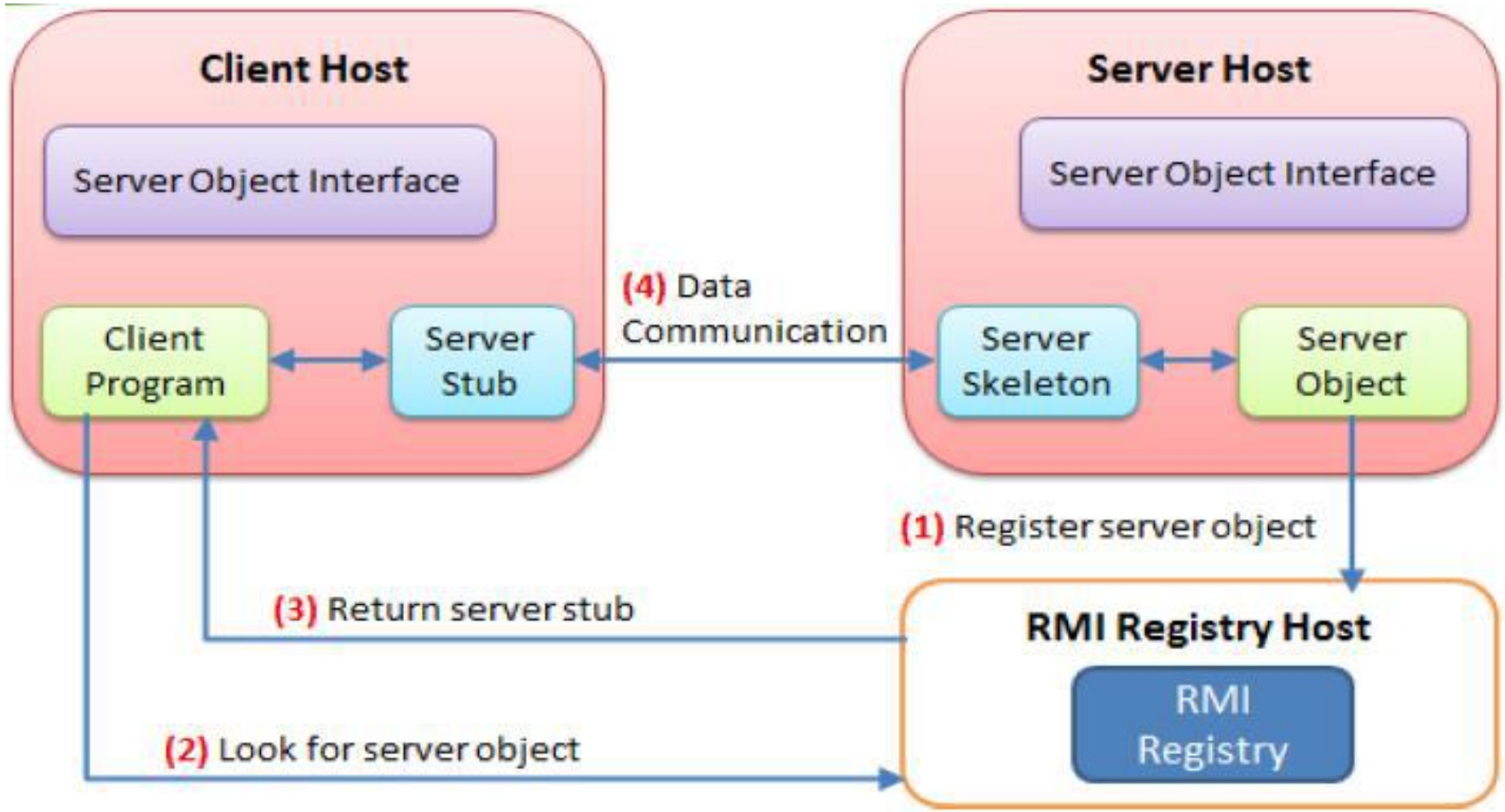
JAVA RMI

TUTORIAL 2

Overview

- Basic Concepts
- Installation Process
- Hands on experience (Coding ☺)

Basic Concepts



Basic Concepts

JAVA RMI:

RMI allows a Java object that executes on one machine to invoke a method of a Java object that executes on another machine.

CLIENT:

CLIENT INVOKES THE METHOD ON REMOTE OBJECT

SERVER:

IT OWNS THE REMOTE OBJECT

REGISTRY:

NAMING SERVER THAT RELATES OBJECTS WITH UNIQUE NAMES

Concepts

Server Object Interface:

An interface defines the method for the server object

Server Object:

An instance of the server object interface

Server Stub:

An object resides on the client host and serves as a representative of the remote server object

Concepts

Server Skeleton:

An object that resides on the server host. It communicates with the stub and the actual server object

RMI Registry:

It is service to register remote objects and to provide naming services for locating objects

Client Program:

A program that invokes the methods in the remote server object

Concepts

Implementation steps:

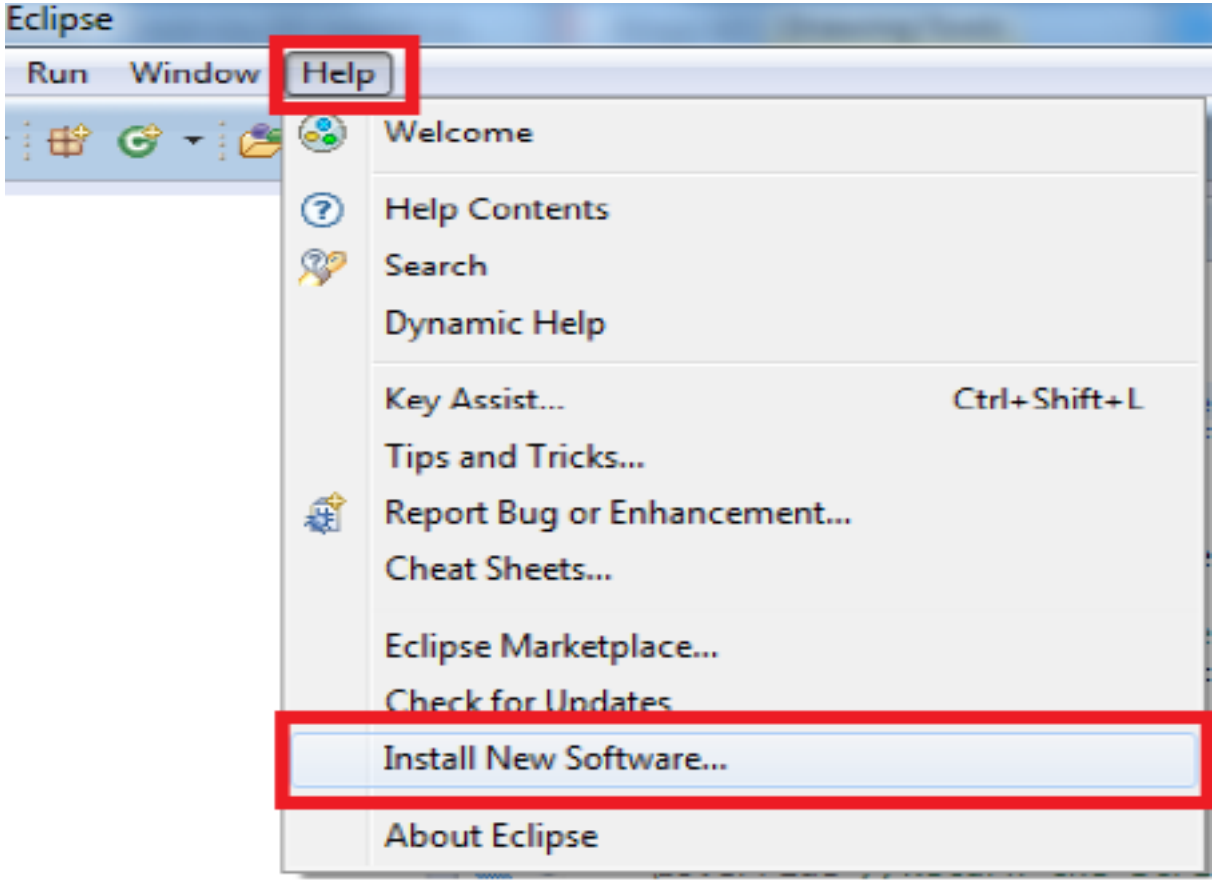
1. Define the interface
2. Implement Server
3. Implement Client

Execution Steps:

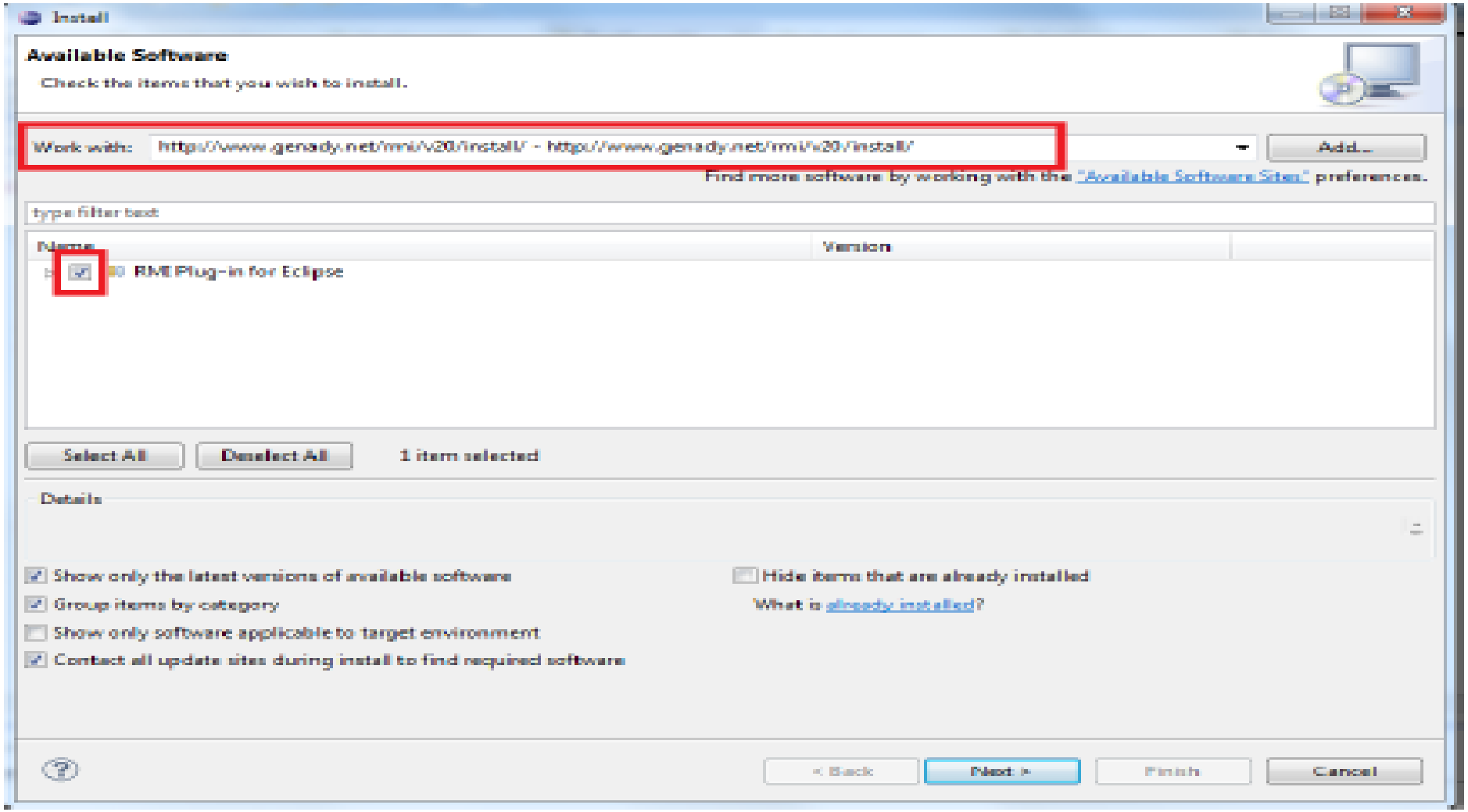
1. Run RMI Registry
2. Run Server
3. Run Client

