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Practical Sheet

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Title: Java Servlets.

Introduction:

Servlets:

Servlets are Java based server side components that extends the capabilities of server. They are part of the Java Enterprise Edition (Java EE) platform and are used to create dynamic web application.

Lifecycle of Servlet:

The servlet lifecycle consists of several stages: initialization, service, and destruction. When a servlet is first invoked, the container initializes it by calling 'init()' method. The 'service()' method is then called for each client request, and finally, the 'destroy()' method is called when the servlet is being taken out of service.

Role of web container:

A web container is responsible for managing the lifecycle of servlets, handling requests, and managing the threading issues to support multiple requests.

List of APIs used in creating servelets:

- javax.servlet;
- javax.servlet.http;
- jakarta.servlet.ServletException;
- jakarta.servlet.annotation.WebServlet;
- jakarta.servlet.http.HttpServlet;
- jakarta.servlet.http.HttpServletRequest;
- jakarta.servlet.http.HttpServletResponse;

Steps to Create Servlet

i) Create a Java class and extend "HttpServlet".
ii) Override the 'doGet()' or 'doPost()' method to handle HTTP requests.
iii) Implement the necessary logic for processing requests and generating responses.

Steps to Deploy Servlet

i) Create a web application directory structure with the 'WEB-INF' folder.
ii) Place the compiled servlet class file in the 'WEB-INF/classes' directory.
iii) Create a deployment descriptor file('web.xml') in the 'WEB-INF' folder.
iv) Package the entire web application into a WAR(Web Application Archive) file.
v) Deploy the WAR file to a servlet container or application server.

webapp folder: Root folder for the web application.
WEB-INF folder: Contains configuration files and classes.
web.xml file: Deployment descriptor that defines the configuration of the web application.

HTTP Request

Client requests sent to the server, specifying the action to be performed.

HTTP Responses

Server responses containing the result of the requested action.

Handling HTTP Requests in Servlets:

- GET Requests : Handled by overriding 'doGet()' method.
- POST Requests : Handled by overriding 'doPost()' method.

Reading Form Parameters:

i) Using 'getParameter(String name)': Retrieves a parameter by name.
ii) Using 'getParameterValues(String name)': Retrieves multiple values for a parameter.
iii) Using 'getParameterMap()': Returns a map of all parameters.

Connecting to a Database using servlets:

i) Load the JDBC driver
ii) Establish a connection to the database.
iii) Create a 'Statement' or 'Prepared Statement' for SQL queries.
iv) Execute SQL queries to interact with the database.
v) Close the database resources (connection, statements).

HTML Code:

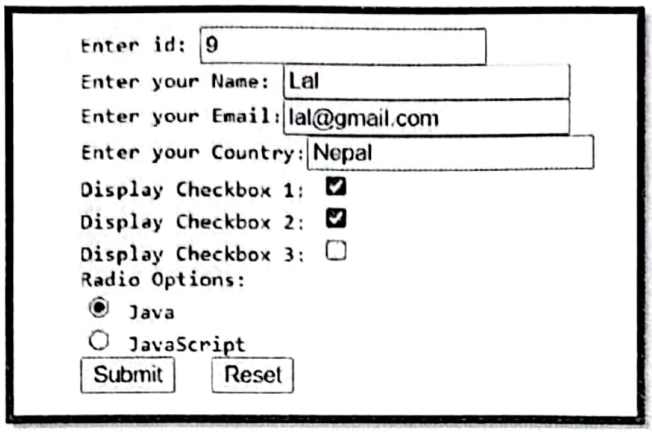
```
<html>
  <head>
    <meta charset = "ISO-8859-1">
    <title> Insert [redacted] </title>
  </head>
  <body>
    <form method = "post" action = "HelloServlet">
      <pre>
        Enter id: <input type="text" name = "tid">
        Enter your Name: <input type = "text" name = "tname">
        Enter your Email: <input type = "email" name = "temail">
        Enter your Country: <input type = "text" name = "tcountry">
        Display Checkbox 1: <input type="checkbox" name = "displayCheckbox1">
        Display Checkbox 2: <input type="checkbox" name="displayCheckbox2">
        Display Checkbox3: <input type="checkbox" name="displayCheckbox3">
        Radio Options:
        <input type = "radio" name = "radioOption" value = "Java"> Java
        <input type = "radio" name = "radioOption" value = "Javascript"> Java Script
        <input type="submit"> <input type="reset">
      </pre>
    </form>
  </body>
</html>
```

