Exno: 5	CRUD OPERATION USING SERVELET
Date:	

Aim:

To Implement crud operations using Servlets is to create a web application that can interact with a database to perform basic operations on data: create new records, retrieve existing records, update records, and delete records. This allows for the development of dynamic and interactive web applications that can manage and manipulate data.

Procedure:

Create a Servlet for Each Operation:

Create a Servlet for each CRUD operation (Create, Read, Update, Delete).

Override the doGet and doPost methods in each Servlet to handle GET and POST requests, respectively.

Handle Database Connections:

Use JDBC (Java Database Connectivity) to connect to your database.

Use Connection, Statement, and ResultSet objects to execute queries and retrieve results.

Implement CRUD Operations:

For Create operation, extract data from the request and insert it into the database.

For Read operation, retrieve data from the database based on the request and send it back as a response.

For Update operation, extract updated data from the request and update the corresponding record in the database.

For Delete operation, extract the record ID from the request and delete the corresponding record from the database.

Map URLs to Servlets:

Use a web.xml file or annotations to map URLs to the appropriate Servlets.

For example, map /create to the Create Servlet, /read to the Read Servlet, and so on.

Handle Responses:

Format the data retrieved from the database (e.g., as JSON, XML, HTML) and send it back as a response to the client.

Error Handling:

Implement error handling to handle database errors, invalid requests, and other exceptional conditions.

Return appropriate error messages or status codes to the client.

Testing:

Test each CRUD operation to ensure it works as expected.

Use tools like Postman or curl to send requests to your Servlets and verify the responses.

Security:

Implement security measures to protect your Servlets from unauthorized access.

Use HTTPS, authentication, and input validation to secure your application.

Code:

index.html:

```
<!DOCTYPE html>
<html>
<head>
<meta charset="UTF-8">
<title>CRUD - Servlet</title>
<style>
   body{
      display: flex;
      justify-content: center;
   }
   form{
      margin-top: 10%;
      background-color:blue;
      display: flex;
      flex-direction: column;
```

```
        padding: 20px;
        width: 500px;
        border: 2px solid black;
        border-radius: 20px;
    }
    h1{
        text-align: center;
    }
    input{
        height: 30px;
        border-radius: 10px;
    }
    .oper{
        display: flex;
        justify-content: space-around;
    }
    .oper button{
        padding: 10px;
        border-radius: 10px;
        background-color: red; /* Different color for buttons in .oper */
        font-weight: bold;
    }
</style>
</head>
<body>
<form action="ServerServlet" method="post">
    <h1>Student form</h1>
            Student Name :<input type="text" name="stname"><br>
            Student ID :<input type="number" name="stid"><br>
            Department :<input type="text" name="dept"><br>
            Year : <input type="text" name="yr"><br>
    <div class="oper">
        <button type="submit" name="action" value="insert">Insert</button>
        <button type="submit" name="action" value="read">Read</button>
        <button type="submit" name="action" value="update">Update</button>
        <button type="submit" name="action" value="delete">Delete</button>
    </div>
</form>
</body>
</html>
```

Java file:

```
import java.io.IOException;

import java.io.PrintWriter;
```

```
import java.sql.Connection;
import java.sql.*;
import javax.servlet.ServletException;
import javax.servlet.annotation.WebServlet;
import javax.servlet.http.HttpServlet;
import javax.servlet.http.HttpServletRequest;
import javax.servlet.http.HttpServletResponse;

/**
 * Servlet implementation class ServerServlet
 */
@WebServlet("/ServerServlet")
public class ServerServlet extends HttpServlet {
	private static final long serialVersionUID = 1L;

   public ServerServlet() {
      super();
   }

   protected void insertRequest(HttpServletRequest request, HttpServletResponse
response)throws ServletException, IOException {
	response.setContentType("text/html,charset=UTF-8");
	PrintWriter out = response.getWriter();
	String name = request.getParameter("stname");
	int id = Integer.parseInt(request.getParameter("stid").toString());
	String dept = request.getParameter("dept");
	String year = request.getParameter("yr");

		try {
			Class.forName("com.mysql.cj.jdbc.Driver");
			Connection conn =
DriverManager.getConnection("jdbc:mysql://localhost:3306/crud", "root", "Shampath@03");
			String query = "insert into studentdata values(?,?,?,?)";
			PreparedStatement st = conn.prepareStatement(query);
			st.setString(1, name);
			st.setInt(2, id);
			st.setString(3, dept);
			st.setString(4,year);
			int c = st.executeUpdate();
			if(c>0) {
			out.println("<html><body>");
		out.println("<h1 style=\"text-align:center\";>Inserted Successfully</h1>");
		out.println("</body></html>");
			}
		}
		catch(Exception e) {
```

