UNIVERSITI MALAYSIA TERENGGANU

FACULTY OF COMPUTER SCIENCE AND MATHEMATICS

CSM3023 – WEB BASED APPLICATION DEVELOPMENT

LAB REPORT 2 - SERVLET: DATA SHARING AND DATABASE MANAGEMENT

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WITH HONOURS

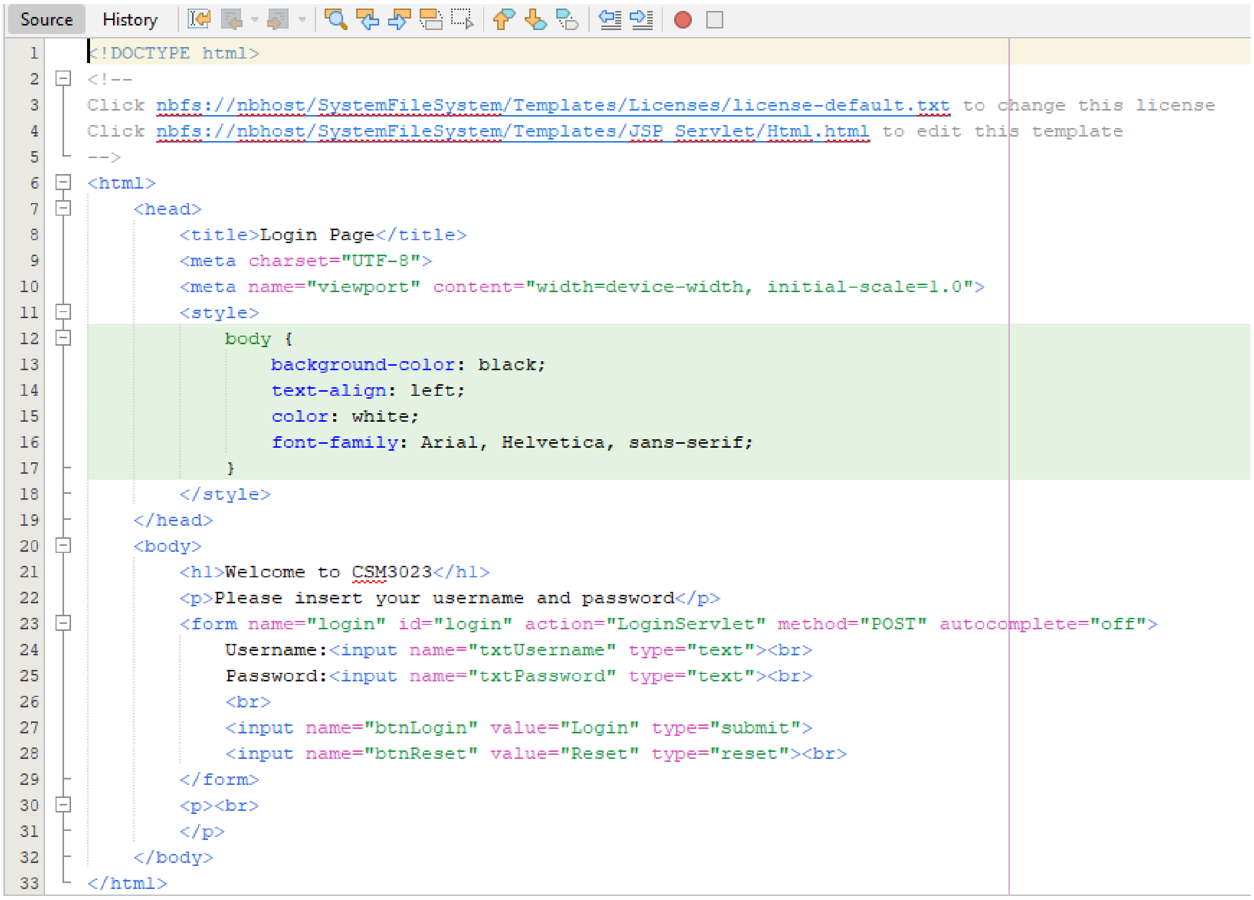
SEMESTER II 2023/2024

TASK 1 DATA SHARING IN SERVLET

Objective :

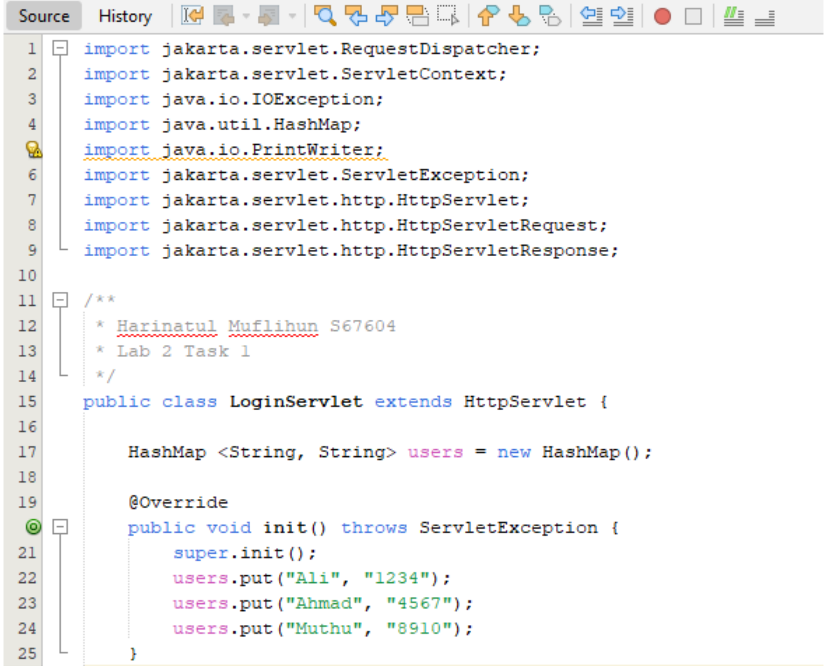
- To use servlet for request forwarding and data sharing.

Login.html Code

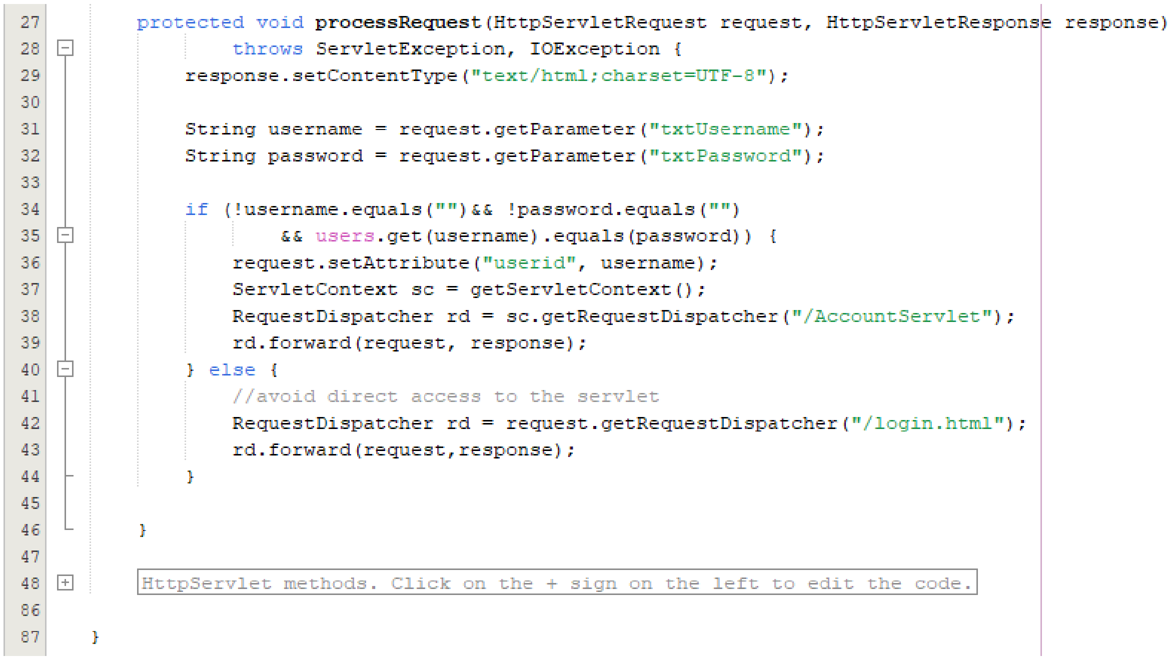


```
<!DOCTYPE html>
<!--
Click nbfs://nbhost/SystemFileSystem/Templates/Licenses/license-default.txt to change this license
Click nbfs://nbhost/SystemFileSystem/Templates/JSP_Servlet/Html.html to edit this template
-->
<html>
    <head>
        <title>Login Page</title>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
        <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="submit">
            <input name="btnReset" value="Reset" type="reset"><br>
        </form>
        <p><br>
        </p>
    </body>
</html>
```

