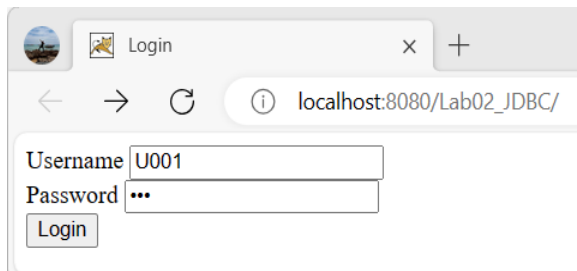


# Building an Java Web Application

## Using HTML, Servlet & JDBC

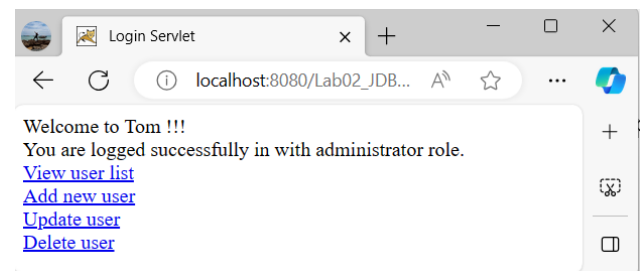
### Requirements

Create a java web application (using HTML, Servlets and JDBC) to perform functions as login and manage users (CRUD) for admin role



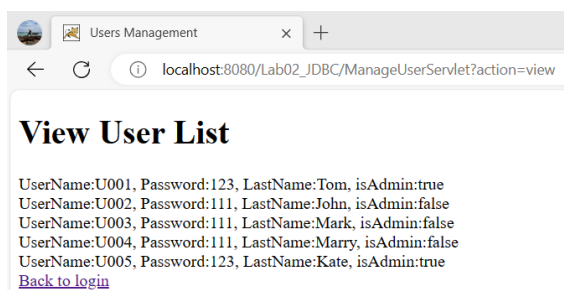
Username

Password



Welcome to Tom !!!  
You are logged successfully in with administrator role.

[View user list](#)  
[Add new user](#)  
[Update user](#)  
[Delete user](#)



**View User List**

UserName:U001, Password:123, LastName:Tom, isAdmin:true  
 UserName:U002, Password:111, LastName:John, isAdmin:false  
 UserName:U003, Password:111, LastName:Mark, isAdmin:false  
 UserName:U004, Password:111, LastName:Marry, isAdmin:false  
 UserName:U005, Password:123, LastName:Kate, isAdmin:true

[Back to login](#)



