Service Oriented Architecture Record

(CS356)

Submitted by

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Semester – VI

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Aim: To create a web service for adding few numbers using NetBeans.

Algorithm:

1. Using the Netbeans API create a project of the type web application.
2. Create a web service in the project.
3. Click on the Design tab and design the prototype of the web service.
4. Click on source tab and modify the application logic of the web service.
5. Save the project.
6. Right click on the project and click on deploy and undeploy.
7. Then test the web service.

Code:

```java
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package org;

import javax.jws.WebService;

import javax.jws.WebMethod;

import javax.jws.WebParam;

/**
 *
 * @author Naman
 */
@WebService(serviceName = "addweb")
public class addweb {

    /**
     * Web service operation
     */
    @WebMethod(operationName = "add")
    public int add(@WebParam(name = "a") int a, @WebParam(name = "b") int b) {

        //TODO write your implementation code here:

        int k=a+b;

        return k;

    }
}
```

Results:

addweb Web Service Tester

This form will allow you to test your web service implementation (WSDL File)

To invoke an operation, fill the method parameter(s) input boxes and click on the button labeled with the method name.

Methods :

public abstract int org.Addweb.add(int,int)

add (50 , 10000)

---

add Method invocation

Method parameter(s)

Type	Value
int	50
int	10000

Method returned

int : "10050"

SOAP Request

```
<?xml version="1.0" encoding="UTF-8"?><S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
    <SOAP-ENV:Header/>
    <S:Body xmlns:ns2="http://org/">
        <ns2:add>
            <a>50</a>
            <b>10000</b>
        </ns2:add>
    </S:Body>
</S:Envelope>
```

SOAP Response

```
<?xml version="1.0" encoding="UTF-8"?><S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/" xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/">
    <SOAP-ENV:Header/>
    <S:Body xmlns:ns2="http://org/">
        <ns2:addResponse>
            <return>10050</return>
        </ns2:addResponse>
    </S:Body>
</S:Envelope>
```

Experiment 2

Aim: Creation of add web service client.

Algorithm:

1. Using the Netbeans API create a project of the type web application.
2. Create a web service in the project.
3. Click on the Design tab and design the prototype of the web service.
4. Click on source tab and modify the application logic of the web service.
5. Save the project.
6. Right click on the project and click on deploy and undeploy.
7. Then test the web service.
8. Create another web application project and create a jsp file.
9. Right click on project and click on create web service client.
10. Browse and choose the web service created i.e wsdl url
11. Drag and drop the web service reference to the source code window.
12. Then pass the appropriate parameters to the web service client and invoke the web service.

Code:

Client Side-

Index.jsp source code:

```
<%@page contentType="text/html" pageEncoding="UTF-8"%>

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.01 Transitional//EN"
"http://www.w3.org/TR/html4/loose.dtd">

<html>

    <head>

        <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">

        <title>JSP Page</title>

    </head>

    <body>

        <h1>Hello World!</h1>

        <form name="" action="action.jsp" method="post">

 Enter 1st No:<input  name="fst" type="text" /><br/>

 Enter 2nd No:<input  name="snd" type="text" /><br/>

 <input  name="ok" type="submit" value="Add" />

</form>

    </body>

</html>
```

action.jsp

```jsp
<%--   Document   : action
   Created on : 17 Sep, 2021, 2:24:48 PM
   Author     : Naman--%>
<%@page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
    <title>JSP Page</title>
  </head>
  <body>
    <h1>Hello World!</h1>
    <%
 String a1=request.getParameter("fst");
String b1=request.getParameter("snd");
int aa=Integer.parseInt(a1);
int bb=Integer.parseInt(b1);
 %>
   <%-- start web service invocation --%><hr/>
   <%
   try {
        org.Addweb_Service service = new org.Addweb_Service();
        org.Addweb port = service.getAddwebPort();
         // TODO initialize WS operation arguments here
        int a = aa;
        int b = bb;
        int result = port.add(a, b);
        out.println("Result = "+result);
   } catch (Exception ex) {
        // TODO handle custom exceptions here
   }   %>
   <%-- end web service invocation --%><hr/>
   </body>
</html>
```

Server Side-

add web service

```java
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package org;


import javax.jws.WebService;
import javax.jws.WebMethod;
import javax.jws.WebParam;


/**
 *
 * @author Naman
 */
@WebService(serviceName = "addweb")
public class addweb {



  /**
   * Web service operation
   */
  @WebMethod(operationName = "add")
  public int add(@WebParam(name = "a") int a, @WebParam(name = "b") int b) {
    //TODO write your implementation code here:
    int k=a+b;
    return k;
  }
}
```

Output:

Hello World!

