CSM3023 WEB APPLICATION DEVELOPMENT (K1)

SEMESTER IV, SESSION 2023/2024

LAB 2 : SERVLET (DATA SHARING AND DATABASE MANAGEMENT)

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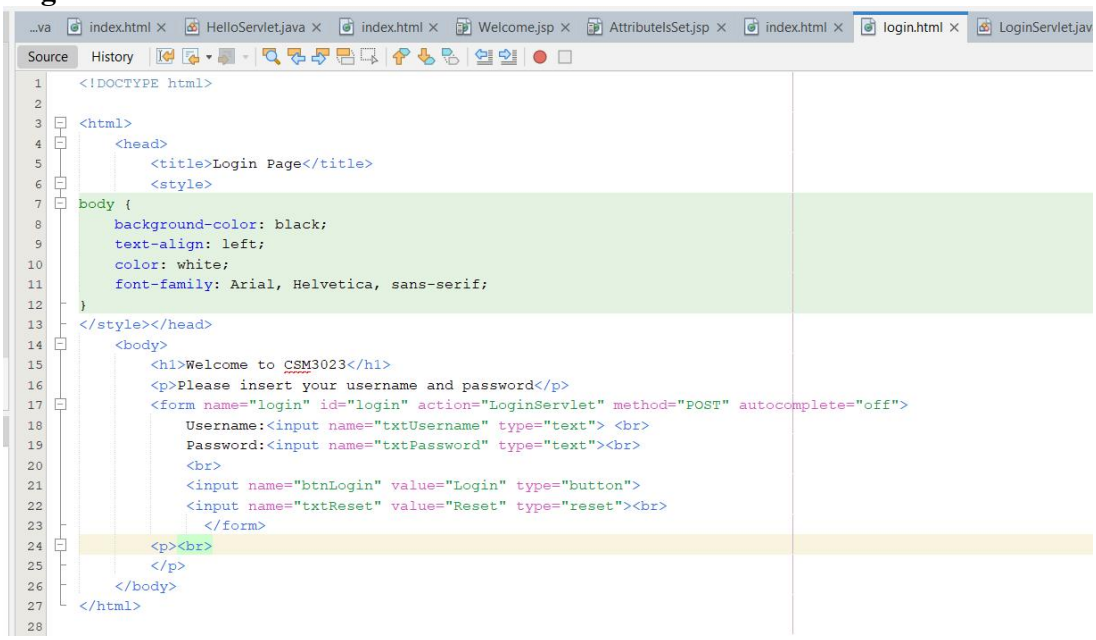
Task 1: Data Sharing in Servlet

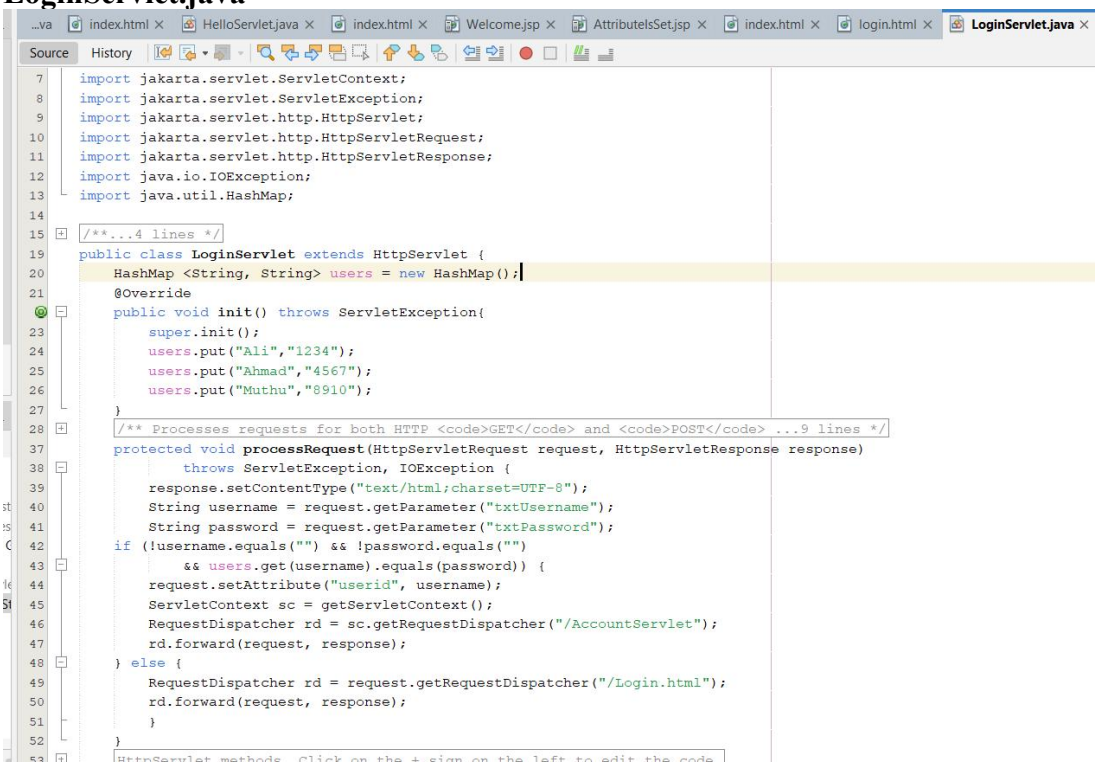
Code:

Login.html



```
<!DOCTYPE html>

<html>
    <head>
        <title>Login Page</title>
        <style>
body {
    background-color: black;
    text-align: left;
    color: white;
    font-family: Arial, Helvetica, sans-serif;
}
</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="button">
            <input name="txtReset" value="Reset" type="reset"><br>
              </form>
        <p><br>
        </p>
    </body>
</html>
```

LoginServlet.java

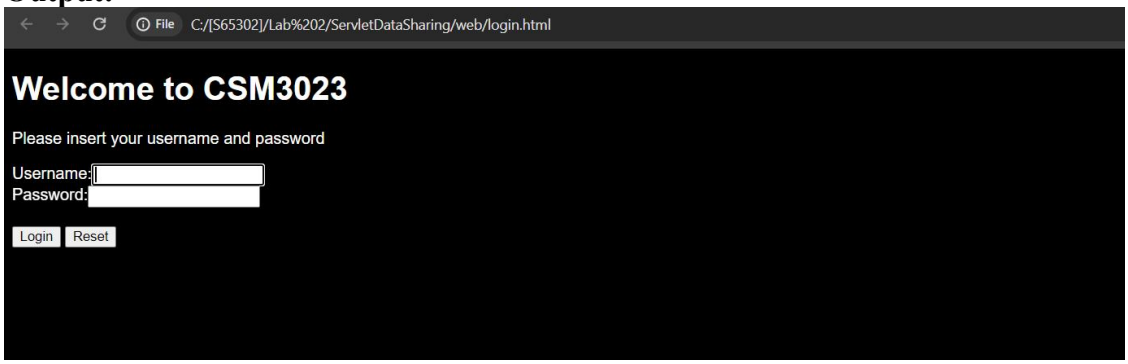


```
import jakarta.servlet.ServletContext;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
import java.io.IOException;
import java.util.HashMap;

/**...4 lines */
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");
    }
    /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
    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 {
        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
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","28/02/2019: 2000"});
    }
    /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
    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!</h>");
            }
            else{
                out.println("<h1>Account status for: " + userid_login + "</h>");
                for(String tempAcc: account.get(userid_login)){
                    out.println("<h2>"+tempAcc+"</h2>");
                }
            }
            out.println("</body>");
            out.println("</html>");
        }
    }
```

Output:



Reflections:

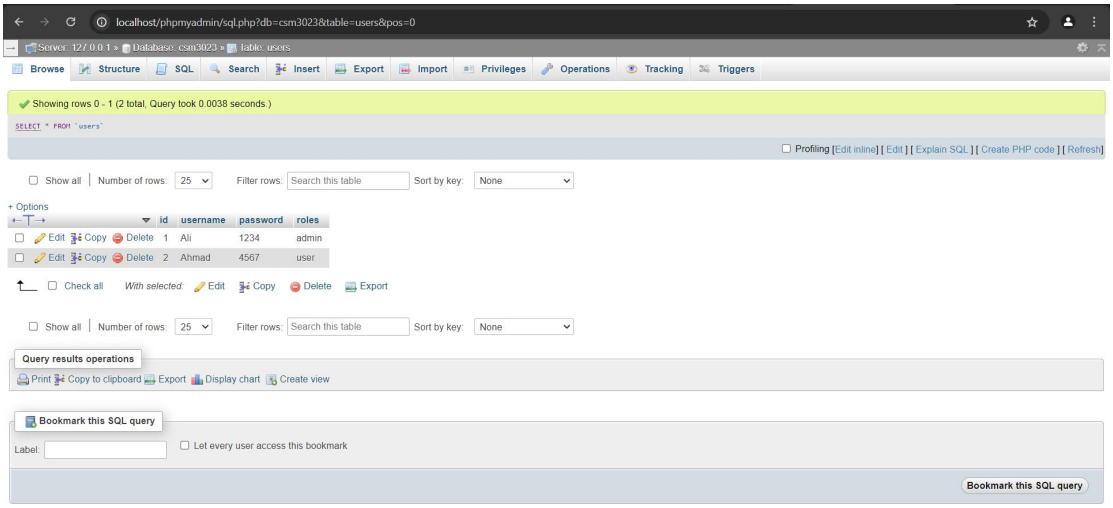
1. What have you you learnt from this exercise?