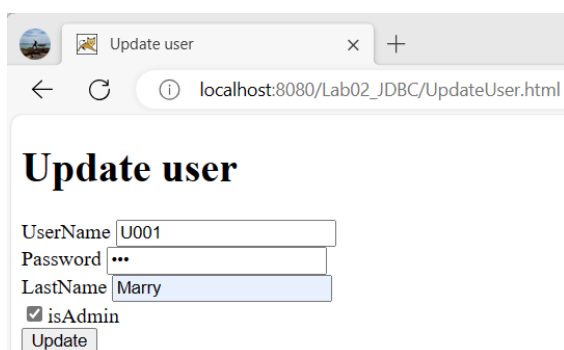
**Add new user**

UserName

Password

LastName

☐ isAdmin



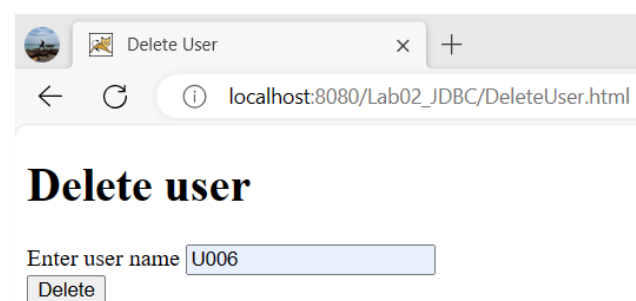
**Update user**

UserName

Password

LastName

☒ isAdmin



**Delete user**

Enter user name

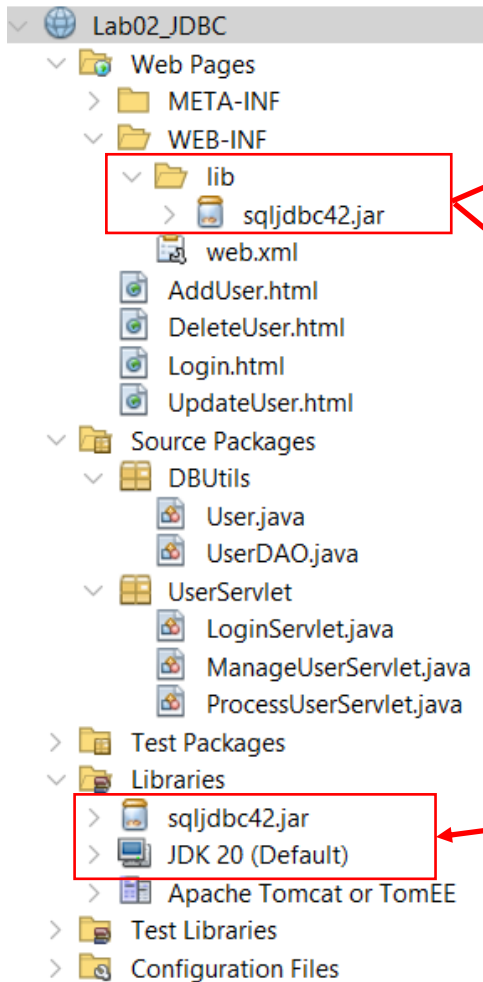
### Lab Objectives

In this lab, you will be:

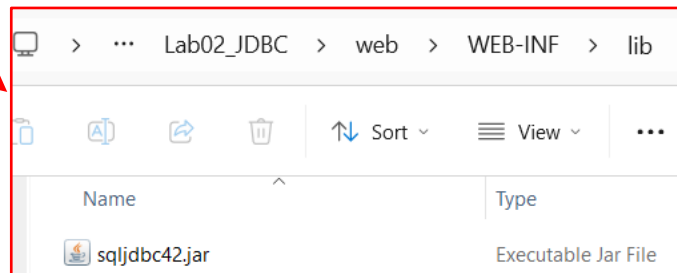
- Create Java web project using the NetBean IDE
- Create the web pages by HTML
- Apply passing data from HTML to Servlet by GET and POST method

- Performs CRUD functions by SqlJDBC driver and SQL Server
- Run the project and test the functions of the application

**Step 01.** Create a Java Web application named **IntroductionJDBC** is structured as follows:



Create folder named **lib** in **WEB-INF** (use File Explorer on Windows) and copy sqljdbc driver( file .jar) that match



Right-click on the project, select **Properties | Libraries | Add JAR/Folder** then select **sqljdbc** driver in the **WEB-INF \ lib** folder that matches the Sql Server version on the machine.

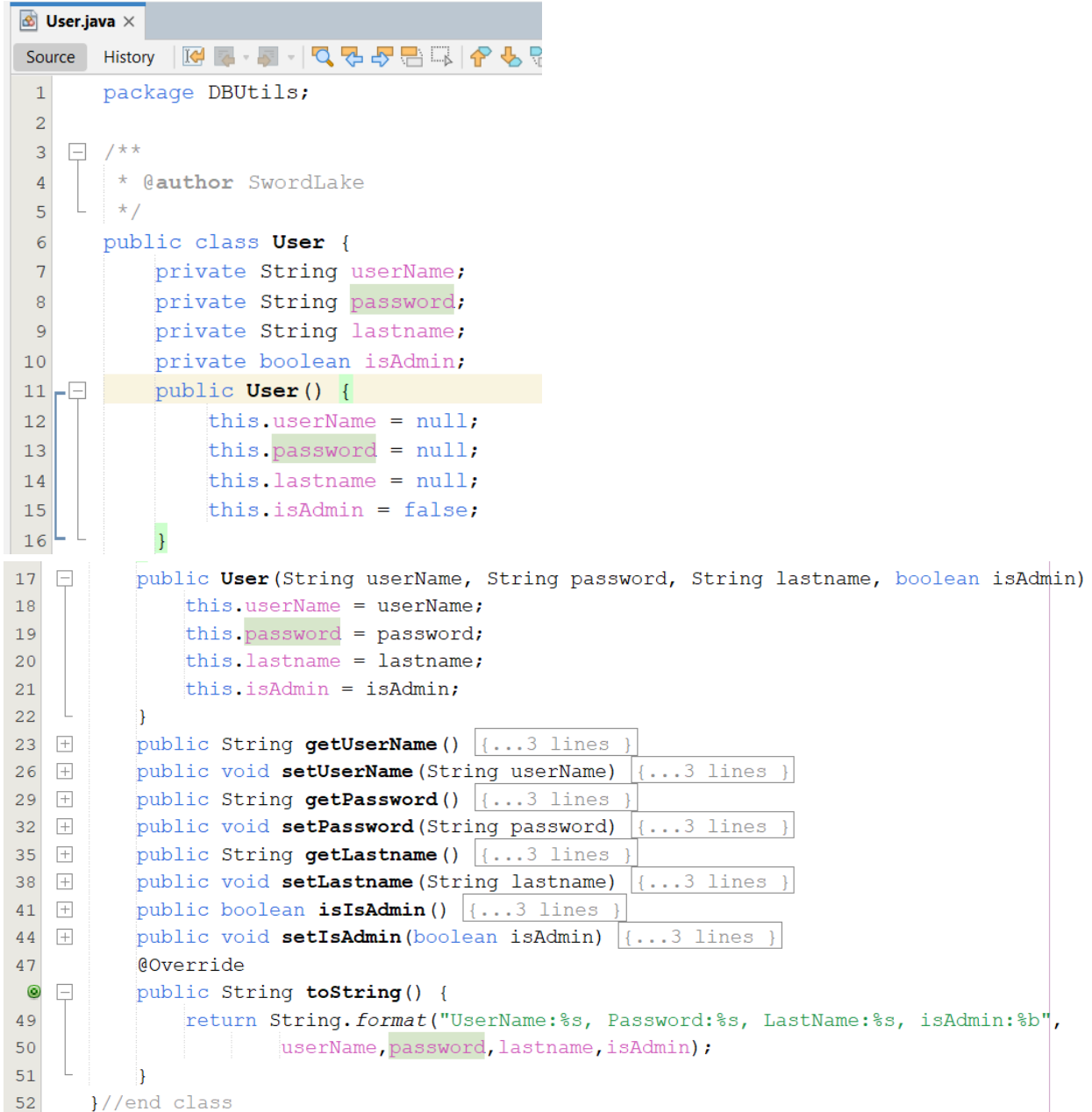
-Open SQL Server Management Studio and create a database named **SampleDB** has a table named **Registration** as follows:

Column Name	Data Type	Allow Nulls
UserName	varchar(30)	<input type="checkbox"/>
Password	varchar(30)	<input type="checkbox"/>
LastName	nvarchar(50)	<input type="checkbox"/>
isAdmin	bit	<input type="checkbox"/>

UserName	Password	LastName	isAdmin
U001	123	Tom	True
U002	456	David	False
U003	789	John	False
U004	012	Mark	True
U005	134	Kate	False

**Step 02.** Write codes for the classes in the **DBUtils** package as the follows:

- **User.java**



```

1  package DBUtils;
2
3  /**
4   * @author SwordLake
5   */
6  public class User {
7      private String userName;
8      private String password;
9      private String lastname;
10     private boolean isAdmin;
11     public User () {
12         this.userName = null;
13         this.password = null;
14         this.lastname = null;
15         this.isAdmin = false;
16     }
17
18     public User(String userName, String password, String lastname, boolean isAdmin)
19     {
20         this.userName = userName;
21         this.password = password;
22         this.lastname = lastname;
23         this.isAdmin = isAdmin;
24     }
25
26     public String getUsername () { ...3 lines }
27     public void setUsername (String userName) { ...3 lines }
28     public String getPassword () { ...3 lines }
29     public void setPassword (String password) { ...3 lines }
30     public String getLastName () { ...3 lines }
31     public void setLastName (String lastname) { ...3 lines }
32     public boolean isIsAdmin () { ...3 lines }
33     public void setIsAdmin (boolean isAdmin) { ...3 lines }
34
35     @Override
36     public String toString () {
37         return String.format("UserName:%s, Password:%s, LastName:%s, isAdmin:%b",
38             userName, password, lastname, isAdmin);
39     }
40 }
41
42 //end class
  
```

- **UserDAO.java**

```

UserDAO.java x
Source History
7   import java.sql.SQLException;
8   import java.util.ArrayList;
9   import java.util.List;
10
11  /**
12   * @author SwordLake
13   */
14  public class UserDAO {
15      // <editor-fold defaultstate="collapsed" desc="getConnection Method">
16      public Connection getConnection() throws Exception {
17          try {
18              Class.forName("com.microsoft.sqlserver.jdbc.SQLServerDriver");
19              String connectionString =
20                  "jdbc:sqlserver://localhost:1433;database=SampleDB;instanceName=SQL2019";
21              //SQL Server Authentication
22              Connection cnn = DriverManager.getConnection(connectionString, "sa", "123");
23              return cnn;
24          } catch (ClassNotFoundException | SQLException ex) {
25              throw ex;
26          }
27      }
28      // </editor-fold>
29
30      // <editor-fold defaultstate="collapsed" desc="login Method">
31      public User login(String userName, String password) throws Exception {
32          User user = null;
33          Connection cnn = null;
34          PreparedStatement preStm = null;
35          ResultSet rs = null;
36          String lastName;
37          boolean isAdmin;
38          try {
39              cnn = getConnection();
40              String sql =
41                  "select LastName,isAdmin from Registration where [UserName]=? and [Password]=?";
42              preStm = cnn.prepareStatement(sql);
43              preStm.setString(1, userName);
44              preStm.setString(2, password);
45              rs = preStm.executeQuery();
46              while (rs.next()) {
47                  lastName = rs.getString(1);
48                  isAdmin = rs.getBoolean(2);
49                  user = new User(userName, password, lastName, isAdmin);
50              } //end while
51          } catch (Exception ex) {
52              throw ex;
53          } finally {
54              if (rs != null) {
55                  rs.close();
56              }
57              if (preStm != null) {
58                  preStm.close();
59              }

