3.3 Stored Procedures and Exception Handling

**Steps:**

* Set up Eclipse to work with JDBC
* Create a database and a table in MySQL
* Create a stored procedure in MySQL
* Create an HTML page to call a servlet
* Create a servlet that calls the stored procedure using JDBC

**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 guide has fourteen subsections, namely:

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

**Step 3.3.1:** Creating a database in MySQL and creating a table in it

* MySQL is already installed in your practice lab. (Refer QA to QE: Lab Guide - Phase 1)
* Log in 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 3.3.2:** Creating a stored procedure add\_product in MySQL

* Log in to the MySQL command line console
* Type the following script:

DELIMITER $$

**CREATE** **PROCEDURE** add\_product(**IN** pname varchar(100), **IN** pprice decimal(10,2))

**INSERT** **INTO** eproduct (name, price) **VALUES** (pname, pprice)

$$

DELIMITER ;

**Step 3.3.3:** Creating a dynamic web project

* Open Eclipse
* Go to 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 3.3.4:** Adding the jar files for MySQL connection for Java

* mysql-connector-java.jar is already present in your lab. (Refer FSD: Lab Guide - Phase 1)
* Take mysql-connector-java.jar file from the folder mentioned in the lab guide for phase 1 and add it to the project’s WebContent/WEB-INF/lib folder

**Step 3.3.5:** 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 Stored Procedures</**title**>

</**head**>

<**body**>

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

</**body**>

</**html**>

* Click on the **Save** icon

**Step 3.3.6:** 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 3.3.7:** 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 3.3.8:** 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"));

**CallableStatement** stmt = conn.getConnection().prepareCall("{call add\_product(?, ?)}");

stmt.setString(1, "new product");

stmt.setBigDecimal(2, **new** **BigDecimal**(1900.50));

stmt.executeUpdate();

out.println("Stored procedure has been executed.<Br>");

stmt.close();

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 3.3.9:** 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 Stored Procedures</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 3.3.10:** Checking for servlet-api.jar

* Before building the project, we need to confirm that **servlet-api.jar** has been added to the project
* 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 3.3.11:** Building the project

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

**Step 3.3.12:** 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 3.3.13:** Running the project

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

**Step 3.3.14:** 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