Network Architecture-1
Project-2

Fall 2016

Submitted by:

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1. Introduction

In this project, we are developing a simple Chat application by using TCP Client and Server. By using resources in GENI, we have connected several clients to single server. In Question a, we created a chat server that accepts a single client connection and displays messages from the client and the connection get terminated from both sides when the client types 'exit'. In Question b, when one client terminates, the server remains open for the other client's that wish to communicate. In Question c, the server will be able to handle multiple clients at a time and the server window displays the messages from the clients. In Question d, the server even echoes the messages from a client to all the remaining clients in the network.

2. About GENI and Putty

We need to first create a GENI account and a slice where we can reserve our resources on which we can work.

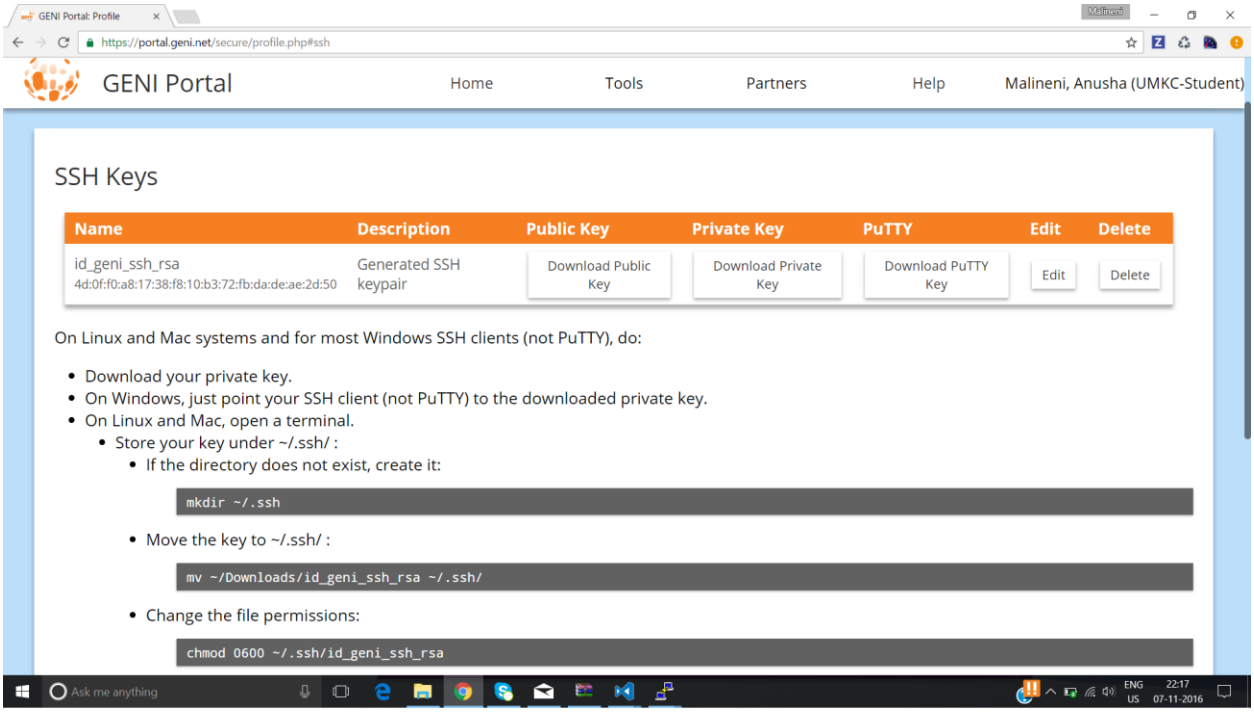
GENI Account Creation:

GENI provides a virtual laboratory for networking and distributed systems research and education.

1. Login to portal.geni.net
2. Activate the GENI account with the required credentials.
3. Download the SSH keys (Putty) for authentication process.
4. Using the Putty key generator, generate a private key which will be used to open the Client and Server windows.

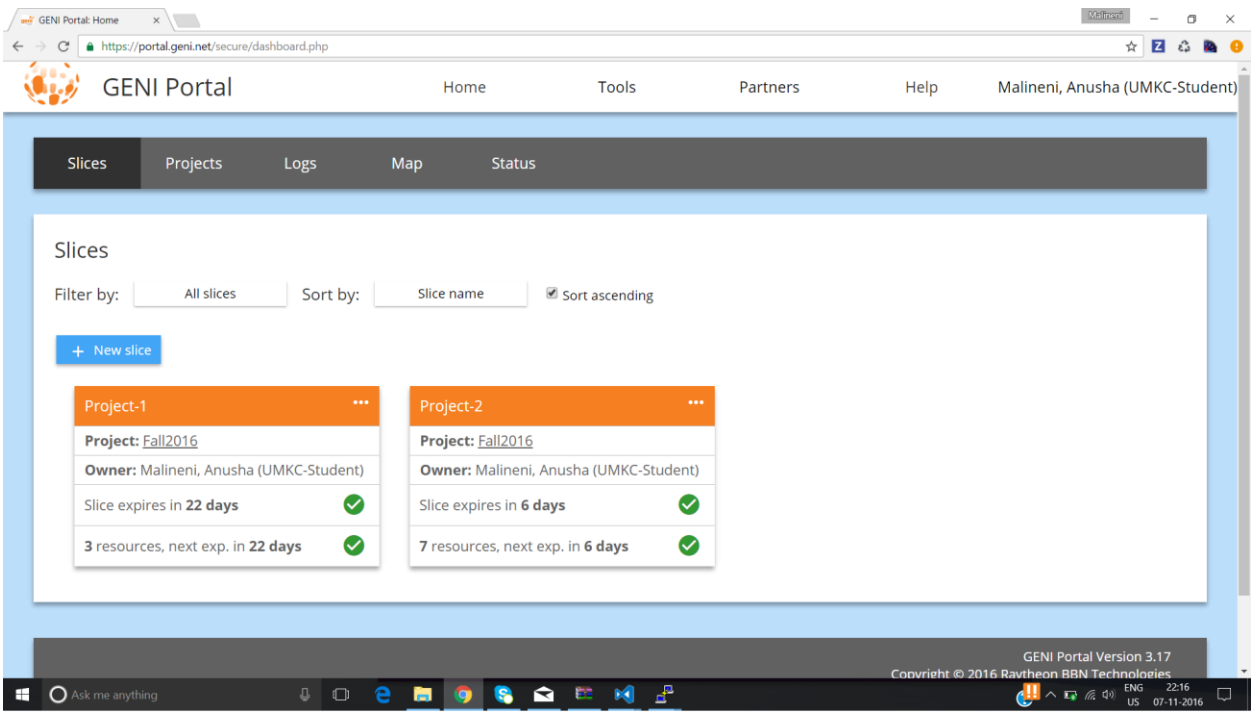
Steps involved:

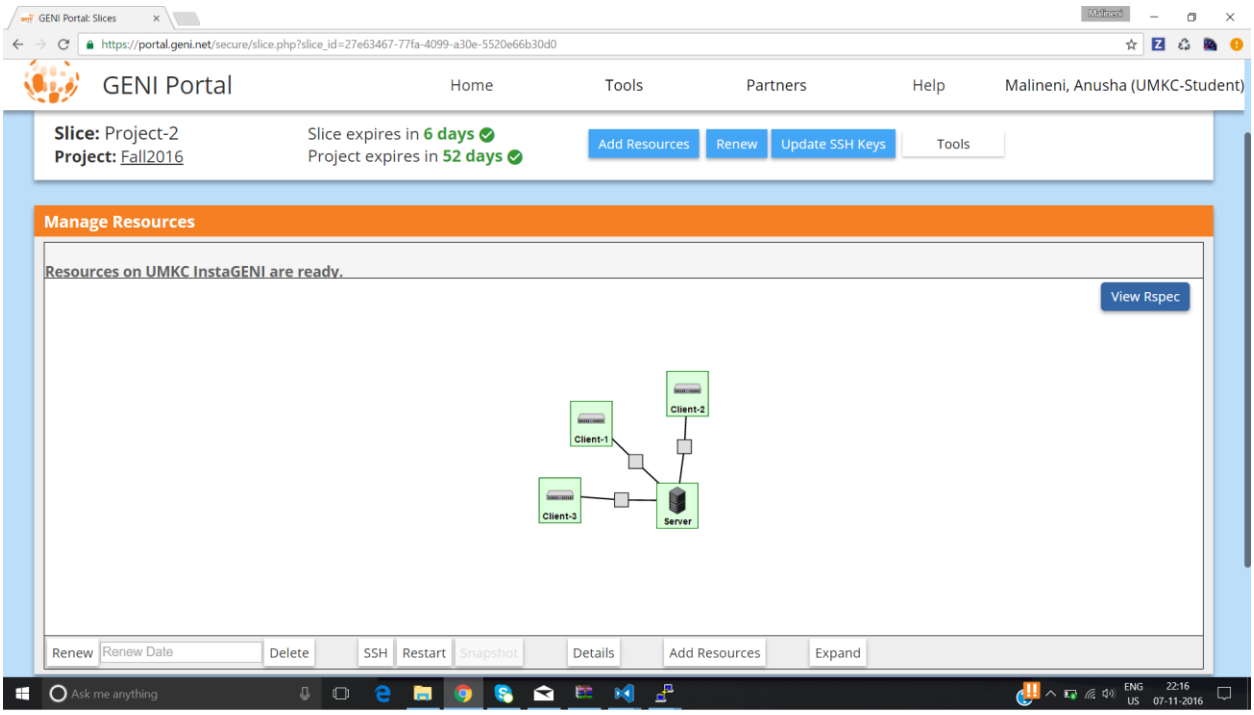
Step 1:
After logging in to GENI Portal, we have downloaded the SSH keypairs for authentication purposes.



