

## Create and deploy the Stock Quote Web service from a Java bean using the WebSphere run-time environment

This StockQuote Web services tutorial will guide you through several of the tools for creating, testing, publishing, and discovering Web services. In this tutorial, you will create, test, and publish a Web service. You will then discover the Web service through UDDI.



2 hours



[Start the tutorial](#)



[See the related sample](#)

# Introduction

## Time required

To complete this tutorial, you will need approximately **1 hour and 30 minutes**. If you decide to explore other facets of Web services while working on the tutorial, it could take longer to finish.

## Prerequisites

In order to complete this tutorial end to end, you should be familiar with:

- Basic Web service concepts and technologies, such as WSDL, WS-I, UDDI, and SOAP

## Learning objectives

This tutorial is divided into several exercises that must be completed in sequence for the tutorial to work properly. While completeing the exercises, you will:

- Set the WS-I compliance level.
- Create a Web project called WebProject.
- Import the StockQuoteService bean named StockQuoteService.java.
- Create Web service and its WSDL document.
- Test the getQuote method using the Web Services Explorer.
- Publish and discover your Web service using the IBM UDDI Test Registry.

When you are ready, begin [Exercise 1.1: Importing the required resources and setting up the workspace](#)

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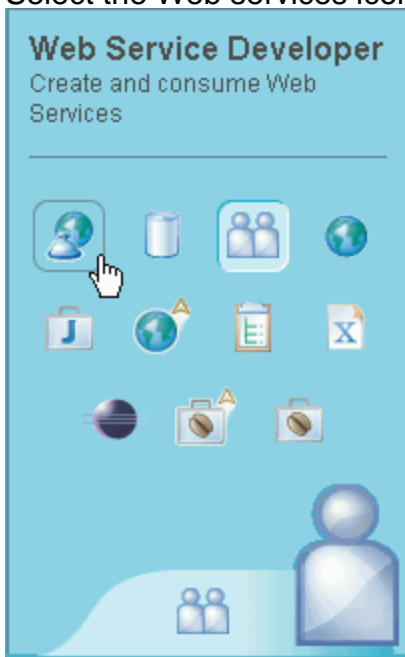
## Exercise 1.1: Importing the required resources and setting up the workspace

Although most of the steps in this tutorial can be preformed in a variety of perspectives, the J2EE perspective is the default perspective for Web service development and thus all images and steps in this tutorial are based on the assumption that you are using the J2EE perspective. You can switch perspectives in the Window menu.

### Enabling Web service capabilities

To enable the capabilities required for Web services development:

1. On the Welcome page, check to see if Web services are enabled by looking for the Web services icon in the lower right-hand corner: . If the Welcome page has been closed, you can reopen it from the Help menu.
2. If Web services are not enabled, select the icon in the lower right corner that looks like a person. This will generate a list of capabilities that you can select from.
3. Select the Web services icon in the top left corner:



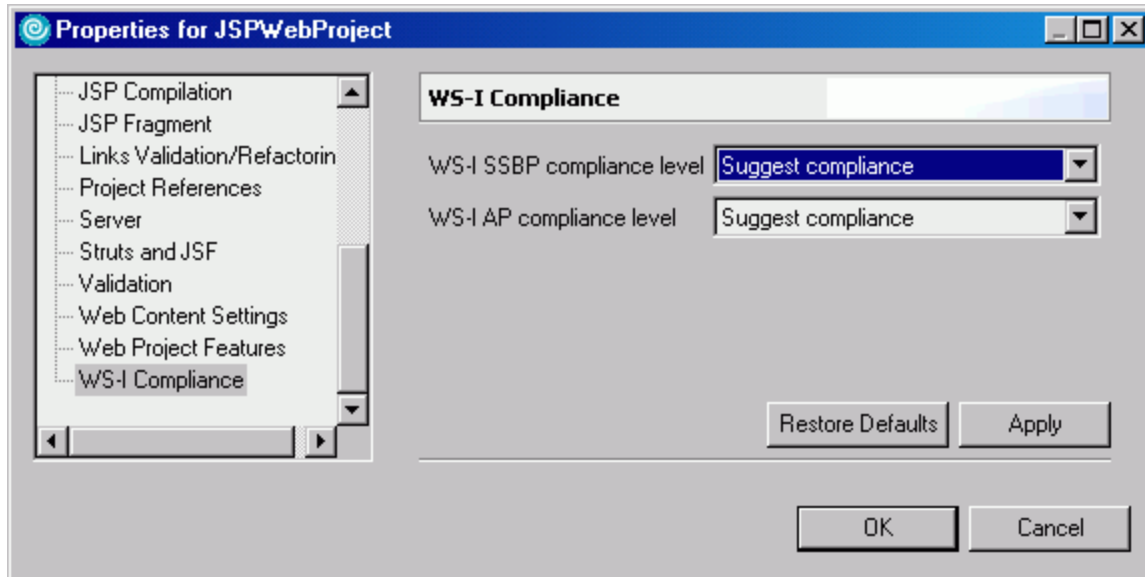
The tools used in Web services development are now enabled.