INSTALLING RMI PLUGIN

1. Open Eclipse
2. Select Help -> Install New Software



- Enter: http://www.genady.net/rmi/v20/install/
- Check RMI plugin for Eclipse



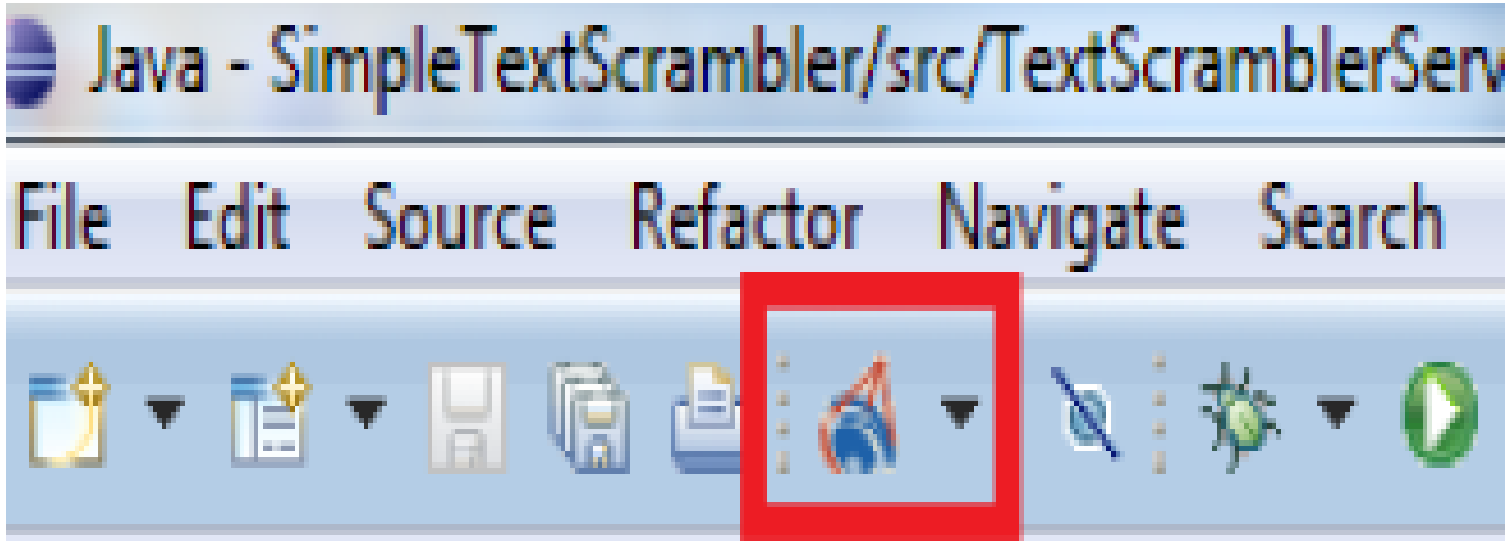
1. Accept the Terms of Services and continue.
2. You may have to restart Eclipse.

3. Troubleshooting:

4. You need Java SDK (1.6+) installed. The JRE does not provide Tools.jar which is essential to Java RMI

5. Your CLASSPATH variable must remain undefined.

1. If successful, you will see the following when you re-open Eclipse:



2. This will enable you to start a local registry manually.

RMI EXERCISE

Now, let’s start coding

Exercise : Addition RMI

- Objective :
    - The objective of today's tutorial is to successfully run RMI distributed system which gives addition of two numbers to the client.

•Note that this tutorial is designed in a very simple fashion. For your assignment, you are expected to structure your code (put files in relevant packages) and modify it as per your need.

Steps :

1. Create the remote interface
2. Implementation of Remote Interface
3. Create server
4. Create client
5. Run RMI plugin
6. Run server and then client

1. Create the Remote Interface

AddInterface.java

```
1
2  import java.rmi.*;
3
4  public interface AddInterface extends Remote{
5
6      public int add(int x, int y) throws RemoteException;
7
8  }
```

- Extend Remote Class belongs to (java.RMI) package in your Interface

- Implement the Interface in the class which you want with remote functionality

- The Remote interface serves to identify interfaces whose methods may be invoked from a non-local virtual machine. Any object that is a remote object must directly or indirectly implement this interface. Only those methods specified in a “remote interface”, an interface that extends java.rmi.Remote are available remotely.

- Your methods now potential throw RemoteException. You must declared them explicitly.

2. Implementation of Remote Interface

AddClass.java

```
1
2  import java.rmi.RemoteException;
4
5  public class AddClass extends UnicastRemoteObject implements AddInterface{
6
7      public AddClass() throws Exception{
8          super();
9      }
10
11     public int add(int x, int y){
12         return x + y;
13     }
14 }
```

- UnicastRemote Object:

- Used for exporting a remote object with JRMP(Java Remote Method Protocol) and obtaining a stub that communicates to the remote object.

3. Create Server

Server.java

```
1
2  import java.rmi.Naming;
5
6  public class Server{
7
8      public static void main(String[] args) throws Exception{
9          // TODO Auto-generated method stub
10
11         AddClass obj = new AddClass();
12         Registry registry = LocateRegistry.createRegistry(2964);
13         registry.bind("Addition", obj);
14         System.out.println("Server is started");
15     }
16
17 }
```

4. Create Client

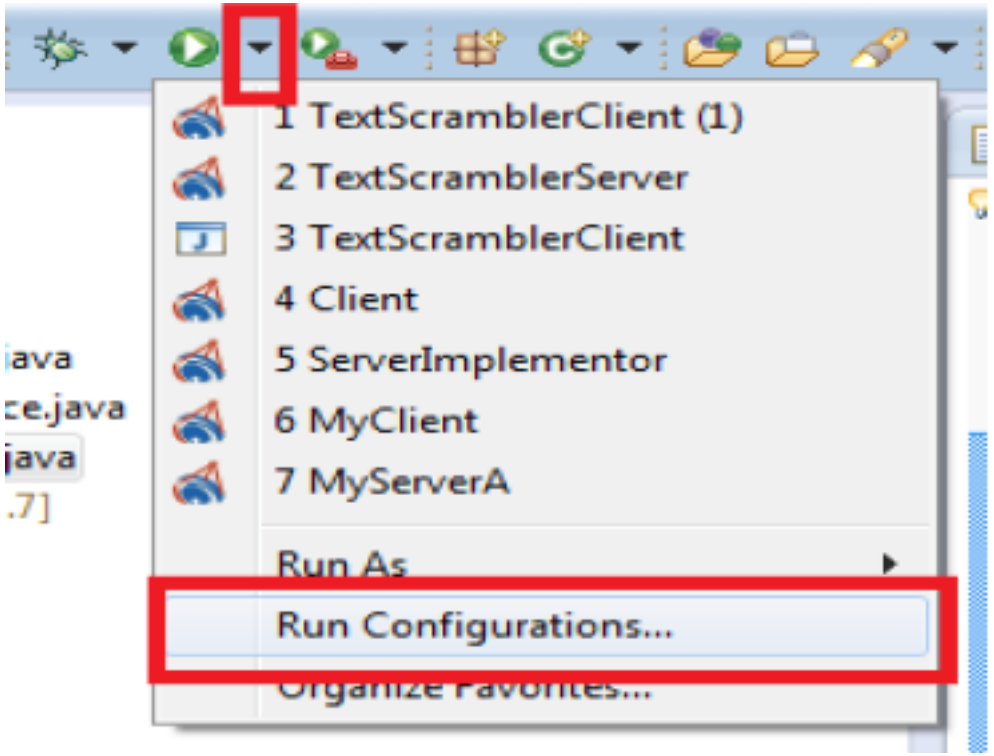
Client.java

```
1
2  import java.rmi.Naming;
5
6  public class Client {
7
8      public static void main(String[] args) throws Exception{
9          // TODO Auto-generated method stub
10
11         Registry registry = LocateRegistry.getRegistry(2964);
12
13         AddInterface obj = (AddInterface) registry.lookup("Addition");
14
15         int n = obj.add(5, 4);
16         System.out.println("Addition is : " + n);
17     }
18 }
```