Enter 1st No: 223
Enter 2nd No: 100
Add

Hello World!

Result = 323

Experiment 3

Aim: To create login form in Java using servlet and jsp.

Algorithm:

1. Using the Netbeans API create a project of the type web application.
2. Create a index.jsp for login form file in the project.
3. Write the code.
4. Create the welcome.jsp file in the project for the welcome page.
5. Create the servlet file in java.
6. Set the doGet, doPost, and getServiceInfo functions for action on buttons click.
7. Save the project.
8. Run the project.

Code-

Index.jsp

```
<%--
  Document   : login
  Created on : 26 Sep, 2021, 6:23:57 PM
  Author     : Naman
--%>
<%@page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
  <head>
    <meta http-equiv="Content-Type" content="text/html; charset=UTF-8">
    <title>Login Page</title>
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.1.1/dist/css/bootstrap.min.css" rel="stylesheet">
    <style>
      td{
        padding:10px;
      }
      div{
        width:50%;
        border:1px;
        border-radius: 5px;
        background-color: lightblue;
      }
    </style>
  </head>
```

```html
<body>
    <h1><center>Login Here</center></h1>
  <center>
    <div>
      <form action="login" method="POST">
        <table>
          <tr>
            <td>User</td>
            <td><input type="text" class="form-control" name="username" placeholder="User Name"></td>
          </tr>
          <tr>
            <td>Password</td>
            <td><input type="password" class="form-control"  name="password"
placeholder="Password"></td>
          </tr>
          <tr>
            <td colspan='2' style="text-align: center"><input type="submit" class="btn btn-success"
value="Submit"></td>
          </tr>
        </table>
      </form>
    </div>
  </center>
  </body>
</html>
```

Welcome.jsp

```jsp
<%--
  Document   : welcome
  Created on : 26 Sep, 2021, 6:57:14 PM
  Author     : Naman
--%>


<%@page contentType="text/html" pageEncoding="UTF-8"%>
<!DOCTYPE html>
<html>
```