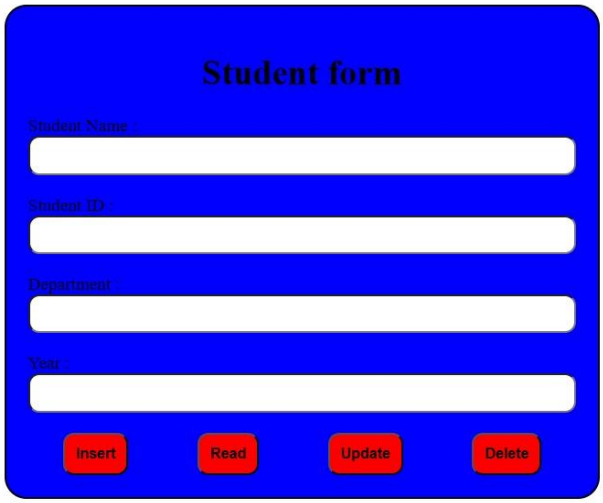
```
                    e.printStackTrace();
                    out.println("<html><body>");
            out.println("<h1>Error: " + e.getMessage() + "</h1>");
            out.println("</body></html>");
                }
                out.println("<center><button>");
                out.println("<a href=\"index.html\" style=\"text-decoration:none\";>Back to
Home</a>");
                out.println("</center></button>");
    }
    protected void readRequest(HttpServletRequest request, HttpServletResponse response)throws
ServletException, IOException {
        response.setContentType("text/html,charset=UTF-8");
        PrintWriter out = response.getWriter();
        int id = Integer.parseInt(request.getParameter("stid").toString());

                try {
                        Class.forName("com.mysql.cj.jdbc.Driver");
                        Connection conn =
DriverManager.getConnection("jdbc:mysql://localhost:3306/crud", "root", "Shampath@03");
                        String query = "select * from studentdata where stid=?";
                        PreparedStatement st = conn.prepareStatement(query);
                        st.setInt(1, id);
                        ResultSet rs = st.executeQuery();
                        out.println("<html><body><center>");
                        out.println("<table border=\"1\" cellpadding=\"10\">");
                        out.println("<tr>");
                        out.println("<th>Name</th>");
                        out.println("<th>ID</th>");
                        out.println("<th>Dept</th>");
                        out.println("<th>Year</th>");
                        out.println("</tr>");
                        while(rs.next()) {
                                out.println("<tr>");
                                out.println("<td>"+rs.getString(1)+"</td>");
                                out.println("<td>"+rs.getInt(2)+"</td>");
                                out.println("<td>"+rs.getString(3)+"</td>");
                                out.println("<td>"+rs.getString(4)+"</td>");
                                out.println("</tr>");
                        }
                        out.println("</table>");
                        out.println("<h3 style=\"text-align:center\";>Read successfully</h3>");
                        out.println("</center></body></html>");
                }
                catch(Exception e) {
                        e.printStackTrace();
```

```
                        out.println("<html><body>");
            out.println("<h1>Error: " + e.getMessage() + "</h1>");
            out.println("</body></html>");
                }
                out.println("<center><button>");
                out.println("<a href=\"index.html\" style=\"text-decoration:none\";>Back to
Home</a>");
                out.println("</center></button>");
    }
    protected void updateRequest(HttpServletRequest request, HttpServletResponse
response)throws ServletException, IOException {
        response.setContentType("text/html,charset=UTF-8");
        PrintWriter out = response.getWriter();
        String name = request.getParameter("stname");
        int id = Integer.parseInt(request.getParameter("stid").toString());
        String dept = request.getParameter("dept");
        String year = request.getParameter("yr");

                try {
                        Class.forName("com.mysql.cj.jdbc.Driver");
                        Connection conn =
DriverManager.getConnection("jdbc:mysql://localhost:3306/crud", "root", "Shampath@03");
                        String query = "update studentdata set stname=?,dept=?,yr=? where
stid=?";
                        PreparedStatement st = conn.prepareStatement(query);
                        st.setString(1, name);
                        st.setString(2, dept);
                        st.setString(3, year);
                        st.setInt(4,id);
                        int c = st.executeUpdate();
                        if(c>0) {
