CSM3023 WEB BASED APPLICATION DEVELOPMENT (K1)

BACHELOR OF COMPUTER SCIENCE (MOBILE COMPUTING) WITH HONORS

SEMESTER 2 2023/2024

LAB 2 – Servlet: Data Sharing and Database Management

Prepared for:

DR. MOHAMAD NOR HASSAN

Prepared by:

MUHAMMAD HAZIQ AIMAN BIN MUSTAFA (S67978)

Task 1:Data Sharing in Servlet

login.html

```html
<html>
    <head>
        <title>Login Page</title>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
        <style>

        </style>
    </head>
    <body>
        <h1>Welcome to CSM3023</h1>
        <p>Please insert your username and password</p>
        <form name="login" id="login" action="LoginServlet" method="POST" autocomplete="off">
            Username:<input name="txtUsername" type="text"><br>
            Password:<input name="txtPassword" type="text"><br>
            <br>
            <input name="btnLogin" value="Login" type="submit">
            <input name="txtReset" value="Reset" type="reset"><br>
        </form>
        <p><br>
        </p>
    </body>
</html>
```

LoginServlet.java

```java
import jakarta.servlet.RequestDispatcher;
import jakarta.servlet.ServletContext;
import java.io.IOException;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
import java.util.HashMap;


/**
 *
 * @author Lenovo
 */
public class LoginServlet extends HttpServlet {

    HashMap <String, String> users = new HashMap();

    @Override
    public void init()throws ServletException{
        super.init();
        users.put("Ali","1234");
        users.put("Ahmad","4567");
        users.put("Muthu","8910");
    }

    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");

        String username = request.getParameter("txtUsername");
        String password = request.getParameter("txtPassword");

        if(!username.equals("") && !password.equals("")
                && users.get(username).equals(password)){
            request.setAttribute("userid", username);
            ServletContext sc = getServletContext();
            RequestDispatcher rd = sc.getRequestDispatcher("/AccountServlet");
            rd.forward(request, response);
        }else{
            //avoid direct access to the servlet
            RequestDispatcher rd = request.getRequestDispatcher("/login.html");
            rd.forward(request, response);
        }
    }

    HttpServlet methods. Click on the + sign on the left to edit the code.

}
```

AccountServlet.java

```java
import java.io.IOException;
import java.io.PrintWriter;
import java.util.HashMap;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

/**
 *
 * @author Lenovo
 */
public class AccountServlet extends HttpServlet {

    HashMap<String, String[]> account = new HashMap();
    @Override
    public void init() throws ServletException{
        super.init();
        account.put("Ali", new String[]{"31/01/2019: 2000.00","28/02/2019: 3000.00"});
        account.put("Ahmad", new String[]{"31/01/2019: 100.00","28/02/2019: 5000.00"});
        account.put("Muthu", new String[]{"31/01/2019: 1000.00","28/02/2019: 2000.00"});

    }
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");

        String userid_login = (String)request.getAttribute("userid");

        try(PrintWriter out = response.getWriter()){

            out.println("<!DOCTYPE html>");
            out.println("<html>");
            out.println("<head>");
            out.println("<title>Servlet AccountServlet</title>");
            out.println("</head>");
            out.println("<body>");

            if(account.get(userid_login)==null){
                out.println("<h1>Sorry, no information found!</h1>");
            }else{
                out.println("<h1>Account status for: " + userid_login + "</h1>");
                for(String tempAcc: account.get(userid_login)){
                    out.println("<h2>"+tempAcc+"</h2>");
                }
            }
            out.println("</body");
            out.println("</html>");
        }
```

Output:

Welcome to CSM3023

Please insert your username and password

Username: Ahmad
Password: 4567

Login Reset

Account status for: Ahmad

31/01/2019: 100.00

28/02/2019: 5000.00

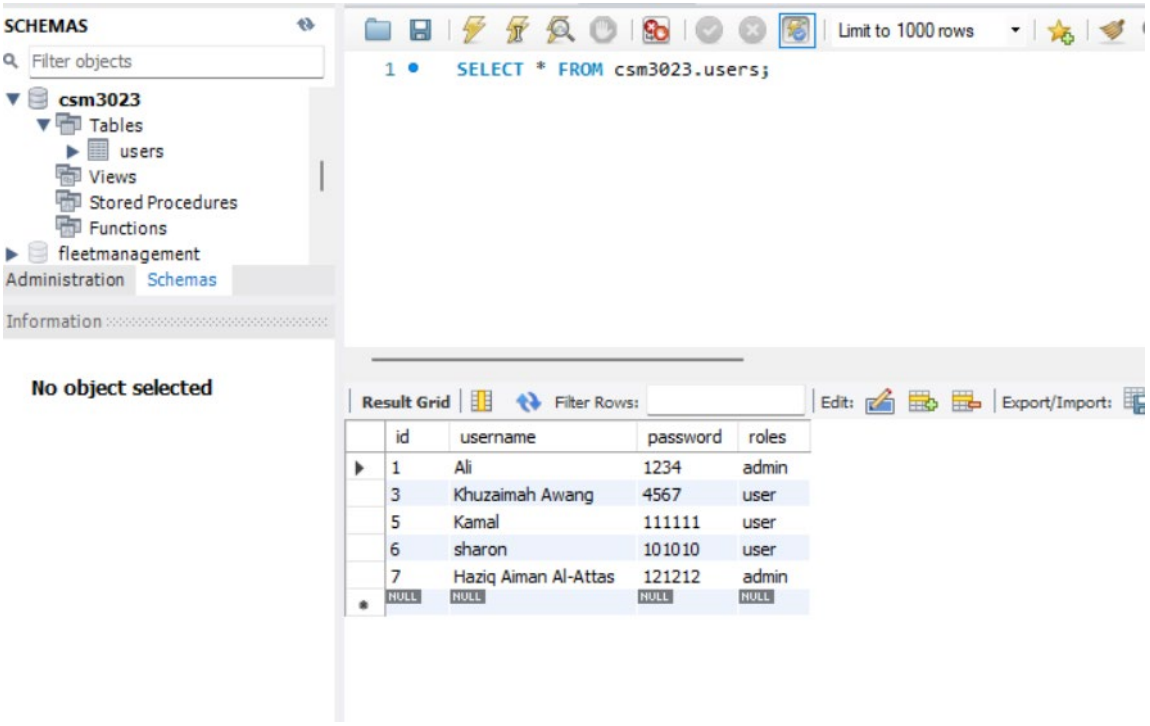
Reflections:

1. What have you learnt form this exercise?
   I have learnt how the data sharing process works by using servlet.

2. What are the common methods used in Java Servlet?
   doGet() and doPost()

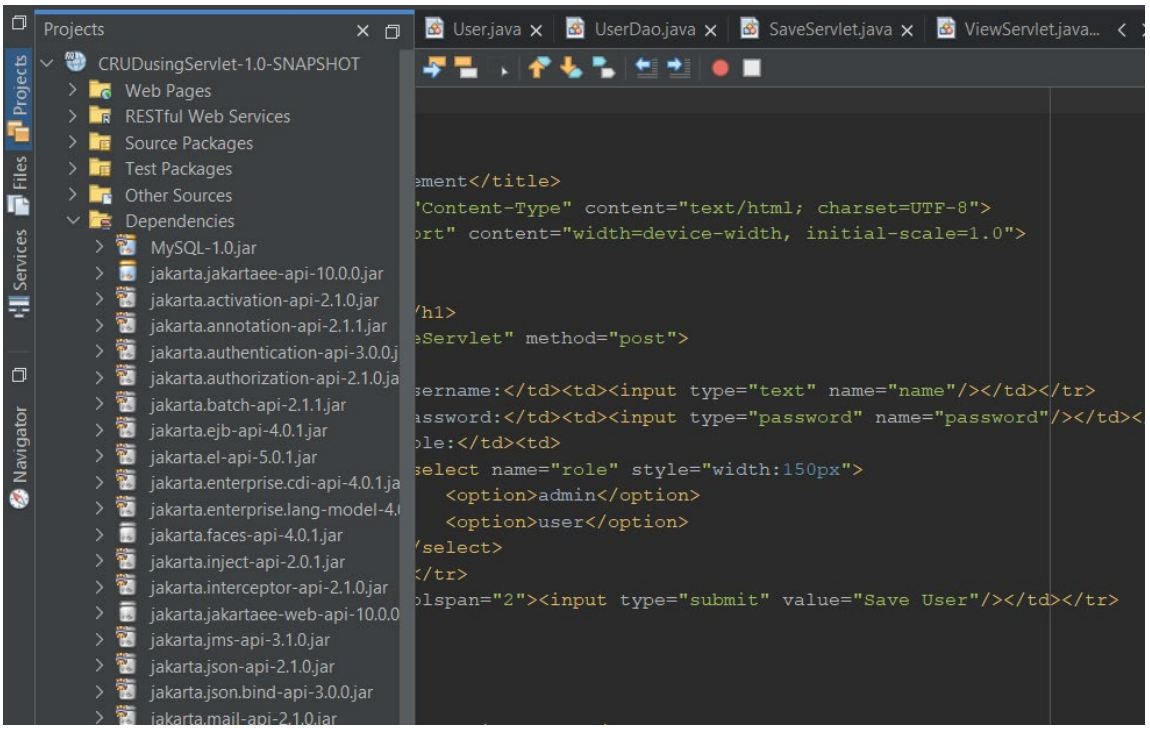
Task 2:Creating a table in MySQL database