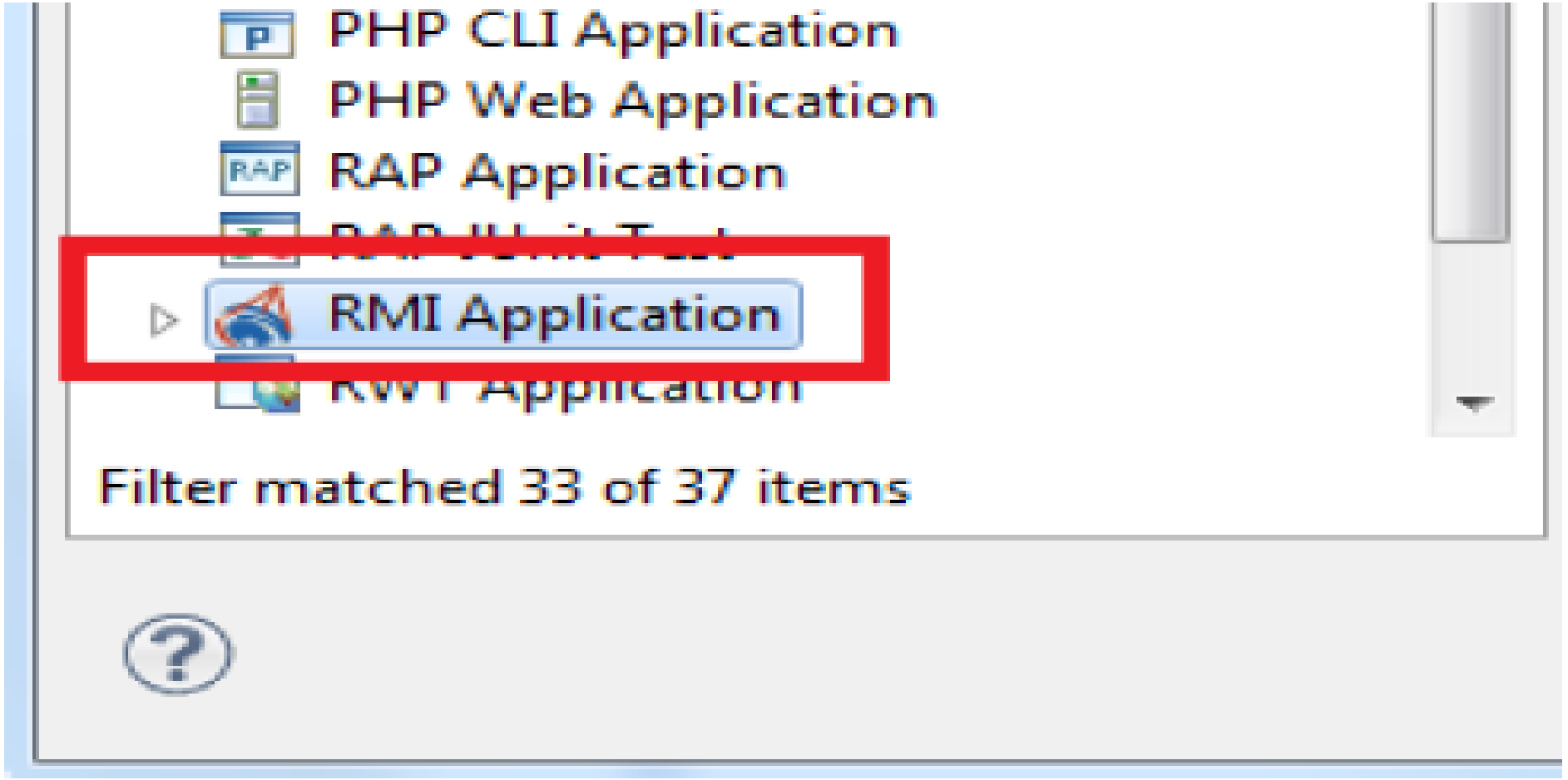
- On the Client!
- The Client must fetch the server from the registry
- If successful, the client will be able to use the methods residing on the server

