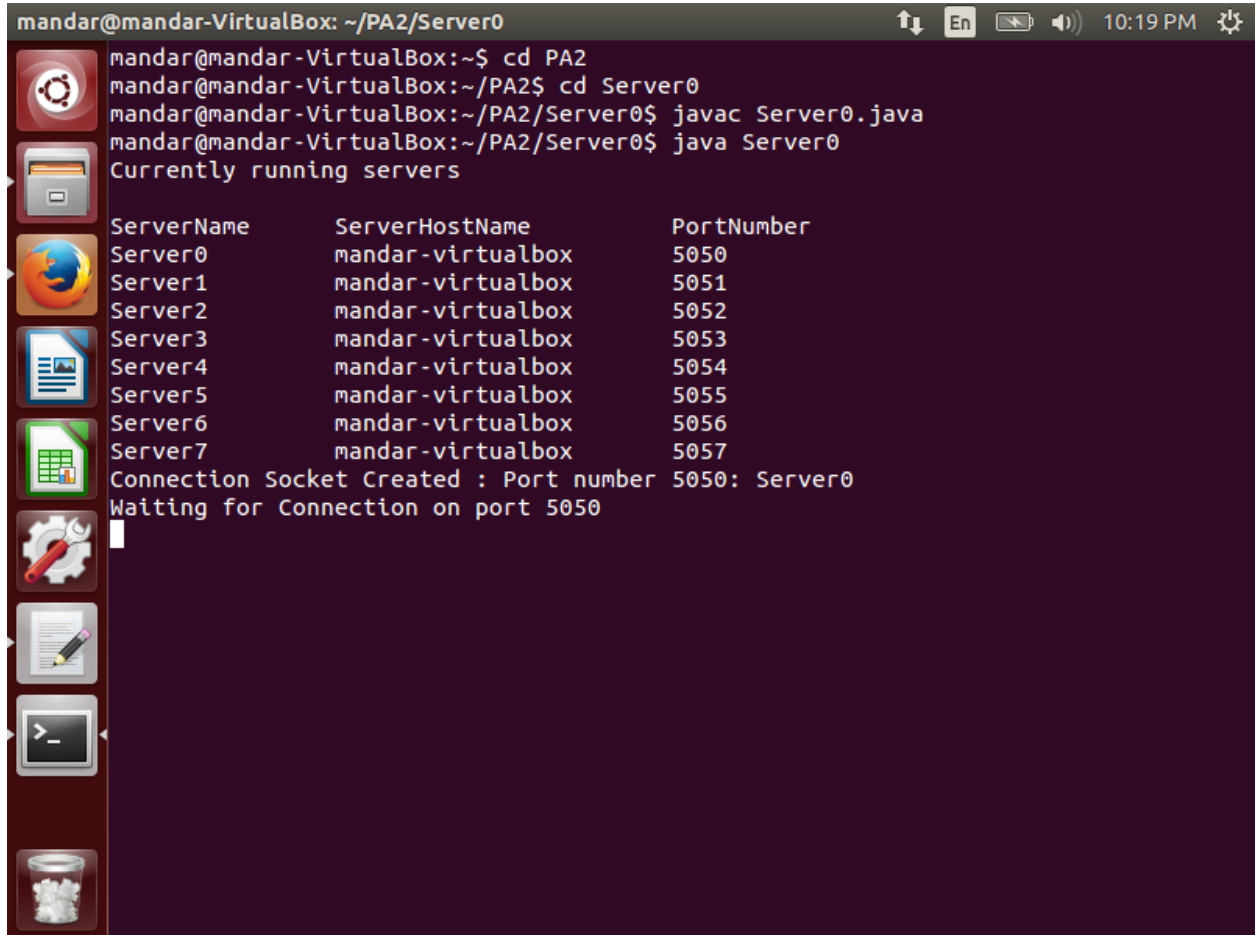


Output File

1. Start Server0 from Server0 directory.



A terminal window titled "mandar@mandar-VirtualBox: ~/PA2/Server0" with a dark purple background. The window shows a series of commands and their outputs. On the left side of the terminal, there is a vertical dock with icons for various applications: a gear, a folder, a globe, a document with a picture, a spreadsheet, a gear with a wrench, a document with a pencil, a terminal window, and a trash can. The terminal output shows the user navigating to the PA2 directory, then to the Server0 directory, compiling Server0.java, and running it. The output of the java command shows a list of currently running servers with their names, hostnames, and port numbers. The list includes Server0 through Server7, all with the hostname "mandar-virtualbox" and port numbers ranging from 5050 to 5057. Below the list, it says "Connection Socket Created : Port number 5050: Server0" and "Waiting for Connection on port 5050".

```
mandar@mandar-VirtualBox: ~/PA2/Server0
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd Server0
mandar@mandar-VirtualBox:~/PA2/Server0$ javac Server0.java
mandar@mandar-VirtualBox:~/PA2/Server0$ java Server0
Currently running servers
ServerName      ServerHostName      PortNumber
Server0         mandar-virtualbox    5050
Server1         mandar-virtualbox    5051
Server2         mandar-virtualbox    5052
Server3         mandar-virtualbox    5053
Server4         mandar-virtualbox    5054
Server5         mandar-virtualbox    5055
Server6         mandar-virtualbox    5056
Server7         mandar-virtualbox    5057
Connection Socket Created : Port number 5050: Server0
Waiting for Connection on port 5050
```

2. Server1 started

```
mandar@mandar-VirtualBox: ~/PA2/Server1
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd Server1
mandar@mandar-VirtualBox:~/PA2/Server1$ javac Server1.java
mandar@mandar-VirtualBox:~/PA2/Server1$ java Server1
Currently running servers

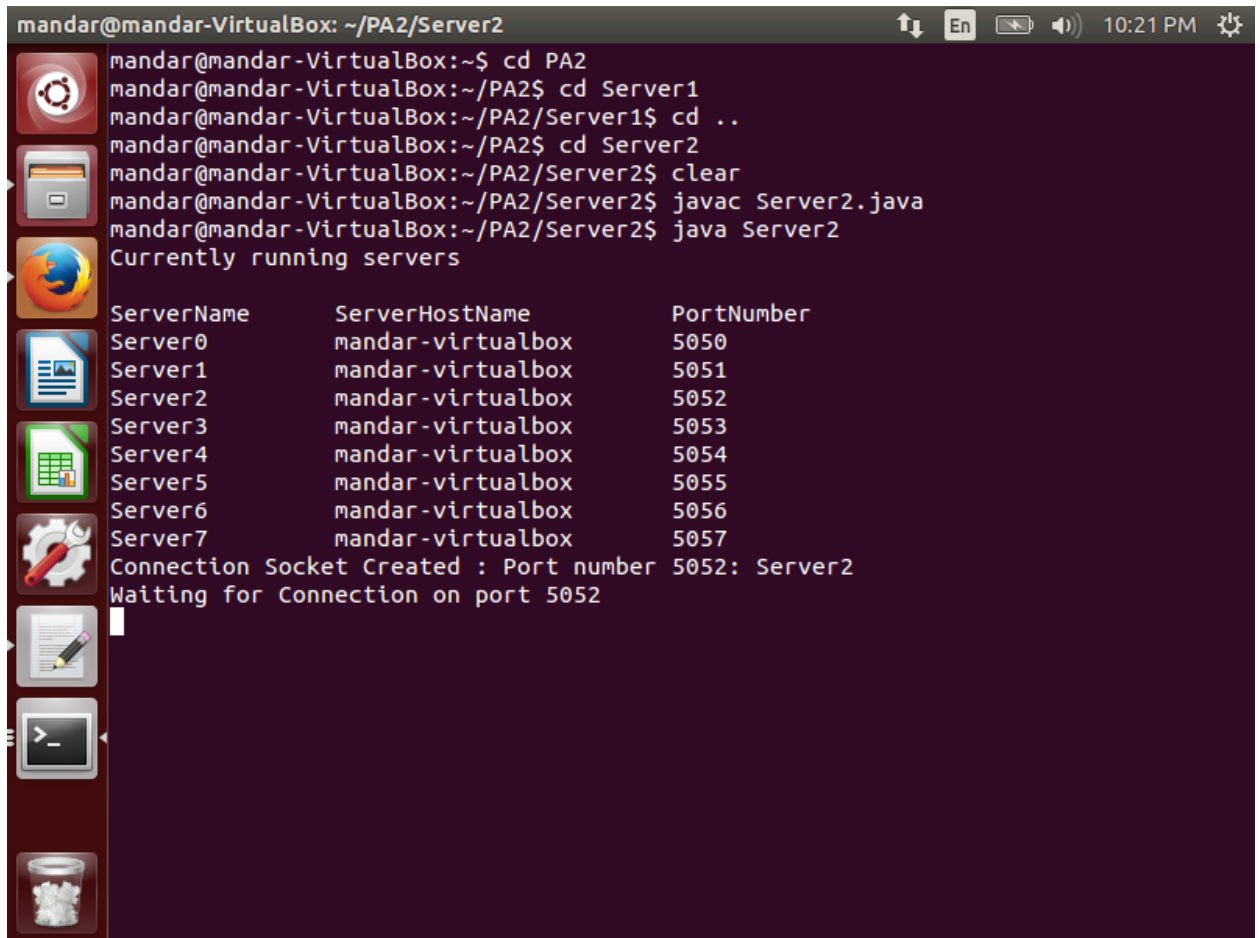
```