### Setting the WS-I compliance level

By default, the level of WS-I compliance is set to **Suggest**, which means that any non-compliant choices that are selected will generate a warning dialog box, but you will be able to continue. This sample will generate a compliant Web service, so you should set the level of WS-I compliance for both the Simple SOAP Binding Profile and Attachements Profile to **Suggest**. This will generate a warning if a non-compliant suggestion is made, while allowing you to continue.

To change the level of WS-I compliance:

1. From the **Window** menu select **Preferences**.
2. Expand **Web Services** and select **WS-I Compliance**.
3. Select **Suggest compliance** for both drop-down lists.

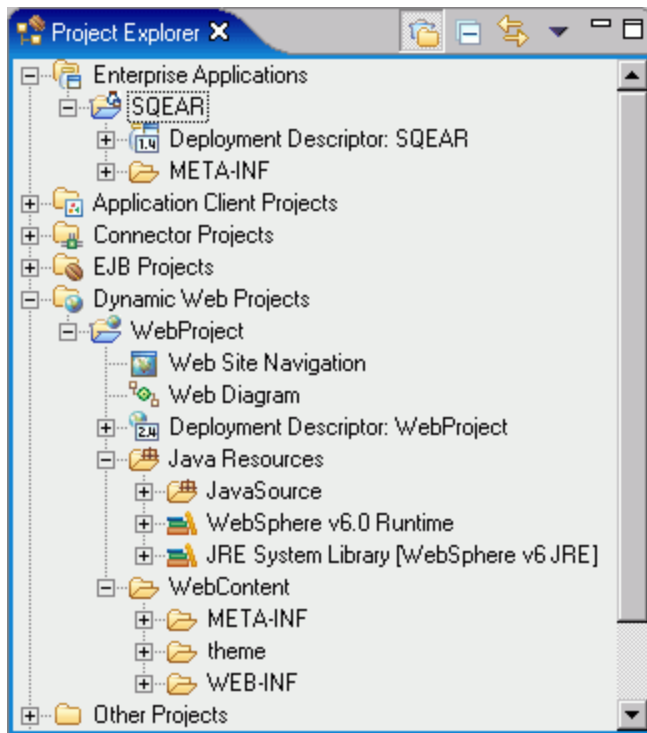


## Creating the Web project

In Rational Developer products, Web services must be contained in a Web project. For this tutorial, all the resources required by the Web service, such as your Java bean and Web settings, will be kept in this project.

To create a Web project:

1. On the main menu bar, click **File > New > Other > Web > Dynamic Web Project**. Click **Next**.
2. Type `WebProject` in the **Project name** text field. Select **Show advanced**. Set the **EAR Project** field to `SQEAR`. Click **Finish**.
3. When prompted to switch to the Web perspective click **No**.
4. You have now created your Web project and it should look something like this in the J2EE perspective:



## Adding the project to the server

You need to associate the project with the server that your Web service will run on. To do this:

1. Right-click the server in the Servers view and select **Add and Remove projects**. If the Servers view is not open in your workspace, open it from the **Window** menu by selecting **Show View > Servers**.
2. In the window that opens, select your dynamic Web project and its associated EAR file, and click **Add**.
3. Click **Finish**.

