T320 E-business technologies: foundations and practice

Block 3 Part 6 Activity 2: Testing a web service for WS-I conformance

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Introduction

Earlier in this block you developed, deployed and tested the 'Hello' web service. In this short activity you will learn how to test this simple web service for conformance to the WS-I interoperability basic profile.

To do this I shall demonstrate the use of the soapUI plug-in for Eclipse. In fact, soapUI is a much more general tool than we need to test for WS-I conformance. It is a general testing tool that has many facilities for scripting and running tests against a web service.

The plug-in versions of soapUI are available from **http://www.soapui.org/ideplugins.html**, but here I shall restrict myself to the Eclipse plug-in, which is described at **http://www.soapui.org/eclipse/index.html**.

Configuring the soapUI plug-in

The soapUI plug-in you will be using should already have been installed as part of the Eclipse installation distributed by the OU. To use the plug-in, you will first need to carry out the following two steps:

1. Set up an environment variable WSI_HOME, which points to the WS-I tools that are supplied within the T320 Eclipse directory.
2. Configure the soapUI preferences within Eclipse.

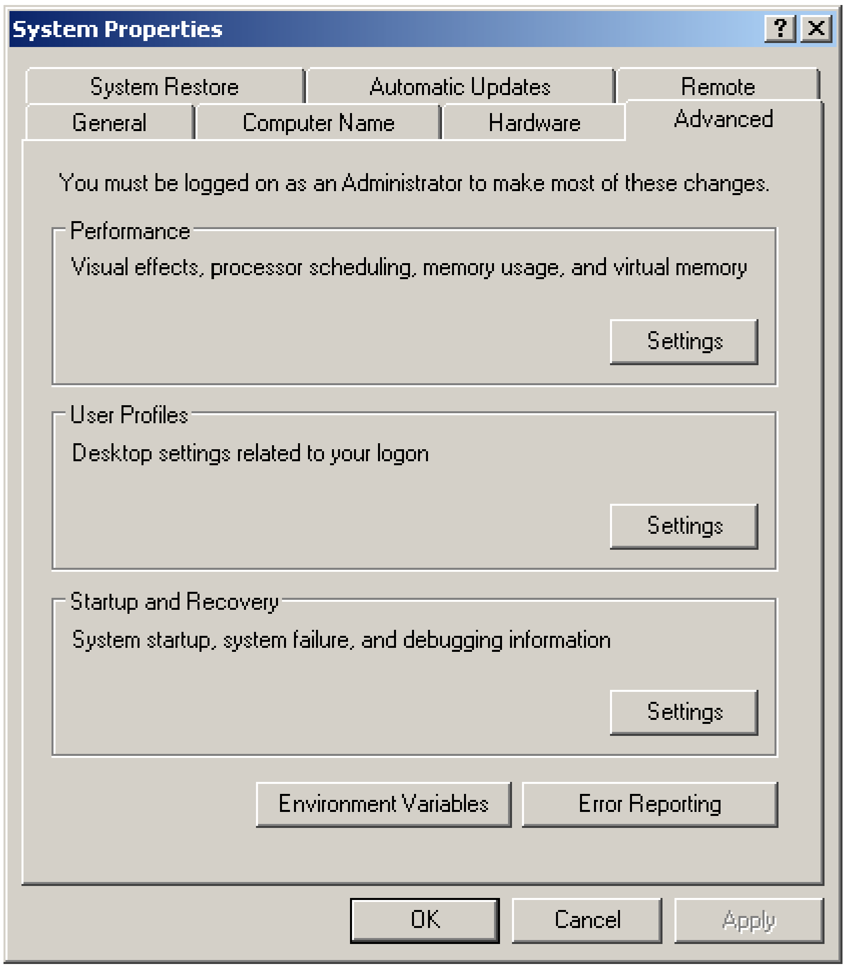
These steps are described next.

WSI_HOME variable

The WSI_HOME variable has to be set up with a value that is the path to the 'wsi-test-tools' directory. This directory contains the WS-I testing tools that have been taken from the WS-I web site. Normally you will find it at the path:

C:\T320\eclipse\wsi-test-tools

First confirm the path to the 'wsi-test-tools' directory. Then go to Start > Control Panel and select the System Properties tool. When the System Properties window opens, select the 'Advanced' tab (Figure 1).


System Properties

You must be logged on as an Administrator to make most of these changes.

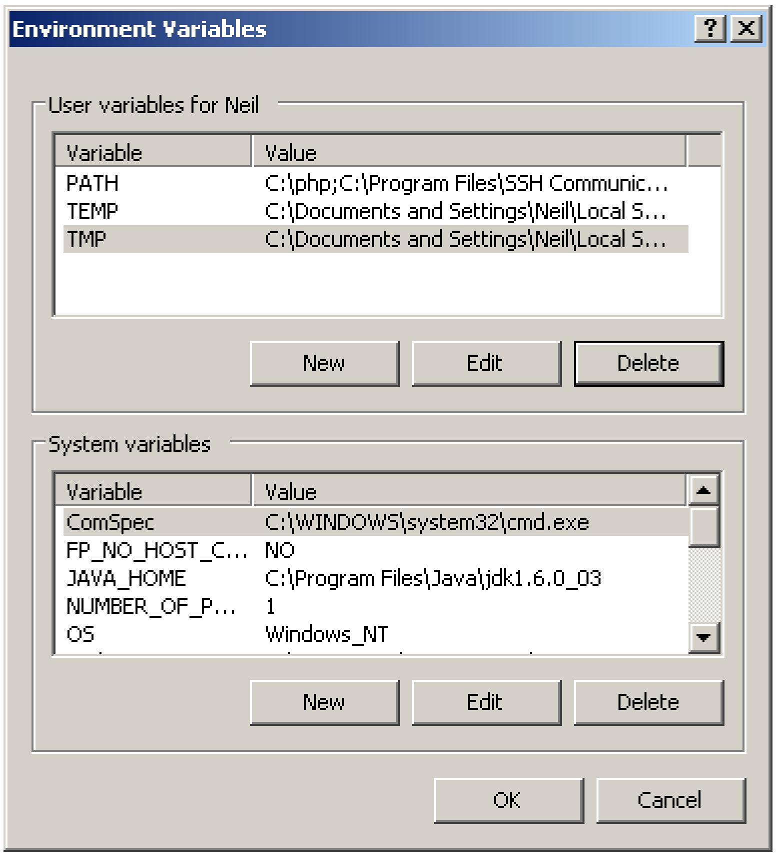
Performance
Visual effects, processor scheduling, memory usage, and virtual memory

User Profiles
Desktop settings related to your logon

Startup and Recovery
System startup, system failure, and debugging information

Figure 1 System Properties 'Advanced' tab

Click on the 'Environment Variables' button to open the Environment Variables window, as shown in Figure 2. You can then choose to create a new variable just for the user account you are using ('Neil' in the figure) or as a system-wide (for all users) variable.

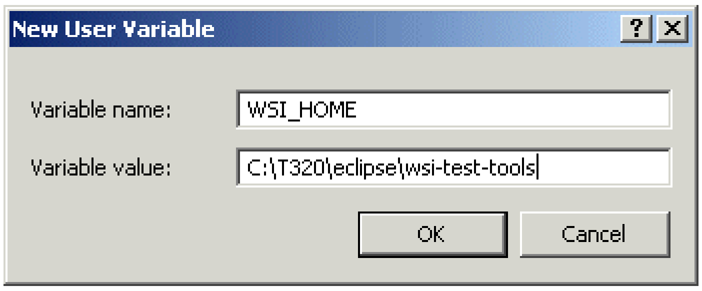


Variable	Value
PATH	C:\php;C:\Program Files\SSH Communic...
TEMP	C:\Documents and Settings\Neil\Local S...
TMP	C:\Documents and Settings\Neil\Local S...

Variable	Value
ComSpec	C:\WINDOWS\system32\cmd.exe
FP_NO_HOST_C...	NO
JAVA_HOME	C:\Program Files\Java\jdk1.6.0_03
NUMBER_OF_P...	1
OS	Windows_NT

Figure 2 Environment Variables window

Click one of the 'New' buttons. You will see a New User Variable window as shown in Figure 3. Fill in the variable and value as shown, before clicking 'OK' in each of the three open windows.