Step 2:

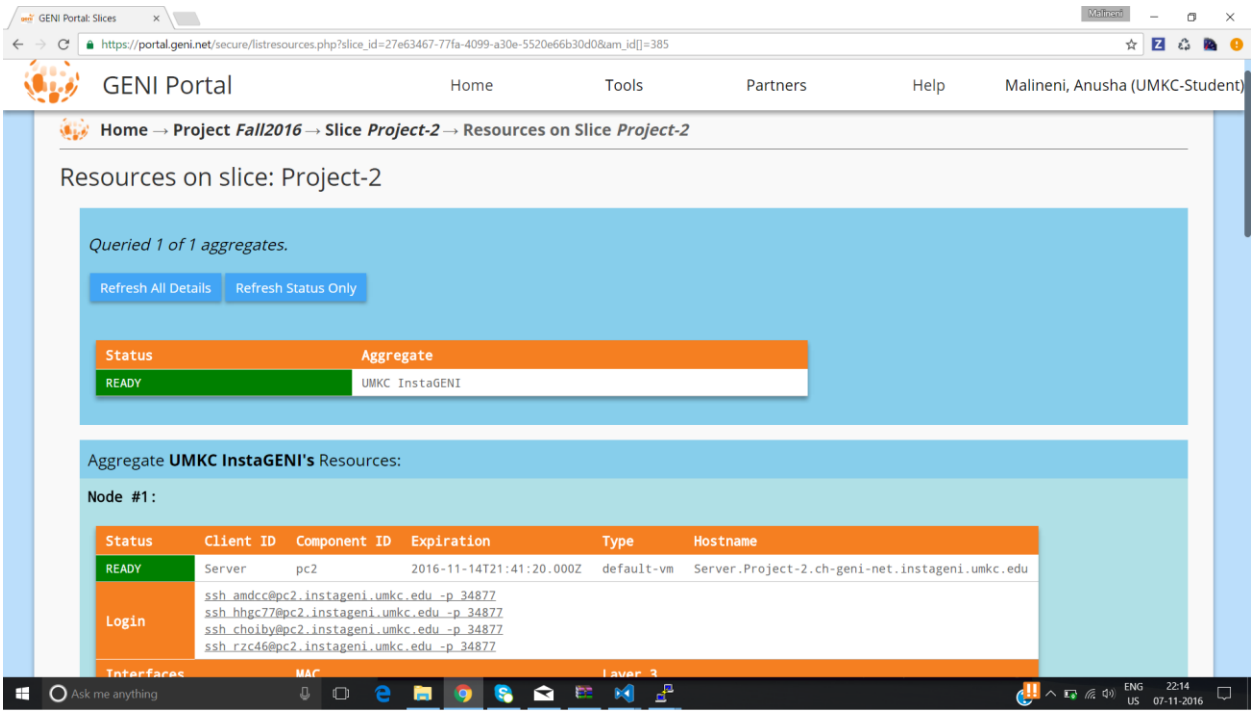
Created a slice “Project-2” and added four resources i,'e four VM’s. One of the VMs acts as server and the remaining three will act as clients. In the next step, I’ve established connection between these four resources.

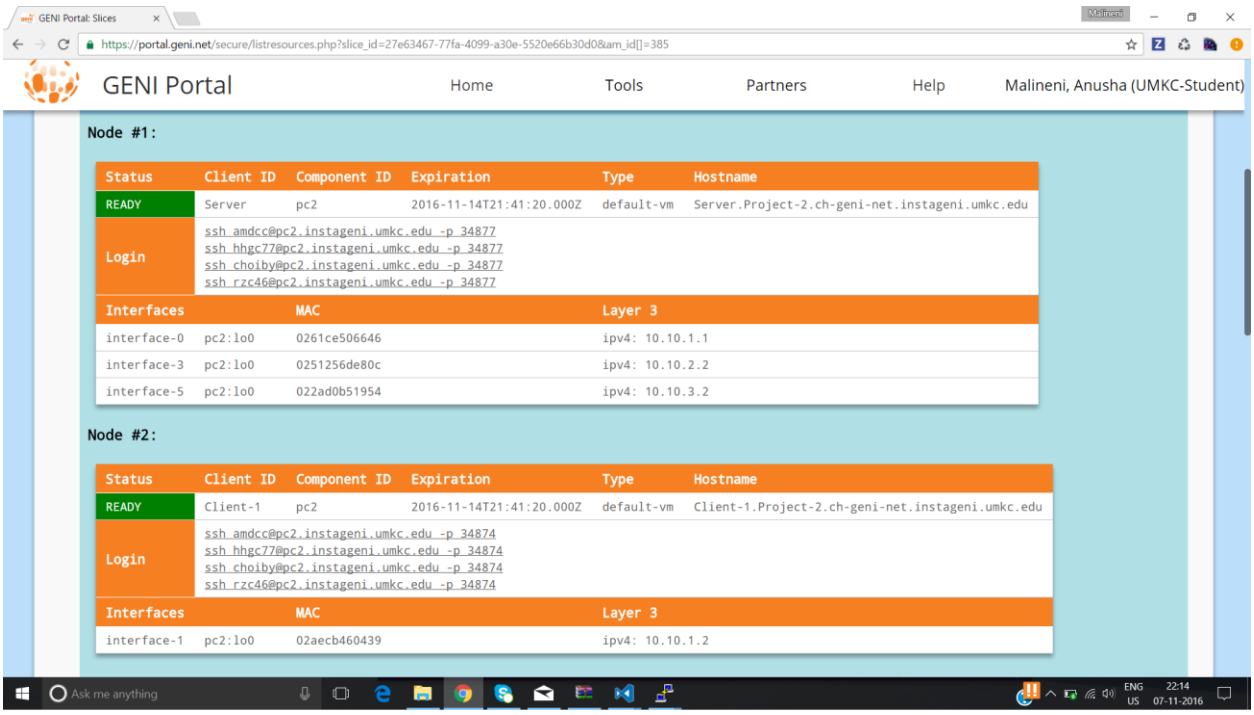




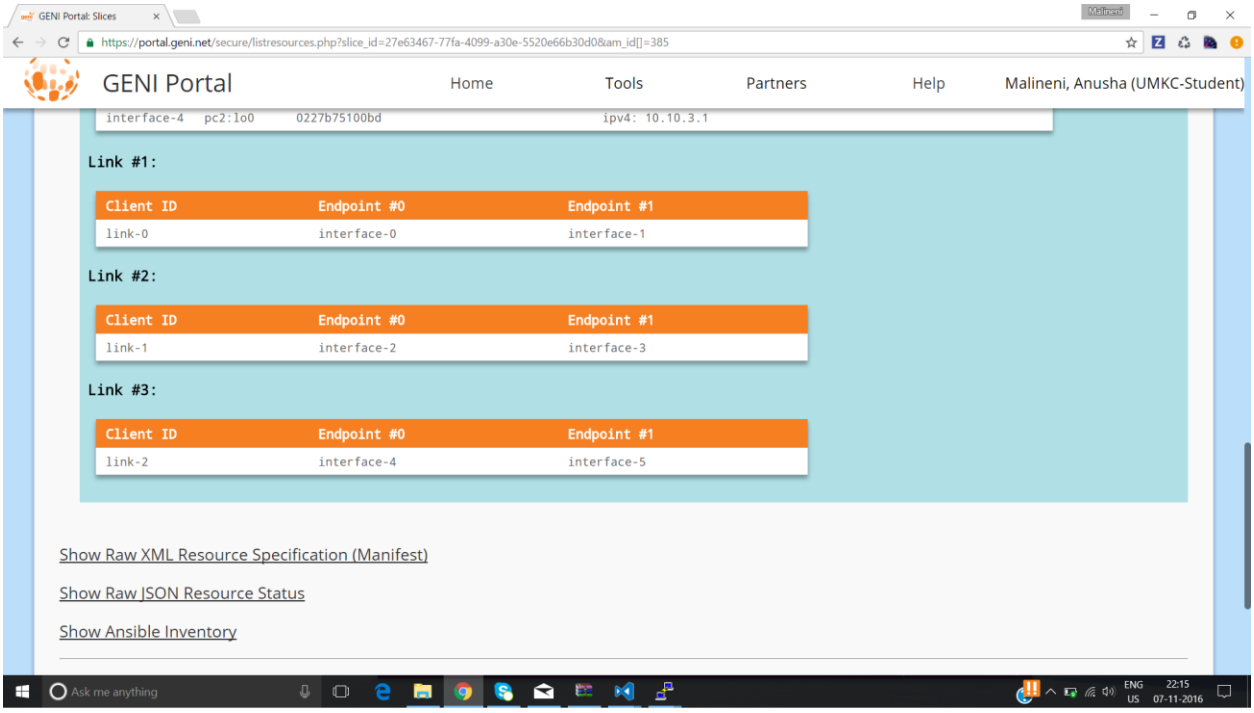
Step 3:

After selecting the resources and establishing connection between them, resources will be allocated to the slice and status of these resources will change to 'Ready'.



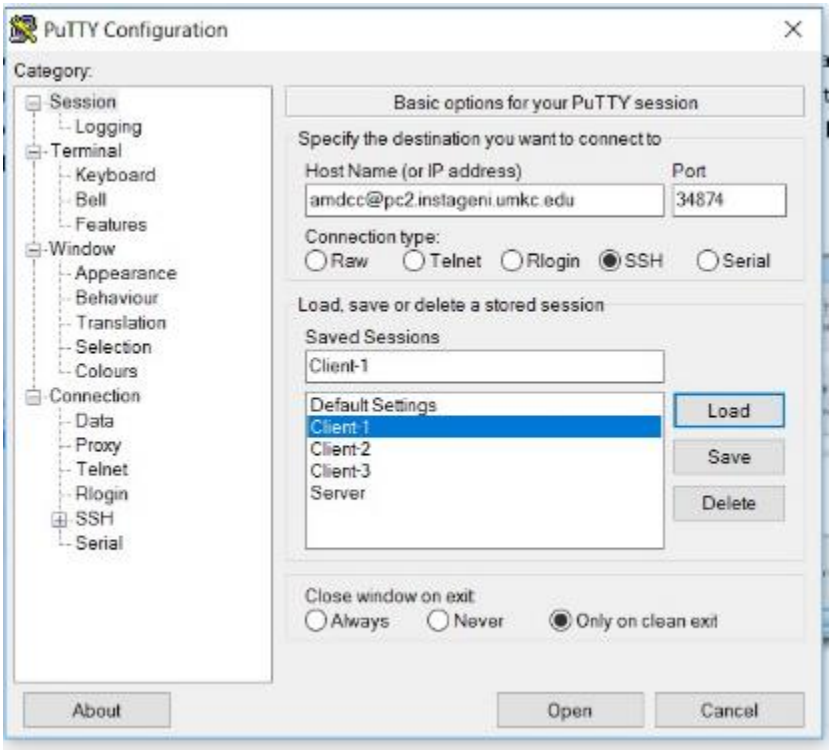

GENI Portal: Slices
https://portal.geni.net/secure/listresources.php?slice_id=27e63467-77fa-4099-a30e-5520e66b30d0&am_id[]=385
GENI Portal
Home
Tools
Partners
Help
Malineni, Anusha (UMKC-Student)
Node #1:
Status Client ID Component ID Expiration Type Hostname
READY Server pc2 2016-11-14T21:41:20.000Z default-vm Server.Project-2.ch-geni-net.instageni.umkc.edu
Login
ssh amdcc@pc2.instageni.umkc.edu -p 34877
ssh hhgc77@pc2.instageni.umkc.edu -p 34877
ssh choiby@pc2.instageni.umkc.edu -p 34877
ssh rzc46@pc2.instageni.umkc.edu -p 34877
Interfaces MAC Layer 3
interface-0 pc2:lo0 0261ce506646 ipv4: 10.10.1.1
interface-3 pc2:lo0 0251256de80c ipv4: 10.10.2.2
interface-5 pc2:lo0 022ad0b51954 ipv4: 10.10.3.2
Node #2:
Status Client ID Component ID Expiration Type Hostname
READY Client-1 pc2 2016-11-14T21:41:20.000Z default-vm Client-1.Project-2.ch-geni-net.instageni.umkc.edu
Login
ssh amdcc@pc2.instageni.umkc.edu -p 34874
ssh hhgc77@pc2.instageni.umkc.edu -p 34874
ssh choiby@pc2.instageni.umkc.edu -p 34874
ssh rzc46@pc2.instageni.umkc.edu -p 34874
Interfaces MAC Layer 3
interface-1 pc2:lo0 02aecb460439 ipv4: 10.10.1.2
Ask me anything
ENG US 22:14 07-11-2016

