines an action.
pnActionCount	OUTPUT. The number of actions returned
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.

Example

```
//**********************************************************************
HRESULT TIGetSourceActions(const TCHAR SourceID[TI_MAX_ID], struct
TIAction *pActions[], int *pnActionCount, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TI_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);
```

```
        if (pContext == 0)
            return TI_ERROR_INVALID_SOURCEID;

       struct TIAction *pTempActions;
       pTempActions = new struct TIAction [2];

      _tcscpy(pTempActions[0].Name, "Custom Action 1\0");
       pTempActions[0].ActionID = 0;

      _tcscpy(pTempActions[1].Name, "Custom Action 2\0");
       pTempActions[1].ActionID = 1;

       *pActionCount = 2;
       *pActions = pTempActions;
       return rc;
}
```

See Also

`TIGetNodeActions()`, `TIExecuteSourceAction()`, `TIExecuteNodeAction()`

TIGetSourceIcon()

Points to the location of the 16 x 16 bitmap containing the icon that is displayed with the name of the test input source in the TestManager Test Input view.

Syntax

```
HRESULT TIGetSourceIcon(const TCHAR SourceID[TI_MAX_ID], TCHAR
   IconPath[TI_MAX_PATH], TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
IconPath	OUTPUT. A string that identifies the location of the icon graphics file.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was incorrectly identified.

Comments

The source is identified in *SourceId*. This icon is also used for all elements of the input source that belong to a type that does not have its own icon.

Example

```
//*********************************************************************
HRESULT TIGetSourceIcon(const TCHAR SourceID[TI_MAX_ID], TCHAR
IconPath[TI_MAX_PATH], TCHAR ErrorDescription[TI_MAX_ERROR])
{
   DWORDdwError;
   charszModuleFileName[_MAX_PATH+1];
   charszModuleFilePath[_MAX_PATH+1];
   charszDir[_MAX_DIR+1];
   charszDrive[_MAX_DRIVE+1];

   // Obtain the path to where the ReqPro adapter is installed.
   dwError=GetModuleFileName((HMODULE)AfxGetInstanceHandle(),
   szModuleFileName, _MAX_PATH);
   _splitpath(szModuleFileName, szDrive, szDir, NULL, NULL);

   // Build the path to where the bitmap file exists.
   _tcscpy(szModuleFilePath, szDrive);
   _tcscat(szModuleFilePath, szDir);
   _tcscat(szModuleFilePath, "bitmap_source.bmp");

   // Copy the path into the return variable.
   _tcscpy(IconPath, szModuleFilePath);

   return TI_SUCCESS;
}
```

See Also

`TIGetTypeIcon()`

TIGetType()

Note: This function is not currently called.

Extracts the name of the type of an input element.

Syntax

```
HRESULT TIGetType(const TCHAR SourceID[TI_MAX_ID], const TCHAR
   NodeID[TI_MAX_ID], TCHAR Type[TI_MAX_TYPE], TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
Type	OUTPUT. A string that identifies the type of node.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

You assign the type of the input element identified in *NodeID* to *Type*.

Example

```
//*****************************************************************
HRESULT TIGetType(const TCHAR SourceID[TI_MAX_ID], const TCHAR
NodeID[TI_MAX_ID], TCHAR Type[TI_MAX_NAME], TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;
```

```
   // Look in the connection map to determine whether a connection with
   // the specified RQS file exists.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(ConnectInfo, (void *&)pContext);

   // Determine whether a connection exists with the specified
   // SourceID.
   if (pContext)
   {
      CString sReqType;

   /* CODE OMITTED: Obtain the type for the requirement whose unique ID
      is the value of NodeID and store it in local variable sReqType.
      If value of NodeID is not a valid test input, return
      TI_NODE_NOT_FOUND.*/

      // Copy its type into the return buffer.
      _tcsncpy(Type, (const char *)sReqType, TI_MAX_TYPE);
   }
   else
      rc = TI_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

`TIGetTypeIcon(), TIGetTypes()`

TIGetTypeIcon()

Points to the location of the 16 x 16 bitmap file of the icon that identifies nodes of a specified type.

Syntax

HRESULT **TIGetTypeIcon**(const TCHAR *SourceID*[TI_MAX_ID], const TCHAR *Type*[TI_MAX_TYPE], TCHAR *IconPath*[TI_MAX_PATH], TCHAR *ErrorDescription*[TI_MAX_ERROR])

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
Type	INPUT. A string that identifies the type of node.

Element	Description
IconPath	OUTPUT. A string that specifies the location of a graphics file for an icon that represents nodes of a particular type.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns `TI_SUCCESS` when the function completes successfully and returns `TI_ERROR_INVALID_SOURCEID` if the input source information was incorrectly identified.

Comments

Use *`IconPath`* to point to the location of the icon that identifies nodes of type *`Type`*.

Example

```
//*******************************************************************
HRESULT TIGetTypeIcon(const TCHAR SourceID[TI_MAX_ID], const TCHAR
Type[TI_MAX_TYPE], TCHAR IconPath[TI_MAX_PATH], TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   DWORDdwError;
   charszModuleFileName[_MAX_PATH+1];
   charszModuleFilePath[_MAX_PATH+1];
   charszDir[_MAX_DIR+1];
   charszDrive[_MAX_DRIVE+1];

