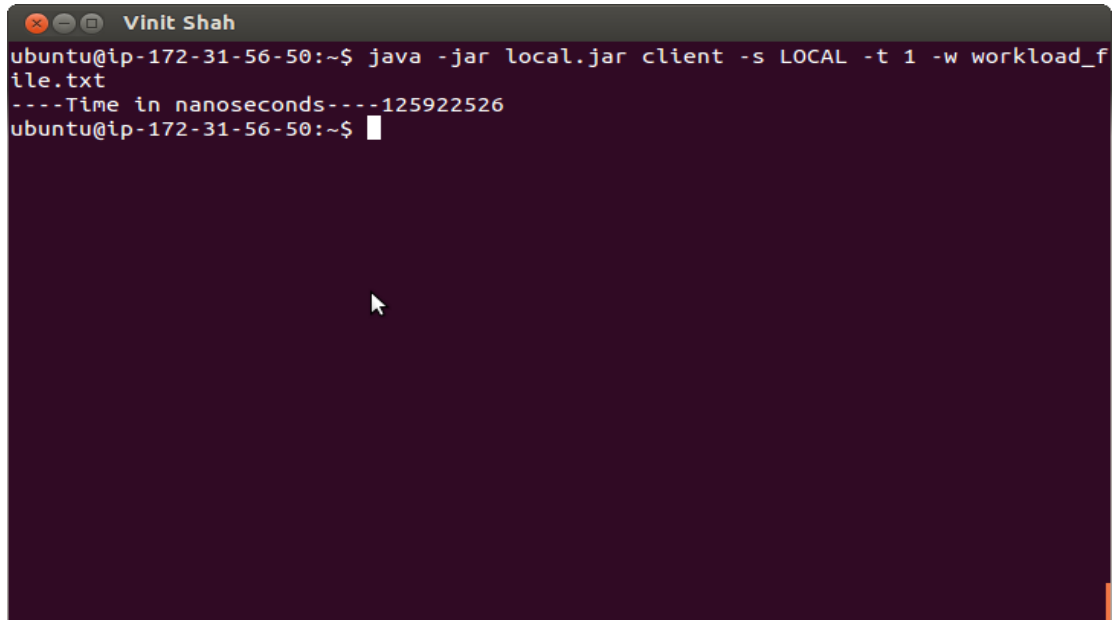


Screenshots

Local (In-memory) Execution (Throughput):

Sleep 10 10K tasks:

No. of Workers 1:

A terminal window titled "Vinit Shah" showing a command execution. The command is `java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt`. The output is `---Time in nanoseconds---125922526`. The prompt is `ubuntu@ip-172-31-56-50:~$`.

```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt
---Time in nanoseconds---125922526
ubuntu@ip-172-31-56-50:~$
```

No. of Workers 2:

A terminal window titled "Vinit Shah" showing a command execution. The command is `java -jar local.jar client -s LOCAL -t 2 -w workload_file.txt`. The output is `---Time in nanoseconds---137294125`. The prompt is `ubuntu@ip-172-31-56-50:~$`.

```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 2 -w workload_file.txt
---Time in nanoseconds---137294125
ubuntu@ip-172-31-56-50:~$
```

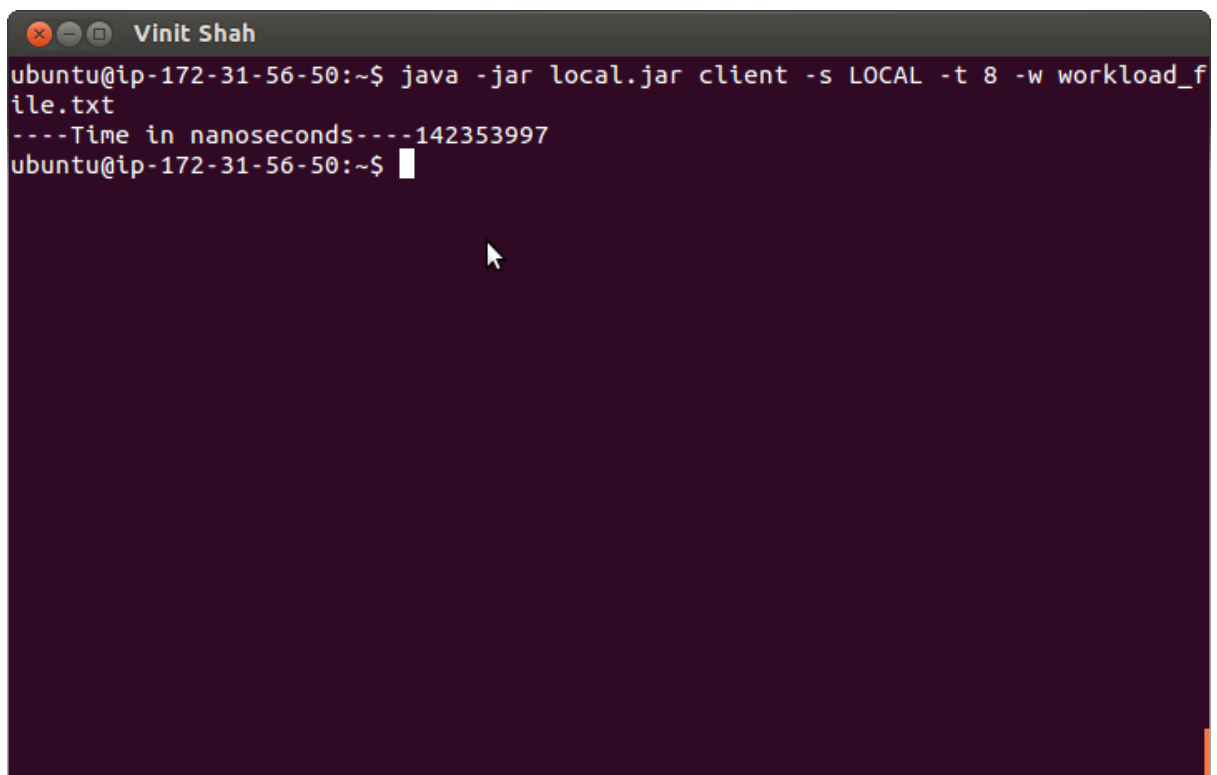
No. of Workers 4:



