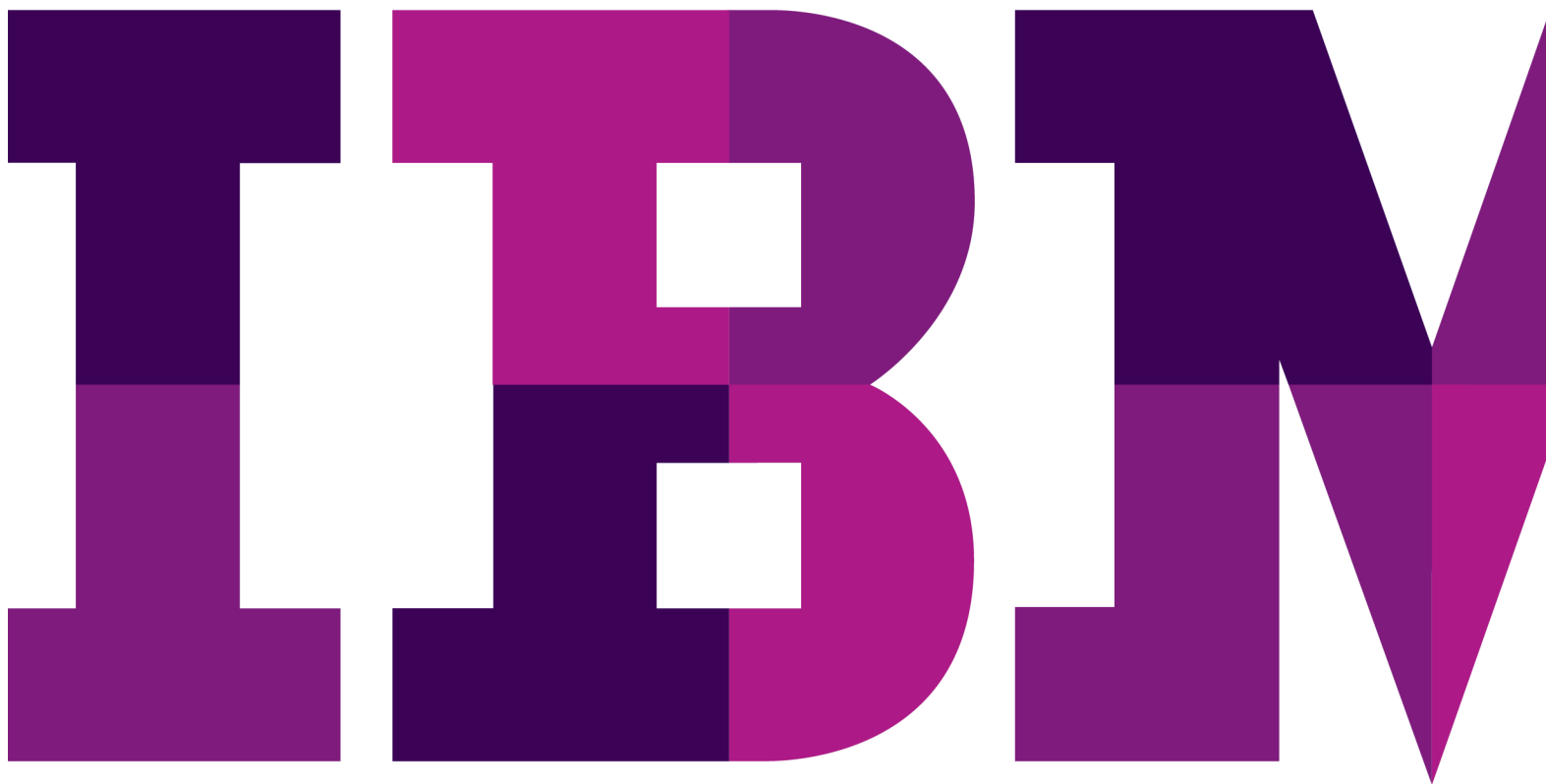


JDBC Lab on Liberty



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JDBC and Liberty

Deploying a data access application includes more than installing your web application archive (WAR) or enterprise archive (EAR) file onto a Liberty. Deployment can include tasks for configuring the data access resources of the server and overall runtime environment.

In this lab exercise, you will learn:

- ___a. Configure Derby Database on Liberty
- ___b. Create a sample JDBC servlet
- ___c. Run the sample JDBC Servlet

To run this lab, your workstation must meet the following requirements:

- Approximately 8GB of storage available for the Windows 7 virtual image
- Approximately 3 GB of memory free to run the developer workbench and the server
- Connectivity to the internet is NOT required
- Please refer to the following table for file and resource location references on different operating systems.

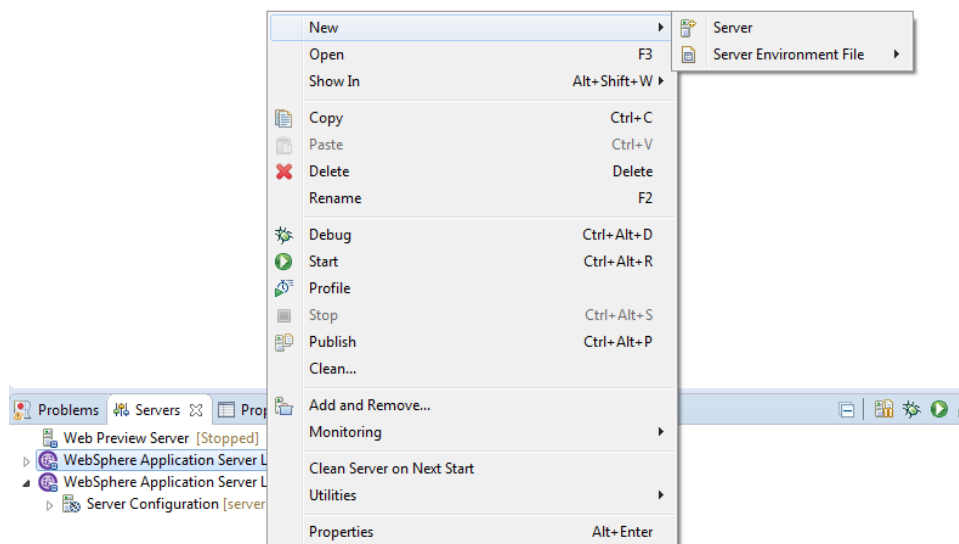
Location Ref.	OS	Absolute Path
{LAB_HOME}	Windows	C:\WLP_<version>
	Linux	~/ WLP_<version>
	Mac OSX	

