**Project 4**

**Due Sunday 2/28/2016 by 11:59 PM**

**No delay is accepted**

**For each day late submission 2 points penalty is incurred.**

**Copy/paste your Server classes and a client class in this document and drop it into the folder *Project 4 on the blackboard.***

**If you have any question please email me at mbadii@pace.edu**

*Do not delete anything from this file. Just write your answer under the word: Answer.*

Write client-server classes to calculate the sum of 1 + 2 + 3 + …+ n with ***rmi APIs*** for one client and one server. The calculation of sum must be written in a remote method in the server program. The remote method should return the value of: sum to the client.

The client calls the remote method of servers to receive the sum. The client displays the sum on its console. Please copy/paste your java classes and interface under the word:

**Answer**.

Below are the programs’ skeleton and a sample dialog:

**The client class and interface**:

**import** java.rmi.Remote;

//This interface is complete. Do not change it.

**public** **interface** Project3ServerInterface **extends** Remote {

**public** **int** calculateSum(**int** n ) **throws** java.rmi.RemoteException;

}

import java.rmi.\*;

import java.util.\*;

public class Project4Client{

//Complete this class.

}

**The server classes and interface**:

**import** java.rmi.Remote;

//This interface is complete. Do not change it.

**public** **interface** Project3ServerInterface **extends** Remote {

**public** **int** calculateSum(**int** n ) **throws** java.rmi.RemoteException;

}

**import** java.rmi.\*;

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

**public** **class** CalculateSumServerImpl **extends** UnicastRemoteObject **implements** Project3ServerInterface {

//Complete this class.

}

**import** java.rmi.\*;

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

**import** java.rmi.registry.Registry;

**import** java.rmi.registry.LocateRegistry;

**import** java.net.\*;

**public** **class** Project4Server{

//Complete this class.

}

**A sample dialog**:

Display output on the server side:

RMI registry cannot be located at port 16790

RMI registry created at port 16790

Hello Server ready.

Display output on the client side:

Enter a positive integer: 5

Lookup completed

The sum is: 15

Note: The green: 5 is what the user entered.

Note: This is just a sample. Your project should work for any positive integer for n.

**Answer**:

**The server classes and interface**:

**Project3ServerInterface**

import java.rmi.Remote;

public interface Project3ServerInterface extends Remote {

public int calculateSum(int n ) throws java.rmi.RemoteException;

}

**CalculateSumServerImpl.java file**

import java.rmi.\*;

import java.rmi.server.\*;

import java.util.Scanner;

public class CalculateSumServerImpl extends UnicastRemoteObject implements Project3ServerInterface {

private static final long serialVersionUID = 1L;

public CalculateSumServerImpl() throws RemoteException {

super();

}

@Override

public int calculateSum(int n) throws RemoteException {

int sum = 0;

while(n!=0)

{

sum = sum+n;

n--;

}

return sum;

}

}

**Project4Server.java file**

import java.rmi.\*;

import java.rmi.server.\*;

import java.rmi.registry.Registry;

import java.rmi.registry.LocateRegistry;

import java.net.\*;

public class Project4Server{

public static void main(String args[]){

try{

int port = 16790;

String host = "localhost";

CalculateSumServerImpl exportedObj = new CalculateSumServerImpl();

startRegistry(port);

String registryURL = "rmi://" + host + ":" + port + "/sum";

Naming.rebind(registryURL, exportedObj);

System.out.println("Hello Server ready.");

}catch (Exception e){

e.printStackTrace();

}

}

private static void startRegistry(int port)throws RemoteException, NotBoundException{

try{

Registry registry = LocateRegistry.getRegistry(port);

registry.list( ); // This call will throw an exception if the registry does not already running

}catch (RemoteException e){

System.out.println("RMI registry cannot be located at port "+port);

LocateRegistry.createRegistry(port);

System.out.println("RMI registry created at port " + port);

}

}

}

**The client class and interface**:

**Project3ServerInterface**

import java.rmi.Remote;

public interface Project3ServerInterface extends Remote {

public int calculateSum(int n ) throws java.rmi.RemoteException;

}

**Project4Client.java file**

import java.rmi.\*;

import java.util.Scanner;

public class Project4Client{

public static void main(String args[]){

Scanner keyboard = new Scanner(System.in);

try{

int port = 16790;

String host = "localhost";

String registryURL = "rmi://" + host + ":" + port + "/sum";

Project3ServerInterface h = (Project3ServerInterface)Naming.lookup(registryURL);

System.out.println("Enter a positive integer:");

String msg = keyboard.nextLine();

System.out.println("Lookup completed " );

int number = Integer.parseInt(msg);

int message = h.calculateSum(number);

System.out.println("Sum is: " + message);

}

catch (Exception e){

e.printStackTrace();

}

}

}

**Output**:

Display output on the server side:

RMI registry cannot be located at port 16790

RMI registry created at port 16790

Hello Server ready.

Display output on the client side:

Enter a positive integer:

5

Lookup completed

Sum is: 15