Implementing a Middleware

(RPC)

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Our application is a simple calculator that performs the addition, subtraction, multiplication and division operations remotely and displays the answer at the client end. An RPC middleware is developed for the application with the following functions.

1. Send and receive marshaled and unmarshaled massages to and from the client application and the respective server.
2. Look up a registry to direct the specific operation to the relevant server.
3. Guarantee the delivery by displaying messages in the client terminal and the terminal of the respective server.
4. Ability to serve multiple client requests.

To run the application follow the following steps according to the screenshots provided.

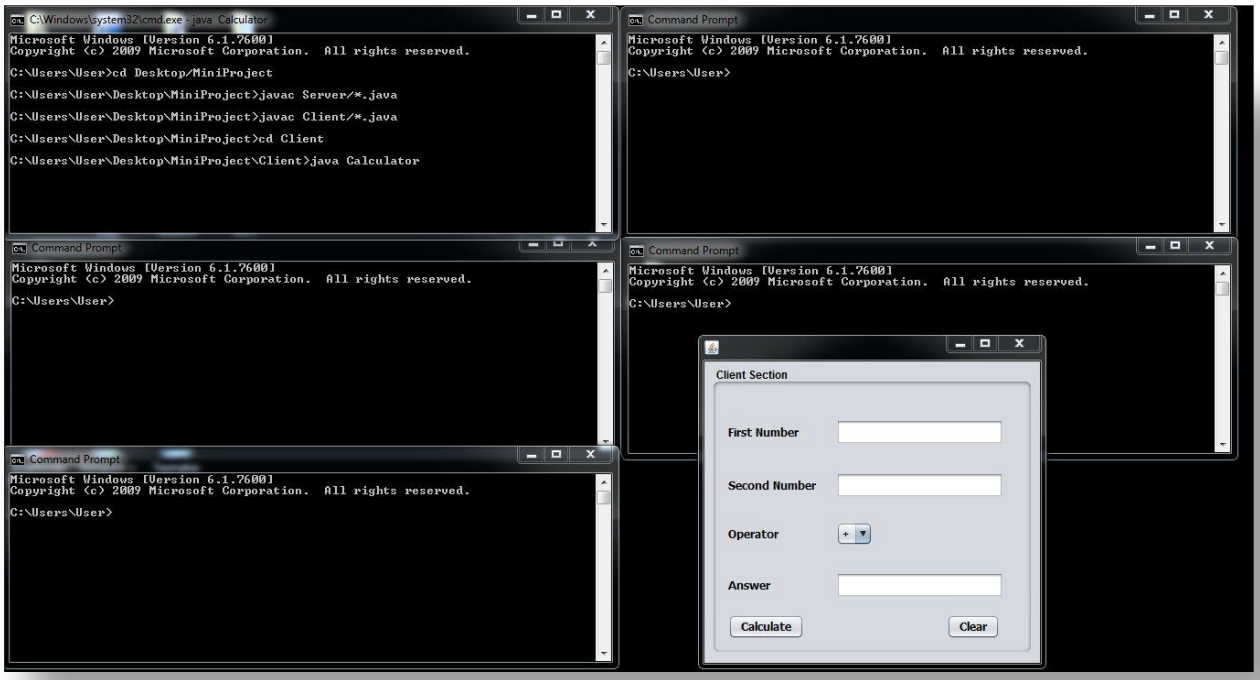


fig.1

1. As shown in figure 1, open up 5 terminals.
2. Assume that the directory containing all the files is in your Desktop with the name MiniProject.
3. Then type **cd Desktop/MiniProject** command as shown in the terminal at the top left corner of figure 1.
4. To compile the client files and the server files, type the next couple of commands as,
   javac Server/*.java and **javac Client/*.java**

5. To run the client application, type **cd Client.**
6. And then type **java Calculator.**
7. The calculator application will start running as shown in the bottom right corner of figure 1.