I learned to set up a Java web app in NetBeans with Tomcat, and create HTML files and servlets for HTTP requests.

2. What are the common methods used in Java Servlet?

- doGet(HttpServletRequest req, HttpServletResponse resp): Handles HTTP GET requests.
- doPost(HttpServletRequest req, HttpServletResponse resp): Handles HTTP POST requests.
- init(): Initializes the servlet.
- destroy(): Cleans up resources before the servlet is destroyed.
- service(HttpServletRequest req, HttpServletResponse resp): General method to handle requests, typically overridden by doGet and doPost.

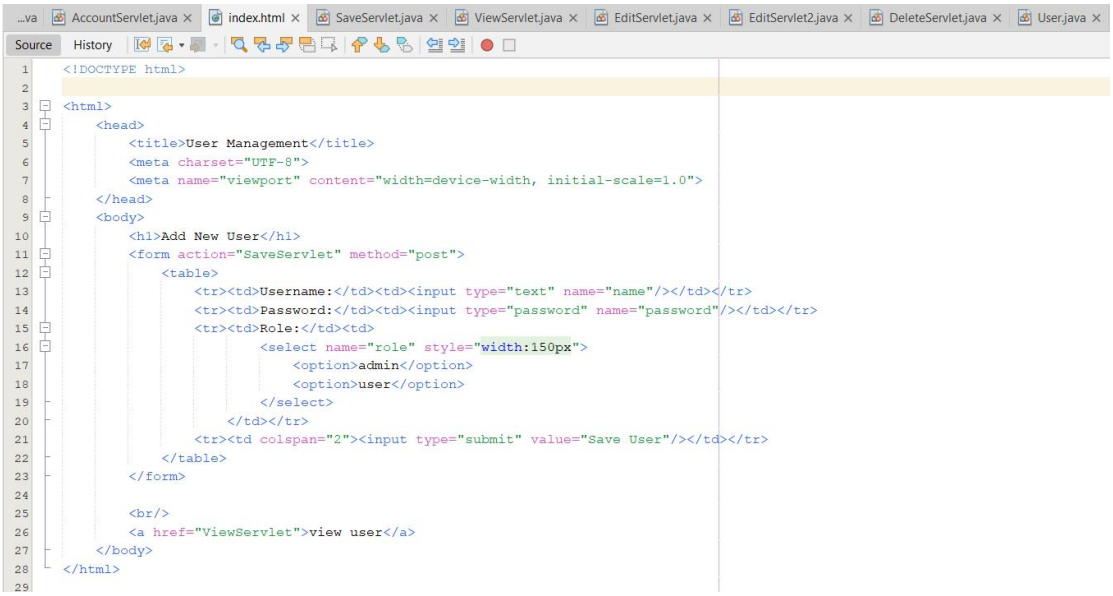
Task 2: Creating A Table in MySQL Database