Java Code- login.java

```java
import java.io.IOException;

import java.io.PrintWriter;

import javax.servlet.ServletException;

import javax.servlet.annotation.WebServlet;

import javax.servlet.http.HttpServlet;

import javax.servlet.http.HttpServletRequest;

import javax.servlet.http.HttpServletResponse;


/**
 *
 * @author Naman
 */
@WebServlet(urlPatterns = {"/login"})
public class login 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 doGet(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    response.setContentType("text/html;charset=UTF-8");
    try (PrintWriter out = response.getWriter()) {
      String user=request.getParameter("username");
      String pass=request.getParameter("password");
      if(!user.isEmpty() && !pass.isEmpty()){
        response.sendRedirect("welcome.jsp");
      }else{
        out.println("<h1><center>Error : Empty username or password.</center><h1>");
```
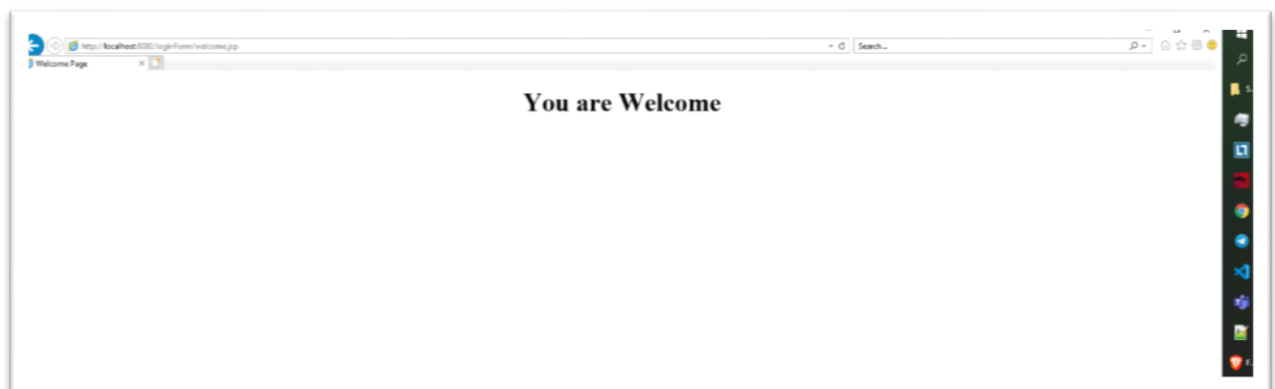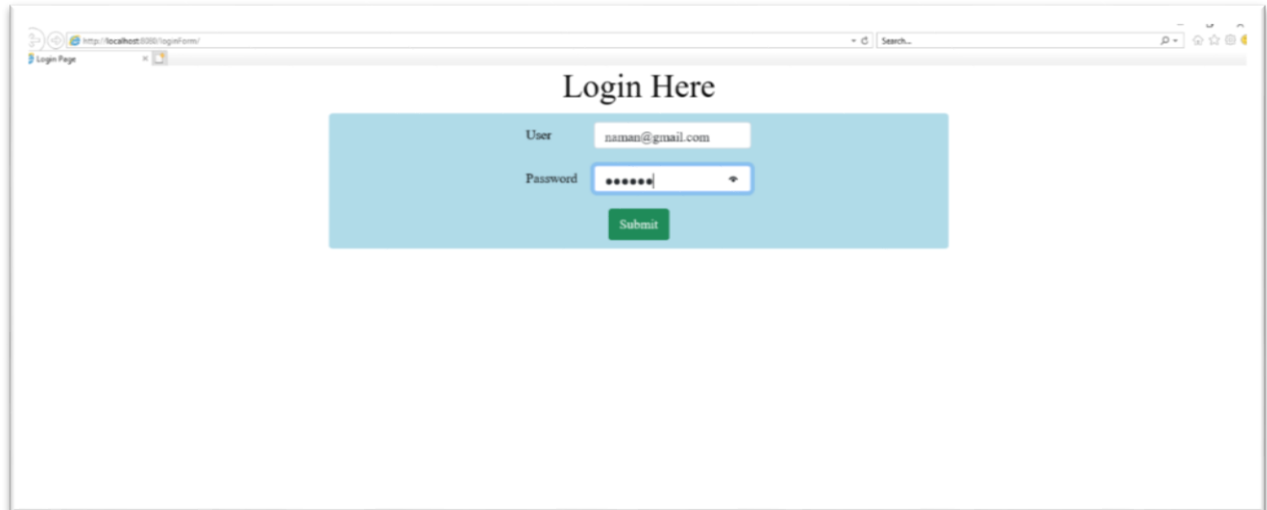
```
        }

    }

}


@Override

protected void doPost(HttpServletRequest request, HttpServletResponse response)

        throws ServletException, IOException {

    doGet(request, response);

}


@Override

public String getServletInfo() {

    return "Short description";

}// </editor-fold>

}
```

Output-

Aim: To create a calculator using NetBeans.

Algorithm:

1. Create a java application project with name calculator.
2. Create a jframe form in the project, and go to the design tab of the window.
3. Select the text field from the palette for displaying numbers in the calculator app.
4. Create the buttons by selecting them from the palette area.
5. Set the variable name for selected buttons and text field.
6. Set the size, text for the proper display of calculator.
7. Double click on the form and it will lead to the java code where we can define the functions for our buttons on the form.
8. Write the code for every different function each button will perform on clicking.
9. Save the project.
10. Build, deploy and run the project on the server.

Code-

Calci.java

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */
package calculator;
/**
 *
 * @author Naman
 */
public class Calci extends javax.swing.JFrame {

    double firstnum;

    double secondnum;

    double result;

    String operations;

    /**
     * Creates new form Calci
     */
    public Calci() {

        initComponents();