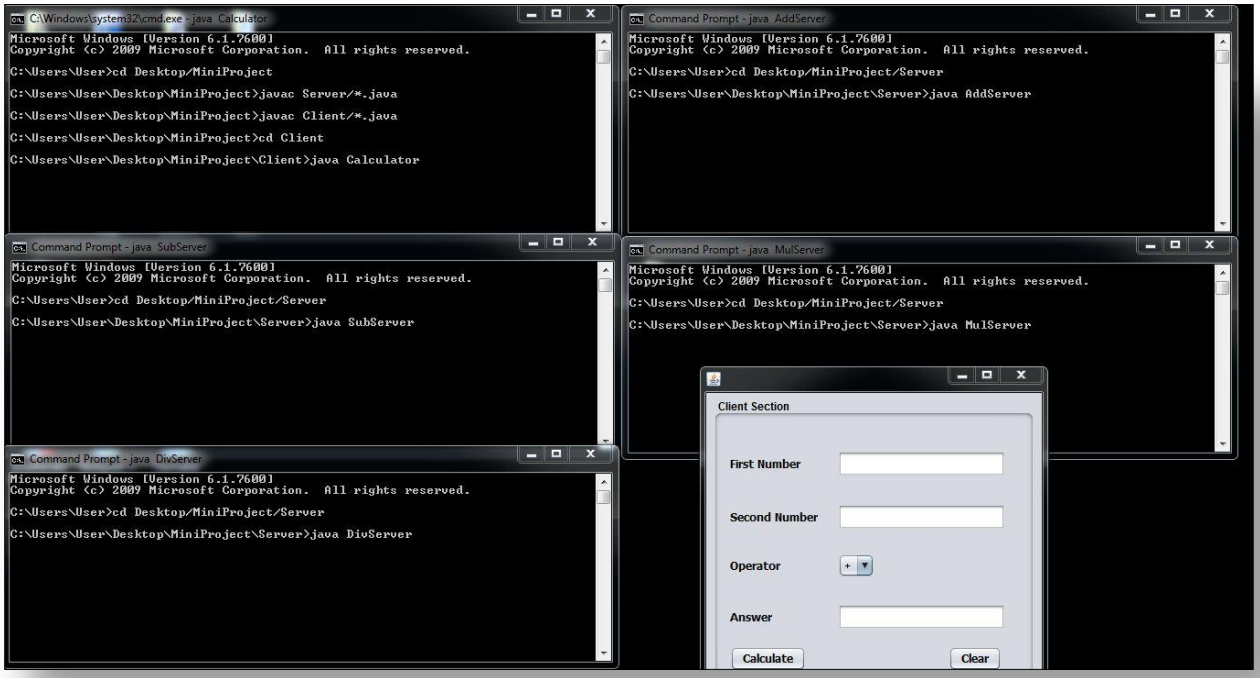


fig.2

8. Then as shown in figure 2, start all the servers in the remaining 4 terminals by typing the following commands.

   (terminal in the top right corner)
   cd Desktop/MiniProject/Server
   java AddServer

   (terminal in the middle towards the left)
   cd Desktop/MiniProject/Server
   java SubServer

   (terminal in the middle towards the right)
   cd Desktop/MiniProject/Server
   java MulServer

(terminal in the bottom left corner)
cd Desktop/MiniProject/Server
java DivServer