As prerequisites, you should:

- ___a. Complete Setup lab to set up the lab environment, and learn how to create a server using WebSphere Developer Tools.
- ___b. Install Derby Database
 - ___i. **For Windows:**
extract {LAB_HOME}\derby\ db-derby-10.14.1.0-lib.zip to {LAB_HOME}\db-derby-10.14.1.0-lib directory.
 - ___ii. **For Linux or Mac :**
extract {LAB_HOME}/derby/ db-derby-10.14.1.0-lib.tar.gz to {LAB_HOME}/was855/ db-derby-10.14.1.0-lib directory

1.1 Create and Configure Liberty Server for JDBC

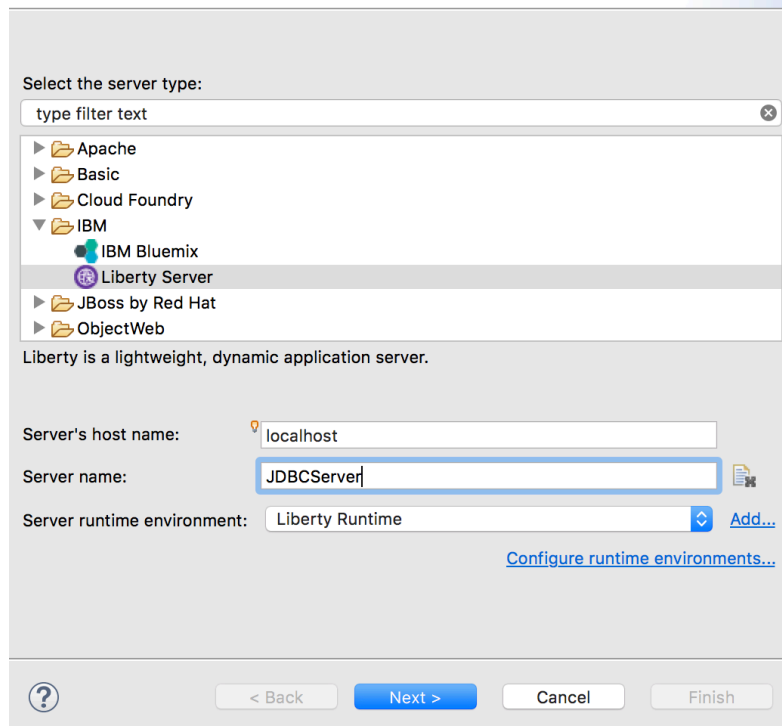
- ___1. Start **Eclipse** from {LAB_HOME}/wdt/eclipse directory
- ___2. Create a new Liberty application server called **JDBCServer**.
 - ___a. Right Click on the **Servers** tab and Select **New → Server**



__c. Select **Liberty Server**. Click **Next**

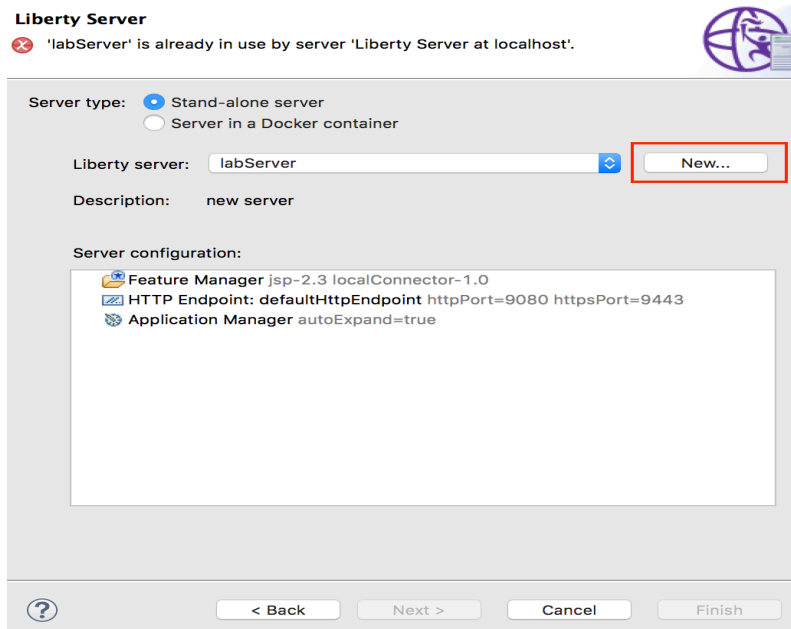
Define a New Server

Choose the type of server to create



The 'Define a New Server' dialog box is shown. It has a title bar with a question mark icon. Below the title bar, there is a subtitle 'Choose the type of server to create' and a small server icon. The main area is titled 'Select the server type:' and contains a search bar with the text 'type filter text'. Below the search bar is a tree view of server types: Apache, Basic, Cloud Foundry, IBM (expanded), IBM Bluemix, Liberty Server (selected), JBoss by Red Hat, and ObjectWeb. Below the tree view, there is a description: 'Liberty is a lightweight, dynamic application server.' Below this, there are three input fields: 'Server's host name:' with the value 'localhost', 'Server name:' with the value 'JDBCServer', and 'Server runtime environment:' with the value 'Liberty Runtime'. There is an 'Add...' button next to the runtime environment field and a link 'Configure runtime environments...'. At the bottom, there are four buttons: '< Back', 'Next >', 'Cancel', and 'Finish'.