LoginServlet.java Code

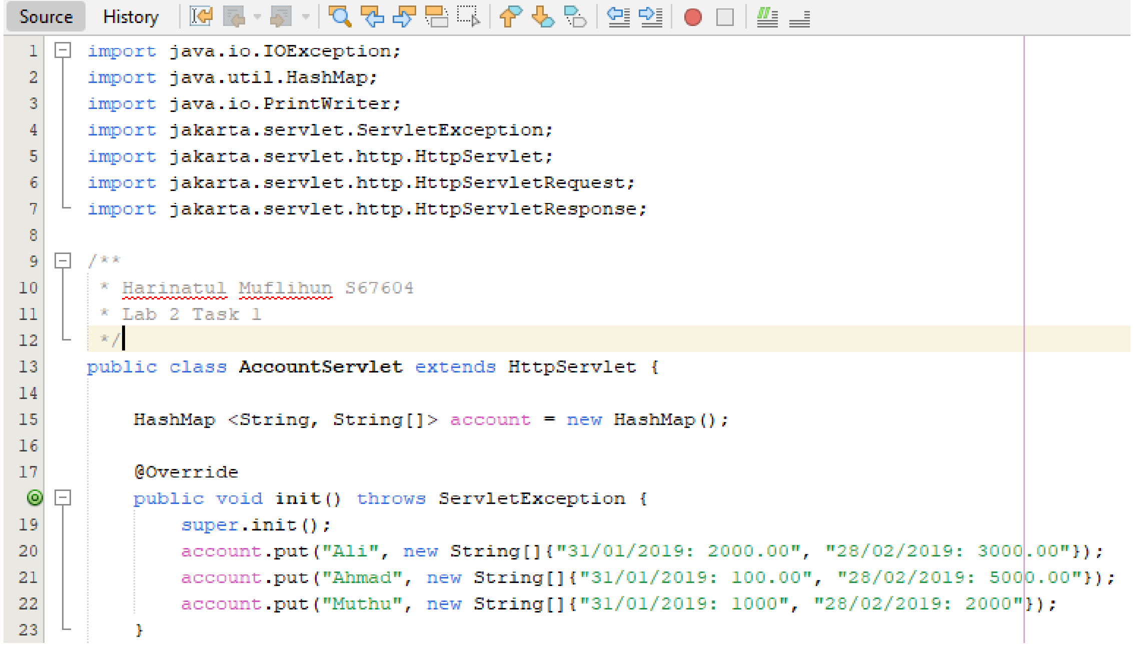


```java
import jakarta.servlet.RequestDispatcher;
import jakarta.servlet.ServletContext;
import java.io.IOException;
import java.util.HashMap;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;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

/**
 * Harinatul Muflihun S67604
 * Lab 2 Task 1
 */
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");
    }
```

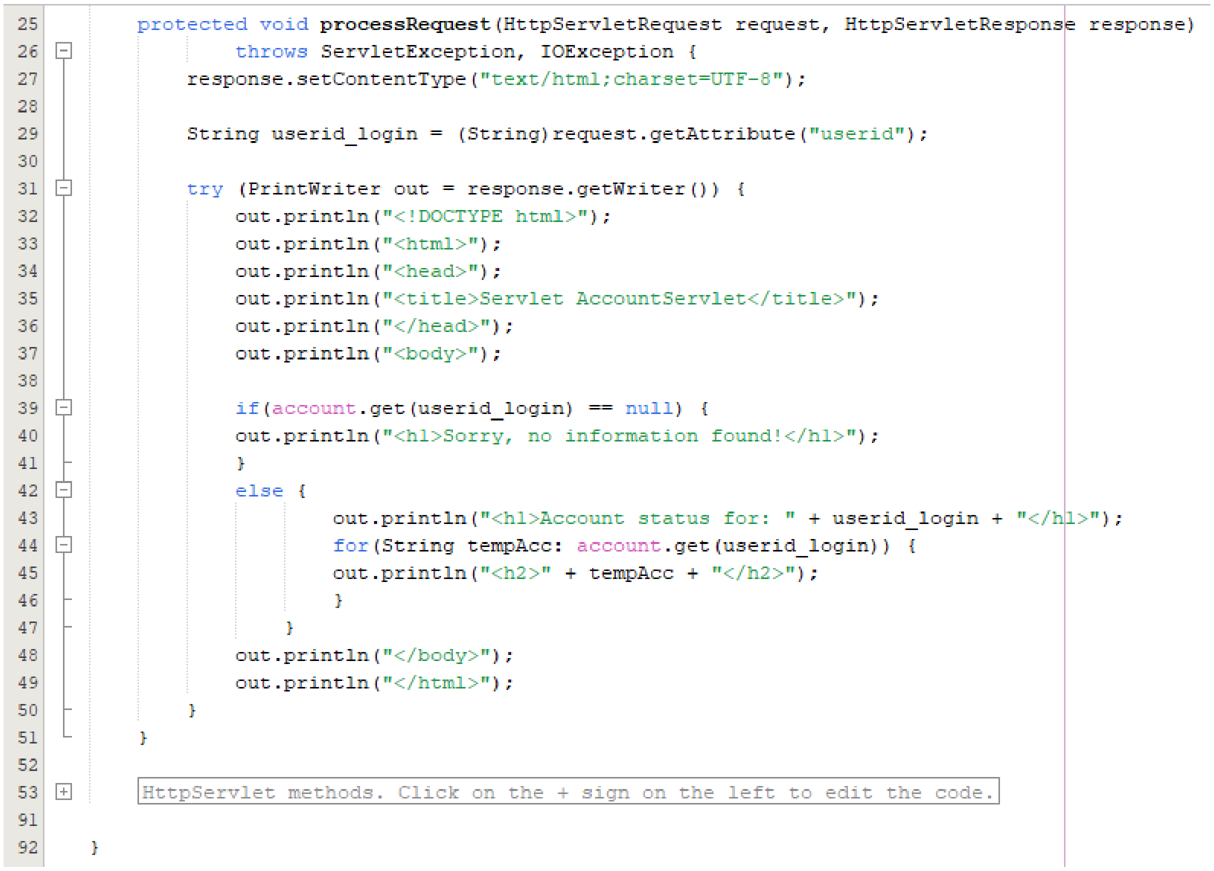


```java
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");

        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 Code



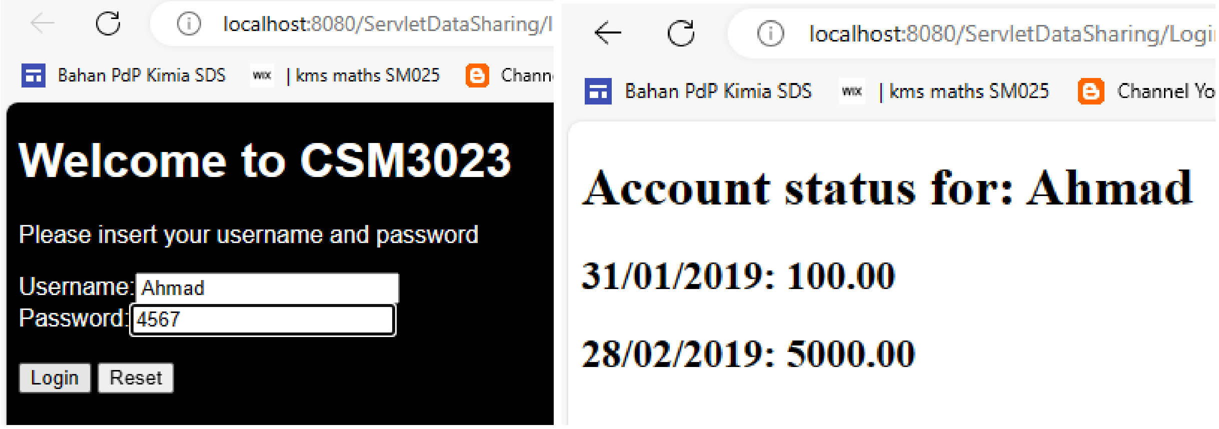
```java
import java.io.IOException;
import java.util.HashMap;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

/**
 * Harinatul Muflihun S67604
 * Lab 2 Task 1
 */
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"});
    }
```



```java
    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>");
        }
    }