9. The servers will now be up and running waiting for client requests.

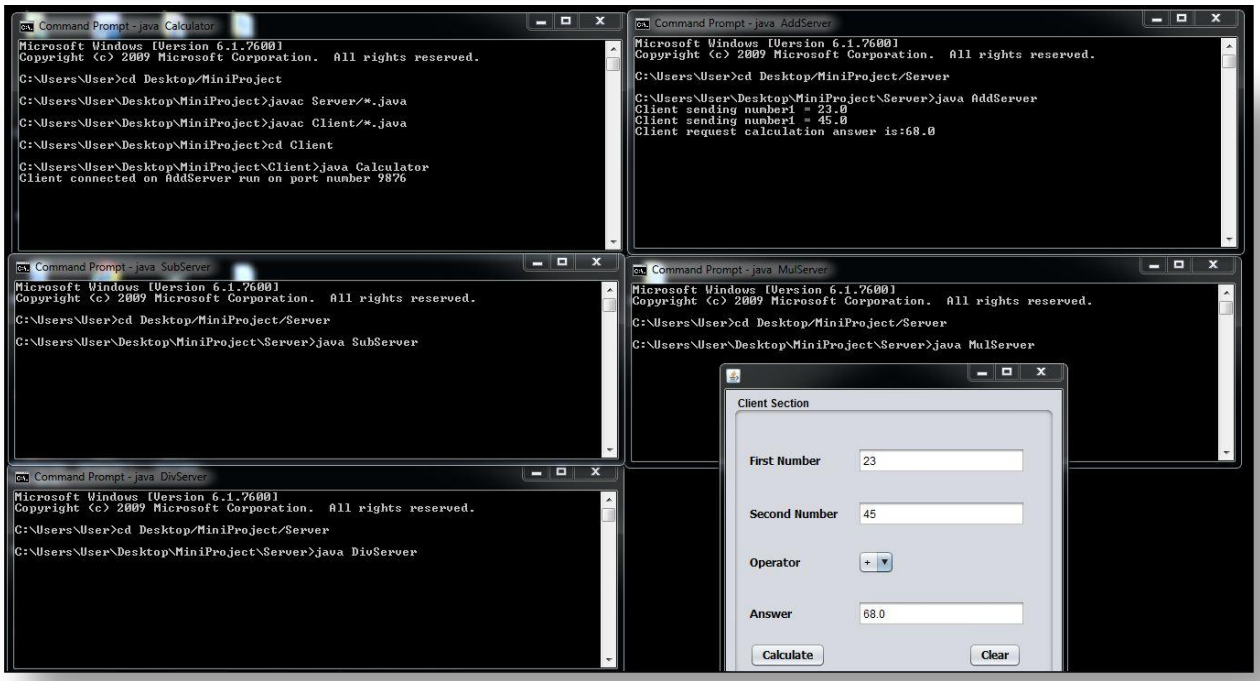


fig.3

10. As shown in figure 3, when you enter 2 numbers and select the add operation to be performed, and press the Calculate button, the parameters entered at the client end can be seen in the terminal of the respective server (AddServer here). And the port to which the client is connected is displayed in the terminal that runs the client. You can press the clear button to reset the input fields.