Variable name: WSI_HOME

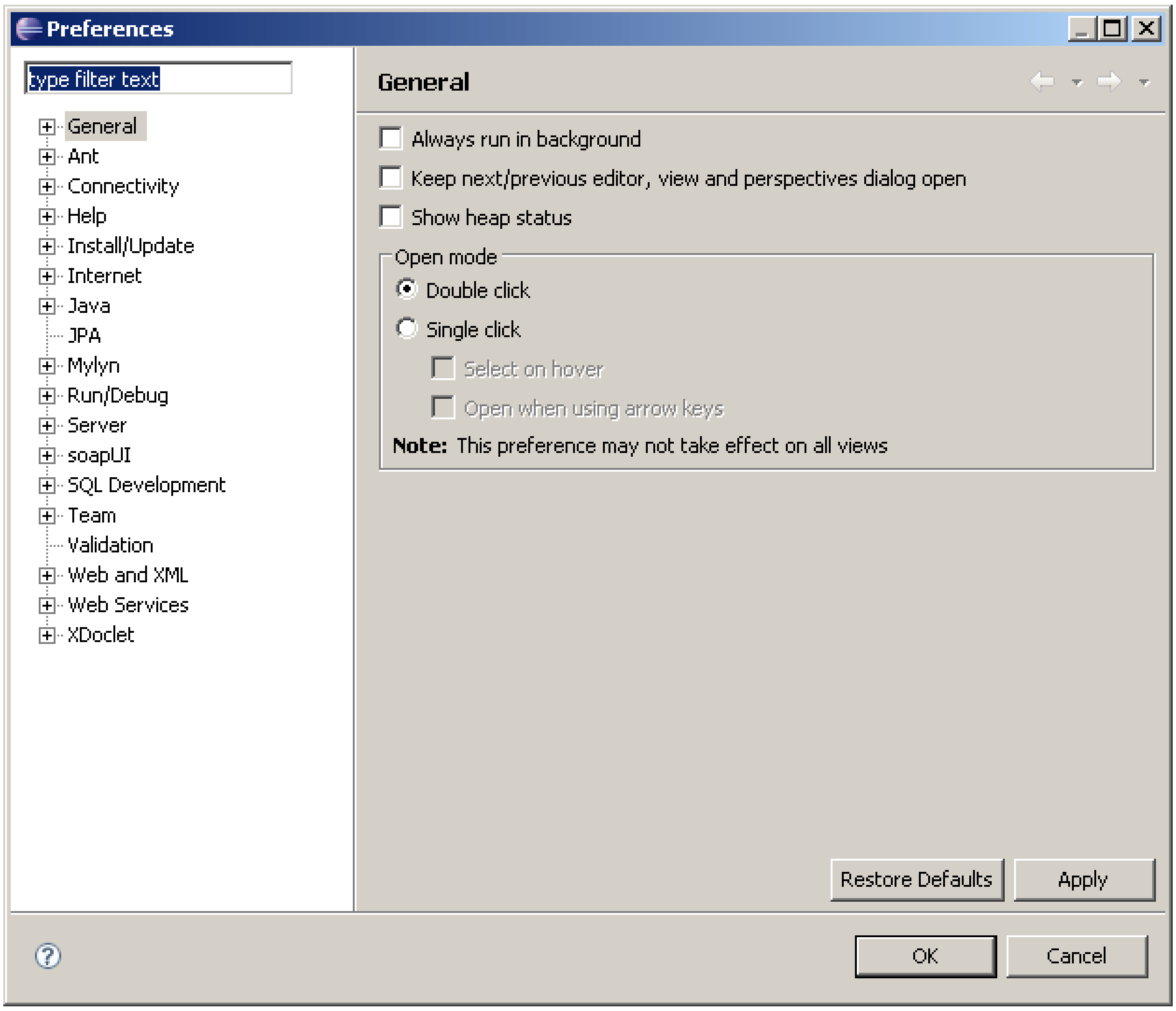
Variable value: C:\T320\eclipse\wsi-test-tools

Figure 3 New User Variable window

If you are running Eclipse, you will need to restart it so that the new variable and its value are found.

soapUI preferences

To access the soapUI preferences, go to the Window menu in Eclipse and select Preferences…. This will present you with the Preferences window shown in Figure 4.



☐ Always run in background

☐ Keep next/previous editor, view and perspectives dialog open

☐ Show heap status

Open mode

● Double click

○ Single click

☐ Select on hover

☐ Open when using arrow keys

Note: This preference may not take effect on all views

Figure 4 Eclipse Preferences window

Expand the 'soapUI' item shown on the left of Figure 4 and select the last item in the list, 'WSI Settings' (Figure 5).

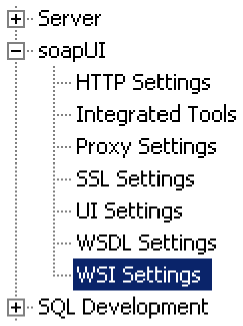
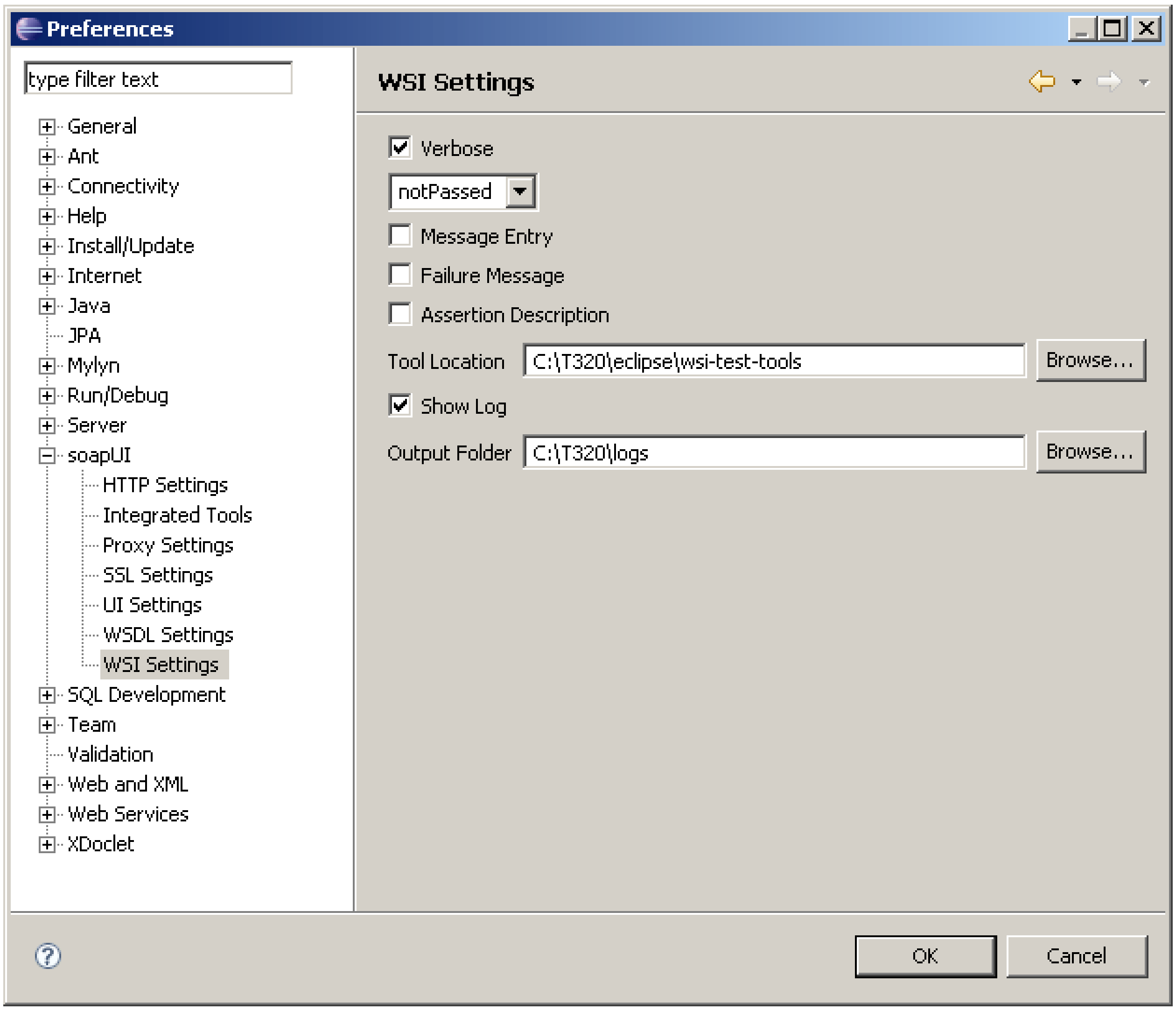


Figure 5 Expanded soapUI settings

When the 'WSI Settings' item is selected, you will see the preferences and configuration options for the WSI tools. Alter the settings as shown in Figure 6, so that 'Verbose' and 'Show Log' are ticked and the tool and log locations are specified as in the figure.

You must make sure that the log directory exists or create it yourself by hand if it isn't already there. This directory is used to store the WS-I compliance report output from the test.



Preferences

type filter text

- General
- Ant
- Connectivity
- Help
- Install/Update
- Internet
- Java
- JPA
- Mylyn
- Run/Debug
- Server
- soapUI
  - HTTP Settings
  - Integrated Tools
  - Proxy Settings
  - SSL Settings
  - UI Settings
  - WSDL Settings
  - WSI Settings
- SQL Development
- Team
- Validation
- Web and XML
- Web Services
- XDoclet

WSI Settings

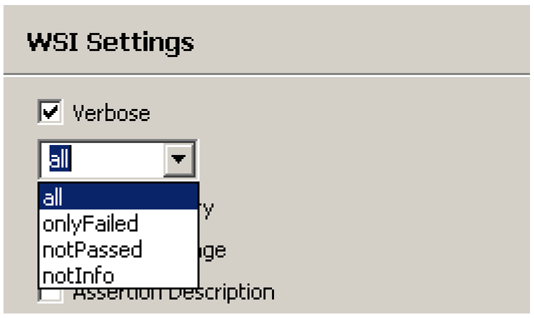
- [✓] Verbose
- notPassed
- [ ] Message Entry
- [ ] Failure Message
- [ ] Assertion Description
- Tool Location: C:\T320\eclipse\wsi-test-tools
- [✓] Show Log
- Output Folder: C:\T320\logs

Figure 6 WSI Settings in Eclipse Preferences

If you look at the options in the drop-down menu (Figure 7) you will see four possible levels of test reporting:

- 'all' will report all tests, no matter what their outcome
- 'onlyFailed' will report only conformance tests that are failed
- 'notPassed' will report tests that are not passed (i.e. failed or for which there is not sufficient information to perform the test)
- 'notInfo' will report tests for which there is not sufficient information to perform the test.