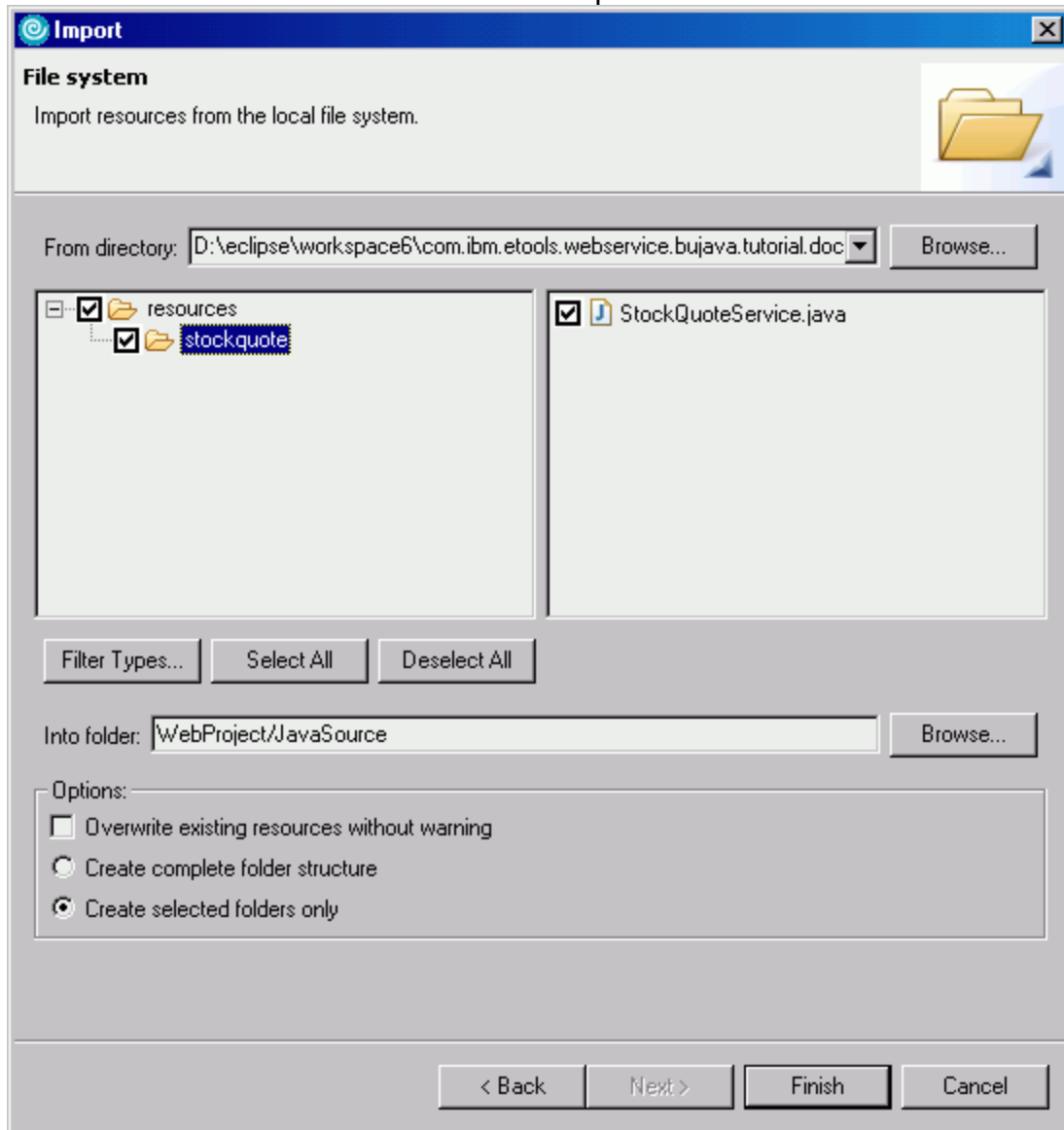
## Importing the bean

The StockQuoteService bean has been provided for you. The bean that you will use in this tutorial returns the last trading price from the Internet Web site <http://finance.yahoo.com> given a stock symbol.