ServerName	ServerHostName	PortNumber
Server0	mandar-virtualbox	5050
Server1	mandar-virtualbox	5051
Server2	mandar-virtualbox	5052
Server3	mandar-virtualbox	5053
Server4	mandar-virtualbox	5054
Server5	mandar-virtualbox	5055
Server6	mandar-virtualbox	5056
Server7	mandar-virtualbox	5057

```
Connection Socket Created : Port number 5051: Server1
Waiting for Connection on port 5051

```

3. Server2 started

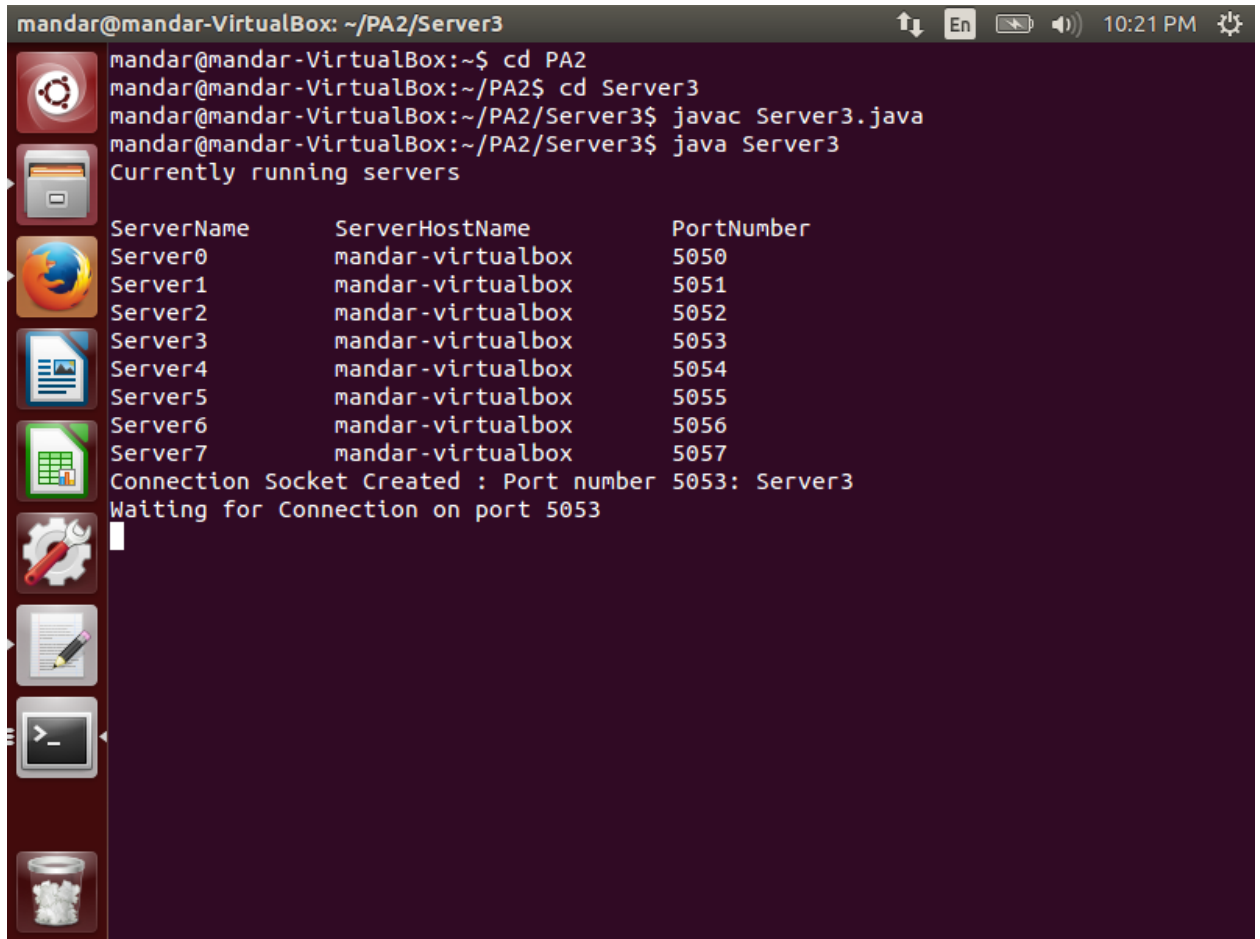


A terminal window titled "mandar@mandar-VirtualBox: ~/PA2/Server2" with a dark purple background. The window shows a series of commands and their outputs. On the left side of the terminal, there is a vertical dock with several application icons: a gear, a folder, a globe, a document, a spreadsheet, a terminal, and a trash can. The terminal output shows the user navigating through directories, clearing the environment, compiling a Java file, and running it. The output includes a table of currently running servers and a message indicating that a connection socket has been created for Server2 on port 5052.

```
mandar@mandar-VirtualBox: ~/PA2/Server2
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd Server1
mandar@mandar-VirtualBox:~/PA2/Server1$ cd ..
mandar@mandar-VirtualBox:~/PA2$ cd Server2
mandar@mandar-VirtualBox:~/PA2/Server2$ clear
mandar@mandar-VirtualBox:~/PA2/Server2$ javac Server2.java
mandar@mandar-VirtualBox:~/PA2/Server2$ java Server2
Currently running servers

ServerName      ServerHostName      PortNumber
Server0         mandar-virtualbox   5050
Server1         mandar-virtualbox   5051
Server2         mandar-virtualbox   5052
Server3         mandar-virtualbox   5053
Server4         mandar-virtualbox   5054
Server5         mandar-virtualbox   5055
Server6         mandar-virtualbox   5056
Server7         mandar-virtualbox   5057
Connection Socket Created : Port number 5052: Server2
Waiting for Connection on port 5052
```