Output:



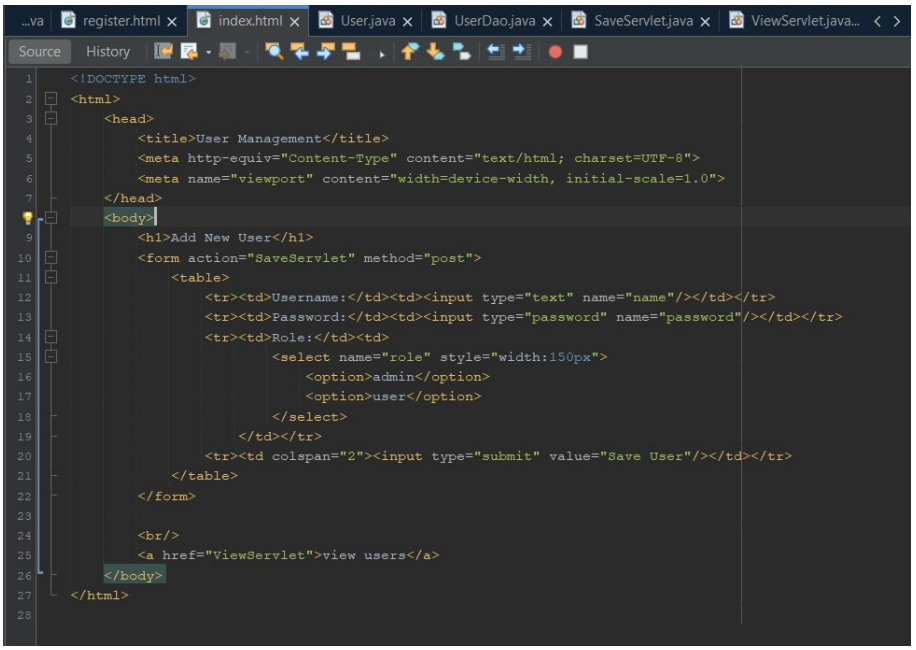
Task 3:Setting the Environment of Web Application for Database Connection

Output:



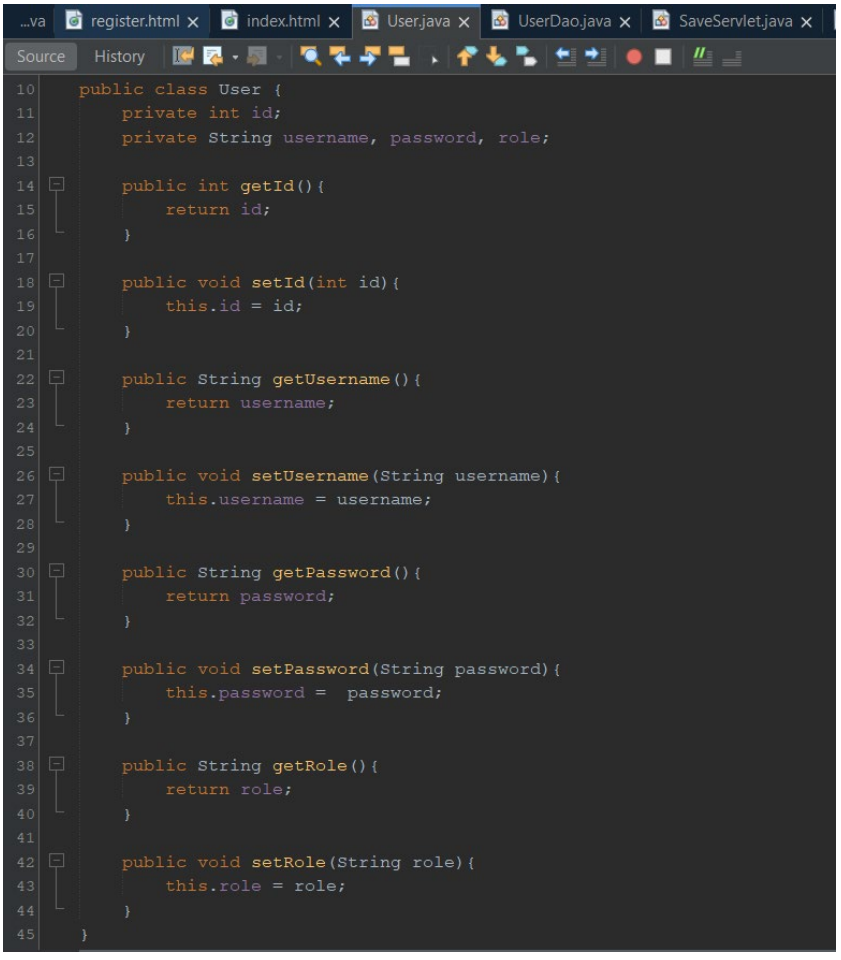
Task 4: Using Servlets for Database CRUD Operations

Index.html



```
<!DOCTYPE html>
<html>
    <head>
        <title>User Management</title>
        <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
    </head>
    <body>
        <h1>Add New User</h1>
        <form action="SaveServlet" method="post">
            <table>
                <tr><td>Username:</td><td><input type="text" name="name"/></td></tr>
                <tr><td>Password:</td><td><input type="password" name="password"/></td></tr>
                <tr><td>Role:</td><td>
                        <select name="role" style="width:150px">
                            <option>admin</option>
                            <option>user</option>
                        </select>
                    </td></tr>
                <tr><td colspan="2"><input type="submit" value="Save User"/></td></tr>
            </table>
        </form>

        <br/>
        <a href="ViewServlet">view users</a>
    </body>
</html>
```

User.java



```
public class User {
    private int id;
    private String username, password, role;

    public int getId(){
        return id;
    }

    public void setId(int id){
        this.id = id;
    }

    public String getUsername(){
        return username;
    }

    public void setUsername(String username){
        this.username = username;
    }

    public String getPassword(){
        return password;
    }

    public void setPassword(String password){
        this.password =  password;
    }

    public String getRole(){
        return role;
    }

    public void setRole(String role){
        this.role = role;
    }
}
```

UserDao.java

```java
import java.util.*;
import java.sql.*;
/**
 *
 * @author Lenovo
 */
public class UserDao {
    public static Connection getConnection(){
        Connection con = null;
        try{
            Class.forName("com.mysql.jdbc.Driver");
            con = DriverManager.getConnection("jdbc:mysql://localhost:3306/csm3023", "root", "admin");
        }catch(Exception e){
            System.out.println("e");
        }
        return con;
    }

    public static int save(User e){
        int status = 0;
        try{
            Connection con = UserDao.getConnection();
            PreparedStatement ps = con.prepareStatement(
                    "insert into users(username,password,roles) values (?,?,?)");
            ps.setString(1, e.getUsername());
            ps.setString(2, e.getPassword());
            ps.setString(3, e.getRole());

            status = ps.executeUpdate();

            con.close();
        }catch (Exception ex){
            ex.printStackTrace();
        }
        return status;
    }
```