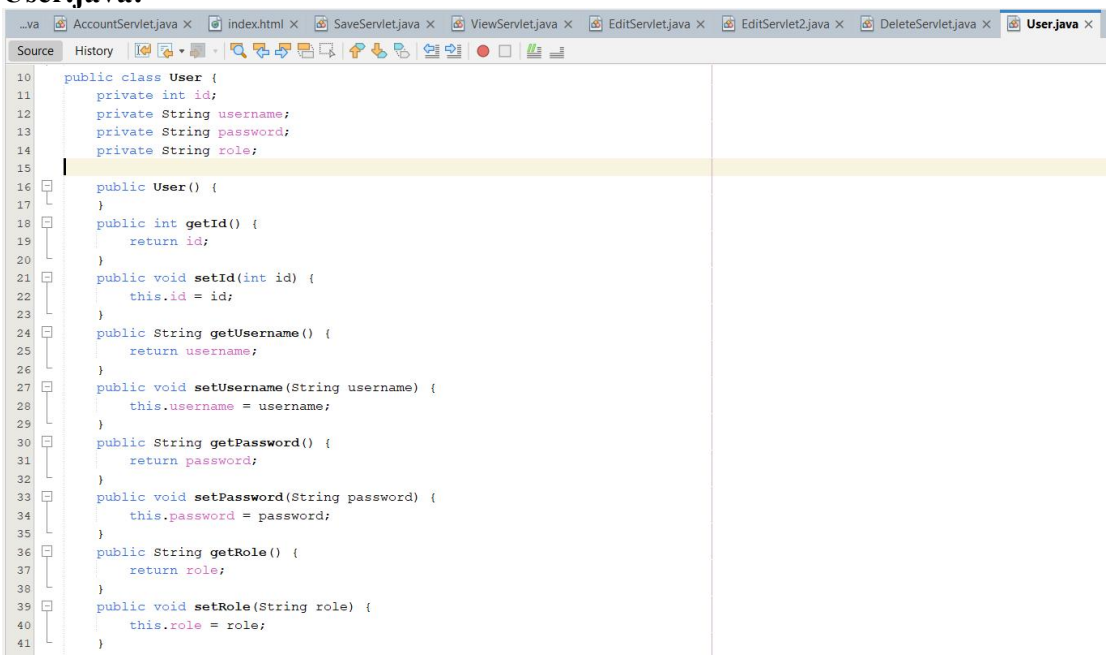
Task 4: Using Servlets for Database CRUD Operations

Code:

Index.html:

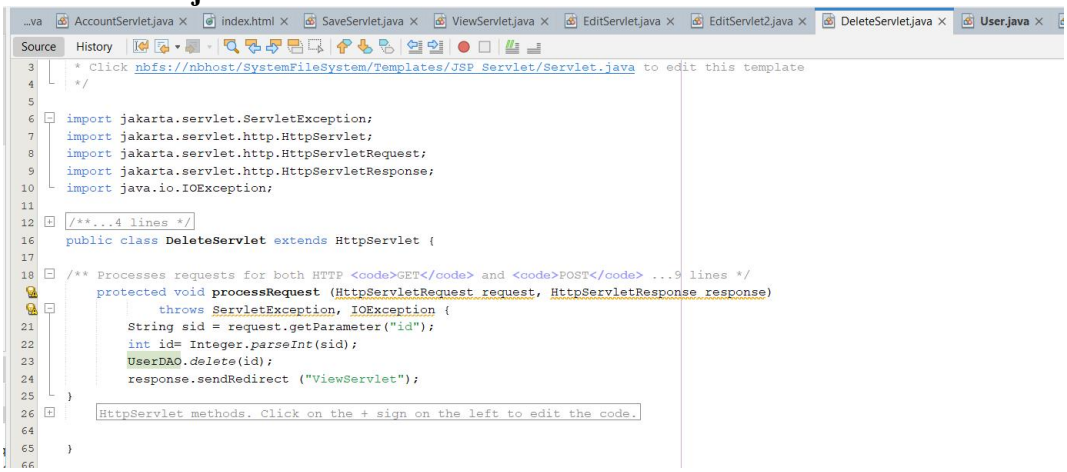


User.java:



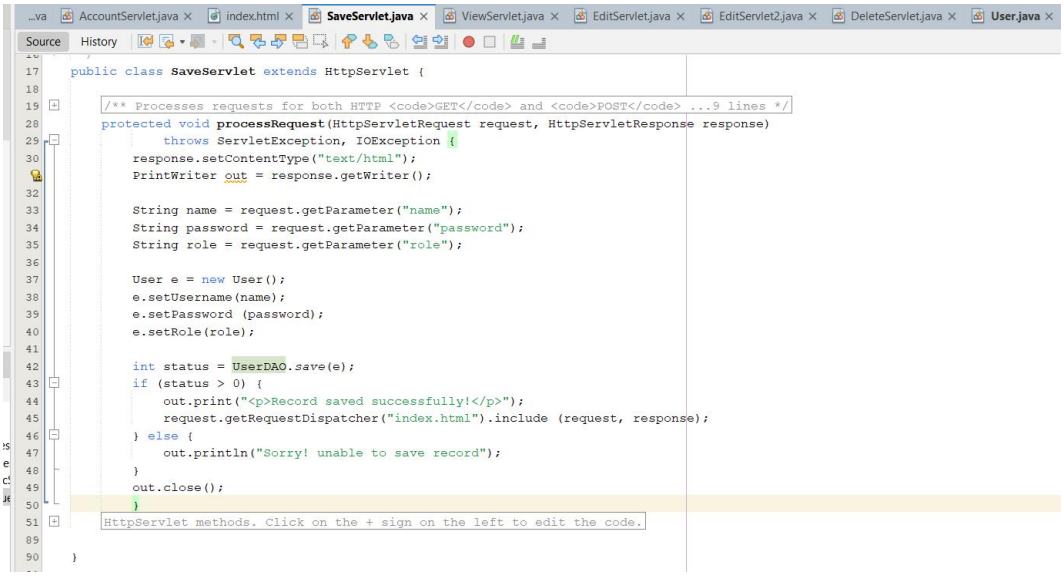
```
public class User {
    private int id;
    private String username;
    private String password;
    private String role;

    public User() {
    }
    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;
    }
```

DeleteServlet.java:



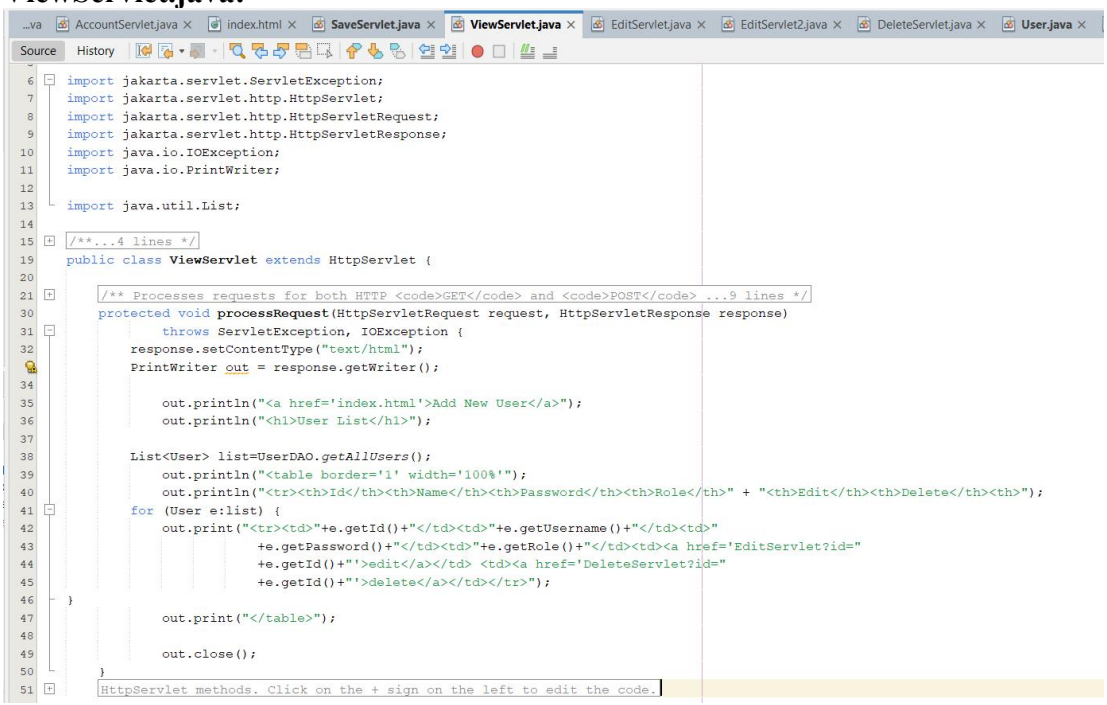
```
/*
 * Click nbfs://nbhost/SystemFileSystem/Templates/JSP_Servlet/Servlet.java to edit this template
 */

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

/**...4 lines */
public class DeleteServlet extends HttpServlet {

/** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
    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.

}
```

Save.Servlet:



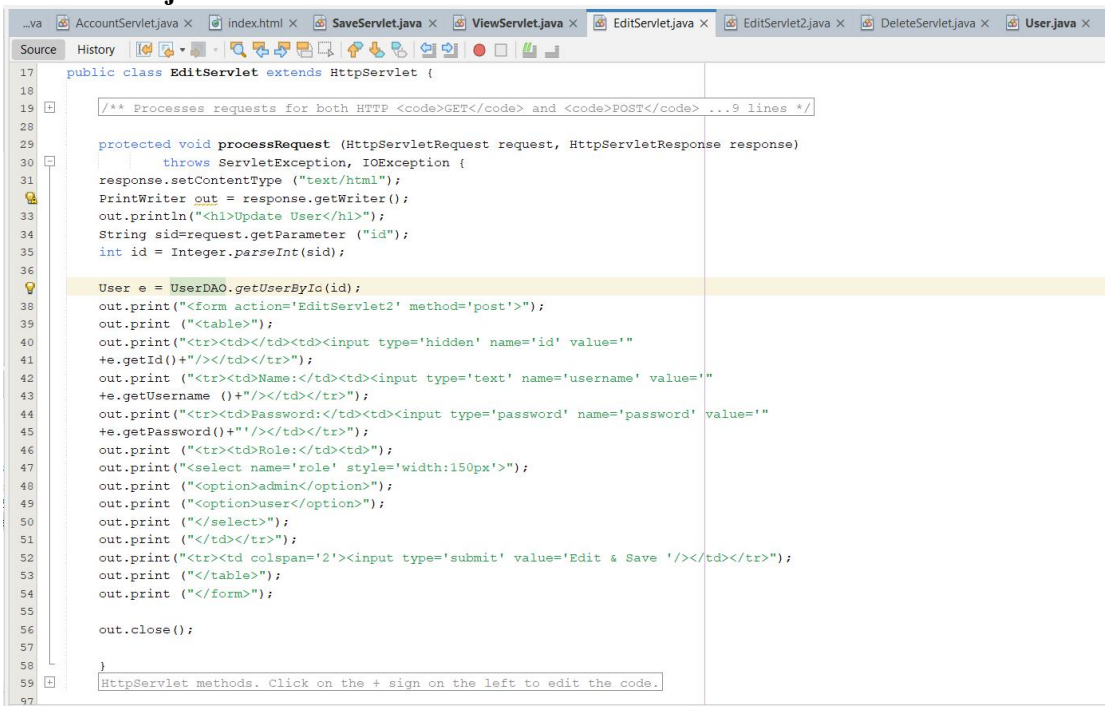
```
public class SaveServlet extends HttpServlet {

    /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html");
        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:



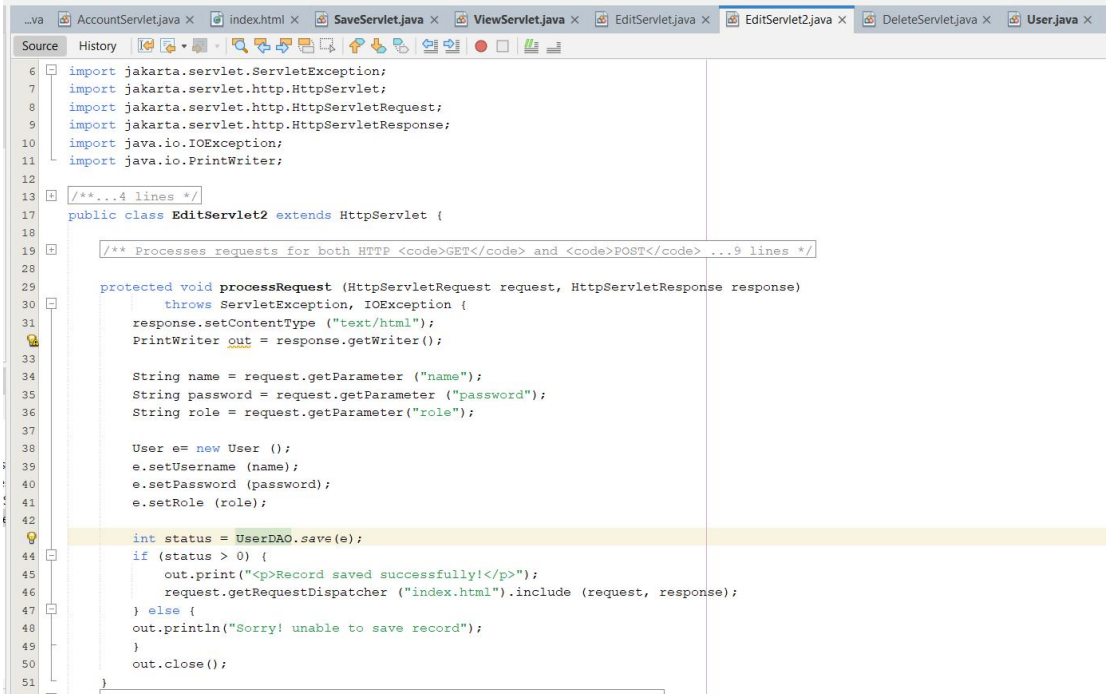
```java
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
import java.io.IOException;
import java.io.PrintWriter;

