Distributed System and Cloud Computing

PRACTICAL NO. 3

1.

Code Files :-

1) Server.java file

```
import java.rmi.registry.LocateRegistry;
import java.rmi.registry.Registry;

public class CalculatorServer {

	public static void main(String[] args) {
		// TODO Auto-generated method stub
		try {
			Calculator calculator = new CalculatorImplementation();
			 Registry registry = LocateRegistry.createRegistry(1099);
	        registry.rebind("Calculator", calculator);
	        System.out.println("Calculator Server is ready.");
		}
		catch (Exception e) {
			// TODO: handle exception
			e.printStackTrace();
		}
	}

}
```

2) Client.java file

```
import java.awt.BorderLayout;

import java.awt.GridLayout;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

import java.rmi.registry.LocateRegistry;

import java.rmi.registry.Registry;

import javax.swing.JButton;

import javax.swing.JFrame;

import javax.swing.JPanel;

import javax.swing.JTextField;


public class CalculatorClient extends JFrame {
      private static final long serialVersionUID = 1L;
      private JTextField display;
    private double num1, num2, result;
    private String operator;

    public CalculatorClient() {
       setTitle("Calculator");
       setSize(300, 400);
       setDefaultCloseOperation(EXIT_ON_CLOSE);
       setLayout(new BorderLayout());

       display = new JTextField();
       display.setSize(100, 50);
       display.setEditable(false);
       add(display, BorderLayout.NORTH);

       JPanel panel = new JPanel();
       panel.setLayout(new GridLayout(4, 4));

       String[] buttons = {
          "7", "8", "9", "/",
          "4", "5", "6", "*",
          "1", "2", "3", "-",
          "0", "C", "=", "+"
       };

       for (String text : buttons) {
          JButton button = new JButton(text);
          button.addActionListener(new ButtonClickListener());
          panel.add(button);
       }

       add(panel, BorderLayout.CENTER);
       setVisible(true);
```

```
}


private class ButtonClickListener implements ActionListener {
    public void actionPerformed(ActionEvent e) {
        String command = e.getActionCommand();
        try {
            Registry registry = LocateRegistry.getRegistry("localhost", 1099);
            Calculator calculator = (Calculator) registry.lookup("Calculator");

            switch (command) {
                case "C":
                    display.setText("");
                    break;
                case "=":
                    num2 = Double.parseDouble(display.getText());
                    switch (operator) {
                        case "+":
                            result = calculator.add(num1, num2);
                            break;
                        case "-":
                            result = calculator.subtract(num1, num2);
                            break;
                        case "*":
                            result = calculator.multiply(num1, num2);
                            break;
                        case "/":
                            result = calculator.divide(num1, num2);
                            break;
                    }
                    display.setText(String.valueOf(result));
                    break;
                default:
                    if ("+-*/".contains(command)) {
```

```
                    operator = command;

                    num1 = Double.parseDouble(display.getText());

                    display.setText("");

                  } else {

                    display.setText(display.getText() + command);

                  }

                  break;

              }

            } catch (Exception ex) {

              display.setText("Error");

            }

          }

        }

        public static void main(String[] args) {

                // TODO Auto-generated method stub

                new CalculatorClient();

        }
```

3) CalcOperation.java

```
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;

public class CalculatorImplementation extends UnicastRemoteObject implements Calculator {

        private static final long serialVersionUID = 1L;

        public CalculatorImplementation() throws RemoteException {
            super();
          }

        @Override
        public double add(double a, double b) throws RemoteException {
                // TODO Auto-generated method stub
                return a+b;
        }

        @Override
        public double subtract(double a, double b) throws RemoteException {
                // TODO Auto-generated method stub
```

```
		return a-b;
	}

	@Override
	public double multiply(double a, double b) throws RemoteException {
		// TODO Auto-generated method stub
		return a*b;
	}

	@Override
	public double divide(double a, double b) throws RemoteException {
		// TODO Auto-generated method stub
		return a/b;
	}

}
```

