



**UNIVERSITI MALAYSIA TERENGGANU**

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**CSM3023 WEB BASED APPLICATION DEVELOPMENT (K1)**

**BACHELOR OF COMPUTER SCIENCE (MOBILE COMPUTING) WITH HONORS**

**LAB 2 – SERVLET: DATA SHARING AND DATABASE MANAGEMENT**

**SEMESTER 4 2024/2025**

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**Prepared for:**

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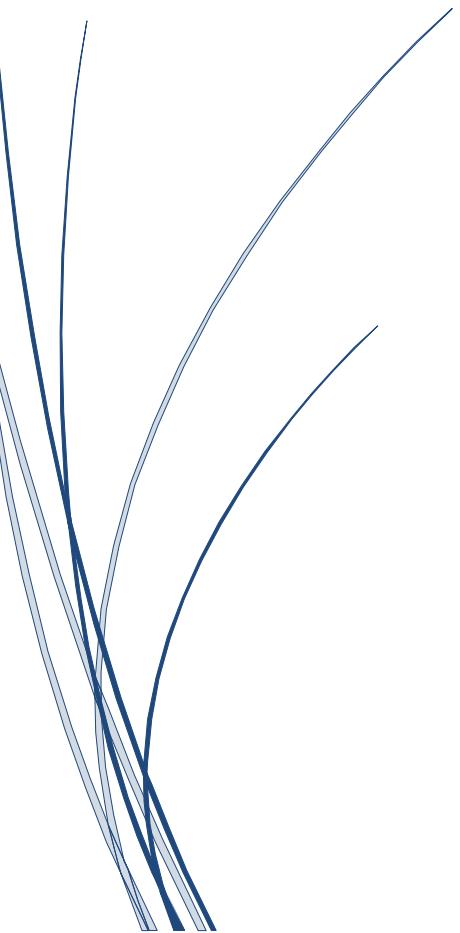
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Week 2

# Servlet: Data Sharing and Database Management

Web Programming 2



Lecturers

PUSAT PENGAJIAN INFORMATIK DAN MATEMATIK GUNAAN  
(PPIMG), UNIVERSITI MALAYSIA TERENGGANU (UMT)

## Revision History

Revision Date	Previous Revision Date	Summary of Changes	Changes Marked
		First Issue	Mohamad Nor Hassan
		Second Issue	Dr Rabiei Mamat Dr Faizah Aplop Dr Fouad Ts Dr Rosmayati Mohemad Fakhrul Adli Mohd Zaki
13/03/2019	21/02/2019	Addition of Revision History, Table of Contents, Formatting Cover Page	Fakhrul Adli Mohd Zaki
15/03/2019		Add Task1, Task 2, Task 3 and Task 4	Fakhrul Adli Mohd Zaki

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**Arahan:**

Manual makmal ini adalah untuk kegunaan pelajar-pelajar Pusat Pengajian Informatik dan Matematik Gunaan (PPIMG), Universiti Malaysia Terengganu (UMT) sahaja. Tidak dibenarkan mencetak dan mengedarkan manual ini tanpa kebenaran rasmi daripada penulis.

Sila ikuti langkah demi langkah sebagaimana yang dinyatakan di dalam manual. Tandakan (/) setiap langkah yang telah selesai dibuat dan tulis kesimpulan bagi setiap aktiviti yang telah selesai dijalankan.

**Instruction:**

*This laboratory manual is for use by the students of the School of Informatics and Applied Mathematics (PPIMG), Universiti Malaysia Terengganu (UMT) only. It is not permissible to print and distribute this manual without the official authorisation of the author.*

*Please follow step by step as described in the manual. Tick (/) each step completed and write the conclusions for each completed activity.*

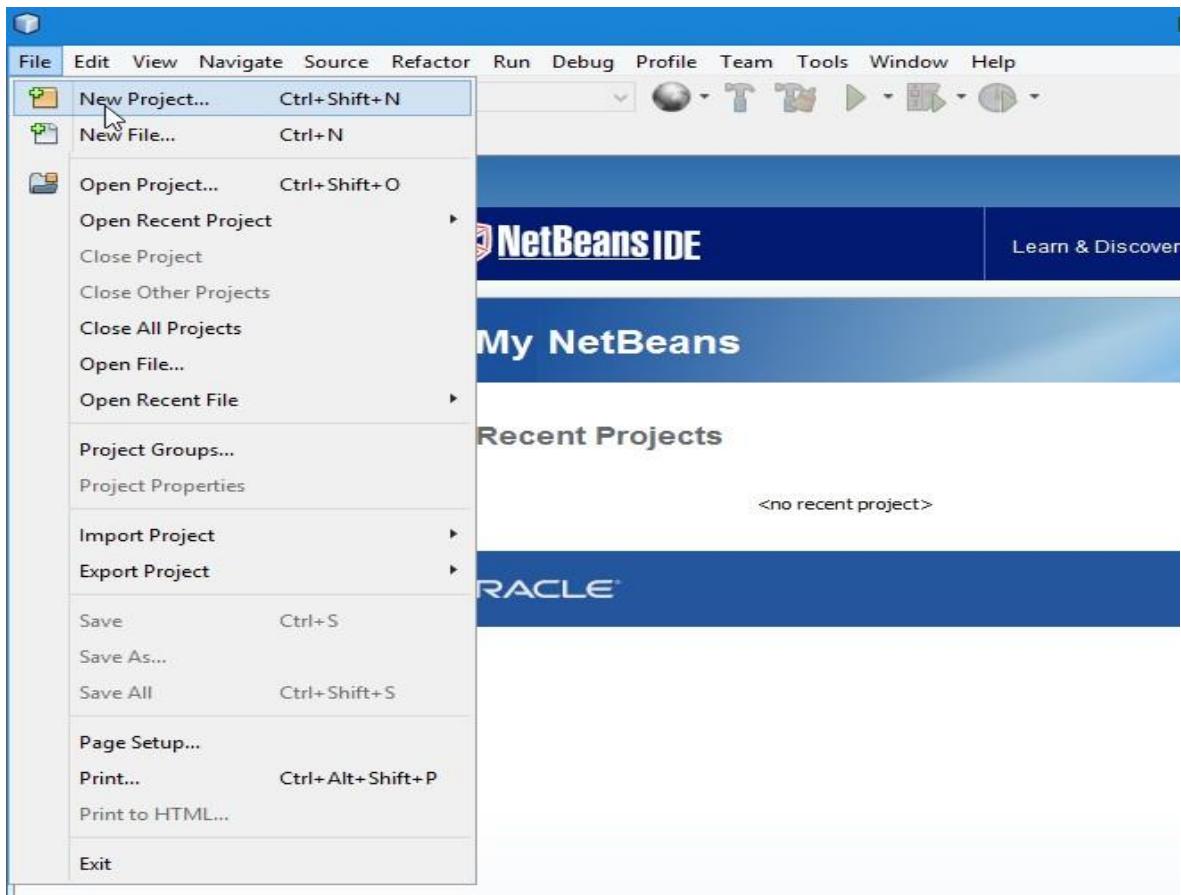
## Task 1: Data Sharing in Servlet

**Objective:** To use servlet for request forwarding and data sharing

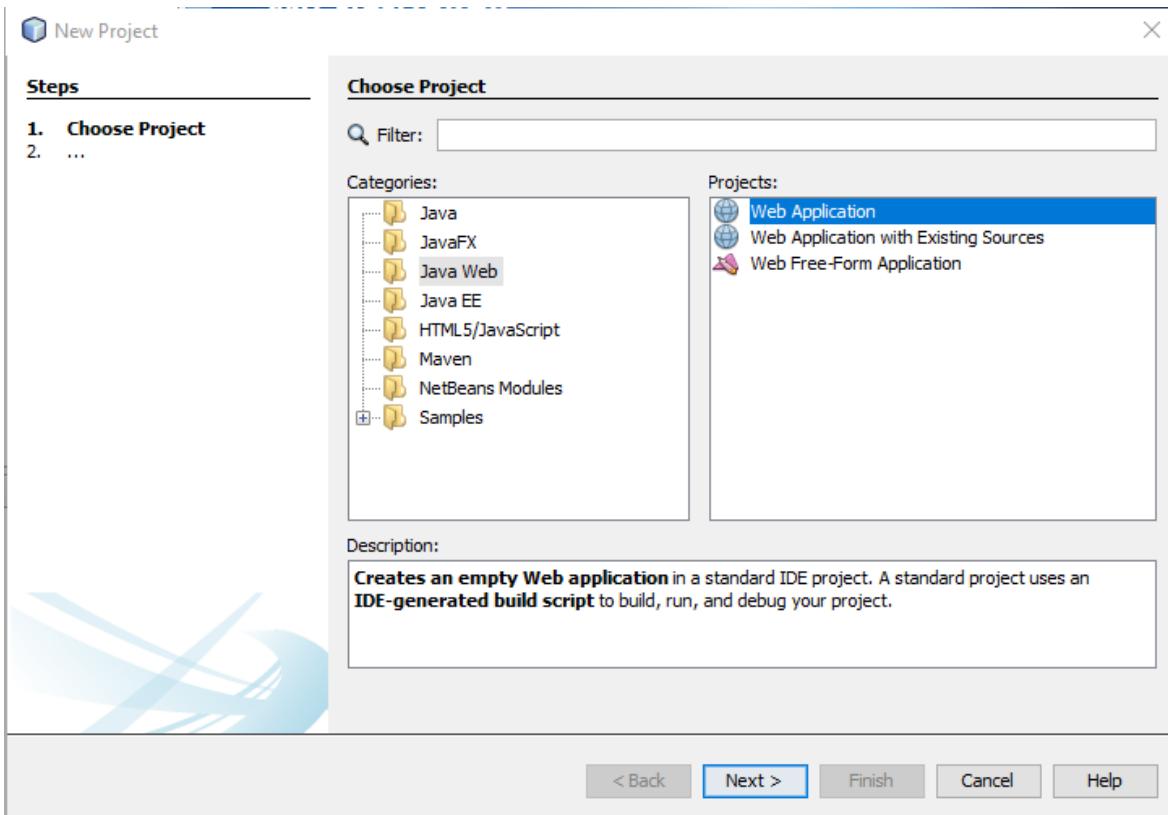
**Problem Description:** Write a login form and a servlet to authenticate a user.

**Estimated time:** 30 minutes

1. Create a directory F:\CSF3107-SXXXXX (only if you have not created it yet). Note: Replace XXXXX with your matric number.
2. Go to F:\CSF3107-SXXXXX\ directory and create sub-directory and name it as *Lab 2*.
3. Open your NetBeans IDE.
4. Go to File -> New Project