Select 'all' as shown in the figure.



WSI Settings

- [✓] Verbose
- all

Figure 7 Possible levels of test reporting

When you are ready, click 'OK' to finish.

Using the soapUI plug-in

To access the facilities of the soapUI plug-in, you need to open a new perspective in Eclipse. To do this select Window > Open Perspective > Other…, which will generate the pop-up selection box shown in Figure 8.

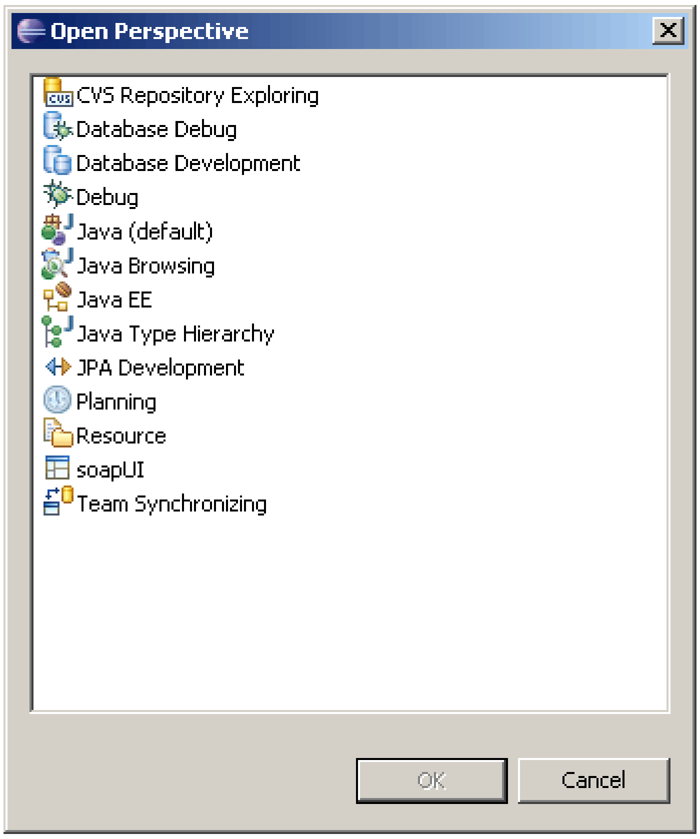


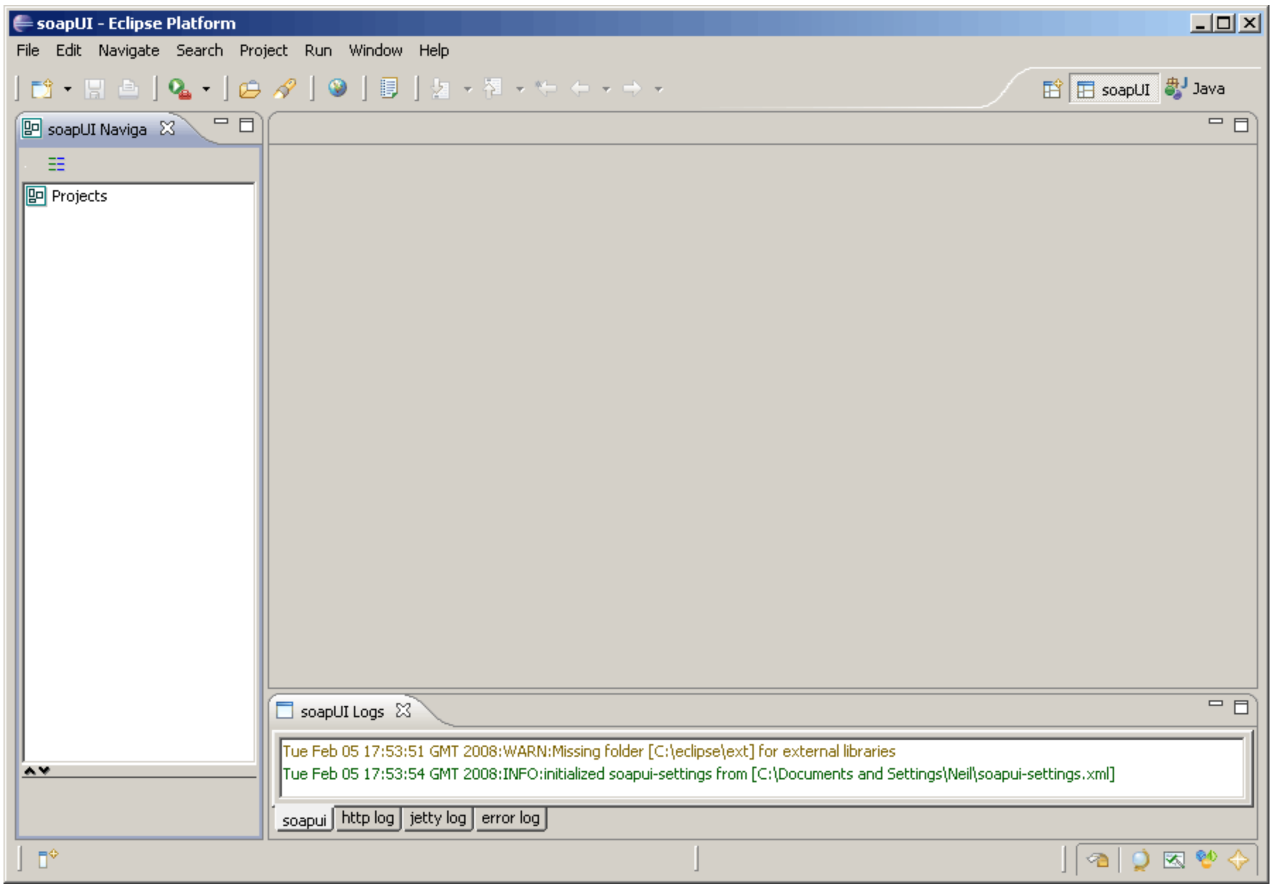
Figure 8 Eclipse Open Perspective selection box

Select the 'soapUI' option and click 'OK'. This will open the soapUI perspective, as shown in Figure 9. This perspective includes two new panels:

- the soapUI Navigator, which displays all the projects and elements that have been created as a graphical hierarchy
- the soapUI Logs view, which displays all the messages, such as errors and warnings, that are being written into the soapUI logs. This has four tabs at the bottom of the panel for different logs related to soapUI.

As you might expect, the soapUI tool can be used to test a web service that is described by a WSDL file. The next step is therefore to 'import' such a file. There are several ways you can approach this, but one reasonable approach is to first create a project into which your 'Hello' web service description can be brought.

Right-click on the 'Projects' icon in the soapUI Navigator window to reveal the pop-up menu shown in Figure 10.


soapUI - Eclipse Platform
File Edit Navigate Search Project Run Window Help
soapUI
Java
soapUI Naviga
Projects
soapUI Logs
soapui
http log
jetty log
error log

```
Tue Feb 05 17:53:51 GMT 2008:WARN:Missing folder [C:\eclipse\ext] for external libraries
Tue Feb 05 17:53:54 GMT 2008:INFO:initialized soapui-settings from [C:\Documents and Settings\Neil\soapui-settings.xml]
```

Figure 9 soapUI perspective in Eclipse

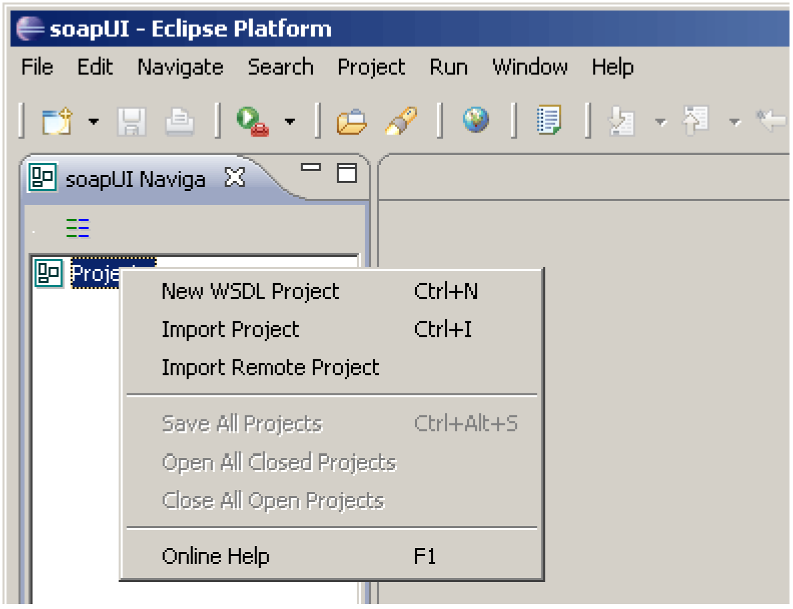
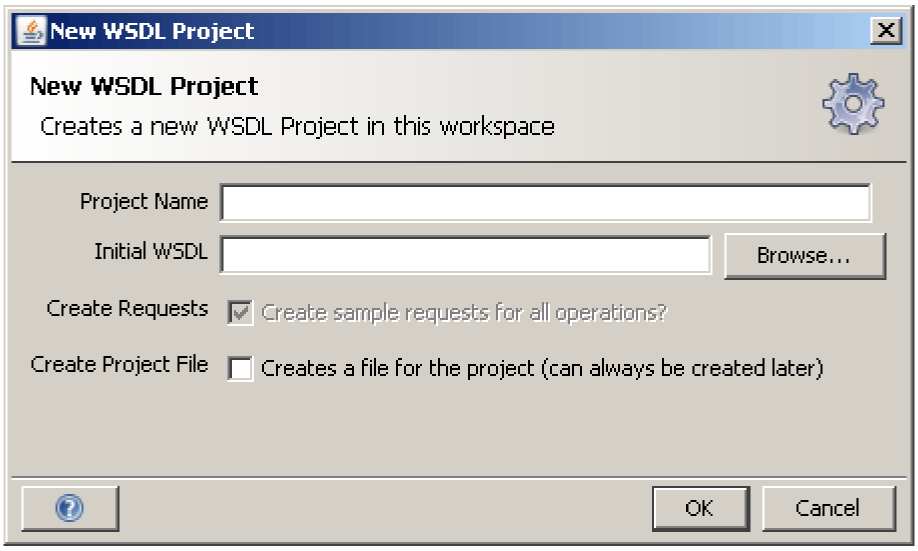


Figure 10 soapUI Projects context menu

To create a new project based on the 'Hello' web service's WSDL, select the New WSDL Project option. This will cause the New WSDL Project dialogue box to be presented (Figure 11).


