Experiment-6

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Aim: Write a C/C++/Java program to Perform Encryption, Authentication and both using RSA.

Code:

Program1: Server Side

```
import java.net.*;
import java.io.*;
import java.util.*;
import java.lang.Math;
public class Server {
	public static void main(String[] args) throws IOException
	{
		try {
			int port = 8088;
			Scanner sc = new Scanner(System.in);
			// Server Key
			System.out.println("Enter the value of server key:- ");
			int b = sc.nextInt();

			// Client p, g, and key
			double clientP, clientG, clientA, B, Bdash;
			String Bstr;

			// Established the Connection
```

```
                ServerSocket serverSocket = new ServerSocket(port);
                System.out.println("Waiting for client on port " +
serverSocket.getLocalPort() + "...");
                Socket server = serverSocket.accept();
                System.out.println("Just connected to " +
server.getRemoteSocketAddress());

                // Server's Private Key
                System.out.println("From Server : Private Key = " + b);

                // Accepts the data from client
                DataInputStream in = new DataInputStream(server.getInputStream());

                clientP = Integer.parseInt(in.readUTF()); // to accept p
                System.out.println("From Client : P = " + clientP);

                clientG = Integer.parseInt(in.readUTF()); // to accept g
                System.out.println("From Client : G = " + clientG);

                clientA = Double.parseDouble(in.readUTF()); // to accept A
                System.out.println("From Client : Public Key = " + clientA);

                B = ((Math.pow(clientG, b)) % clientP); // calculation of B
                Bstr = Double.toString(B);

                // Sends data to client
                // Value of B
                OutputStream outToclient = server.getOutputStream();
                DataOutputStream out = new DataOutputStream(outToclient);
```

```
                    out.writeUTF(Bstr); // Sending B

                    Bdash = ((Math.pow(clientA, b)) % clientP); // calculation of Bdash

                    System.out.println("Secret Key to perform Symmetric Encryption = "
                                                    + Bdash);

                    double inputnumber = Double.parseDouble(in.readUTF());
                    System.out.println(inputnumber);
                    int number = (int)(((Math.cbrt(inputnumber))));
                    int square = number*number*4;
                    String n = Integer.toString(square);
                    out.writeUTF(n);
                    System.out.println("Sending Result Encrypted = "+ n);
                    server.close();
                }

                catch (SocketTimeoutException s) {
                    System.out.println("Socket timed out!");
                }
                catch (IOException e) {
                }
        }
}
```