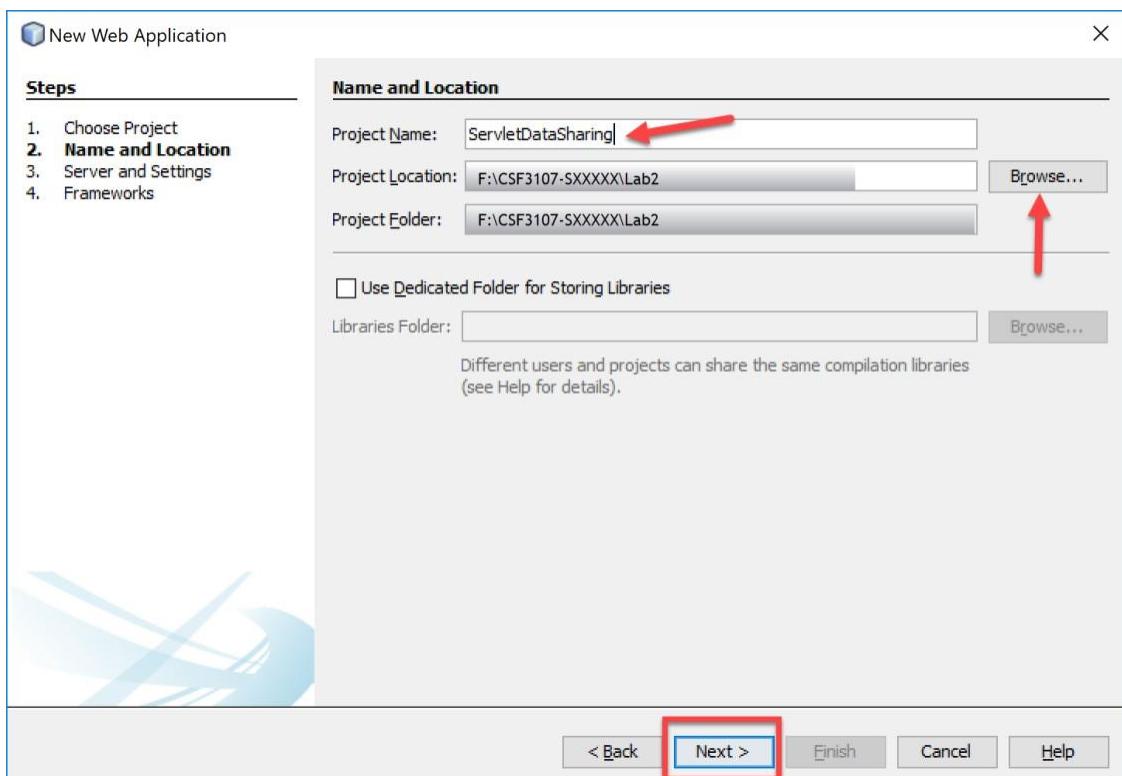


5. Select Java Web -> Web Application and click Next.

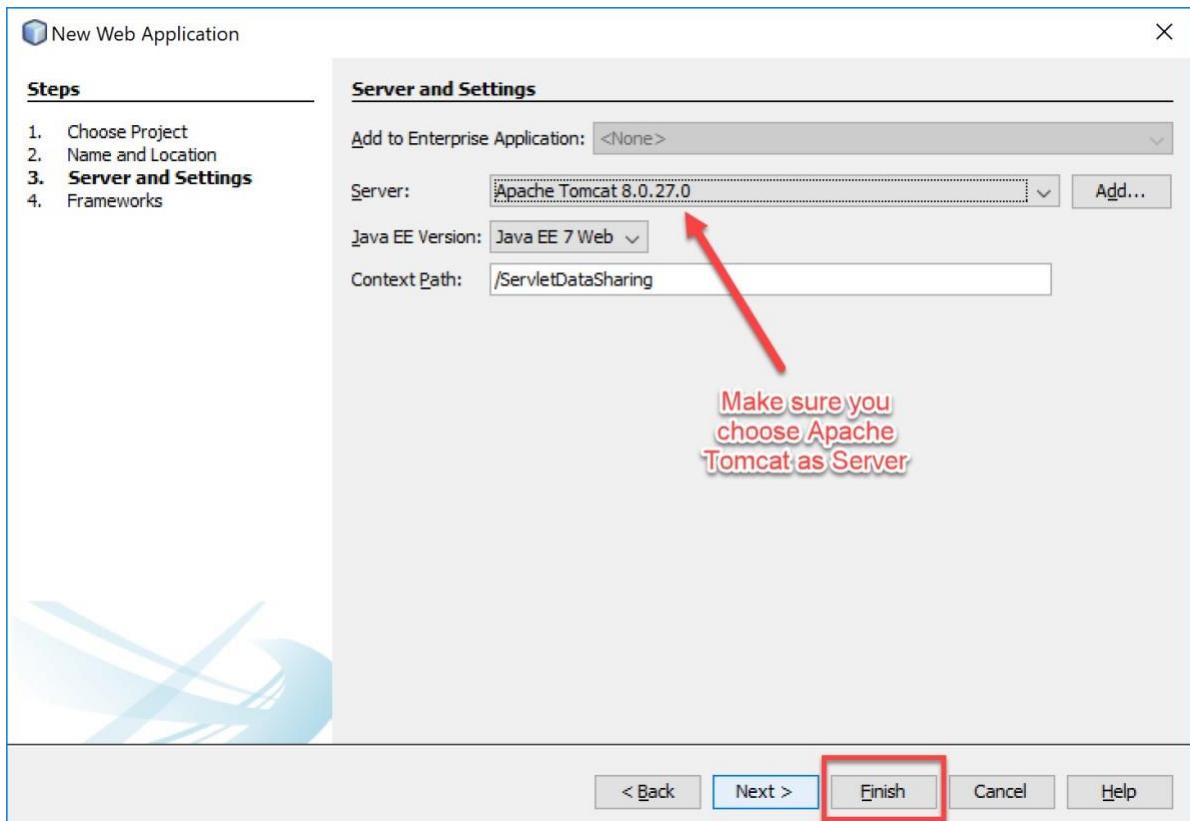


6. Type Project Name: *ServletDataSharing*.

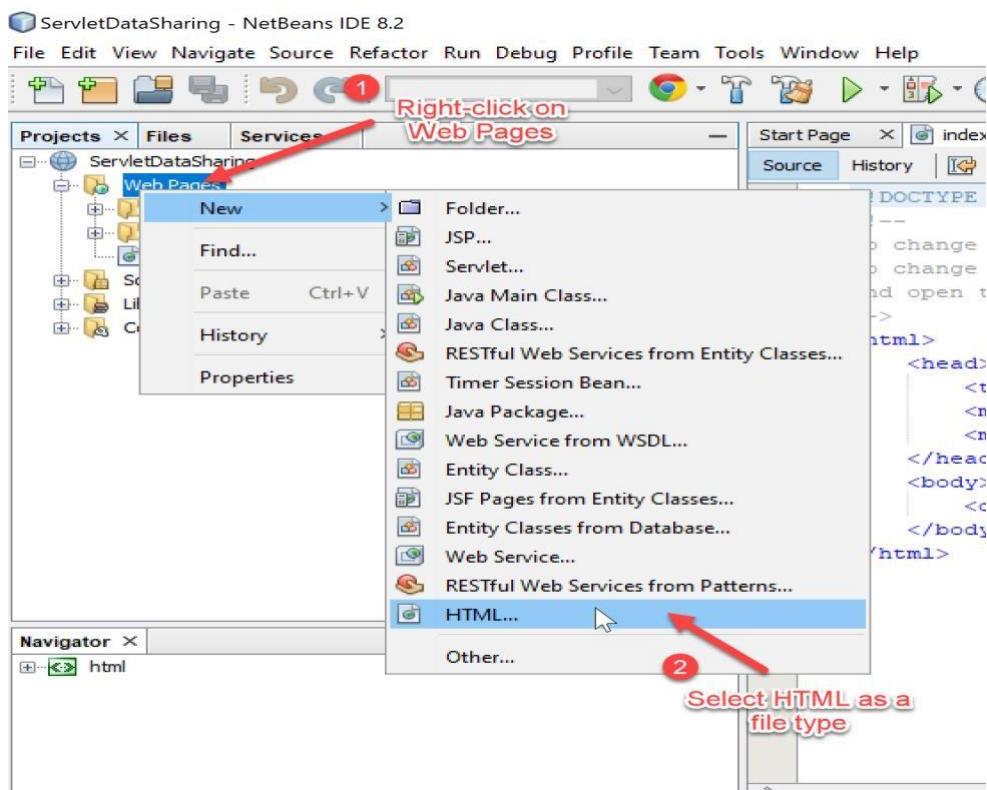
7. Click Browse and choose Project Location: F:\CSF3107-SXXXXX\Lab2. Then click the Next button.



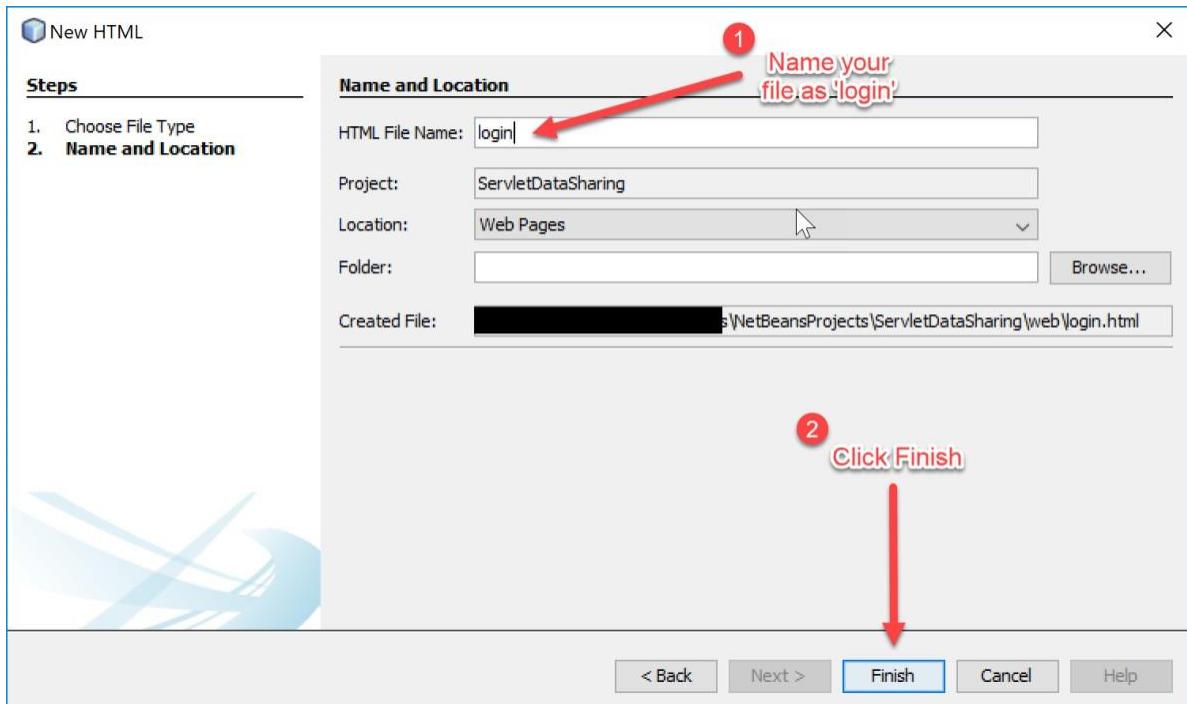
8. Then, choose Apache Tomcat as the server and click Finish.



9. You will see your project structure on the left side of your Netbeans editor. Next, you will create an HTML file for a login page. Follow the instructions as shown on the following screenshot.



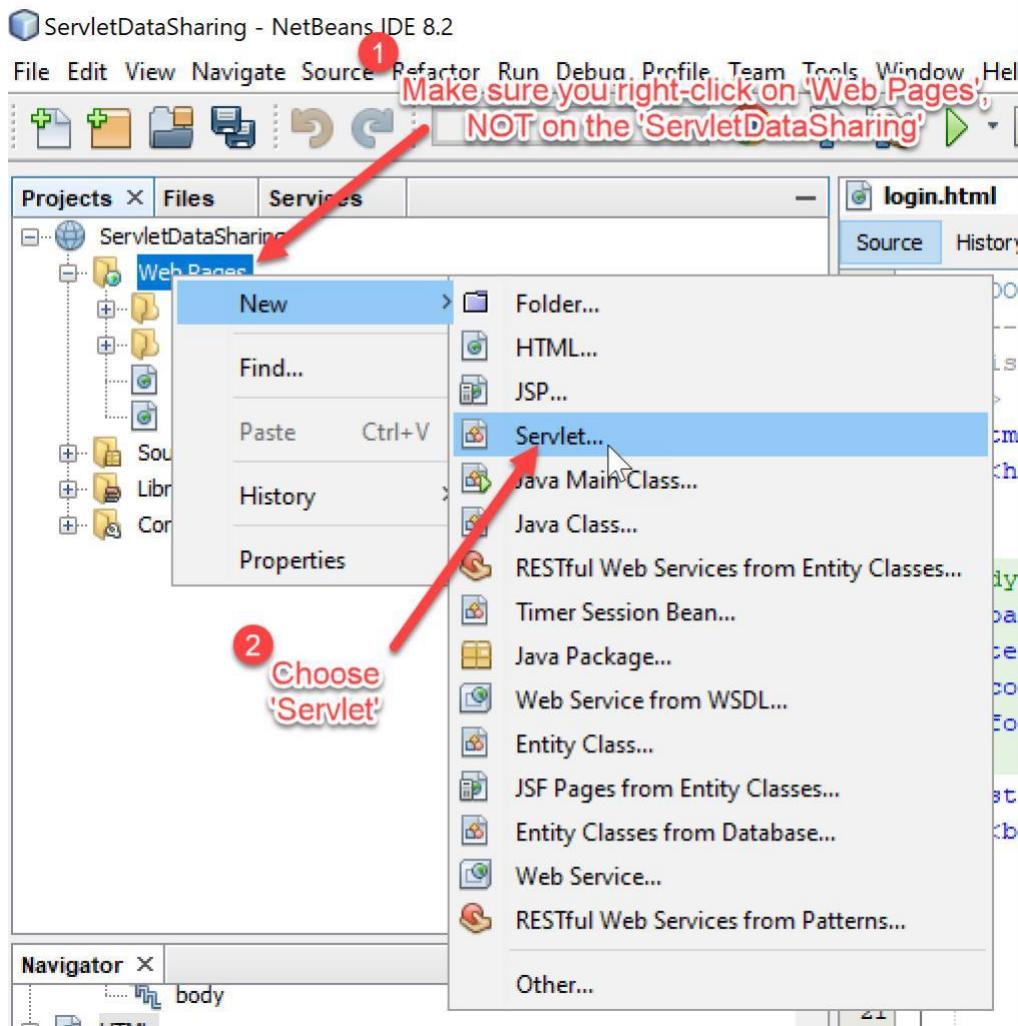
10. Name your HTML file as ‘login’, then click Finish.

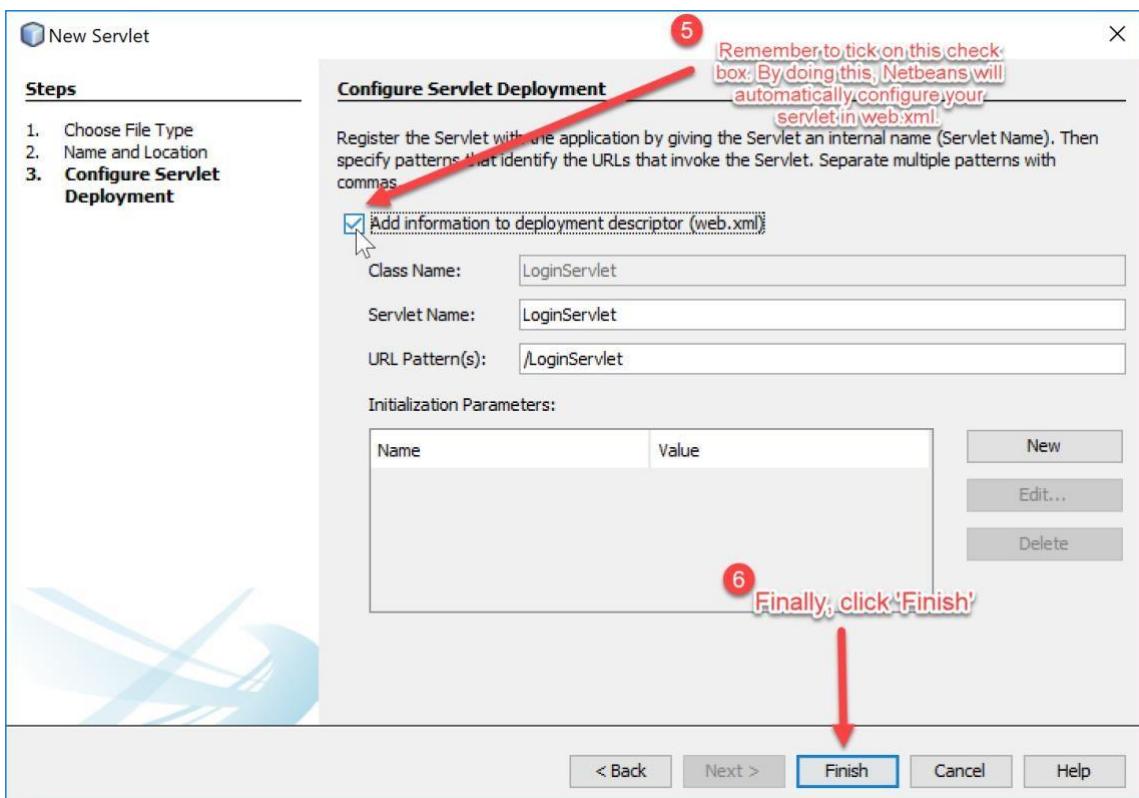
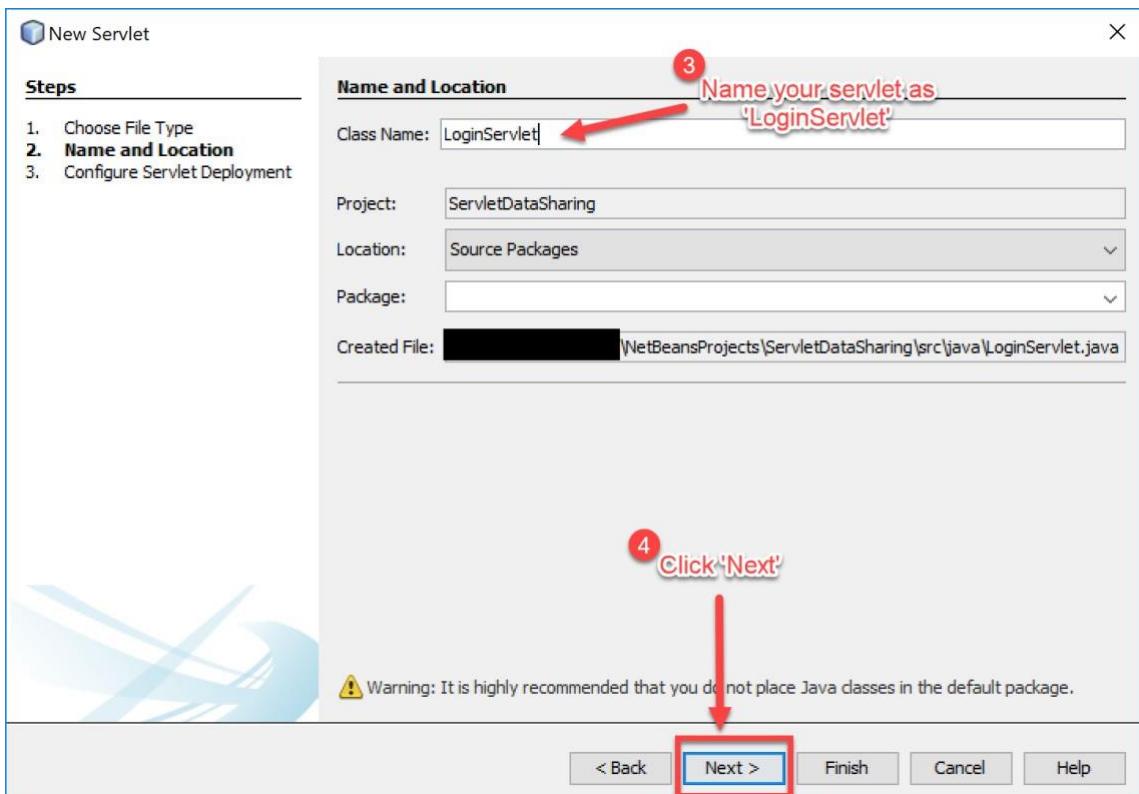