5: Configure RMI Plugin

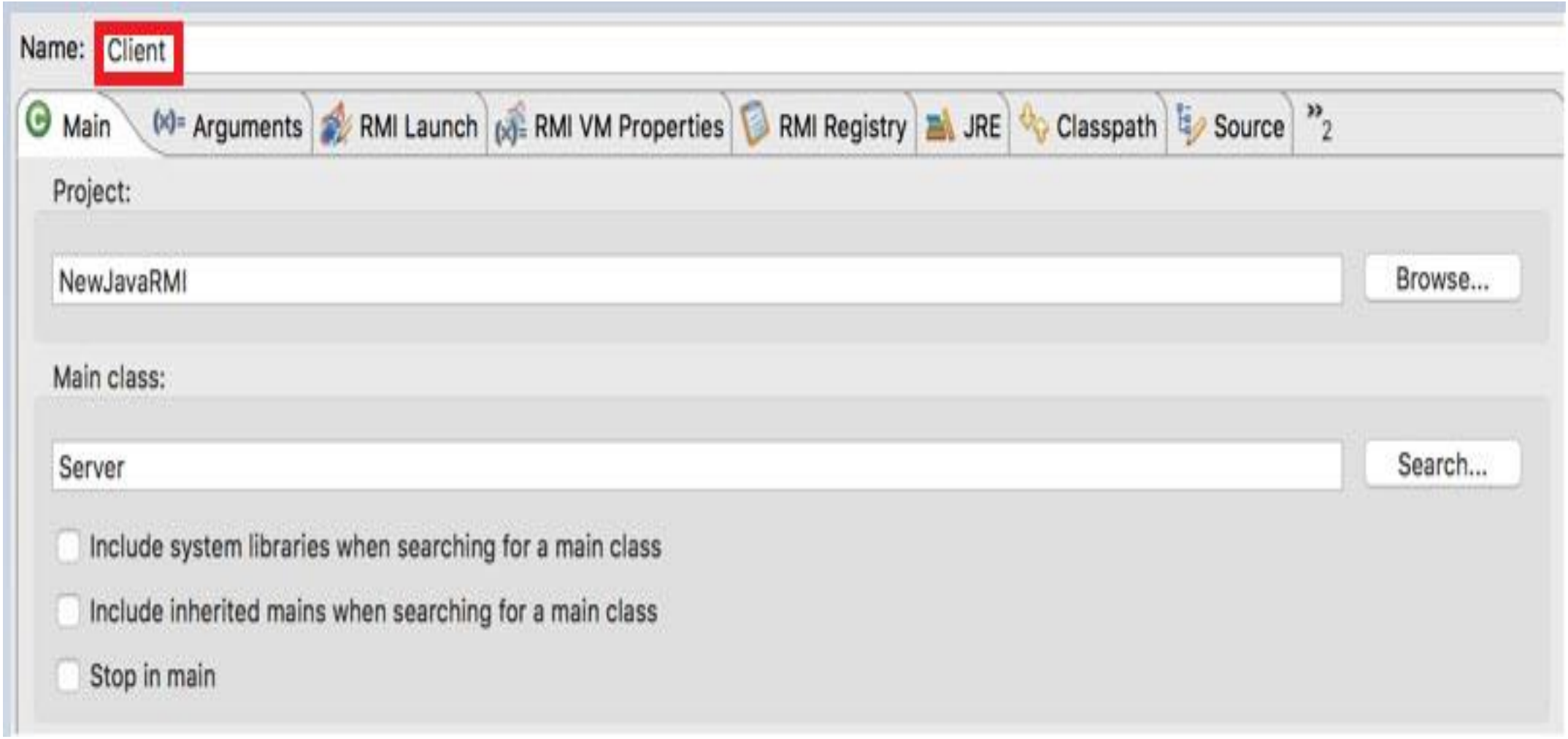
- Now to start our server we have to create a special RMI configuration