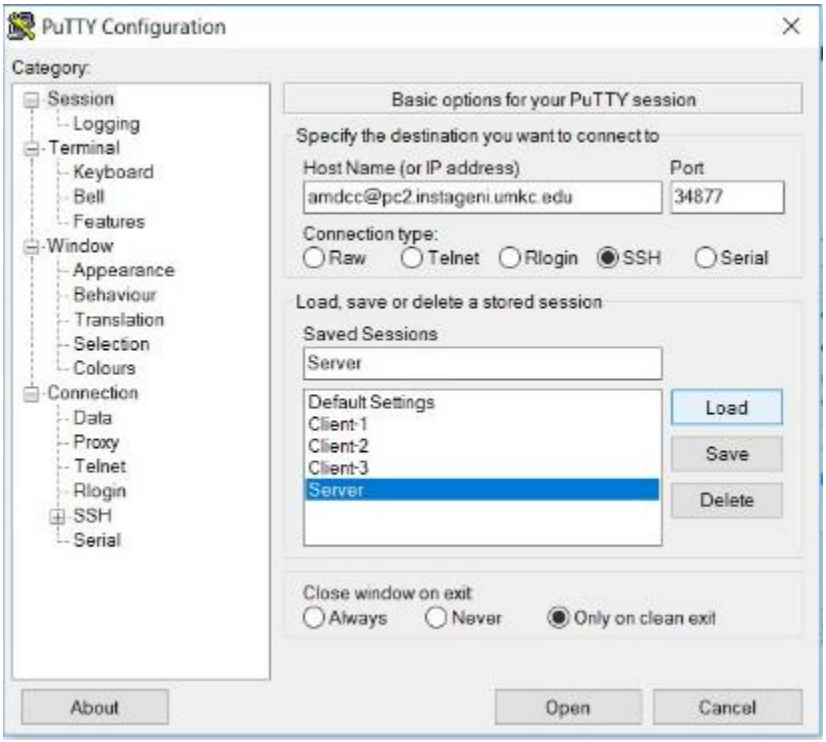

GENI Portal: Slices
https://portal.geni.net/secure/listresources.php?slice_id=27e63467-77fa-4099-a30e-5520e66b30d0&am_id[]=385
GENI Portal
Home
Tools
Partners
Help
Malineni, Anusha (UMKC-Student)
interface-1 pc2:lo0 02aecb460439 ipv4: 10.10.1.2
Node #3:
Status Client ID Component ID Expiration Type Hostname
READY Client-2 pc2 2016-11-14T21:41:20.000Z default-vm Client-2.Project-2.ch-geni-net.instageni.umkc.edu
Login
ssh amdcc@pc2.instageni.umkc.edu -p 34875
ssh hhgc77@pc2.instageni.umkc.edu -p 34875
ssh choiby@pc2.instageni.umkc.edu -p 34875
ssh rzc46@pc2.instageni.umkc.edu -p 34875
Interfaces MAC Layer 3
interface-2 pc2:lo0 02160794826e ipv4: 10.10.2.1
Node #4:
Status Client ID Component ID Expiration Type Hostname
READY Client-3 pc2 2016-11-14T21:41:20.000Z default-vm Client-3.Project-2.ch-geni-net.instageni.umkc.edu
Login
ssh amdcc@pc2.instageni.umkc.edu -p 34876
ssh hhgc77@pc2.instageni.umkc.edu -p 34876
ssh choiby@pc2.instageni.umkc.edu -p 34876
ssh rzc46@pc2.instageni.umkc.edu -p 34876
Interfaces MAC Layer 3
interface-4 pc2:lo0 0227b75100bd ipv4: 10.10.3.1
Link #1:
Ask me anything
ENG US 22:15 07-11-2016



Step 4:

By using putty, we need to load all the clients and servers.





3. Project Description

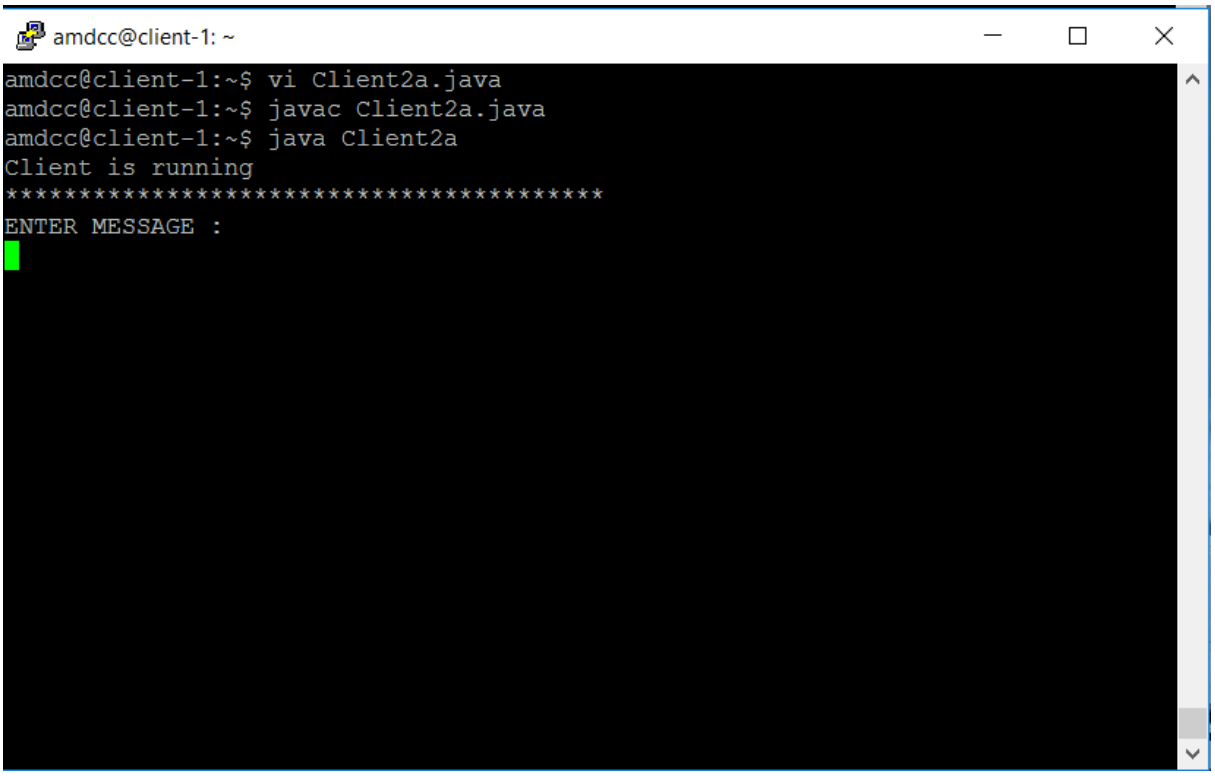
Need to develop a simple chat program (like google hangout and skype chat).

3.1 Question a:

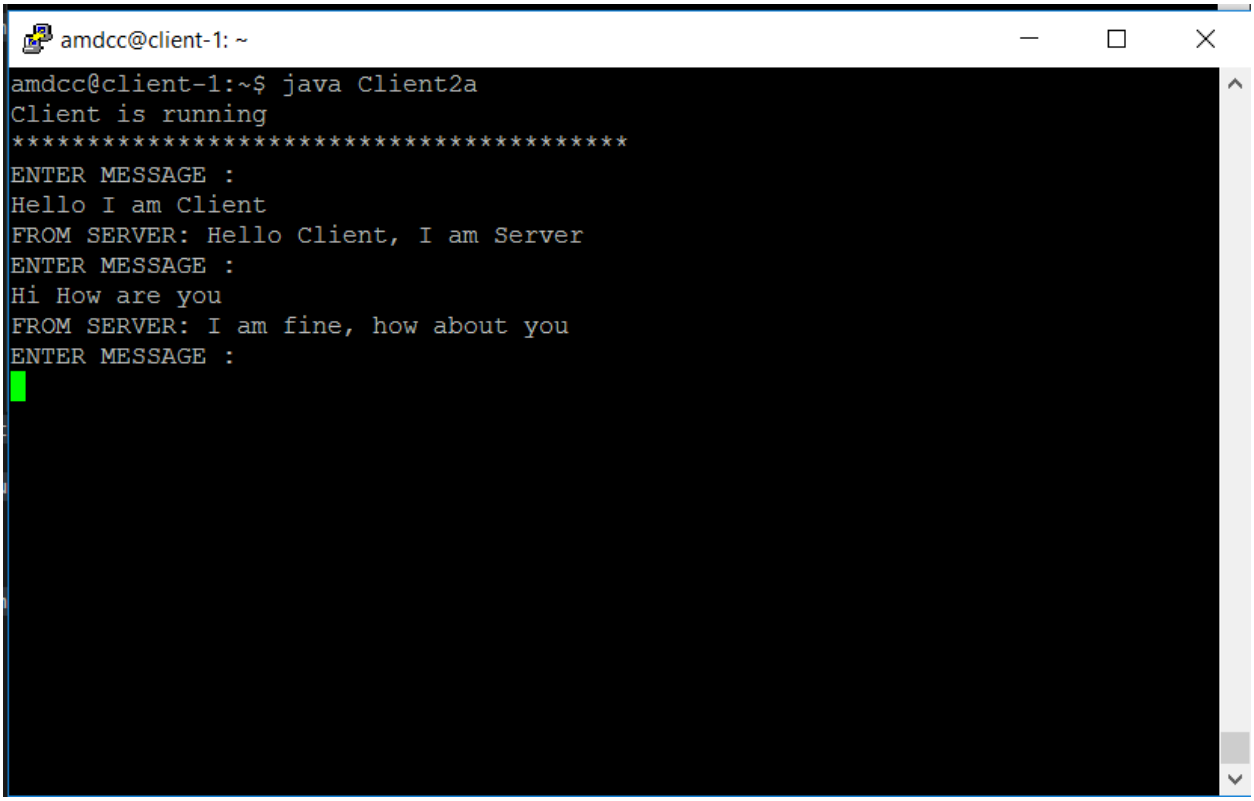
A chat server will accept a single client connection and display everything the client types. If the client user types 'exit', both client and server will end the program.