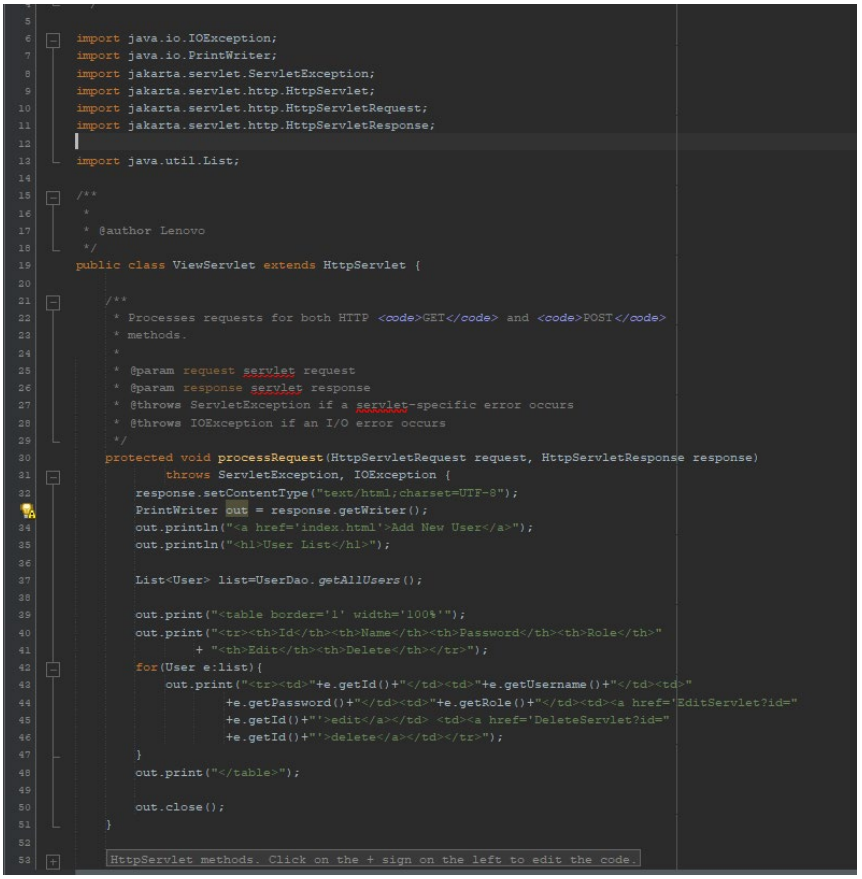
```java
    public static int update(User e){
        int status = 0;
        try{
            Connection con = UserDao.getConnection();
            PreparedStatement ps = con.prepareStatement(
                    "update users set username=?,password=?,roles=? where id=?");
            ps.setString(1, e.getUsername());
            ps.setString(2, e.getPassword());
            ps.setString(3, e.getRole());
            ps.setInt(4, e.getId());

            status = ps.executeUpdate();

            con.close();
        }catch (Exception ex){
            ex.printStackTrace();
        }
        return status;
    }

    public static int delete(int id){
        int status = 0;
        try{
            Connection con = UserDao.getConnection();
            PreparedStatement ps = con.prepareStatement("delete from users where id=?");
            ps.setInt(1, id);
            status = ps.executeUpdate();

            con.close();
        }catch(Exception e){
            e.printStackTrace();
        }
        return status;
    }

    public static User getUserById(int id){
        User e = new User();

        try{
            Connection con = UserDao.getConnection();
```

```
            PreparedStatement ps = con.prepareStatement("select * from users where id=?");
            ps.setInt(1, id);
            ResultSet rs = ps.executeQuery();
            if (rs.next()){
                e.setId(rs.getInt(1));
                e.setUsername(rs.getString(2));
                e.setPassword(rs.getString(3));
                e.setRole(rs.getString(4));
            }
            con.close();
        }catch(Exception ex){
            ex.printStackTrace();
        }
        return e;
    }

    public static List<User> getAllUsers(){
        List<User> list = new ArrayList<User>();

        try{
            Connection con = UserDao.getConnection();
            PreparedStatement ps = con.prepareStatement("select * from users");
            ResultSet rs = ps.executeQuery();
            while (rs.next()){
                User e = new User();
                e.setId(rs.getInt(1));
                e.setUsername(rs.getString(2));
                e.setPassword(rs.getString(3));
                e.setRole(rs.getString(4));
                list.add(e);
            }
            con.close();
        }catch (Exception e){
            e.printStackTrace();
        }
        return list;
    }

}
```