   // Obtain the path to where the ReqPro adapter is installed.
   dwError=GetModuleFileName((HMODULE)AfxGetInstanceHandle(),
   szModuleFileName, _MAX_PATH);
   _splitpath(szModuleFileName, szDrive, szDir, NULL, NULL);

   // Build the path to where the bitmap file exists.
   _tcscpy(szModuleFilePath, szDrive);
   _tcscat(szModuleFilePath, szDir);
   _tcscat(szModuleFilePath, "bitmap_type.bmp");

   // Copy the path into the return variable.
   _tcscpy(IconPath, szModuleFilePath);

   return TI_SUCCESS;
}
```

See Also

`TIGetSourceIcon()`

TIGetTypes()

Note: This function is not currently called.

Fills an array with an identifier for each type of input element.

Syntax

```
HRESULT TIGetTypes(const TCHAR SourceID[TI_MAX_ID], TCHAR
   (**Types)[TI_MAX_TYPE], long* plTypeCount, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
Types	OUTPUT. A pointer to an array of type identifiers.
pTypeCount	OUTPUT. A pointer to a long integer that specifies the total number of test types.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns `TI_SUCCESS` when the function completes successfully and returns `TI_ERROR_INVALID_SOURCEID` if the input source information was incorrectly identified.

Comments

You assign an identifier for each input type to *`Types`*.

You assign the total count of type identifiers to *`plTypeCount`*.

Example

```
//*****************************************************************
HRESULT TIGetTypes(const TCHAR SourceID[TI_MAX_ID], TCHAR (**
Types)[TI_MAX_TYPE], long* plTypeCount, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   // Lookup the connection information for the ReqPro Project
   // identified by SourceID.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   // Determine whether a connection exists with the specified
   // SourceID.
   if (pContext)
   {
      try
      {
         // Get the ReqPro project interface pointer from the instance
         // of CConnectionContext.
         ReqServer::_ProjectPtr
         ProjectPtr(pContext->m_lpDispatchProject);

         // Get the requirement types from the ReqPro project interface
         // pointer.
         ReqServer::_ReqTypesPtr
         MyReqTypesPtr(ProjectPtr->GetReqTypes());

         // Allocate enough memory to return the types - (which are
         // strings in ReqPro).
         *Types = (char (*)[TI_MAX_TYPE]) malloc(sizeof(char) *
          MyReqTypesPtr->GetCount() * TI_MAX_TYPE);

         // Loop through the requirements types to find the right one.
         for (long lIndex = 1; lIndex <= MyReqTypesPtr->GetCount();
               lIndex++)
         {
            COleVariant varIndex=lIndex;

         /* CODE OMITTED: Obtain requirement type from collection and
            store in variable MyReqTypePtr.*/

            // Copy name of requirement type into the return array. Note
            // that index of array is 0 based.
            _tcscpy((*pszTypes)[lIndex-1], (char
            *)MyReqTypePtr->GetName());
         }
         // Store count of types in return variable.
         *plTypeCount = MyReqTypesPtr->GetCount();
      }
```

```
      catch (_com_error)
      {
         rc = TI_ERROR;
      }
   }
   else
      rc = TI_ERROR_INVALID_SOURCEID;

   return rc;
}
```

See Also

TIGetType(), TIGetTypeIcon()

TISetConfiguration()

Sets the configuration for the test input source based on the specified configuration buffer.

Syntax

```
HRESULT TISetConfiguration(const TCHAR SourceID[TI_MAX_PATH],
   TCHAR *pConfigurationBuffer, int nConfigurationBufferLength,
   TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
pConfigurationBuffer	INPUT. A pointer to the buffer that contains the streamed configuration.
nConfigurationBufferLength	INPUT. The length of the configuration buffer.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was identified incorrectly.

Example

```
//*****************************************************************
HRESULT TISetConfiguration(const TCHAR SourceID[TI_MAX_ID], TCHAR
*pConfigurationBuffer, int nConfigurationBufferLength, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   CConnectionContext *pContext=0;

   // lookup the context information for the specified SourceID
   CString sSourceID = SourceID;
   m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

   if (pContext == 0)
      return TI_ERROR_INVALID_SOURCEID;

   // Persist the raw filter buffer for possible future use by
   //TIGetConfigurationEx or
   // TICompile, TIEdit, etc...
   pContext->m_sConfiguration = pConfigurationBuffer;

   /* CODE OMITED: Handle any configuration application actions
        needed by the adapter */

   return rc;
}
```

See Also

`TIGetConfiguration()`

TISetFilter()

Filters the display of test input elements.

Syntax

HRESULT **TISetFilter**(const TCHAR *SourceID*[TI_MAX_ID], const
  TCHAR *UserID*[TI_MAX_ID], TCHAR
  ErrorDescription[TI_MAX_ERROR])

Element	**Description**
SourceID	INPUT. The handle identifying the connection to the test input source.

Element	Description
UserID	INPUT. A string that identifies the current user.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was incorrectly identified.

Comments

You provide the filter creation mechanism in a window or in a dialog box so that the display of input elements is reduced to a specific set. Filtering information can be stored on a peruser basis.

Example