```

```

60         if (cnn != null) {
61             cnn.close();
62         }
63     }
64     return user;
65 } //end login
66 // </editor-fold>
67 //-----
68 // <editor-fold defaultstate="collapsed" desc="getUserList Method">
69 public List<User> getUserList() throws Exception {
70     String userName, password, lastName;
71     boolean isAdmin;
72     Connection cnn = null;
73     PreparedStatement preStm = null;
74     ResultSet rs = null;
75     List<User> userList = new ArrayList();
76     try {
77         cnn = getConnection();
78         String sql = "select UserName,Password,LastName,isAdmin from Registration";
79         preStm = cnn.prepareStatement(sql);
80         rs = preStm.executeQuery();
81         while (rs.next()) {
82             userName = rs.getString(1);
83             password = rs.getString(2);
84             lastName = rs.getString(3);
85             isAdmin = rs.getBoolean(4);
86             User user = new User(userName, password, lastName, isAdmin);
87             userList.add(user);
88         } //end while
89     } catch (Exception ex) {
90         throw ex;
91     } finally {
92         if (rs != null) {
93             rs.close();
94         }
95         if (preStm != null) {
96             preStm.close();
97         }
98         if (cnn != null) {
99             cnn.close();
100         }
101     }
102     if (userList.isEmpty()) {
103         return null;
104     }
105     return userList;
106 } //end getUserList
107 // </editor-fold>
108 //-----
109 // <editor-fold defaultstate="collapsed" desc="addUser Method">
110 public boolean addUser(User user) throws Exception {
111     PreparedStatement preStm = null;
112     Connection cnn = null;

```

```

113         try {
114             cnn = getConnection();
115             String sql = "Insert Registration values(?,?,?,?)";
116             preStm = cnn.prepareStatement(sql);
117             preStm.setString(1, user.getUserName());
118             preStm.setString(2, user.getPassword());
119             preStm.setString(3, user.getLastname());
120             preStm.setBoolean(4, user.isIsAdmin());
121             return preStm.executeUpdate() > 0;
122         } catch (Exception ex) {
123             throw ex;
124         } finally {
125             if (preStm != null) {
126                 preStm.close();
127             }
128             if (cnn != null) {
129                 cnn.close();
130             }
131         }
132     } //end addUser
133 // </editor-fold>
134 //-----
135 // <editor-fold defaultstate="collapsed" desc="updateUser Method">
136 public boolean updateUser(User user) throws Exception {
137     PreparedStatement preStm = null;
138     Connection cnn = null;
139     try {
140         cnn = getConnection();
141         String sql =
142             "Update Registration Set Password=?,LastName=?,isAdmin=? Where UserName=?";
143         preStm = cnn.prepareStatement(sql);
144         preStm.setString(1, user.getPassword());
145         preStm.setString(2, user.getLastname());
146         preStm.setBoolean(3, user.isIsAdmin());
147         preStm.setString(4, user.getUserName());
148         return preStm.executeUpdate() > 0;
149     } catch (Exception ex) {
150         throw ex;
151     } finally {
152         if (preStm != null) {
153             preStm.close();
154         }
155         if (cnn != null) {
156             cnn.close();
157         }
158     }
159 } //end updateUser
160 // </editor-fold>
161 //-----
162 // <editor-fold defaultstate="collapsed" desc="deleteUser Method">
163 public boolean deleteUser(String userName) throws Exception {
164     PreparedStatement preStm = null;
165     Connection cnn = null;
166     try {
167         cnn = getConnection();
168         String sql = "delete Registration Where UserName=?";