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

}
```

This is the output.

a) Output for Ahmad



Welcome to CSM3023

Please insert your username and password

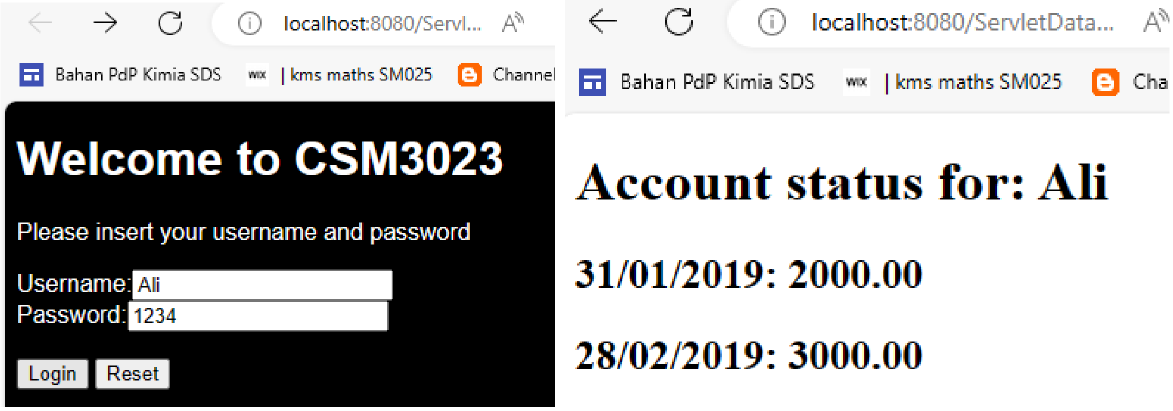
Username: Ahmad
Password: 4567

Account status for: Ahmad

31/01/2019: 100.00

28/02/2019: 5000.00

b) Output for Ali



Welcome to CSM3023

Please insert your username and password

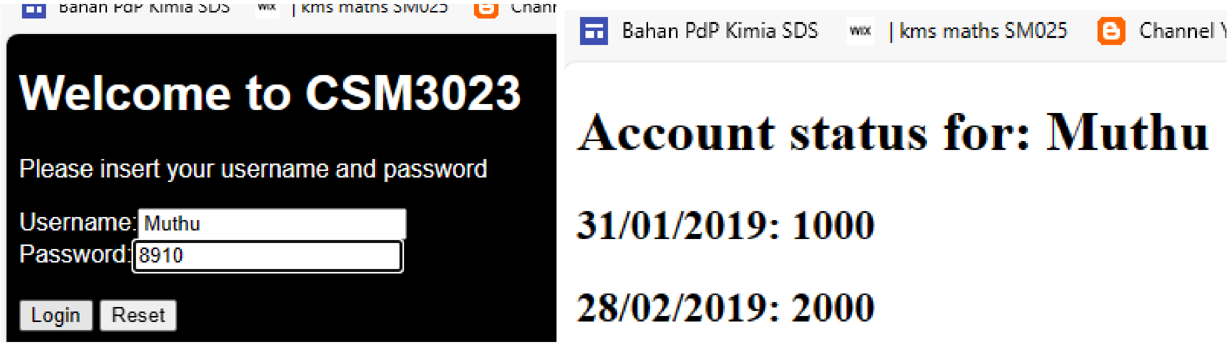
Username: Ali
Password: 1234

Account status for: Ali

31/01/2019: 2000.00

28/02/2019: 3000.00

c) Output for Muthu



Welcome to CSM3023

Please insert your username and password

Username: Muthu
Password: 8910

Account status for: Muthu

31/01/2019: 1000

28/02/2019: 2000

Reflections :

1. What have you learnt from this exercise?

   - I learnt to create the servlet, used HashMap and how to use a post method. HashMap is one way to store data. With HashMap, the data will efficiently retrieve and manipulate.

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

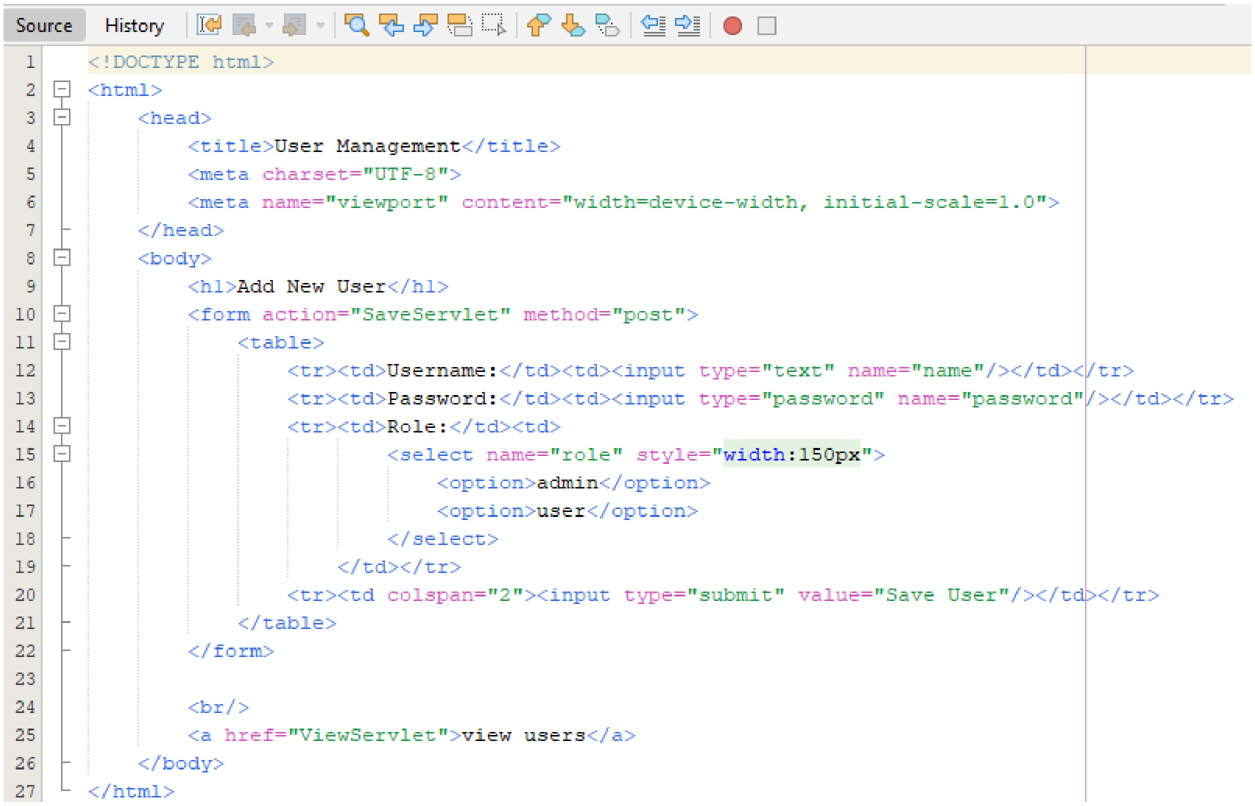
   - The command methods used in Java Servlet are Get method and Post method. But in task 1, the method that we used is Post method. This is because Post method for sensitive information and used to create or update a resource. For this case, amount account is a sensitive information and the data about amount account always needs to update.

TASK 4 : USING SERVLETS FOR DATABASE CRUD OPERATIONS

Objective :

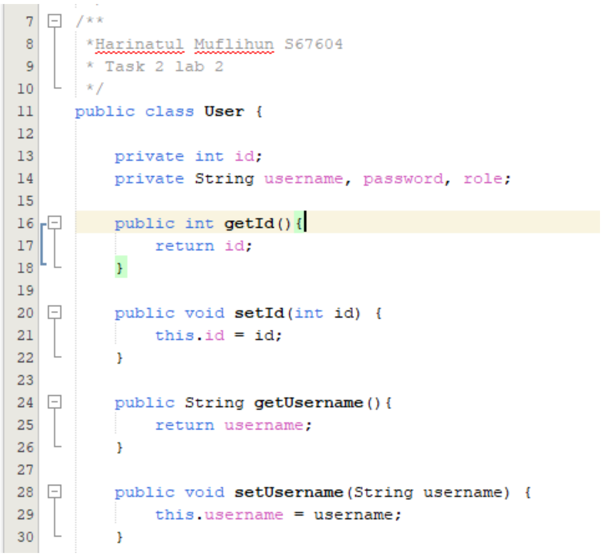
- To program multiple servlets for manipulating the database.

Index.html Code

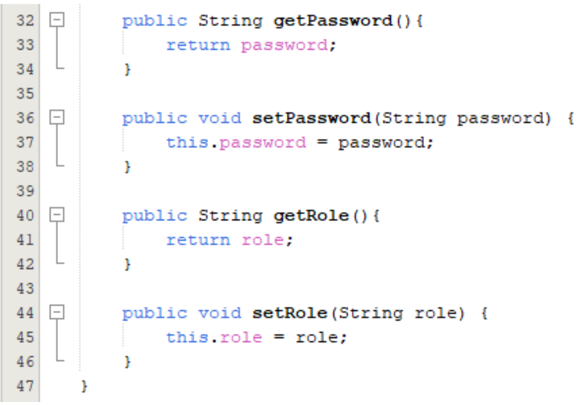


```
<!DOCTYPE html>
<html>
    <head>
        <title>User Management</title>
        <meta charset="UTF-8">
        <meta name="viewport" content="width=device-width, initial-scale=1.0">
    </head>
    <body>
        <h1>Add New User</h1>
        <form action="SaveServlet" method="post">
            <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

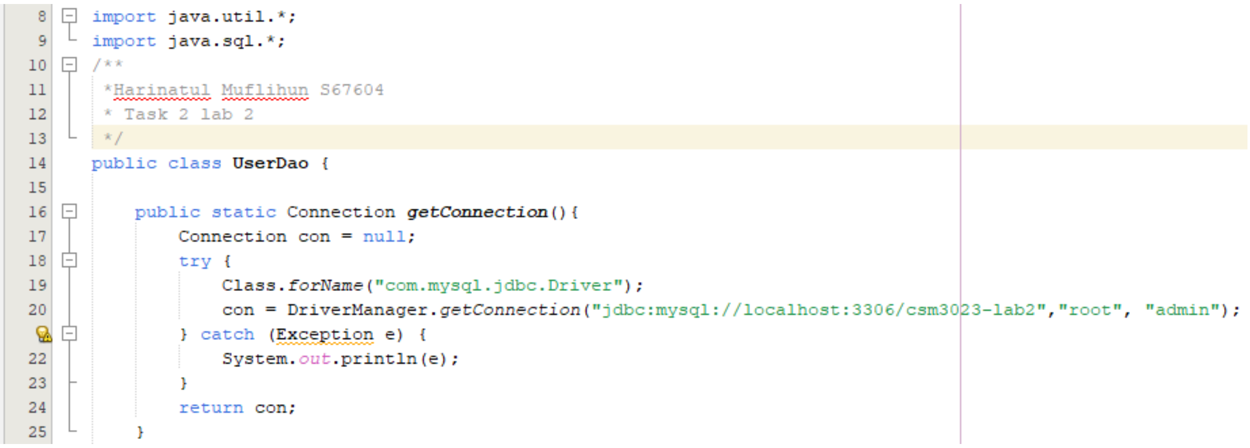


```java
/**
 *Harinatul Muflihun S67604
 * Task 2 lab 2
 */
public class User {

    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;
    }
```