```
//*******************************************************************
HRESULT TISetFilter(const TCHAR SourceID[TI_MAX_ID], const TCHAR
UserID[TI_MAX_ID], TCHAR ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   // Lookup the connection information for the ReqPro Project
   // identified by SourceID.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   // Determine whether a connection exists with the specified
   // SourceID.
   if (pContext)
   {
      try
      {
         CFilterDialog FilterDialog(pContext, NULL);

         // Display filter dialog.
         if (FilterDialog.DoModal())
         {
         }
      }
      catch (_com_error)
```

```
        {

        }
    }
    else
        rc = TI_ERROR_INVALID_SOURCEID;

    return rc;
}
```

See Also

TISetFilterEx(), TISetValidationFilter()

TISetFilterEx()

Sets the filter for the test input source based on the specified filter buffer.

Syntax

```
HRESULT TISetFilterEx(const TCHAR SourceID[TI_MAX_PATH], TCHAR
    *pFilterBuffer, int nFilterBufferLength, TCHAR
    ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
pFilterBuffer	OUTPUT. A pointer to a buffer that contains the streamed filter.
nFilterBufferLength	OUTPUT. The length of the filter buffer.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR. The function did not complete successfully.

Comments

This function supersedes the function `TISetFilter()`.

TestManager is responsible for persisting this data.

Example

```
//**********************************************************************
HRESULT TISetFilterEx(const TCHAR SourceID[TI_MAX_ID], TCHAR
*pFilterBuffer, int nFilterBufferLength, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
     AFX_MANAGE_STATE(AfxGetStaticModuleState());

     HRESULT rc = TI_SUCCESS;

     CConnectionContext *pContext=0;

     // lookup the context information for the specified SourceID
     CString sSourceID = SourceID;
     m_ServerConnections.Lookup(sSourceID, (void *&)pContext);

     if (pContext == 0)
          return TI_ERROR_INVALID_SOURCEID;

     /* The remainder of this code is an example of filtering file
        based input source. In this sample, the TIGetFilterEx returned
        a list of file extensions that were to be hidden from the user.
        This example merely parses the filter buffer and stores the
        results in the adapter's connection context. TIGetRoots and
        TIGetChildren would then use this to determine their output.*/

     // Persist the raw filter buffer for possible future use
      // by TIGetFilterEx
     pContext->m_sFilter = pFilterBuffer;

     TCHAR szBuffer[512];
     _tcscpy(szBuffer, pFilterBuffer);
     char seps[] = ";";
     char *token;

     pContext->m_asFilterFileExtensions.RemoveAll();

     // establish string and get the first token:
     token = strtok(szBuffer, seps );
     while( token != NULL )
     {
          CString sToken = token;
          sToken.TrimLeft();
          sToken.TrimRight();
          pContext->m_asFilterFileExtensions.Add(sToken);
```

```
            // Get next token:
            token = strtok( NULL, seps );

        }  //  end while

        return rc;
    }
```

See Also

TIGetFilterEx()

TISetValidationFilter()

Note: This function is not currently called.

Filters operations according to validation status.

Syntax

```
HRESULT TISetValidationFilter(const TCHAR SourceID[TI_MAX_ID],
   const TCHAR UserID[TI_MAX_ID], BOOL bOnlyNeedsValidation,
   TCHAR ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
UserID	INPUT. A string that identifies the current user.
bOnlyNeedsValidation	INPUT. A pointer to a Boolean value that specifies whether filtering by validation status is in effect.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was incorrectly identified.

Comments

Create a filter so that all operations on the input source (*SourceID*) performed by the current tester (*UserID*) apply only to elements that need validation. If *bOnlyNeedsValidation* is set to `False`, filtering by this criterion is disabled.

See Also

`TISetFilter(), TISetFilterEx(), TIGetFilterEx()`

TIShowProperties()

Displays the property page or dialog box of an input element.

Syntax

```
HRESULT TIShowProperties(TCHAR const SourceID[TI_MAX_ID], const
   TCHAR NodeID[TI_MAX_ID], struct Node** pModifiedNode, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
NodeID	INPUT. A string that identifies an input element.
pModifiedNode	OUTPUT. A pointer to a structure that receives the new information about a node.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- `TI_SUCCESS`. The function completed successfully.
- `TI_ERROR_INVALID_SOURCEID`. The input source was identified incorrectly.
- `TI_NODE_NOT_FOUND`. The adapter was unable to locate the specified input element.

Comments

If any property relevant to TestManager has changed, assign the new information to a `Node` structure associated with the pointer *pModifiedNode*.