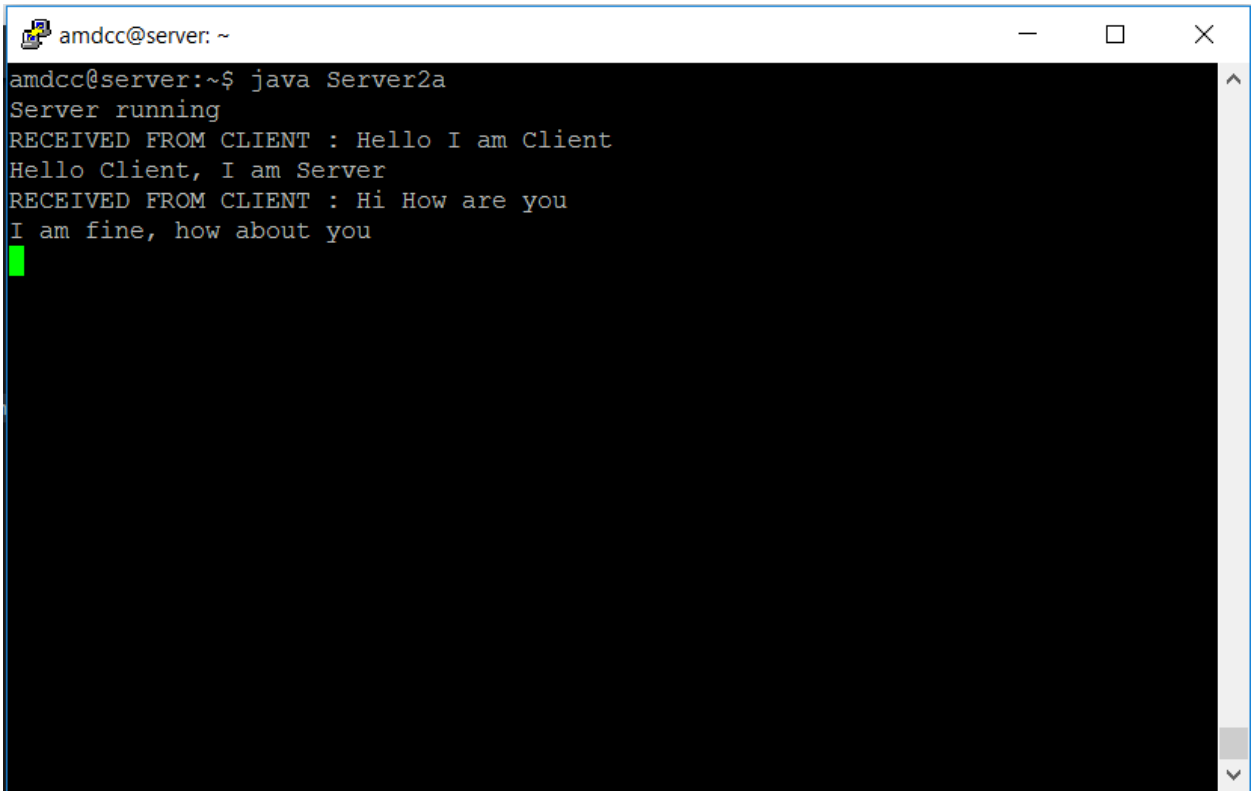
Solution:

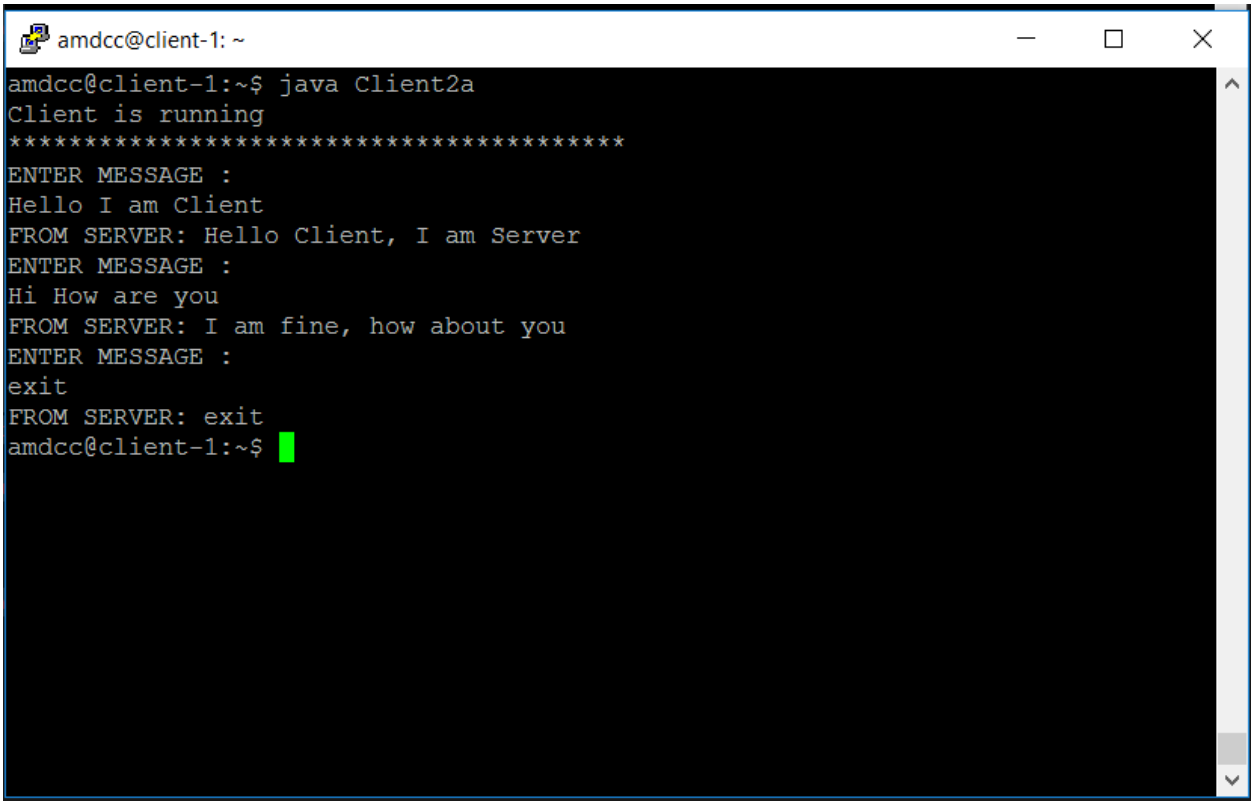
Client and server java programs were loaded to client and server respectively. After compiling and running those programs both client and server will run.

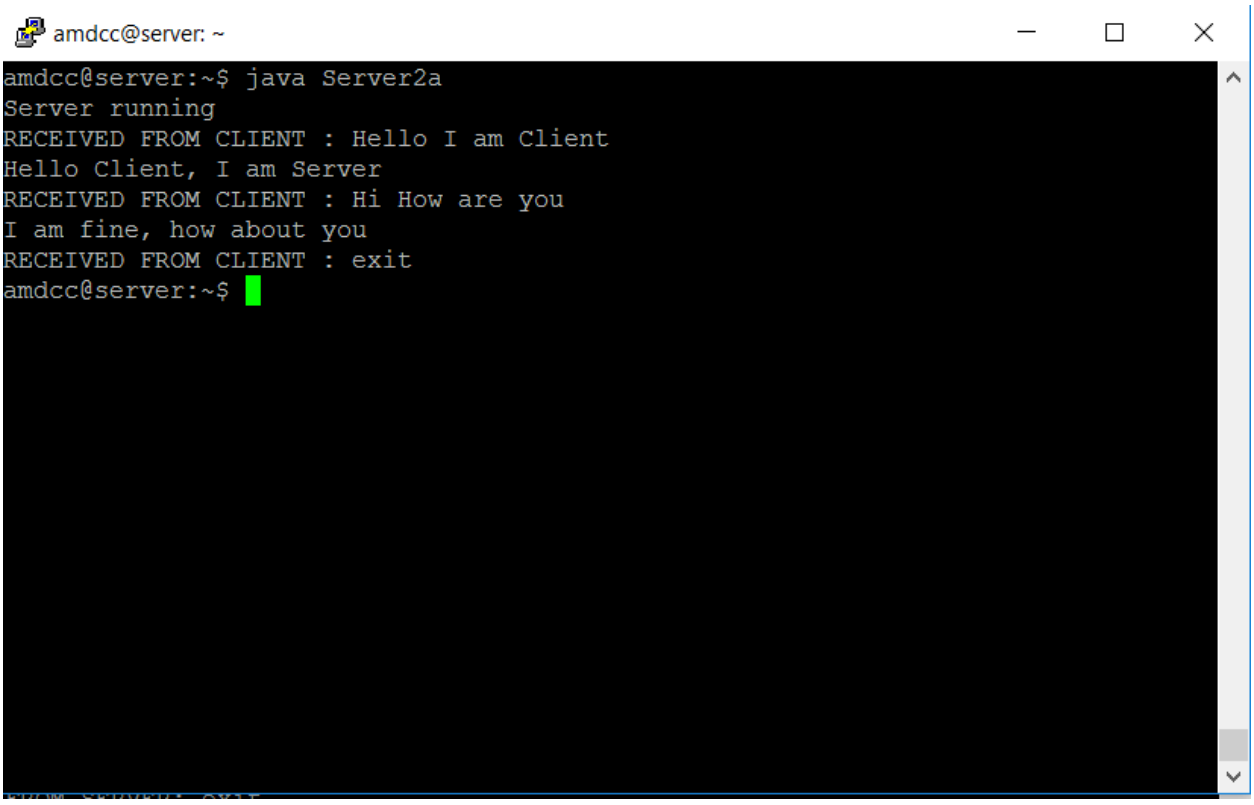


Both client and server can communicate with each other through messages. This connection will stay till client sends 'exit'. Once client sends 'exit' connection between client and server will get terminated. Both client and server connections will get terminated.