- Double Click on RMI Application

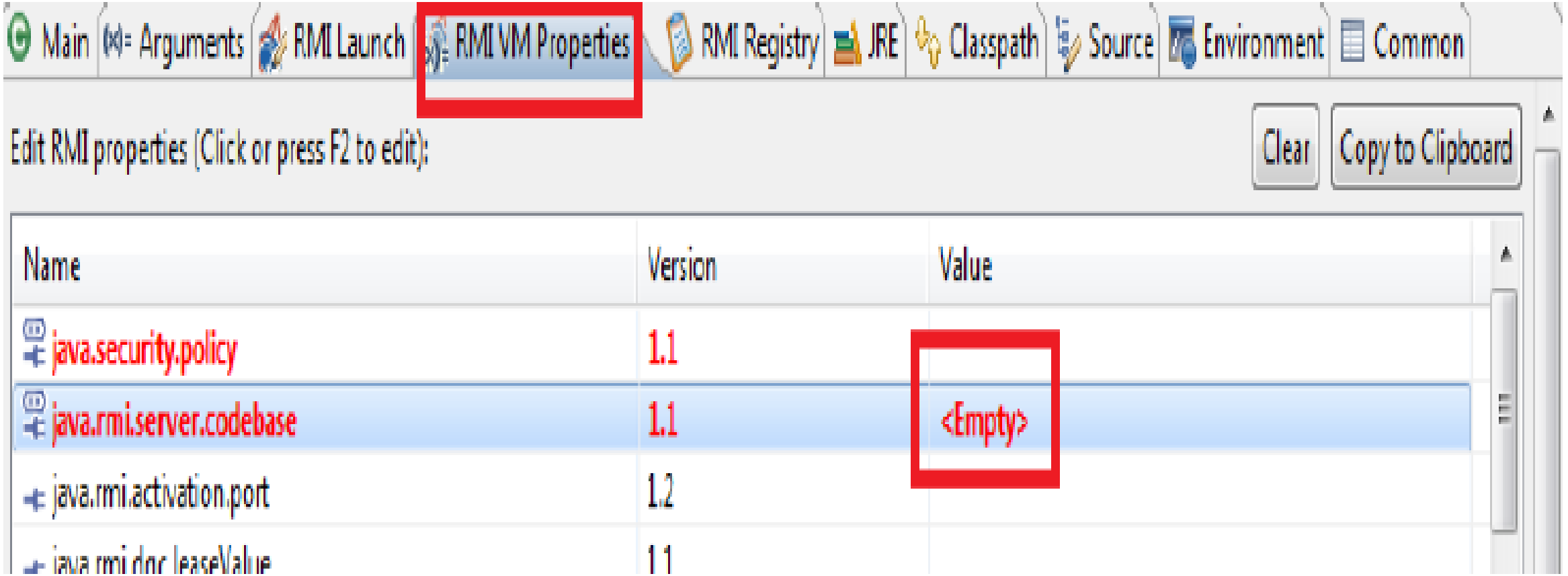


- Name your configuration – Client

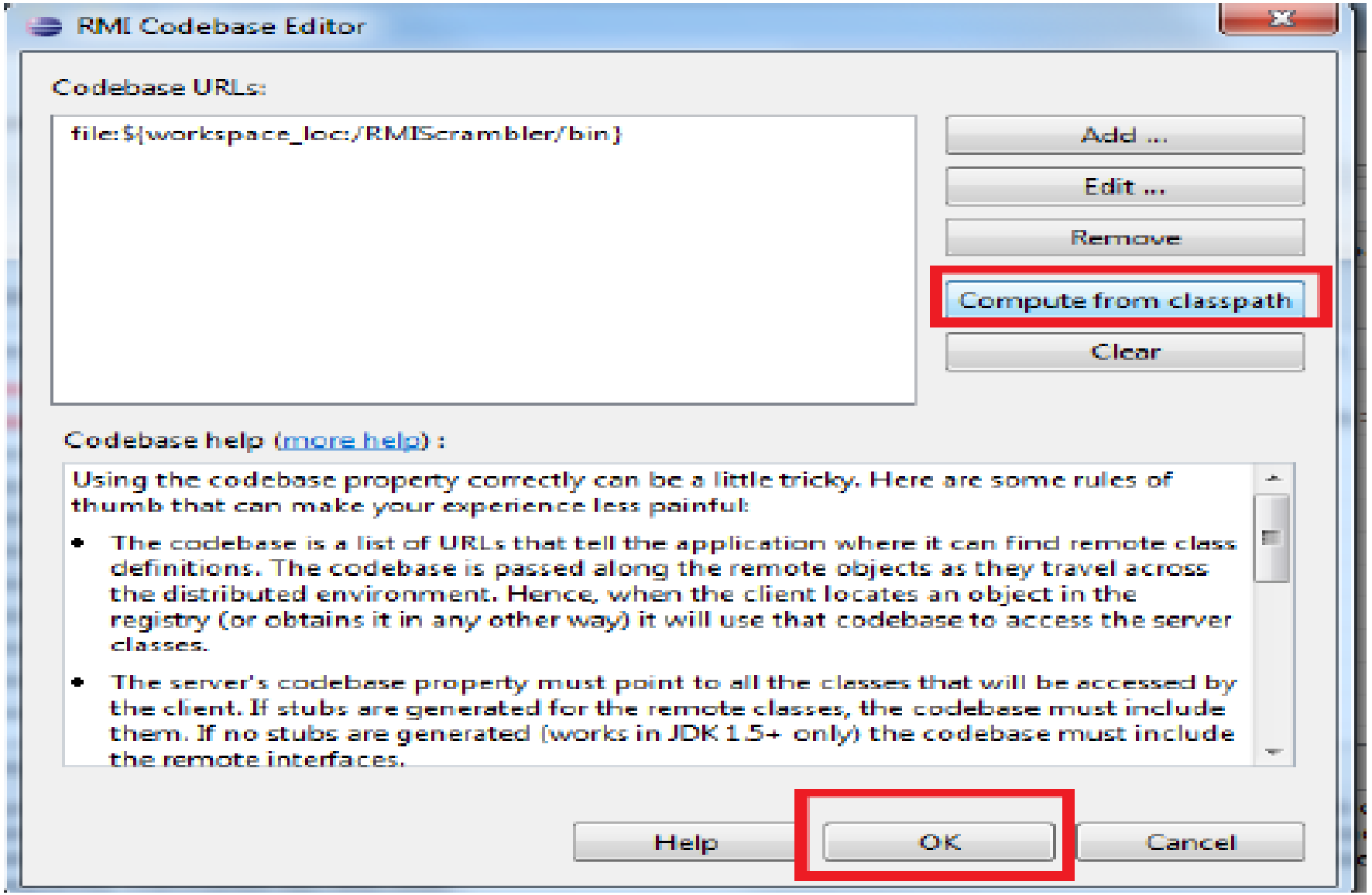


- Select the appropriate main class by clicking on search

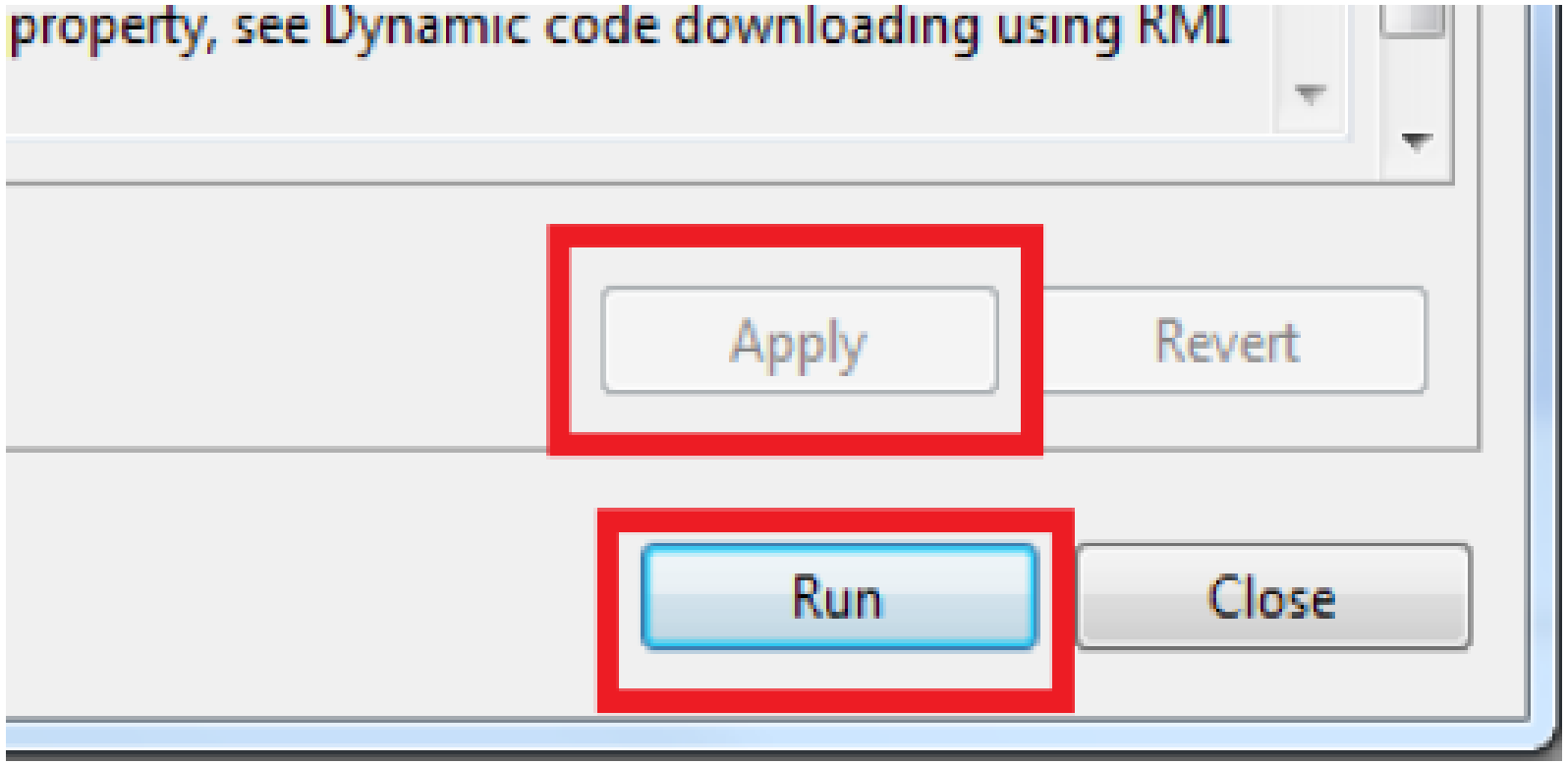
- Next you have to select RMI VM properties and click on the <Empty> to set a codebase.