Before you can work with the bean, you must import it from the file system into the workbench:

1. Switch to the Resource perspective (**Window > Open Perspective > Other > Resource**).
2. In the Navigator view of the Resource perspective, under the Web project that you just created, select the **JavaSource** folder.
3. Click **File > Import** to open the Import wizard.
4. Click **File system** to import the resources from the local file system. Click **Next**.

5. To enter the directory in the Directory text field, click **Browse** to locate and select the following folder:  
`com.ibm.etools.webservice.bujava.tutorial.doc\resources` and click **OK**. This folder is located in the Rational Developer product's install directory, within the folder `rwd\eclipse\plugins`.
6. Select the **resources** check box in the left pane:



7. Click **Finish** to import the file and close the wizard.

Once the bean is imported, you can create the Web service.

If you are successful in importing the bean, the Task view will not contain any errors and the Java Source folder will contain the bean `StockQuoteService.java`, and the `WEB-INF/classes` folder will contain the compiled bean `StockQuoteService.class`. If you accidentally import the incorrect folder, double-click the `StockQuoteService.java` file and ensure that the package name listed matches the package name in your workspace. If they do not match you can either delete the imported package and

reimport the correct folder, or you can manually create a package with the correct name and move the Java file into it.

Now you are ready to begin [Exercise 1.2: Creating the Web service](#).

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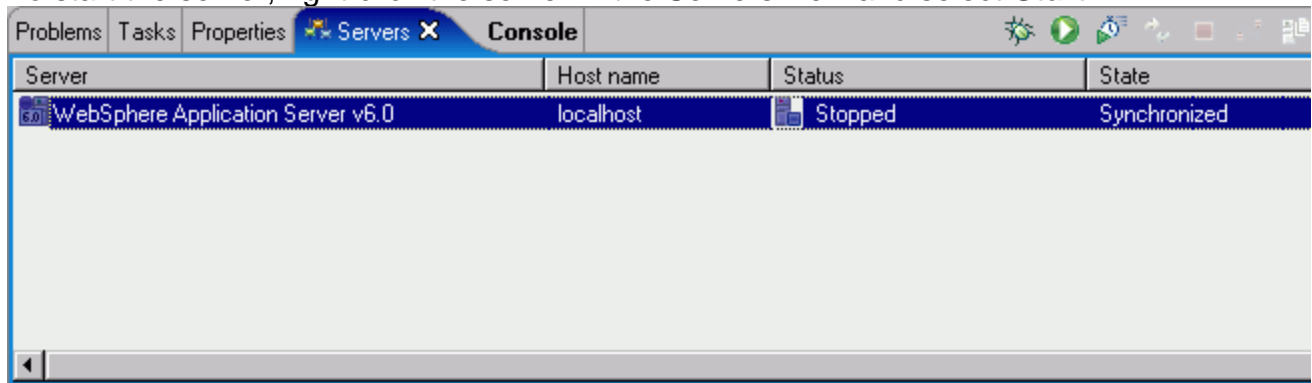
## Exercise 1.2: Creating the Web service

Before you begin, you must complete [Exercise 1.1: Importing the required resources and setting up the workspace](#).

### Starting the server

Before you attempt to create a Web service it is always suggested that you start the WebSphere Application Server on which the Web service will run. Although you can start the server in the Web service wizards, since it may take several minutes to start depending on the speed of your machine, starting the server before you begin will both increase the speed with which you complete the wizard and reduce the chance that the wizard will generate an error because the server is taking too long to start.

To start the server, right-click the server in the Servers view and select **Start**:



If the Servers view is not open in your workspace, open it from the **Window** menu by selecting **Show View > Servers**.

### Create a Web service from a bean

The Web Service wizard assists you in creating a new Web service, configuring it for deployment, and deploying the Web service to a server. Once your Web service is deployed, the wizard assists you in generating the client proxy and sample application to test the Web service.