                        out.println("<html><body>");
            out.println("<h1 style=\"text-align:center\";>Updated Successfully</h1>");
            out.println("</body></html>");
                        }
                }
                catch(Exception e) {
                        e.printStackTrace();
                        out.println("<html><body>");
            out.println("<h1>Error: " + e.getMessage() + "</h1>");
            out.println("</body></html>");
                }
                out.println("<center><button>");
                out.println("<a href=\"index.html\" style=\"text-decoration:none\";>Back to
Home</a>");
                out.println("</center></button>");
```

```
    }
    protected void deleteRequest(HttpServletRequest request, HttpServletResponse
response)throws ServletException, IOException {
        response.setContentType("text/html,charset=UTF-8");
        PrintWriter out = response.getWriter();
        int id = Integer.parseInt(request.getParameter("stid").toString());
            try {
                Class.forName("com.mysql.cj.jdbc.Driver");
                Connection conn =
DriverManager.getConnection("jdbc:mysql://localhost:3306/crud", "root", "Shampath@03");
                String query = "delete from studentdata where stid=?";
                PreparedStatement st = conn.prepareStatement(query);
                st.setInt(1, id);
                int c = st.executeUpdate();
                if(c>0) {
                out.println("<html><body>");
          out.println("<h1 style=\"text-align:center\";>Deleted Successfully</h1>");
          out.println("</body></html>");
                }
            }
            catch(Exception e) {
                e.printStackTrace();
                out.println("<html><body>");
          out.println("<h1>Error: " + e.getMessage() + "</h1>");
          out.println("</body></html>");
            }
            out.println("<center><button>");
            out.println("<a href=\"index.html\" style=\"text-decoration:none\";>Back to
Home</a>");
            out.println("</center></button>");
    }

        protected void doGet(HttpServletRequest request, HttpServletResponse response) throws
ServletException, IOException {
            String action = request.getParameter("action");
            switch(action) {
                case "insert":
                    insertRequest(request,response);
                    break;
                case "read":
                    readRequest(request,response);
                    break;
                case "update":
                    updateRequest(request,response);
                    break;
                case "delete":
```

```
                        deleteRequest(request,response);
                        break;
                }
        }
        protected void doPost(HttpServletRequest request, HttpServletResponse response)
throws ServletException, IOException {
                String action = request.getParameter("action");
                switch(action) {
                        case "insert":
                                insertRequest(request,response);
                                break;
                        case "read":
                                readRequest(request,response);
                                break;
                        case "update":
                                updateRequest(request,response);
                                break;
                        case "delete":
                                deleteRequest(request,response);
                                break;
                }

        }

}
```

OUTPUT:


Student form
Student Name
Student ID
Department
Year
Insert
Read
Update
Delete


localhost:8081/servlet_CRUD/ServerServlet
Name
ID
Dept
Year
Shampath Kumar
2112087
CSE
Third
Read successfully
Back to Home

Problem Understanding (5)	Implementation & Output (5)	Time Management (5)	Viva (5)	Total (20)

Result:

Thus the Servelet code was successfully executed using html,java file and the output was verified.