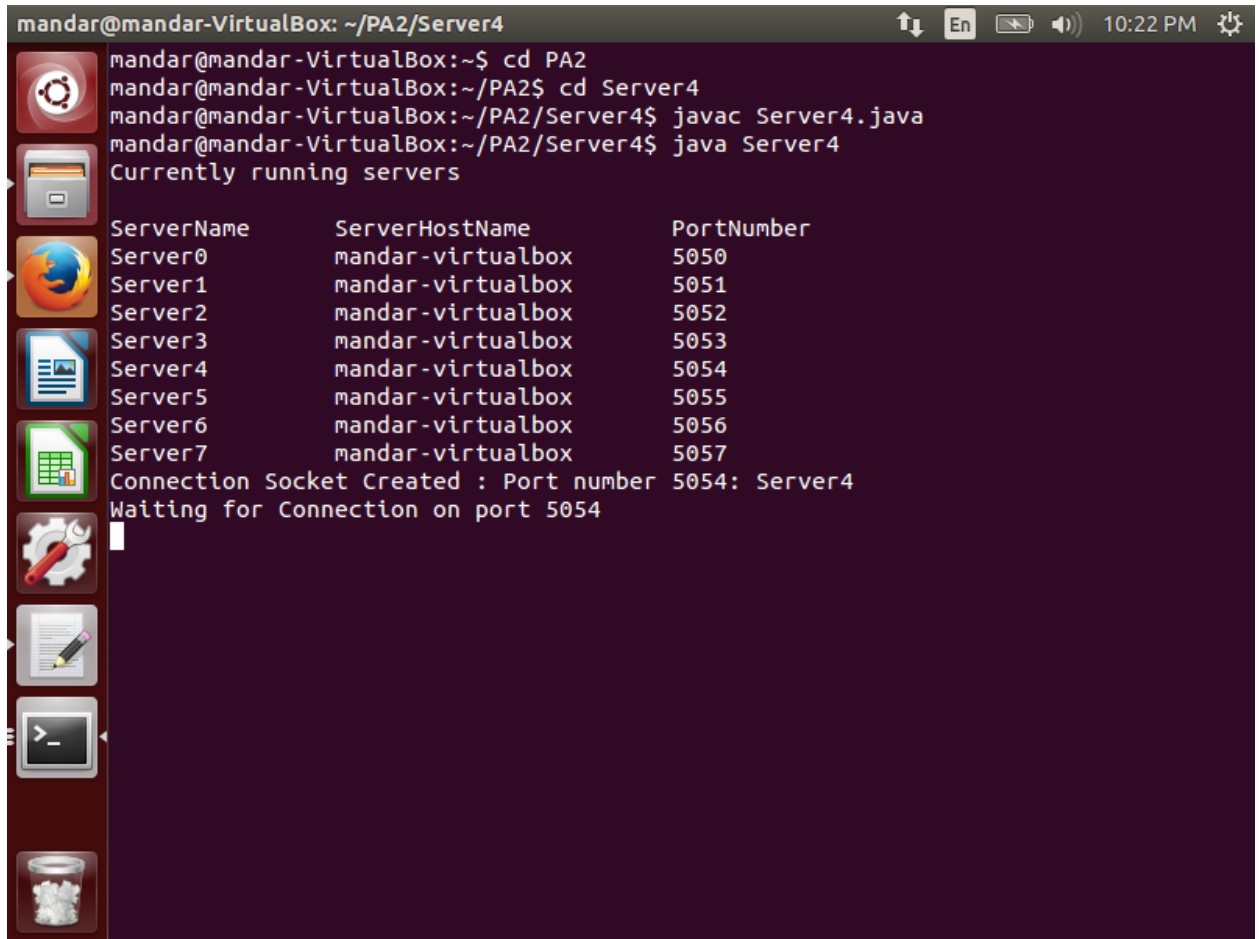
4. Server3 Started:



A terminal window titled "mandar@mandar-VirtualBox: ~/PA2/Server3" with a dark purple background. The window shows the execution of a Java program. The user navigates to the "PA2" directory and then to "Server3". They compile "Server3.java" and run "java Server3". The program outputs a list of currently running servers, including "Server3" on port 5053. It then displays "Connection Socket Created : Port number 5053: Server3" and "Waiting for Connection on port 5053". A vertical sidebar on the left contains icons for various applications like a file manager, web browser, and terminal.

```
mandar@mandar-VirtualBox: ~/PA2/Server3
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd Server3
mandar@mandar-VirtualBox:~/PA2/Server3$ javac Server3.java
mandar@mandar-VirtualBox:~/PA2/Server3$ java Server3
Currently running servers
ServerName      ServerHostName      PortNumber
Server0         mandar-virtualbox    5050
Server1         mandar-virtualbox    5051
Server2         mandar-virtualbox    5052
Server3         mandar-virtualbox    5053
Server4         mandar-virtualbox    5054
Server5         mandar-virtualbox    5055
Server6         mandar-virtualbox    5056
Server7         mandar-virtualbox    5057
Connection Socket Created : Port number 5053: Server3
Waiting for Connection on port 5053
```

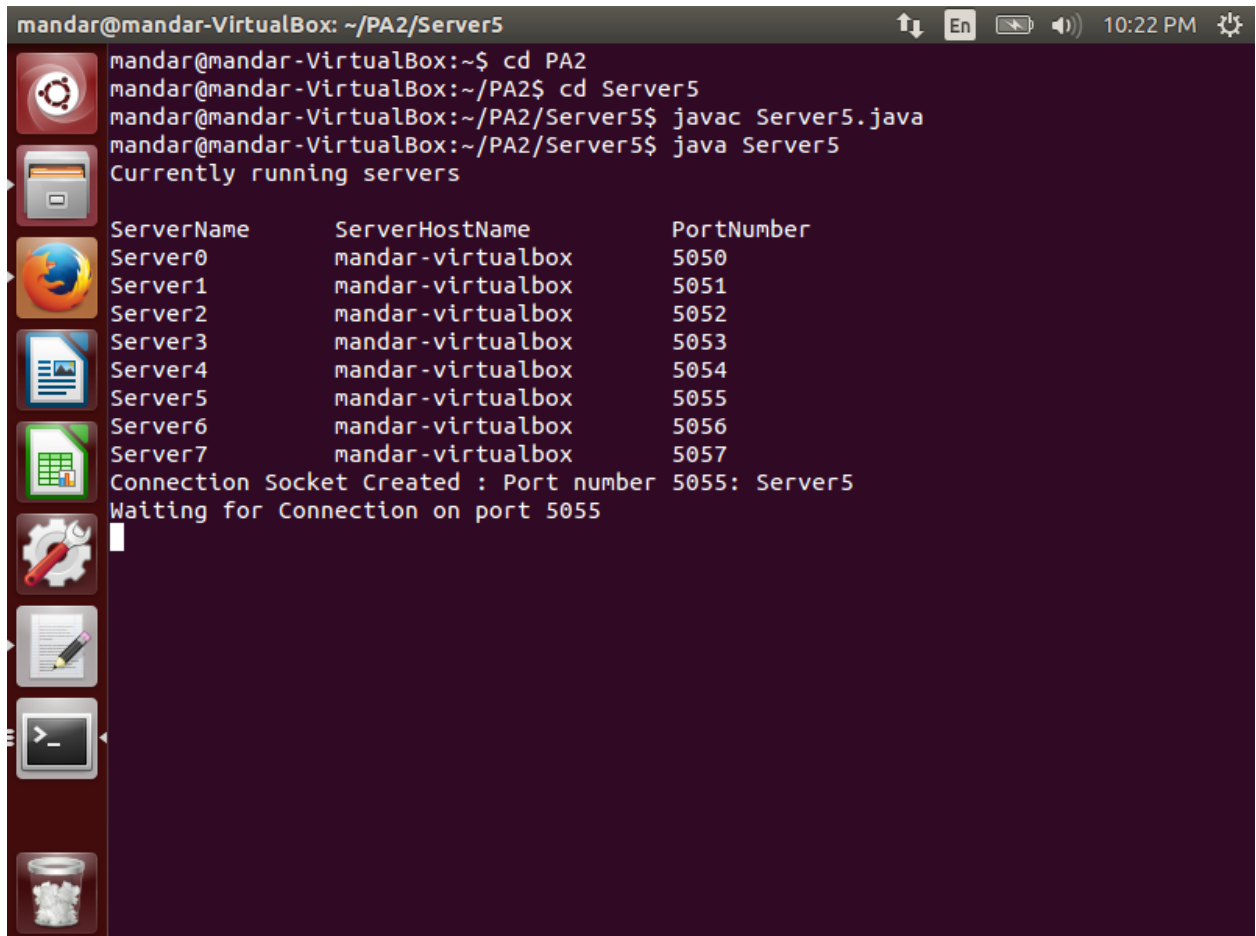
5. Server4 Started



A terminal window titled "mandar@mandar-VirtualBox: ~/PA2/Server4" with a dark purple background. The window shows the execution of a Java program. The user navigates to the "PA2" directory and then to "Server4". They compile "Server4.java" and run "java Server4". The program outputs a list of currently running servers, including "Server4" on port 5054. It then displays "Connection Socket Created : Port number 5054: Server4" and "Waiting for Connection on port 5054". A vertical sidebar on the left contains icons for various applications like a web browser, file manager, and terminal.

```
mandar@mandar-VirtualBox: ~/PA2/Server4
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd Server4
mandar@mandar-VirtualBox:~/PA2/Server4$ javac Server4.java
mandar@mandar-VirtualBox:~/PA2/Server4$ java Server4
Currently running servers
ServerName      ServerHostName      PortNumber
Server0         mandar-virtualbox    5050
Server1         mandar-virtualbox    5051
Server2         mandar-virtualbox    5052
Server3         mandar-virtualbox    5053
Server4         mandar-virtualbox    5054
Server5         mandar-virtualbox    5055
Server6         mandar-virtualbox    5056
Server7         mandar-virtualbox    5057
Connection Socket Created : Port number 5054: Server4
Waiting for Connection on port 5054
```