- Click on compute from ClassPath and then ok.

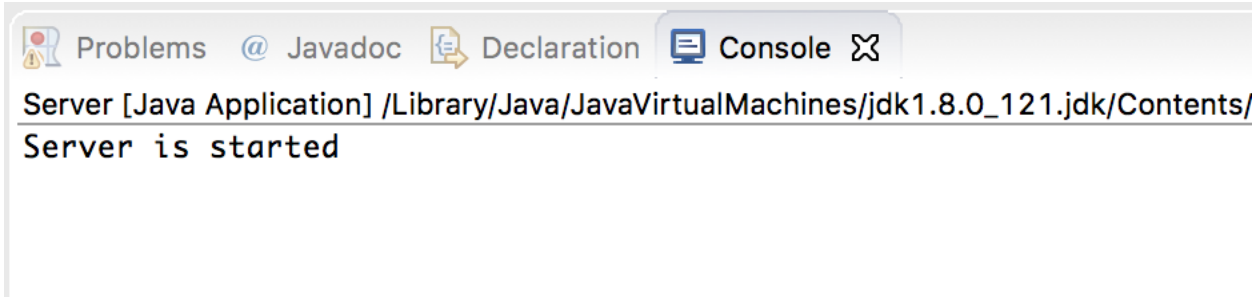


- Then click on Apply and Run. The server is finally starting!



6. Run server and then client

- Successful setup of Server
- Output



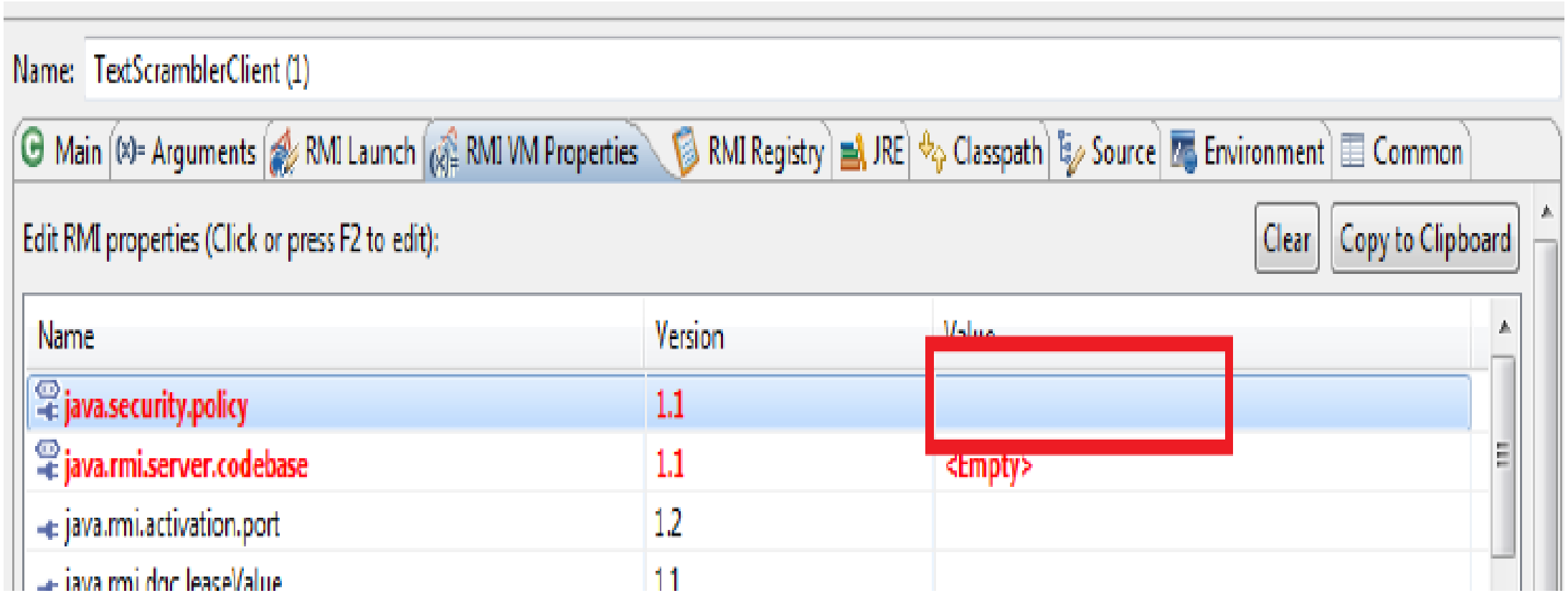
Client :

- For the client, you do not have to set the classpath. However, you do have to provide a security policy.