11. Type the following HTML markups into your login.html.

```
<!DOCTYPE html>
<!-- This is a login page.
--&gt;
&lt;html&gt;
    &lt;head&gt;
        &lt;title&gt;Login Page&lt;/title&gt;
        &lt;style&gt;
body {
    background-color: black;
    text-align: left;
    color: white;
    font-family: Arial, Helvetica, sans-serif;
}
&lt;/style&gt; &lt;/head&gt;
    &lt;body&gt;
        &lt;h1&gt;Welcome to CSF3107&lt;/h1&gt;
        &lt;p&gt;Please insert your username and password&lt;/p&gt;
        &lt;form name="login" id="login" action="LoginServlet" method="POST" autocomplete="off"&gt;
            Username:&lt;input name="txtUsername" type="text"&gt; &lt;br&gt;
            Password: &lt;input name="txtPassword" type="text"&gt;&lt;br&gt;
            &lt;br&gt;
            &lt;input name="btnLogin" value="Login" type="button"&gt;
            &lt;input name="txtReset" value="Reset" type="reset"&gt;&lt;br&gt;
        &lt;/form&gt;
        &lt;p&gt;&lt;br&gt;
        &lt;/p&gt;
        &lt;/body&gt;
&lt;/html&gt;</pre>
```

12. Next, we are going to create a servlet to process the username and password insert by the user on the login form. We start it by creating a new file for our servlet. Follow the steps below:





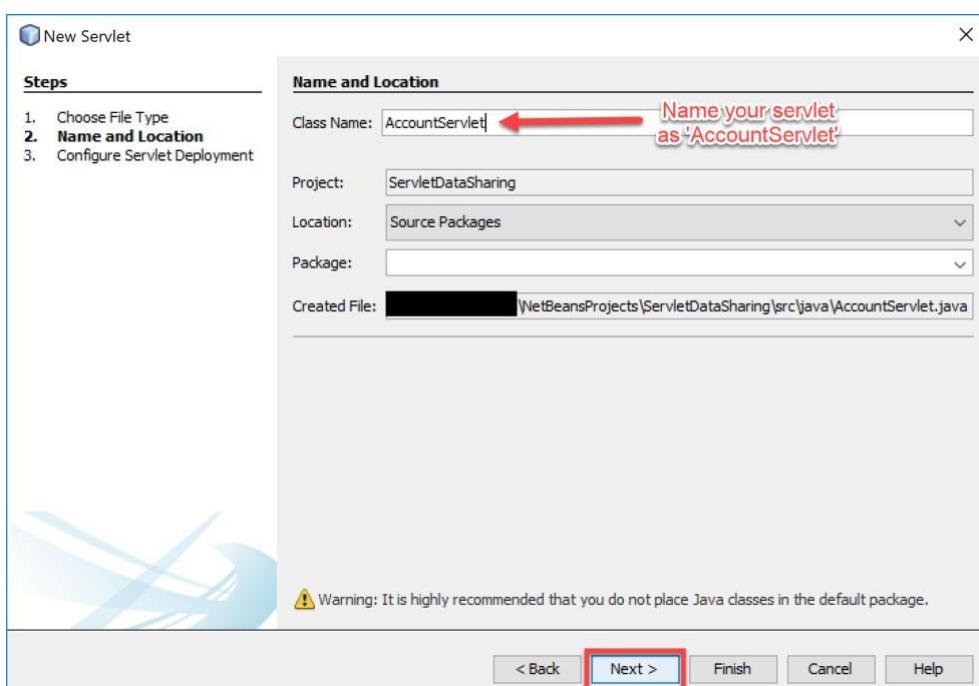
```

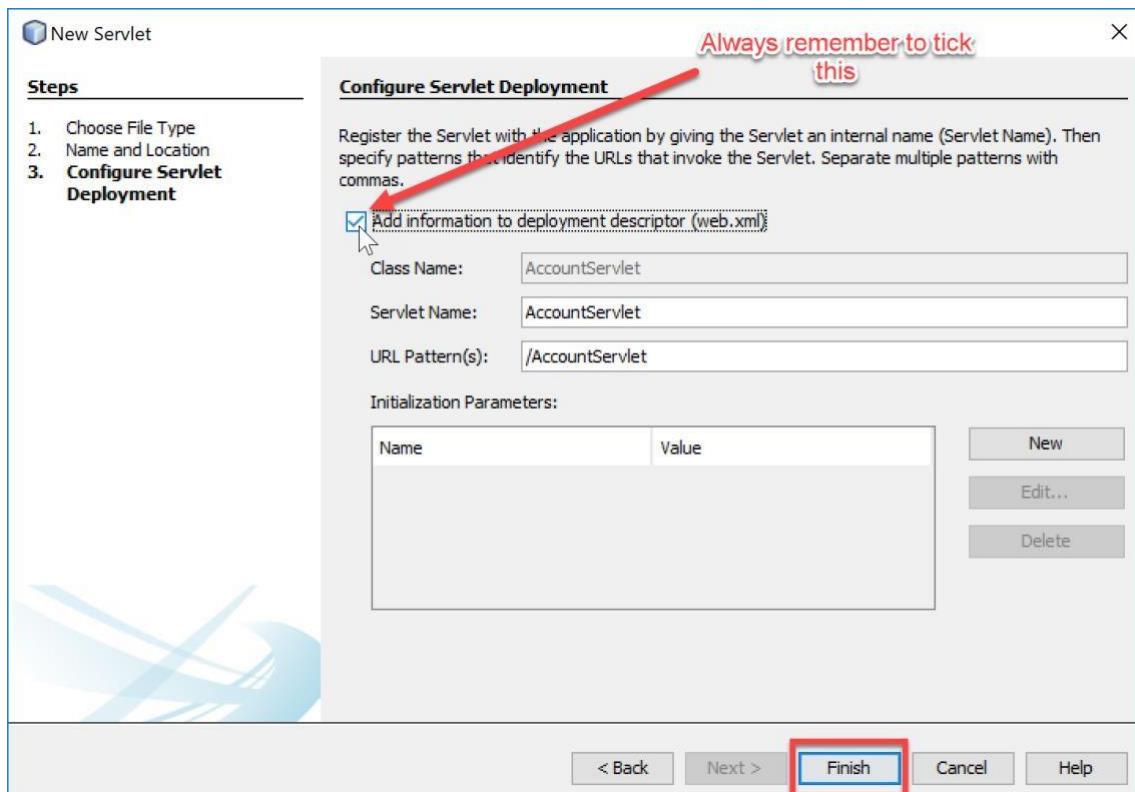
7 import java.io.IOException;
8 import java.util.HashMap; ← We will use HashMap to save the
9 import javax.servlet.ServletException; username and password, remember to
10 import javax.servlet.http.HttpServlet; import it from the library.
11 import javax.servlet.http.HttpServletRequest;
12 import javax.servlet.http.HttpServletResponse;
13 import javax.servlet.RequestDispatcher;
14 import javax.servlet.ServletContext;
15
16 /**... 4 lines */
17 public class LoginServlet extends HttpServlet {
18
19     HashMap <String, String> users = new HashMap();
20
21     @Override
22     public void init() throws ServletException{
23         super.init();
24         users.put("Ali", "1234");
25         users.put("Ahmad", "4567");
26         users.put("Muthu", "8910");
27     }
28
29     /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ... 9 lines */
30     protected void processRequest(HttpServletRequest request, HttpServletResponse response)
31         throws ServletException, IOException {
32         response.setContentType("text/html;charset=UTF-8");
33
34         String username = request.getParameter("txtUsername");
35         String password = request.getParameter("txtPassword");
36
37         if (!username.equals("") && !password.equals("") && users.get(username).equals(password)) {
38             request.setAttribute("userid", username);
39             ServletContext sc = getServletContext();
40             RequestDispatcher rd = sc.getRequestDispatcher("/AccountServlet");
41             rd.forward(request, response);
42         } else {
43             //avoid direct access to the servlet
44             RequestDispatcher rd = request.getRequestDispatcher("/login.html");
45             rd.forward(request, response);
46         }
47     }
48
49 }

```

Copy the codes as given.

13. Next, we need a servlet to return the information about users' accounts and display it on the browser. Repeat previous step for creating a new servlet and fill the details as shown on the screenshots below.





```

1  ...
2
3
4
5
6
7 import java.io.IOException;
8 import java.io.PrintWriter;
9 import java.util.HashMap;
10 import javax.servlet.ServletException;
11 import javax.servlet.http.HttpServlet;
12 import javax.servlet.http.HttpServletRequest;
13 import javax.servlet.http.HttpServletResponse;
14

```

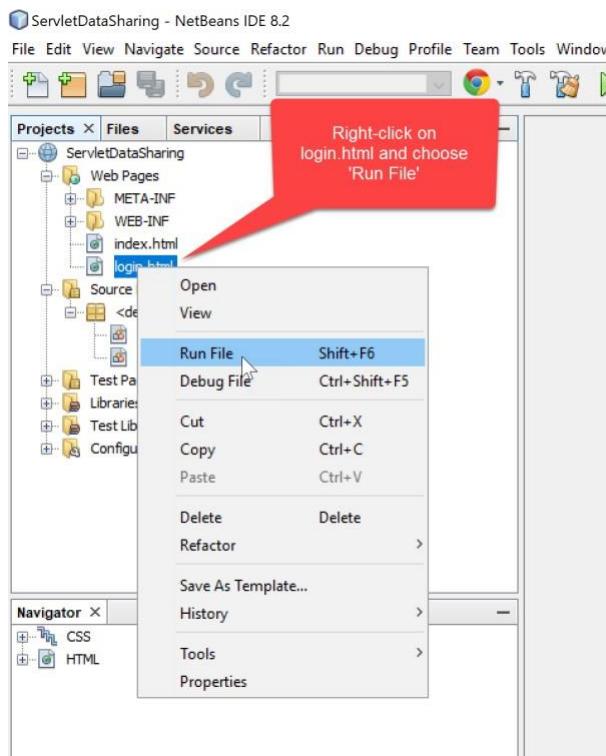
Once again, we need to import HashMap class. This time we use this to store the information about the user accounts.

AccountServlet.java - Editor

Source History

```
15  /*...4 lines */
16  public class AccountServlet extends HttpServlet {
17      HashMap<String, String[]> account = new HashMap();
18      @Override
19      public void init() throws ServletException{
20          super.init();
21          account.put("Ali", new String[]{"31/01/2019: 2000.00", "28/02/2019: 3000.00"});
22          account.put("Ahmad", new String[]{"31/01/2019: 100.00", "28/02/2019 5000.00"});
23          account.put("Muthu", new String[]{"31/01/2019: 1000", "28/02/2019 2000"});
24      }
25
26
27  }
28
29  /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
30  protected void processRequest(HttpServletRequest request, HttpServletResponse response)
31      throws ServletException, IOException {
32      response.setContentType("text/html;charset=UTF-8");
33
34      String userid_login = (String)request.getAttribute("userid");
35
36      try (PrintWriter out = response.getWriter()) {
37
38          out.println("<!DOCTYPE html>");
39          out.println("<html>");
40          out.println("<head>");
41          out.println("<title>Servlet AccountServlet</title>");
42          out.println("</head>");
43          out.println("<body>");
44
45
46          if(account.get(userid_login)==null){
47              out.println("<h1>Sorry, no information found!</h1>");
48          }
49          else{
50              out.println("<h1>Account status for: " + userid_login + "</h1>");
51              for(String tempAcc: account.get(userid_login)){
52                  out.println("<h2>" + tempAcc + "</h2>");
53              }
54          }
55
56
57          out.println("</body>");
58          out.println("</html>");
59      }
60  }
61
62
63
64
65 }
```

Type the rest of the code into AccountServlet.java



14. The Output will appear in a web browser. Put a Username as ‘Ahmad’ and Password as ‘4567’, then click *Login*.

← → ⌂ ⓘ localhost:8084/ServletDataSharing/login.html

Welcome to CSF3107

Please insert your username and password

Username: Ahmad

Password: ....

Login Reset

15. If you have followed all the previous steps correctly, you will see the account information of a user named ‘Ahmad’. Repeat step 14 with other users as input and see the result.

← → ⌂ ⓘ localhost:8084/ServletDataSharing/LoginServlet

## Account status for: Ahmad

**31/01/2019: 100.00**

**28/02/2019 5000.00**

### Reflections:

1. What have you learnt from this exercise?  
=How to sharing data within the servlets.
2. What are the common methods used in Java Servlet?  
= init()

The screenshot shows a Microsoft Edge browser window with a purple header bar. The title bar says "Login Page" and the address bar shows "localhost:8080/ServletDataSharing...". The main content area has a black background with white text. It displays the heading "Welcome to CSM3032" in large bold letters, followed by the instruction "Please insert your username and password". Below this, there are two input fields: "Username: Ahmad" and "Password: 4567". At the bottom are two buttons: "Login" and "Reset".

Welcome to CSM3032

Please insert your username and password

Username: Ahmad

Password: 4567

Login Reset

The screenshot shows a Microsoft Edge browser window with a purple header bar. The title bar says "Servlet AccountServlet" and the address bar shows "localhost:8080/ServletDataSharing/Login...". The main content area displays the heading "Account status for: Ahmad" in large bold letters. Below it, the date "31/01/2019" and the amount "100.00" are shown. A large, bold, dark text "28/02/2019 5000.00" is prominently displayed.

Account status for: Ahmad

31/01/2019: 100.00

**28/02/2019 5000.00**

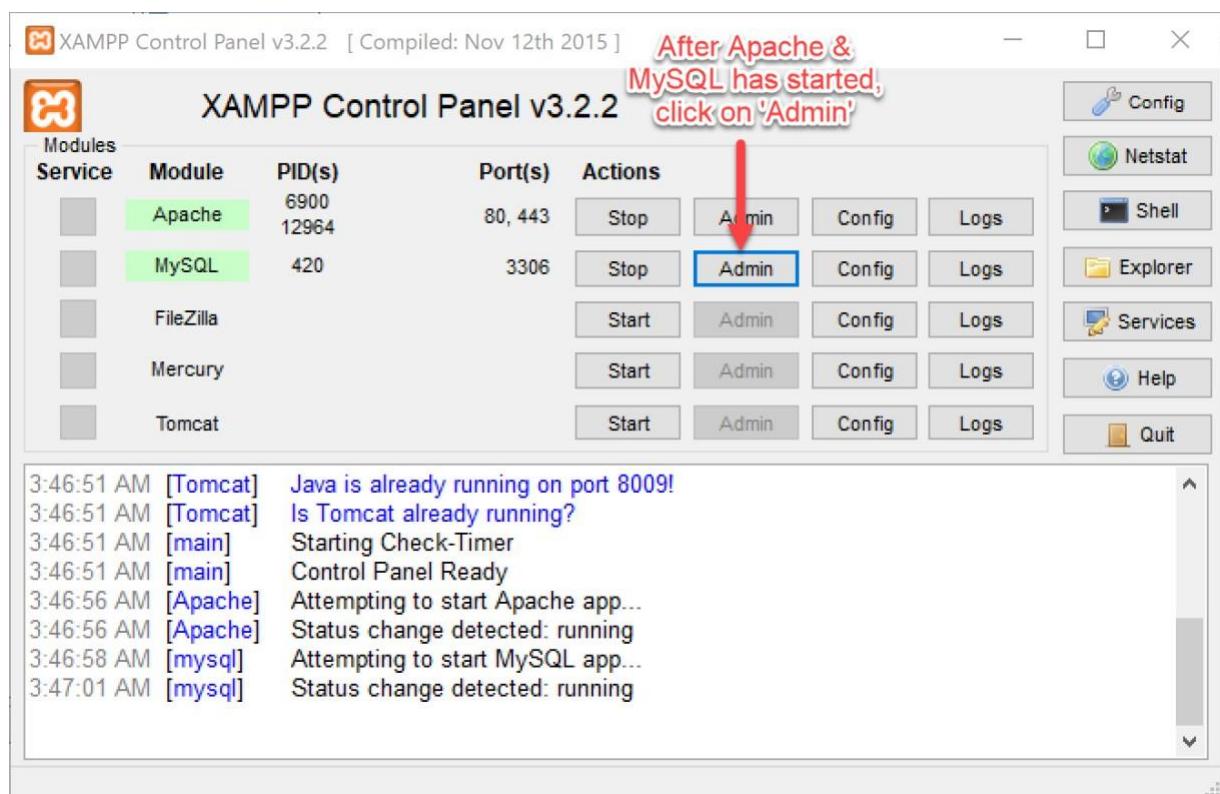
## Task 2: Creating A Table in MySQL Database

**Objective:** To create a MySQL table to store user credentials

**Problem Description:** Prepare a user table to be used in Web Application

**Estimated time:** 30 minutes

### 1. Start Apache and MySQL.



## 2. Create a new database.

The screenshot shows the 'Databases' section of phpMyAdmin. On the left, there's a sidebar with a 'New' button highlighted by a red arrow. In the main area, a 'Create database' button is shown with a red arrow pointing to it. A text input field contains 'CSF3107'. To the right of the input field is a dropdown menu set to 'latin1\_swedish\_ci'. Below these fields is a 'Create' button. Red annotations with numbered circles provide instructions: 'Click on 'New' to create a new Database' (pointing to the sidebar), 'Name your database as 'CSF3107'' (pointing to the input field), and 'Click 'Create'' (pointing to the 'Create' button). At the bottom, there's a note about enabling statistics and a link to enable them.