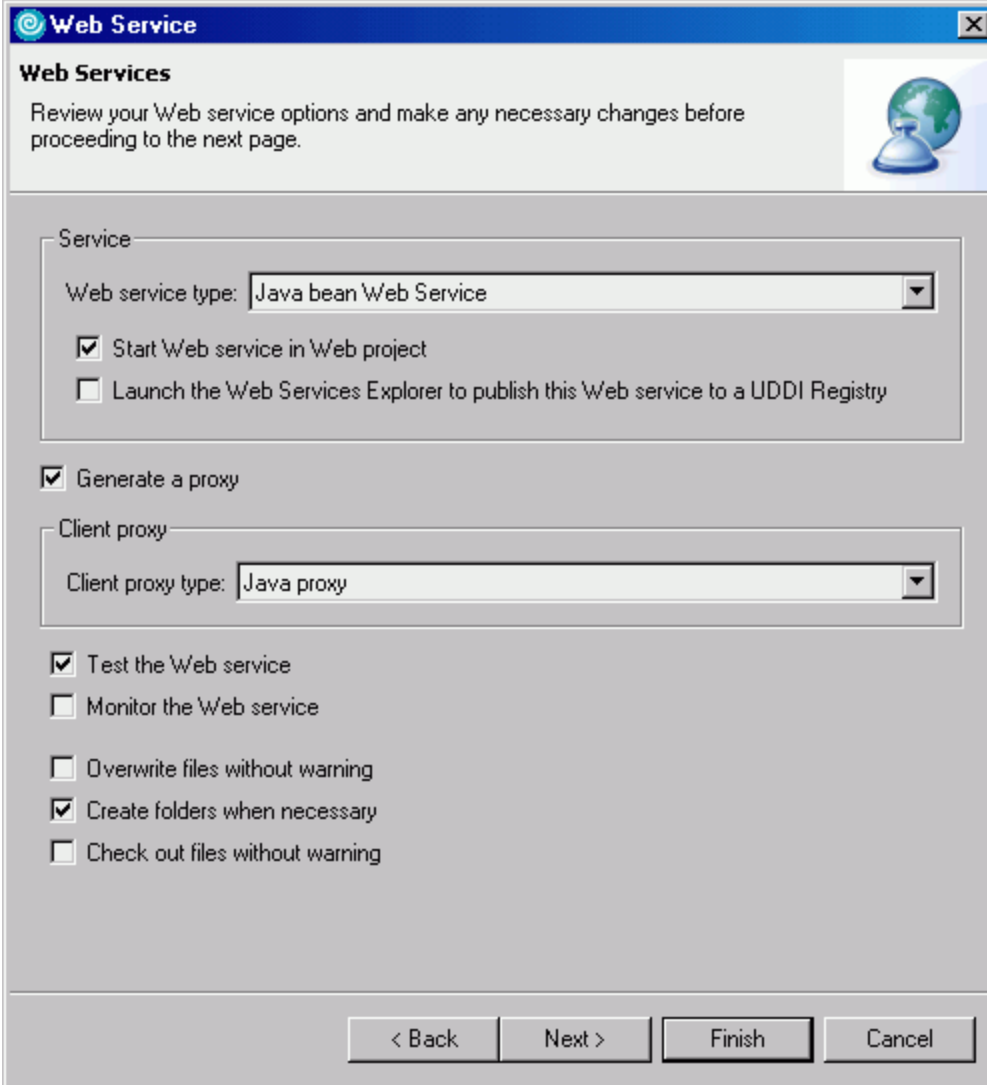
1. In the Project Explorer view, select the bean that you imported into the **Java Source** folder of your Web project.
2. Click **File > New > Other**. Select **Web Services** in order to display the various Web service wizards. Select the **Web Service** wizard. Click **Next**.
3. In the Web Services panel, select **Java bean Web service** as your Web service type. You can optionally choose to do the following:
  - Start the Web service in a Web project - if you do not select this option you will have to manually start the Web service. You must select this option to enable the other options on this page.
  - Launch the Web Services Explorer to publish your Web service to a UDDI registry.
  - Generate a Java bean client proxy to the Web service. The Java bean



client proxy that is generated provides a remote procedure call interface to the Web service.

- Test the Web service - this allows you to test the Web service using the test facility of your choice.
- Send the Web service traffic through the TCP/IP Monitor, which allows you to watch the SOAP traffic generated by the Web service and to test this traffic for WS-I compliance.