```

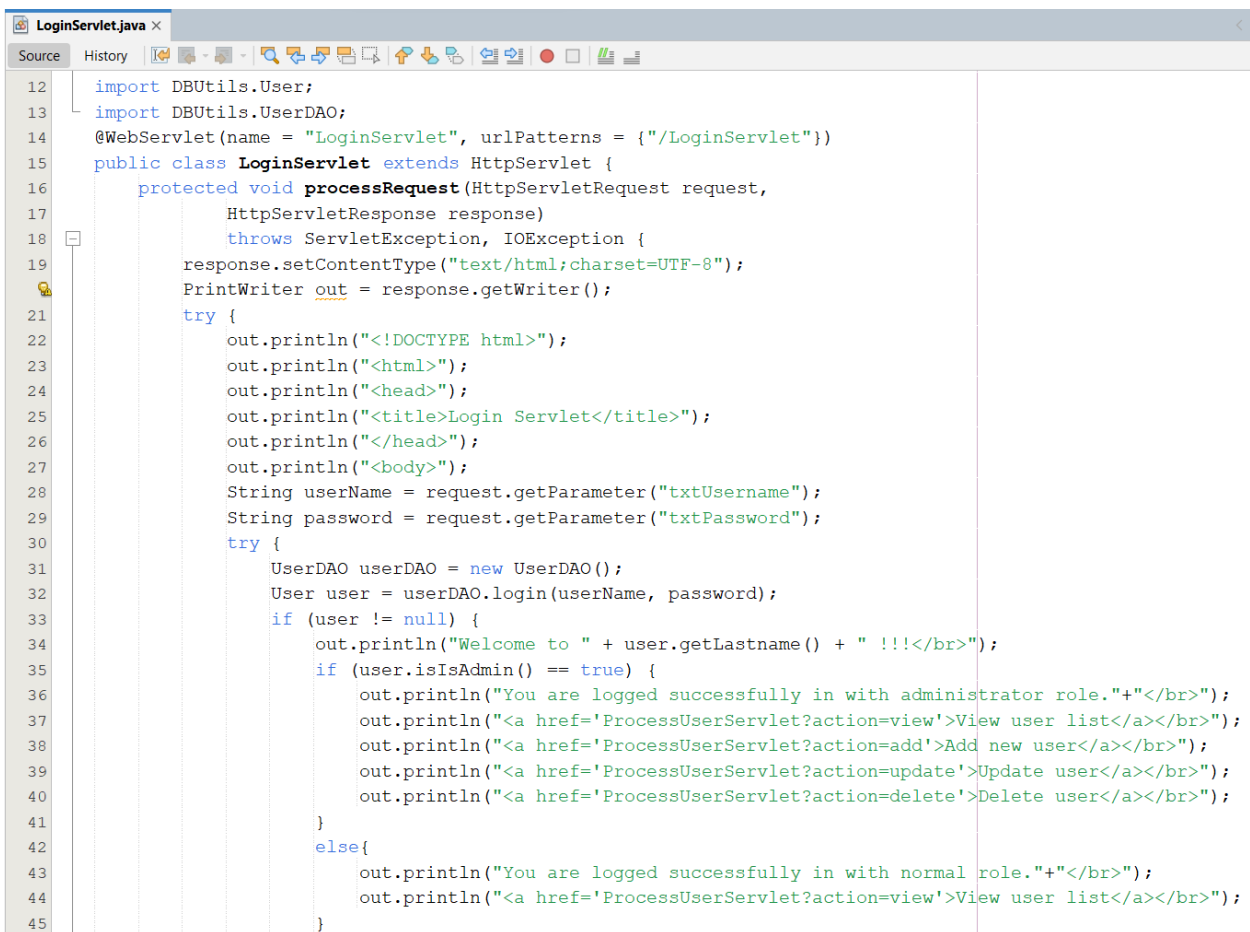
```

169         preStm = cnn.prepareStatement(sql);
170         preStm.setString(1, userName);
171         return preStm.executeUpdate() > 0;
172     } catch (Exception ex) {
173         throw ex;
174     } finally {
175         if (preStm != null) {
176             preStm.close();
177         }
178         if (cnn != null) {
179             cnn.close();
180         }
181     }
182 } //end deleteUser
183 // </editor-fold>
184 } //end class