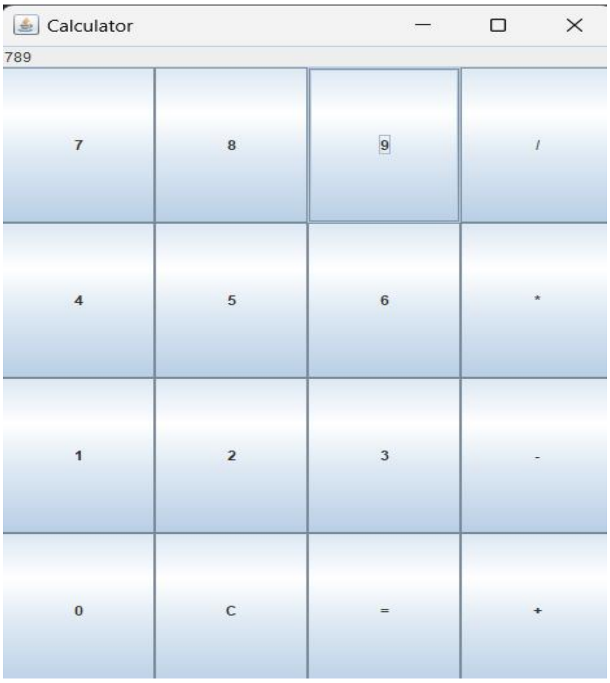
4) Calculator.java(interface)

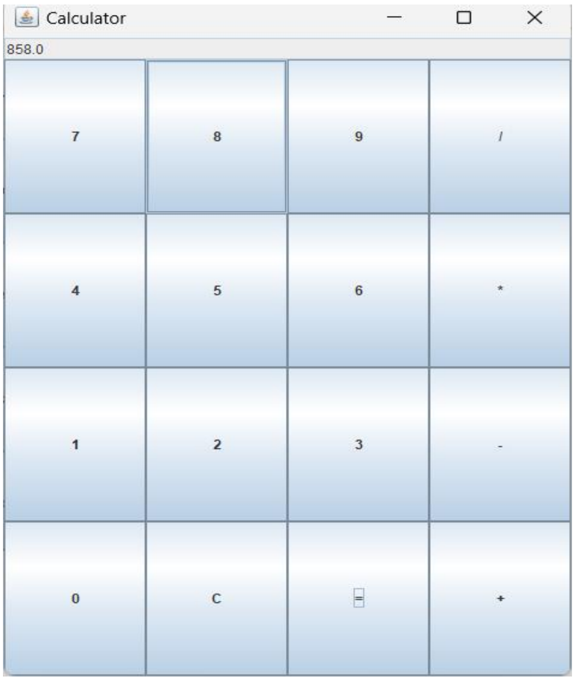
```
import java.rmi.Remote;
import java.rmi.RemoteException;

public interface Calculator extends Remote {
	double add(double a, double b) throws RemoteException;
	double subtract(double a, double b) throws RemoteException;
	double multiply(double a, double b) throws RemoteException;
	double divide(double a, double b) throws RemoteException;
}
```

Output :-

Addition





2. Retrieve day, time and date function from server to client. This program should display server day, date and time.

Code Files :-

1) DateTimeServiceClient.java

```
package RMIDemo;
import java.rmi.Naming;
import java.util.Date;
public class DateTimeClient {
    public static void main(String[] args) {
        try {

            DateTimeService dateTimeService = (DateTimeService)
Naming.lookup("rmi://localhost:1900/DateTimeService");
            Date serverDateTime = dateTimeService.getCurrentDateTime();
            System.out.println("Current Date and Time from Server: " + serverDateTime.toString());
            String serverDay = dateTimeService.getCurrentDay();
            System.out.println("Current Day from Server: " + serverDay);
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

2) DateTimeServer.java