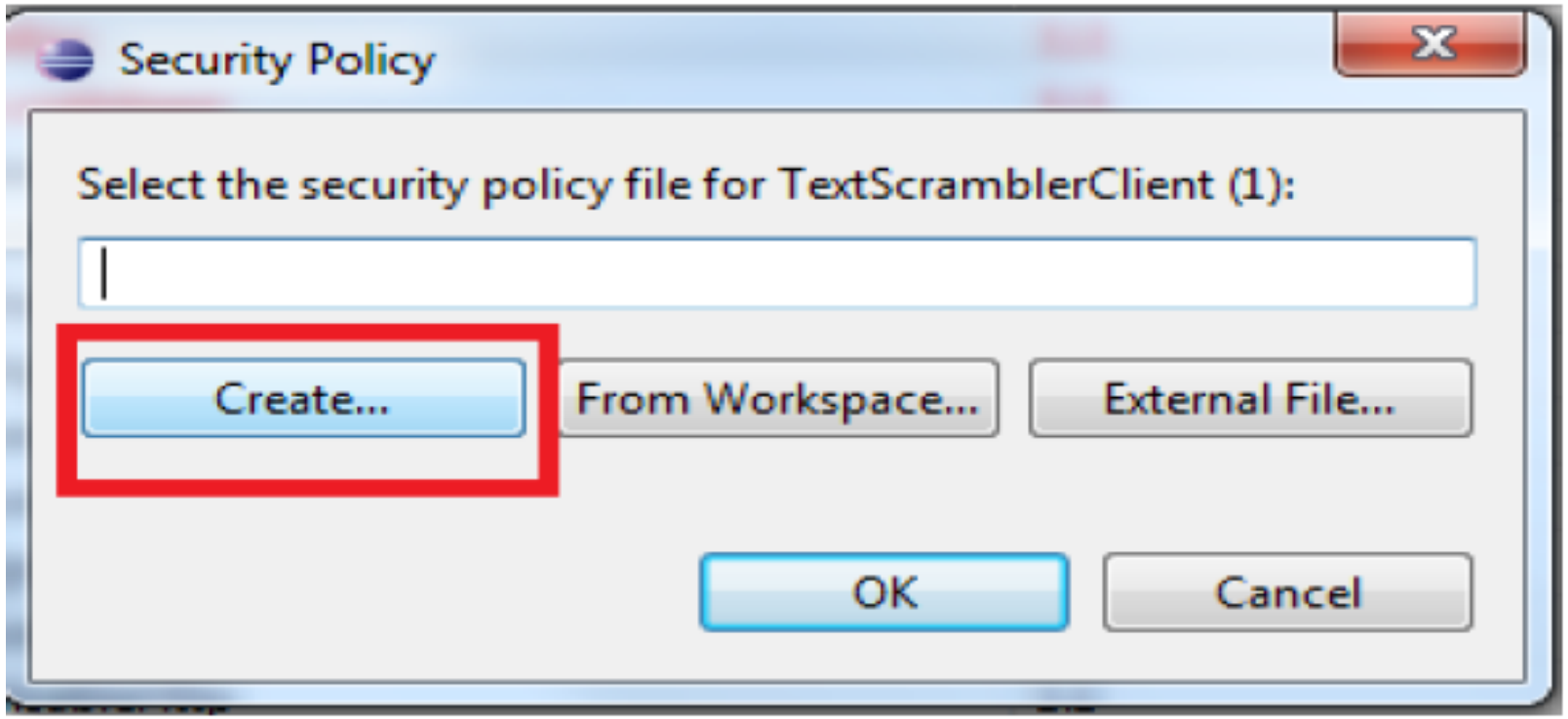
- To do so, go back to run configuration, double click on RMI Application and then RMI VM Properties.

Security Policy

- Click right above the <Empty>

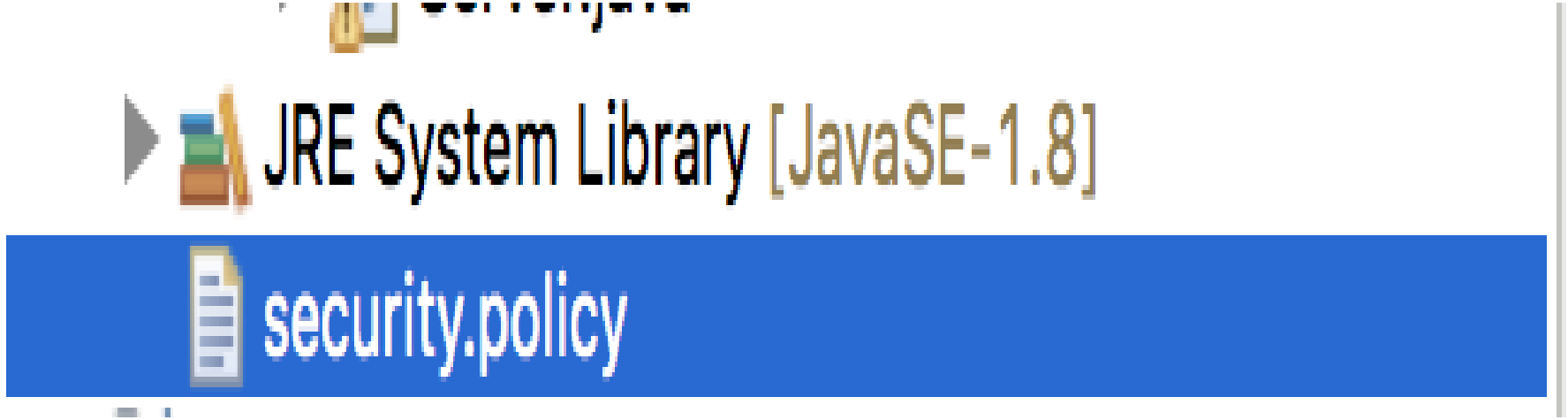


Create a new Security Policy



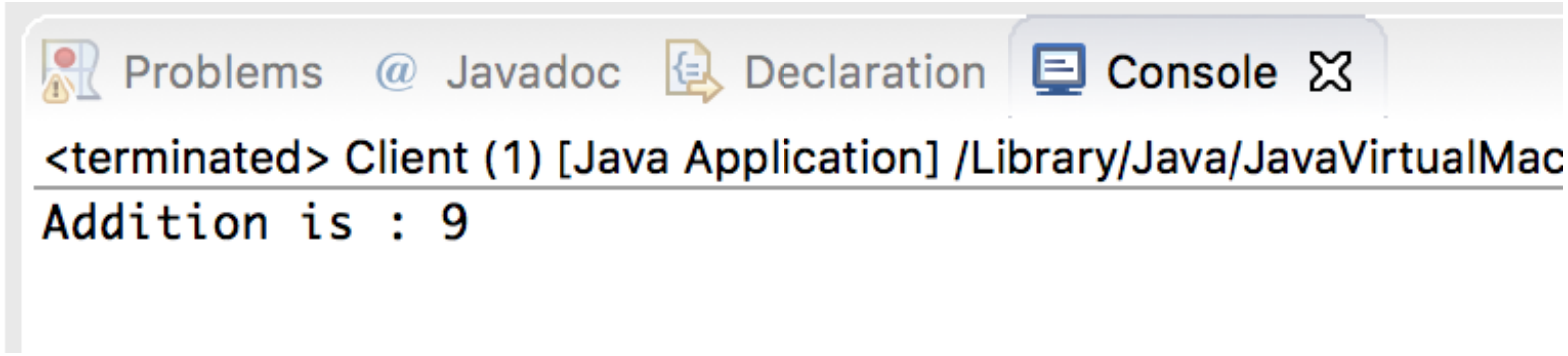
Successful setup of Security Policy

- If successful you will see the following:



Starting New Client

- You may now start the client.
- Output:



Reference Link

1. https://docs.oracle.com/javase/tutorial/rmi/
2. http://java2all.com/technology/rmi/rmi-program/rmi-example
3. https://www.javatpoint.com/RMI