amdcc@client-1: ~
amdcc@client-1:~$ java Client2a
Client is running
****
ENTER MESSAGE :
Hello I am Client
FROM SERVER: Hello Client, I am Server
ENTER MESSAGE :
Hi How are you
FROM SERVER: I am fine, how about you
ENTER MESSAGE :


amdcc@server: ~
amdcc@server:~$ java Server2a
Server running
RECEIVED FROM CLIENT : Hello I am Client
Hello Client, I am Server
RECEIVED FROM CLIENT : Hi How are you
I am fine, how about you


amdcc@client-1: ~
amdcc@client-1:~$ java Client2a
Client is running
****
ENTER MESSAGE :
Hello I am Client
FROM SERVER: Hello Client, I am Server
ENTER MESSAGE :
Hi How are you
FROM SERVER: I am fine, how about you
ENTER MESSAGE :
exit
FROM SERVER: exit
amdcc@client-1:~$

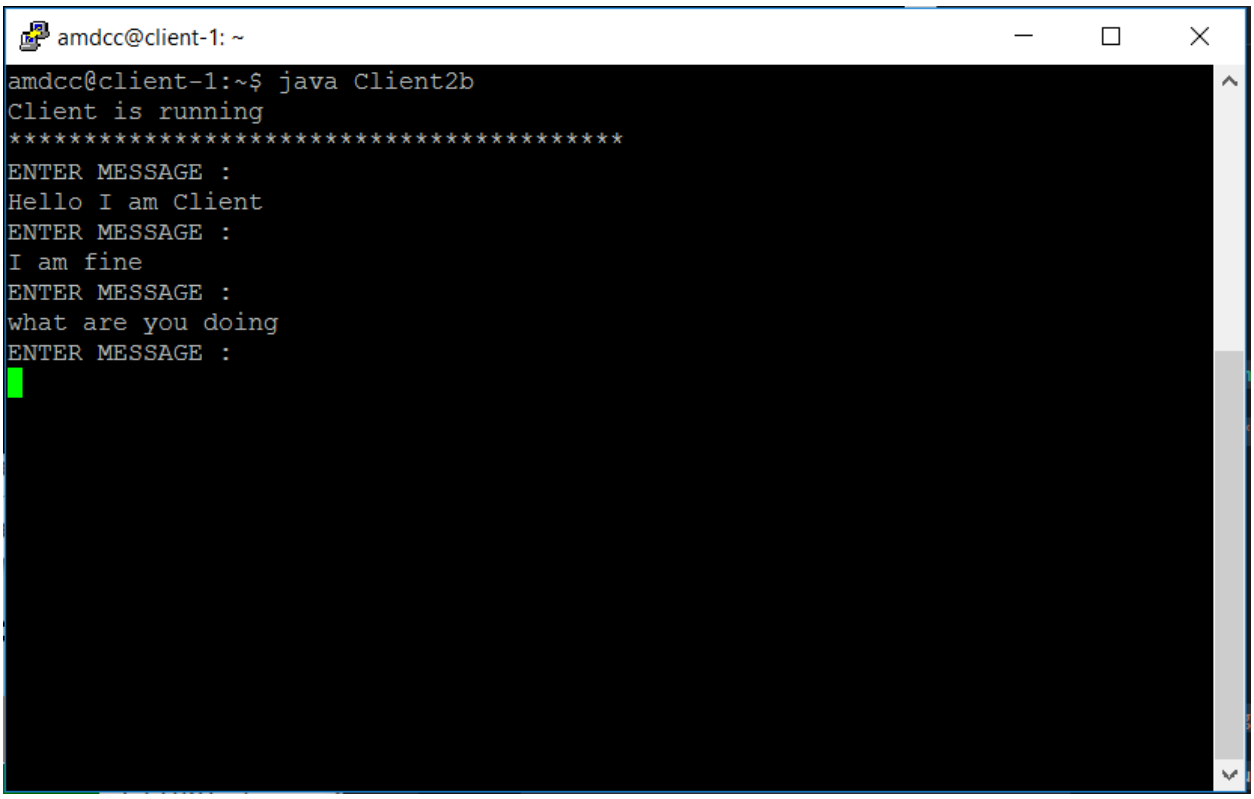

amdcc@server: ~
amdcc@server:~$ java Server2a
Server running
RECEIVED FROM CLIENT : Hello I am Client
Hello Client, I am Server
RECEIVED FROM CLIENT : Hi How are you
I am fine, how about you
RECEIVED FROM CLIENT : exit
amdcc@server:~$

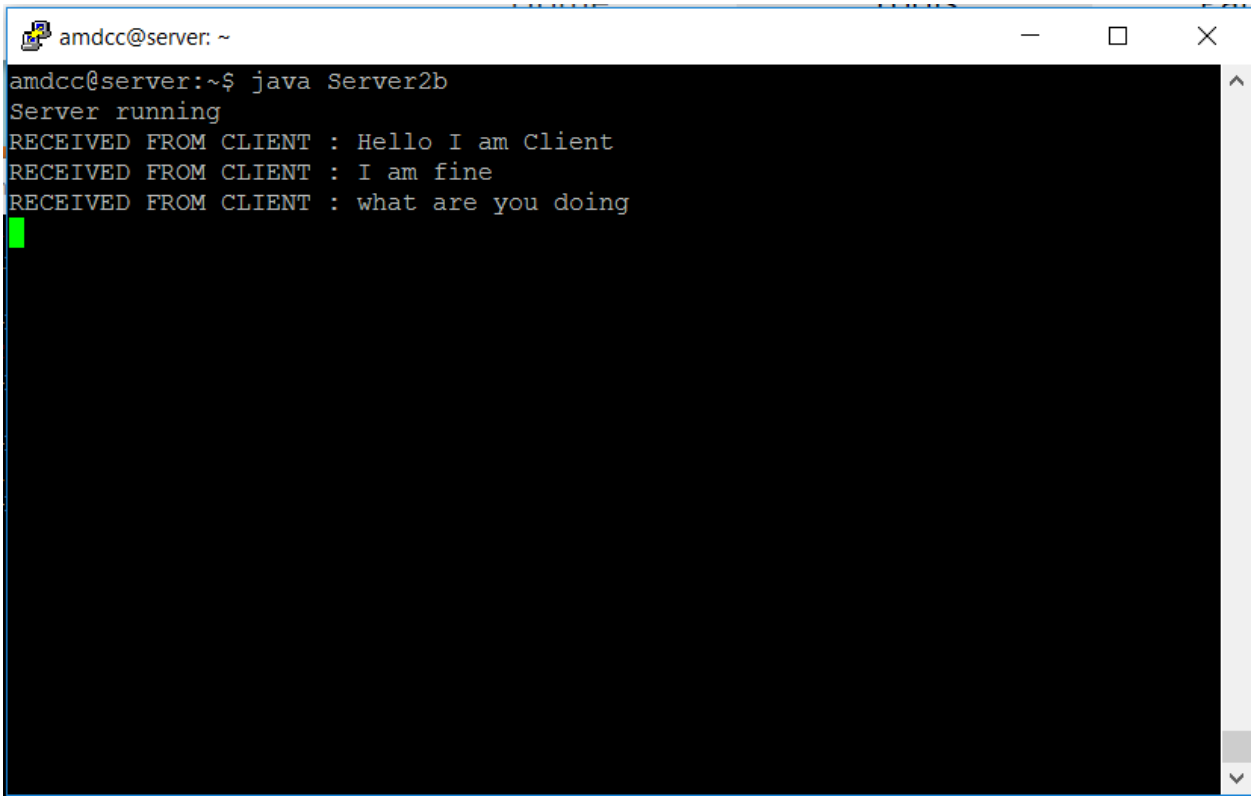
3.2 Question-b:

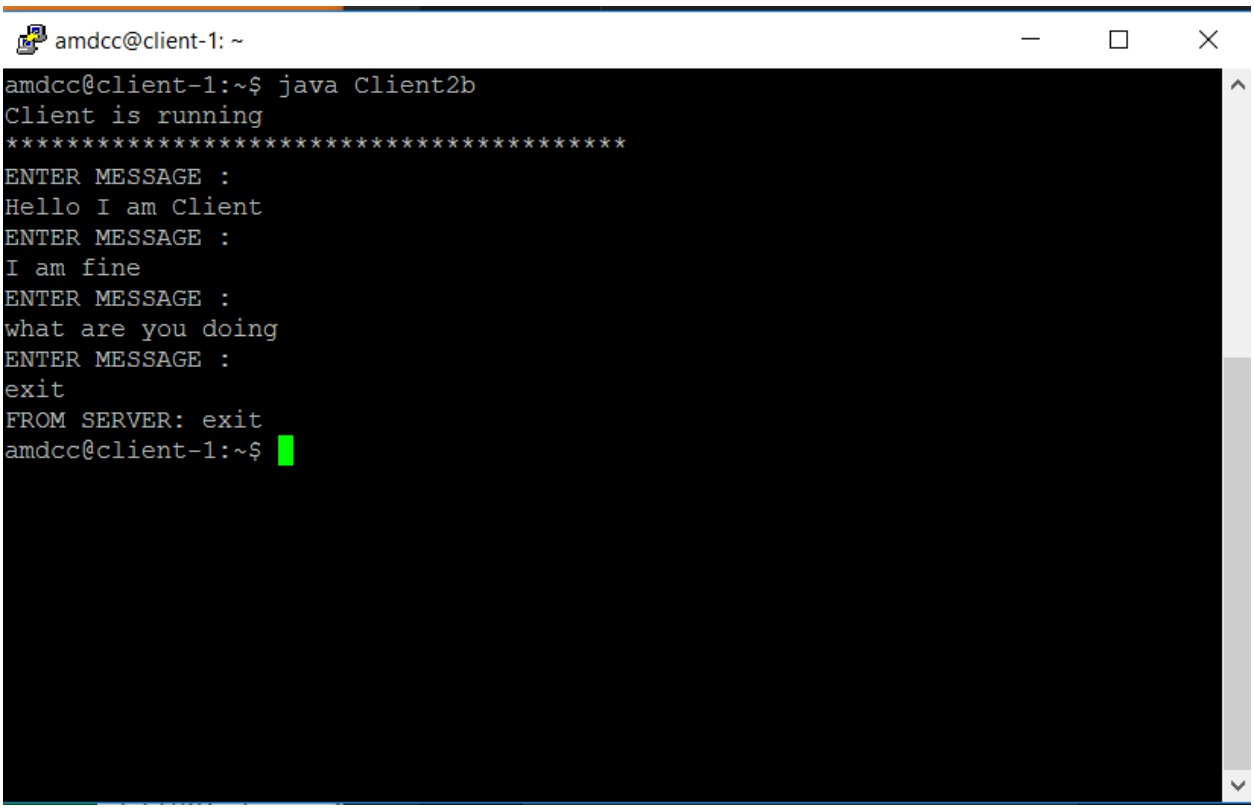
A server now remains 'open' for additional connection once a client quits. The server can handle at most one connection at a time.

