Practical No. 2

1. Design a Graphical User Interface (GUI) based calculator. (scientific or standard)Operations should be performed using both mouse and keyboard.

Calculator.java

```
package Praticalno3;

import java.rmi.Remote;
import java.rmi.RemoteException;
public interface Calculator extends Remote{
public void calculate() throws RemoteException;
}
```

Main.java

```
package Praticalno3;

import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
public class Main extends UnicastRemoteObject implements Calculator{
protected Main() throws RemoteException {
super();
}
private static final long serialVersionUID = 1L;
@Override
public void calculate() throws RemoteException {
new calculator();
}
}
```

calculator.java

```
package Praticalno3;

import java.awt.event.*;
import java.awt.*;
import javax.swing.*;
public class calculator extends JFrame implements ActionListener
{
JButton b10,b11,b12,b13,b14,b15;
JButton b[]=new JButton[10];
int i,r,n1,n2;
JTextField res;
char op;
public calculator()
{
super("calulator");
setLayout(new BorderLayout());
JPanel p=new JPanel();
p.setLayout(new GridLayout(4,4));
for(int i=0;i<=9;i++)
{
b[i]=new JButton(i+"");
p.add(b[i]);
b[i].addActionListener(this);
```

```
}
b10=new JButton("+");
p.add(b10);
b10.addActionListener(this);
b11=new JButton("-");
p.add(b11);
b11.addActionListener(this);
b12=new JButton("*");
p.add(b12);
b12.addActionListener(this);
b13=new JButton("/");
p.add(b13);
b13.addActionListener(this);
b14=new JButton("=");
p.add(b14);
b14.addActionListener(this);
b15=new JButton("C");
p.add(b15);
b15.addActionListener(this);
res=new JTextField(10);
add(p,BorderLayout.CENTER);
add(res,BorderLayout.NORTH);
setVisible(true);
setSize(200,200);
}
public void actionPerformed(ActionEvent ae)
{
JButton pb=(JButton)ae.getSource();
if(pb==b15)
{
r=n1=n2=0;
res.setText("");
}
else
if(pb==b14)
{
n2=Integer.parseInt(res.getText());
eval();
res.setText(""+r);
}
else
{
boolean opf=false;
if(pb==b10)
{ op='+';
opf=true;
}
if(pb==b11)
{ op='-';opf=true;}
if(pb==b12)
{ op='*';opf=true;}
if(pb==b13)
{ op='/';opf=true;}
if(opf==false)
{
for(i=0;i<10;i++)
{
if(pb==b[i])
{
String t=res.getText();
t+=i;
res.setText(t);
}
}
}
else
{
n1=Integer.parseInt(res.getText());
res.setText(""); }}
}
int eval()
{
switch(op)
{
case '+': r=n1+n2; break;
case '-': r=n1-n2; break;
case '*': r=n1*n2; break;
case '/': r=n1/n2; break;
}
return 0;
}}
```