New WSDL Project

New WSDL Project
Creates a new WSDL Project in this workspace

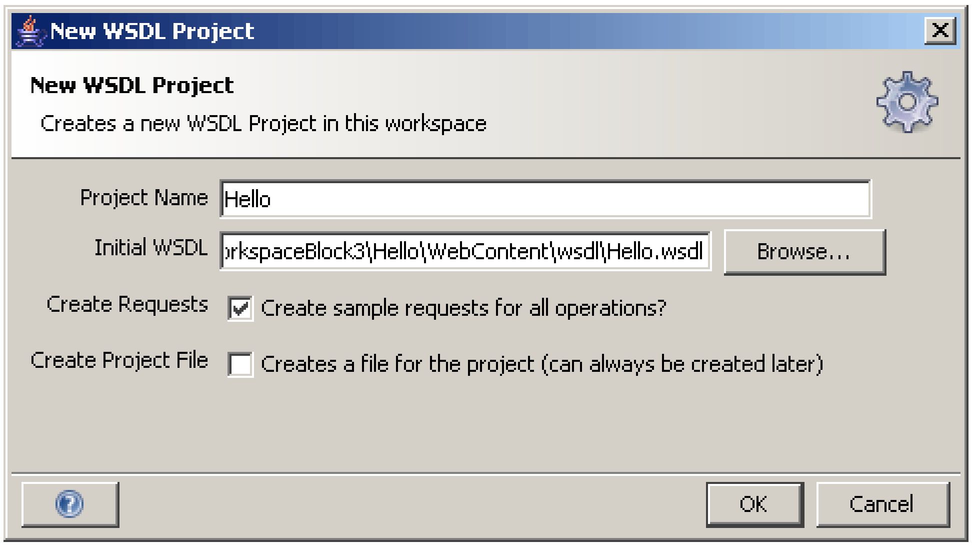
Project Name	
Initial WSDL	
Create Requests	[✓] Create sample requests for all operations?
Create Project File	[ ] Creates a file for the project (can always be created later)

Figure 11 New WSDL Project dialogue box

The project name can be any name you choose, but here I am going to call the project 'Hello' after the original web services project. Note that this project is a soapUI-type project intended for testing the web service, not for developing a web service as was the earlier 'Hello' project.

As well as a project name, we want to import the web service's WSDL file, so click the 'Browse…' button and navigate to the WSDL file in the 'Hello' web service project. This project will be inside the workspace you used in the earlier activity; the WSDL file can be found down the path 'Hello/WebContent/wsdl/Hello.wsdl' if you called the project 'Hello'.

Once you have specified the project name and located the WSDL file (Figure 12), click 'OK' to proceed.


New WSDL Project

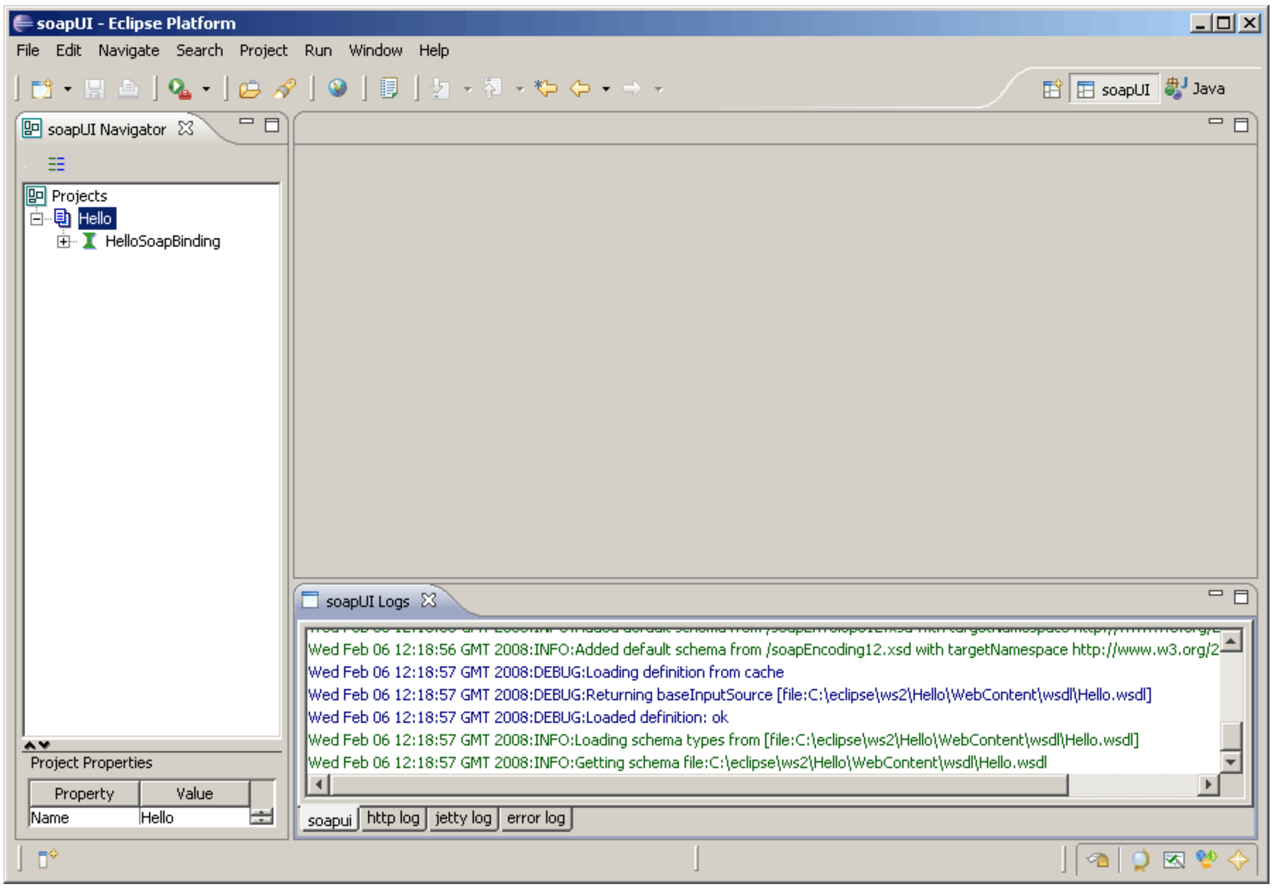
New WSDL Project
Creates a new WSDL Project in this workspace

Project Name	Hello
Initial WSDL	orkspaceBlock3\Hello\WebContent\wsdl\Hello.wsdl
Create Requests	[✓] Create sample requests for all operations?
Create Project File	[ ] Creates a file for the project (can always be created later)

Figure 12 New WSDL Project dialogue box completed

After the WSDL has been processed, you will see some messages in the soapUI Logs pane and the 'Hello' project listed in the soapUI Navigator (Figure 13).