Example

```
//*****************************************************************
HRESULT TIShowProperties(const TCHAR SourceID[TI_MAX_ID], const TCHAR
NodeID[TI_MAX_ID], struct Node** pModifiedNode, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   // Look in the connection map to determine whether a connection with
   // the specified RQS file exists.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   if (pContext)
   {
   /* CODE OMITTED: Display the ReqPro Requirement Properties dialog
      If OK is selected, store relevant information in an instance of
      CReqInfo. CReqInfo is a ReqPro adapter-specific class.
      If value of NodeID is not a valid test input,
      TI_NODE_NOT_FOUND is returned.*/

      // Populate Node structure.
      *pNode = new struct Node;

      // Copy test input name.
      _tcscpy((*pModifiedNode)->Name, (const char *)pReqInfo->m_sName);

      (*pModifiedNode)->IsOnlyContainer = pReqInfo->m_bContainer;
      (*pModifiedNode)->NeedsValidation =
      pReqInfo->m_bNeedsValidation;

      // Copy the Requirement NodeID (which is a GUID for a ReqPro
      // requirement).
      _tcscpy((*pModifiedNode)->NodeID, pReqInfo->m_sGUID);

      char szNodeType[TI_MAX_TYPE+1];

   /* CODE OMITTED: Obtain the name of the requirement type by using
      the ReqPro COM server.*/

      // Copy the name of requirement type into the node structure.
      _tcscpy((*pModifiedNode)->Type, (char *) szNodeType);
   }
   else
      rc = TI_ERROR_INVALID_SOURCEID;
```

```
   return rc;
}
```

See Also

`TIShowSelectDialog()`

TIShowSelectDialog()

Note: This function is not currently called.

Displays a selection dialog box for choosing elements from the input source.

Syntax

```
HRESULT TIShowSelectDialog(const TCHAR SourceID[TI_MAX_ID],
   struct Node* pSelectedNodes[], long* plNodeCount, TCHAR
   ErrorDescription[TI_MAX_ERROR])
```

Element	Description
SourceID	INPUT. The handle identifying the connection to the test input source.
pSelectedNodes	OUTPUT. An array of structures that specifies the selected input elements.
plNodeCount	OUTPUT. A pointer to a long integer that specifies the total number of nodes selected.
ErrorDescription	OUTPUT. The message to be displayed to the TestManager user if there is an error.

Return Values

This function typically returns one of the following values:

- TI_SUCCESS. The function completed successfully.
- TI_ERROR_INVALID_SOURCEID. The input source was incorrectly identified.

Comments

This function displays a selection dialog box (supplied by the adapter) for selecting elements from the input source (*SourceID*). You assign the selected elements to *pSelectedNodes*.

Assign the total number of selected elements to *plNodeCount*.

Example

```
//*****************************************************************
HRESULT TIShowSelectDialog(const TCHAR SourceID[TI_MAX_ID], struct
Node *pSelectedNodes[], long* plNodeCount, TCHAR
ErrorDescription[TI_MAX_ERROR])
{
   AFX_MANAGE_STATE(AfxGetStaticModuleState());

   HRESULT rc = TI_SUCCESS;

   struct Node *pNodeArray=0;
   // Look in the connection map to determine whether a connection with
   // the specified RQS file exists.
   CConnectionContext *pContext=0;
   m_ProjectConnections.Lookup(SourceID, (void *&)pContext);

   // Determine whether a connection exists with the specified
   // SourceID.
   if (pContext)
   {
      CPtrArray PtrArray;

      /* CODE OMITTED: Display the RequisitePro Requirement Selection
         Dialog. Upon selection of the OK button, extract the selected
         requirements and store the data for each requirement in an
         instance of class CReqInfo.
         CReqInfo is a ReqPro adapter-specific class that stores info
         about each ReqPro requirement. The instances of CReqInfo are
         stored in a pointer array (CPtrArray).*/

      // Allocate enough Node data structures for all the root nodes in
      // the pointer array.
      pNodeArray = new struct Node[PtrArray.GetSize()];

      // Populate the array of Nodes with the data returned by using
      // the ReqPro COM server.
      for (long lIndex=0; lIndex < PtrArray.GetSize(); lIndex++)
      {
         // Get instance of CReqInfo.
         CReqInfo *pReqInfo = (CReqInfo *)PtrArray.GetAt(lIndex);

         // Copy the requirement name.
         _tcscpy(pNodeArray[lIndex].Name, (const char
```

```
            *)pReqInfo->m_sName);

            // Copy the Container and NeedsValidation attributes.
            pNodeArray[lIndex].IsOnlyContainer = pReqInfo->m_bContainer;
            pNodeArray[lIndex].NeedsValidation =
            pReqInfo->m_bNeedsValidation;

            // Copy the Requirement NodeID (which is a GUID for a ReqPro
            // requirement).
            _tcscpy(pNodeArray[lIndex].NodeID, pReqInfo->m_sGUID);

            char szNodeType[TI_MAX_TYPE+1];

            /* CODE OMITTED: Obtain the name of the requirement type by
               using the ReqPro COM server.*/

            // Copy the name of requirement type into the node structure.
            _tcscpy(pNodeArray[lIndex].Type, (char *) szNodeType);

            delete pReqInfo;
        }

        // Set the return pointer for the node array.
        *pSelectedNodes = pNodeArray;

        // Set the count for the number of returned nodes.
        *pNodeCount = PtrArray.GetSize();
    }
    else
        rc = TI_ERROR_INVALID_SOURCEID;

    return rc;
}
```

See Also

TIShowProperties()

Using Test Script Services from an External C or C++ Program

A

This appendix explains how to use the test script services calls documented in Chapter 3 from a C or C++ program.