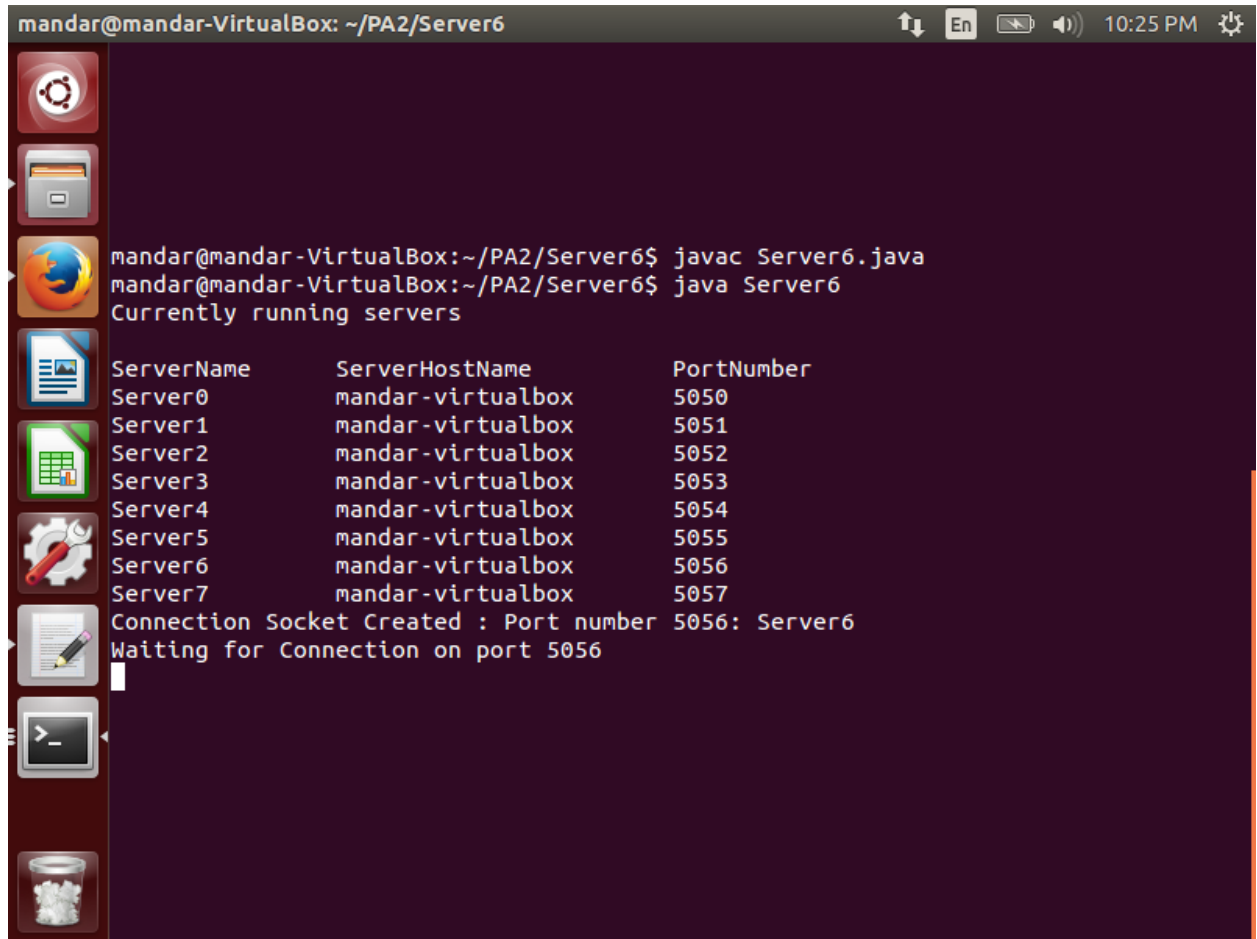
6. Server5 Started:



```
mandar@mandar-VirtualBox: ~/PA2/Server5
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd Server5
mandar@mandar-VirtualBox:~/PA2/Server5$ javac Server5.java
mandar@mandar-VirtualBox:~/PA2/Server5$ java Server5
Currently running servers
ServerName      ServerHostName      PortNumber
Server0         mandar-virtualbox   5050
Server1         mandar-virtualbox   5051
Server2         mandar-virtualbox   5052
Server3         mandar-virtualbox   5053
Server4         mandar-virtualbox   5054
Server5         mandar-virtualbox   5055
Server6         mandar-virtualbox   5056
Server7         mandar-virtualbox   5057
Connection Socket Created : Port number 5055: Server5
Waiting for Connection on port 5055
```

The image shows a terminal window titled "mandar@mandar-VirtualBox: ~/PA2/Server5". The terminal output shows the user navigating to the "PA2" directory, then to "Server5", and running "javac Server5.java" and "java Server5". The output of "java Server5" is "Currently running servers", followed by a table of servers. The table has three columns: "ServerName", "ServerHostName", and "PortNumber". The servers listed are Server0 through Server7, all with "mandar-virtualbox" as the host name and port numbers ranging from 5050 to 5057. Below the table, it says "Connection Socket Created : Port number 5055: Server5" and "Waiting for Connection on port 5055". The terminal window has a sidebar with icons for various applications and a top bar with system status icons and the time "10:22 PM".

7. Server6 Started:



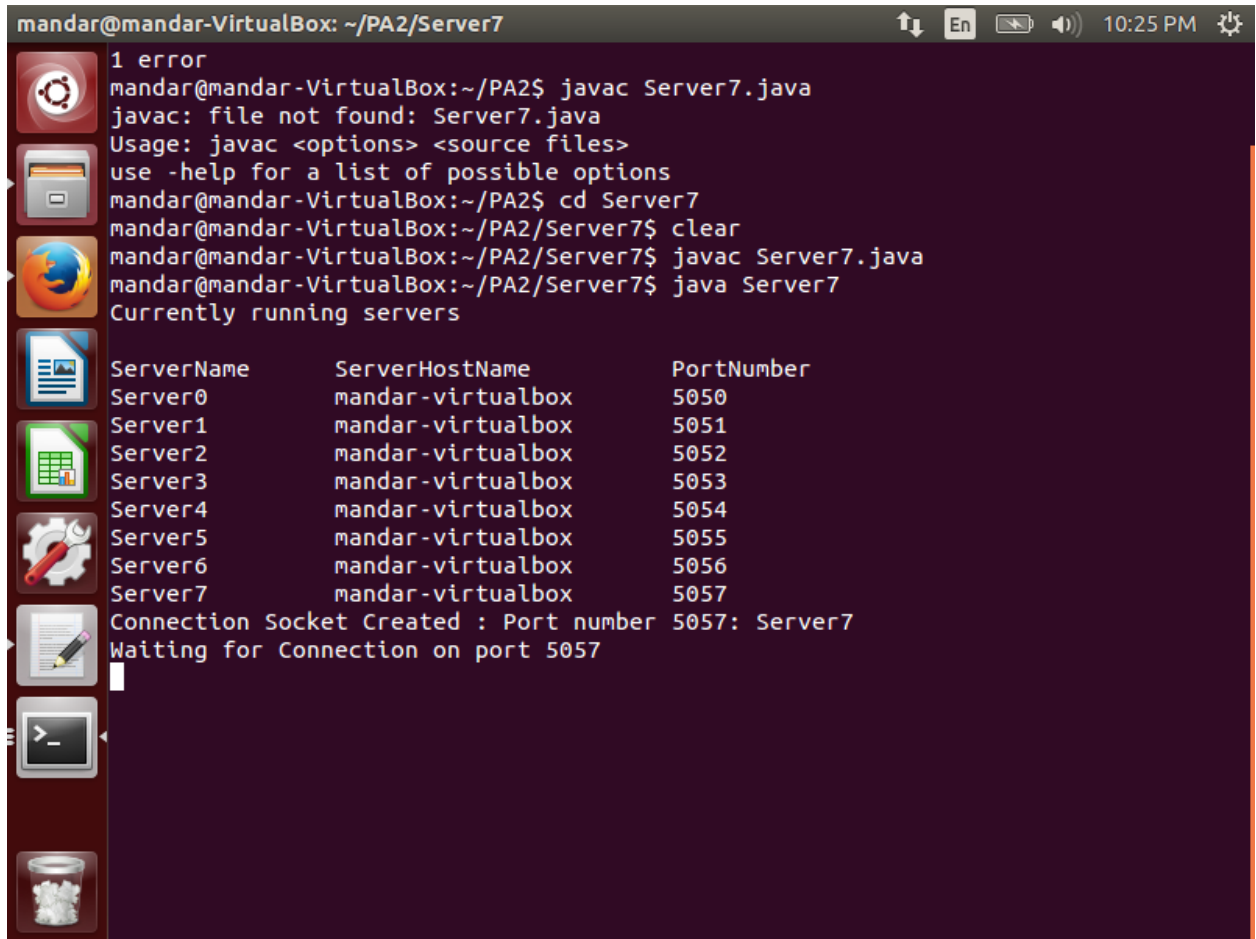
A terminal window titled "mandar@mandar-VirtualBox: ~/PA2/Server6" with a dark purple background. The window has a sidebar on the left with icons for applications, files, and system settings. The terminal output shows the execution of Java commands and a list of running servers.

```
mandar@mandar-VirtualBox: ~/PA2/Server6
mandar@mandar-VirtualBox:~/PA2/Server6$ javac Server6.java
mandar@mandar-VirtualBox:~/PA2/Server6$ java Server6
Currently running servers
```