__d. Click **New** in the New Server window to create a new Liberty Server



The 'Liberty Server' configuration dialog box is shown. It has a title bar with a question mark icon. Below the title bar, there is a subtitle 'Liberty Server' and a red error message: 'labServer' is already in use by server 'Liberty Server at localhost'. Below the error message, there are two radio buttons: 'Stand-alone server' (selected) and 'Server in a Docker container'. Below the radio buttons, there is a 'Liberty server:' dropdown menu with the value 'labServer' and a 'New...' button (highlighted with a red box). Below the dropdown menu, there is a 'Description:' field with the value 'new server'. Below the description field, there is a 'Server configuration:' section with a list of features: 'Feature Manager jsp-2.3 localConnector-1.0', 'HTTP Endpoint: defaultHttpEndpoint httpPort=9080 httpsPort=9443', and 'Application Manager autoExpand=true'. At the bottom, there are four buttons: '?', '< Back', 'Next >', 'Cancel', and 'Finish'.

- __e. Enter the server name as **JDBCServer** and Click **Finish**

New Liberty Server
Specify the name of the new server.

User directory: Liberty Runtime

Server name: JDBCServer

Template: defaultServer

? < Back Next > Cancel Finish

- __f. Click **Finish** in the New Server window after the new Liberty Server has been created, making sure **JDBCServer** shows in the combo box

Liberty Server
Select an existing server or create a new one.

Server type: ☒ Stand-alone server
☐ Server in a Docker container

Liberty server: JDBCServer New...

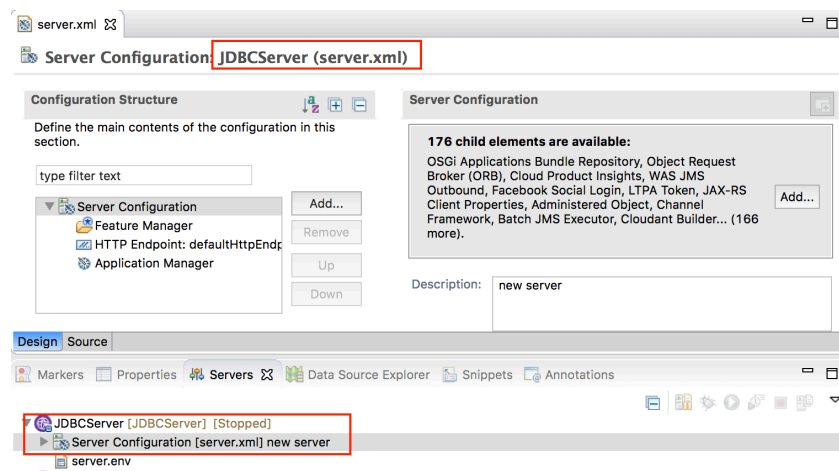
Description: new server

Server configuration:

- Feature Manager jsp-2.3
- HTTP Endpoint: defaultHttpEndpoint httpPort=9080 httpsPort=9443
- Application Manager autoExpand=true

? < Back Next > Cancel Finish

- ___3. Double click **Server Configuration** for the **JDBCServer** to bring up **server.xml**



- ___4. Click on the **Source** tab.

```

1 <?xml version="1.0" encoding="UTF-8"?>
2 <server description="new server">
3
4 <!-- Enable features -->
5 <featureManager>
6   <feature>jsp-2.3</feature>
7 </featureManager>
8
9 <!-- To access this server from a remote client add a host attribute to the follo
10 <httpEndpoint id="defaultHttpEndpoint"
11   httpPort="9080"
12   httpsPort="9443" />
13
14 <!-- Automatically expand WAR files and EAR files -->
15 <applicationManager autoExpand="true"/>
16
17 </server>

```

- ___5. Remove the **jsp-2.3** feature from **server.xml**, and add the following features:

<feature>jdbc-4.0</feature>

<feature>servlet-3.1</feature>

- ___7. Paste the following **DataSource** definition into **server.xml**. If you are using Linux or Mac you need to update directory location for the **fileset** tag to the following value: "{**LAB_HOME**}/db-derby-10.14.1.0-lib/lib"

```
<library id="JDBCSampleDerbyLibs">
    <fileset dir="{LAB_HOME}\db-derby-10.14.1.0-lib\lib" includes="derby.jar"/>
</library>

<jdbcDriver id="DerbyEmbedded" libraryRef="JDBCSampleDerbyLibs"/>

<dataSource id="ds1" jdbcDriverRef="DerbyEmbedded" jndiName="jdbc/exampleDS">
    <properties.derby.embedded createDatabase="create"
        databaseName="{server.config.dir}/data/exampleDB"/>
</dataSource>
```

- ___8. Note that we had used **{server.config.dir}/data/exampleDB** as the location of the database. Once the **server.xml** has been updated you should see it as shown below.