Connecting to a TestManager Listener Port

Rational does not provide a built-in test script type for C or C++ test scripts. You can, however, directly call the test script services documented in Chapter 3 from a C or C++ program and run the program from TestManager as a Command Line test script. TestManager displays the test results if you:

- Include code that connects the external program to a TestManager listener port.
- Compile the program and link it with the `rttssremote.lib` library released with TestManager.

An example follows. The lines that attach to a TestManager listener port are shown in bold. If you saved this program to a file named emulmany.c, here's how you would compile and link the program:

```
cl /I "%ratl_rthome%\rtsdk\c\include" /c emulmany.c
link /out:emulmany.exe emulmany.obj
"%ratl_rthome%\rtsdk\c\lib\rttssremote.lib"
```

To run the program, follow the instructions in "Running a Test Script with the Command Line Adapter" on page 2. Alternatively, to be able to access C or C++ test scripts for viewing or editing as well as for execution from TestManager's **File** pull-down menu selections, you can create a new test script type for your C or C++ test scripts: see "Adding a Command Line Test Script Type" on page 4.

Example: Attaching to a TestManager Listener Port

```
* This program demonstrates how to use the Test Script Services
(TSS)
 * from a C program.
 *
 * The program is designed to run as a command line script under
TestManager.
```

```
#include <stdlib.h>
#include <stdio.h>
#include "rttss.h"

char    emul_logmsg[512];

typedef struct info {
    char *host;
    u16 port;
    s32 vtid;
} info_t;

int
uniform_delay(int mindly,
              int maxdly,
              int pctpass) {
    s32 dly;
    s32 pass;

    dly = TSSUniform(mindly, maxdly);
    pass = TSSUniform(1,100) < pctpass;
    sprintf(emul_logmsg, "uniform_delay(%d, %d, %d) delayed %d and
%s.",
            mindly, maxdly, pctpass, dly,
            pass ? "passed" : "failed");
    TSSDelay(dly);
    return pass;
}


int main(int argc, char *argv[]) {
    s32 rc;
    s32 pass;
    EvarValue evalue;
    int i;
    char *s;
   info_t     thinfo;               /* Parent program host/port
*/


    /* Get connect info from the environment. */

    if (s = getenv("RTTSS_HOST"))
   thinfo.host = s;
```

```
    else {
   fprintf(stderr, "Environment variable RTTSS_HOST is not
defined\n");
   exit(1);
    }
    thinfo.port = 0;
    if (s = getenv("RTTSS_PORT"))
   thinfo.port = (u16) strtoul(s, NULL, 10);
    thinfo.vtid = 0;
    if (s = getenv("RTTSS_VTID"))
   thinfo.vtid = strtol(s, NULL, 10);

    if ((rc = TSSConnect(thinfo.host, thinfo.port, thinfo.vtid)) !=
TSS_OK) {
        fprintf(stderr, "TSSConnect failed\n");
        exit(-1);
    }


    evalue.envStr = "NEGEXP";
    TSSEnvironmentOp(EVAR_Think_dist, EVOP_set, &evalue);
    evalue.envInt = 100;
    TSSEnvironmentOp(EVAR_Think_dly_scale, EVOP_set, &evalue);
    evalue.envInt = 3000;
    TSSEnvironmentOp(EVAR_Think_avg, EVOP_set, &evalue);

    for (i = 0; i < 1; i++) {
        TSSCommandStart("step001", "step001", MST_DELAY);
        pass = uniform_delay(10, 100, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step001 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step002", "step002", MST_DELAY);
        pass = uniform_delay(100, 200, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step002 failed",
                      0,
                      0,
```

```
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step003", "step003", MST_DELAY);
        pass = uniform_delay(200, 300, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step003 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step004", "step004", MST_DELAY);
        pass = uniform_delay(300, 400, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step004 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step005", "step005", MST_DELAY);
        pass = uniform_delay(400, 500, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step005 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step006", "step006", MST_DELAY);
        pass = uniform_delay(500, 600, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step006 failed",
                      0,
                      0,
                      emul_logmsg,
```

```
                    0,
                    NULL);

        TSSCommandStart("step007", "step007", MST_DELAY);
        pass = uniform_delay(600, 700, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step007 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
                    NULL);

        TSSCommandStart("step008", "step008", MST_DELAY);
        pass = uniform_delay(700, 800, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step008 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
                    NULL);

        TSSCommandStart("step009", "step009", MST_DELAY);
        pass = uniform_delay(800, 900, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step009 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
                    NULL);

        TSSCommandStart("step010", "step010", MST_DELAY);
        pass = uniform_delay(900, 1000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step010 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
```

```
                    NULL);

        TSSCommandStart("step011", "step011", MST_DELAY);
        pass = uniform_delay(1000, 1100, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step011 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
                    NULL);

        TSSCommandStart("step012", "step012", MST_DELAY);
        pass = uniform_delay(1100, 1200, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step012 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
                    NULL);

        TSSCommandStart("step013", "step013", MST_DELAY);
        pass = uniform_delay(1200, 1300, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step013 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
                    NULL);

        TSSCommandStart("step014", "step014", MST_DELAY);
        pass = uniform_delay(1300, 1400, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                    "step014 failed",
                    0,
                    0,
                    emul_logmsg,
                    0,
                    NULL);
```

```
        TSSCommandStart("step015", "step015", MST_DELAY);
        pass = uniform_delay(1400, 1500, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step015 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step016", "step016", MST_DELAY);
        pass = uniform_delay(1500, 1600, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step016 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step017", "step017", MST_DELAY);
        pass = uniform_delay(1600, 1700, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step017 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step018", "step018", MST_DELAY);
        pass = uniform_delay(1700, 1800, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step018 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);
```

```
        TSSCommandStart("step019", "step019", MST_DELAY);
        pass = uniform_delay(1800, 1900, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step019 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step020", "step020", MST_DELAY);
        pass = uniform_delay(1900, 2000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step020 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step021", "step021", MST_DELAY);
        pass = uniform_delay(2000, 3000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step021 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step022", "step022", MST_DELAY);
        pass = uniform_delay(3000, 4000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step022 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step023", "step023", MST_DELAY);
```

```
        pass = uniform_delay(4000, 5000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step023 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step024", "step024", MST_DELAY);
        pass = uniform_delay(5000, 6000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step024 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step025", "step025", MST_DELAY);
        pass = uniform_delay(6000, 7000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step025 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step026", "step026", MST_DELAY);
        pass = uniform_delay(7000, 8000, 90);
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                      "step026 failed",
                      0,
                      0,
                      emul_logmsg,
                      0,
                      NULL);

        TSSCommandStart("step027", "step027", MST_DELAY);
        pass = uniform_delay(8000, 9000, 90);
```

```
        TSSCommandEnd(pass ? TSS_LOG_RESULT_PASS :
TSS_LOG_RESULT_FAIL,
                     "step027 failed",
                     0,
                     0,
                     emul_logmsg,
                     0,
                     NULL);
    }
}
```