SaveServlet.java

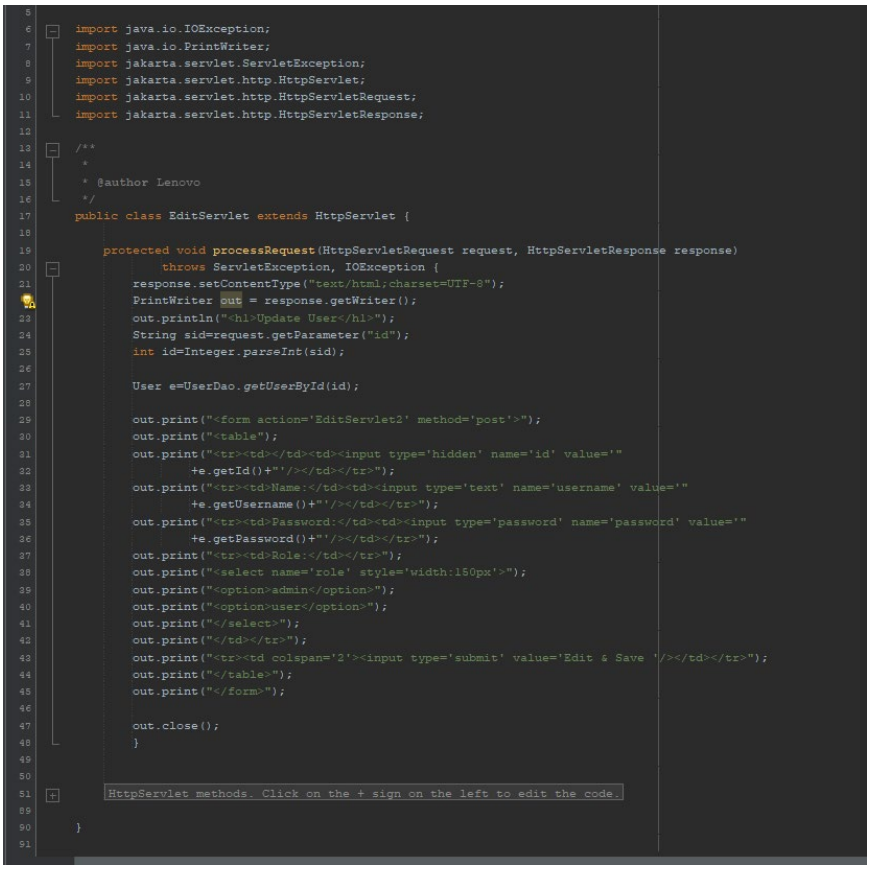
```
import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

/**
 *
 * @author Lenovo
 */
public class SaveServlet extends HttpServlet {

    /**
     * Processes requests for both HTTP <code>GET</code> and <code>POST</code>
     * methods.
     *
     * @param request servlet request
     * @param response servlet response
     * @throws ServletException if a servlet-specific error occurs
     * @throws IOException if an I/O error occurs
     */
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");
        PrintWriter out = response.getWriter();

        String name = request.getParameter("name");
        String password = request.getParameter("password");
        String role = request.getParameter("role");

        User e = new User();
        e.setUsername(name);
        e.setPassword(password);
        e.setRole(role);

        int status = UserDao.save(e);
        if(status > 0){
            out.print("<p>Record saved successfully!</p>");
            request.getRequestDispatcher("index.html").include(request, response);
        }else{
            out.println("Sorry! unable to save record");
        }
        out.close();
    }

    HttpServlet methods. Click on the + sign on the left to edit the code.

}
```