    }
```

```java
/**
 * This method is called from within the constructor to initialize the form.
 * WARNING: Do NOT modify this code. The content of this method is always
 * regenerated by the Form Editor.
 */
@SuppressWarnings("unchecked")
// <editor-fold defaultstate="collapsed" desc="Generated Code">
private void initComponents() {

    jtxtDisplay = new javax.swing.JTextField();
    btn1 = new javax.swing.JButton();
    btn2 = new javax.swing.JButton();
    btn3 = new javax.swing.JButton();
    btn4 = new javax.swing.JButton();
    btn5 = new javax.swing.JButton();
    btn6 = new javax.swing.JButton();
    btn7 = new javax.swing.JButton();
    btn8 = new javax.swing.JButton();
    btn9 = new javax.swing.JButton();
    btn10 = new javax.swing.JButton();
    btn11 = new javax.swing.JButton();
    btn12 = new javax.swing.JButton();
    btn13 = new javax.swing.JButton();
    btn14 = new javax.swing.JButton();
    btn15 = new javax.swing.JButton();
    btn16 = new javax.swing.JButton();
    btn17 = new javax.swing.JButton();
    btn18 = new javax.swing.JButton();
    btn19 = new javax.swing.JButton();
    btn20 = new javax.swing.JButton();


    setDefaultCloseOperation(javax.swing.WindowConstants.EXIT_ON_CLOSE);
    jtxtDisplay.setFont(new java.awt.Font("Tahoma", 1, 24)); // NOI18N
    jtxtDisplay.setHorizontalAlignment(javax.swing.JTextField.RIGHT);
```

```java
        jtxtDisplay.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
      jtxtDisplayActionPerformed(evt);
    }
});


btn1.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N
btn1.setText("C");
btn1.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
      btn1ActionPerformed(evt);
    }
});


btn2.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N
btn2.setText("%");
btn2.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
      btn2ActionPerformed(evt);
    }
});


btn3.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N
btn3.setText("←");
btn3.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
      btn3ActionPerformed(evt);
    }
});
btn4.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N
btn4.setText("÷");
btn4.addActionListener(new java.awt.event.ActionListener() {
    public void actionPerformed(java.awt.event.ActionEvent evt) {
      btn4ActionPerformed(evt);
    }
});
```

```java
btn5.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

    btn5.setText("7");

    btn5.addActionListener(new java.awt.event.ActionListener() {

      public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn5ActionPerformed(evt);

      }

    });

    btn6.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

    btn6.setText("8");

    btn6.addActionListener(new java.awt.event.ActionListener() {

      public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn6ActionPerformed(evt);

      }

    });

    btn7.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

    btn7.setText("9");

    btn7.addActionListener(new java.awt.event.ActionListener() {

      public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn7ActionPerformed(evt);

      }

    });

    btn8.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

    btn8.setText("×");

    btn8.addActionListener(new java.awt.event.ActionListener() {

      public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn8ActionPerformed(evt);

      }

    });

    btn9.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

    btn9.setText("4");

    btn9.addActionListener(new java.awt.event.ActionListener() {

      public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn9ActionPerformed(evt);

      }

    });
```

```java
btn10.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn10.setText("5");

btn10.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn10ActionPerformed(evt);

    }

});

btn11.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn11.setText("6");

btn11.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn11ActionPerformed(evt);

    }

});

btn12.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn12.setText("-");

btn12.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn12ActionPerformed(evt);

    }

});

btn13.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn13.setText("1");

btn13.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn13ActionPerformed(evt);

    }

});

btn14.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn14.setText("2");

btn14.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn14ActionPerformed(evt);

    }

});
```

```java
btn15.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn15.setText("3");

btn15.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn15ActionPerformed(evt);

    }

});

btn16.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn16.setText("+");

btn16.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn16ActionPerformed(evt);

    }

});

btn17.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn17.setText("+/-");

btn17.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn17ActionPerformed(evt);

    }

});

btn18.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn18.setText("0");

btn18.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn18ActionPerformed(evt);

    }

});

btn19.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn19.setText(".");

btn19.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn19ActionPerformed(evt);

    }

});
```

```java
btn20.setFont(new java.awt.Font("Tahoma", 1, 14)); // NOI18N

btn20.setText("=");

btn20.addActionListener(new java.awt.event.ActionListener() {

    public void actionPerformed(java.awt.event.ActionEvent evt) {

        btn20ActionPerformed(evt);

    }

});

javax.swing.GroupLayout layout = new javax.swing.GroupLayout(getContentPane());

getContentPane().setLayout(layout);

layout.setHorizontalGroup(

    layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

    .addGroup(layout.createSequentialGroup()

        .addContainerGap()

        .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)

            .addComponent(jtxtDisplay)

            .addGroup(layout.createSequentialGroup()