Arguments of TSSEnvironmentOp()

The following table describes the valid values of the first argument (*envVar*) of `TSSEnvironmentOp()`. Note the following about `EVAR_LogData_control` and `EVAR_LogEvent_control`:

- They correspond to the check boxes in the TestManager TSS Environment Variables dialog box. Use this dialog box to set logging and reporting options at the suite rather than the script level.
- They are more flexible alternatives to `EVAR_Log_level` and `EVAR_Report_level`.

Name	Type/Values/(default)	Contains
EVAR_Delay_dly_scale	integer 0–2000000000 percent (100)	The scaling factor applied globally to all timing delays. A value of 100%, which is the default, means no change. A value of 50% means one-half the delay, which is twice as fast as the original; 200% means twice the delay, which is half as fast. A value of zero means no delay.

Name	Type/Values/(default)	Contains
EVAR_LogData_control	NONE, PASS, FAIL, WARNING, STOPPED, INFORMATIONAL, COMPLETED, UNEVALUATED ANYRESULT	Flags indicating the level of detail to log. Specify one or more. These result flags (except the last, which specifies everything) correspond to flags entered with the TSSLogEvent, TSSLogMessage, TSSTestCaseResult, TSSCommandEnd, and TSSLogCommand functions. For example, specifying FAIL selects everything logged by functions that specified flag FAIL.
EVAR_LogEvent_controlL	NONE, PASS, FAIL, WARNING, STOPPED, INFORMATIONAL, COMPLETED, UNEVALUATED, TIMERS, COMMANDS, ENVIRON, STUBS, TSSERROR, TSSPROXYERROR ANYRESULT	Flags indicating the level of detail to log for reports. Specify one or more. The first nine result flags (NONE through UNEVALUATED) correspond to flags specified with the TSSLogEvent, TSSLogMessage, TSSTestCaseResult, TSSCommandEnd, and TSSLogCommand functions. The other flags (TIMERS through TSSPROXYERROR) indicate the event objects. For example, FAIL plus COMMANDS selects for reporting all commands that recorded a failed result. ANYRESULTS selects everything.

Name	Type/Values/(default)	Contains
EVAR_Log_level	string "OFF" ("TIMEOUT") "UNEXPECTED" "ERROR" "ALL"	The level of detail to log: ▪ OFF – Log nothing. ▪ TIMEOUT – Log emulation command time-outs. ▪ UNEXPECTED – Log time-outs and unexpected responses from emulation commands. ▪ ERROR – Log all emulation commands that set IV_error to a nonzero value. Log entries include IV_error and IV_error_text. ▪ ALL – Log everything: emulation command types and IDs, script IDs, source files, and line numbers.

Name	Type/Values/(default)	Contains
EVAR_Record_level	"MINIMAL" "TIMER" "FAILURE" ("COMMAND") "ALL"	The level of detail to log for reporting: ▪ MINIMAL – Record only items necessary for reports to run. Use this value when you do not want user activity to be reported. ▪ TIMER – MINIMAL plus start_time and stop_time emulation commands. Reports do not contain response times for each emulation command, emulation command failure does not appear, and the result file for each virtual tester is small. Use this setting if you are not concerned with the response times or pass/fail status of individual emulation commands. ▪ FAILURE - TIMER plus emulation command failures and some environment variable changes. Use this setting if you want the advantages of a small result file but to show also that no emulation command failed. ▪ COMMAND – FAILURE plus emulation command successes and some environment variable changes. ▪ ALL – COMMAND plus all environment variable changes. Complete recording.