ViewServlet.java



```java
import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

import java.util.List;

/**
 *
 * @author Lenovo
 */
public class ViewServlet extends HttpServlet {

    /**
     * Processes requests for both HTTP <code>GET</code> and <code>POST</code>
     * methods.
     *
     * @param request servlet request
     * @param response servlet response
     * @throws ServletException if a servlet-specific error occurs
     * @throws IOException if an I/O error occurs
     */
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");
        PrintWriter out = response.getWriter();
        out.println("<a href='index.html'>Add New User</a>");
        out.println("<h1>User List</h1>");

        List<User> list=UserDao.getAllUsers();

        out.print("<table border='1' width='100%'");
        out.print("<tr><th>Id</th><th>Name</th><th>Password</th><th>Role</th>"
                + "<th>Edit</th><th>Delete</th></tr>");
        for(User e:list){
            out.print("<tr><td>"+e.getId()+"</td><td>"+e.getUsername()+"</td><td>"
                    +e.getPassword()+"</td><td>"+e.getRole()+"</td><td><a href='EditServlet?id="
                    +e.getId()+"'>edit</a></td> <td><a href='DeleteServlet?id="
                    +e.getId()+"'>delete</a></td></tr>");
        }
        out.print("</table>");

        out.close();
    }

    HttpServlet methods. Click on the + sign on the left to edit the code.
```

EditServlet.java



```java
import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

/**
 *
 * @author Lenovo
 */
public class EditServlet extends HttpServlet {

    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");
        PrintWriter out = response.getWriter();
        out.println("<h1>Update User</h1>");
        String sid=request.getParameter("id");
        int id=Integer.parseInt(sid);

        User e=UserDao.getUserById(id);

        out.print("<form action='EditServlet2' method='post'>");
        out.print("<table");
        out.print("<tr><td></td><td><input type='hidden' name='id' value='"
                +e.getId()+"'/></td></tr>");
        out.print("<tr><td>Name:</td><td><input type='text' name='username' value='"
                +e.getUsername()+"'/></td></tr>");
        out.print("<tr><td>Password:</td><td><input type='password' name='password' value='"
                +e.getPassword()+"'/></td></tr>");
        out.print("<tr><td>Role:</td></tr>");
        out.print("<select name='role' style='width:150px'>");
        out.print("<option>admin</option>");
        out.print("<option>user</option>");
        out.print("</select>");
        out.print("</td></tr>");
        out.print("<tr><td colspan='2'><input type='submit' value='Edit & Save '/></td></tr>");
        out.print("</table>");
        out.print("</form>");

        out.close();
        }


    HttpServlet methods. Click on the + sign on the left to edit the code.

}
```

EditServlet2.java

```java
import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

/**
 *
 * @author Lenovo
 */
public class EditServlet2 extends HttpServlet {

    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");
        PrintWriter out = response.getWriter();
        String sid=request.getParameter("id");
        int id=Integer.parseInt(sid);

        String name = request.getParameter("username");
        String password = request.getParameter("password");
        String role = request.getParameter("role");

        User e=UserDao.getUserById(id);
        e.setUsername(name);
        e.setPassword(password);
        e.setRole(role);

        int status = UserDao.update(e);
        response.sendRedirect("ViewServlet");

        out.close();
    }

    HttpServlet methods. Click on the + sign on the left to edit the code.

}
```

DeleteServlet.java

```java
/*
 * Click nbfs://nbhost/SystemFileSystem/Templates/Licenses/license-default.txt to change thi
 * Click nbfs://nbhost/SystemFileSystem/Templates/JSP_Servlet/Servlet.java to edit this temp
 */

import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

/**
 *
 * @author Lenovo
 */
public class DeleteServlet extends HttpServlet {

    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        String sid = request.getParameter("id");
        int id = Integer.parseInt(sid);
        UserDao.delete(id);
        response.sendRedirect("ViewServlet");
    }

    HttpServlet methods. Click on the + sign on the left to edit the code.

}
```

Output:

Add New User

Username: RyoukiTenkai
Password: ••••••
Role: user
Save User

view users

Record saved successfully!