                .addComponent(btn5, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)

                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

                .addComponent(btn6, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)

                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

                .addComponent(btn7, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)

                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)

                .addComponent(btn8, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE))

            .addGroup(layout.createSequentialGroup()

                .addComponent(btn13, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)

                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

                .addComponent(btn14, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)

                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)

                .addComponent(btn15, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
```

```java
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                .addComponent(btn16, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGroup(layout.createSequentialGroup()
                .addComponent(btn17, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(btn18, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                .addComponent(btn19, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED,
javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE)
                .addComponent(btn20, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGroup(layout.createSequentialGroup()
                .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
                    .addGroup(layout.createSequentialGroup()
                        .addComponent(btn1, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                        .addComponent(btn2, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                        .addComponent(btn3, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                        .addComponent(btn4, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE))
                    .addGroup(layout.createSequentialGroup()
                        .addComponent(btn9, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                        .addComponent(btn10, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
                        .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                        .addComponent(btn11, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)
```

```java
                    .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
                    .addComponent(btn12, javax.swing.GroupLayout.PREFERRED_SIZE, 70,
javax.swing.GroupLayout.PREFERRED_SIZE)))
                .addGap(0, 0, Short.MAX_VALUE)))
            .addContainerGap())
    );
    layout.setVerticalGroup(
        layout.createParallelGroup(javax.swing.GroupLayout.Alignment.LEADING)
        .addGroup(layout.createSequentialGroup()
            .addContainerGap()
            .addComponent(jtxtDisplay, javax.swing.GroupLayout.PREFERRED_SIZE, 75,
javax.swing.GroupLayout.PREFERRED_SIZE)
            .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.UNRELATED)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(btn1, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn2, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn3, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn4, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(btn5, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn6, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn7, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn8, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(btn9, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn10, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn11, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn12, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE))
```

```java
                .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(btn13, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn14, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn15, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn16, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.RELATED)
            .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.BASELINE)
                .addComponent(btn17, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn18, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn19, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE)
                .addComponent(btn20, javax.swing.GroupLayout.PREFERRED_SIZE, 49,
javax.swing.GroupLayout.PREFERRED_SIZE))
            .addContainerGap(javax.swing.GroupLayout.DEFAULT_SIZE, Short.MAX_VALUE))
    );
    pack();
  }// </editor-fold>


  private void jtxtDisplayActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
  }


  private void btn1ActionPerformed(java.awt.event.ActionEvent evt) {
    jtxtDisplay.setText("");
  }


  private void btn5ActionPerformed(java.awt.event.ActionEvent evt) {
    String enterNum= jtxtDisplay.getText() + btn5.getText();
    jtxtDisplay.setText(enterNum);      // TODO add your handling code here:
  }
```

```java
private void btn2ActionPerformed(java.awt.event.ActionEvent evt) {

    firstnum = Double.parseDouble(jtxtDisplay.getText());

    jtxtDisplay.setText(""+firstnum/100);

}

private void btn6ActionPerformed(java.awt.event.ActionEvent evt) {

    // TODO add your handling code here:

    String enterNum= jtxtDisplay.getText() + btn6.getText();

    jtxtDisplay.setText(enterNum);

}

private void btn8ActionPerformed(java.awt.event.ActionEvent evt) {

    firstnum = Double.parseDouble(jtxtDisplay.getText());

    jtxtDisplay.setText("");

    operations="×";      // TODO add your handling code here:

}

private void btn9ActionPerformed(java.awt.event.ActionEvent evt) {

    // TODO add your handling code here:

    String enterNum= jtxtDisplay.getText() + btn9.getText();

    jtxtDisplay.setText(enterNum);

}

private void btn3ActionPerformed(java.awt.event.ActionEvent evt) {

    // TODO add your handling code here:

    String backspace=null;

    if (jtxtDisplay.getText().length()>0){

        StringBuilder strB= new StringBuilder(jtxtDisplay.getText());

        strB.deleteCharAt(jtxtDisplay.getText().length()-1);

        backspace = strB.toString();

        jtxtDisplay.setText(backspace);

    }

}

private void btn4ActionPerformed(java.awt.event.ActionEvent evt) {

    // TODO add your handling code here:

    firstnum = Double.parseDouble(jtxtDisplay.getText());

    jtxtDisplay.setText("");

    operations="÷";