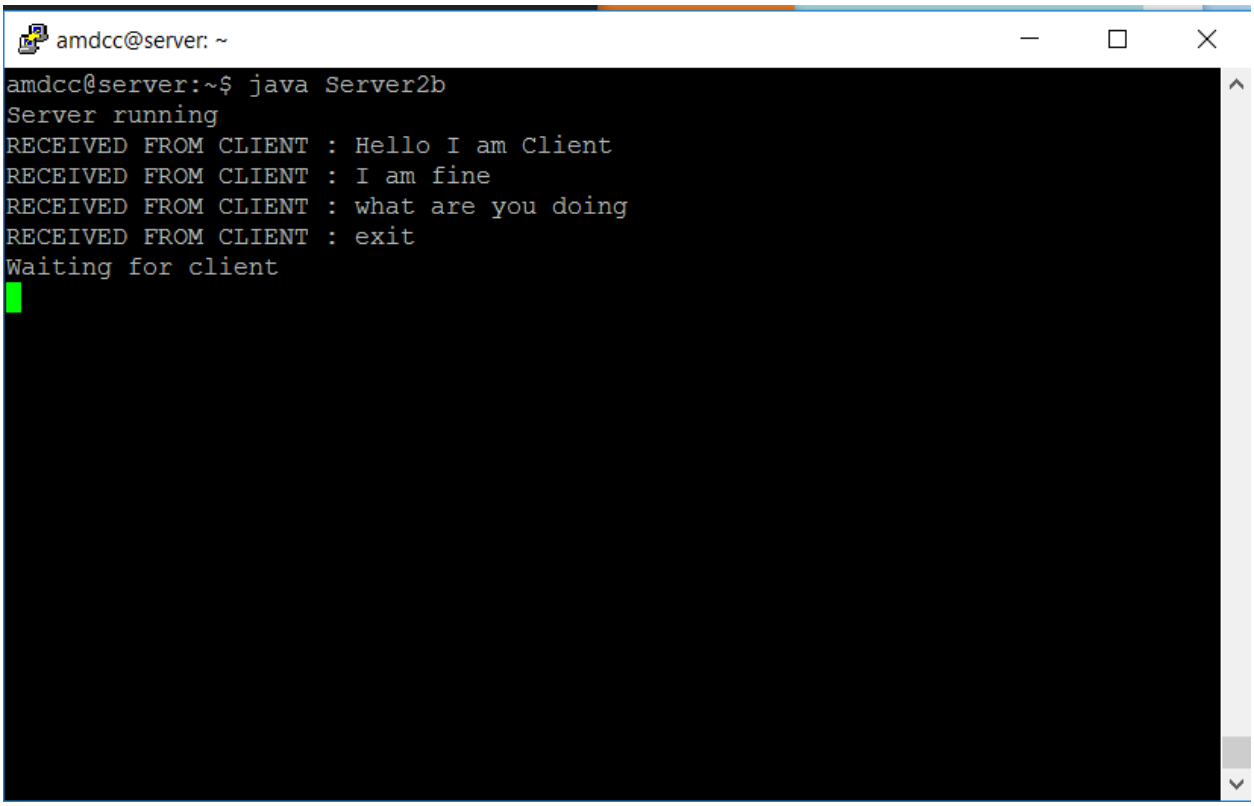
Solution:

For the question b, client and server java programs were loaded to client and server. Both client and server can communicate with each other through messages. Once client sends 'exit', connection of the client will be terminated and server connection will wait for next client to connect.




amdcc@server: ~
amdcc@server:~$ java Server2b
Server running
RECEIVED FROM CLIENT : Hello I am Client
RECEIVED FROM CLIENT : I am fine
RECEIVED FROM CLIENT : what are you doing


amdcc@client-1: ~
amdcc@client-1:~$ java Client2b
Client is running
****
ENTER MESSAGE :
Hello I am Client
ENTER MESSAGE :
I am fine
ENTER MESSAGE :
what are you doing
ENTER MESSAGE :
exit
FROM SERVER: exit
amdcc@client-1:~$

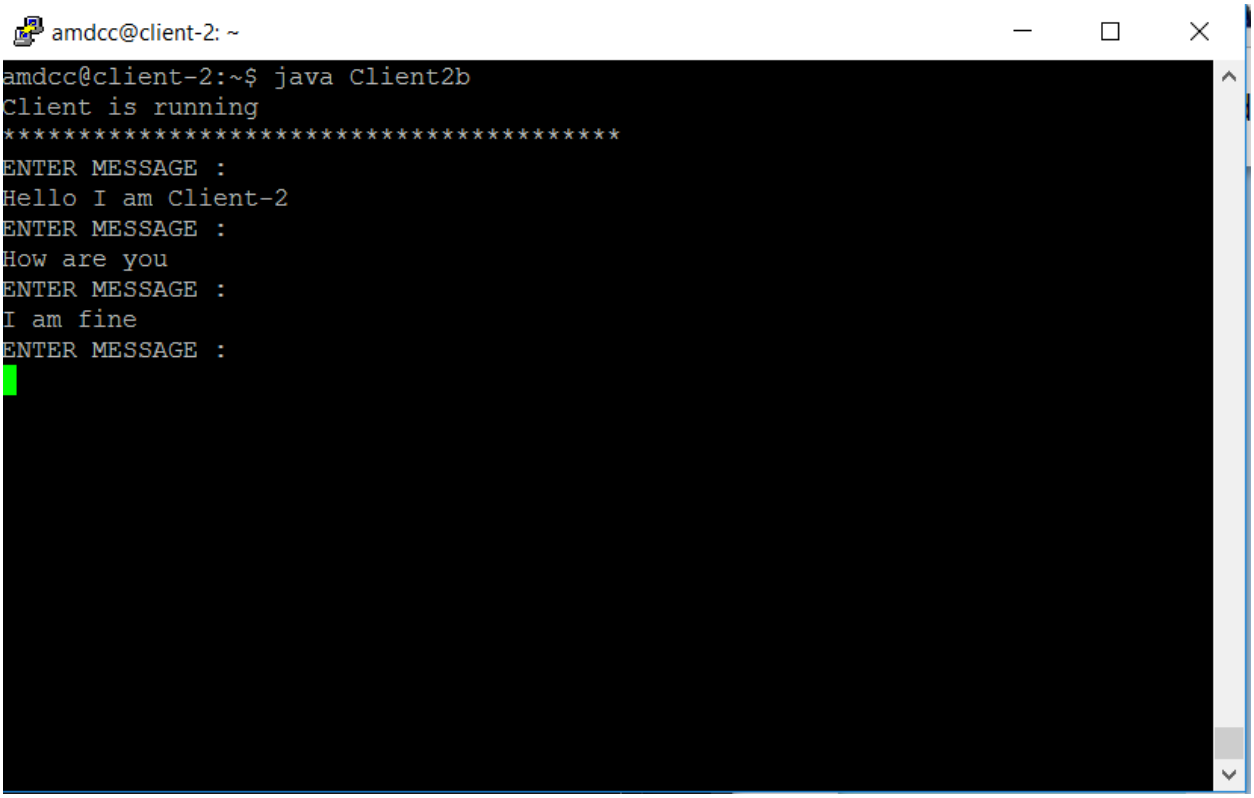


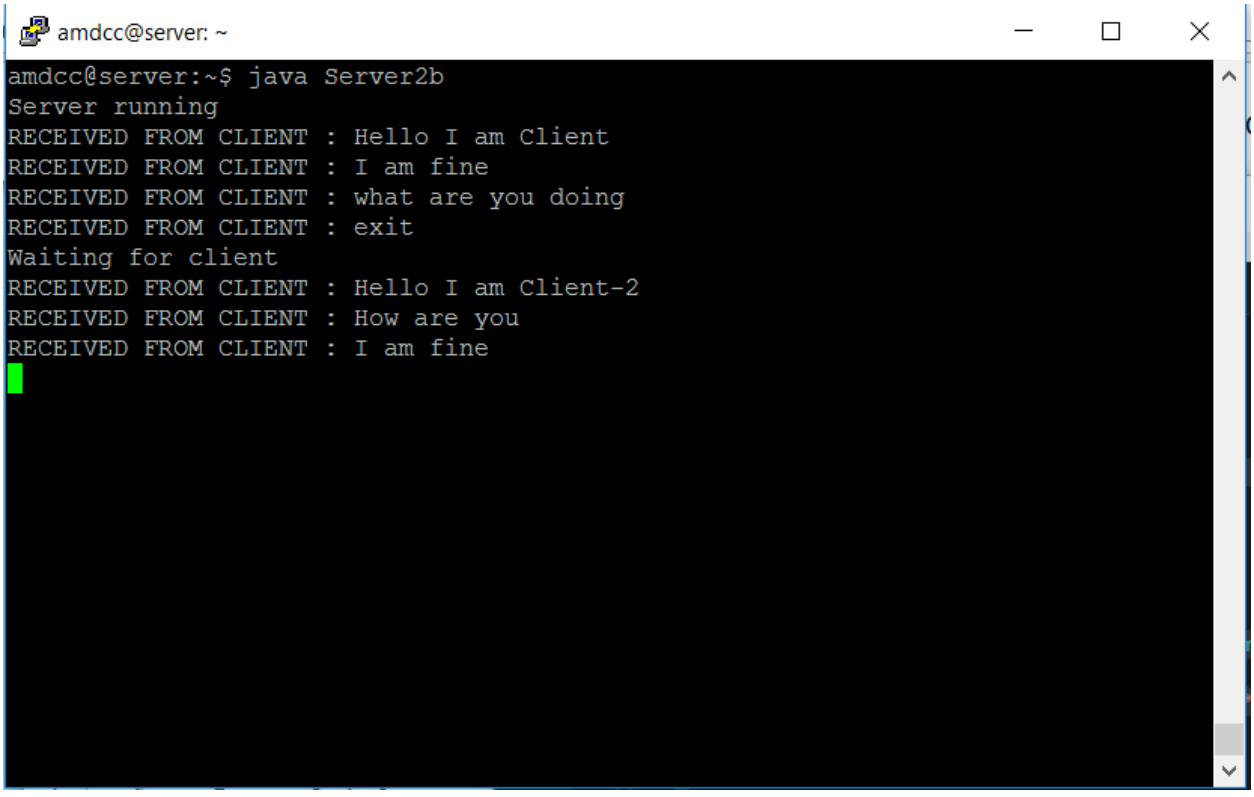
3.3 Question-c:

A server now can handle multiple clients at the same time. The output from all the connected clients will appear on the server's screen.