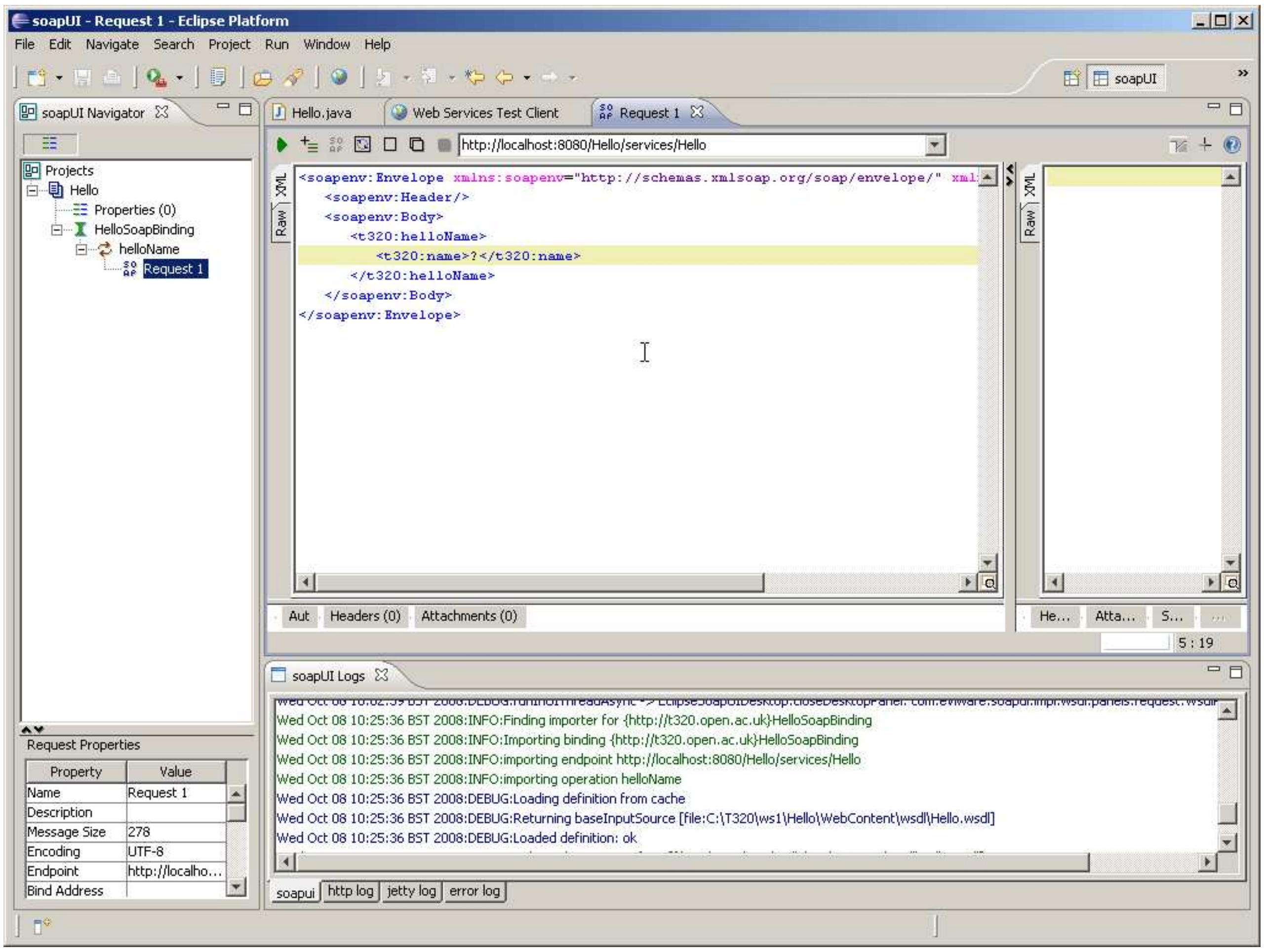
In the Navigator you should see (or be able to expand out) the SOAP binding for the web service. If you expand this out further, you will see that the project contains a single binding and this a single request. Double-click on the request and you will see an XML skeleton of the SOAP request that can be put to the web service (Figure 14).



Property	Value
Name	Hello

```
Wed Feb 06 12:18:56 GMT 2008:INFO:Added default schema from /soapEncoding12.xsd with targetNamespace http://www.w3.org/2
Wed Feb 06 12:18:57 GMT 2008:DEBUG:Loading definition from cache
Wed Feb 06 12:18:57 GMT 2008:DEBUG:Returning baseInputSource [file:C:\eclipse\ws2\Hello\WebContent\wsdl\Hello.wsdl]
Wed Feb 06 12:18:57 GMT 2008:DEBUG:Loaded definition: ok
Wed Feb 06 12:18:57 GMT 2008:INFO:Loading schema types from [file:C:\eclipse\ws2\Hello\WebContent\wsdl\Hello.wsdl]
Wed Feb 06 12:18:57 GMT 2008:INFO:Getting schema file:C:\eclipse\ws2\Hello\WebContent\wsdl\Hello.wsdl
```

Figure 13 Eclipse after creating new soapUI 'Hello' project



http://localhost:8080/Hello/services/Hello

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/" xml:
   <soapenv:Header/>
   <soapenv:Body>
      <t320:helloName>
         <t320:name>?</t320:name>
      </t320:helloName>
   </soapenv:Body>
</soapenv:Envelope>
```

```
Wed Oct 08 10:25:36 BST 2008:INFO:Finding importer for {http://t320.open.ac.uk}HelloSoapBinding
Wed Oct 08 10:25:36 BST 2008:INFO:Importing binding {http://t320.open.ac.uk}HelloSoapBinding
Wed Oct 08 10:25:36 BST 2008:INFO:importing endpoint http://localhost:8080/Hello/services/Hello
Wed Oct 08 10:25:36 BST 2008:INFO:importing operation helloName
Wed Oct 08 10:25:36 BST 2008:DEBUG:Loading definition from cache