}
```

```java
private void btn7ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String enterNum= jtxtDisplay.getText() + btn7.getText();
    jtxtDisplay.setText(enterNum);
}
private void btn10ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String enterNum= jtxtDisplay.getText() + btn10.getText();
    jtxtDisplay.setText(enterNum);
}
private void btn11ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String enterNum= jtxtDisplay.getText() + btn11.getText();
    jtxtDisplay.setText(enterNum);
}
private void btn13ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String enterNum= jtxtDisplay.getText() + btn13.getText();
    jtxtDisplay.setText(enterNum);
}
private void btn14ActionPerformed(java.awt.event.ActionEvent evt) {
    String enterNum= jtxtDisplay.getText() + btn14.getText();
    jtxtDisplay.setText(enterNum);      // TODO add your handling code here:
}
private void btn15ActionPerformed(java.awt.event.ActionEvent evt) {
    String enterNum= jtxtDisplay.getText() + btn15.getText();
    jtxtDisplay.setText(enterNum);      // TODO add your handling code here:
}
private void btn18ActionPerformed(java.awt.event.ActionEvent evt) {
    String enterNum= jtxtDisplay.getText() + btn18.getText();
    jtxtDisplay.setText(enterNum);      // TODO add your handling code here:
}
```

```java
private void btn20ActionPerformed(java.awt.event.ActionEvent evt) {

    String answer;

    secondnum = Double.parseDouble(jtxtDisplay.getText());

    switch(operations){

        case "+":

            result = firstnum + secondnum;

            answer = String.format("%.2f", result);

            jtxtDisplay.setText(answer);

            break;

        case "-":

            result = firstnum - secondnum;

            answer = String.format("%.2f", result);

            jtxtDisplay.setText(answer);

            break;

        case "×":

            result = firstnum * secondnum;

            answer = String.format("%.2f", result);

            jtxtDisplay.setText(answer);

            break;

        case "÷":

            result = firstnum/secondnum;

            answer = String.format("%.2f", result);

            jtxtDisplay.setText(answer);

            break;

    }

}

private void btn19ActionPerformed(java.awt.event.ActionEvent evt) {

    // TODO add your handling code here:

    String enterNum= jtxtDisplay.getText() + btn19.getText();

    jtxtDisplay.setText(enterNum);

}

private void btn16ActionPerformed(java.awt.event.ActionEvent evt) {

    firstnum = Double.parseDouble(jtxtDisplay.getText());

    jtxtDisplay.setText("");

    operations="+";

}
```

```java
private void btn17ActionPerformed(java.awt.event.ActionEvent evt) {

    double num= Double.parseDouble(jtxtDisplay.getText());

    jtxtDisplay.setText(String.valueOf(num*-1));      // TODO add your handling code here:

}


private void btn12ActionPerformed(java.awt.event.ActionEvent evt) {

    firstnum = Double.parseDouble(jtxtDisplay.getText());

    jtxtDisplay.setText("");

    operations="-";      // TODO add your handling code here:

}


public static void main(String args[]) {

    try {

        for (javax.swing.UIManager.LookAndFeelInfo info : javax.swing.UIManager.getInstalledLookAndFeels()) {

            if ("Nimbus".equals(info.getName())) {

                javax.swing.UIManager.setLookAndFeel(info.getClassName());

                break;

            }

        }

    } catch (ClassNotFoundException ex) {

        java.util.logging.Logger.getLogger(Calci.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

    } catch (InstantiationException ex) {

        java.util.logging.Logger.getLogger(Calci.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

    } catch (IllegalAccessException ex) {

        java.util.logging.Logger.getLogger(Calci.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

    } catch (javax.swing.UnsupportedLookAndFeelException ex) {

        java.util.logging.Logger.getLogger(Calci.class.getName()).log(java.util.logging.Level.SEVERE, null, ex);

    }

    java.awt.EventQueue.invokeLater(new Runnable() {

        public void run() {

            new Calci().setVisible(true);

        }

    });