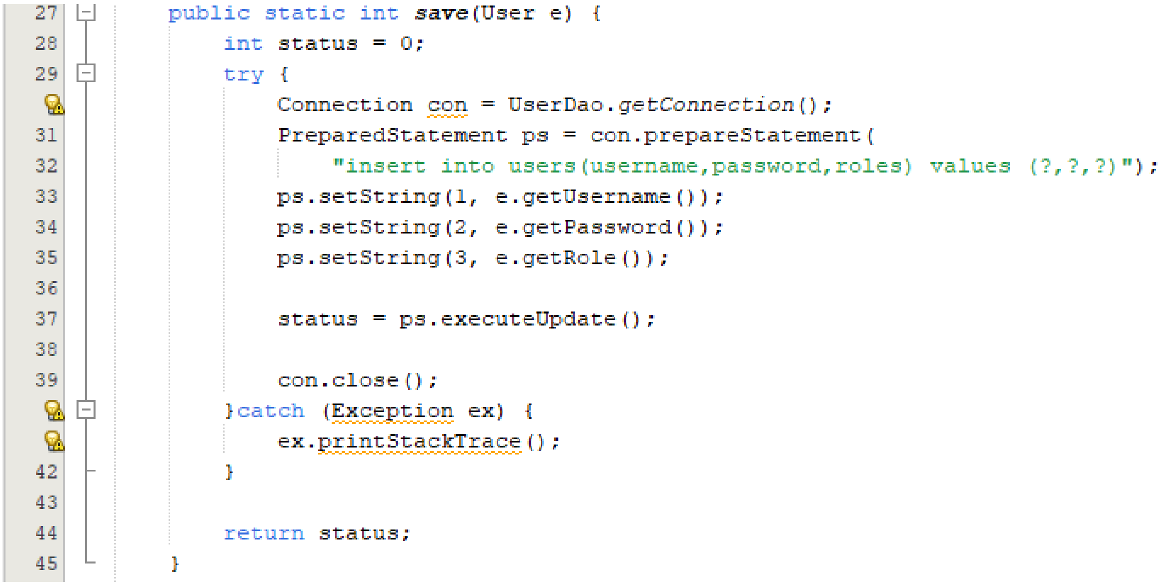


```java
    public String getPassword(){
        return password;
    }

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

    public String getRole(){
        return role;
    }

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

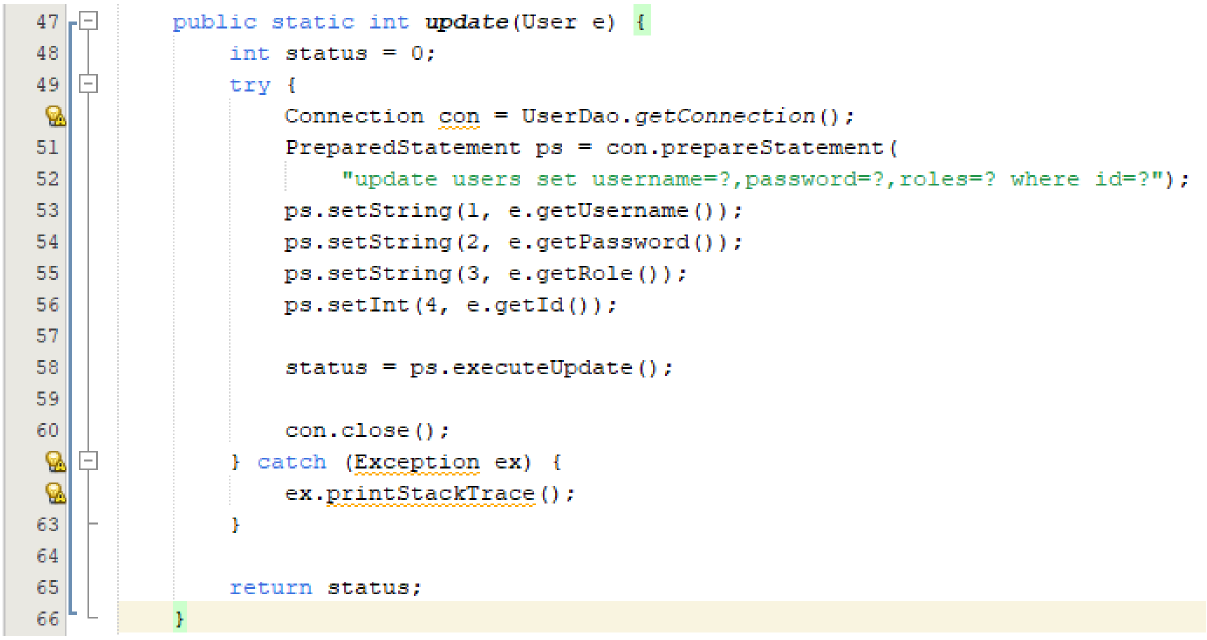
UserDao.java



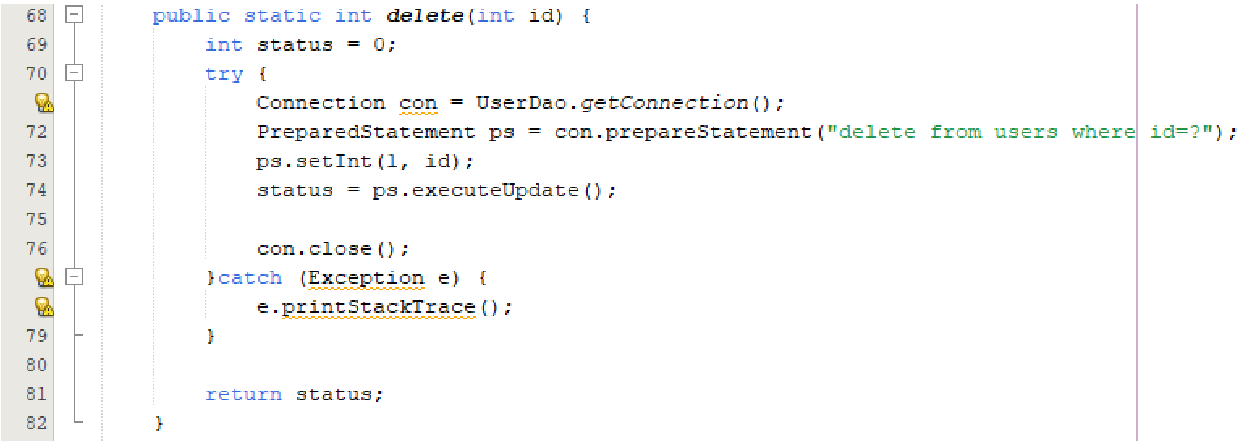
```java
import java.util.*;
import java.sql.*;
/**
 *Harinatul Muflihun S67604
 * Task 2 lab 2
 */
public class UserDao {

    public static Connection getConnection(){
        Connection con = null;
        try {
            Class.forName("com.mysql.jdbc.Driver");
            con = DriverManager.getConnection("jdbc:mysql://localhost:3306/csm3023-lab2","root", "admin");
        } catch (Exception e) {
            System.out.println(e);
        }
        return con;
    }
```



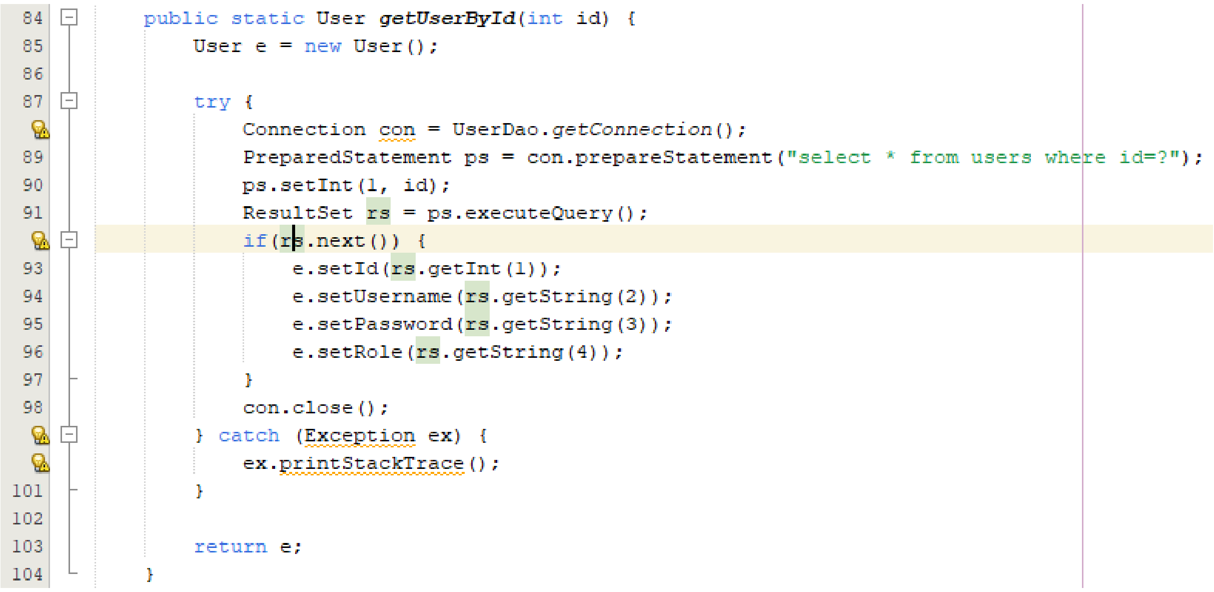
```java
    public static int save(User e) {
        int status = 0;
        try {
            Connection con = UserDao.getConnection();
            PreparedStatement ps = con.prepareStatement(
                "insert into users(username,password,roles) values (?,?,?)");
            ps.setString(1, e.getUsername());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

            status = ps.executeUpdate();