- ___9. **Save** the configuration

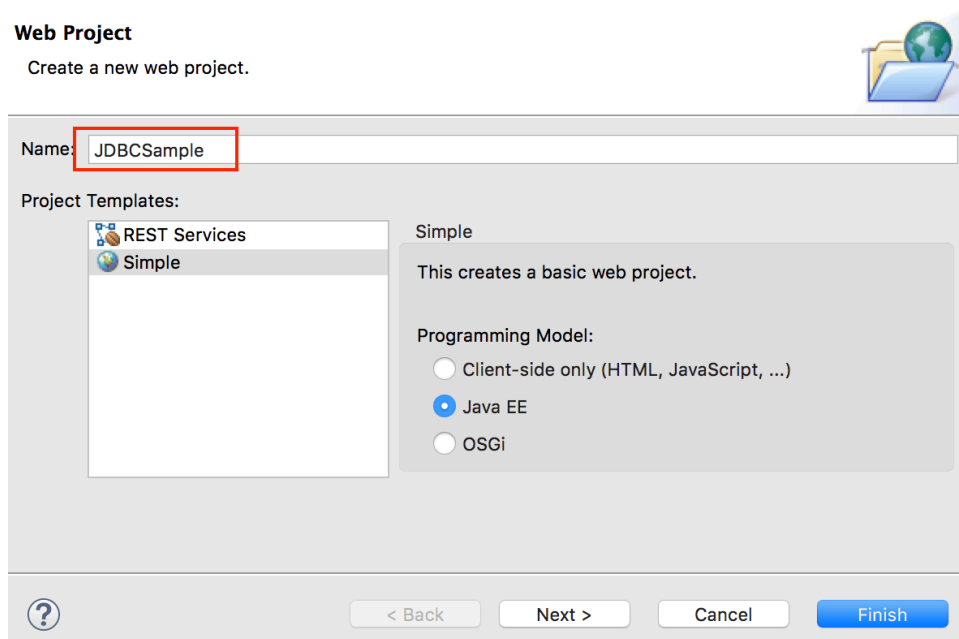
1.2 Create New Web Project

In this section we will create a new web project called **JDBC Sample** to deploy and run the JDBC servlet.

__1. Create a **Web Project** called “**JDBCSample**”

__a. Select **File → New → Web Project**

__b. Enter **JDBCSample** as the name

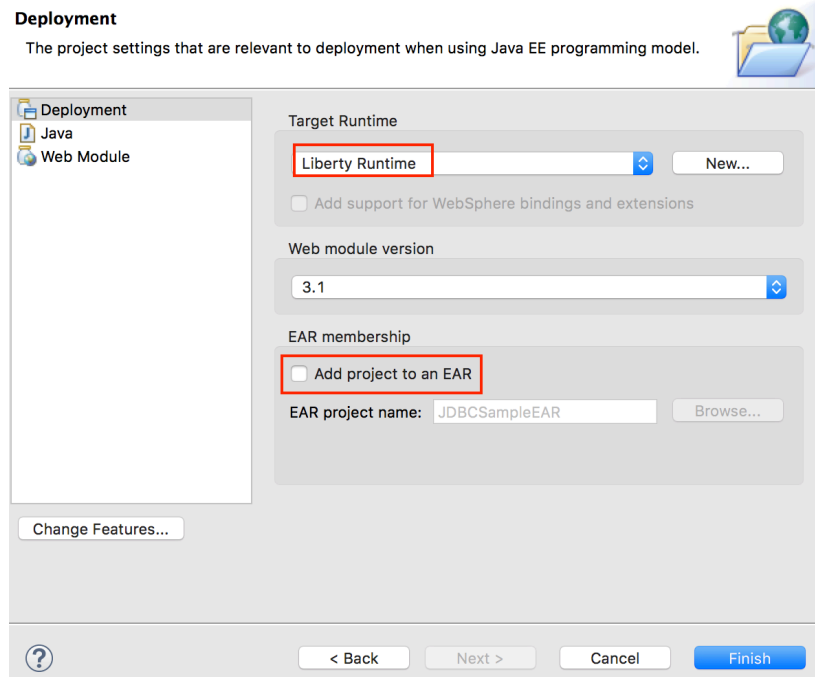


__c. Click **Next**

__d. Under **Target Runtime** select **Liberty Runtime**

__e. Deselect **Add project to EAR**

Deployment
The project settings that are relevant to deployment when using Java EE programming model.



The dialog box shows the 'Deployment' settings for a project. On the left, a tree view shows 'Deployment', 'Java', and 'Web Module'. The main area has three sections: 'Target Runtime' with a dropdown set to 'Liberty Runtime' (highlighted with a red box) and a 'New...' button; 'Web module version' with a dropdown set to '3.1'; and 'EAR membership' with a checkbox 'Add project to an EAR' (highlighted with a red box) and an 'EAR project name' field containing 'JDBCSampleEAR' with a 'Browse...' button. A 'Change Features...' button is at the bottom left. At the bottom right are buttons for '< Back', 'Next >', 'Cancel', and 'Finish'.

Deployment

- Java
- Web Module

Target Runtime

Liberty Runtime

New...

☐ Add support for WebSphere bindings and extensions

Web module version

3.1

EAR membership

☐ Add project to an EAR

EAR project name: JDBCSampleEAR

Browse...

Change Features...