}
```

```java
    // Variables declaration - do not modify

    private javax.swing.JButton btn1;

    private javax.swing.JButton btn10;

    private javax.swing.JButton btn11;

    private javax.swing.JButton btn12;

    private javax.swing.JButton btn13;

    private javax.swing.JButton btn14;

    private javax.swing.JButton btn15;

    private javax.swing.JButton btn16;

    private javax.swing.JButton btn17;

    private javax.swing.JButton btn18;

    private javax.swing.JButton btn19;

    private javax.swing.JButton btn2;

    private javax.swing.JButton btn20;

    private javax.swing.JButton btn3;

    private javax.swing.JButton btn4;

    private javax.swing.JButton btn5;

    private javax.swing.JButton btn6;

    private javax.swing.JButton btn7;

    private javax.swing.JButton btn8;

    private javax.swing.JButton btn9;

    private javax.swing.JTextField jtxtDisplay;

    // End of variables declaration

}
```
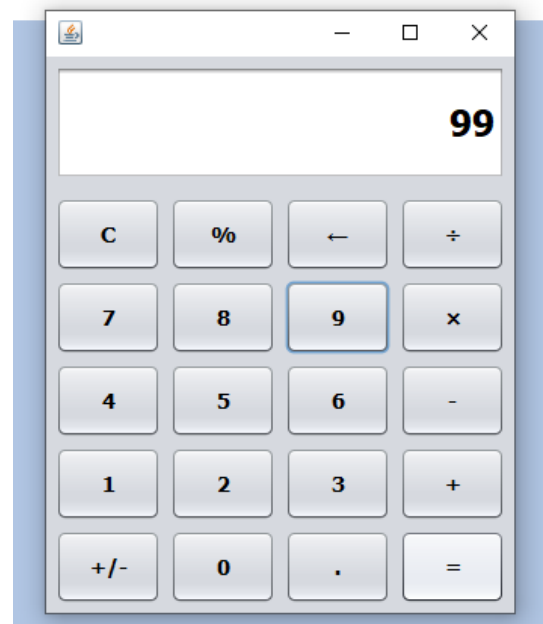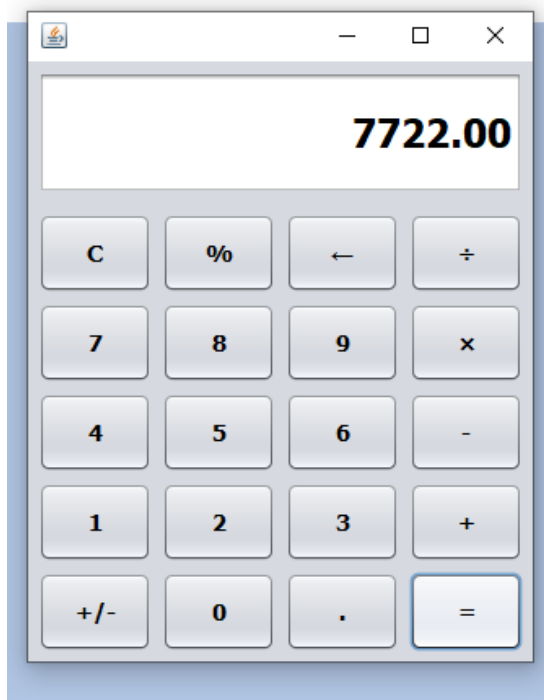
Output-
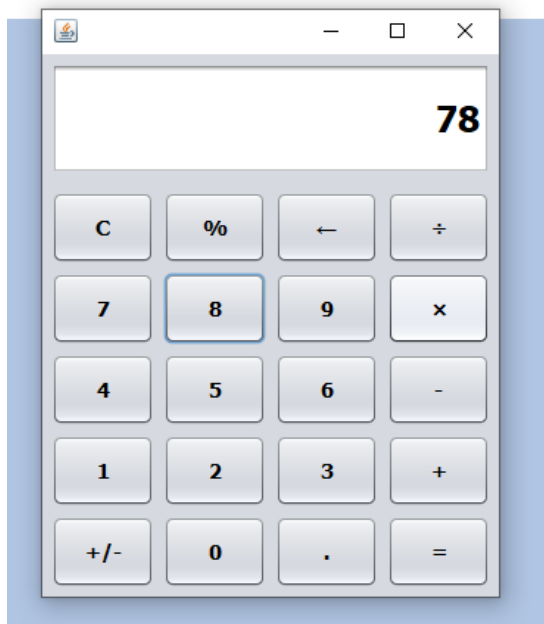
Entering first digit and clicking '*' - 78

Entering second digit for multiplication

Result

--THE END------------