**Assisted Practice: 2.5 Insertion, Updation, and Deletion of Database Records**

This section will guide you to:

* Set up Eclipse to work with JDBC
* Create a database and a table in MySQL
* Create an HTML page to call a servlet
* Create a servlet that will use JDBC to insert, update, and delete data

**Development Environment**

* Eclipse IDE for Enterprise Java Developers v2019-03 (4.11.0)
* Apache Tomcat Server v9.0
* JRE: OpenJDK Runtime Environment 11.0.2
* MySQL Connector for Java 8.0.16

This lab has thirteen subsections, namely:

* + 1. Creating a database in MySQL and a table in it
    2. Creating a dynamic web project
    3. Adding the jar files for MySQL connection for Java
    4. Creating an HTML page index.html
    5. Creating a DBConnection class to initiate a JDBC connection in code
    6. Creating a config.properties file to storeJDBC credentials
    7. Creating a ProductDetails servlet
    8. Configuring web.xml
    9. Checking for servlet-api.jar
    10. Building the project
    11. Publishing and starting the project
    12. Running the project
    13. Pushing the code to your GitHub repositories

**Step 2.5.1:** Creating a database in MySQL and a table in it

* MySQL is already installed in your practice lab, (Refer FSD: Lab Guide - Phase 2)
* Login to the MySQL command line console
* Type **CREATE DATABASE ecommerce** and press **Enter**
* Type **USE ecommerce** and press **Enter**
* Type **CREATE TABLE eproduct (ID bigint primary key auto\_increment, name varchar(100), price decimal(10,2), date\_added timestamp default now())** and press **Enter**
* We will now add some rows into the table
* Type **INSERT INTO eproduct(name, ‘HP Laptop ABC’, 12000)** and press **Enter**
* Type **INSERT INTO eproduct(name, ‘Acer Laptop ABC’, 14000)** and press **Enter**
* Type **INSERT INTO eproduct(name, ‘Lenovo Laptop ABC’, 12000)** and press **Enter**
* Type **SELECT \* from eproduct** and press **Enter** to confirm that the rows have been added
* Type **EXIT** to exit the MySQL command console

**Step 2.5.2:** Creating a dynamic web project

* Open Eclipse Environment
* Go the **File** menu. Choose **New->Dynamic Web Project**
* Enter the project name as **JDBCSetup**. Click on **Next**
* Enter nothing in the next screen and click on **Next**
* Check the checkbox **Generate web.xml deployment descriptor** and click on **Finish**
* This will create the project files in the Project Explorer

**Step 2.5.3:** Adding the jar files for MySQL connection for Java

* **mysql-connector-java.jar** is already present in your lab. To learn about its directory path details you can refer the **lab guide for phase 2**
* Take **mysql-connector-java.jar** file from the folder mentioned in the lab guide for phase 2 and add it to the project’s **WebContent/WEB-INF/lib** folder

**Step 2.5.4:** Creating an HTML page index.html

* In the Project Explorer, expand the project **JDBCSetup**
* Expand **WebContent**. Right click on **WebContent**. Choose **New->HTML File**
* Enter the filename as **index.html** and click on **Finish**
* Enter the following code:

<!DOCTYPE html>

<**html**>

<**head**>

<**meta** charset="UTF-8">

<**title**>JDBC Insert, Update, Delete</**title**>

</**head**>

<**body**>

<**a** href="list">Product Info</**a**><**br**>

</**body**>

</**html**>

* Click on the **Save** icon

**Step 2.5.5:** Creating a DBConnection class to initiate a JDBC connection in code

* In the Project Explorer, expand **JDBCSetup->Java Resources**
* Right click on **src** and choose **New->Class**
* In **Package,** enter **com.ecommerce** and in **Name** enter **DBConnection** and click on **Finish**
* Enter the following code:

**package** com.ecommerce;

**import** java.sql.Connection;

**import** java.sql.DriverManager;

**import** java.sql.SQLException;

**public** **class** DBConnection {

**private** **Connection** connection;

**public** DBConnection(**String** dbURL, **String** user, **String** pwd) **throws** **ClassNotFoundException**, **SQLException**{

**Class**.forName("com.mysql.jdbc.Driver");

**this**.connection = **DriverManager**.getConnection(dbURL, user, pwd);

}

**public** **Connection** getConnection(){

**return** **this**.connection;

}

**public** void closeConnection() **throws** **SQLException** {

**if** (**this**.connection != **null**)

**this**.connection.close();

}

}

**Step 2.5.6:** Creating a config.properties file to store JDBC credentials

* In the Project Explorer, expand the project **JDBCSetup**
* Expand **WebContent**. Right click on **WebContent**. Choose **New->File**
* Enter the filename as **config.properties** and click on **Finish**
* Enter the following data:

url=jdbc:mysql://localhost:3306/ecommerce

userid=root

password=master

**Step 2.5.7:** Creating a ProductDetails servlet

* In the Project Explorer, expand **JDBCSetup->Java Resources**
* Right click on **src** and choose **New->Servlet**
* In **Class Name,** enter **ProductDetails** and click on **Finish**
* Enter the following code:

**import** java.io.IOException;

**import** java.io.InputStream;

**import** java.io.PrintWriter;

**import** java.math.BigDecimal;

**import** java.sql.CallableStatement;

**import** java.sql.ResultSet;

**import** java.sql.SQLException;

**import** java.sql.Statement;

**import** java.util.Properties;

**import** javax.servlet.ServletException;

**import** javax.servlet.annotation.WebServlet;

**import** javax.servlet.http.HttpServlet;

**import** javax.servlet.http.HttpServletRequest;

**import** javax.servlet.http.HttpServletResponse;

**import** com.ecommerce.DBConnection;

/\*\*

**\*** Servlet implementation class ProductDetails

\*/

**@WebServlet("/ProductDetails")**

**public** **class** ProductDetails **extends** HttpServlet {

**private** **static** **final** long serialVersionUID = 1L;

/\*\*

**\*** **@see** HttpServlet**#**HttpServlet()

\*/

**public** ProductDetails() {

**super**();

// TODO Auto-generated constructor stub

}

/\*\*

**\*** **@see** HttpServlet**#**doGet(HttpServletRequest request**,** HttpServletResponse response)

\*/

**protected** void doGet(HttpServletRequest request, HttpServletResponse response) **throws** ServletException, **IOException** {

// TODO Auto-generated method stub

**try** {

**PrintWriter** out = response.getWriter();

out.println("<html><body>");

**InputStream** in = getServletContext().getResourceAsStream("/WEB-INF/config.properties");

**Properties** props = **new** **Properties**();

props.load(in);

DBConnection conn = **new** DBConnection(props.getProperty("url"), props.getProperty("userid"), props.getProperty("password"));

**Statement** stmt = conn.getConnection().createStatement(**ResultSet**.TYPE\_SCROLL\_INSENSITIVE, **ResultSet**.CONCUR\_READ\_ONLY);

stmt.executeUpdate("insert into eproduct (name, price, date\_added) values ('New Product', 17800.00, now())");

out.println("Executed an insert operation<br>");

stmt.executeUpdate("update eproduct set price=2000 where name = 'New Product'");

out.println("Executed an update operation<br>");

stmt.executeUpdate("delete from eproduct where name = 'New Product'");

out.println("Executed a delete operation<br>");

stmt.close();

conn.closeConnection();

out.println("</body></html>");

conn.closeConnection();

} **catch** (**ClassNotFoundException** e) {

e.printStackTrace();

} **catch** (**SQLException** e) {

e.printStackTrace();

}

}

/\*\*

**\*** **@see** HttpServlet**#**doPost(HttpServletRequest request**,** HttpServletResponse response)

\*/

**protected** void doPost(HttpServletRequest request, HttpServletResponse response) **throws** ServletException, **IOException** {

// TODO Auto-generated method stub

doGet(request, response);

}

}

**Step 2.5.8:** Configuring web.xml

* In the Project Explorer, expand **JDBCSetup->WebContent->WEB-INF**
* Double click on **web.xml** to open it in the editor
* Enter the following script:

<?xml version="1.0" encoding="UTF-8"?>

<web-app xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://xmlns.jcp.org/xml/ns/javaee" xsi:schemaLocation="http://xmlns.jcp.org/xml/ns/javaee http://xmlns.jcp.org/xml/ns/javaee/web-app\_4\_0.xsd" id="WebApp\_ID" version="4.0">

<display-name>JDBC Insert, Update, Delete</display-name>

<welcome-file-list>

<welcome-file>index.html</welcome-file>

<welcome-file>index.htm</welcome-file>

<welcome-file>index.jsp</welcome-file>

<welcome-file>default.html</welcome-file>

<welcome-file>default.htm</welcome-file>

<welcome-file>default.jsp</welcome-file>

</welcome-file-list>

<servlet>

<servlet-name>ProductDetails</servlet-name>

<servlet-class>ProductDetails</servlet-class>

</servlet>

<servlet-mapping>

<servlet-name>ProductDetails</servlet-name>

<url-pattern>/list</url-pattern>

</servlet-mapping>

</web-app>

**Step 2.5.9:** Checking for servlet-api.jar

* Before building the project, we need to add **servlet-api.jar** to the project
* Servlet-api.jar file is already present in your practice lab. (Refer FSD: Lab Guide - Phase 2)
* To add it to the project, follow the below mentioned steps:
  + In the Project Explorer, right click on **JDBCSetup** and choose **Properties**
  + Select **Java Build Path** from the options on the left
  + Click on **Libraries** tab on the right
  + Under **ClassPath,** expand the node that says **Apache Tomcat**
  + If there is an existing entry for **servlet-api.jar,** then click on **Cancel** and exit the window
  + If it is not there, then click on **Classpath** entry and click on **Add External JARs** button on the right
  + From the **file** list, select **servlet-api.jar** file and click on **Ok**
  + Click on **Apply and Close**

**Step 2.5.10:** Building the project

* From the **Project** menu at the top, click on **Build**
* If any compile errors are shown, fix them as required

**Step 2.5.11:** Publishing and starting the project

* If you do not see the **Servers** tab near the bottom of the IDE, go to **Window** menu and click on **Show View->Servers**
* Right click the **Server** entry and choose **Add and Remove**
* Click the **Add** button to move **JDBCSetup** from the **Available** list to the **Configured** list
* Click on **Finish**
* Right click the **Server** entry and click on **Publish**
* Right click the **Server** entry and click on **Start**
* This will start the server

**Step 2.5.12:** Running the project

* To run the project, open a web browser and type: [**http://localhost:8080/**](http://localhost:8080/ServletConcept)**JDBCSetup**

**Step 2.5.13:** Pushing the code to your GitHub repositories

* Open your command prompt and navigate to the folder where you have created your files.

**cd <folder path>**

* Initialize your repository using the following command:

**git init**

* Add all the files to your git repository using the following command:

**git add .**

* Commit the changes using the following command:

**git commit . -m “Changes have been committed.”**

* Push the files to the folder you initially created using the following command:

**git push -u origin master**