## 3. After the database has been created, now we are going to create a table named 'users'. This table has four columns.

The screenshot shows the 'Structure' screen for the 'csf3107' database. On the left, the database link 'csf3107' is highlighted with a red arrow and labeled 'Click on your database link, CSF3107'. In the center, a 'Create table' dialog box is open. It has a 'Name:' field containing 'users' and a 'Number of columns:' field set to '4'. Red annotations with numbered circles provide instructions: 'Create a table, name it as 'users'' (pointing to the 'Name:' field), and 'Click 'Go'' (pointing to the 'Create table' button at the bottom of the dialog).

4. Setup the table ‘users’ as below:

Table name: users

Name	Type	Length/Values	Default	Collation	Attributes	Null	Index
id	INT		None		PRIMARY	PRIMARY	<input checked="" type="checkbox"/>
username	VARCHAR	100	None				<input type="checkbox"/>
password	VARCHAR	225	None				<input type="checkbox"/>
roles	VARCHAR	10	None				<input type="checkbox"/>

Storage Engine: InnoDB

PARTITION definition: Partition by: ( Expression or column list )  
Partitions:

1 Fill in the table's schema as given!  
2 Click on A\_I to enable autoincrement for field 'id'  
3 Click Save

5. After you tick for auto-increment, this dialogue box will appear, leave the settings as it is and click ‘Go’.

Add index

Index name: PRIMARY

Index choice: PRIMARY

+ Advanced Options

Column	Size
id [int]	

Click 'Go' → Go Cancel

6. Your newly created table can be seen on the left phpMyAdmin.

The screenshot shows the phpMyAdmin interface. On the left, the database tree shows 'csf3107' selected, with a 'users' table node highlighted. A red arrow labeled '1 Click on 'users' table' points to this node. In the main panel, the 'Structure' tab is active, displaying the table 'users'. A red box highlights the table header row ('id', 'username', 'password', 'roles'). A red arrow labeled '2 You will see an empty table' points to this row. Below the table, the SQL query 'SELECT \* FROM `users`' is shown, along with a green checkmark indicating an empty result set.

7. You may insert some data into the table by following the steps on the screenshot.

The screenshot shows the phpMyAdmin interface with the 'Insert' tab selected for the 'users' table. A red arrow labeled '1 Click on 'Insert' link to insert a new data' points to the 'Insert' button in the top navigation bar. A red box highlights the first data entry form. A red arrow labeled '2 Untick the 'Ignore' checkbox' points to the 'Ignore' checkbox in the bottom left of the form. Another red arrow labeled '3 Fill in the details as shown' points to the second data entry form. A red arrow labeled '4 Click 'Go' to save the record' points to the 'Go' button at the bottom right of the second form. Both forms contain the following data:

Column	Type	Value
id	int(11)	
username	varchar(100)	Ali
password	varchar(225)	1234
roles	varchar(10)	admin

Column	Type	Value
id	int(11)	
username	varchar(100)	Ahmad
password	varchar(225)	4567
roles	varchar(10)	user

At the bottom, the 'Insert as new row' dropdown is set to 'and then', and the 'Go' button is highlighted.

8. After you have clicked the ‘Go’ button in the previous step, you will see an autogenerated SQL query on the phpMyAdmin page. To view the data, click Browse.

2 rows inserted.  
Inserted row id: 2

**Click 'Browse' to view the record**

```
INSERT INTO `users` (`id`, `username`, `password`, `roles`) VALUES (NULL, 'Ali', '1234', 'admin'), (NULL, 'Ahmad', '4567', 'user');
```

[Edit inline] [Edit] [Create]

Run SQL query/queries on table csf3107.users:

1. `INSERT INTO `users` (`id`, `username`, `password`, `roles`) VALUES (NULL, 'Ali', '1234', 'admin'), (NULL, 'Ahmad', '4567', 'user');`

Columns

`id`  
`username`  
`password`  
`roles`

SELECT \*    SELECT    INSERT    UPDATE    DELETE    Clear    Format  
Get auto-saved query  
Bind parameters  
Bookmark this SQL query:  
[ Delimiter : ]    Show this query here again    Retain query box    Rollback when finished    Enable foreign key checks

9. You will see the data of the users. Now, we have finished this task.

**Note:** In a real implementation, you should encrypt the password and never display the original form of it.

Showing rows 0 - 1 (2 total, Query took 0.0020 seconds.)

`SELECT * FROM `users``

Show all | Number of rows: 25 | Filter rows: Search this table

+ Options

			<b>id</b>	<b>username</b>	<b>password</b>	<b>roles</b>
<input type="checkbox"/>	<a href="#">Edit</a>	<a href="#">Copy</a>	1	Ali	1234	admin
<input type="checkbox"/>	<a href="#">Edit</a>	<a href="#">Copy</a>	2	Ahmad	4567	user

Check all    With selected: [Edit](#)    [Copy](#)    [Delete](#)    [Export](#)

Query 1 x users

CREATE TABLE users(  
 id INT NOT NULL AUTO\_INCREMENT,  
 username VARCHAR(100),  
 password VARCHAR(255),  
 roles VARCHAR(10),  
 PRIMARY KEY (id))  
 AUTO\_INCREMENT = 1;  
  
INSERT INTO users  
VALUES (NULL, 'Ali', '1234', 'admin'),  
 (NULL, 'Ahmad', '4567', 'user');

## Output

Result Grid | Filter Rows:

	id	username	password	roles
▶	1	Ali	1234	admin
▶	2	Ahmad	4567	user
*	NULL	NULL	NULL	NULL

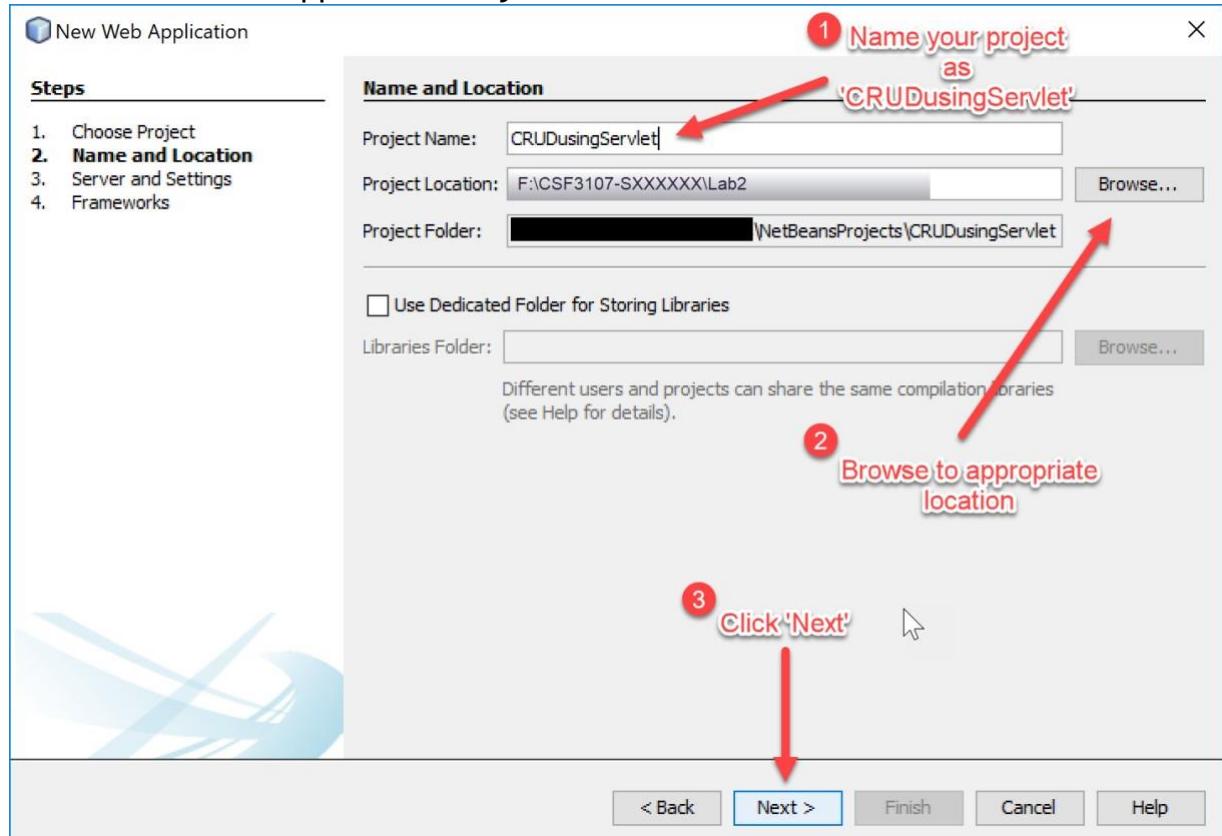
## Task 3: Setting the Environment of Web Application for Database Connection

**Objective:** To set up a proper environment for integrating web application to the database

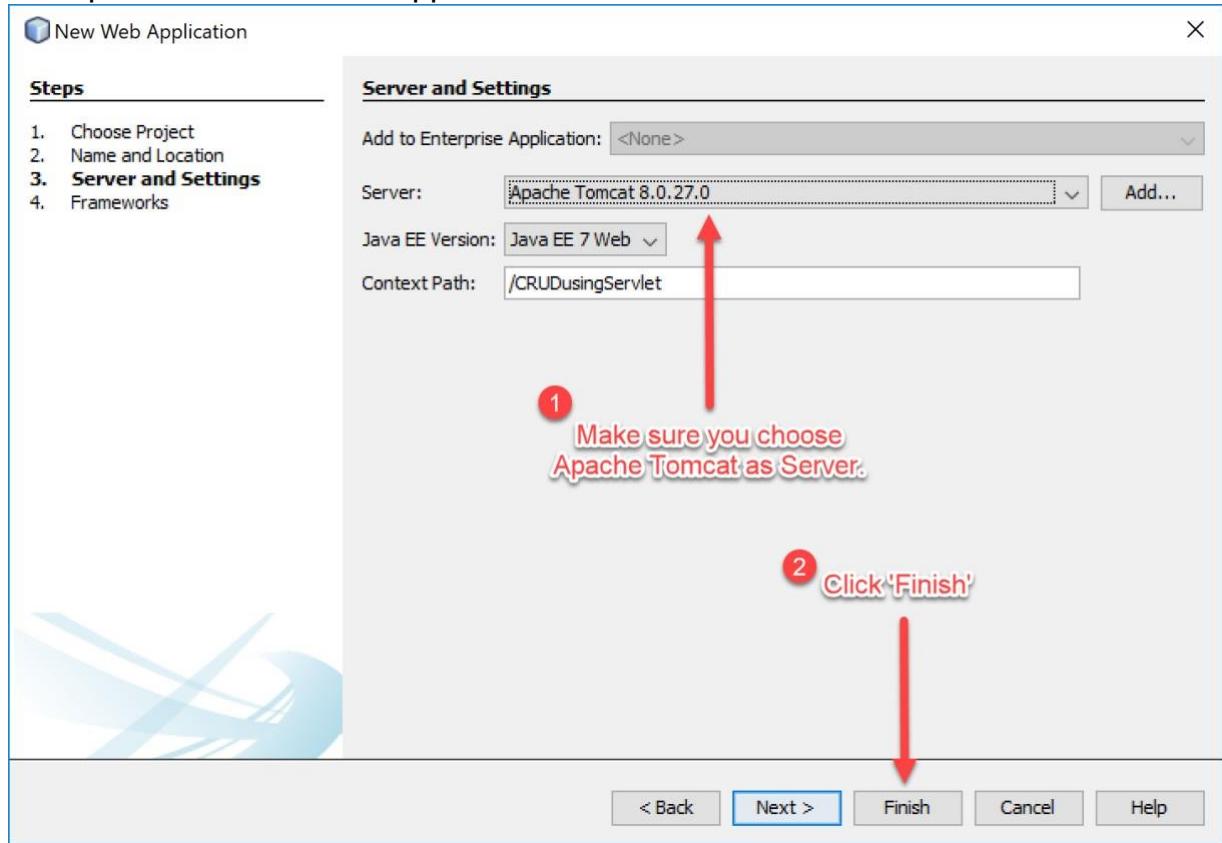
**Problem Description:** Import MySQL JDBC Library to an existing project

**Estimated time:** 5 minutes

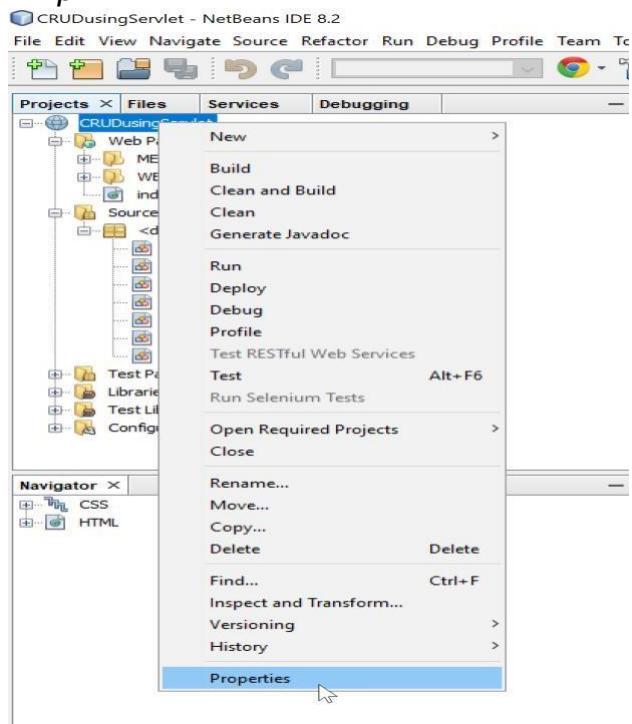
### 1. Create a new Web Application Project.