```

**Step 03.** Write codes for the classes in the **UserServlet** package as the follows:

- **LoginServlet.java**



```

12 import DBUtils.User;
13 import DBUtils.UserDAO;
14 @WebServlet(name = "LoginServlet", urlPatterns = {"/LoginServlet"})
15 public class LoginServlet extends HttpServlet {
16     protected void processRequest(HttpServletRequest request,
17         HttpServletResponse response)
18         throws ServletException, IOException {
19         response.setContentType("text/html;charset=UTF-8");
20         PrintWriter out = response.getWriter();
21         try {
22             out.println("<!DOCTYPE html>");
23             out.println("<html>");
24             out.println("<head>");
25             out.println("<title>Login Servlet</title>");
26             out.println("</head>");
27             out.println("<body>");
28             String userName = request.getParameter("txtUsername");
29             String password = request.getParameter("txtPassword");
30             try {
31                 UserDAO userDAO = new UserDAO();
32                 User user = userDAO.login(userName, password);
33                 if (user != null) {
34                     out.println("Welcome to " + user.getLastname() + " !!!<br>");
35                     if (user.isIsAdmin() == true) {
36                         out.println("You are logged successfully in with administrator role."<br>");
37                         out.println("<a href='ProcessUserServlet?action=view'>View user list</a><br>");
38                         out.println("<a href='ProcessUserServlet?action=add'>Add new user</a><br>");
39                         out.println("<a href='ProcessUserServlet?action=update'>Update user</a><br>");
40                         out.println("<a href='ProcessUserServlet?action=delete'>Delete user</a><br>");
41                     }
42                     else{
43                         out.println("You are logged successfully in with normal role."<br>");
44                         out.println("<a href='ProcessUserServlet?action=view'>View user list</a><br>");
45                     }

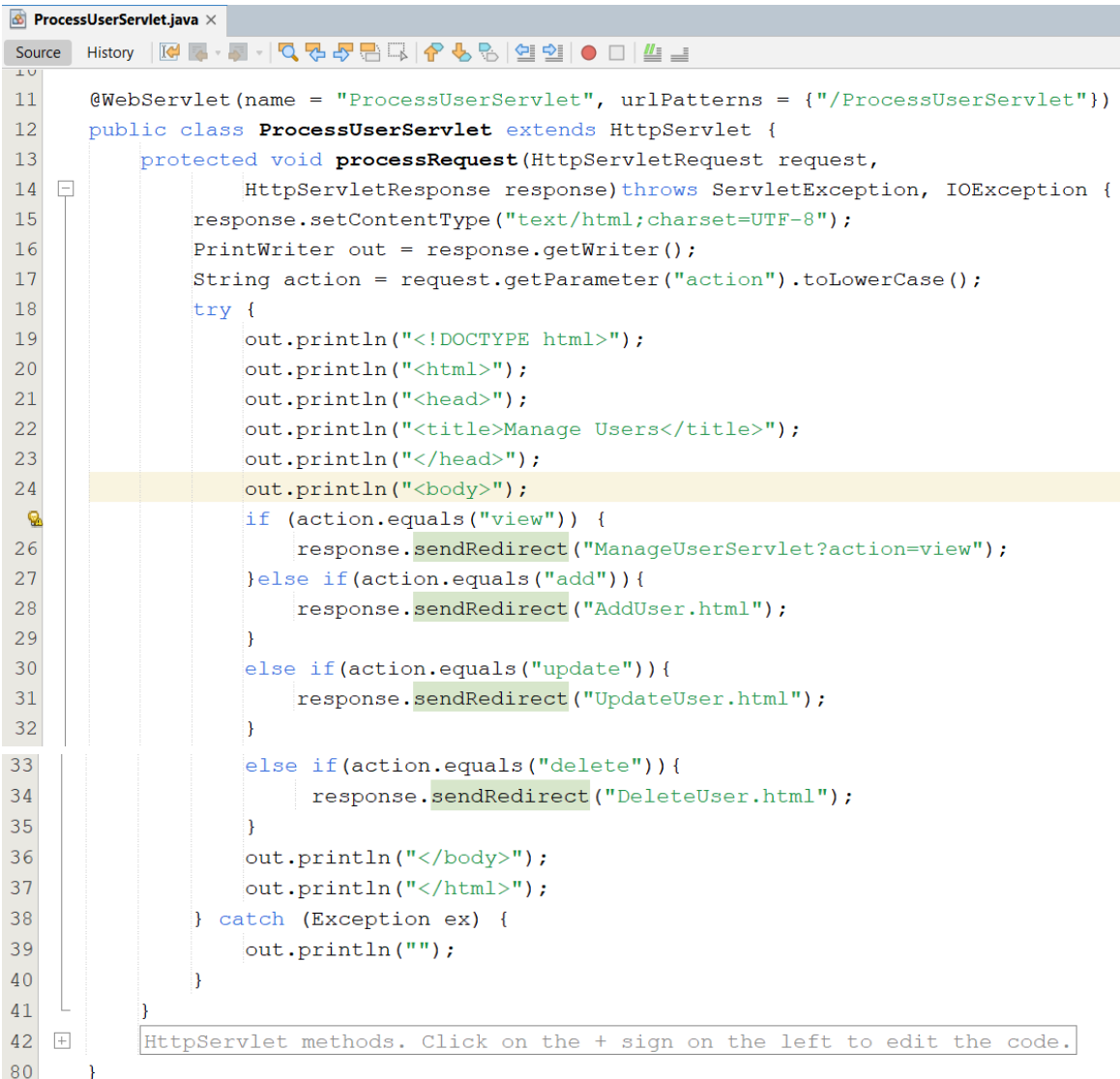
```

```

46         } else {
47             out.println("Loggin has failed. </br>");
48             out.println("<a href='Login.html'>Back to login</a>");
49         }
50     } catch (Exception ex) {
51         out.println("Something went wrong. Error :" + ex.getMessage());
52     }
53     out.println("</body>");
54     out.println("</html>");
55 }
56 finally{
57     out.close();
58 }
59 }
60 + HttpServlet methods. Click on the + sign on the left to edit the code.
98 }