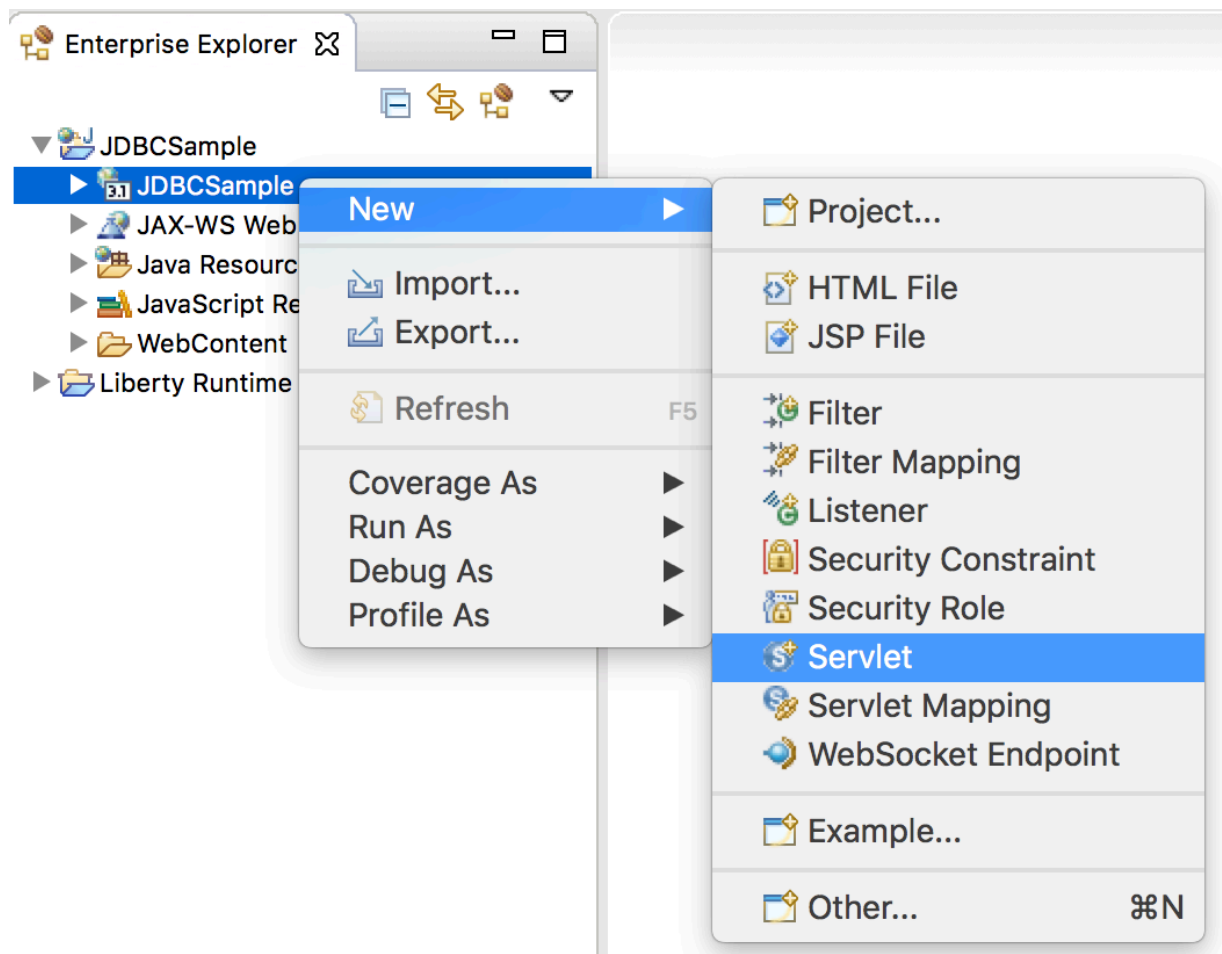
< Back Next > Cancel Finish

__f. Click **Finish**

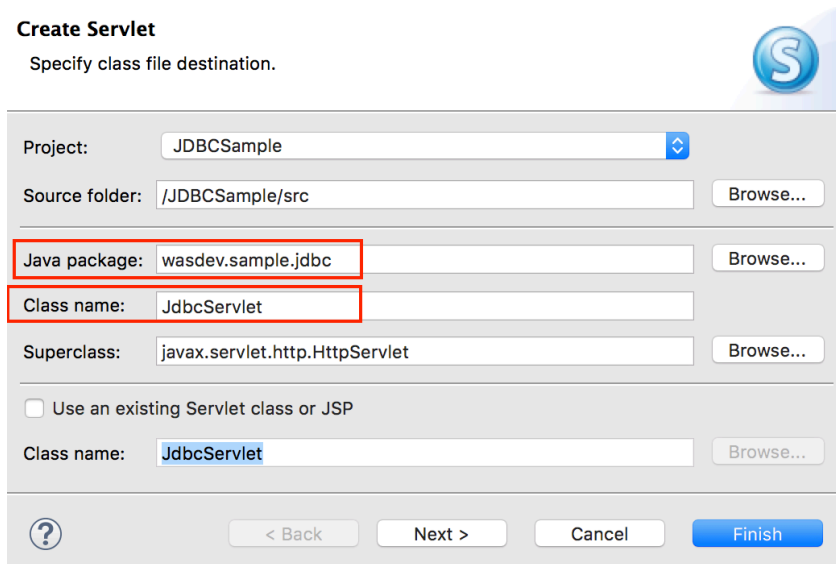
__g. Click **Open** if prompted to switch to **Web perspective**

1.3 Create JDBC Servlet

- ___1. From the **Enterprise Explorer**, Right click “**JDBCSample**” project, and select **New → Servlet**



- __2. Use **wasdev.sample.jdbc** as the package, and **JdbcServlet** as the class



The image shows the 'Create Servlet' dialog box in an IDE. The title is 'Create Servlet' with a subtitle 'Specify class file destination.' and an IBM logo. The dialog contains several input fields: 'Project' (JDBC Sample), 'Source folder' (/JDBCSample/src), 'Java package' (wasdev.sample.jdbc), 'Class name' (JdbcServlet), and 'Superclass' (javax.servlet.http.HttpServlet). Each of these fields has a 'Browse...' button to its right. Below these fields is a checkbox labeled 'Use an existing Servlet class or JSP' which is unchecked. At the bottom, there is another 'Class name' field with 'JdbcServlet' entered and a 'Browse...' button. The bottom of the dialog features a help icon, a '< Back' button, a 'Next >' button, a 'Cancel' button, and a blue 'Finish' button.