The following settings should be selected for this example:

The image shows a 'Web Service' wizard window. The title bar says 'Web Service'. Inside, the 'Web Services' section has a sub-header 'Review your Web service options and make any necessary changes before proceeding to the next page.' and a globe icon. Below this, the 'Service' section has a dropdown for 'Web service type' set to 'Java bean Web Service'. It includes two checkboxes: 'Start Web service in Web project' (checked) and 'Launch the Web Services Explorer to publish this Web service to a UDDI Registry' (unchecked). The 'Generate a proxy' checkbox is checked. The 'Client proxy' section has a dropdown for 'Client proxy type' set to 'Java proxy'. At the bottom, there are five checkboxes: 'Test the Web service' (checked), 'Monitor the Web service' (unchecked), 'Overwrite files without warning' (unchecked), 'Create folders when necessary' (checked), and 'Check out files without warning' (unchecked). The bottom of the window has four buttons: '< Back', 'Next >', 'Finish', and 'Cancel'.

Click **Next**.

4. The Object selection page should have listed the Java bean from which the Web service will be created. If not, you can browse to this bean. Click **Next**.
5. Accept the default deployment settings. The IBM WebSphere run-time environment is the default run-time environment and the WebSphere v6 server is the default server. Click **Next**.
6. The Service Endpoint Interface selection page allows you to select to use an existing service endpoint interface (SEI) rather than letting the wizard generate one. Since there is no pre-existing interface for this service, allow the wizard to create one for you. Click **Next**.
7. The Java Bean Identity page shows the Web service URI, and allows you to

select the methods to expose, encoding styles, and security options. This sample uses the default selections. Click **Next**.

8. The Web service test page allows you to select the test facility for the generated Web service. This will open the Web service in the Web Services Explorer once the wizards completes. Click **Next**.
9. Ensure **Generate a proxy** is selected. Click **Next**.
10. Ensure **Test the generated proxy** and **Run test on server** are selected. Click **Next**.
11. When asked where you would like to publish your Web service, select to launch the Web Services Explorer to publish to a UDDI Registry, and click **Finish**.

The sample application is launched in a Web browser at the following URL :

`http://localhost:`

`port/WebProjectClient/sample/StockQuoteServiceProxy/TestClient.jsp`

You can use this sample application to test the Web service by selecting a method, entering a value for the method, and clicking **Invoke**. The result of the method will display in the results pane.

The Web Services Explorer is launched allowing you to publish your Web service to the IBM UDDI Test Registry. Follow the instructions in *Publishing the Web service* to complete this task.

Now you are ready to begin [Exercise 1.3: Publishing the Web service](#).

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## Creating the Web service

Before you begin, you must complete [Exercise 1.1: Set up the workspace and create the required projects](#).

### Register with the IBM UDDI Registry.

Before you publish your Web service to the [IBM UDDI Registry](#) you must get an IBM ID and password.

**Important:** To register with the registry, follow the instructions provided by the IBM UDDI Registry. In order to activate your account, you must initially log in to the registry from [www.ibm.com/services/uddi](http://www.ibm.com/services/uddi)

### Publish the Business Entity to UDDI

The Web Services Explorer enables you to publish and maintain your business entity, business services, and service interfaces. For more information on UDDI data structure types, refer to the Web service development section of the online help.

If it is necessary to manually launch the IBM Web Services Explorer, click the **Launch Web Services Explorer** icon on the main toolbar, or right-click the WSDL file and select **Web Services > Publish WSDL file**.