Program2: Client Side

```
import java.net.*;
import java.io.*;
```

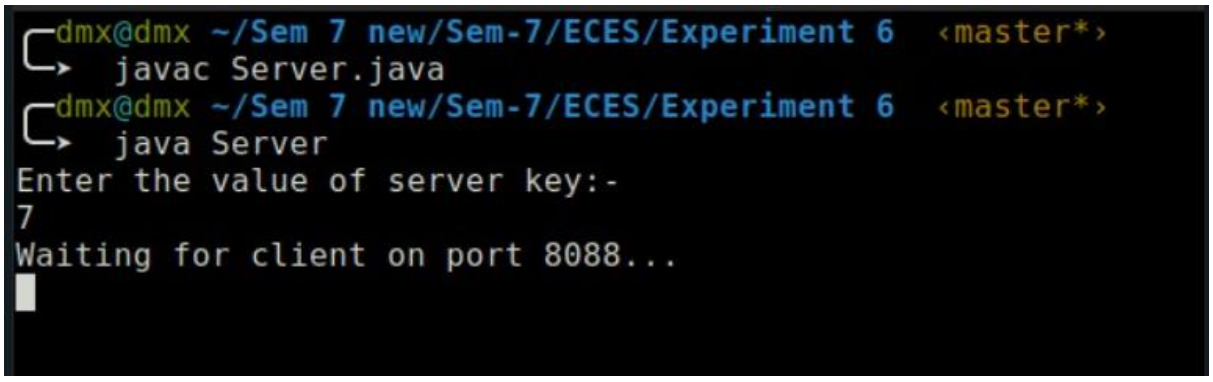
```
import java.util.*;
public class Client {
	public static void main(String[] args)
	{
		try {
			String pstr, gstr, Astr;
			String serverName = "localhost";
			int port = 8088;
			Scanner sc = new Scanner(System.in);
			// Declare p, g, and Key of client
			System.out.println("Enter the value of p:- ");
			int p = sc.nextInt();
			System.out.println("Enter the value of g:- ");
			int g = sc.nextInt();
			System.out.println("Enter the value of client key:- ");
			int a = sc.nextInt();
			double Adash, serverB;
			// Established the connection
			System.out.println("Connecting to " + serverName
							+ " on port " + port);
			Socket client = new Socket(serverName, port);
			System.out.println("Just connected to "
							+ client.getRemoteSocketAddress());
			// Sends the data to client
			OutputStream outToServer = client.getOutputStream();
			DataOutputStream out = new DataOutputStream(outToServer);

			pstr = Integer.toString(p);
			out.writeUTF(pstr); // Sending p
```

```
gstr = Integer.toString(g);
out.writeUTF(gstr); // Sending g
double A = ((Math.pow(g, a)) % p); // calculation of A
Astr = Double.toString(A);
out.writeUTF(Astr); // Sending A

// Client's Private Key
System.out.println("From Client : Private Key = " + a);

// Accepts the data
DataInputStream in = new DataInputStream(client.getInputStream());

serverB = Double.parseDouble(in.readUTF());
System.out.println("From Server : Public Key = " + serverB);

Adash = ((Math.pow(serverB, a)) % p); // calculation of Adash

System.out.println("Secret Key to perform Symmetric Encryption = "
                                    + Adash);

System.out.println("========Find Number From Server========");
System.out.println("Enter the Number: ");

int n = sc.nextInt();
double number = n*n*n;
System.out.println(number);
String nstr = Double.toString(number);
System.out.println("send data to server:- "+nstr);
out.writeUTF(nstr);
```

```
                int ans = Integer.parseInt(in.readUTF());
                ans = ans/4;
                System.out.println("From Server Output Decrypted: " + ans);
                client.close();
                client.close();
            }
            catch (Exception e) {
                e.printStackTrace();
            }
        }
}
```

Output:

Server Side:-



```
dmx@dmx ~/Sem 7 new/Sem-7/ECES/Experiment 6  <master*>
➜  javac Server.java
dmx@dmx ~/Sem 7 new/Sem-7/ECES/Experiment 6  <master*>
➜  java Server
Enter the value of server key:-
7
Waiting for client on port 8088...
Just connected to /127.0.0.1:38214
From Server : Private Key = 7
From Client : P = 11.0
From Client : G = 5.0
From Client : Public Key = 5.0
Secret Key to perform Symmetric Encryption = 3.0
64.0
Sending Result Encrypted = 64
dmx@dmx ~/Sem 7 new/Sem-7/ECES/Experiment 6  <master*>
➜
```

Client Side:-

```
dmx@dmx ~/Sem 7 new/Sem-7/ECES/Experiment 6  <master*>
➜  javac Client.java
dmx@dmx ~/Sem 7 new/Sem-7/ECES/Experiment 6  <master*>
➜  java Client
Enter the value of p:-
11
Enter the value of g:-
5
Enter the value of client key:-
6
Connecting to localhost on port 8088
Just connected to localhost/127.0.0.1:8088
From Client : Private Key = 6
From Server : Public Key = 3.0
Secret Key to perform Symmetric Encryption = 3.0
========Find Number From Server========
Enter the Number:
4
64.0
send data to server:- 64.0
From Server Output Decrypted: 16
dmx@dmx ~/Sem 7 new/Sem-7/ECES/Experiment 6  <master*>
➜
```