ServerName	ServerHostName	PortNumber
Server0	mandar-virtualbox	5050
Server1	mandar-virtualbox	5051
Server2	mandar-virtualbox	5052
Server3	mandar-virtualbox	5053
Server4	mandar-virtualbox	5054
Server5	mandar-virtualbox	5055
Server6	mandar-virtualbox	5056
Server7	mandar-virtualbox	5057

```
Connection Socket Created : Port number 5056: Server6
Waiting for Connection on port 5056
```

8. Server7 Started:



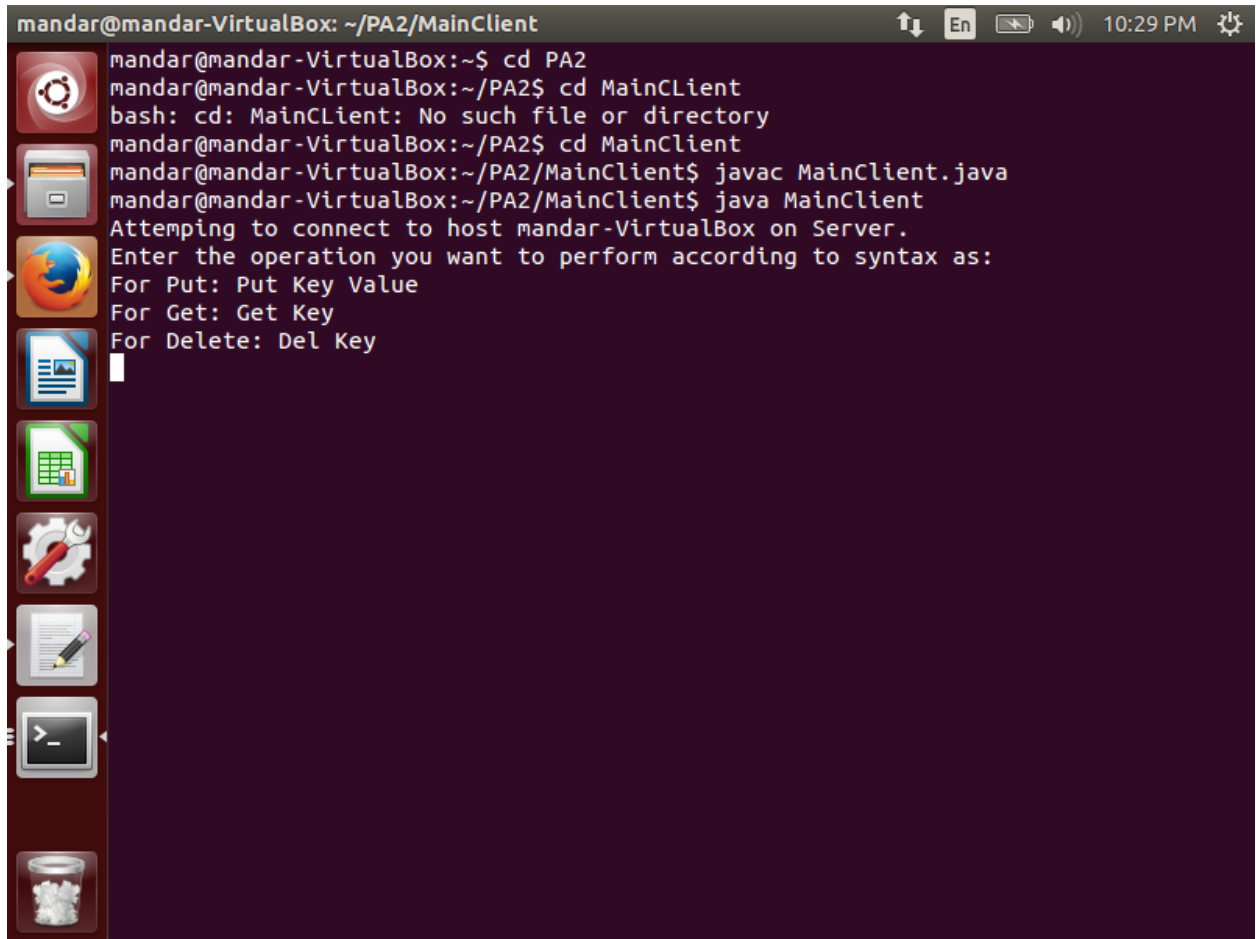
A terminal window titled "mandar@mandar-VirtualBox: ~/PA2/Server7" with a system tray at the top showing "En", battery, and "10:25 PM". The terminal output shows the following sequence of commands and results:

```
1 error
mandar@mandar-VirtualBox:~/PA2$ javac Server7.java
javac: file not found: Server7.java
Usage: javac <options> <source files>
use -help for a list of possible options
mandar@mandar-VirtualBox:~/PA2$ cd Server7
mandar@mandar-VirtualBox:~/PA2/Server7$ clear
mandar@mandar-VirtualBox:~/PA2/Server7$ javac Server7.java
mandar@mandar-VirtualBox:~/PA2/Server7$ java Server7
Currently running servers
```

ServerName	ServerHostName	PortNumber
Server0	mandar-virtualbox	5050
Server1	mandar-virtualbox	5051
Server2	mandar-virtualbox	5052
Server3	mandar-virtualbox	5053
Server4	mandar-virtualbox	5054
Server5	mandar-virtualbox	5055
Server6	mandar-virtualbox	5056
Server7	mandar-virtualbox	5057

```
Connection Socket Created : Port number 5057: Server7
Waiting for Connection on port 5057
```