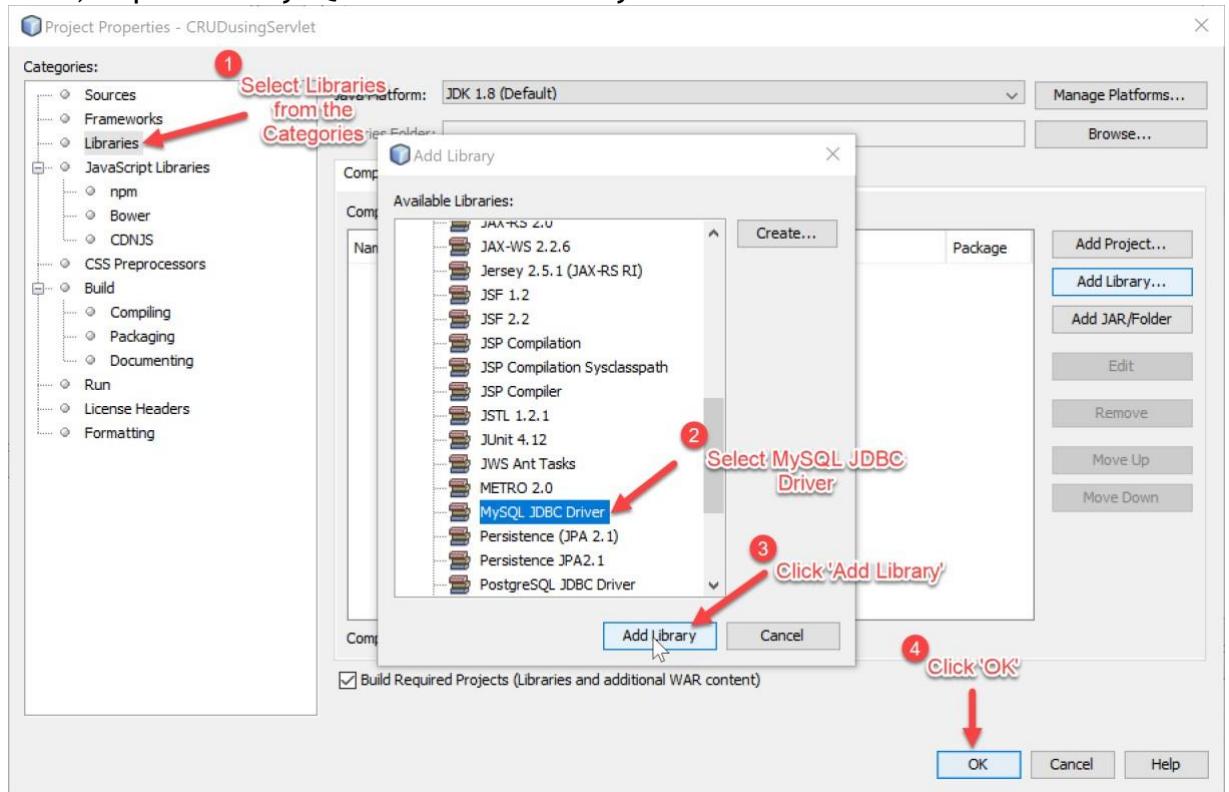
2. Use Apache Tomcat as our application server.



3. Once finished, right-click on Project's name (*CRUDUsingServlet*) and choose *Properties*.



4. Next, import the MySQL JDBC Driver library.



5. Now your application is ready to connect to MySQL database and execute a SQL query.

## Task 4: Using Servlets for Database CRUD Operations

**Objective:** To program multiple servlets for manipulating the database

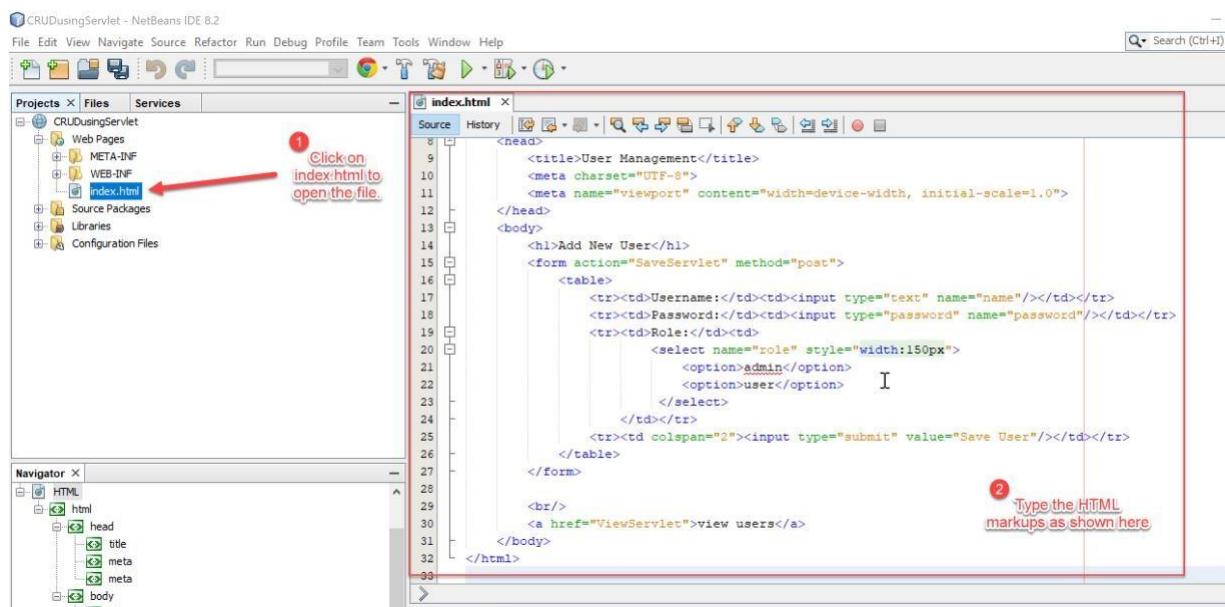
**Problem Description:** Program five different servlets to handle database operations such as insert, update and delete.

- i. SaveServlet.java: to save data into the database
- ii. ViewServlet.java: to view data retrieved from database
- iii. EditServlet.java & EditServlet2.java: to edit existing data
- iv. DeleteServlet.java: to delete existing data

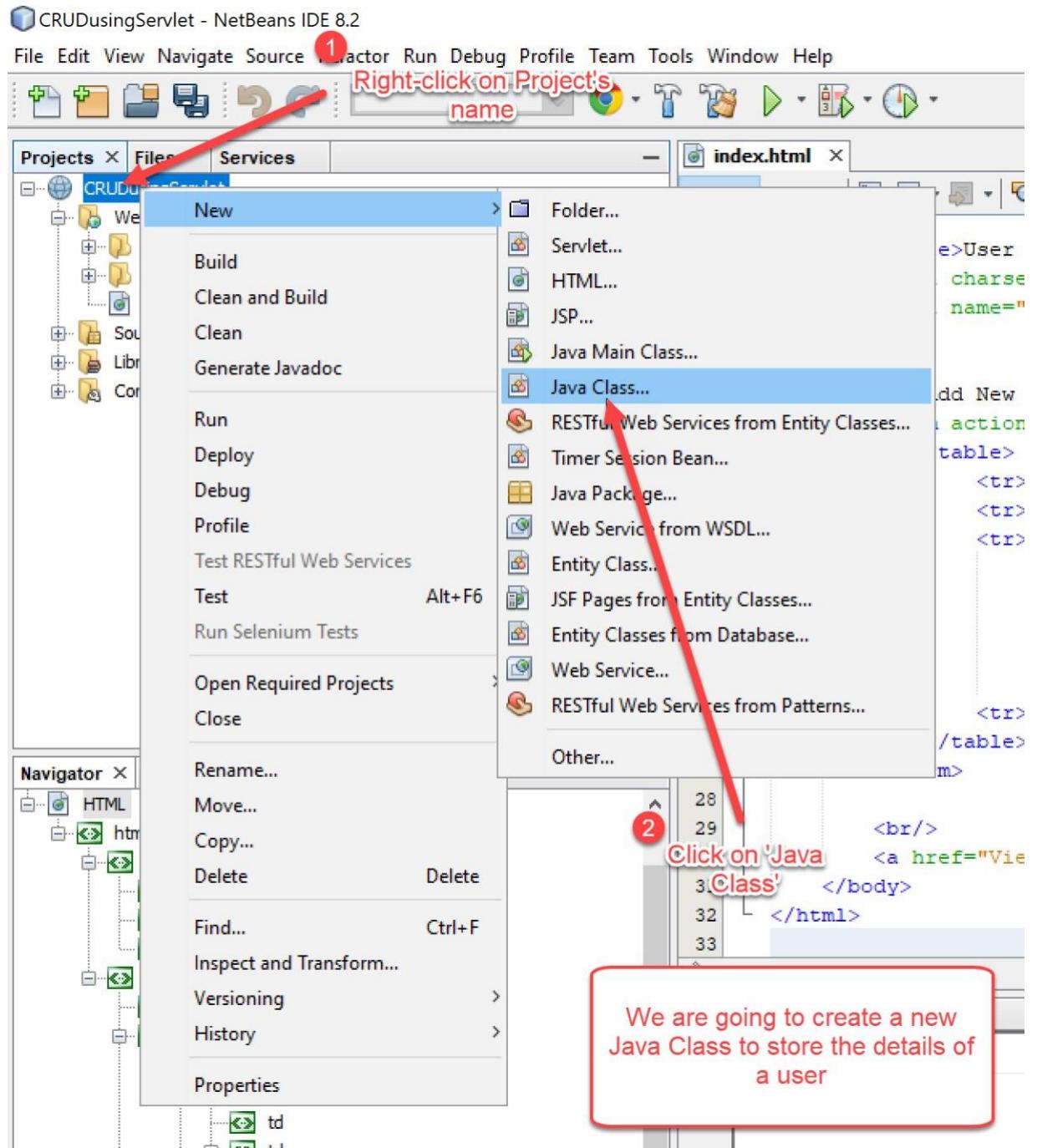
Apart from the servlets, we are going to develop two custom Java class known as JavaBeans and Data Access Object (DAO).

**Estimated time:** 90 minutes

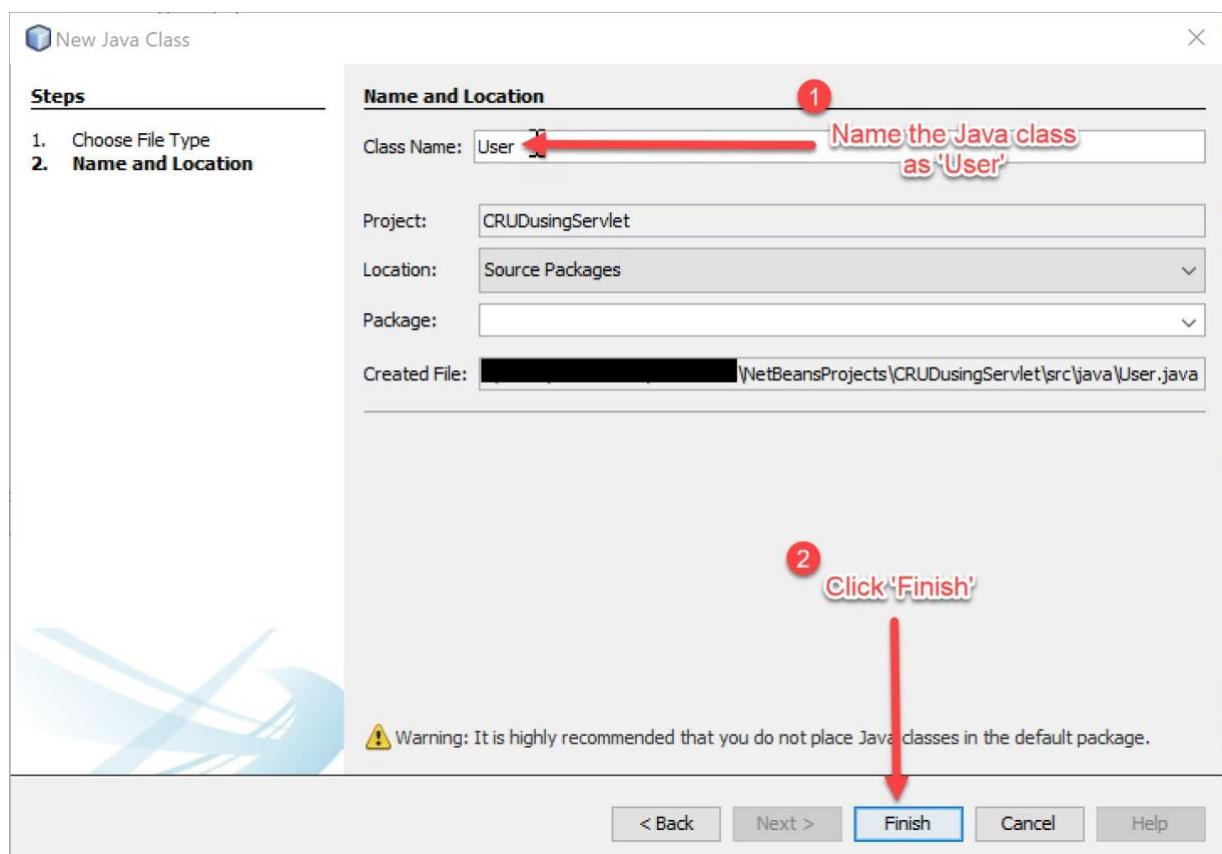
1. Open the Web Application Project (*CRUDusingServlet*) created in Task 3.
2. Open the index.html file and edit as follows.



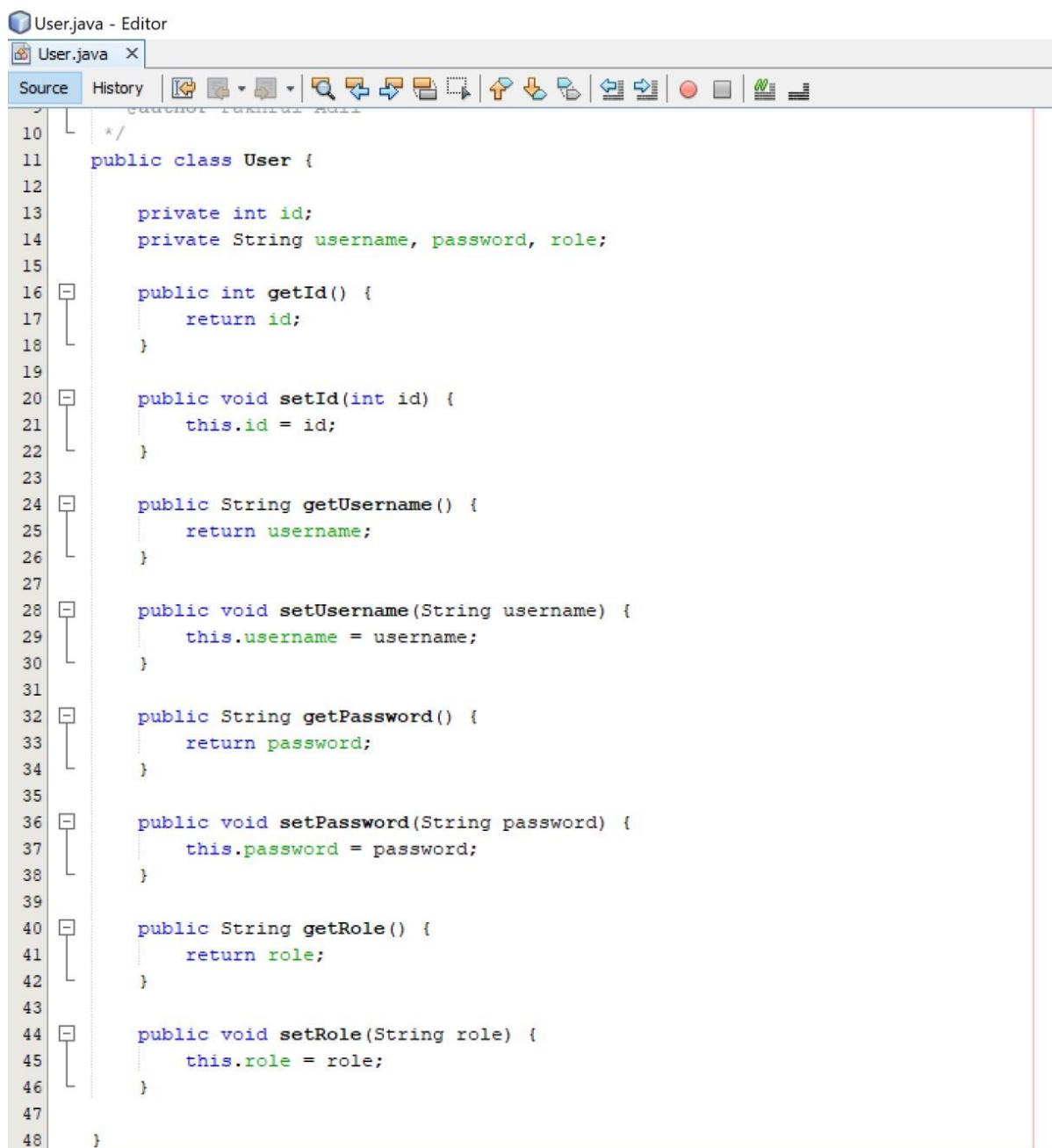
3. Now we are going to create a Java class which is specially used to store the user data.