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

        return status;
    }
```



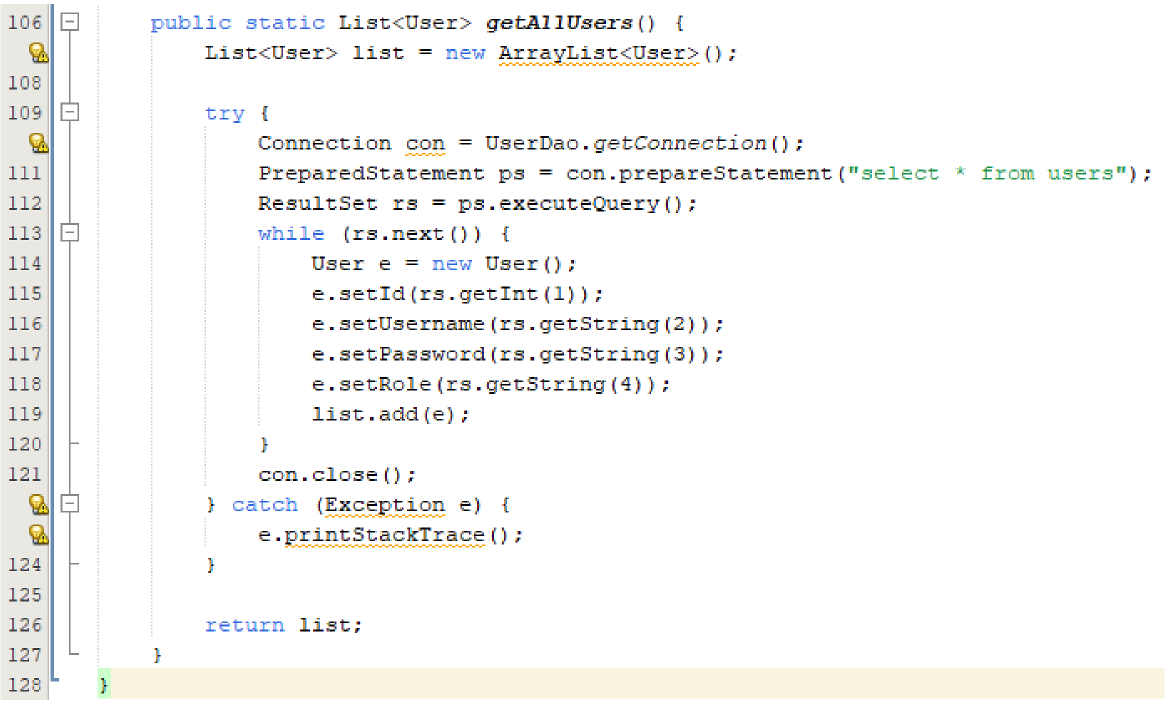
```java
    public static int update(User e) {
        int status = 0;
        try {
            Connection con = UserDao.getConnection();
            PreparedStatement ps = con.prepareStatement(
                "update users set username=?,password=?,roles=? where id=?");
            ps.setString(1,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



```java
    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;
    }
```

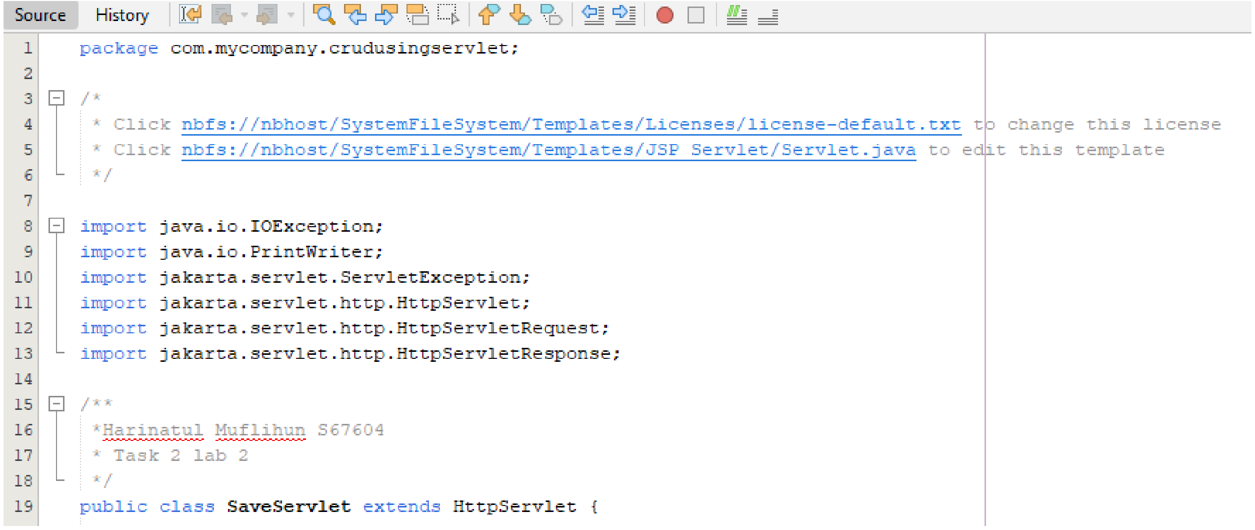


```java
    public static User getUserById(int id) {
        User e = new User();

        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;
    }
```

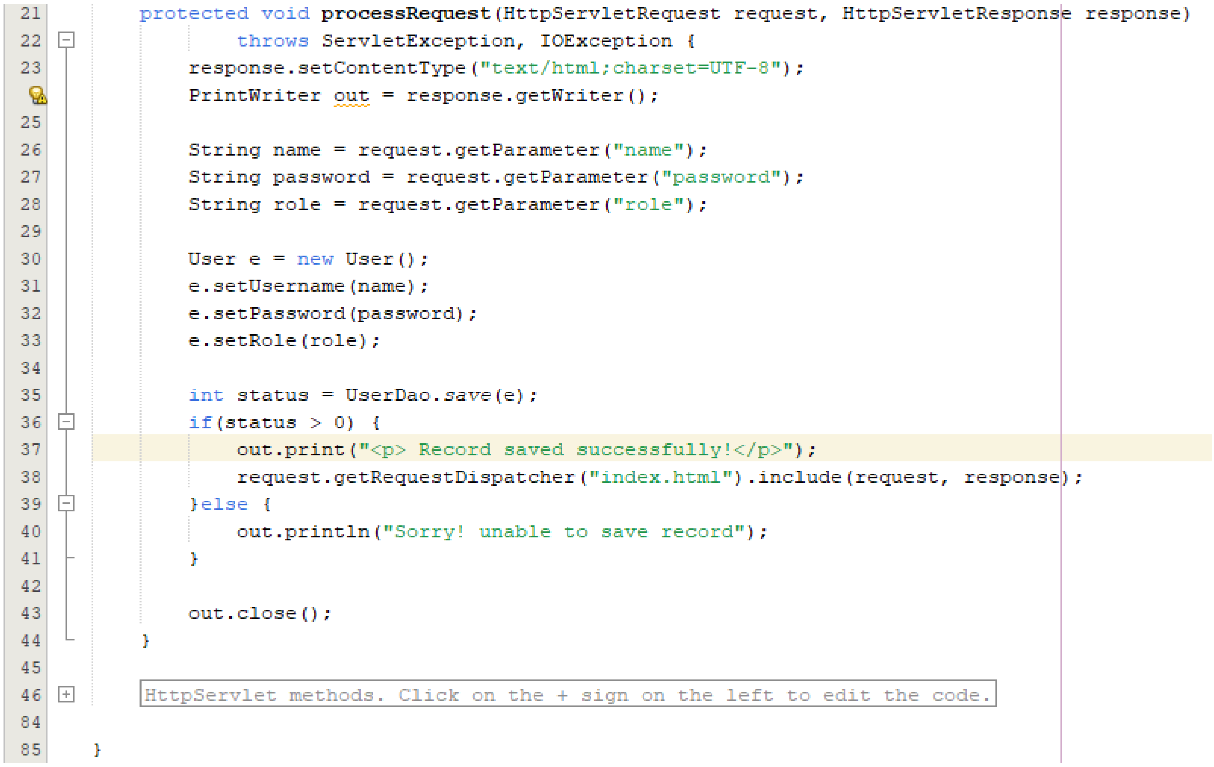


```java
    public static List<User> getAllUsers() {
        List<User> list = new ArrayList<User>();

        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

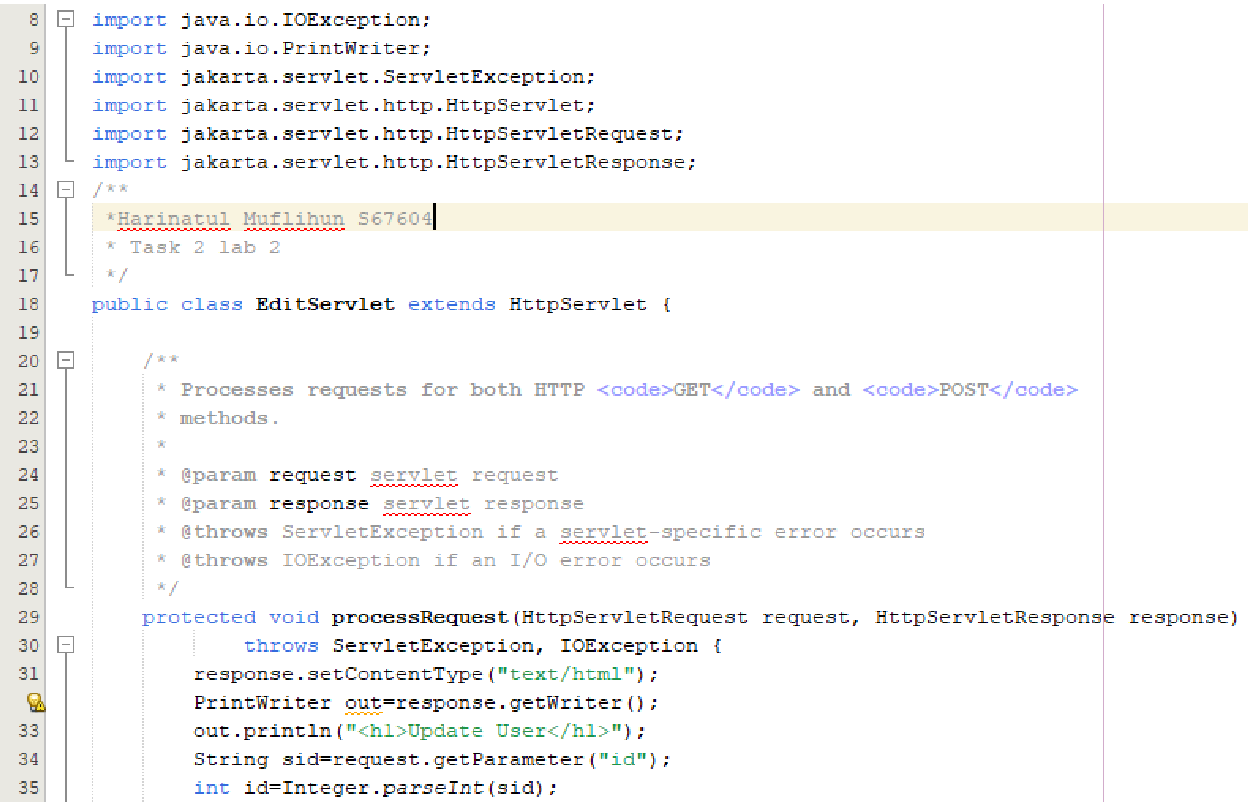