Name	Type/Values/(default)	Contains
EVAR_Suspend_check	string ("ON") "OFF"	Controls whether you can suspend a virtual tester from a Monitor view: ▪ ON – A suspend request is checked before beginning the think time interval by each send emulation command. ▪ OFF – Disable suspend checking.
EVAR_Think_avg	integer 0–2000000000 ms (5000)	The average think-time delay (the amount of time that, on average, a user delays before performing an action).
EVAR_Think_cpu_dly_scale	integer 0–2000000000 ms (100)	The scaling factor applied globally to CPU (processing time) delays. Used instead of EVAR_Think_dly_scale if EVAR_Think_avg is less than EVAR_Think_cpu_threshold. Delay scaling is performed before truncation (if any) by EVAR_Think_max.
EVAR_Think_cpu_threshold	integer 0–2000000000 ms (0)	The threshold value used to distinguish CPU delays from think-time delays.

Name	Type/Values/(default)	Contains
EVAR_Think_def	string "FS" "LS" "FR" ("LR") "FC" "LC"	The starting point of the think-time interval: ▪ FS – the submission time of the previous send emulation command ▪ LS – the completion time of the previous send emulation command ▪ FR – the time the first data of the previous receive emulation command was received ▪ LR – the time the last data of the previous receive emulation command was received, or LS if there was no intervening receive emulation command ▪ FC – the submission time of the previous connect emulation command (uses the IV_fc_ts internal variable) ▪ LC – the completion time of the previous connect emulation command (uses the IV_lc_ts internal variable)

Name	Type/Values/(default)	Contains
EVAR_Think_dist	string ("CONSTANT") "UNIFORM" "NEGEXP"	The think-time distribution: ▪ CONSTANT – sets a constant distribution equal to Think_avg ▪ UNIFORM – sets a random think-time interval distributed uniformly in the range: [EVAR_Think_avg - EVAR_Think_sd, EVAR_Think_avg + EVAR_Think_sd] ▪ NEGEXP – sets a random think-time interval approximating a bell curve with EVAR_Think_avg equal to standard deviation
EVAR_Think_dly_scale	integer 0 – 2000000000 ms (100)	The scaling factor applied globally to think-time delays. Used instead of EVAR_Think_cpu_dly_scale if EVAR_Think_avg is greater than EVAR_Think_cpu_threshold. Delay scaling is performed before truncation (if any) by EVAR_Think_max.
EVAR_Think_max	integer 0–2000000000 ms (2000000000)	A maximum threshold for think times that replaces any larger setting.
EVAR_Think_sd	integer 0–2000000000 ms (0)	Where EVAR_Think_dist is set to UNIFORM, specifies the think-time standard deviation.

The following table describes the valid values of the second argument (*envOp*) of TSSEnvironmentOp().

Operation	Description
EVOP_eval	Operate on the value at the top of the variable's stack.
EVOP_pop	Remove the variable value at the top of the stack.
EVOP_push	Push a value to the top of a variable's stack.
EVOP_reset	Set the value of a variable to the default and discard any other values in the stack.
EVOP_restore	Set the saved value to the current value.
EVOP_save	Save the value of a variable.
EVOP_set	Set a variable to the specified value.

Example: Manipulating Environment Variables

This example illustrates how to manipulate environment variables.

```
#include <stdio.h>
#include <rttss.h>

void errorexit(void);

int main(int argc, char *argv[])
{
    EvarValue ev;
    if (s = getenv("RTTSS_HOST"))
      thinfo.host = s;
    else {
      fprintf(stderr, "Environment variable RTTSS_HOST is not
defined\n");
      exit(1);
      }
    thinfo.port = 0;
    if (s = getenv("RTTSS_PORT"))
      thinfo.port = (u16) strtoul(s, NULL, 10);
      thinfo.vtid = 0;
      if (s = getenv("RTTSS_VTID"))
         thinfo.vtid = strtol(s, NULL, 10);
         if ((rc = TSSConnect(thinfo.host, thinfo.port, thinfo.vtid))
!= TSS_OK) {
          fprintf(stderr, "TSSConnect failed\n");
          exit(-1);
            }

    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_eval, &ev) != TSS_OK)
   errorexit();
    printf("At start, value is '%s'\n", ev.envStr);
```

```
    ev.envStr = "NEGEXP";
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_push, &ev) != TSS_OK)
   errorexit();
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_eval, &ev) != TSS_OK)
   errorexit();
    printf("After push, value is '%s'\n", ev.envStr);

    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_pop, NULL) != TSS_OK)
   errorexit();
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_eval, &ev) != TSS_OK)
   errorexit();
    printf("After pop, value is '%s'\n", ev.envStr);

    ev.envStr = "NEGEXP";
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_set, &ev) != TSS_OK)
   errorexit();
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_eval, &ev) != TSS_OK)
   errorexit();
    printf("After set, value is '%s'\n", ev.envStr);

    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_save, NULL) != TSS_OK)
   errorexit();
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_reset, NULL) != TSS_OK)
   errorexit();
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_eval, &ev) != TSS_OK)
   errorexit();
    printf("After save and reset, value is '%s'\n", ev.envStr);

    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_restore, NULL) !=
TSS_OK)
   errorexit();
    if (TSSEnvironmentOp(EVAR_Think_dist, EVOP_eval, &ev) != TSS_OK)
   errorexit();
    printf("After restore, value is '%s'\n", ev.envStr);

    return 0;
}


void errorexit(void)
{
    char msg[256];
    int msglen;
    int r;

    msglen = sizeof(msg);
    r = TSSErrorDetail(msg, &msglen);
    fprintf(stderr, "TSS call failed, code %d: %s\n", r, msg);

    exit(1);
}
```

Arguments of TSSInternalVarGet()

The following table lists the internal variables that can be entered with the *internVar* argument.