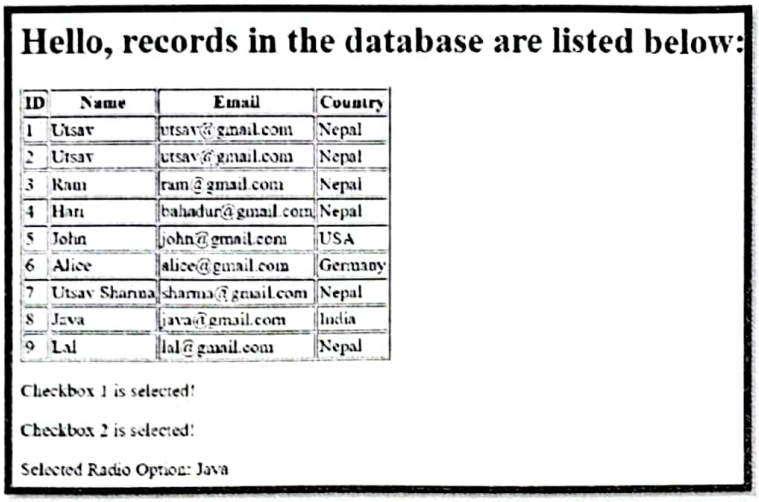
Servletcode:

```
import java.io.IOException;
import java.io.PrintWriter;
import java.sql.Connection;
import java.sql.DriverManager;
import java.sql.PreparedStatement;
import java.sql.ResultSet;
import java.sql.SQLException;
import jakarta.servlet.ServletException;
import jakarta.servlet.annotation.WebServlet;
import jakarta.servlet.http.HttpServlet;
import jakarta.servlet.http.HttpServletRequest;
import jakarta.servlet.http.HttpServletResponse;
@WebServlet("/HelloServlet")
public class HelloServlet extends HttpServlet{
    private static final long serialVersionUID = 1L;
    public HelloServlet(){
        //TODO Auto-generated constructor stub
    }
    protected void doGet(HttpServletRequest request, HttpServletResponse
            throws ServletException, IOException{          response)
        PrintWriter pw = response.getWriter();
        String name = request.getParameter("tname");
        int id = Integer.parseInt(request.getParameter("tid"));
        String email = request.getParameter("temail");
        String country = request.getParameter("tcountry");
        try{
            Connection con = DriverManager.getConnection("jdbc:
                mysql://localhost:3306/javaprac","root","");
            insertRecord(con,id,name,email,country);
            displayRecords(con,pw,request);
        }catch(Exception e){
            e.printStackTrace();
        }
    }
```

```
protected void doPost(HttpServletRequest request, HttpServletResponse
                      response)
    throws ServletException, IOException{
        doGet(request, response);
}
protected void insertRecord(Connection con, int id, String name,
                            String email, String Country) throws Exception
{
    PreparedStatement stmt = con.prepareStatement("Insert into
                                    users values(?,?,?,?)");
    stmt.setInt(1,id);
    stmt.setString(2,name);
    stmt.setString(3,email);
    stmt.setString(4,country);
    int i = stmt.executeUpdate();
    System.out.println(i+"recordsinserted");
}
protected void displayRecords(Connection con, PrintWriter pw, HttpSer
                              vletRequest request) throws SQLException{
    pw.println("<h1> Hello, records in the database are listed
                        below:</h1>");
    String sql = "select id, Name, Email, Country from users";
    PreparedStatement stmt = con.prepareStatement(sql);
    ResultSet rs = stmt.executeQuery();
    if(!rs.next()){
        pw.println("<table border='1'>");
        pw.println("<tr><th>ID</th><th>Name</th><th>Email
                    </th><th>Country</th></tr>");
        do{
            pw.println("<tr>");
            pw.println("<td>"+rs.getString(1)+"</td>");
            pw.println("<td>"+rs.getString(2)+"</td>");
            pw.println("<td>"+rs.getString(3)+"</td>");
            pw.println("<td>"+rs.getString(4)+"</td>");
        }while(rs.next());
```

```
pw.println("</table>");
for(int i=1; i<=3; i++){
    String checkboxName = "displayCheckbox"+i;
    String checkboxValue = request.getParameter(checkboxName);
    if(checkboxValue != null && checkboxValue.equals("on")){
        pw.println("<p>Checkbox "+ i + "is selected !</p>");
    }
}
  String radioOption = request.getParameter("radioOption");
    if(radioOption != null){
        pw.println("<p>Selected Radio Option: "+ radioOption+
                "</p>");
    }else{
      pw.println("<p>No Radio Option Selected.</p>");
    }
  }
 }
}
```





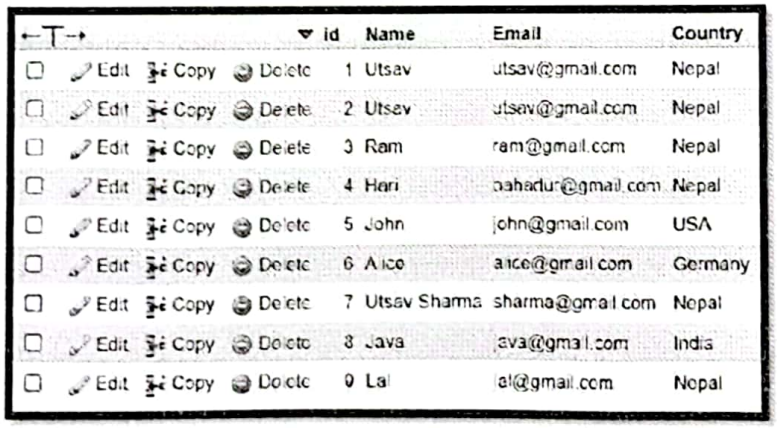
Hello, records in the database are listed below:

ID	Name	Email	Country
1	Utsav	utsav@gmail.com	Nepal
2	Utsav	utsav@gmail.com	Nepal
3	Ram	ram@gmail.com	Nepal
4	Hari	bahadur@gmail.com	Nepal
5	John	john@gmail.com	USA
6	Alice	alice@gmail.com	Germany
7	Utsav Sharma	sharma@gmail.com	Nepal
8	Java	java@gmail.com	India
9	Lal	lal@gmail.com	Nepal

Checkbox 1 is selected!

Checkbox 2 is selected!

Selected Radio Option: Java



←T→		id	Name	Email	Country
Edit Copy Delete		1	Utsav	utsav@gmail.com	Nepal
Edit Copy Delete		2	Utsav	utsav@gmail.com	Nepal
Edit Copy Delete		3	Ram	ram@gmail.com	Nepal
Edit Copy Delete		4	Hari	bahadur@gmail.com	Nepal
Edit Copy Delete		5	John	john@gmail.com	USA
Edit Copy Delete		6	Alice	alice@gmail.com	Germany
Edit Copy Delete		7	Utsav Sharma	sharma@gmail.com	Nepal
Edit Copy Delete		8	Java	java@gmail.com	India
Edit Copy Delete		9	Lal	lal@gmail.com	Nepal