Create Servlet
Specify class file destination.

Project: JDBC Sample

Source folder: /JDBCSample/src Browse...

Java package: wasdev.sample.jdbc Browse...

Class name: JdbcServlet

Superclass: javax.servlet.http.HttpServlet Browse...

☐ Use an existing Servlet class or JSP

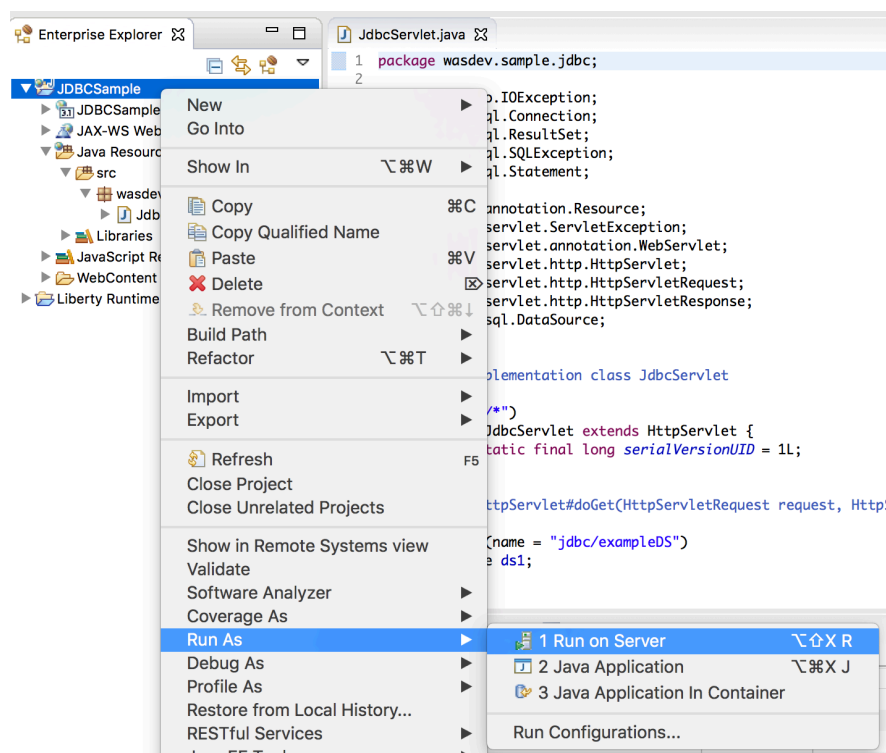
Class name: JdbcServlet Browse...

? < Back Next > Cancel Finish

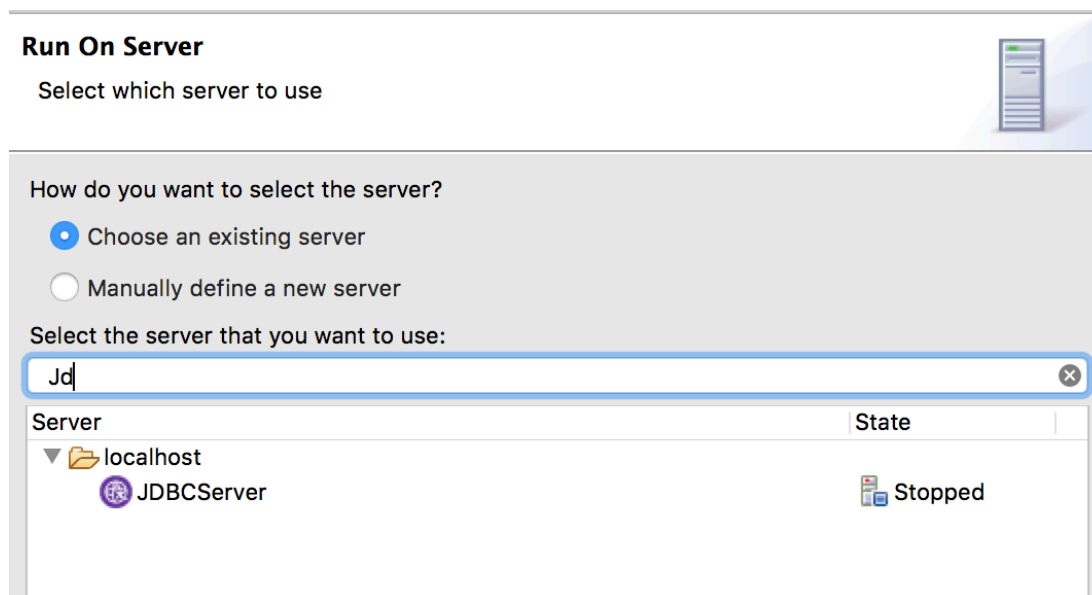
- __3. Click **Finish**
- __4. Replace the contents of **JdbcServlet.java** with
{LAB_HOME}/labs/development/2_JDBC_<timestamp>\JdbcServlet.java
- __5. Review the servlet source code to learn how it is calling JDBC.