Wed Oct 08 10:25:36 BST 2008:DEBUG:Returning baseInputSource [file:C:\T320\ws1\Hello\WebContent\wsdl\Hello.wsdl]
Wed Oct 08 10:25:36 BST 2008:DEBUG:Loaded definition: ok
```

Request Properties

Property	Value
Name	Request 1
Description	
Message Size	278
Encoding	UTF-8
Endpoint	http://localho...
Bind Address	

Figure 14 Expanded WSDL binding and SOAP request

In fact the soapUI tool is able to simulate the entire service for testing purposes, but that is not the reason we are using the tool here. We want the soapUI tool to run tests to determine whether the 'Hello' web service conforms to the WS-I basic profile. To do this, right-click on 'HelloSoapBinding' in the soapUI Navigator. This will produce the pop-up menu shown in Figure 15.

"

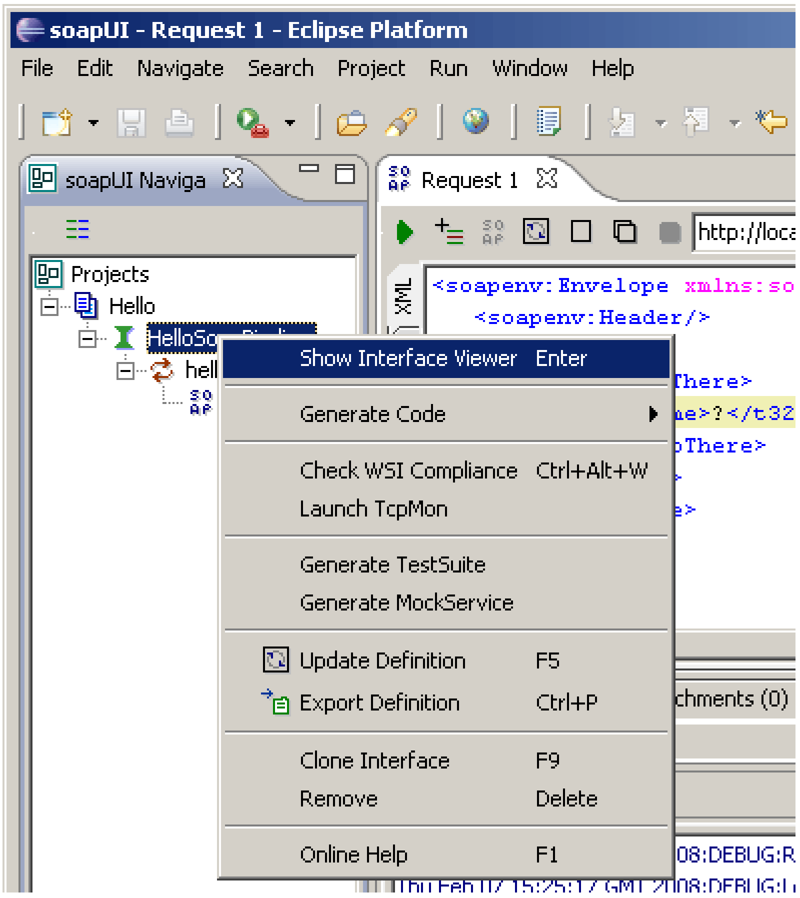
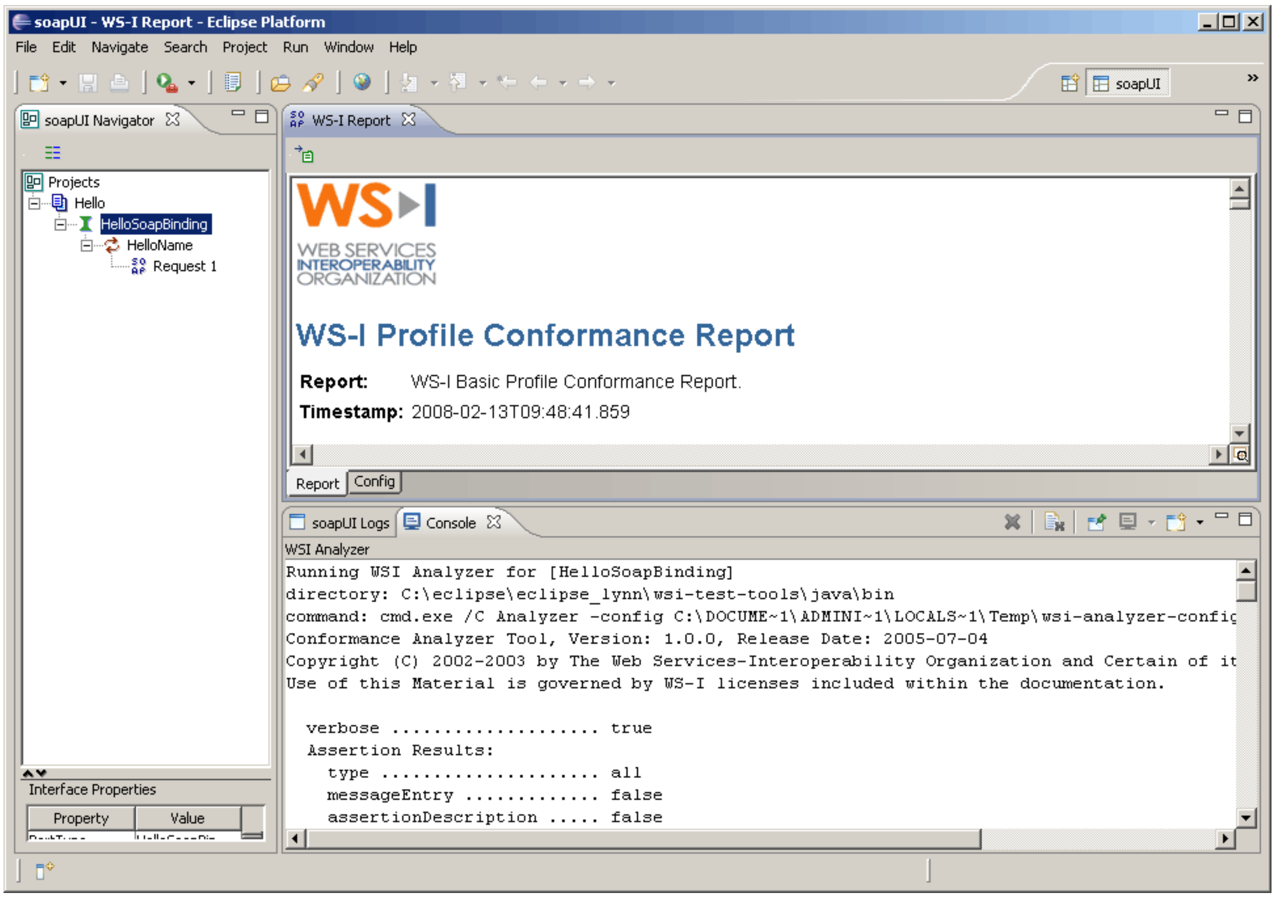


Figure 15 Pop-up menu from 'HelloSoapBinding'

Select the Check WSI Compliance option, which will start the test. You will see that there are messages being written into the Eclipse Console view; this is simply reporting the tasks being performed and listing any problems or errors encountered. After a short time you will see a new view open in the centre of your workbench, called WS-I Report (Figure 16).

The soapUI Logs view should look something like Figure 17.

If you have any problems following this practical activity, you should examine the information in the Console and soapUI Logs views. Then report any error messages, together with your observations, to the appropriate course forum (and your tutor) for help.



WS-I Profile Conformance Report

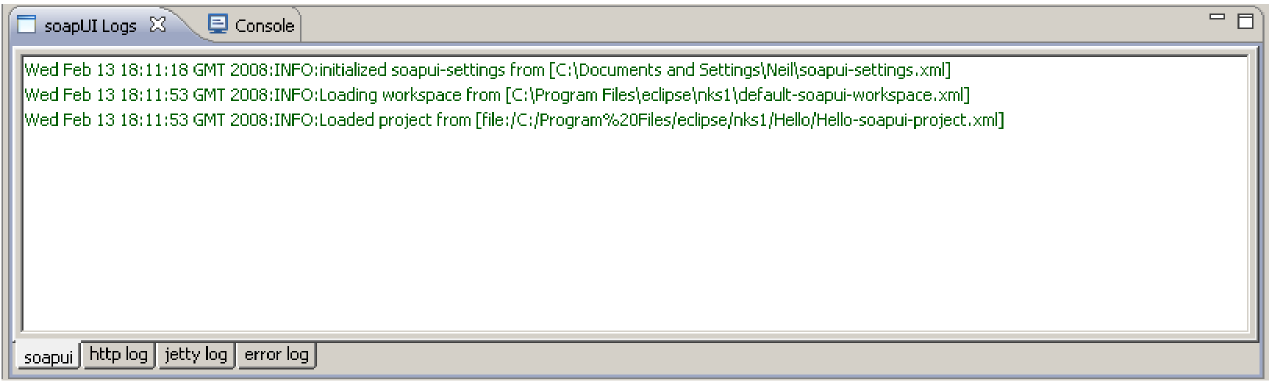
Report: WS-I Basic Profile Conformance Report.

Timestamp: 2008-02-13T09:48:41.859