11. Similarly the other operations can also be performed as shown in the following figures.

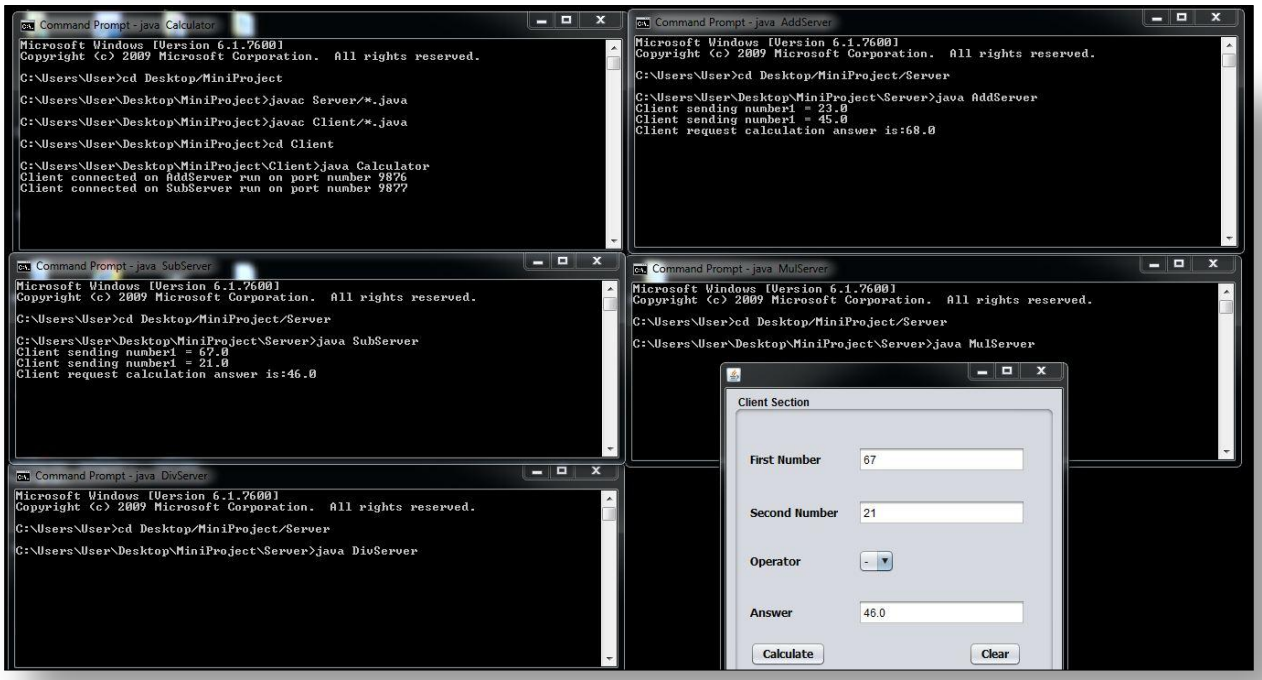

Command Prompt - java Calculator
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject
C:\Users\User\Desktop\MiniProject>javac Server/*.java
C:\Users\User\Desktop\MiniProject>javac Client/*.java
C:\Users\User\Desktop\MiniProject>cd Client
C:\Users\User\Desktop\MiniProject\Client>java Calculator
Client connected on AddServer run on port number 9876
Client connected on SubServer run on port number 9877
Command Prompt - java AddServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java AddServer
Client sending number1 = 23.0
Client sending number1 = 45.0
Client request calculation answer is:68.0
Command Prompt - java SubServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java SubServer
Client sending number1 = 67.0
Client sending number1 = 21.0
Client request calculation answer is:46.0
Command Prompt - java MulServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java MulServer
Command Prompt - java DivServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java DivServer
Client Section
First Number
67
Second Number
21
Operator
-
Answer
46.0
Calculate
Clear

fig.4

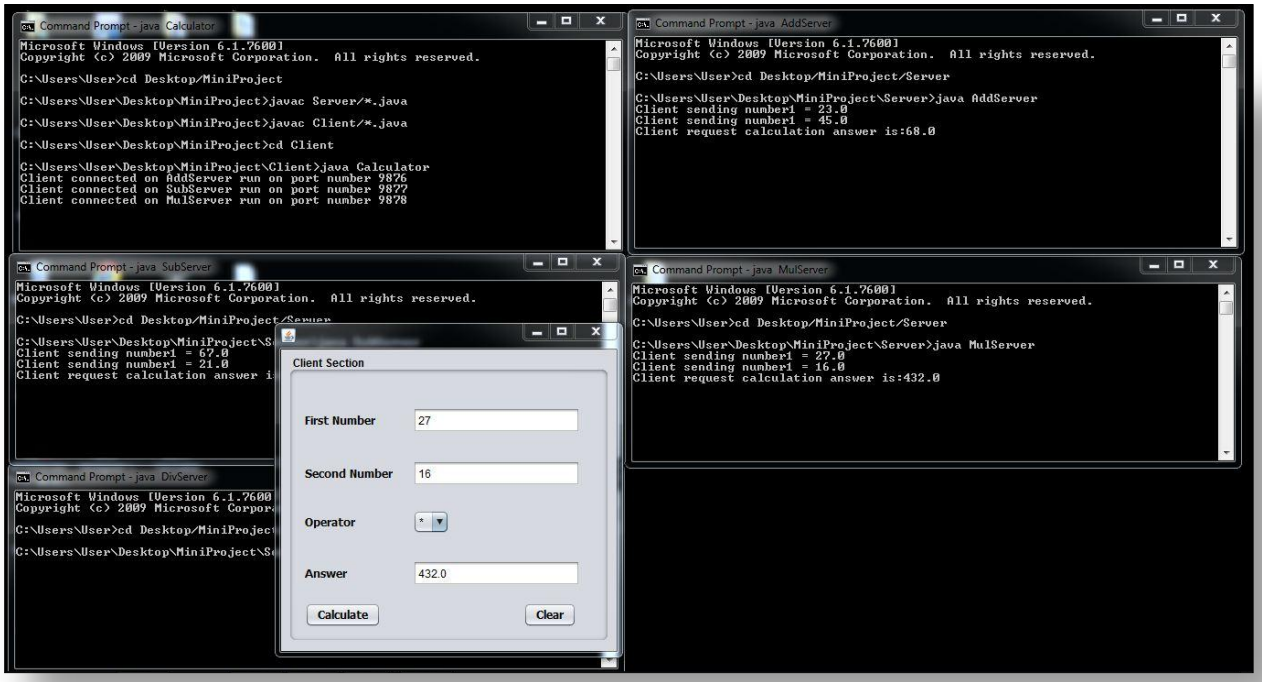
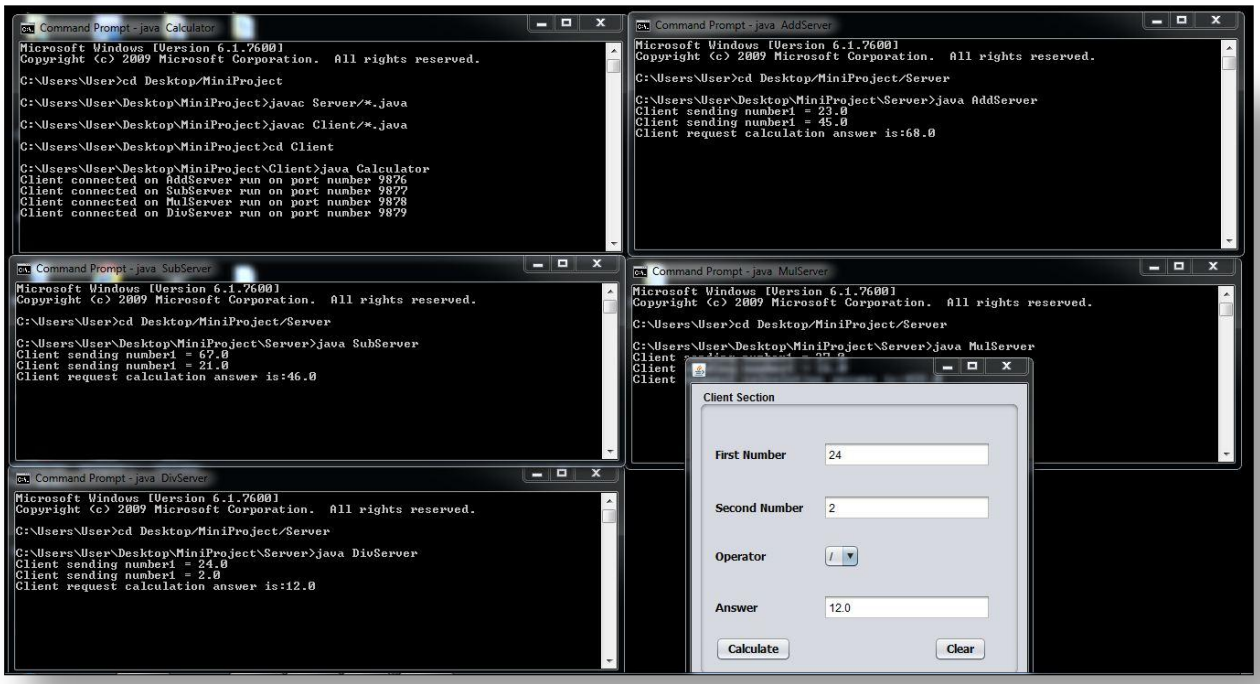