1.4 Running the Sample JDBC Servlet

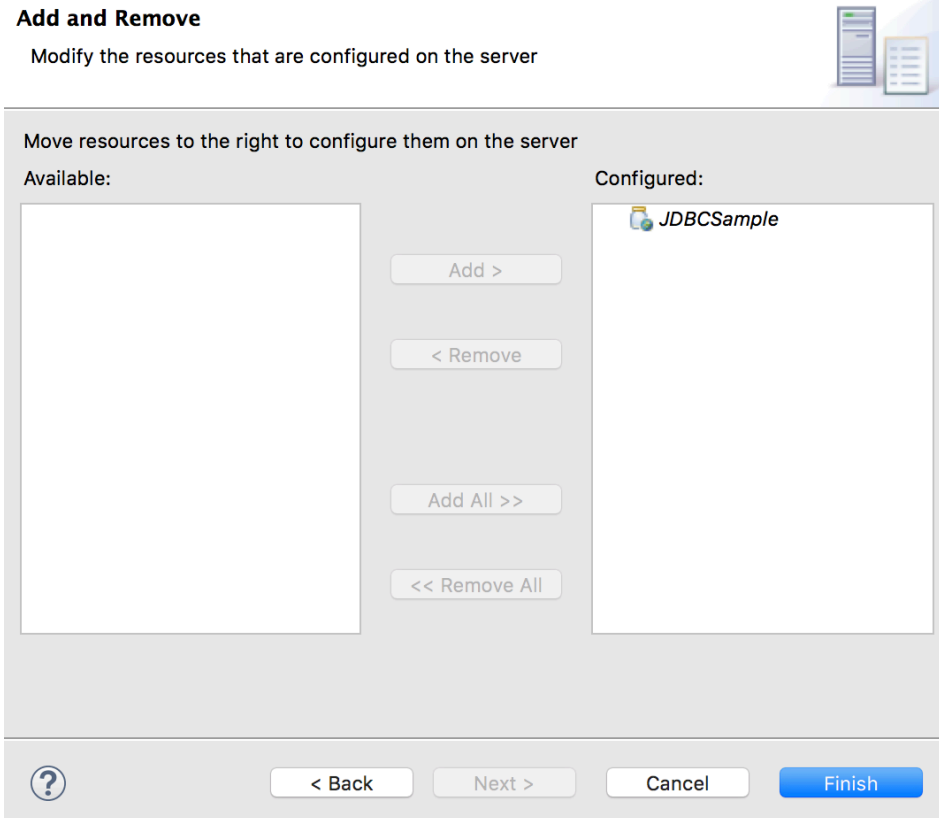
- ___1. Right click the “JDBCSample” project, and choose **Run As → Run on Server**



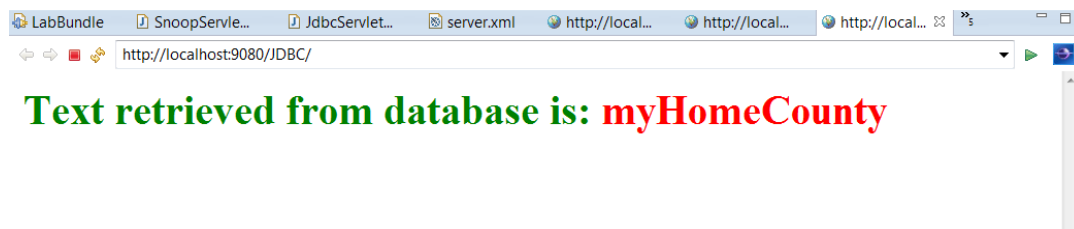
- ___2. Choose the **JDBCServer** (if you have multiple servers created), then click **Next**.



- ___3. If you have multiple projects, just select **JDBCSample** as the project to run, and then click **Finish**



__4. WDT will run and open a browser to the application automatically as shown below:



__5. Check that `{LAB_HOME}\wlp\usr\servers\JDBCServer\data\exampleDB` is created.

- ___6. Check the contents of **server.xml**. WDT adds additional configuration automatically to set up a development environment.

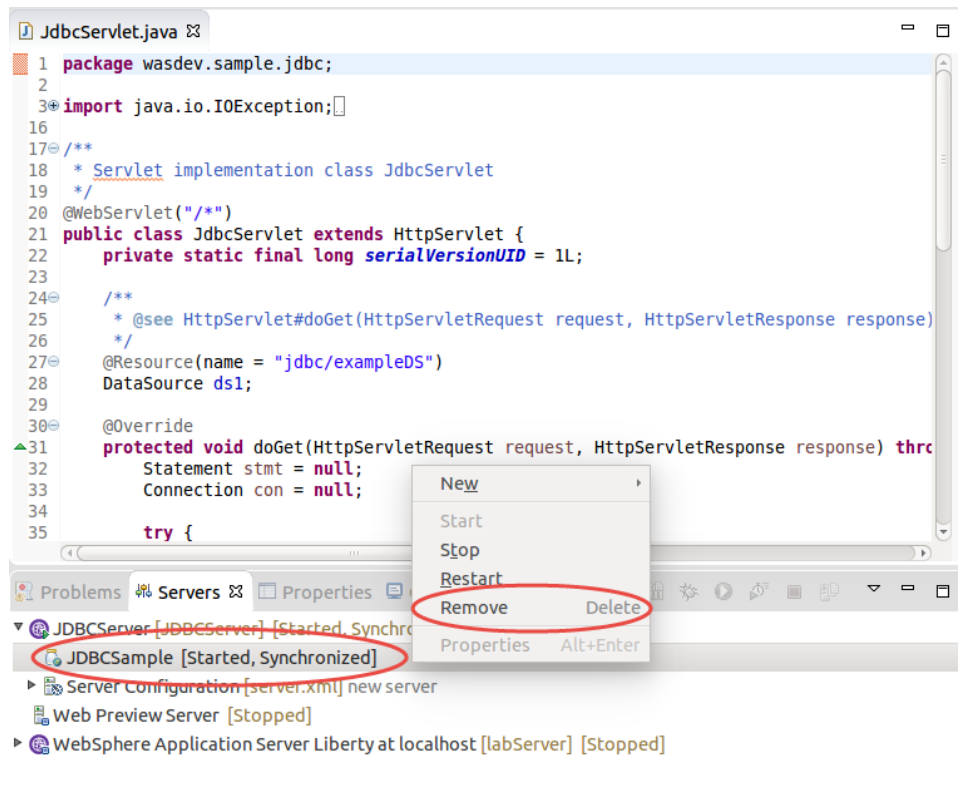


```
1 <server description="new server">
2
3   <!-- Enable features -->
4   <featureManager>
5     <feature>jdbc-4.0</feature>
6     <feature>servlet-3.1</feature>
7     <feature>localConnector-1.0</feature>
8   </featureManager>
9
10  <!-- To access this server from a remote client add a host attribute to the following element, e.g. host="*" -->
11  <httpEndpoint httpPort="9080" httpsPort="9443" id="defaultHttpEndpoint"/>
12
13  <library id="JDBCExampleDerbyLibs">
14    <fileset dir="c:\was855\db-derby-10.10.2.0-lib\lib" includes="derby.jar"/>
15  </library>
16
17  <jdbcDriver id="DerbyEmbedded" libraryRef="JDBCExampleDerbyLibs"/>
18
19  <dataSource id="ds1" jdbcDriverRef="DerbyEmbedded" jndiName="jdbc/exampleDS">
20    <properties.derby.embedded createDatabase="create" databaseName="${server.config.dir}/data/exampleDB"/>
21  </dataSource>
22
23  <applicationMonitor updateTrigger="mbean"/>
24  <webApplication id="JDBCExample" location="JDBCExample.war" name="JDBCExample"/>
25
26 </server>
```