9. MainClient Started:



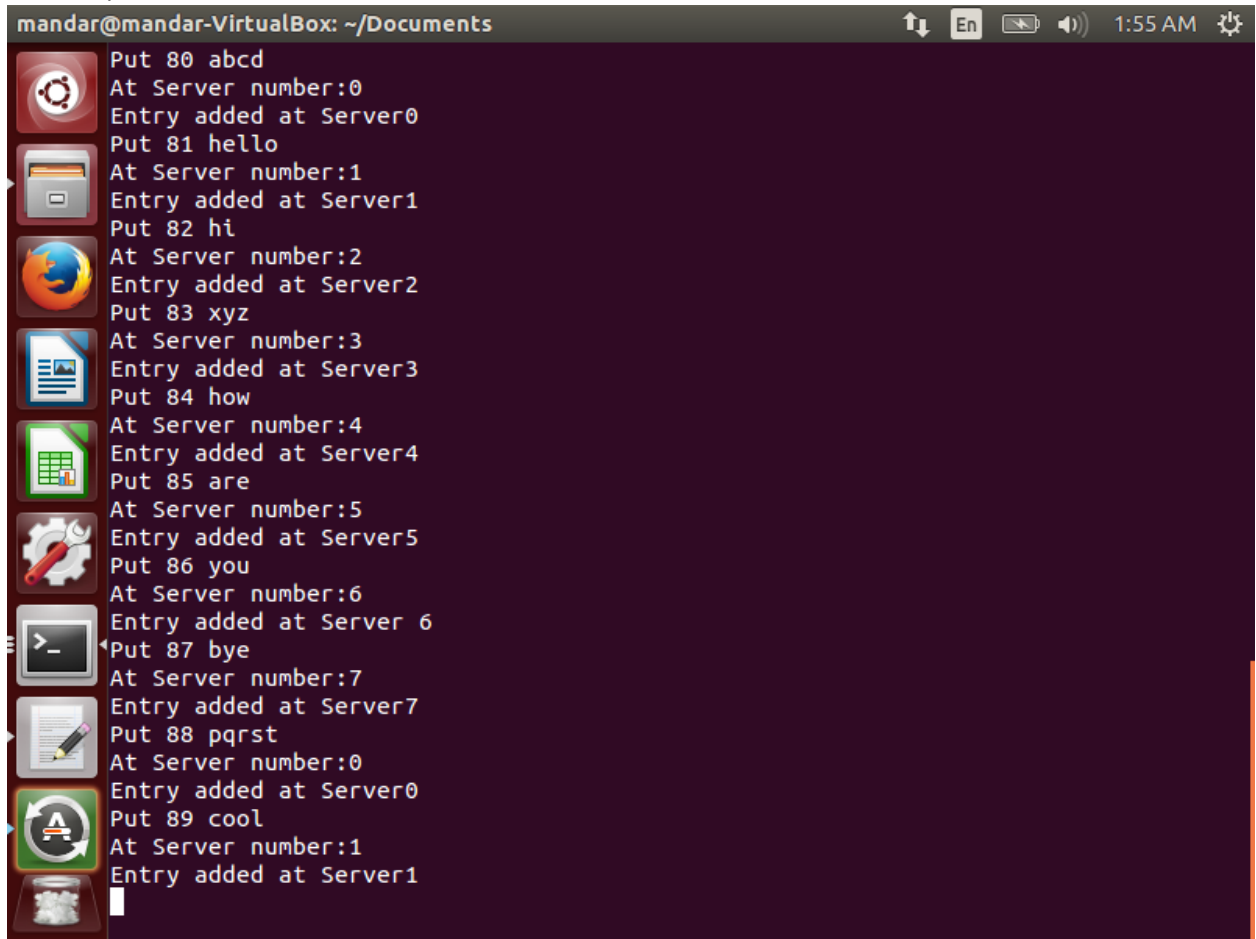
The screenshot shows a terminal window titled "mandar@mandar-VirtualBox: ~/PA2/MainClient". The terminal output is as follows:

```
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd MainClient
bash: cd: MainClient: No such file or directory
mandar@mandar-VirtualBox:~/PA2$ cd MainClient
mandar@mandar-VirtualBox:~/PA2/MainClient$ javac MainClient.java
mandar@mandar-VirtualBox:~/PA2/MainClient$ java MainClient
Attempting to connect to host mandar-VirtualBox on Server.
Enter the operation you want to perform according to syntax as:
For Put: Put Key Value
For Get: Get Key
For Delete: Del Key

```

The terminal window has a dark purple background. On the left side, there is a vertical dock with several application icons: a red gear, a folder, a Firefox browser, a document with a magnifying glass, a spreadsheet, a gear with a wrench, a document with a pencil, a terminal icon, and a trash can. The top of the window shows system status icons including a network icon, a language icon (En), a battery icon, a speaker icon, and the time 10:29 PM.

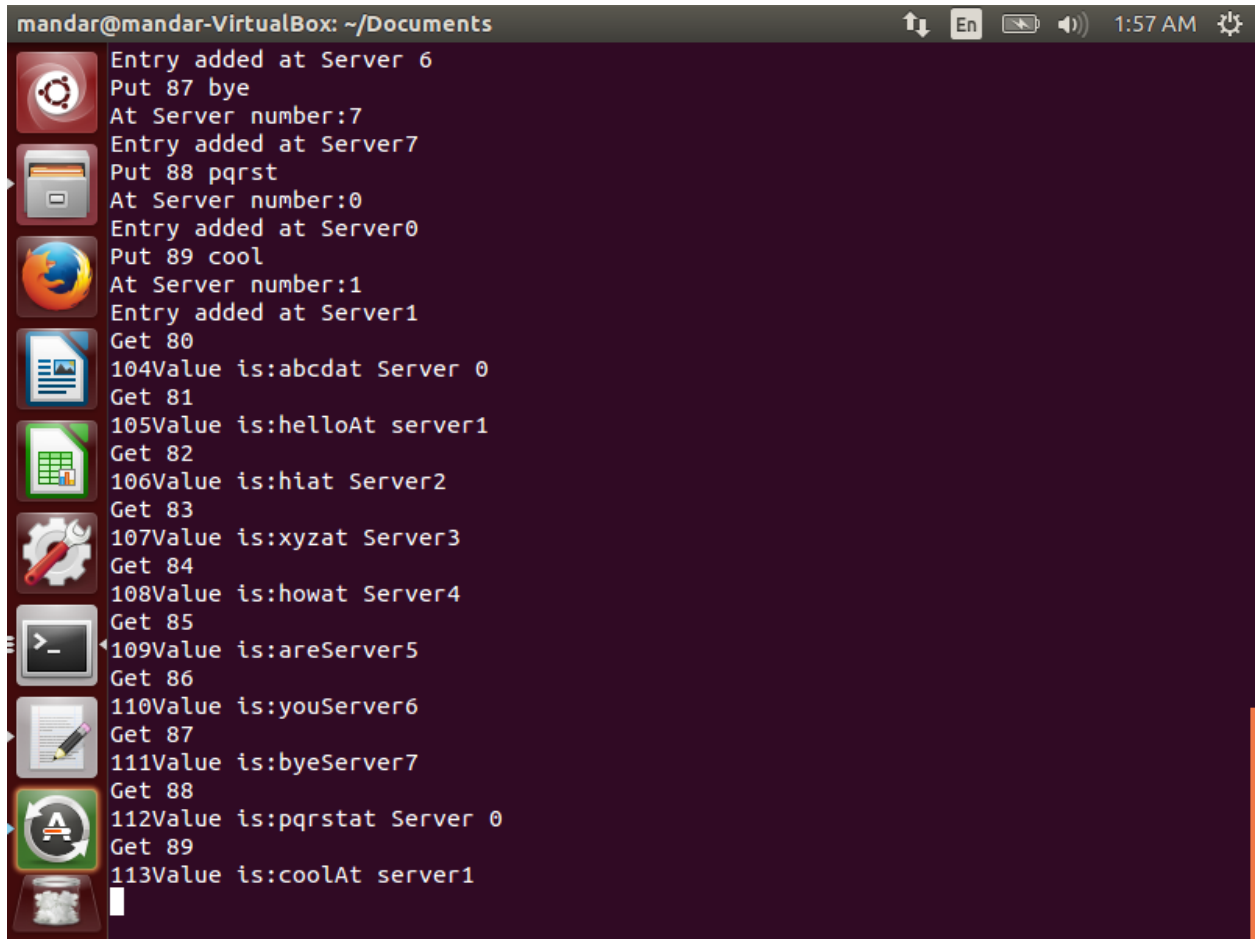
10. 10 Put operations:



A terminal window titled 'mandar@mandar-VirtualBox: ~/Documents' with a dark purple background. On the left side, there is a vertical dock with ten application icons: a red gear, a folder, a globe, a document with a magnifying glass, a green spreadsheet, a gear with a wrench, a terminal window, a document with a pencil, a green circular arrow, and a server rack. The terminal text shows a sequence of 10 'Put' operations, each followed by 'At Server number:' and 'Entry added at ServerX'. The operations are numbered 80 through 89. The sequence of server numbers is 0, 1, 2, 3, 4, 5, 6, 7, 0, 1. The terminal ends with a white cursor line.

```
mandar@mandar-VirtualBox: ~/Documents
Put 80 abcd
At Server number:0
Entry added at Server0
Put 81 hello
At Server number:1
Entry added at Server1
Put 82 hi
At Server number:2
Entry added at Server2
Put 83 xyz
At Server number:3
Entry added at Server3
Put 84 how
At Server number:4
Entry added at Server4
Put 85 are
At Server number:5
Entry added at Server5
Put 86 you
At Server number:6
Entry added at Server 6
Put 87 bye
At Server number:7
Entry added at Server7
Put 88 pqrst
At Server number:0
Entry added at Server0
Put 89 cool
At Server number:1
Entry added at Server1
```

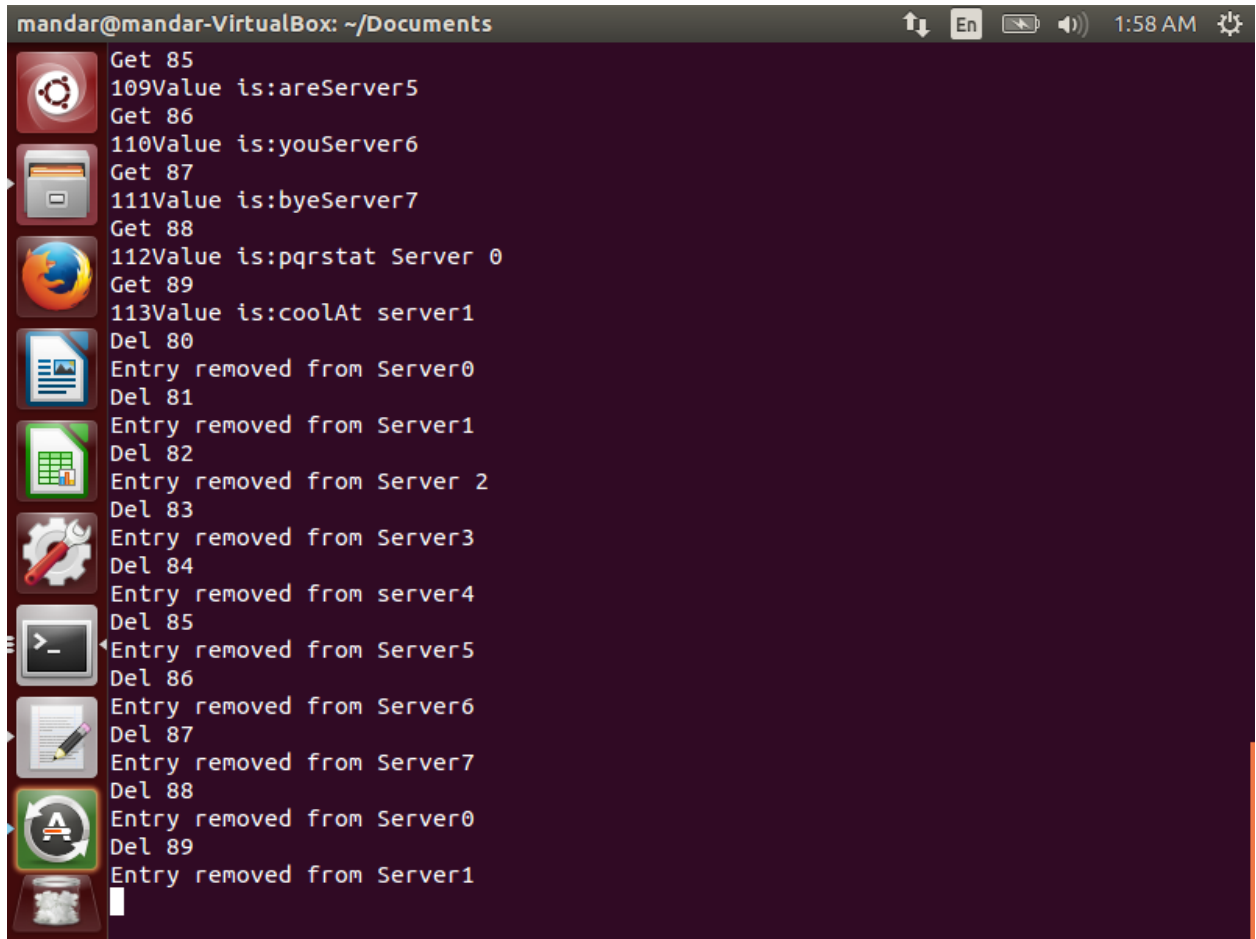
11. 10 Get commands:



A terminal window titled 'mandar@mandar-VirtualBox: ~/Documents' displays a sequence of 10 GET commands and their corresponding responses. The window has a dark purple background and a sidebar on the left with various application icons. The status bar at the top shows system icons and the time '1:57 AM'.

```
mandar@mandar-VirtualBox: ~/Documents
Entry added at Server 6
Put 87 bye
At Server number:7
Entry added at Server7
Put 88 pqrst
At Server number:0
Entry added at Server0
Put 89 cool
At Server number:1
Entry added at Server1
Get 80
104Value is:abcdat Server 0
Get 81
105Value is:helloAt server1
Get 82
106Value is:hiat Server2
Get 83
107Value is:xyzat Server3
Get 84
108Value is:howat Server4
Get 85
109Value is:areServer5
Get 86
110Value is:youServer6
Get 87
111Value is:byeServer7
Get 88
112Value is:pqrstat Server 0
Get 89
113Value is:coolAt server1
```

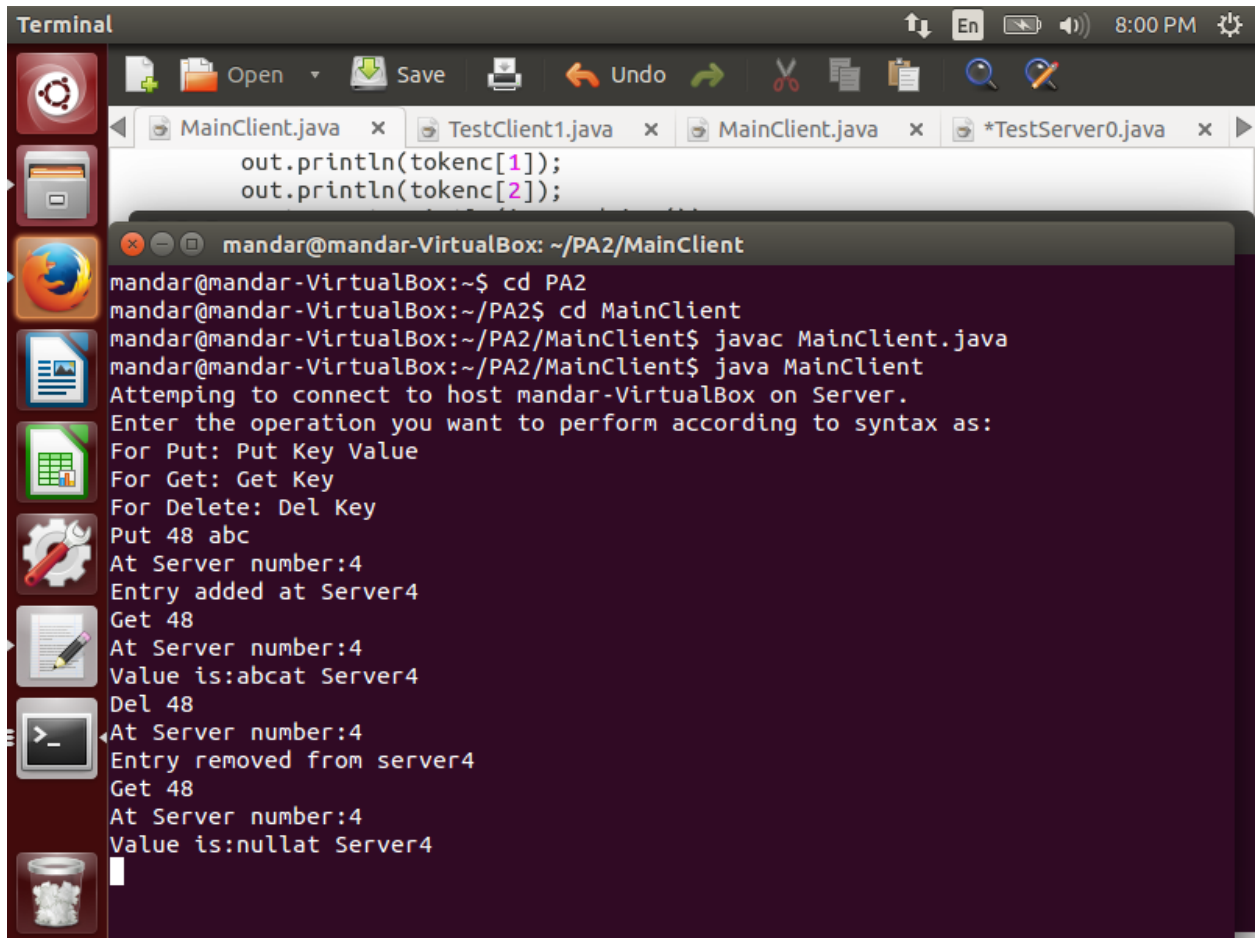
12. 10 Del commands:



A terminal window titled 'mandar@mandar-VirtualBox: ~/Documents' with a dark purple background. On the left side, there is a vertical toolbar with icons for various applications: a red gear, a folder, a globe, a document, a spreadsheet, a gear with a wrench, a terminal, a document with a pencil, a circular arrow with a warning sign, and a server rack. The terminal text shows a sequence of 10 'Del' commands (80-89) and their corresponding outputs, which are 'Entry removed from Server0' through 'Server1'. The status bar at the top right shows 'En', battery, speaker, and the time '1:58 AM'.

```
mandar@mandar-VirtualBox: ~/Documents
Get 85
109Value is:areServer5
Get 86
110Value is:youServer6
Get 87
111Value is:byeServer7
Get 88
112Value is:pqrstat Server 0
Get 89
113Value is:coolAt server1
Del 80
Entry removed from Server0
Del 81
Entry removed from Server1
Del 82
Entry removed from Server 2
Del 83
Entry removed from Server3
Del 84
Entry removed from server4
Del 85
Entry removed from Server5
Del 86
Entry removed from Server6
Del 87
Entry removed from Server7
Del 88
Entry removed from Server0
Del 89
Entry removed from Server1
```

13. If value not present, get returns null.



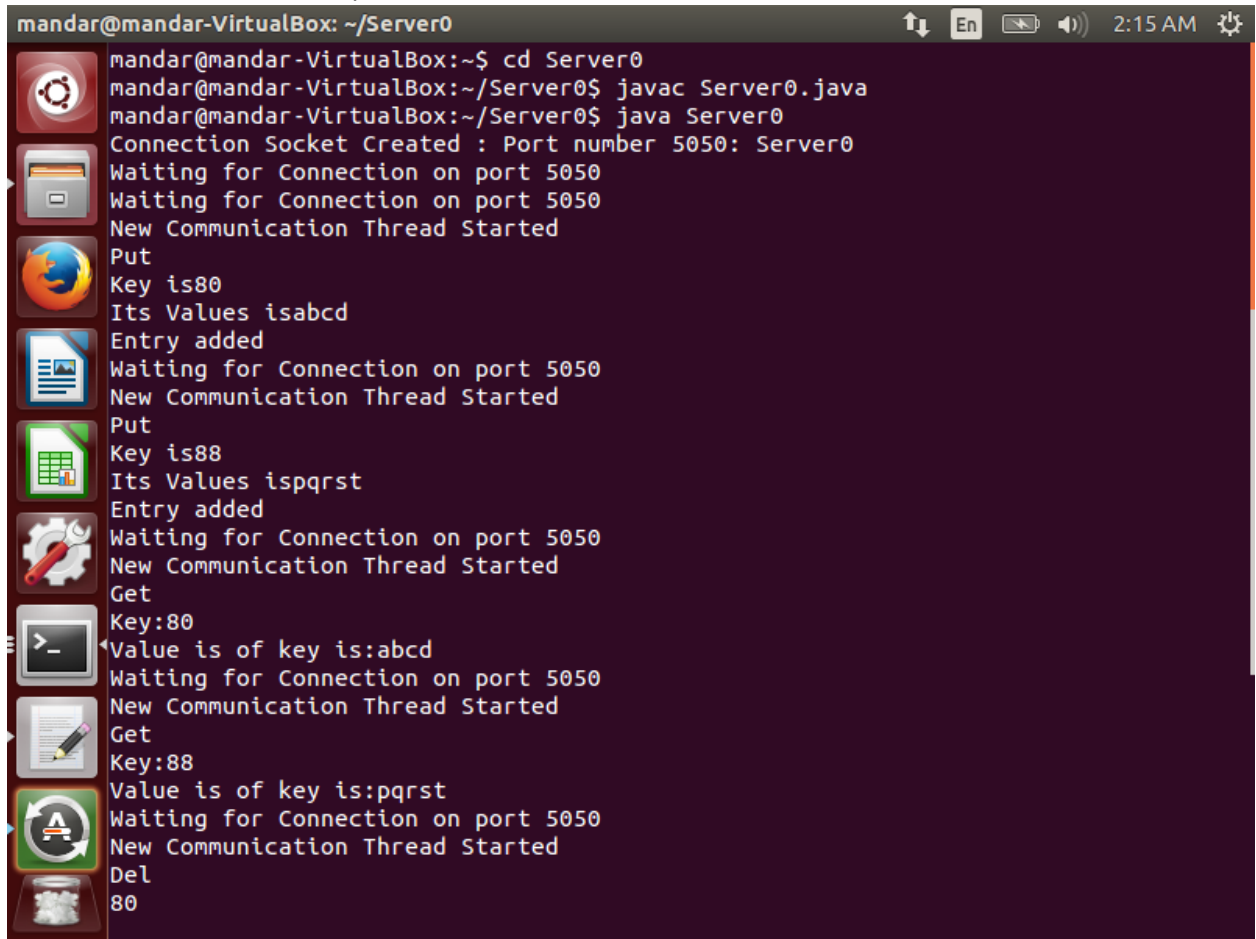
The image shows a Java IDE window with several tabs: `MainClient.java`, `TestClient1.java`, `MainClient.java`, and `*TestServer0.java`. The `MainClient.java` tab is active, showing the following code:

```
out.println(tokenc[1]);
out.println(tokenc[2]);
```

Below the IDE, a terminal window is open, showing the execution of the program. The terminal output is as follows:

```
mandar@mandar-VirtualBox: ~/PA2/MainClient
mandar@mandar-VirtualBox:~$ cd PA2
mandar@mandar-VirtualBox:~/PA2$ cd MainClient
mandar@mandar-VirtualBox:~/PA2/MainClient$ javac MainClient.java
mandar@mandar-VirtualBox:~/PA2/MainClient$ java MainClient
Attempting to connect to host mandar-VirtualBox on Server.
Enter the operation you want to perform according to syntax as:
For Put: Put Key Value
For Get: Get Key
For Delete: Del Key
Put 48 abc
At Server number:4
Entry added at Server4
Get 48
At Server number:4
Value is:abcat Server4
Del 48
At Server number:4
Entry removed from server4
Get 48
At Server number:4
Value is:nullat Server4
```

14. One of the Server Screen output:

A screenshot of a terminal window titled 'mandar@mandar-VirtualBox: ~/Server0'. The window shows the execution of a Java program. The user enters 'cd Server0', 'javac Server0.java', and 'java Server0'. The program outputs 'Connection Socket Created : Port number 5050: Server0' and enters a loop of waiting for connections on port 5050. It successfully receives two connections. The first connection sends 'Key is80' and 'Its Values isabcd', which the server logs as 'Entry added'. The second connection sends 'Key is88' and 'Its Values ispqrst', also logged as 'Entry added'. The terminal window has a dark background with a vertical toolbar on the left containing various application icons. The top status bar shows system icons and the time '2:15 AM'.