```java
package com.mycompany.crudusingservlet;

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

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;

/**
 *Harinatul Muflihun S67604
 * Task 2 lab 2
 */
public class SaveServlet extends HttpServlet {
```

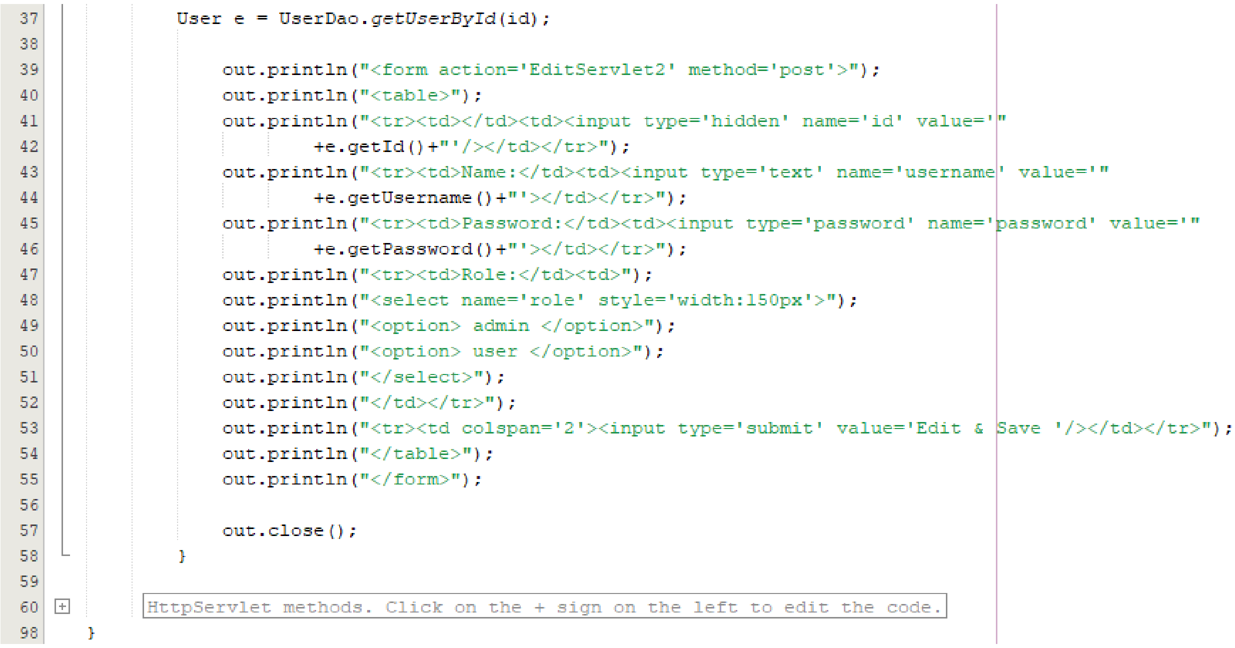


```java
    protected void processRequest(HttpServletRequest request, HttpServletResponse response)
            throws ServletException, IOException {
        response.setContentType("text/html;charset=UTF-8");
        PrintWriter out = response.getWriter();

        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.

}
```

EditServlet.java

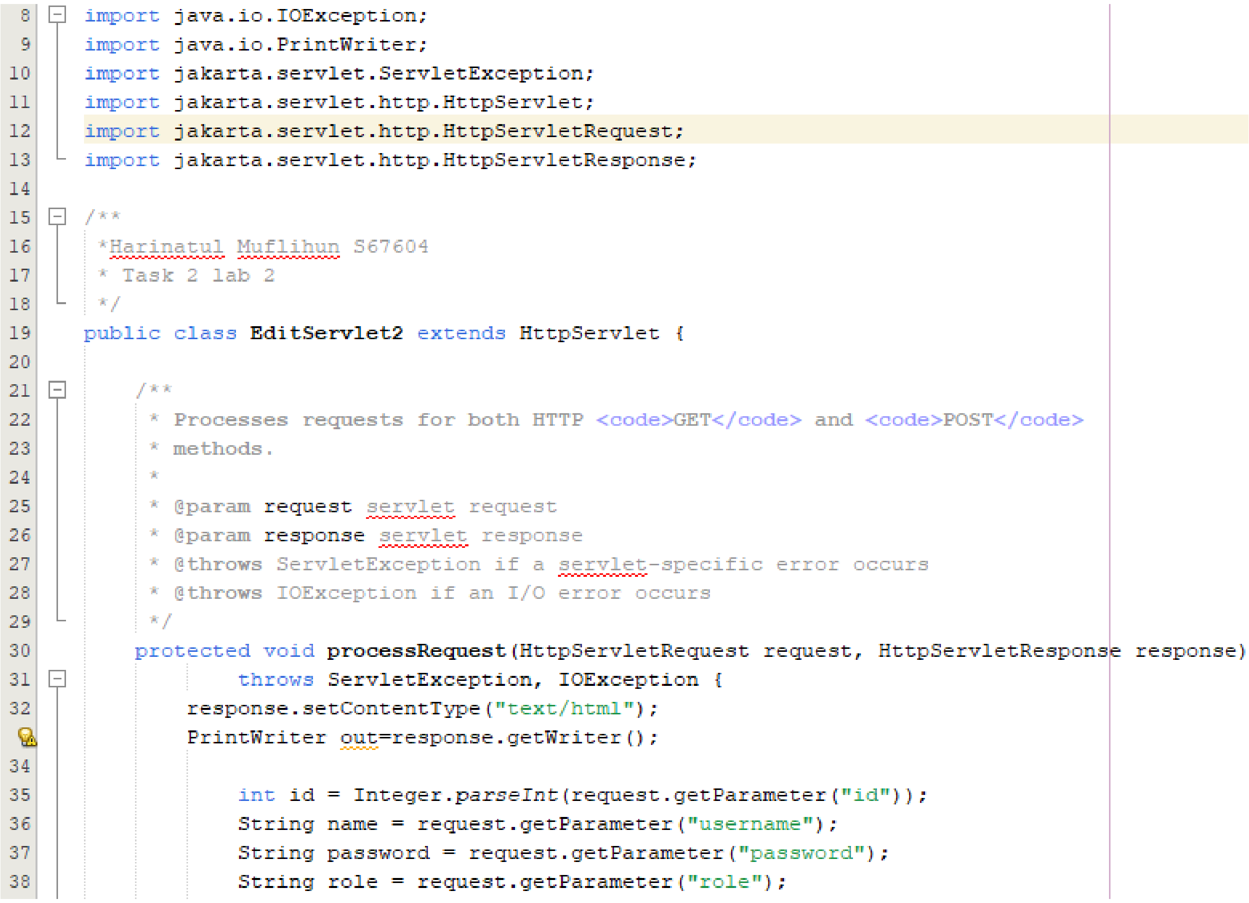


```java
import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
/**
 *Harinatul Muflihun S67604
 * Task 2 lab 2
 */
public class EditServlet 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");
        PrintWriter out=response.getWriter();
        out.println("<h1>Update User</h1>");
        String sid=request.getParameter("id");
        int id=Integer.parseInt(sid);
```

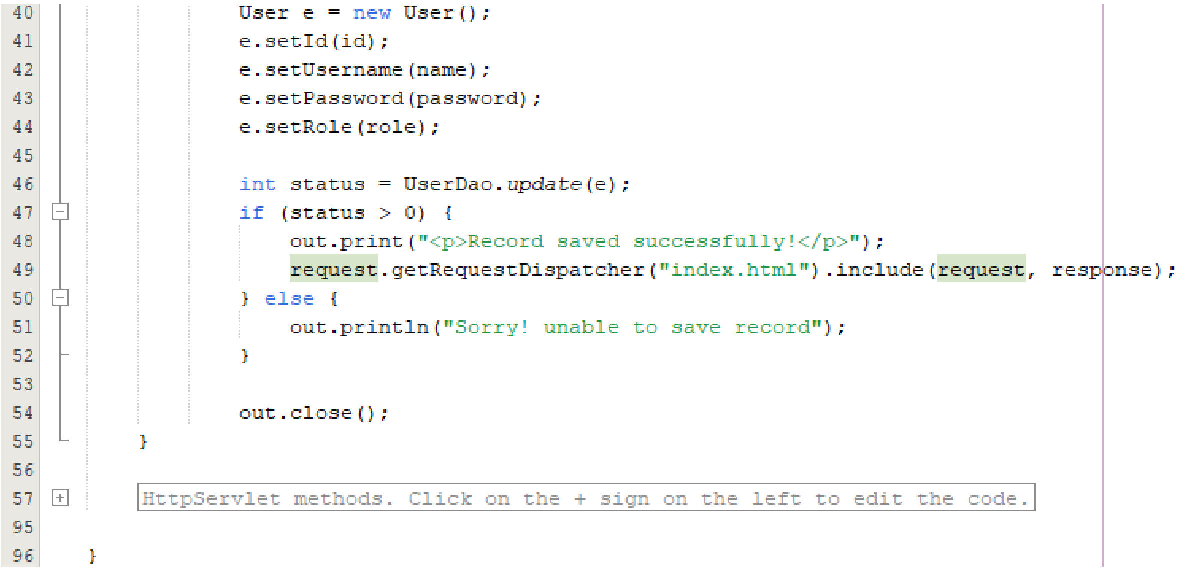


```java
        User e = UserDao.getUserById(id);