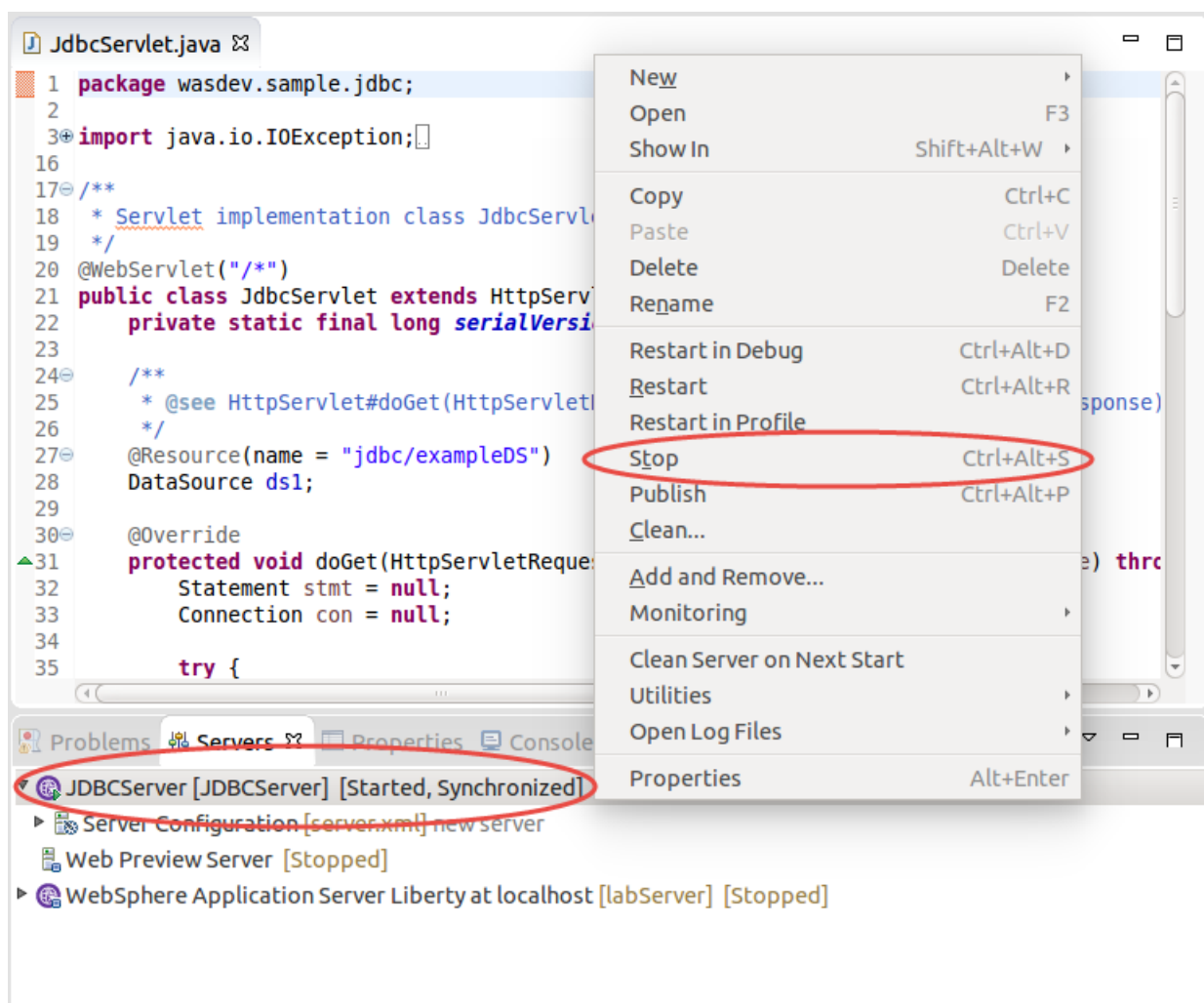
Design Source

1.5 Clean up

1. Right click on the **JDBC project** and select **Remove**



__2. Right click on the **JDBCServer** and select **Stop** to stop the server



1.6 Summary

In this lab you have learned:

- ✓ Configuring Derby Database on Liberty
- ✓ Create a sample JDBC servlet
- ✓ Run the sample JDBC Servlet

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NOTES

NOTES



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