Command Prompt - java Calculator
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject
C:\Users\User\Desktop\MiniProject>javac Server/*.java
C:\Users\User\Desktop\MiniProject>javac Client/*.java
C:\Users\User\Desktop\MiniProject>cd Client
C:\Users\User\Desktop\MiniProject\Client>java Calculator
Client connected on AddServer run on port number 9876
Client connected on SubServer run on port number 9877
Client connected on MulServer run on port number 9878
Command Prompt - java AddServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java AddServer
Client sending number1 = 23.0
Client sending number1 = 45.0
Client request calculation answer is:68.0
Command Prompt - java SubServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
Client sending number1 = 67.0
Client sending number1 = 21.0
Client request calculation answer i
Command Prompt - java MulServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java MulServer
Client sending number1 = 27.0
Client sending number1 = 16.0
Client request calculation answer is:432.0
Command Prompt - java DivServer
Microsoft Windows [Version 6.1.7600
Copyright (c) 2009 Microsoft Corpor
C:\Users\User>cd Desktop/MiniProjec
Client Section
First Number
27
Second Number
16
Operator
*
Answer
432.0
Calculate
Clear

fig.5


Command Prompt - java Calculator
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject
C:\Users\User\Desktop\MiniProject>javac Server/*.java
C:\Users\User\Desktop\MiniProject>javac Client/*.java
C:\Users\User\Desktop\MiniProject>cd Client
C:\Users\User\Desktop\MiniProject\Client>java Calculator
Client connected on AddServer run on port number 9876
Client connected on SubServer run on port number 9877
Client connected on MulServer run on port number 9878
Client connected on DivServer run on port number 9879
Command Prompt - java AddServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java AddServer
Client sending number1 = 23.0
Client sending number1 = 45.0
Client request calculation answer is:68.0
Command Prompt - java SubServer
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Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java SubServer
Client sending number1 = 67.0
Client sending number1 = 21.0
Client request calculation answer is:46.0
Command Prompt - java MulServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java MulServer
Client
Client
Client
Command Prompt - java DivServer
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\User>cd Desktop/MiniProject/Server
C:\Users\User\Desktop\MiniProject\Server>java DivServer
Client sending number1 = 24.0
Client sending number1 = 2.0
Client request calculation answer is:12.0
Client Section
First Number
24
Second Number
2
Operator
/
Answer
12.0
Calculate
Clear

fig.6

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