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

            out.close();
        }

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

EditServlet2.java

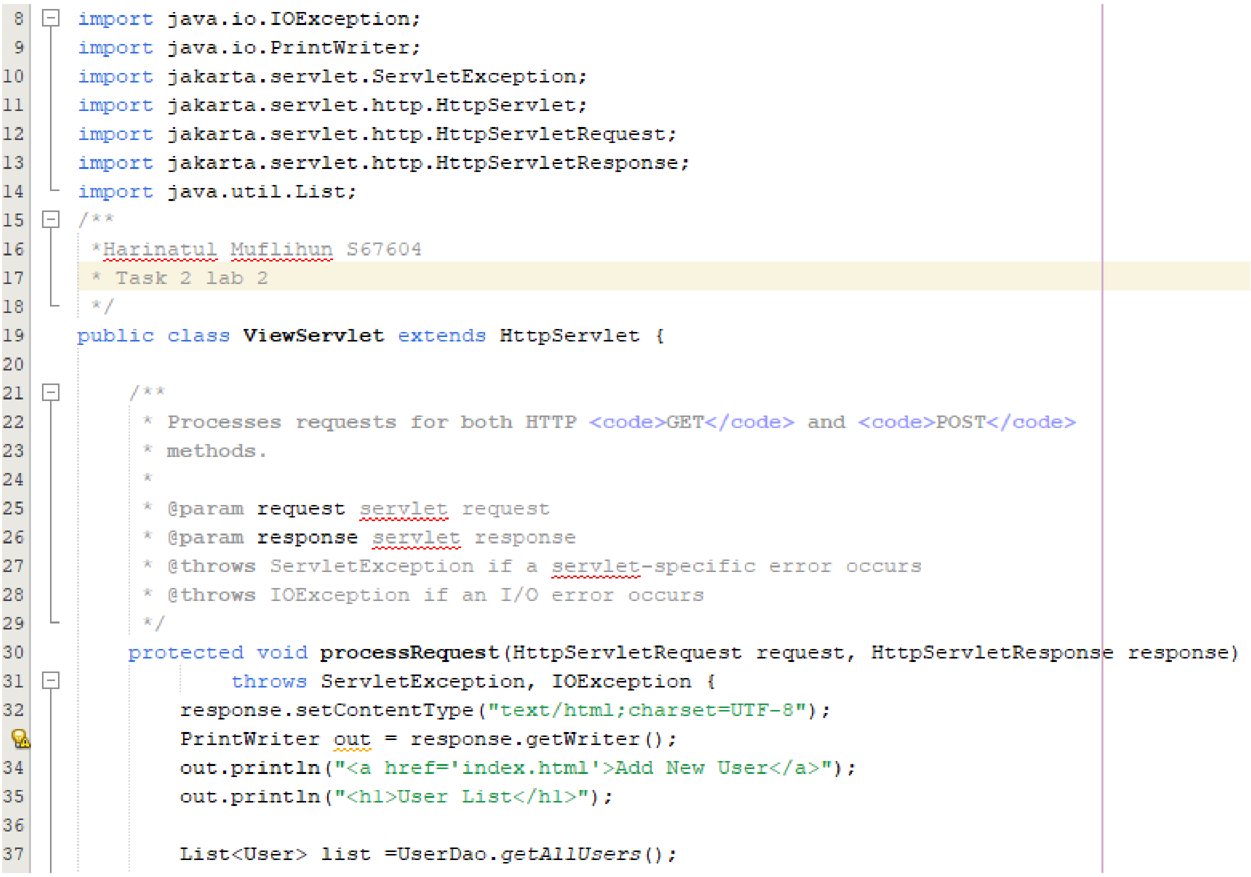


```java
import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;

/**
 *Harinatul Muflihun S67604
 * Task 2 lab 2
 */
public class EditServlet2 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");
        PrintWriter out=response.getWriter();

            int id = Integer.parseInt(request.getParameter("id"));
            String name = request.getParameter("username");
            String password = request.getParameter("password");
            String role = request.getParameter("role");
```

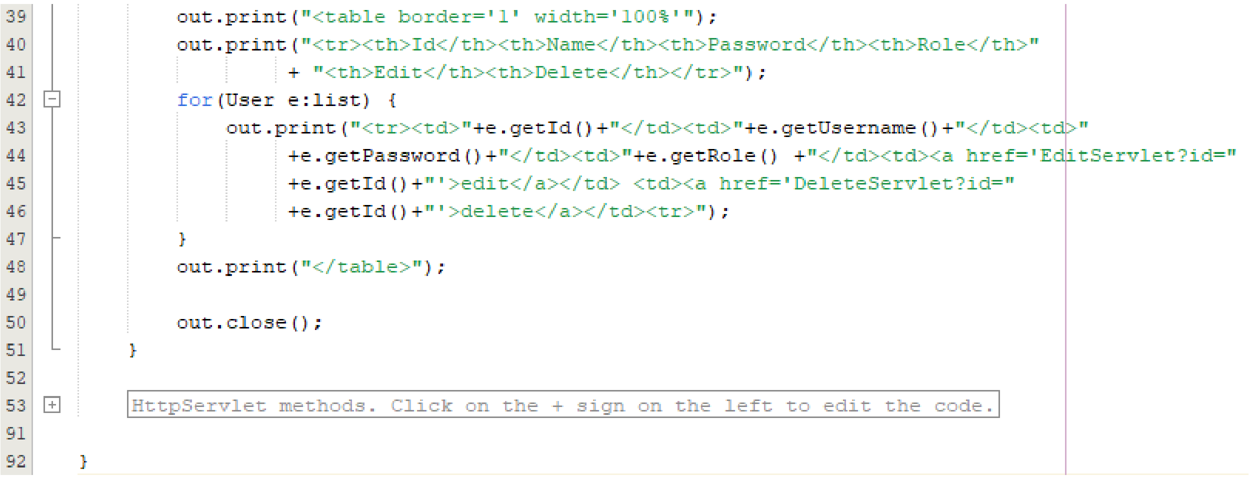


```java
            User e = new User();
            e.setId(id);
            e.setUsername(name);
            e.setPassword(password);
            e.setRole(role);

            int status = UserDao.update(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

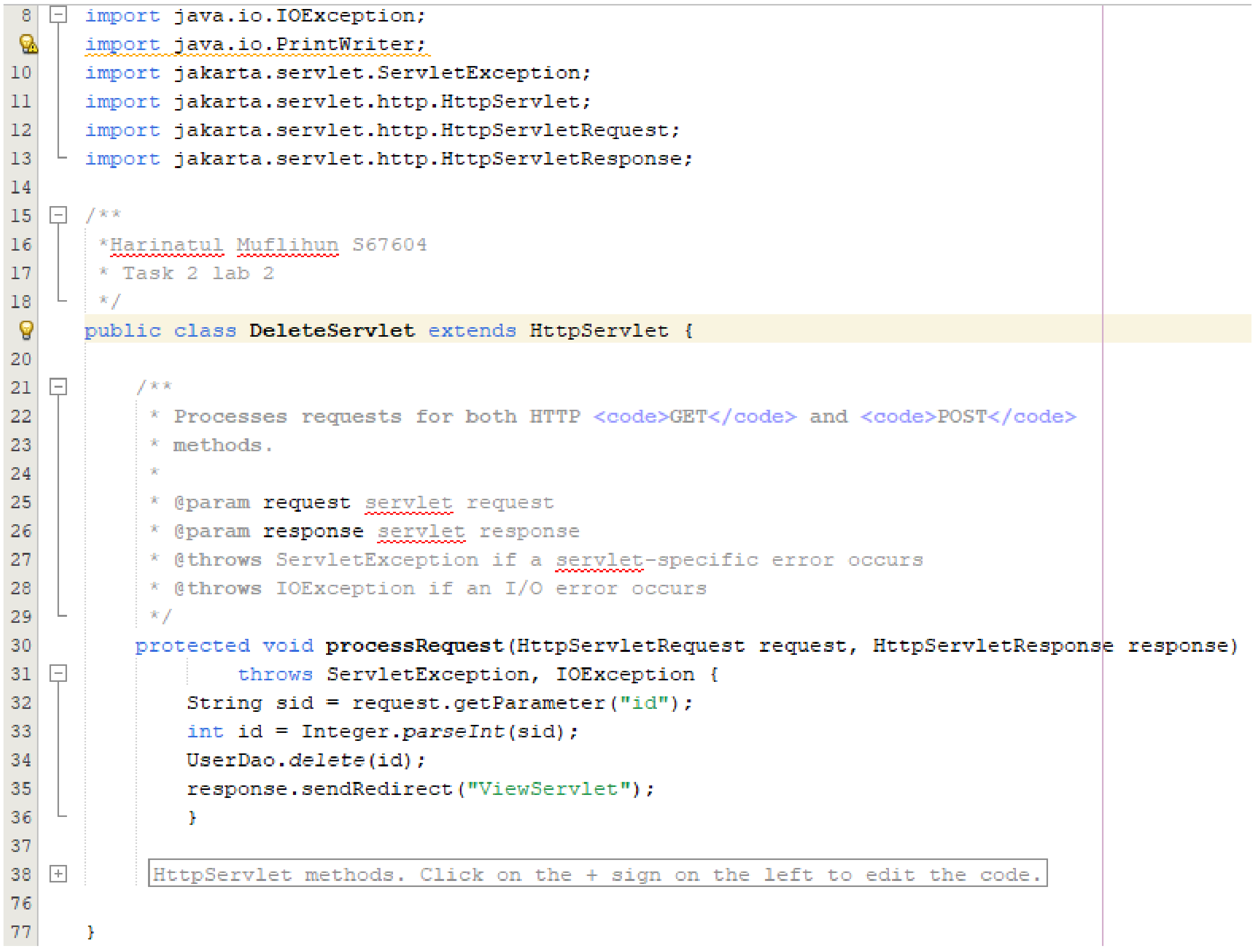


```java
import java.io.IOException;
import java.io.PrintWriter;
import jakarta.servlet.ServletException;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
import java.util.List;
/**
 *Harinatul Muflihun S67604
 * Task 2 lab 2
 */
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();
```



```java
        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.