```
Running WSI Analyzer for [HelloSoapBinding]
directory: C:\eclipse\eclipse_lynn\wsi-test-tools\java\bin
command: cmd.exe /C Analyzer -config C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\wsi-analyzer-config
Conformance Analyzer Tool, Version: 1.0.0, Release Date: 2005-07-04
Copyright (C) 2002-2003 by The Web Services-Interoperability Organization and Certain of it
Use of this Material is governed by WS-I licenses included within the documentation.

  verbose ................... true
  Assertion Results:
    type ..................... all
    messageEntry ............. false
    assertionDescription ..... false
```

Figure 16 WS-I conformance report in Eclipse



```
Wed Feb 13 18:11:18 GMT 2008:INFO:initialized soapui-settings from [C:\Documents and Settings\Neil\soapui-settings.xml]
Wed Feb 13 18:11:53 GMT 2008:INFO:Loading workspace from [C:\Program Files\eclipse\nks1\default-soapui-workspace.xml]
Wed Feb 13 18:11:53 GMT 2008:INFO:Loaded project from [file:/C:/Program%20Files/eclipse/nks1/Hello/Hello-soapui-project.xml]
```

Figure 17 soapUI Logs in Eclipse

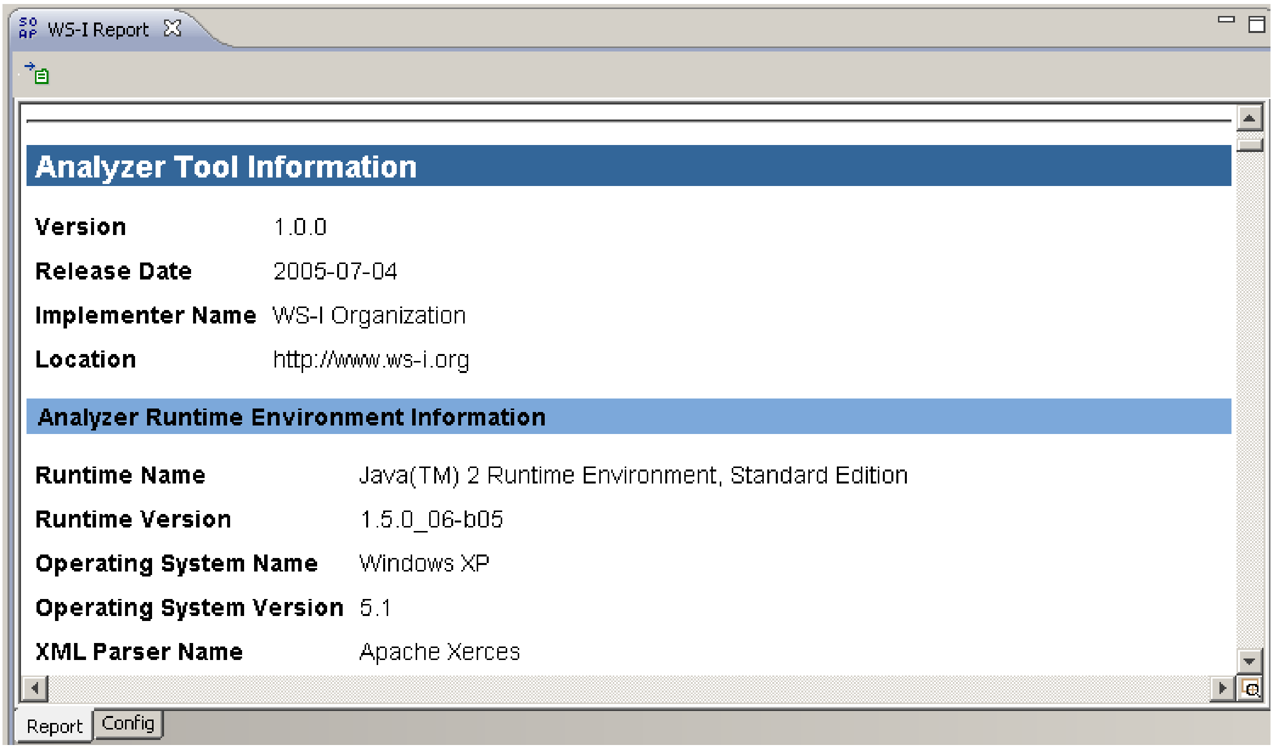
WS-I profile conformance report

The WS-I report is produced as an XML document, which is then processed to produce an HTML document using XSLT. If you wished, you could obtain the XML version of the report and process this yourself to extract the information you are interested in or to present the information in another format, rather than use the formatting and HTML presentation provided as a default.

Here we are interested in the structure of the report and the overall outcome of the testing (i.e. is the service generally good at interoperating?). There's also a quick and simple way to save the report for later reference.

Report structure

The results of the conformance test are listed in the WS-I Report panel. If you start to scroll down the report, you will see that it is divided into sections. The first section you will encounter gives some 'Analyzer Tool Information' (Figure 18).



Analyzer Tool Information

Version	1.0.0
Release Date	2005-07-04
Implementer Name	WS-I Organization
Location	http://www.ws-i.org

Analyzer Runtime Environment Information

Runtime Name	Java(TM) 2 Runtime Environment, Standard Edition
Runtime Version	1.5.0_06-b05
Operating System Name	Windows XP
Operating System Version	5.1
XML Parser Name	Apache Xerces

Figure 18 'Analyzer Tool Information' section of WS-I conformance report

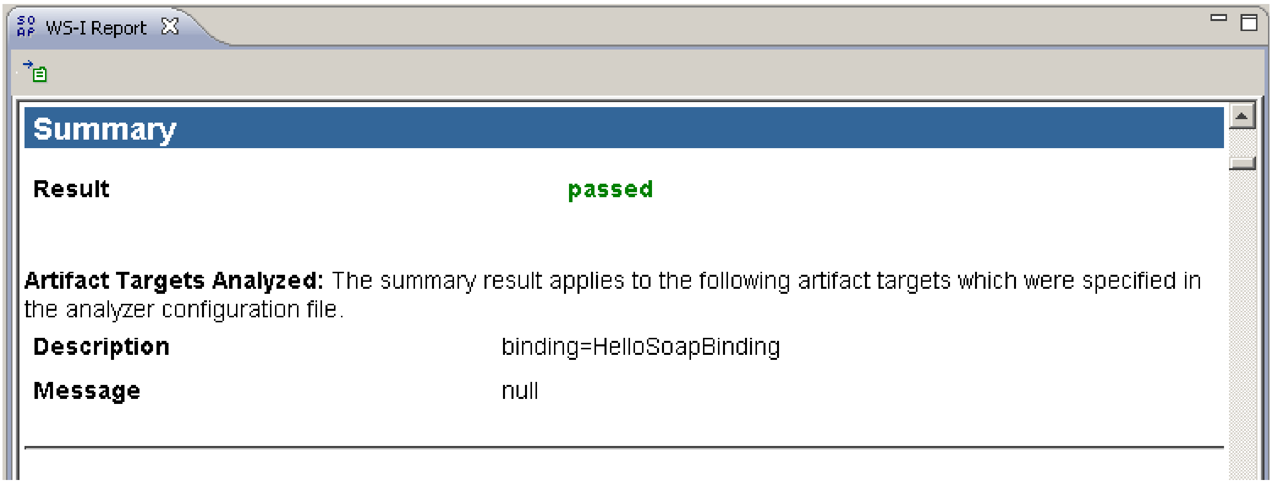
Moving further down the report you will find the 'Summary' section (Figure 19). This section includes the all-important 'Result', which in this case is 'passed'. You can also see that the binding is named but that no message was tested.

The soapUI tool allows various web service elements to be tested against the WS-I basic profile, not just bindings. The tools is designed to test:

- a web services description (WSDL document)
- the web service's messages (SOAP request and response)
- the web service's UDDI entries.

Here we are simply testing the `<binding>` element of the web service's WSDL. This is a major component in the overall testing required for basic profile conformance.

If you want to apply the tool more generally then you should download the soapUI tool and also read the user guide, which is available in the 'wsi-test-tools/common/docs' directory inside the Eclipse installation.


WS-I Report

Summary

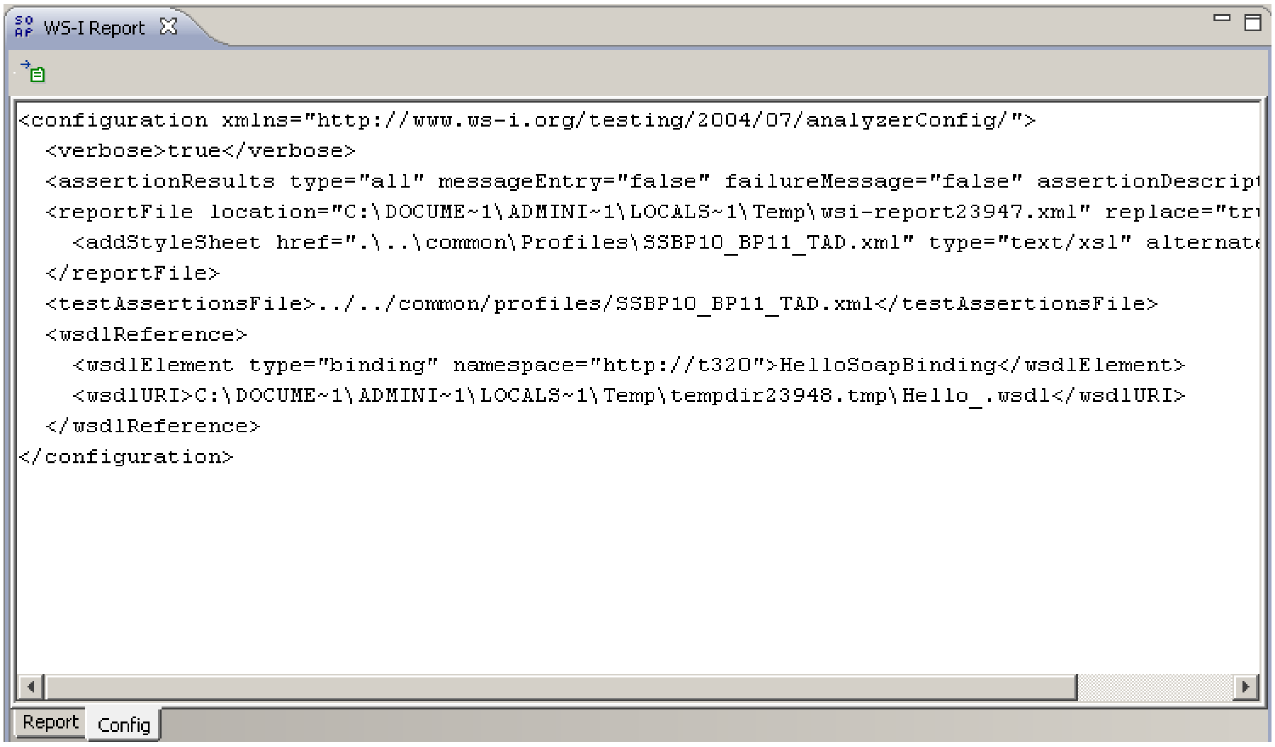
Result	**passed**

Artifact Targets Analyzed: The summary result applies to the following artifact targets which were specified in the analyzer configuration file.

Description	binding=HelloSoapBinding
Message	null

Figure 19 'Summary' section of WS-I conformance report

The test tool is very configurable and uses an XML configuration file (which you can view by clicking on the 'Config' tab in the WS-I Report window, as shown in Figure 20). Here I shall not explore soapUI very far, but if you are interested in the tool's facilities beyond WS-I conformance testing then you should read the documentation and experiment with the 'Hello' web service.

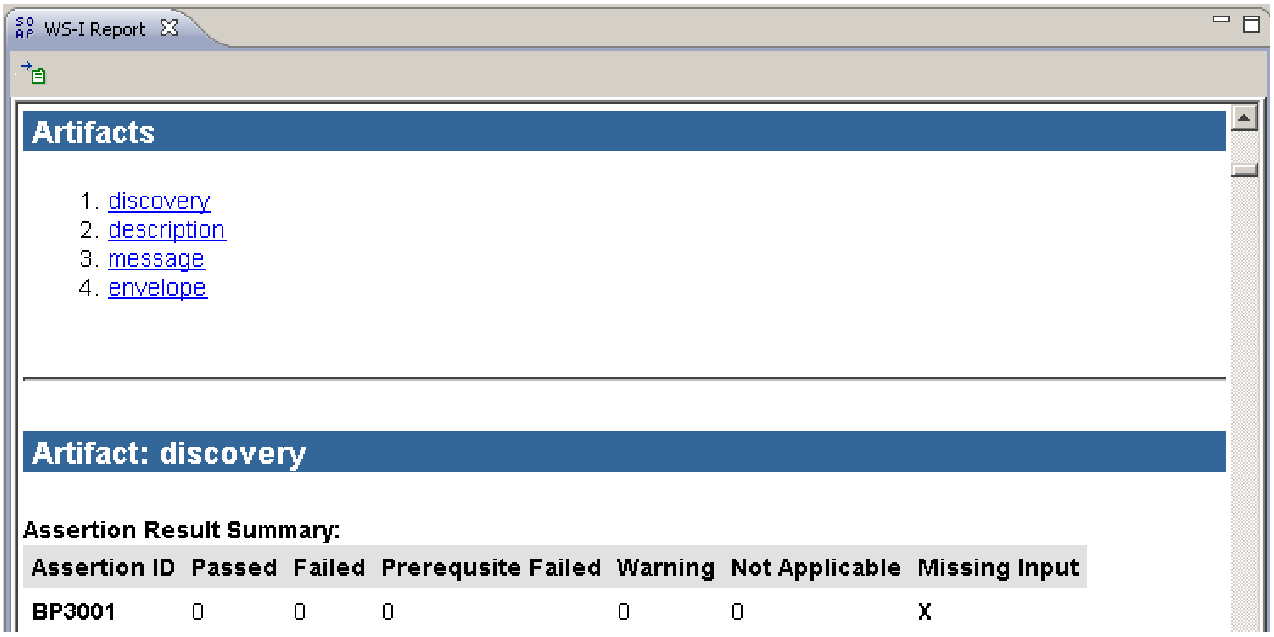

WS-I Report