4. Name the Java class as *User*.



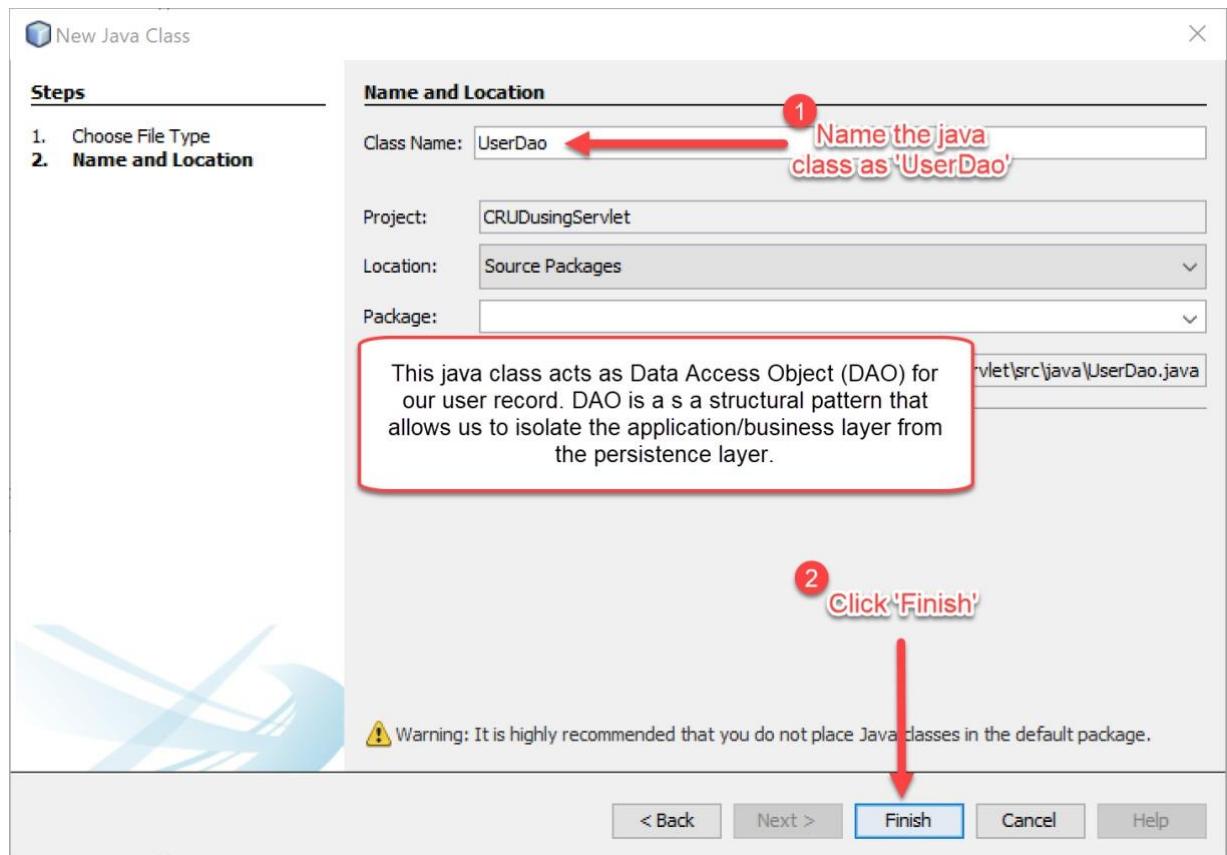
5. Type the following codes in User.java file.



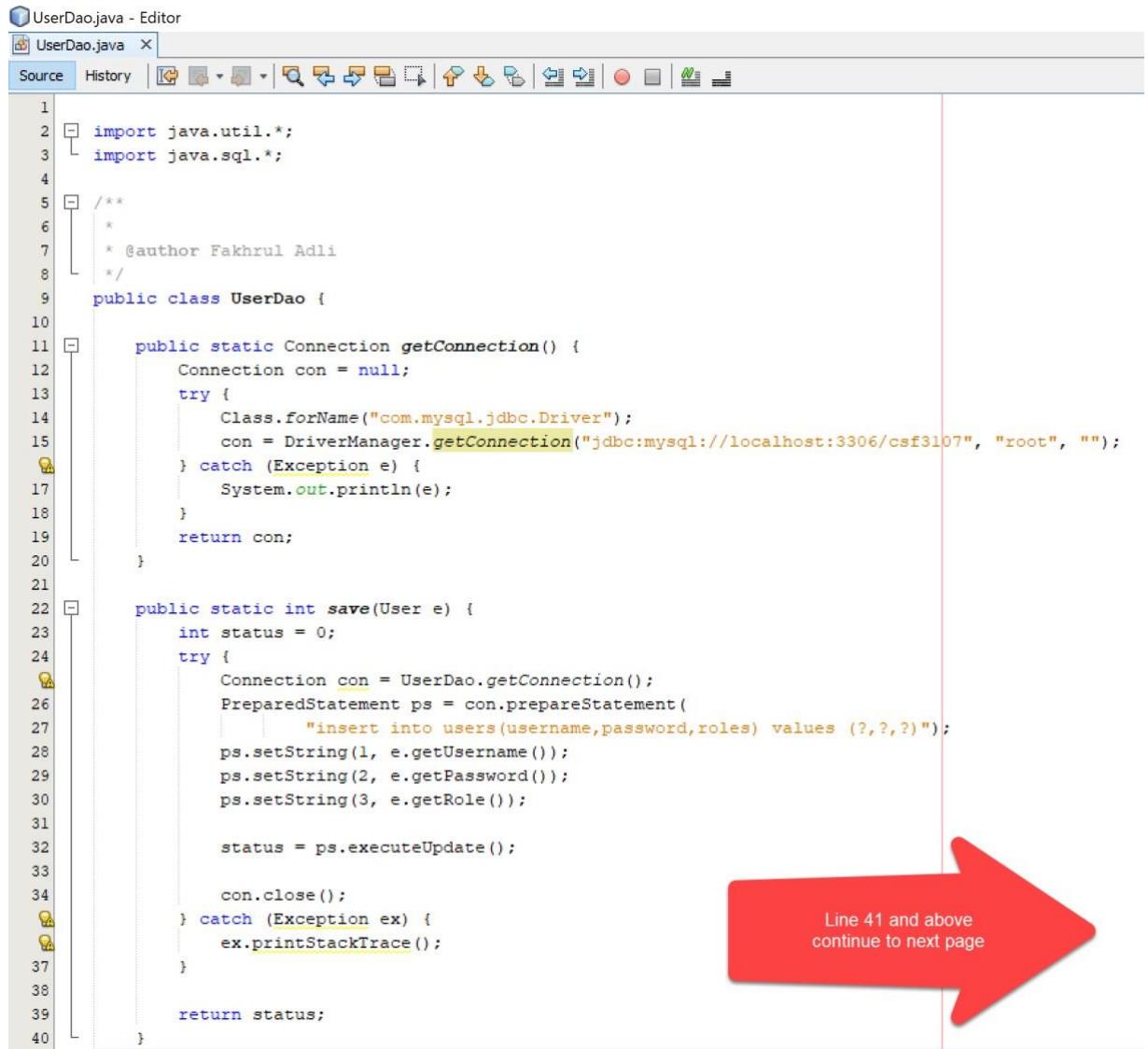
The screenshot shows a Java code editor window titled "User.java - Editor". The tab bar at the top has "User.java" selected. Below the tabs is a toolbar with various icons for file operations like cut, copy, paste, and search. The main area displays the following Java code:

```
10  /*
11  public class User {
12
13      private int id;
14      private String username, password, role;
15
16      public int getId() {
17          return id;
18      }
19
20      public void setId(int id) {
21          this.id = id;
22      }
23
24      public String getUsername() {
25          return username;
26      }
27
28      public void setUsername(String username) {
29          this.username = username;
30      }
31
32      public String getPassword() {
33          return password;
34      }
35
36      public void setPassword(String password) {
37          this.password = password;
38      }
39
40      public String getRole() {
41          return role;
42      }
43
44      public void setRole(String role) {
45          this.role = role;
46      }
47
48  }
```

6. Next, we need to program the Data Access Object (DAO) class which is used for managing database connection and SQL operations.



7. Put the following codes in UserDao.java file. Make sure your database URL is correct, and database user credentials are also valid.



```
1  import java.util.*;
2  import java.sql.*;
3
4
5  /**
6   * 
7   * @author Fakhrul Adli
8   */
9  public class UserDao {
10
11     public static Connection getConnection() {
12         Connection con = null;
13         try {
14             Class.forName("com.mysql.jdbc.Driver");
15             con = DriverManager.getConnection("jdbc:mysql://localhost:3306/csf3107", "root", "");
16         } catch (Exception e) {
17             System.out.println(e);
18         }
19         return con;
20     }
21
22     public static int save(User e) {
23         int status = 0;
24         try {
25             Connection con = UserDao.getConnection();
26             PreparedStatement ps = con.prepareStatement(
27                 "insert into users(username,password,roles) values (?, ?, ?)");
28             ps.setString(1, e.getUsername());
29             ps.setString(2, e.getPassword());
30             ps.setString(3, e.getRole());
31
32             status = ps.executeUpdate();
33
34             con.close();
35         } catch (Exception ex) {
36             ex.printStackTrace();
37         }
38
39         return status;
40     }
}
```

Line 41 and above  
continue to next page

## 8. ...continued.

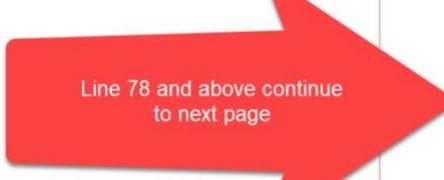
UserDao.java - Editor

UserDao.java

Source History

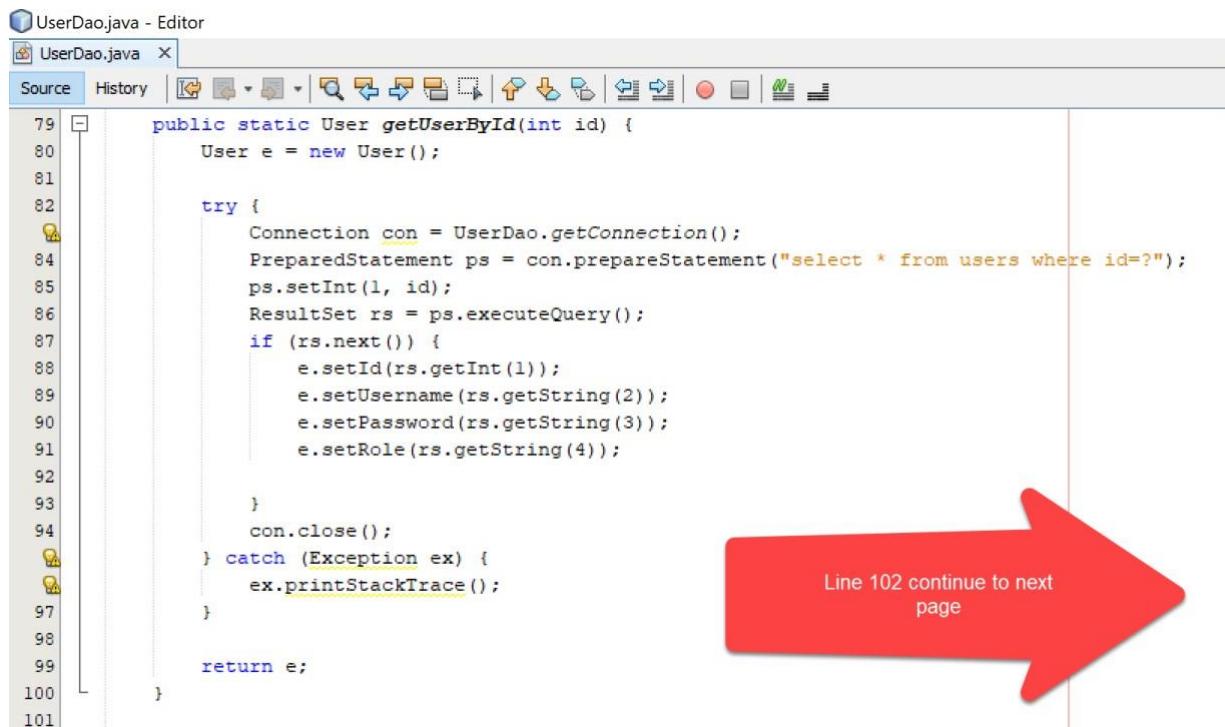
```
42     public static int update(User e) {
43         int status = 0;
44         try {
45             Connection con = UserDao.getConnection();
46             PreparedStatement ps = con.prepareStatement(
47                 "update users set username=?,password=?,roles=? where id=?");
48             ps.setString(1, e.getUsername());
49             ps.setString(2, e.getPassword());
50             ps.setString(3, e.getRole());
51             ps.setInt(4, e.getId());
52
53             status = ps.executeUpdate();
54
55             con.close();
56         } catch (Exception ex) {
57             ex.printStackTrace();
58         }
59
60         return status;
61     }
62
63     public static int delete(int id) {
64         int status = 0;
65         try {
66             Connection con = UserDao.getConnection();
67             PreparedStatement ps = con.prepareStatement("delete from users where id=?");
68             ps.setInt(1, id);
69             status = ps.executeUpdate();
70
71             con.close();
72         } catch (Exception e) {
73             e.printStackTrace();
74         }
75
76         return status;
77     }

```



Line 78 and above continue  
to next page

## 9. ...continued.



UserDao.java - Editor

UserDao.java

Source History

```
79     public static User getUserById(int id) {
80         User e = new User();
81
82         try {
83             Connection con = UserDao.getConnection();
84             PreparedStatement ps = con.prepareStatement("select * from users where id=?");
85             ps.setInt(1, id);
86             ResultSet rs = ps.executeQuery();
87             if (rs.next()) {
88                 e.setId(rs.getInt(1));
89                 e.setUsername(rs.getString(2));
90                 e.setPassword(rs.getString(3));
91                 e.setRole(rs.getString(4));
92
93             }
94             con.close();
95         } catch (Exception ex) {
96             ex.printStackTrace();
97         }
98
99         return e;
100    }
101 }
```

Line 102 continue to next page

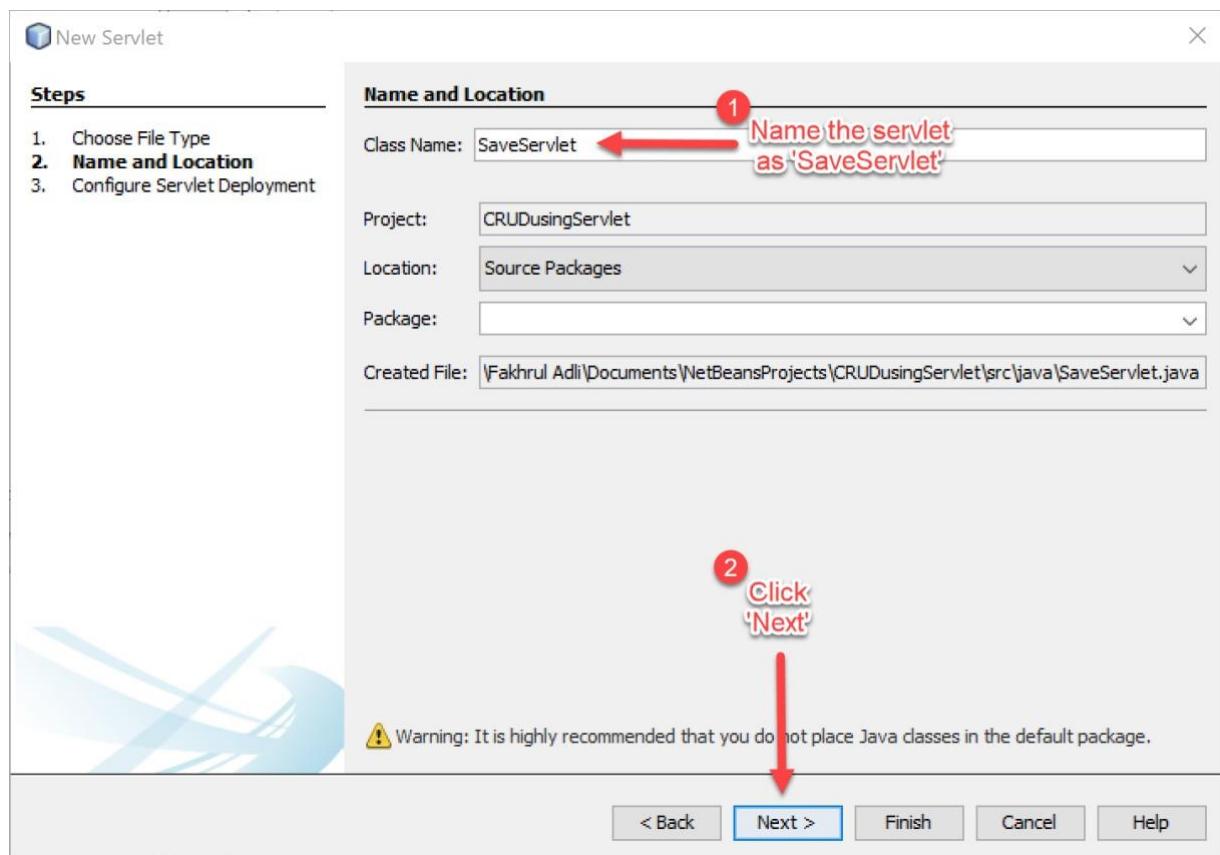
## 10. Save (CTRL+s) UserDao.java file.