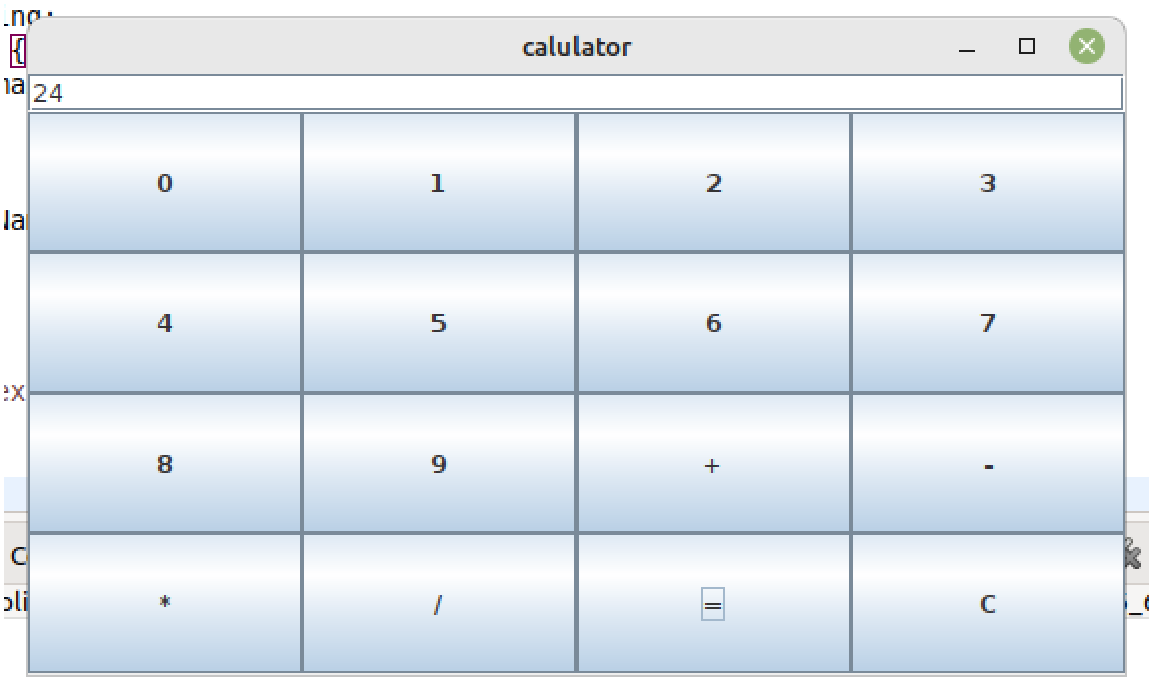
Server.java

```
package Praticalno3;

import java.rmi.Naming;
import java.rmi.registry.LocateRegistry;
public class Server {
public static void main(String[] args) {
try
{
Calculator cal=new Main();
LocateRegistry.createRegistry(1900);
Naming.rebind("rmi://localhost:1900/calculator", cal);
}
catch(Exception ex)
{
System.out.println(ex);
}
}

}
```

Client.java

```
package Praticalno3;

import java.rmi.Naming;
public class Client {
public static void main(String[] args) {
try
{
Calculator
access=(Calculator)Naming.lookup("rmi://localhost:1900/calculator");
access.calculate();
}
catch(Exception ex)
{
System.out.println(ex);
}
}
}
```

Output:



Q2. Retrieve day, time and date function from server to client. This program should display server day, date and time.

<u>Dater.java</u>

```
package datetime;
import java.rmi.Remote;
import java.rmi.RemoteException;
import java.sql.Date;
import java.time.LocalDateTime;
public interface Dater extends Remote {
public LocalDateTime getDate() throws RemoteException;
}
```

<u>Main.java</u>

```
package datetime;
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
import java.sql.Date;
import java.time.LocalDate;
import java.time.LocalDateTime;
public class Main extends UnicastRemoteObject implements Dater{
Main() throws RemoteException
{
super();
}
@Override
public LocalDateTime getDate() throws RemoteException {
return java.time.LocalDateTime.now();
}
}
```

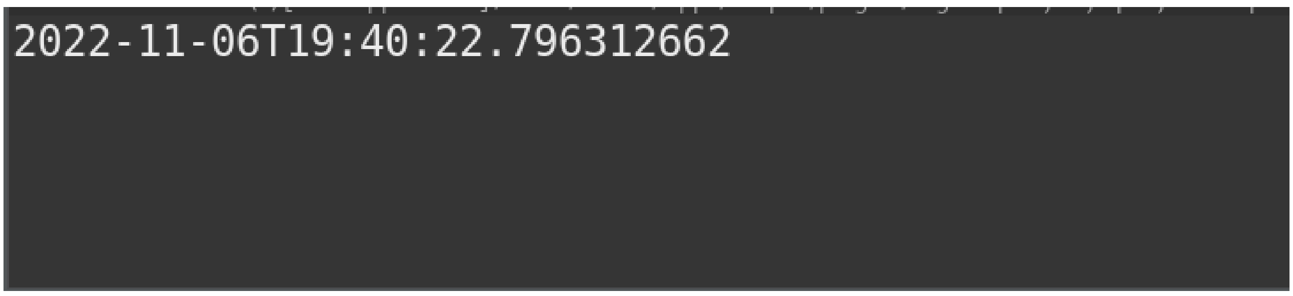
Server.java

```
package datetime;
import java.rmi.Naming;
import java.rmi.registry.LocateRegistry;
public class Server {
public static void main(String[] args) {
try
{
Dater dt= new Main();
LocateRegistry.createRegistry(1900);
Naming.rebind("rmi://localhost:1900/datedisplay", dt);
}
catch(Exception ex)
{
System.out.println(ex);
}
}
}
```