```

## • ProcessUserServlet.java



```

10
11 @WebServlet(name = "ProcessUserServlet", urlPatterns = {"/ProcessUserServlet"})
12 public class ProcessUserServlet extends HttpServlet {
13     protected void processRequest(HttpServletRequest request,
14         HttpServletResponse response)throws ServletException, IOException {
15         response.setContentType("text/html;charset=UTF-8");
16         PrintWriter out = response.getWriter();
17         String action = request.getParameter("action").toLowerCase();
18         try {
19             out.println("<!DOCTYPE html>");
20             out.println("<html>");
21             out.println("<head>");
22             out.println("<title>Manage Users</title>");
23             out.println("</head>");
24             out.println("<body>");
25             if (action.equals("view")) {
26                 response.sendRedirect("ManageUserServlet?action=view");
27             }else if(action.equals("add")){
28                 response.sendRedirect("AddUser.html");
29             }
30             else if(action.equals("update")){
31                 response.sendRedirect("UpdateUser.html");
32             }
33             else if(action.equals("delete")){
34                 response.sendRedirect("DeleteUser.html");
35             }
36             out.println("</body>");
37             out.println("</html>");
38         } catch (Exception ex) {
39             out.println("");
40         }
41     }
42 + HttpServlet methods. Click on the + sign on the left to edit the code.
80 }

```



## • ManageUserServlet.java

```

ManageUserServlet.java x
Source History
11 import DBUtils.User;
12 import DBUtils.UserDAO;
13 import java.util.List;
14 @WebServlet(name = "ManageUserServlet", urlPatterns = {"/ManageUserServlet"})
15 public class ManageUserServlet extends HttpServlet {
16     protected void processRequest(HttpServletRequest request,
17         HttpServletResponse response)
18         throws ServletException, IOException {
19         String userName, password, lastName;
20         boolean isAdmin = true;
21         String action;
22         response.setContentType("text/html;charset=UTF-8");
23         PrintWriter out = response.getWriter();
24         action = request.getParameter("action").toLowerCase();
25         try {
26             out.println("<!DOCTYPE html>");
27             out.println("<html>");
28             out.println("<head>");
29             out.println("<title>Users Management</title>");
30             out.println("</head>");
31             out.println("<body>");
32             userName = request.getParameter("txtUserName");
33             UserDAO userDAO = new UserDAO();
34             if(action.equals("view")) {
35                 out.println("<h1>View User List" + "</h1>");
36                 List<User> userList = userDAO.getUserList();
37                 for (User user : userList) {
38                     out.println(user + "</br>");
39                 }
40             }
41             else if (action.equals("delete")) {
42                 out.println("<h1>Users Management - Delete user" + "</h1>");
43                 if (userDAO.deleteUser(userName) == true) {
44                     out.println("User has been deleted successfully</br>");
45                 } else {
46                     out.println("<h3>Something went wrong!</h3></br>");
47                 }
48             } else {
49                 password = request.getParameter("txtPassword");
50                 lastName = request.getParameter("txtLastName");
51                 String admin = request.getParameter("chkIsAdmin");
52                 if (admin == null) {
53                     isAdmin = false;
54                 }
55                 User user = new User(userName, password, lastName, isAdmin);
56                 if (action.equals("add")) {
57                     out.println("<h1>Users Management - Add new user" + "</h1>");
58                     if (userDAO.addUser(user) == true) {
59                         out.println("User has been added successfully</br>");

```

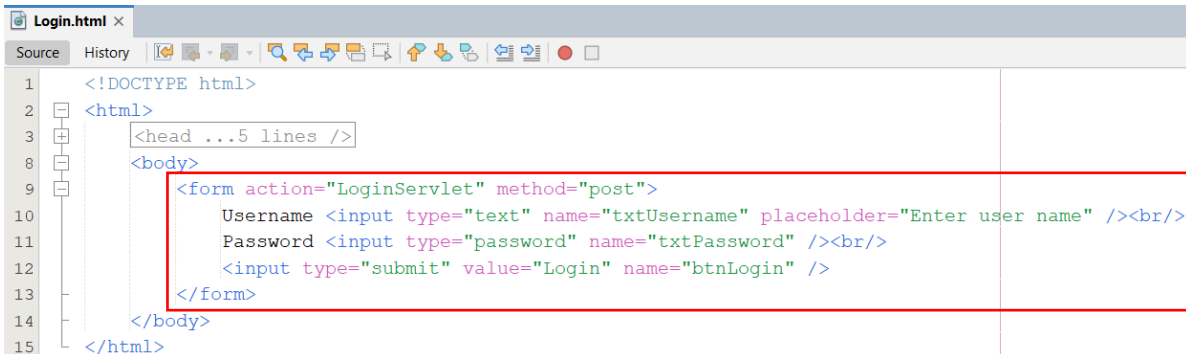
```

60         } else {
61             out.println("<h3>Something went wrong!</h3></br>");
62         }
63     } else if (action.equals("update")) {
64         out.println("<h1>Users Management - Update user" + "</h1>");
65         if (userDAO.updateUser(user) == true) {
66             out.println("User has been updated successfully</br>");
67         } else {
68             out.println("<h3>Something went wrong!</h3></br>");
69         }
70     }
71 }
72 out.println("<a href='Login.html'>Back to login</a>");
73 out.println("</body>");
74 out.println("</html>");
75 } catch (Exception ex) {
76     out.println("Error:" + ex.getMessage());
77 }
78 }
79
117 } //end class