```
package RMIDemo;
import java.rmi.Naming;
import java.rmi.registry.LocateRegistry;
public class DateTimeServer {
    public static void main(String[] args) {
        try {
            DateTimeService dateTimeService = new DateTimeServiceImpl();
            LocateRegistry.createRegistry(1900);

            Naming.rebind("rmi://localhost:1900/DateTimeService", dateTimeService);
            System.out.println("DateTimeServer is running...");
        } catch (Exception e) {
            e.printStackTrace();
        }
    }
}
```

3) DateTimeServiceImpl.java

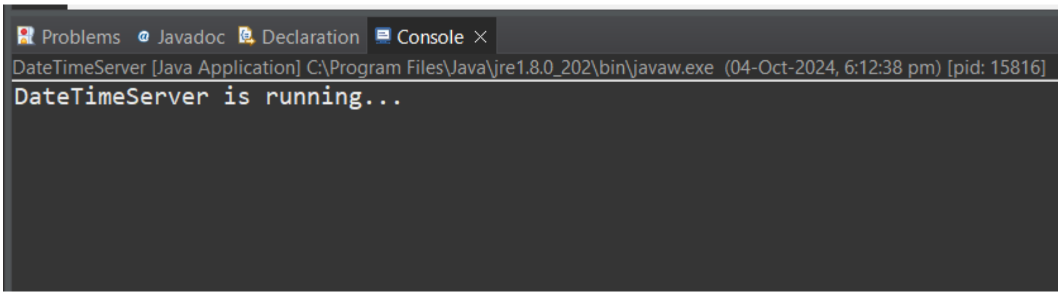
```
package RMIDemo;
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
import java.text.SimpleDateFormat;
import java.util.Date;
import java.util.Locale;
public class DateTimeServiceImpl extends UnicastRemoteObject implements DateTimeService {
        private static final long serialVersionUID = 1L;
        protected DateTimeServiceImpl() throws RemoteException {
    super();
  }
  @Override
  public Date getCurrentDateTime() throws RemoteException {
    return new Date();
  }
  @Override
  public String getCurrentDay() throws RemoteException {
    SimpleDateFormat dayFormat = new SimpleDateFormat("EEEE", Locale.ENGLISH);
    return dayFormat.format(new Date());
  }
}
```

4) DateTimeService.java (Interface)

```
package RMIDemo;
import java.rmi.Remote;
import java.rmi.RemoteException;
import java.util.Date;
public interface DateTimeService extends Remote {
  Date getCurrentDateTime() throws RemoteException;
  String getCurrentDay() throws RemoteException;
}
```

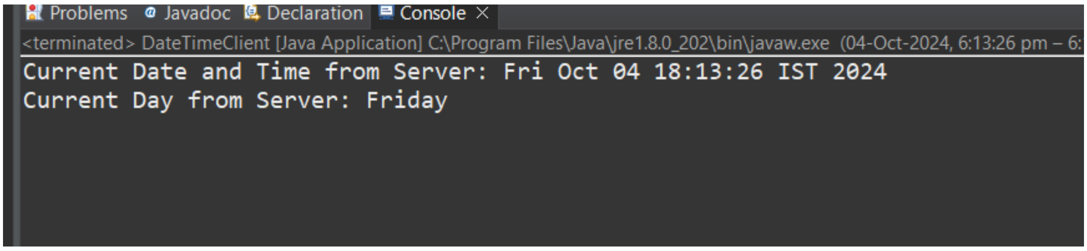
Output :-

- Server



```
DateTimeServer [Java Application] C:\Program Files\Java\jre1.8.0_202\bin\javaw.exe  (04-Oct-2024, 6:12:38 pm) [pid: 15816]
DateTimeServer is running...
```

- Client



```
<terminated> DateTimeClient [Java Application] C:\Program Files\Java\jre1.8.0_202\bin\javaw.exe  (04-Oct-2024, 6:13:26 pm – 6:
Current Date and Time from Server: Fri Oct 04 18:13:26 IST 2024
Current Day from Server: Friday
```