import java.util.List;

/**...4 lines */
public class ViewServlet extends HttpServlet {

    /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html");
        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.println("<table border='1' width='100%'");
            out.println("<tr><th>Id</th><th>Name</th><th>Password</th><th>Role</th>" + "<th>Edit</th><th>Delete</th><th>");
        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:



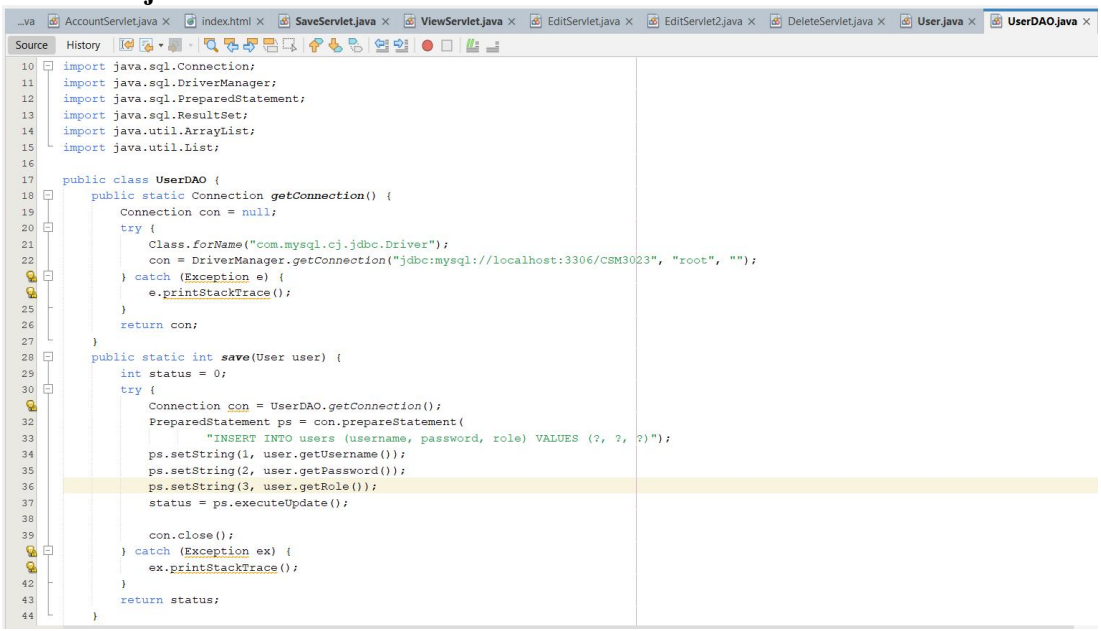
```java
public class EditServlet extends HttpServlet {

    /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */

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

    User e = UserDAO.getUserByIa(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><td>");
    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 jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
import java.io.IOException;
import java.io.PrintWriter;

/**...4 lines */
public class EditServlet2 extends HttpServlet {

    /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */

    protected void processRequest (HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType ("text/html");
        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();
    }
```

UserDAO.java:



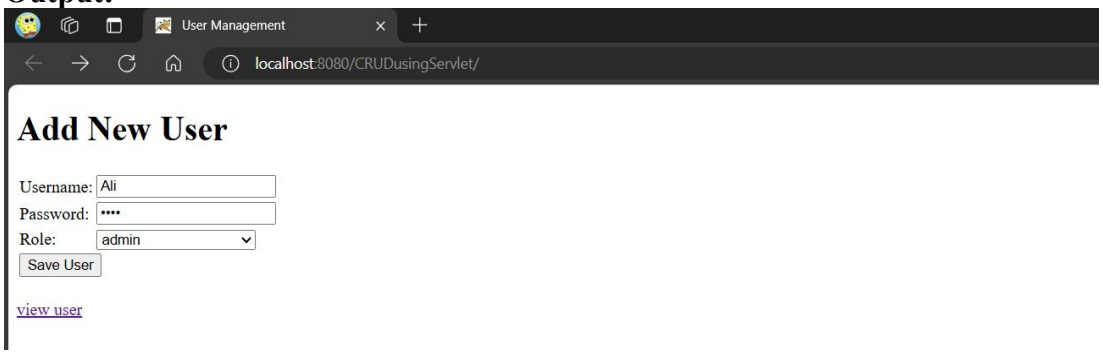
```java
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.util.ArrayList;
import java.util.List;

public class UserDAO {
    public static Connection getConnection() {
        Connection con = null;
        try {
            Class.forName("com.mysql.cj.jdbc.Driver");
            con = DriverManager.getConnection("jdbc:mysql://localhost:3306/CSM3023", "root", "");
        } catch (Exception e) {
            e.printStackTrace();
        }
        return con;
    }
    public static int save(User user) {
        int status = 0;
        try {
            Connection con = UserDAO.getConnection();
            PreparedStatement ps = con.prepareStatement(
                    "INSERT INTO users (username, password, role) VALUES (?, ?, ?)");
            ps.setString(1, user.getUsername());
            ps.setString(2, user.getPassword());
            ps.setString(3, user.getRole());
            status = ps.executeUpdate();

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

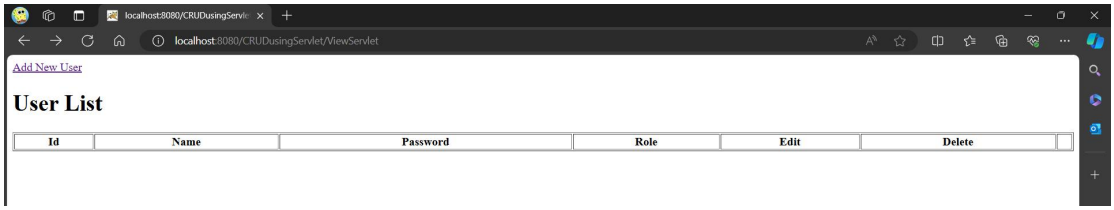
```java
public static int update(User user) {
    int status = 0;
    try {
        Connection con = UserDAO.getConnection();
        PreparedStatement ps = con.prepareStatement(
                "UPDATE users SET username=?, password=?, role=? WHERE id=? ");
        ps.setString(1, user.getUsername());
        ps.setString(2, user.getPassword());
        ps.setString(3, user.getRole());
        ps.setInt(4, user.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;
}
```

```java
public static User getUserById(int id) {
    User user = null;
    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()) {
            user = new User();
            user.setId(rs.getInt("id"));
            user.setUsername(rs.getString("username"));
            user.setPassword(rs.getString("password"));
            user.setRole(rs.getString("role"));
        }
        con.close();
    } catch (Exception ex) {
        ex.printStackTrace();
    }
    return user;
}
```

```java
public static List<User> getAllUsers() {
    List<User> userList = new ArrayList<>();
    try {
        Connection con = UserDAO.getConnection();
        PreparedStatement ps = con.prepareStatement(
                "SELECT * FROM users");
        ResultSet rs = ps.executeQuery();
        while (rs.next()) {
            User user = new User();
            user.setId(rs.getInt("id"));
            user.setUsername(rs.getString("username"));
            user.setPassword(rs.getString("password"));
            user.setRole(rs.getString("role"));
            userList.add(user);
```

Output:





Reflections:

1. What is the name of the Java Library that you need to import before coding the web application with database operations?
need to import the JDBC (Java Database Connectivity) library.

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 located in the WEB-INF folder of a Java web application. It contains configurations like servlet definitions (<servlet>), servlet mappings (<servlet-mapping>), and other settings.

3. Define the usage of Data Access Object (DAO) servlet. How it ease the business process in your servlet-based web application?
A DAO servlet separates database tasks from servlets, making code cleaner and easier to reuse. It simplifies how applications interact with databases, improving maintenance and testing in servlet-based web apps.