Variable	Contains
IV_alltext	Response text up to the value of Max_nrecv_saved. The same as response.
IV_cmd_id	The ID of the most recent emulation command.
IV_cmdcnt	A running count of the number of emulation commands the script has executed.
IV_col	The current column position (1-based) of the cursor (ASCII screen emulation variable).
IV_column_headers	The two-line column header if Column_headers is ON.
IV_command	The text of the most recent emulation command.
IV_cursor_id	The last cursor declared by sqldeclare_cursor or opened by sqlopen_cursor.
IV_error	The status of the last emulation command. Most values for error are supplied by the server.
IV_error_text	The full text of the error from the last emulation command. If error is 0, error_text returns "". For a SQL database or TUXEDO error, the text is provided by the server.
IV_error_type	If you are emulating a TUXEDO session and error is nonzero, error_type contains one of the following values: 0 (no error) 1 VU/TUX Usage Error 2 TUXEDO System/T Error 3 TUXEDO FML Error 4 TUXEDO FML32 Error 5 Application under test Error 6 Internal Error If you are emulating an IIOP session and error is nonzero, error_type contains one of the following values: 0 (no error) 1 IIOP_EXCEPTION_SYSTEM 2 IIOP_EXCEPTION_USER 3 IIOP_ERROR

Variable	Contains
IV_fc_ts	The "first connect" time stamp for http_request and sock_connect.
IV_fr_ts	The time stamp of the first received data of sqlnrecv, http_nrecv, http_recv, http_header_recv, sock_nrecv, or sock_recv. For sqlexec and sqlprepare, fr_ts is set to the time the SQL database server responded to the SQL statement.
IV_fs_ts	The time the SQL statement was submitted to the server by sqlexec or sqlprepare, or the time when the first data was submitted to the server by http_request or sock_send.
IV_host	The host name of the computer on which the script is running.
IV_lc_ts	The "last connect" time stamp for http_request and sock_connect.
IV_lineno	The line number in source_file of the previously executed emulation command.
IV_lr_ts	The time stamp of the last received data for sqlnrecv, http_nrecv, http_recv, http_header_recv, sock_nrecv, or sock_recv. For sqlexec and sqlprepare, lr_ts is set to the time the SQL database server responded to the SQL statement.
IV_ls_ts	The time the SQL statement was submitted to the server by sqlexec or sqlprepare, or the time the last data was submitted to the server by http_request or sock_send.
IV_mcommand	The actual (mapped) sequence of characters submitted to the application under test by the most recent send or msend command. For send commands, mcommand is always equivalent to command.
IV_ncnull	The number of null characters in an application response examined by the previous receive command in attempting to match this response.
IV_ncols	The number of columns in the current screen (ASCII screen emulation variable).
IV_ncrecv	The total number of nonnull characters from an application response examined by the previous receive command in attempting to match this response.
IV_ncxmit	The total number of characters transmitted to the application by the previous send or msend command.

Variable	Contains
IV_nkxmit	The total number of "keystrokes" transmitted to the application by the previous send or msend command. For send commands, nkxmit is always equivalent to ncxmit.
IV_nrecv	The number of rows processed by the last sqlnrecv, or the number of bytes received by the last http_nrecv, http_recv, sock_nrecv, or sock_recv.
IV_nrows	The number of rows in the current screen (ASCII screen emulation variable).
IV_nusers	The number of total virtual testers in the current TestManager session.
IV_nxmit	The total number of characters contained in the SQL statements transmitted to the server in the last sqlexec or sqlprepare command, or the number of bytes transmitted by the last http_request or sock_send.
IV_response	Same as row.
IV_row	The current row position (1-based) of the cursor (ASCII screen emulation variable).
IV_script	The name of the script currently being executed.
IV_source_file	The name of the file that was the source for the portion of the script being executed.
IV_statement_id	The value assigned as the prepared statement ID, which is returned by sqlprepare and sqlalloc_statement.
IV_total_nrecv	The total number of bytes received for all HTTP and socket receive emulation commands issued on a particular connection.
IV_total_rows	Set to the number of rows processed by the SQL statements. If the SQL statements do not affect any rows, total_rows is set to 0. If the SQL statements return row results, total_rows is set to 0 by sqlexec, and then incremented by sqlnrecv as the row results are retrieved.
IV_tux_tpurcode	TUXEDO user return code, which mirrors the TUXEDO API global variable tpurcode. It can be set only by the tux_tpcall, tux_tpgetrply, tux_tprecv, and tux_tpsend emulation commands.
IV_uid	The numeric ID of the current virtual tester.
IV_user_group	The name of the user group (from the suite) of the virtual tester running the script.
IV_version	The full version string of TestManager (for example, 7.5.0.1045).

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