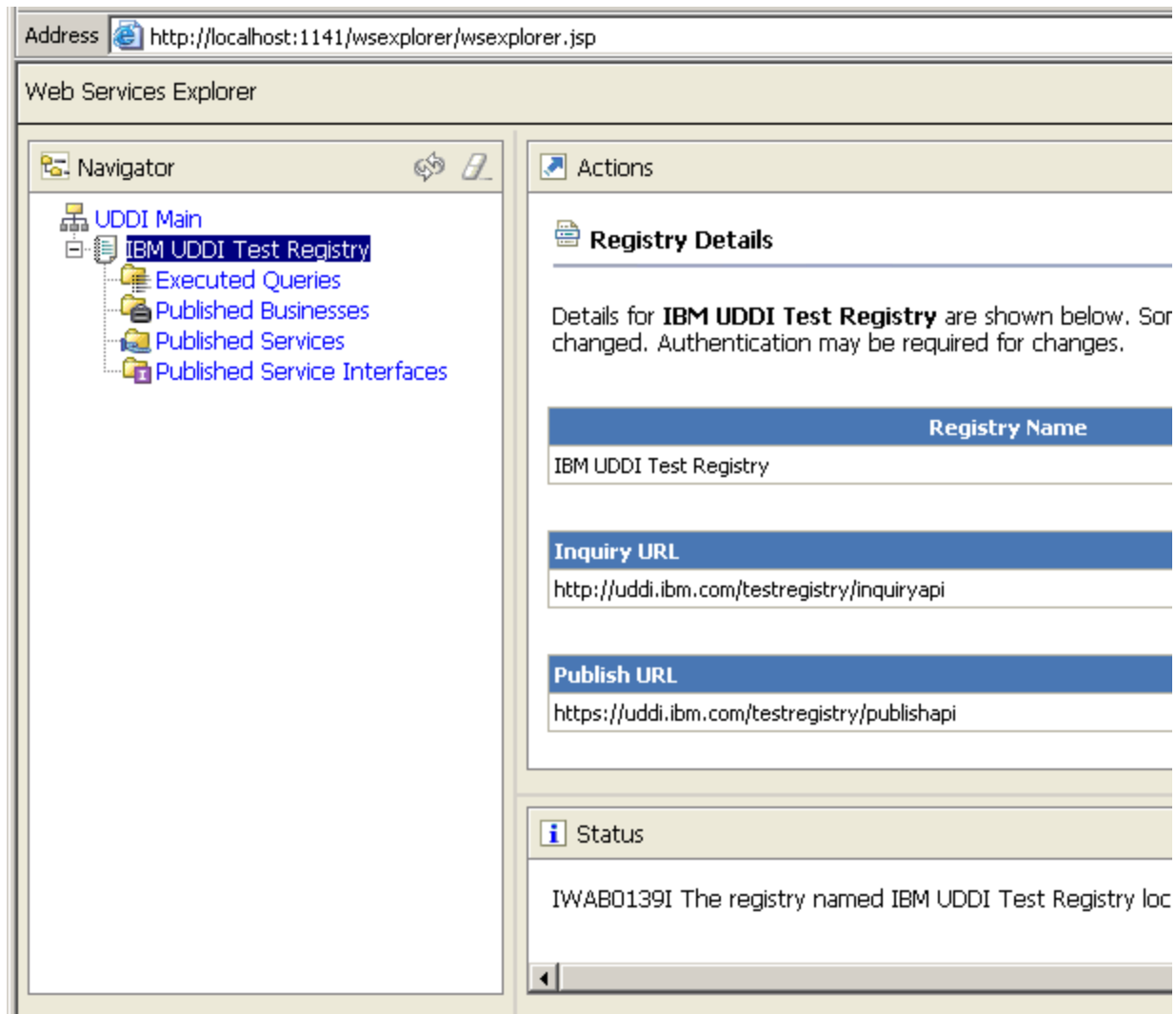
The business entity contains information about the business, for example contact information and URLs.

**Important:** The IBM UDDI Registry allows for only one business entity to be published per user ID. If you previously published a business entity to the IBM UDDI Registry, you can either remove the existing business entity, or publish the StockQuoteService using your existing business entity. For information on removing a business entity, refer to the Web services tools in the online help.

- To remove the existing business entity, refer to Removing a business entity, Web service, or service interface from a registry in the online help. Once you have unpublished your business entity, follow the steps in "Publishing the business entity" and "Publishing the StockQuoteService Web service".