Client.java

```
package datetime;
import java.rmi.Naming;
import java.sql.Date;
import java.time.LocalDateTime;
public class Client {
public static void main(String[] args) {
LocalDateTime answer;
try
{
Dater
access= (Dater)Naming.lookup("rmi://localhost:1900/datedisplay");
answer= access.getDate();
System.out.println(answer);
}
catch(Exception ex)
{
System.out.println(ex);
}
}
}
```

Output:



```
2022-11-06T19:40:22.796312662
```

3. Equation solver. The client should provide an equation to the server through an interface. The server will solve the expression given by the client. (a–b)2 = a2 —2ab + b2;
If a = 5 and b = 2 then return value = 52 — 2*5*2 + 22 = 9.

Equator.java

```
package mypackage;
import java.rmi.Remote;
import java.rmi.RemoteException;
public interface Equator extends Remote{
public int getEquation(int a,int b) throws RemoteException;
}
```

Main.java

```
package mypackage;
import java.rmi.RemoteException;
import java.rmi.server.UnicastRemoteObject;
public class Main extends UnicastRemoteObject implements Equator{
protected Main() throws RemoteException {
super();
}
private static final long serialVersionUID = 1L;
@Override
public int getEquation(int a, int b) throws RemoteException {
int result= ((a*a)-(2*a*b)+ (b*b));
return result;
}
}
```

Server.java

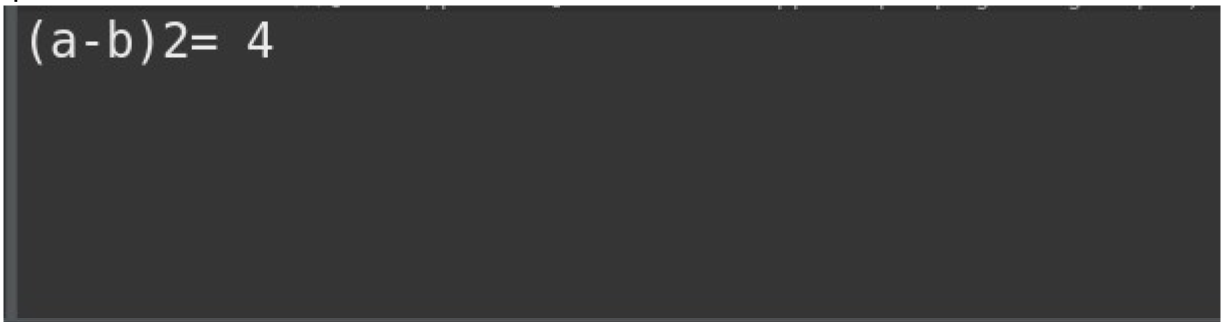
```
package mypackage;
import java.rmi.Naming;
import java.rmi.registry.LocateRegistry;
public class Server {
```

```
public static void main(String[] args) {
try
{
Equator eq= new Main();
LocateRegistry.createRegistry(1900);
Naming.rebind("rmi://localhost:1900/equationsolver", eq);
}
catch(Exception ex)
{
System.out.println(ex);
}
}
}
```

__Client.java__

```
package mypackage;
import java.rmi.Naming;
public class Client {
public static void main(String[] args) {
try
{
Equator
access= (Equator)Naming.lookup("rmi://localhost:1900/equationsolver");
int answer= access.getEquation(5, 3);
System.out.println("(a-b)2= "+ answer);
}
catch(Exception ex)
{
System.out.println(ex);
}
}
}
```

Output:



```
(a-b)2= 4
```