

Practical: 2

Aim: Java RMI Programming.

1. Implementation of “Hello World” Service using Java RMI.

Code:

```
/* SampleServer.java */
import java.rmi.*;

public interface SampleServer extends Remote
{
    public String printHello() throws RemoteException;
}

/* SampleServerImpl.java */

import java.rmi.*;
import java.rmi.server.*;

public class SampleServerImpl extends UnicastRemoteObject implements SampleServer
{
    SampleServerImpl() throws RemoteException
    {
        super();
    }
    public static void main(String args[])
    {
        try
        {
            SampleServerImpl Server = new SampleServerImpl();
            Naming.rebind("SAMPLE-SERVER" , Server);
            System.out.println("Server waiting.....");
        }
        catch (java.net.MalformedURLException me)
        {
            System.out.println("Malformed URL: " + me.toString());
        }
        catch (RemoteException re)
        {
            System.out.println("Remote exception: " + re.toString());
        }
    }
}
```

```
    }
}
public String printHello() throws RemoteException
{
    return "Sample Hello World";
}
}

/* SampleClient.java */

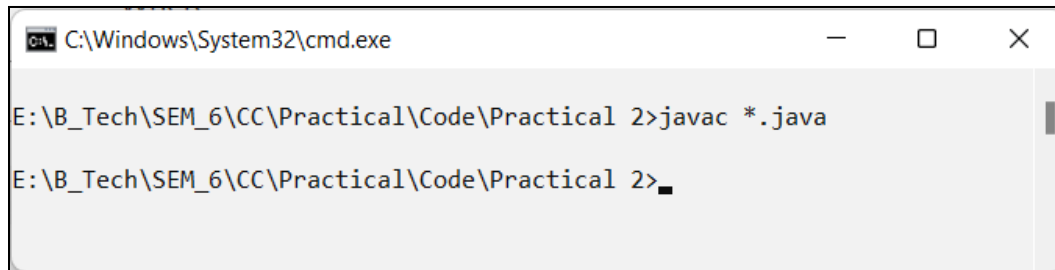
import java.rmi.*;

public class SampleClient
{
    public static void main(String[] args)
    {
        try
        {
            System.out.println("Security Manager loaded");
            String url = "//localhost/SAMPLE-SERVER";

            SampleServer remoteObject = (SampleServer)Naming.lookup(url);
            System.out.println("Got remote object\n");
            System.out.println("Print Hello: "+remoteObject.printHello());
        }
        catch (RemoteException exc)
        {
            System.out.println("Error in lookup: " + exc.toString());
        }
        catch (java.net.MalformedURLException exc)
        {
            System.out.println("Malformed URL: " + exc.toString());
        }
        catch (java.rmi.NotBoundException exc)
        {
            System.out.println("NotBound: " + exc.toString());
        }
    }
}
```

Output:

Compile Code:

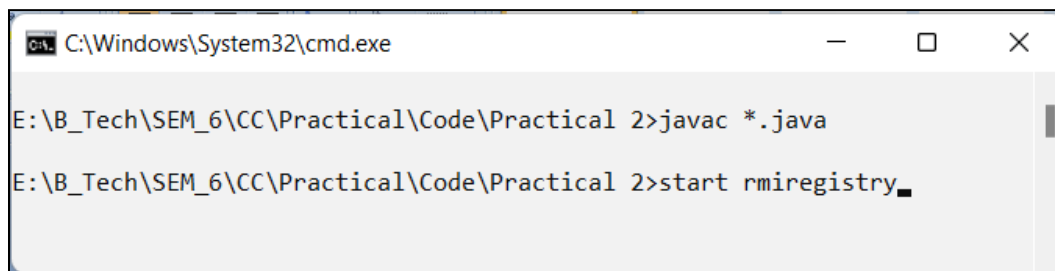


```
C:\Windows\System32\cmd.exe

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>javac *.java

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>_
```

Start RMI:

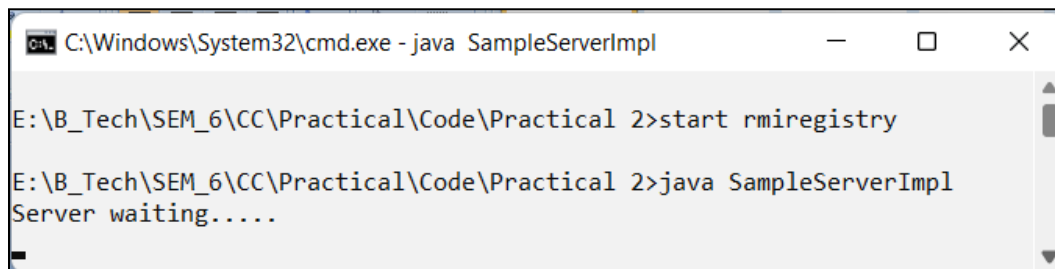


```
C:\Windows\System32\cmd.exe

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>javac *.java

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>start rmiregistry_
```

Run SampleServerImpl.java



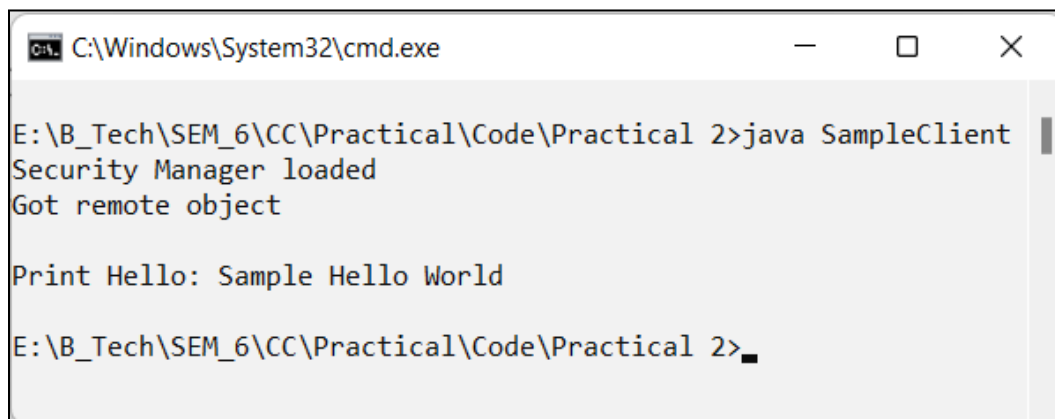
```
C:\Windows\System32\cmd.exe - java SampleServerImpl

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>start rmiregistry

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>java SampleServerImpl
Server waiting.....

_
```

Run SampleClient.java



```
C:\Windows\System32\cmd.exe

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>java SampleClient
Security Manager loaded
Got remote object

Print Hello: Sample Hello World

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2>_
```

2. Implementation of “Calculator” Service (Add, Sub, Mul, Div) using Java RMI.**Code:**

```
/* SampleServer.java */
```

```
import java.rmi.*;
```

```
public interface SampleServer extends Remote
{
    public double sum(double a, double b) throws RemoteException;
    public double sub(double a, double b) throws RemoteException;
    public double mul(double a, double b) throws RemoteException;
    public double div(double a, double b) throws RemoteException;
}
```

```
/* SampleServerImpl.java */
```

```
import java.rmi.*;
```

```
import java.rmi.server.*;
```

```
public class SampleServerImpl extends UnicastRemoteObject implements SampleServer
{
    SampleServerImpl() throws RemoteException
    {
        super();
    }
    public static void main(String args[])
    {
        try
        {
            SampleServerImpl Server = new SampleServerImpl();
            Naming.rebind("SAMPLE-SERVER" , Server);
            System.out.println("Server waiting.....");
        }
        catch (java.net.MalformedURLException me)
        {
            System.out.println("Malformed URL: " + me.toString());
        }
        catch (RemoteException re)
        {