Solution:

For the question c, required client and server java programs were loaded to both client and server. Here server handles multiple clients at the same time and it accepts messages from all connected clients and all the messages from the clients were displayed on server.


amdcc@client-2: ~
amdcc@client-2:~$ java Client2b
Client is running
****
ENTER MESSAGE :
Hello I am Client-2
ENTER MESSAGE :
How are you
ENTER MESSAGE :
I am fine
ENTER MESSAGE :


amdcc@server: ~
amdcc@server:~$ java Server2b
Server running
RECEIVED FROM CLIENT : Hello I am Client
RECEIVED FROM CLIENT : I am fine
RECEIVED FROM CLIENT : what are you doing
RECEIVED FROM CLIENT : exit
Waiting for client
RECEIVED FROM CLIENT : Hello I am Client-2
RECEIVED FROM CLIENT : How are you
RECEIVED FROM CLIENT : I am fine

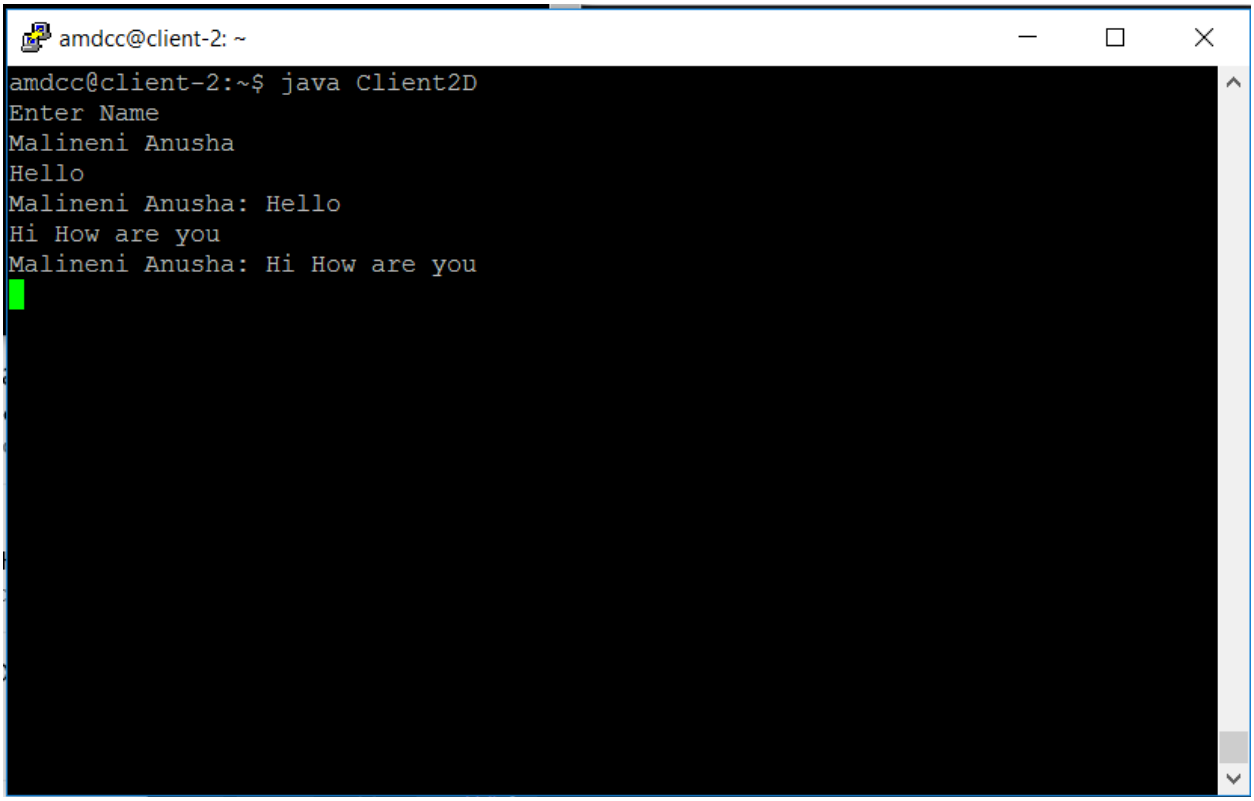
3.4 Question-d:

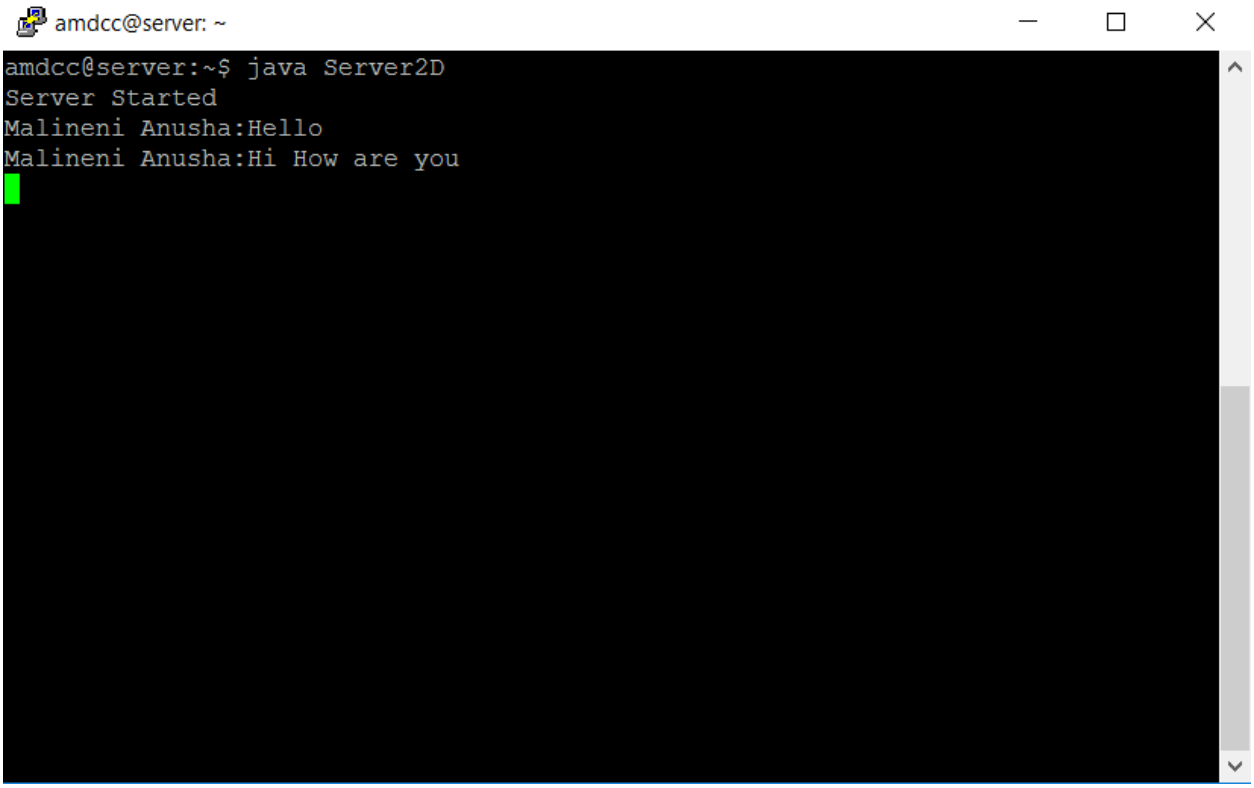
A server now echoes all the text received from any of the connected clients to all.

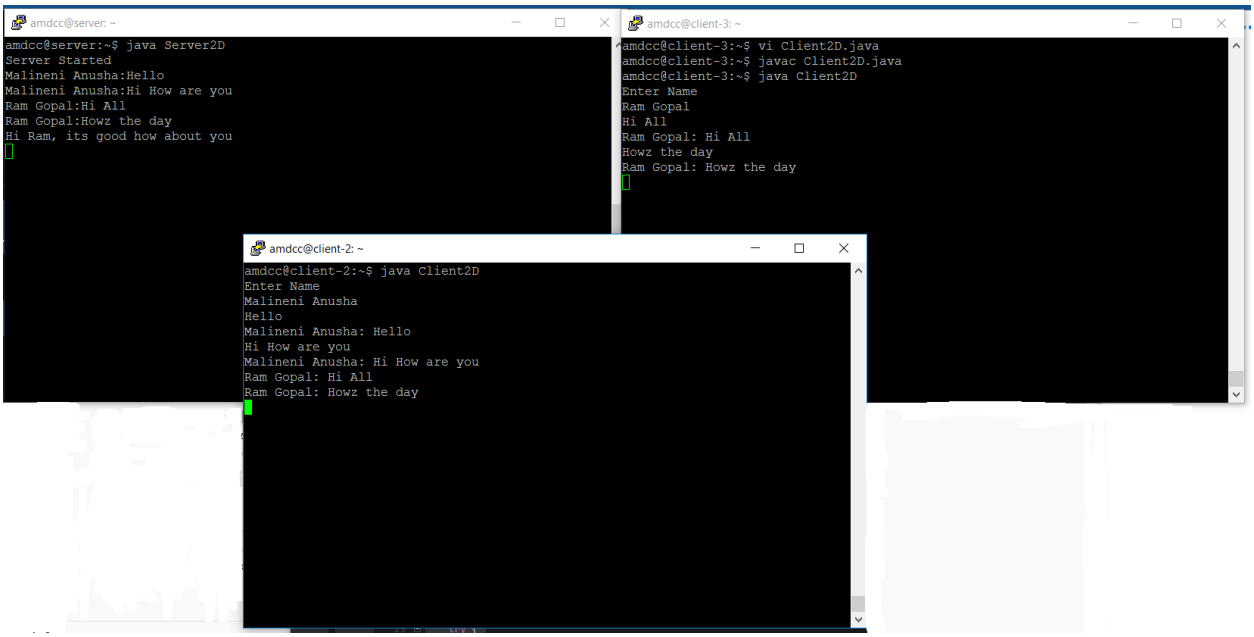
Solution:

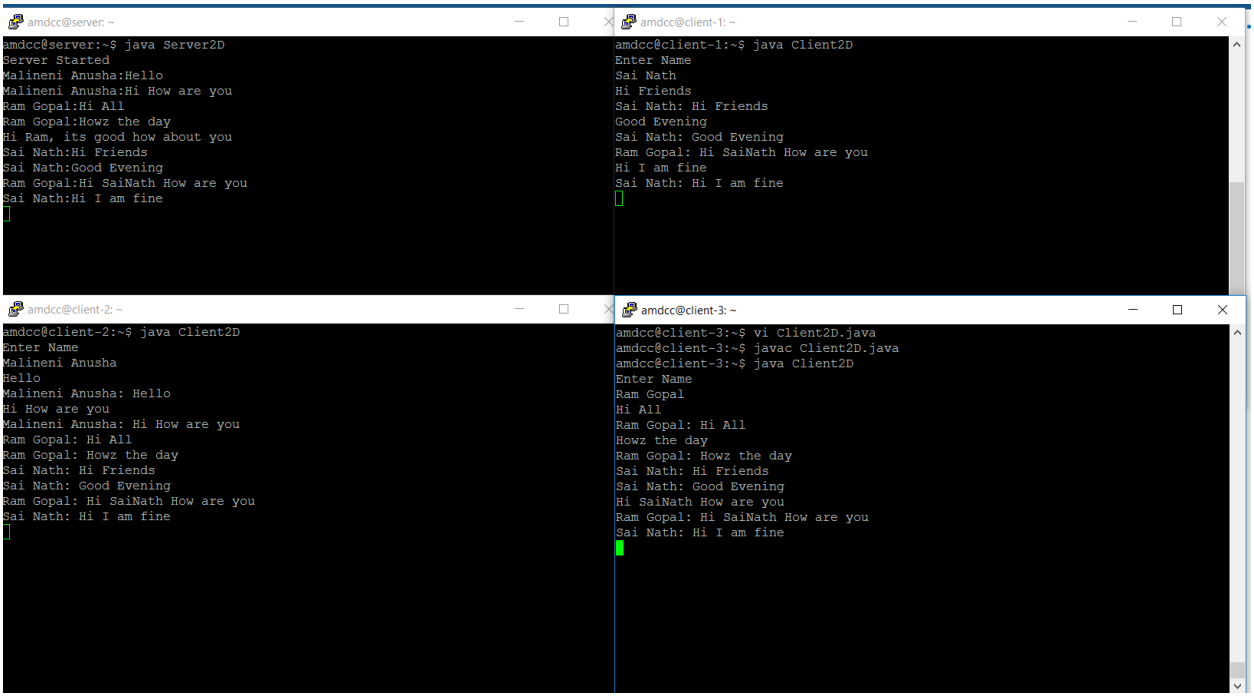
Java files are created for each of the Clients and Server through which messages are received and sent back. In this query, we show that when any of the Clients sends its message to the Server, it broadcasts the message to the remaining Clients with the name of the Client specified.

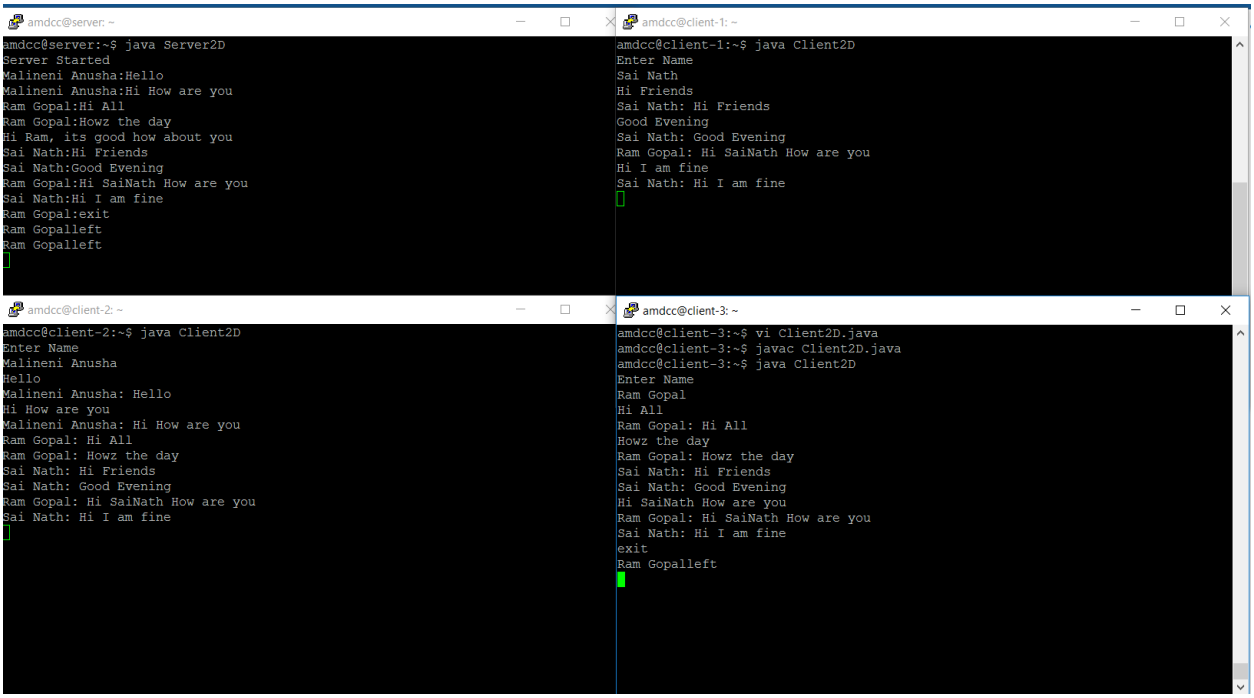
Here we are connecting to 4 Clients, whenever new Client is started to Chat Application the intimation is given to all other Clients. Also, when Client is left from Chat the exit message is sent to Server. The communication between client and server is echoed to all other servers. For example, Client-1 sends message 'hi', this message will be displayed on Clien-2, Client-3, Client-4 along with Server.




amdcc@server: ~
amdcc@server:~$ java Server2D
Server Started
Malineni Anusha:Hello
Malineni Anusha:Hi How are you


amdcc@server: ~
amdcc@server:~$ java Server2D
Server Started
Malineni Anusha:Hello
Malineni Anusha:Hi How are you
Ram Gopal:Hi All
Ram Gopal:Howz the day
Hi Ram, its good how about you
amdcc@client-3: ~
amdcc@client-3:~$ vi Client2D.java
amdcc@client-3:~$ javac Client2D.java
amdcc@client-3:~$ java Client2D
Enter Name
Ram Gopal
Hi All
Ram Gopal: Hi All
Howz the day
Ram Gopal: Howz the day
amdcc@client-2: ~
amdcc@client-2:~$ java Client2D
Enter Name
Malineni Anusha
Hello
Malineni Anusha: Hello
Hi How are you
Malineni Anusha: Hi How are you
Ram Gopal: Hi All
Ram Gopal: Howz the day


amdcc@server: ~
amdcc@server:~$ java Server2D
Server Started
Malineni Anusha:Hello
Malineni Anusha:Hi How are you
Ram Gopal:Hi All
Ram Gopal:Howz the day
Hi Ram, its good how about you
Sai Nath:Hi Friends
Sai Nath:Good Evening
Ram Gopal:Hi SaiNath How are you
Sai Nath:Hi I am fine
amdcc@client-1: ~
amdcc@client-1:~$ java Client2D
Enter Name
Sai Nath
Hi Friends
Sai Nath: Hi Friends
Good Evening
Sai Nath: Good Evening
Ram Gopal: Hi SaiNath How are you
Hi I am fine
Sai Nath: Hi I am fine
amdcc@client-2: ~
amdcc@client-2:~$ java Client2D
Enter Name
Malineni Anusha
Hello
Malineni Anusha: Hello
Hi How are you
Malineni Anusha: Hi How are you
Ram Gopal: Hi All
Ram Gopal: Howz the day
Sai Nath: Hi Friends
Sai Nath: Good Evening
Ram Gopal: Hi SaiNath How are you
Sai Nath: Hi I am fine
amdcc@client-3: ~
amdcc@client-3:~$ vi Client2D.java
amdcc@client-3:~$ javac Client2D.java
amdcc@client-3:~$ java Client2D
Enter Name
Ram Gopal
Hi All
Ram Gopal: Hi All
Howz the day
Ram Gopal: Howz the day
Sai Nath: Hi Friends
Sai Nath: Good Evening
Hi SaiNath How are you
Ram Gopal: Hi SaiNath How are you
Sai Nath: Hi I am fine


amdcc@server: ~
amdcc@server:~$ java Server2D
Server Started
Malineni Anusha:Hello
Malineni Anusha:Hi How are you
Ram Gopal:Hi All
Ram Gopal:Howz the day
Hi Ram, its good how about you
Sai Nath:Hi Friends
Sai Nath:Good Evening
Ram Gopal:Hi SaiNath How are you
Sai Nath:Hi I am fine
Ram Gopal:exit
Ram Gopalleft
Ram Gopalleft
amdcc@client-1: ~
amdcc@client-1:~$ java Client2D
Enter Name
Sai Nath
Hi Friends
Sai Nath: Hi Friends
Good Evening
Sai Nath: Good Evening
Ram Gopal: Hi SaiNath How are you
Hi I am fine
Sai Nath: Hi I am fine
amdcc@client-2: ~
amdcc@client-2:~$ java Client2D
Enter Name
Malineni Anusha
Hello
Malineni Anusha: Hello
Hi How are you
Malineni Anusha: Hi How are you
Ram Gopal: Hi All
Ram Gopal: Howz the day
Sai Nath: Hi Friends
Sai Nath: Good Evening
Ram Gopal: Hi SaiNath How are you
Sai Nath: Hi I am fine
amdcc@client-3: ~
amdcc@client-3:~$ vi Client2D.java
amdcc@client-3:~$ javac Client2D.java
amdcc@client-3:~$ java Client2D
Enter Name
Ram Gopal
Hi All
Ram Gopal: Hi All
Howz the day
Ram Gopal: Howz the day
Sai Nath: Hi Friends
Sai Nath: Good Evening
Hi SaiNath How are you
Ram Gopal: Hi SaiNath How are you
Sai Nath: Hi I am fine
exit
Ram Gopalleft

4. References

a. http://portal.geni.net/secure/dashboard.php

b. http://stackoverflow.com/

c. http://www.putty.org/