To publish your business entity:

1. From the toolbar open the UDDI page of the Web Services Explorer.
2. In the Navigator pane, select the **UDDI Main** node.
3. In the Actions pane, IBM UDDI Test Registry will appear in the Registry Name field. Click **Go**. The IBM Web Services Explorer will look similar to this:



4. In the toolbar of the Actions pane, click the **Publish** icon.
5. From the Publish list, select **Business**.
6. Select the **Simple** radio button.
7. In the Publish URL field, keep the default URL. Enter your user ID, password, business name, and a description of your business entity in the respective fields.
8. Click **Go**.

The IBM Web Services Explorer is automatically updated with your published business entity.

## Discovering the business entity

To discover your business entity using the IBM Web Services Explorer:

1. In the Navigator pane, select the **IBM UDDI Test Registry** node.
2. In the toolbar of the Actions pane, click the **Find** icon.
3. From the Search For list, select **Business**
4. Select the **Simple** radio button.
5. In the Name field of the Actions pane, enter the name of your business entity

then click **Go**.

### **Publish a Web service to UDDI**

1. In the Navigator pane, select your business entity under the Published Businesses folder.
2. In the toolbar of the Actions pane click the **Publish Service** icon.
3. Select the **Simple** radio button.
4. To enter the WSDL URL, click **Browse** to select the WSDL URL for your Web project. In the WSDL Browser, select **http://localhost:9080/WebProject/wsdl/StockQuoteService.wsdl**, then click **Go**.
5. In the Name field of the Actions pane type `StockQuote service`.
6. In the Description field of the Actions pane type `StockQuote service`.
7. When you have finished entering the service information click **Go**.

The IBM Web Services Explorer is automatically updated with your published Web service. If your update is successful, the Status pane displays

```
Service interface http://  
DefaultNamespace was successfully published.  
Service StockQuote service was successfully published.
```

**Important:** The IBM UDDI Test Registry should only be used for initial prototyping and testing. Data stored in these sites can be lost at any time.

When you have finished publishing your Web service, exit the IBM Web Services Explorer.

### **Discovering the StockQuote Web service**

This part of the tutorial shows how another developer in another company could use Rational Developer to discover the Web service that you just registered. You will begin by creating a Web project into which you will import the discovered WSDL document. You will now play the role of a business discovering a StockQuote Web service.

You can discover a Web service by searching for a business entity, business service, or service interface. In this sample you will query the registry with the name of business entity that you created when you were playing the role of a developer publishing a Web service. To discover a Web service using the IBM Web Services Explorer:

1. Click the **Launch Web Services Explorer** icon on the main toolbar.
2. In the Web Services Explorer toolbar, select the **Favorites** icon.
3. Expand **Favorite UDDI Registries** and select **IBM UDDI Test Registry**.
4. In the Actions toolbar, click the **Add to UDDI Page** icon.
5. In the Actions toolbar, click the **Find** icon.
6. In the Actions pane, type `StockQuoteQuery` as the query name.

7. Select the **Simple** radio button.
8. In the Name text field, type the name of the business that published the StockQuote service. Click **Go**. You have now discovered the business.
9. To discover the service, click **Get Services**. This should result in your Web service being listed.

Once you have discovered a Web service you can import the WSDL document to your Web project and launch the Web Service Client wizard to test the Web service, or test the WSDL file using the Web Services Explorer..

Finish your tutorial by reviewing the materials in the [Summary](#).

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## Summary

You have just completed development, publishing, and discovery of a Web service. In this tutorial, you played the role of a developer in a business using a wizard to deploy a Web service and to publish its resulting WSDL to a UDDI registry. You played the role of a business discovering a StockQuote Web service on the IBM UDDI Registry. The bean that you used in this tutorial returns the last trading price from the Internet Web site <http://finance.yahoo.com> for a given stock symbol.

Once you have completed the Java bean Web services tutorial and no longer require the Web project for testing, right-click **WebProject** and select **Delete** to remove the StockQuote tutorial from your workspace. Remove the **WebProjectClient** project by following the same process.

For more information about Web services, WSDL, SOAP, and the WebSphere run-time environment, consult the online help ( **Help > Help Contents**). For more in-depth technical articles on Web services, consult [www.ibm.com/developerworks/webservices](http://www.ibm.com/developerworks/webservices)

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