```
<configuration xmlns="http://www.ws-i.org/testing/2004/07/analyzerConfig/">
  <verbose>true</verbose>
  <assertionResults type="all" messageEntry="false" failureMessage="false" assertionDescrip
  <reportFile location="C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\wsi-report23947.xml" replace="tr
    <addStyleSheet href=".\..\common\Profiles\SSBP10_BP11_TAD.xml" type="text/xsl" alternat
  </reportFile>
  <testAssertionsFile>../../common/profiles/SSBP10_BP11_TAD.xml</testAssertionsFile>
  <wsdlReference>
    <wsdlElement type="binding" namespace="http://t320">HelloSoapBinding</wsdlElement>
    <wsdlURI>C:\DOCUME~1\ADMINI~1\LOCALS~1\Temp\tempdir23948.tmp\Hello_.wsdl</wsdlURI>
  </wsdlReference>
</configuration>
```

Figure 20 XML soapUI configuration file

If you click back on the 'Report' tab and scroll further down the report, you will find an 'Artifacts' section that has four subsections: 'discovery', 'description', 'message' and 'envelope' (Figure 21). Each of these sections lists tests related to the artefact type. So, 'discovery' lists tests on UDDI descriptions, 'description' lists tests on WSDL, and 'message' and 'envelope' are related to SOAP encoding aspects.

If you scroll further you can see individual tests and their results being listed. The tests listed in Figure 22 (BP2010 to BP2020) have been either passed or found not to be applicable.



Artifacts

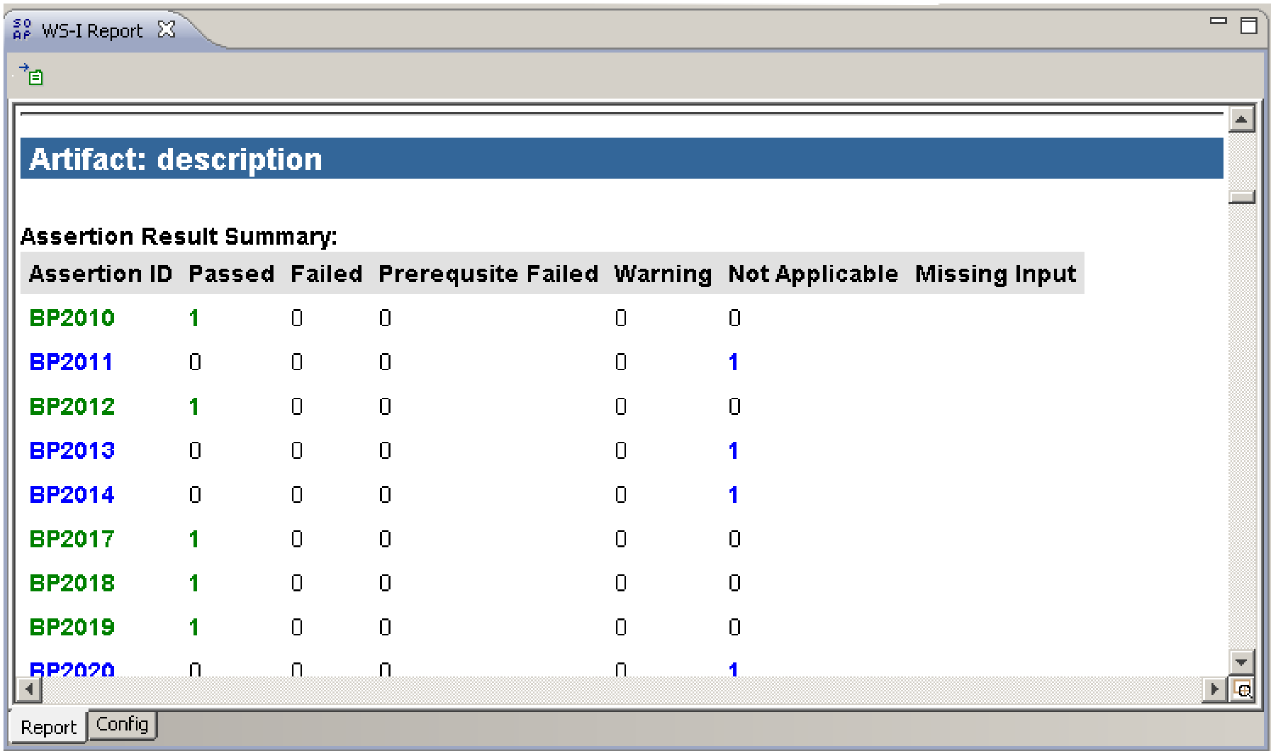
1. discovery
2. description
3. message
4. envelope

Artifact: discovery

Assertion Result Summary:

Assertion ID	Passed	Failed	Prerequsite Failed	Warning	Not Applicable	Missing Input
BP3001	0	0	0	0	0	X

Figure 21 WS-I report 'Artifacts' section headings



Artifact: description

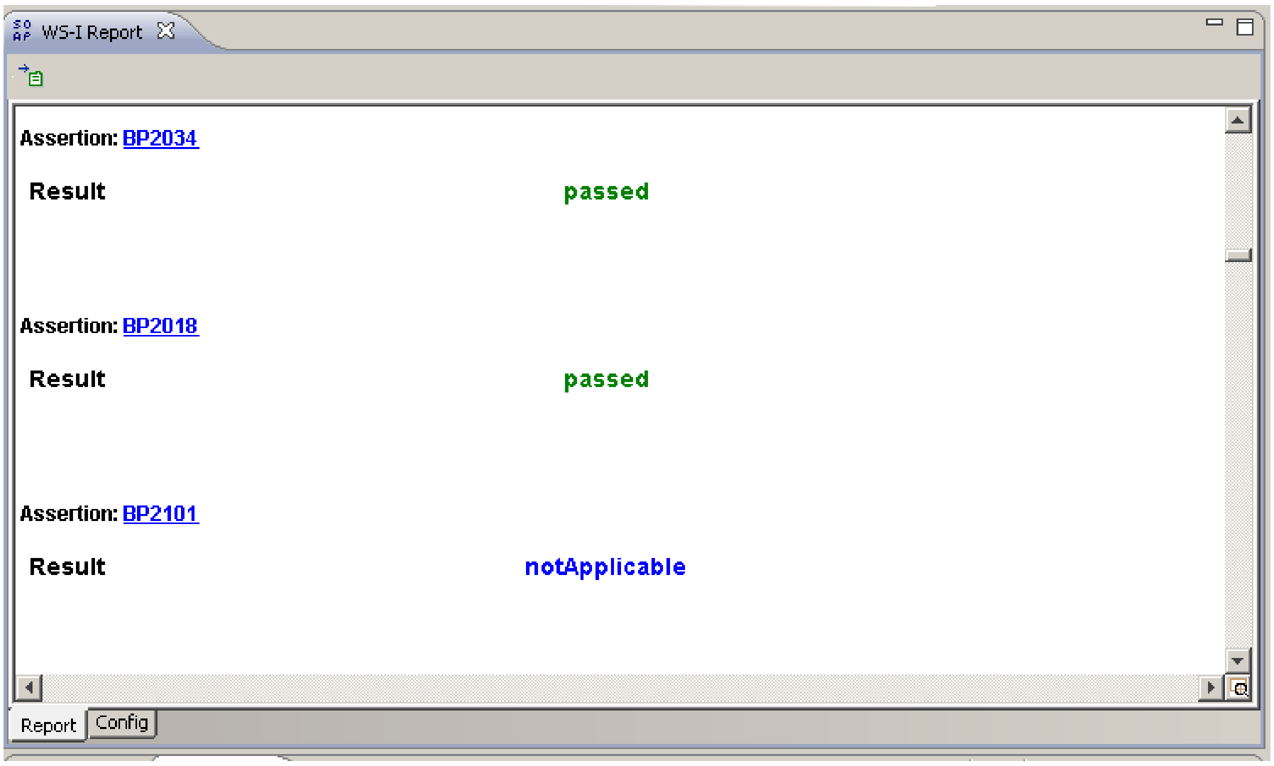
Assertion Result Summary:

Assertion ID	Passed	Failed	Prerequsite Failed	Warning	Not Applicable	Missing Input
BP2010	1	0	0	0	0	
BP2011	0	0	0	0	1	
BP2012	1	0	0	0	0	
BP2013	0	0	0	0	1	
BP2014	0	0	0	0	1	
BP2017	1	0	0	0	0	
BP2018	1	0	0	0	0	
BP2019	1	0	0	0	0	
BP2020	0	0	0	0	1	

Figure 22 Sample WSDL test results

Test results in the report are listed in a range of formats. In Figure 22 a summary is given, whereas in Figure 23 a few individual tests are listed.

If you want to know exactly what a test relates to, you can look up the test number (for example, 'BP2010' in the WS-I basic profile document). Go to http://www.ws-i.org/Profiles/BasicProfile-2_0(WGD).html and search for the BPXXXX that you are interested in.



Assertion: BP2034

Result passed

Assertion: BP2018

Result passed

Assertion: BP2101

Result notApplicable

Figure 23 Individual tests listed in WS-I report

The BP2010 test is a test on the WSDL, which is described as shown in Table 1. The test ensures that operation names are unique.

Table 1 Description of BP2010 test

Test Assertion:	**BP2010**
Description:	name attributes of Operations are unique in the wsdl:portType definition
Prerequisite:	BP2703
Context:	//wsdl:definitions/wsdl:portType
Match:	not(wsdl:operation/@name = preceding::wsdl:portType/wsdl:operation/@name) and not(wsdl:operation/@name = following::wsdl:portType/wsdl:operation/@name)
Error Message:	name attributes are not unique within the portType definition.
Diagnostic:	list of duplicate name(s) and of elements that use them.

Source: http://www.ws-i.org/Profiles/BasicProfile-2_0(WGD).html#BP2010

Saving the WS-I report

Saving the report is very simple. At the top of the window that shows the report you might have noticed the small icon shown in Figure 24 (see Figure 16 for the position of this), consisting of a tiny arrow and what looks like a page of text.

Figure 24 Save WS-I report icon

If you click on this icon, you will be taken to a Save Report dialogue box where you can specify the path and file name for the HTML report file. You can then open the file using a browser to review the report at any time.