```

```
        System.out.println("Remote exception: " + re.toString());
    }
}
@Override
public double sum(double a, double b) throws RemoteException {
    return a+b;
}
@Override
public double sub(double a, double b) throws RemoteException {
    return a-b;
}
@Override
public double mul(double a, double b) throws RemoteException {
    return a*b;
}
@Override
public double div(double a, double b) throws RemoteException {
    if(b!=0)
    {
        return a/b;
    }
    else{
        return 0;
    }
}
}
```

```
/* SampleClient.java */
import java.rmi.*;
import java.util.*;

public class SampleClient
{
    public static void main(String[] args)
    {
        double num1, num2;
        int sel;
        String res;
        Scanner sc= new Scanner(System.in);

        try
        {
            System.out.println("Security Manager loaded");
            String url = "//localhost/SAMPLE-SERVER";

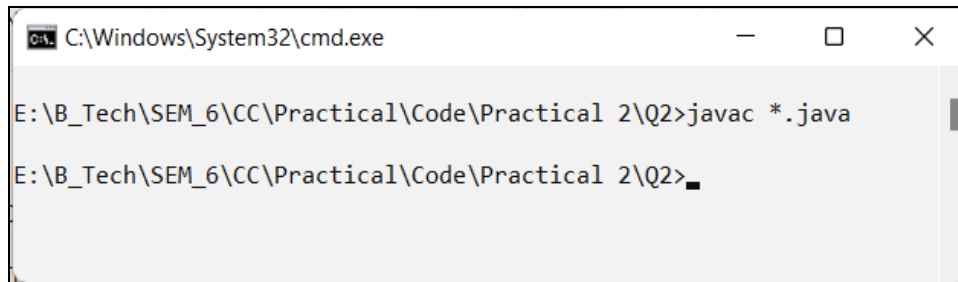
            SampleServer remoteObject = (SampleServer)Naming.lookup(url);
            System.out.println("Got remote object\n");
            System.out.println("1. Addition");
            System.out.println("2. Subtraction");
            System.out.println("3. Multiplication");
            System.out.println("4. Division\n");

            System.out.print("Select Options: ");
            sel=sc.nextInt();
            System.out.print("Enter Num1: ");
            num1=sc.nextDouble();
            System.out.print("Enter Num2: ");
            num2=sc.nextDouble();
            switch(sel)
            {
                case 1: res = String.format("Addition of %f + %f: %f",num1,
                    num2,remoteObject.sum(num1, num2));
                    System.out.println(res);
                    break;
                case 2: res = String.format("Subtraction of %f - %f: %f",num1,
                    num2,remoteObject.sub(num1, num2));
                    System.out.println(res);
```

```
        break;
    case 3: res = String.format("Multiplication of %f * %f: %f",num1,
        num2,remoteObject.mul(num1, num2));
        System.out.println(res);
        break;
    case 4: res = String.format("Division of %f / %f: %f",num1,
        num2,remoteObject.div(num1, num2));
        System.out.println(res);
        break;
    default: System.out.println("Invalid Selection! Retry");
    }
}
catch (RemoteException exc)
{
    System.out.println("Error in lookup: " + exc.toString());
}
catch (java.net.MalformedURLException exc)
{
    System.out.println("Malformed URL: " + exc.toString());
}
catch (java.rmi.NotBoundException exc)
{
    System.out.println("NotBound: " + exc.toString());
}
sc.close();
}
}
```

Output:

Compile Code:

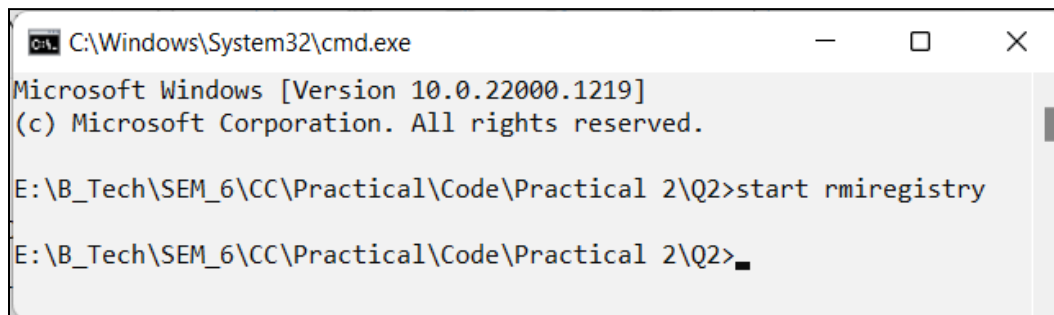


```
C:\Windows\System32\cmd.exe

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2\Q2>javac *.java

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2\Q2>_
```