```

**Step 04.** Write HTML codes for the web pages as the follows:

- **Login.html page**

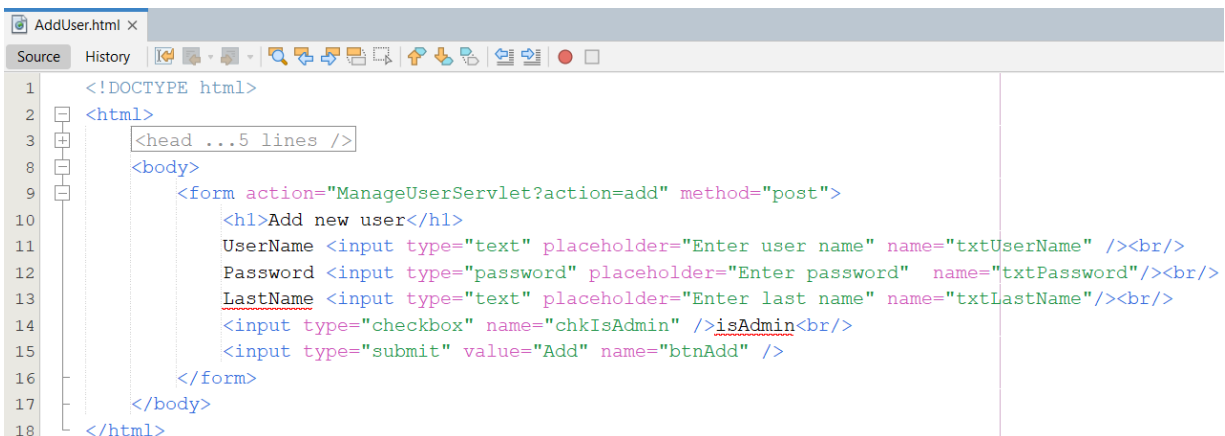


```

1 <!DOCTYPE html>
2 <html>
3   <head ...5 lines />
4   <body>
5     <form action="LoginServlet" method="post">
6       Username <input type="text" name="txtUsername" placeholder="Enter user name" /><br/>
7       Password <input type="password" name="txtPassword" /><br/>
8       <input type="submit" value="Login" name="btnLogin" />
9     </form>
10   </body>
11 </html>

```

- **AddUser.html page**



```

1 <!DOCTYPE html>
2 <html>
3   <head ...5 lines />
4   <body>
5     <form action="ManageUserServlet?action=add" method="post">
6       <h1>Add new user</h1>
7       UserName <input type="text" placeholder="Enter user name" name="txtUserName" /><br/>
8       Password <input type="password" placeholder="Enter password" name="txtPassword"/><br/>
9       LastName <input type="text" placeholder="Enter last name" name="txtLastName"/><br/>
10      <input type="checkbox" name="chkIsAdmin" />isAdmin<br/>
11      <input type="submit" value="Add" name="btnAdd" />
12    </form>
13  </body>
14 </html>

```

- **DeleteUser.html page**

```

DeleteUser.html x
Source History
1 <!DOCTYPE html>
2 <html>
3 <head>
4 <title>Delete User</title>
5 <meta charset="UTF-8">
6 <meta name="viewport" content="width=device-width, initial-scale=1.0">
7 </head>
8 <body>
9 <form action="ManageUserServlet?action=delete" method="post">
10 <h1>Delete user</h1>
11 Enter user name <input type="text" placeholder="Uxxx" name="txtUserName"/><br/>
12 <input type="submit" value="Delete" name="btnDelete" />
13 </form>
14 </body>
15 </html>

```

## • UpdateUser.html page

```

UpdateUser.html x
Source History
1 <!DOCTYPE html>
2 <html>
3 <head ...5 lines />
4 <body>
5 <form action="ManageUserServlet?action=update" method="post">
6 <h1>Update user</h1>
7 UserName <input type="text" name="txtUserName" value="Uxxx" /><br/>
8 Password <input type="password" name="txtPassword" value="" /><br/>
9 LastName <input type="text" name="txtLastName" value="" /><br/>
10 <input type="checkbox" name="chkIsAdmin" />isAdmin<br/>
11 <input type="submit" value="Update" name="btnUpdate" />
12 </form>
13 </body>
14 </html>

```

**Step 05.** Open the **web.xml** in the WEB-INF folder then update as the follows:

```

web.xml x
Source General Servlets Filters Pages References Security History
1 <?xml version="1.0" encoding="UTF-8"?>
2 <web-app version="3.1" xmlns="http://xmlns.jcp.org/xml/ns/javaee">
3 <session-config>
4 <session-timeout>
5 30
6 </session-timeout>
7 </session-config>
8 <welcome-file-list>
9 <welcome-file>Login.html</welcome-file>
10 </welcome-file-list>
11 </web-app>

```

**Step 06.** Right-click on **IntroductionJDBC** project, select Run to run the web app then test all functions.