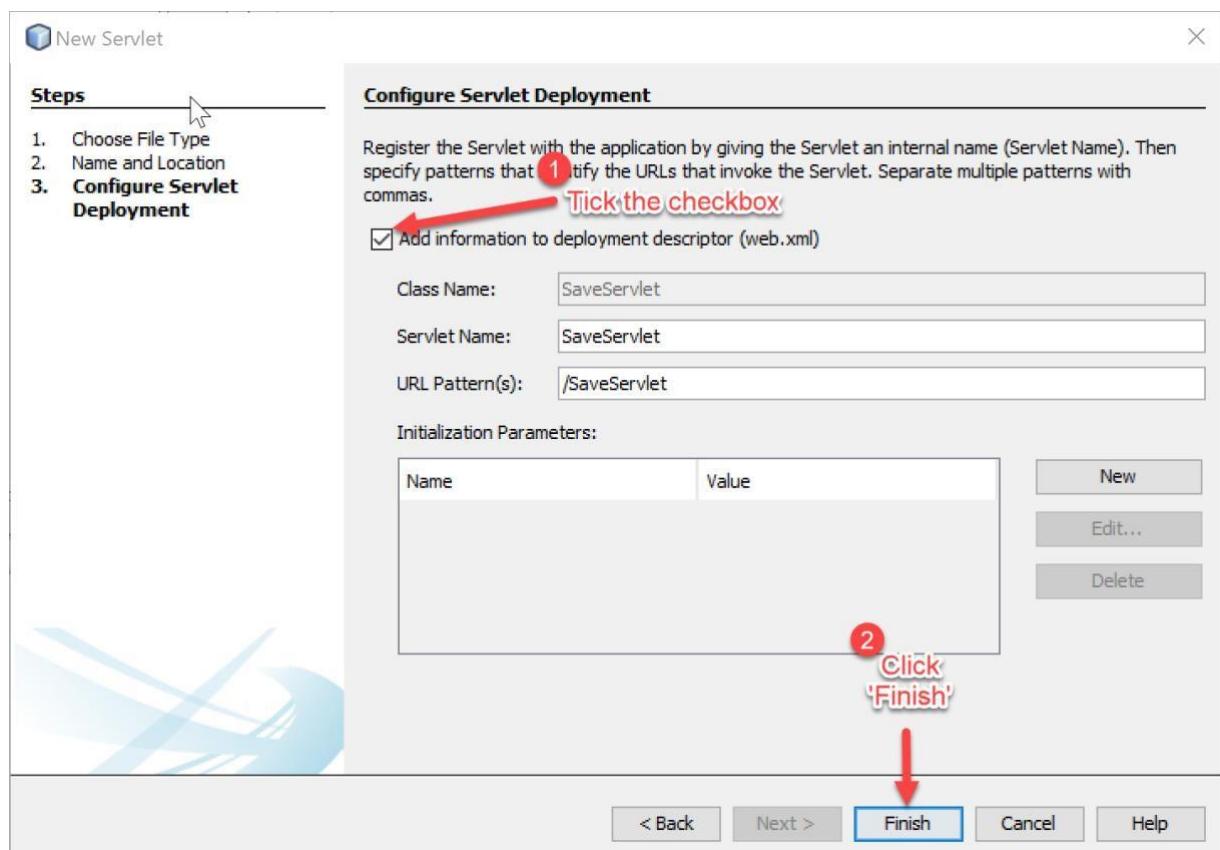
```
101
102     public static List<User> getAllUsers() {
103         List<User> list = new ArrayList<User>();
104
105         try {
106             Connection con = UserDao.getConnection();
107             PreparedStatement ps = con.prepareStatement("select * from users");
108             ResultSet rs = ps.executeQuery();
109             while (rs.next()) {
110                 User e = new User();
111                 e.setId(rs.getInt(1));
112                 e.setUsername(rs.getString(2));
113                 e.setPassword(rs.getString(3));
114                 e.setRole(rs.getString(4));
115                 list.add(e);
116             }
117             con.close();
118         } catch (Exception e) {
119             e.printStackTrace();
120         }
121
122         return list;
123     }
124 }
```

End of UserDao.java

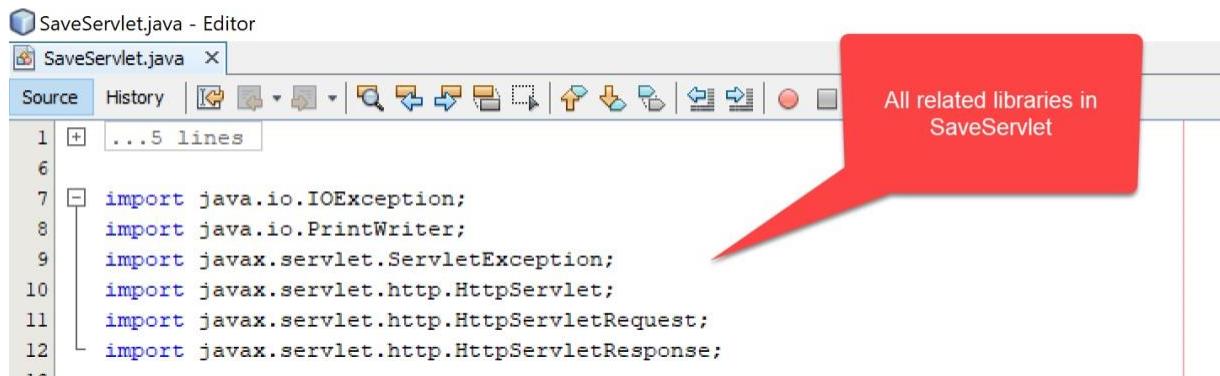
11. After finish coding the UserDao.java, now we are to code the servlet for saving data into the database.



12. Remember to tick the checkbox every time you create a new servlet.



13. Make sure all related libraries are included in the SaveServlet.java file.



```
SaveServlet.java - Editor
SaveServlet.java X
Source History | ... 5 lines | 
1 import java.io.IOException;
2 import java.io.PrintWriter;
3 import javax.servlet.ServletException;
4 import javax.servlet.http.HttpServlet;
5 import javax.servlet.http.HttpServletRequest;
6 import javax.servlet.http.HttpServletResponse;
```

All related libraries in SaveServlet

14. Type the following codes in processRequest() method.



```
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();
}
```

Put these codes in the processRequest() method

15. Save the file after finished.

16. Next, we are going to create a servlet to view our data in database. Create a new servlet *ViewServlet*, tick ‘Add information to deployment descriptor (web.xml)’ and click finish. Insert the following codes to the servlet.

```

1 ViewServlet.java - Editor
2 ViewServlet.java X
3 Source History | 
4 7 import java.io.IOException;
5 8 import java.io.PrintWriter;
6 9 import javax.servlet.ServletException;
7 10 import javax.servlet.http.HttpServlet;
8 11 import javax.servlet.http.HttpServletRequest;
9 12 import javax.servlet.http.HttpServletResponse;
10 13
11 14 import java.util.List;
12 15
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31 protected void processRequest(HttpServletRequest request, HttpServletResponse response)
32     throws ServletException, IOException {
33     response.setContentType("text/html");
34     PrintWriter out=response.getWriter();
35     out.println("<a href='index.html'>Add New User</a>");
36     out.println("<h1>User List</h1>");
37
38     List<User> list=UserDao.getAllUsers();
39
40     out.print("<table border='1' width='100%'>");
41     out.print("<tr><th>Id</th><th>Name</th><th>Password</th><th>Role</th>" +
42         "<th>Edit</th><th>Delete</th></tr>");
43     for(User e:list{
44         out.print("<tr><td>"+e.getId()+"</td><td>"+e.getUsername()+"</td><td>" +
45             "+e.getPassword()+"</td><td>"+e.getRole()+"</td><td><a href='EditServlet?id='
46             "+e.getId()+">edit</a></td> <td><a href='DeleteServlet?id='
47             "+e.getId()+">delete</a></td></tr>");
48     }
49     out.print("</table>");
50
51     out.close();
52 }

```

17. Currently, we have finished creating a servlet for saving and viewing the data in the database. Now, we need a servlet to handle the process of editing the existing data stored in the table in the database.

**New Servlet**

**Steps**

1. Choose File Type
- 2. Name and Location**
3. Configure Servlet Deployment

**Name and Location**

Class Name: **EditServlet** 1 Name the servlet as 'EditServlet'

Project: CRUDUsingServlet

Location: Source Packages

Package:

Created File: C:\Users\asus\NetBeansProjects\CRUDUsingServlet\src\java>EditServlet.java

**Click 'Next >'** 2

**Warning:** It is highly recommended that you do not place Java classes in the default package.

< Back Next > Finish Cancel Help

---

**New Servlet**

**Steps**

1. Choose File Type
2. Name and Location
- 3. Configure Servlet Deployment**

**Configure Servlet Deployment**

Register the Servlet with the application by giving the Servlet an internal name (Servlet Name). Then specify patterns that identify the URLs that invoke the Servlet. Separate multiple patterns with commas.

**Tick the checkbox** 1

Add information to deployment descriptor (web.xml)

Class Name:	EditServlet
Servlet Name:	EditServlet
URL Pattern(s):	/EditServlet

Initialization Parameters:

Name	Value

New Edit... Delete

**Click 'Finish'** 2

< Back Next > Finish Cancel Help

18. Type the following codes in the servlet you just created.

EditServlet.java - Editor

EditServlet.java

Source History

```

7 import java.io.IOException;
8 import java.io.PrintWriter;
9 import javax.servlet.ServletException;
10 import javax.servlet.http.HttpServlet;
11 import javax.servlet.http.HttpServletRequest;
12 import javax.servlet.http.HttpServletResponse;
13
14 /*...4 lines */
15 public class EditServlet extends HttpServlet {
16
17     /** Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
18     protected void processRequest(HttpServletRequest request, HttpServletResponse response)
19             throws ServletException, IOException {
20         response.setContentType("text/html");
21         PrintWriter out=response.getWriter();
22         out.println("<h1>Update User</h1>");
23         String sid=request.getParameter("id");
24         int id=Integer.parseInt(sid);
25
26         User e=UserDao.getUserById(id);
27
28         out.print("<form action='EditServlet2' method='post'>");
29         out.print("<table>");
30         out.print("<tr><td></td><td><input type='hidden' name='id' value='"
31                 +e.getId()+"'></td></tr>");
32         out.print("<tr><td>Name:</td><td><input type='text' name='username' value='"
33                 +e.getUsername()+"'></td></tr>");
34         out.print("<tr><td>Password:</td><td><input type='password' name='password' value='"
35                 +e.getPassword()+"'></td></tr>");
36         out.print("<tr><td>Role:</td><td>");
37         out.print("<select name='role' style='width:150px'>");
38         out.print("<option>admin</option>");
39         out.print("<option>user</option>");
40         out.print("</select>");
41         out.print("</td></tr>");
42         out.print("<tr><td colspan='2'><input type='submit' value='Edit & Save' /></td></tr>");
43         out.print("</table>");
44         out.print("</form>");
45
46         out.close();
47     }
48
49 }
50
51
52
53
54
55
56
57
58
59

```

Make EditServlet.java looks like this

19. The previous servlet for editing data is for displaying the form as below:

← → ⌂ i localhost:8084/CRUDusingServlet/EditServlet?id=1

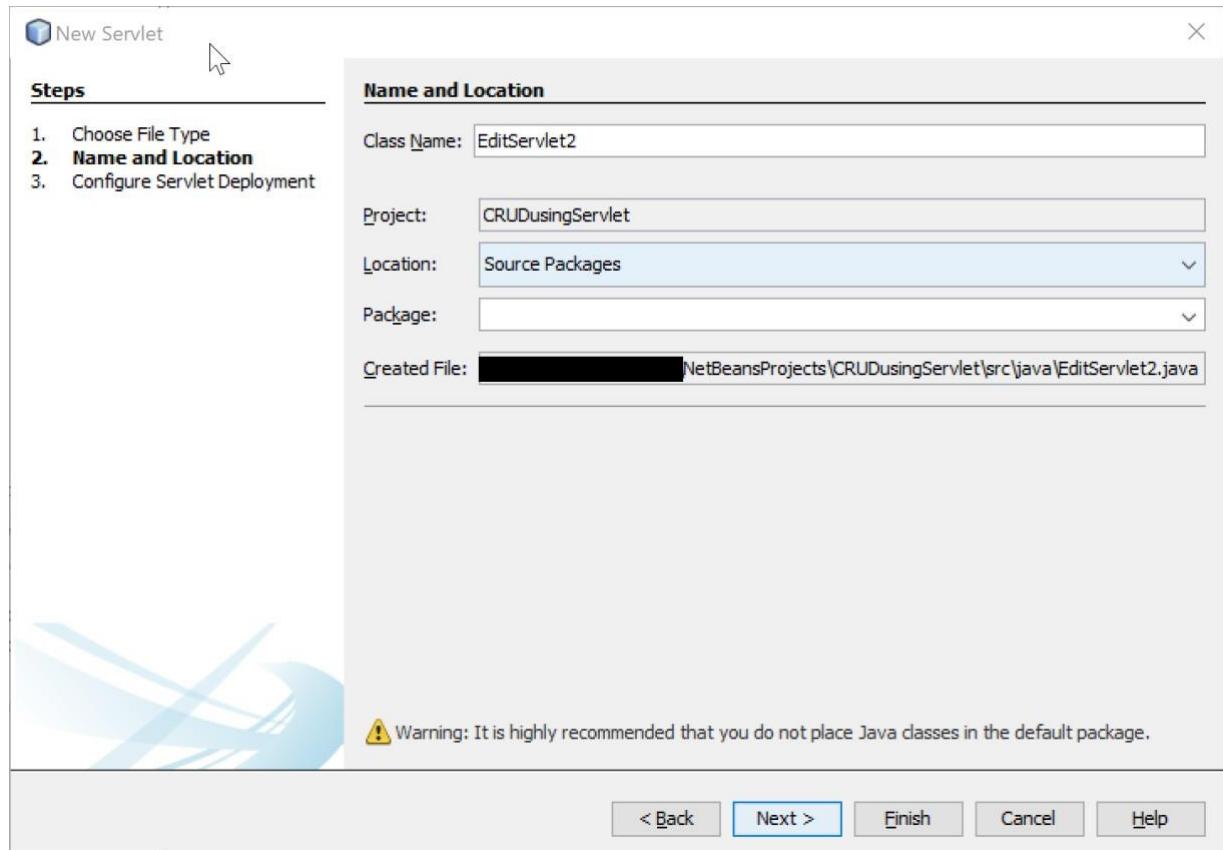
## Update User

Name:

Password:

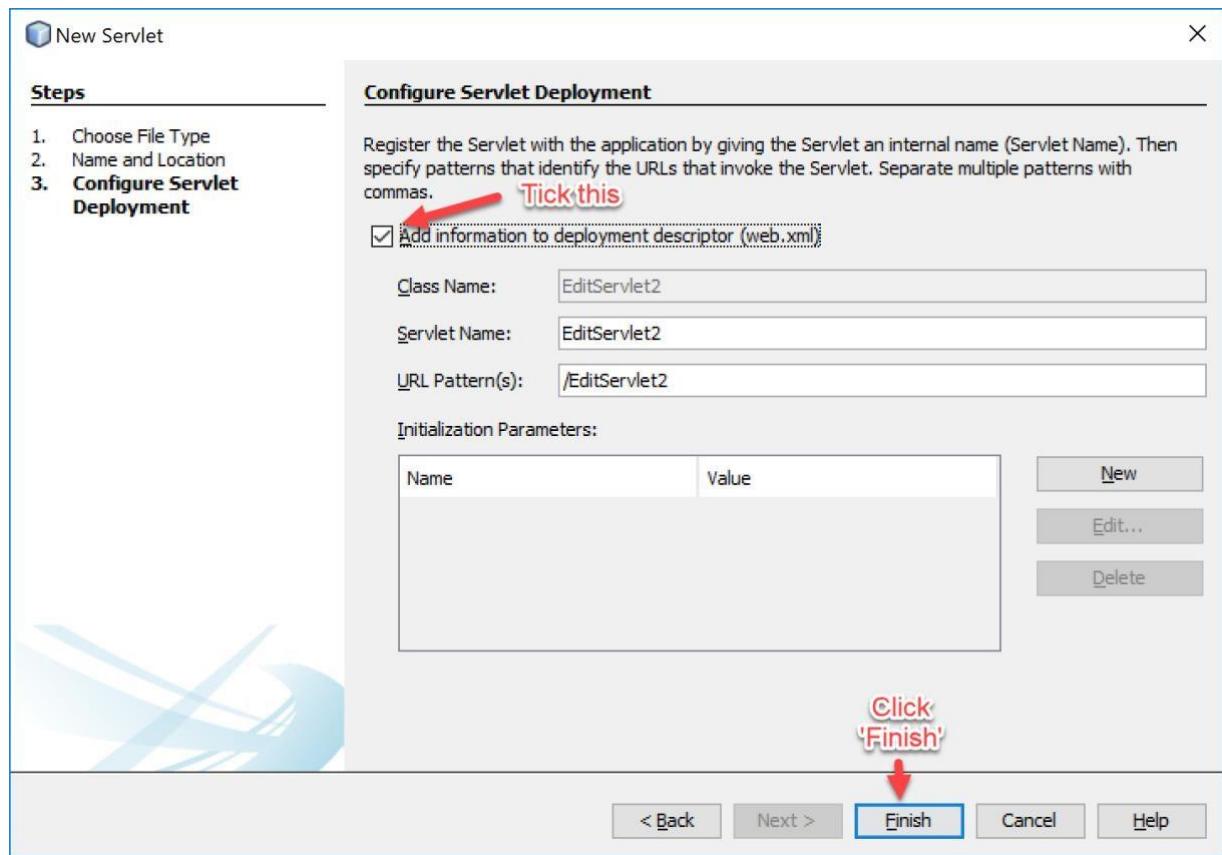
Role:

20. Now, we need another servlet to handle database processing.



21. Remember to tick 'Add information to deployment descriptor (web.xml)'.

Netbeans will configure the servlet in web.xml on your behalf.



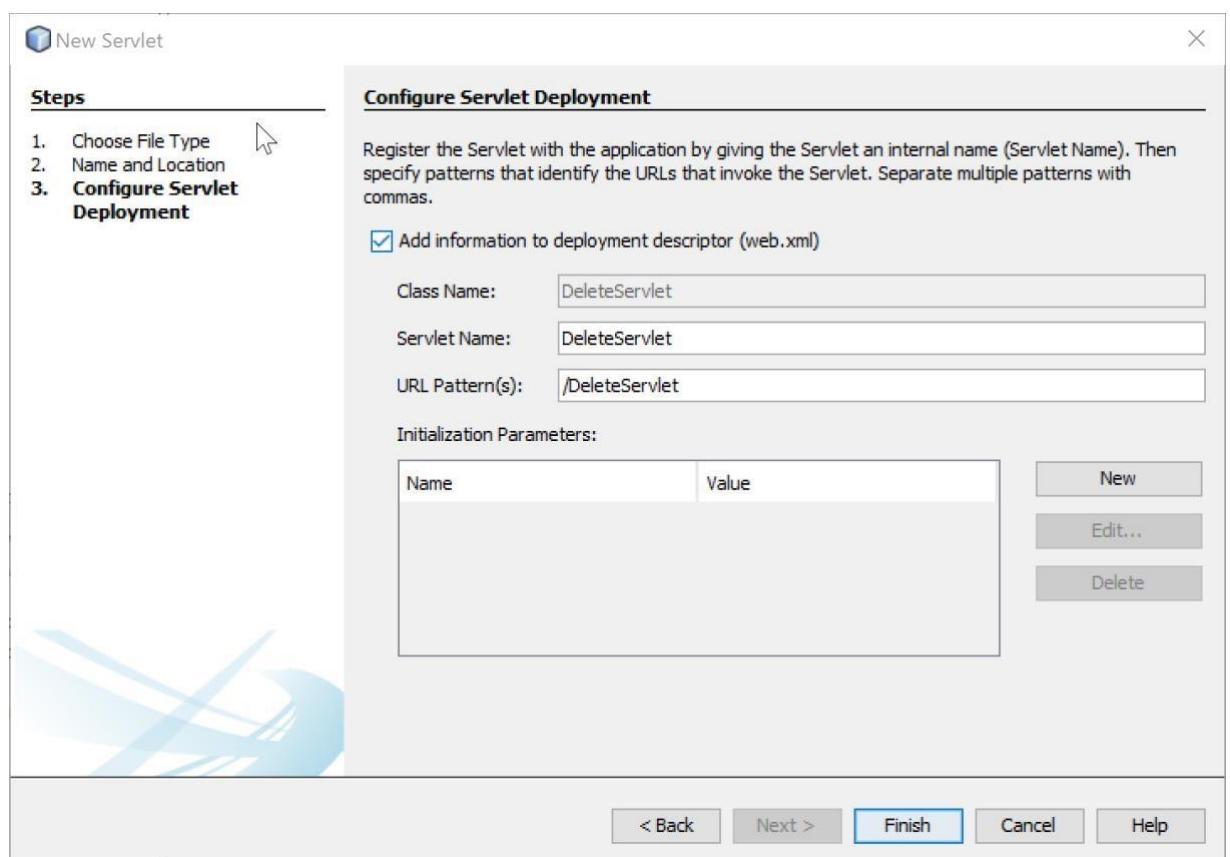
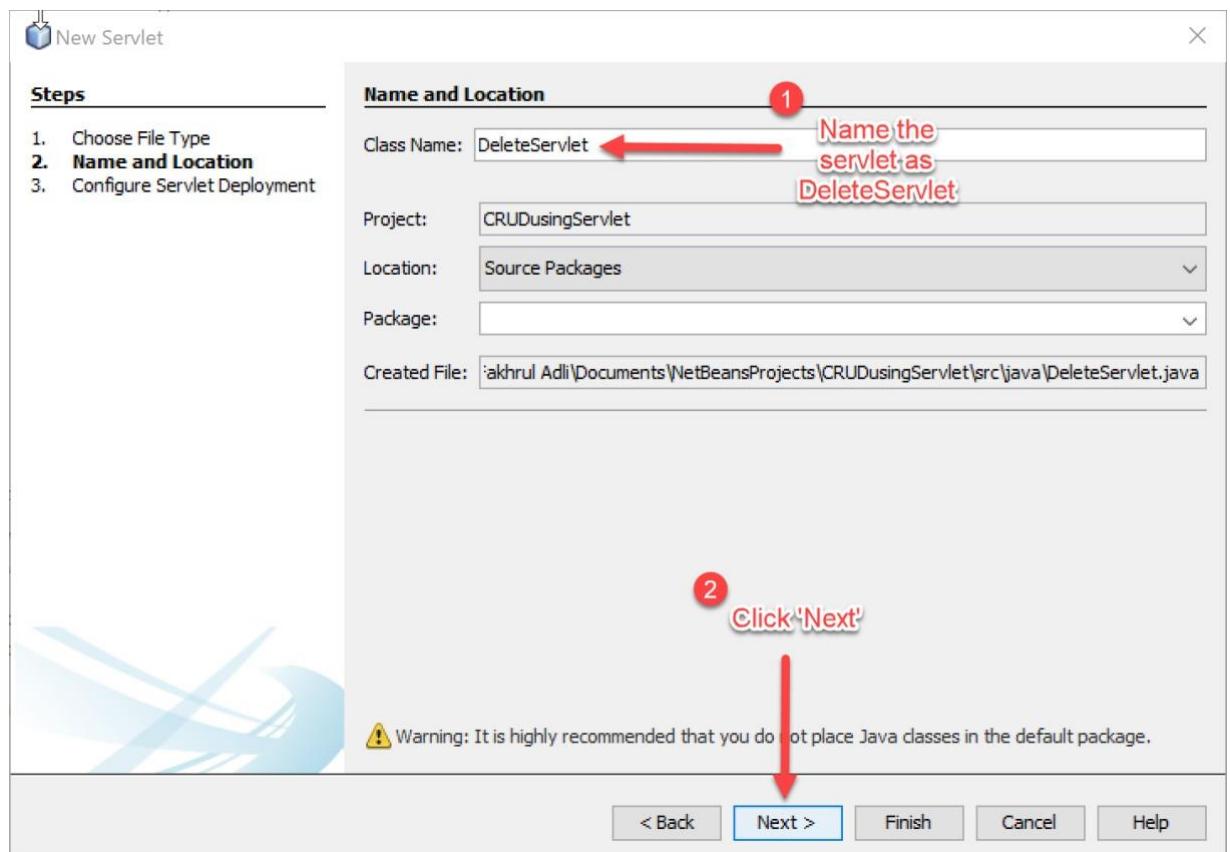
22. Type the following codes in the processRequest() method in

EditServlet2.java. Save the file when you have finished.

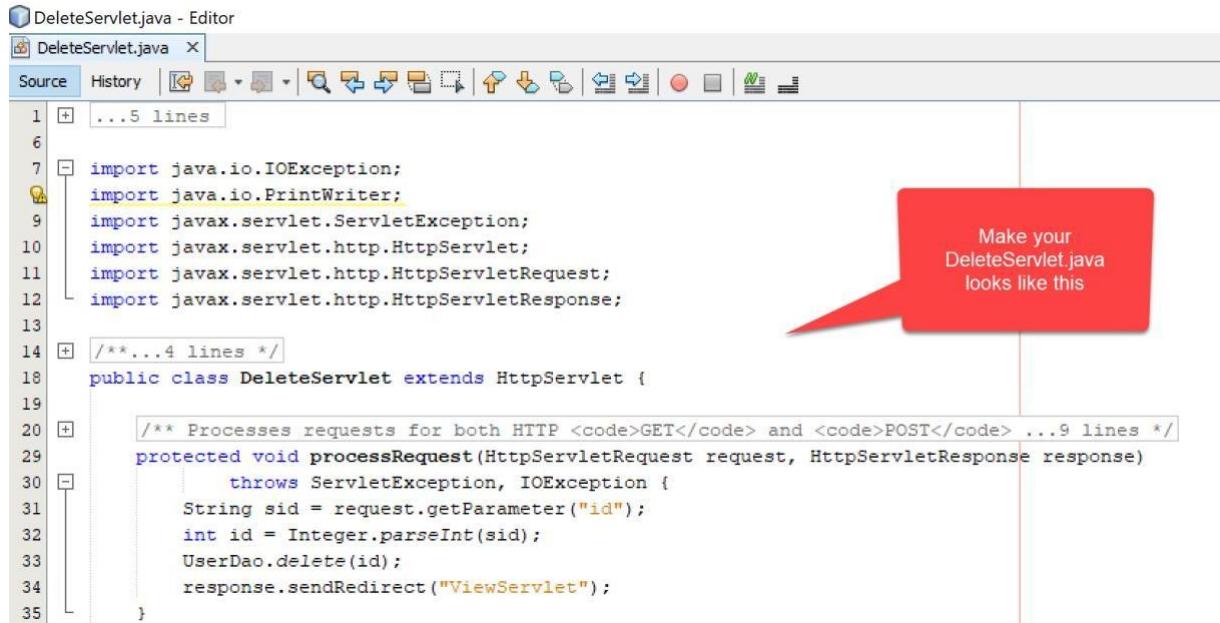
```
29 protected void processRequest(HttpServletRequest request, HttpServletResponse response)
30     throws ServletException, IOException {
31     response.setContentType("text/html");
32     PrintWriter out = response.getWriter();
33
34     String name = request.getParameter("name");
35     String password = request.getParameter("password");
36     String role = request.getParameter("role");
37
38     User e = new User();
39     e.setUsername(name);
40     e.setPassword(password);
41     e.setRole(role);
42
43     int status = UserDao.save(e);
44     if (status > 0) {
45         out.print("<p>Record saved successfully!</p>");
46         request.getRequestDispatcher("index.html").include(request, response);
47     } else {
48         out.println("Sorry! unable to save record");
49     }
50
51     out.close();
52 }
```

A red callout bubble on the right side of the code editor contains the text: "Put these codes in the processRequest() method".

23. Now we already have servlets for edit and saving the data, so the last servlet we need to provide is a servlet for deleting the data.



24. Write the codes below into your DeleteServlet.java file. Save the file when you have done.



```
1  ...5 lines
6
7  import java.io.IOException;
8  import java.io.PrintWriter;
9  import javax.servlet.ServletException;
10 import javax.servlet.http.HttpServlet;
11 import javax.servlet.http.HttpServletRequest;
12 import javax.servlet.http.HttpServletResponse;
13
14 /**
15  * Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
16 public class DeleteServlet extends HttpServlet {
17
18     /**
19      * Processes requests for both HTTP <code>GET</code> and <code>POST</code> ...9 lines */
20     protected void processRequest(HttpServletRequest request, HttpServletResponse response)
21         throws ServletException, IOException {
22         String sid = request.getParameter("id");
23         int id = Integer.parseInt(sid);
24         UserDao.delete(id);
25         response.sendRedirect("ViewServlet");
26     }
27
28 }
29
30
31
32
33
34
35 }
```

Make your DeleteServlet.java looks like this

25. Run all the CRUD process of your servlet applications. In the end, you should be able to (C)reate, (R)etrieve, (U)pdate and (D)elete the data in the database.

#### Reflections:

1. What is the name of the Java Library that you need to import before coding the web application with database operations?  
= `import java.sql.*;`
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.  
= WEB-INF folder
  - `<servlet>` this tag defines a servlet and associates it with a jaca class.
  - `<servlet-name>` is a specific or unique name for a servlet
  - `<servlet-mapping>` tag map to a URL to specifying which request should be handle by the servlet.

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

= DAO is a way of organizing code to handle the communication between program and a database. It helps to keep code clean and separates the logic for interacting with data from the rest of the application. It also can ease the business process by separation of concern, encapsulation database operations, security and transactions and enhanced maintainability.