}
```

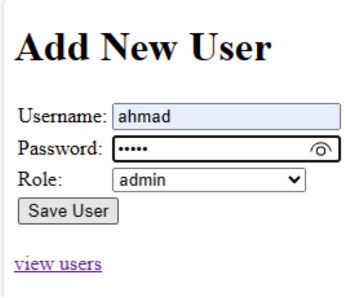
DeleteServlet.java



```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;

/**
 *Harinatul Muflihun S67604
 * Task 2 lab 2
 */
public class DeleteServlet 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 {
        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.

}
```

The output

a) Add new user



Add New User

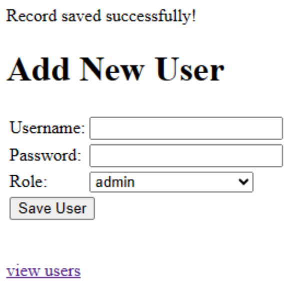
Username: ahmad

Password: •••••

Role: admin

view users

- This is the output shown when the user success register.



Record saved successfully!

Add New User

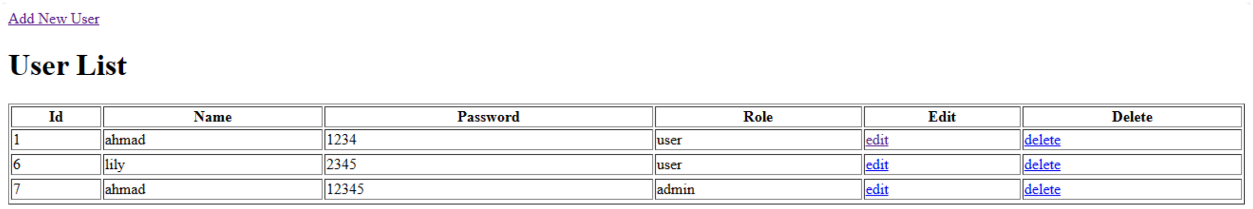
Username:

Password:

Role: admin

view users

b) Output for view users

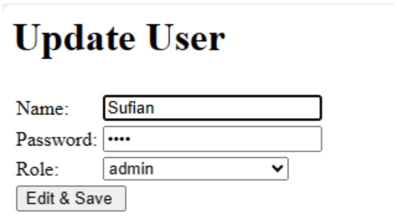


Add New User

User List

Id	Name	Password	Role	Edit	Delete
1	ahmad	1234	user	edit	delete
6	lily	2345	user	edit	delete
7	ahmad	12345	admin	edit	delete

c) Output when click the edit button.



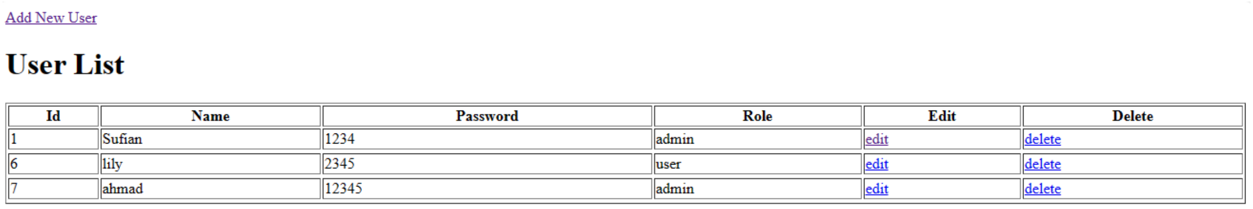
Update User

Name: Sufian

Password: ••••

Role: admin

- The result after I edit the Id=1, name=Sufian.

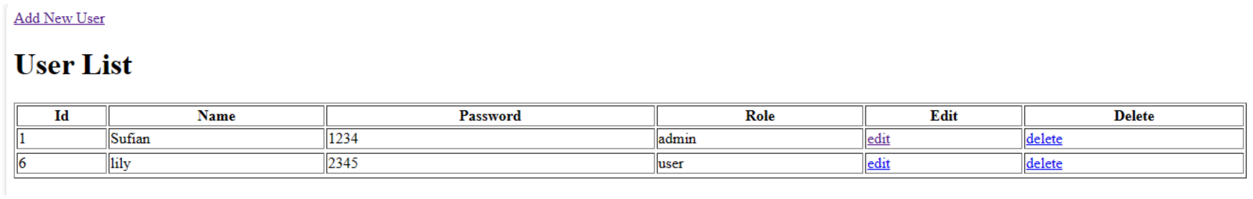


Add New User

User List

Id	Name	Password	Role	Edit	Delete
1	Sufian	1234	admin	edit	delete
6	lily	2345	user	edit	delete
7	ahmad	12345	admin	edit	delete

d) Output for deleted users.



Add New User

User List

Id	Name	Password	Role	Edit	Delete
1	Sufian	1234	admin	edit	delete
6	lily	2345	user	edit	delete

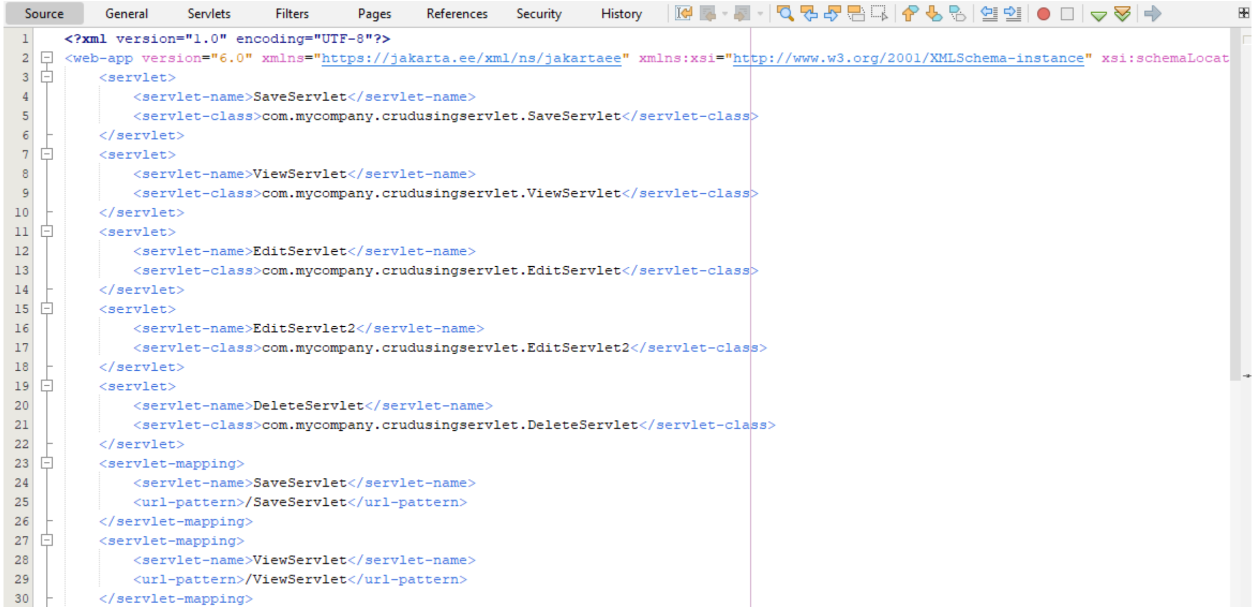
Reflection :

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

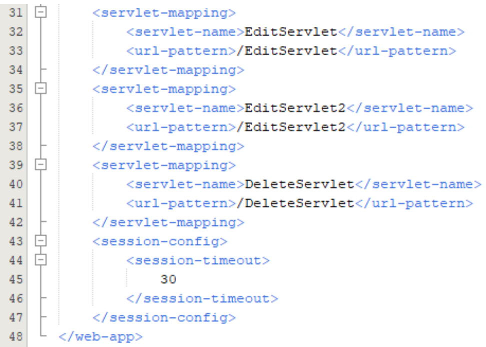
   - I need to import the MySQL JDBC Driver Library. With this MySQL JDBC, we can connect to the database for CRUD which is create, read, update and delete all the data and perform all the database operation.

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 folder that keeps the web.xml file is a 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:schemaLocat
    <servlet>
        <servlet-name>SaveServlet</servlet-name>
        <servlet-class>com.mycompany.crudusingservlet.SaveServlet</servlet-class>
    </servlet>
    <servlet>
        <servlet-name>ViewServlet</servlet-name>
        <servlet-class>com.mycompany.crudusingservlet.ViewServlet</servlet-class>
    </servlet>
    <servlet>
        <servlet-name>EditServlet</servlet-name>
        <servlet-class>com.mycompany.crudusingservlet.EditServlet</servlet-class>
    </servlet>
    <servlet>
        <servlet-name>EditServlet2</servlet-name>
        <servlet-class>com.mycompany.crudusingservlet.EditServlet2</servlet-class>
    </servlet>
    <servlet>
        <servlet-name>DeleteServlet</servlet-name>
        <servlet-class>com.mycompany.crudusingservlet.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>
```

   - <?xml version="1.0" encoding="UTF-8"?> (This explain that the file is XML with version 1.0 encoded using 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"> (This web-app refer to the XML file will represent in Java Web Application and servlet API version 6.0)

- <servlet> define a servlet.
- <servlet-name> specific name of servlet
- <servlet-class> specific package for servlet
- <servlet-mapping> this refers to maps where notices the web container which servlet need to handle.
- <servlet-name> this refers to servlet name in servlet maps.
- <url-pattern> this refers to servlet name for servlet response.
- <session-config> configures session-related settings for the application.
- <session-timeout> this refers to timeout maximum in minutes between client request and web server.

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

   - Data Access Object (DAO) function is to create and end connection to the data source. It also performs a CRUD operation which is create, read, update, delete all the data and perform all the database operation.
   - DAO eases the business process in servlet-based web application because it can separate the data access login from the servlets responsible for handle HTTP requests and generate respond. The separate make the code easy to understand.