Add New User

Username:
Password:
Role: admin
Save User

view users

Add New User

User List

Id	Name	Password	Role	Edit	Delete
1	Ali	1234	admin	edit	delete
3	Khuzaimah Awang	4567	user	edit	delete
5	Kamal	111111	user	edit	delete
6	sharon	101010	user	edit	delete
7	Haziq Aiman Al-Attas	121212	admin	edit	delete
8	RyoukiTenkai	121212	user	edit	delete

Update User

Name: RyoukiTenkai Password: •••••• Role: admin
Edit & Save

Update User

Name: RyoukiTenkai Password: •••••• Role: user
Edit & Save

Add New User

User List

Id	Name	Password	Role	Edit	Delete
1	Ali	1234	admin	edit	delete
3	Khuzaimah Awang	4567	user	edit	delete
5	Kamal	111111	user	edit	delete
6	sharon	101010	user	edit	delete
7	Haziq Aiman Al-Attas	121212	admin	edit	delete
8	RyoukiTenkai	121212	user	edit	delete

Reflections:

1. What is the name of the Java Library that you need to import before coding the web application with database operations?

   JDBC (Java Database Connectivity).It provides a set of classes and interfaces for accessing and manipulating relational databases from a Java program.It also allows Java applications to connect to a database and perform CRUD process by sending SQL queries to database.

2. Which folder keeps the web.xml file? Copy the contents of the file and explain in brief the tags included such as <servlet-name><servlet-class>

   <servlet-mapping>. etc.
   The web.xml file is kept inside WEB-INF folder.

```
<?xml version="1.0" encoding="UTF-8"?>
<web-app version="6.0" xmlns="https://jakarta.ee/xml/ns/jakartaee"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="https://jakarta.ee/xml/ns/jakartaee
https://jakarta.ee/xml/ns/jakartaee/web-app_6_0.xsd">
  <servlet>
    <servlet-name>SaveServlet</servlet-name>
    <servlet-class>SaveServlet</servlet-class>
  </servlet>
  <servlet>
    <servlet-name>ViewServlet</servlet-name>
    <servlet-class>ViewServlet</servlet-class>
  </servlet>
  <servlet>
    <servlet-name>EditServlet</servlet-name>
    <servlet-class>EditServlet</servlet-class>
  </servlet>
  <servlet>
    <servlet-name>EditServlet2</servlet-name>
    <servlet-class>EditServlet2</servlet-class>
  </servlet>
  <servlet>
    <servlet-name>DeleteServlet</servlet-name>
    <servlet-class>DeleteServlet</servlet-class>
```

```
  </servlet>
  <servlet-mapping>
    <servlet-name>SaveServlet</servlet-name>
    <url-pattern>/SaveServlet</url-pattern>
  </servlet-mapping>
  <servlet-mapping>
    <servlet-name>ViewServlet</servlet-name>
    <url-pattern>/ViewServlet</url-pattern>
  </servlet-mapping>
  <servlet-mapping>
    <servlet-name>EditServlet</servlet-name>
    <url-pattern>/EditServlet</url-pattern>
  </servlet-mapping>
  <servlet-mapping>
    <servlet-name>EditServlet2</servlet-name>
    <url-pattern>/EditServlet2</url-pattern>
  </servlet-mapping>
  <servlet-mapping>
    <servlet-name>DeleteServlet</servlet-name>
    <url-pattern>/DeleteServlet</url-pattern>
  </servlet-mapping>
  <session-config>
    <session-timeout>
      30
    </session-timeout>
  </session-config>
</web-app>
```

<servlet-name> specifies a unique name for the servlet configuration.
<servlet-class> specifies the fully permissioned class name of the implementation.
<servlet-mapping> maps a servlet to a URL pattern. It defines the URLs that invoke the servlet.
<url-pattern> specifies the URL pattern to which the servlet is mapped.

3. Define the usage of Data Access Object (DAO) servlet. How it ease thebusiness process in your servlet-based web application?

   DAO servlet is a design pattern used to separate the data access logic from the business logic of a servlet-based web application.DAO involves creating a separate class or set of classes responsible for interacting with the database, querying data, and perform database CRUD operations.By using a DAO servlet, the business logic in servlets can focus on handling user requests, processing data, and generating responses, while the data access logic is encapsulated within the DAO classes, improving the overall organization and clarity of the application architecture.