Start RMI:



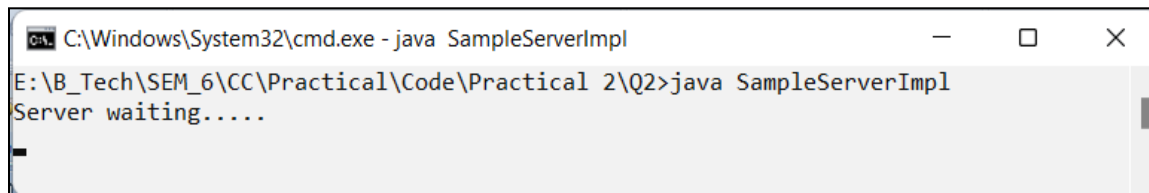
```
C:\Windows\System32\cmd.exe

Microsoft Windows [Version 10.0.22000.1219]
(c) Microsoft Corporation. All rights reserved.

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2\Q2>start rmiregistry

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2\Q2>_
```

Run SampleServerImpl.java

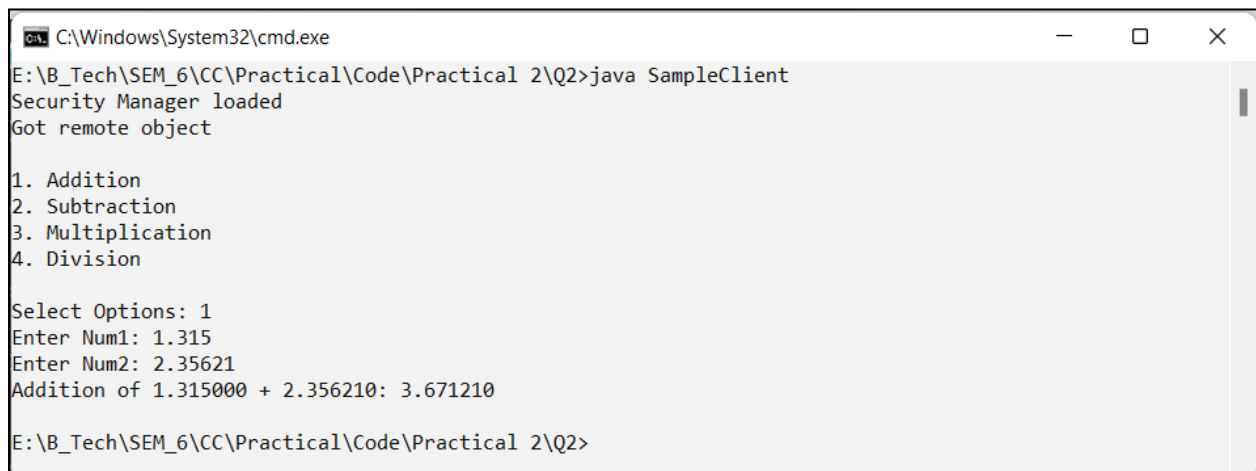


```
C:\Windows\System32\cmd.exe - java SampleServerImpl

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2\Q2>java SampleServerImpl
Server waiting.....

_
```

Run SampleClient.java



```
C:\Windows\System32\cmd.exe

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2\Q2>java SampleClient
Security Manager loaded
Got remote object

1. Addition
2. Subtraction
3. Multiplication
4. Division

Select Options: 1
Enter Num1: 1.315
Enter Num2: 2.35621
Addition of 1.315000 + 2.356210: 3.671210

E:\B_Tech\SEM_6\CC\Practical\Code\Practical 2\Q2>
```