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt
---Time in nanoseconds---153162268
ubuntu@ip-172-31-56-50:~$
```

A terminal window titled "Vinit Shah" showing a command execution. The command is `java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt`. The output is `---Time in nanoseconds---153162268`. The prompt is `ubuntu@ip-172-31-56-50:~$`.

No. of Workers 8



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 8 -w workload_file.txt
---Time in nanoseconds---142353997
ubuntu@ip-172-31-56-50:~$
```

A terminal window titled "Vinit Shah" showing a command execution. The command is `java -jar local.jar client -s LOCAL -t 8 -w workload_file.txt`. The output is `---Time in nanoseconds---142353997`. The prompt is `ubuntu@ip-172-31-56-50:~$`.

:


No. of Workers 16:

A terminal window titled "Vinit Shah" with a dark purple background. The prompt is "ubuntu@ip-172-31-56-50:~\$". The command entered is "java -jar local.jar client -s LOCAL -t 16 -w workload_file.txt". The output is "----Time in nanoseconds----146585012". The prompt returns to "ubuntu@ip-172-31-56-50:~\$".

```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 16 -w workload_file.txt
----Time in nanoseconds----146585012
ubuntu@ip-172-31-56-50:~$
```

Sleep 0 100K tasks:

No. of Workers 1:

A terminal window titled "Vinit Shah" with a dark purple background. The prompt is "ubuntu@ip-172-31-56-50:~\$". The command entered is "java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt". The output is "----Time in nanoseconds----452327557". The prompt returns to "ubuntu@ip-172-31-56-50:~\$".

```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt
----Time in nanoseconds----452327557
ubuntu@ip-172-31-56-50:~$
```

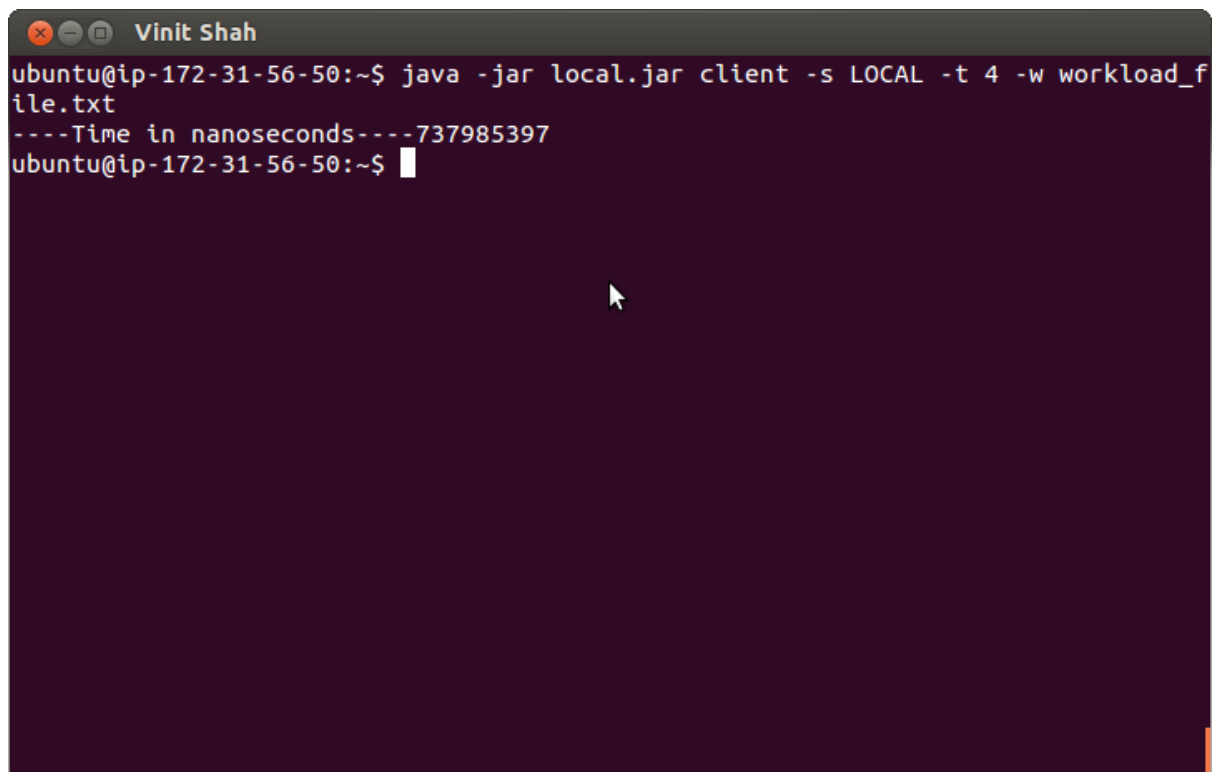
No. of Workers 2:



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 2 -w workload_file.txt
----Time in nanoseconds----725852975
ubuntu@ip-172-31-56-50:~$
```

A terminal window titled "Vinit Shah" showing a command execution. The command is `java -jar local.jar client -s LOCAL -t 2 -w workload_file.txt`. The output is `----Time in nanoseconds----725852975`. The prompt is `ubuntu@ip-172-31-56-50:~$`.

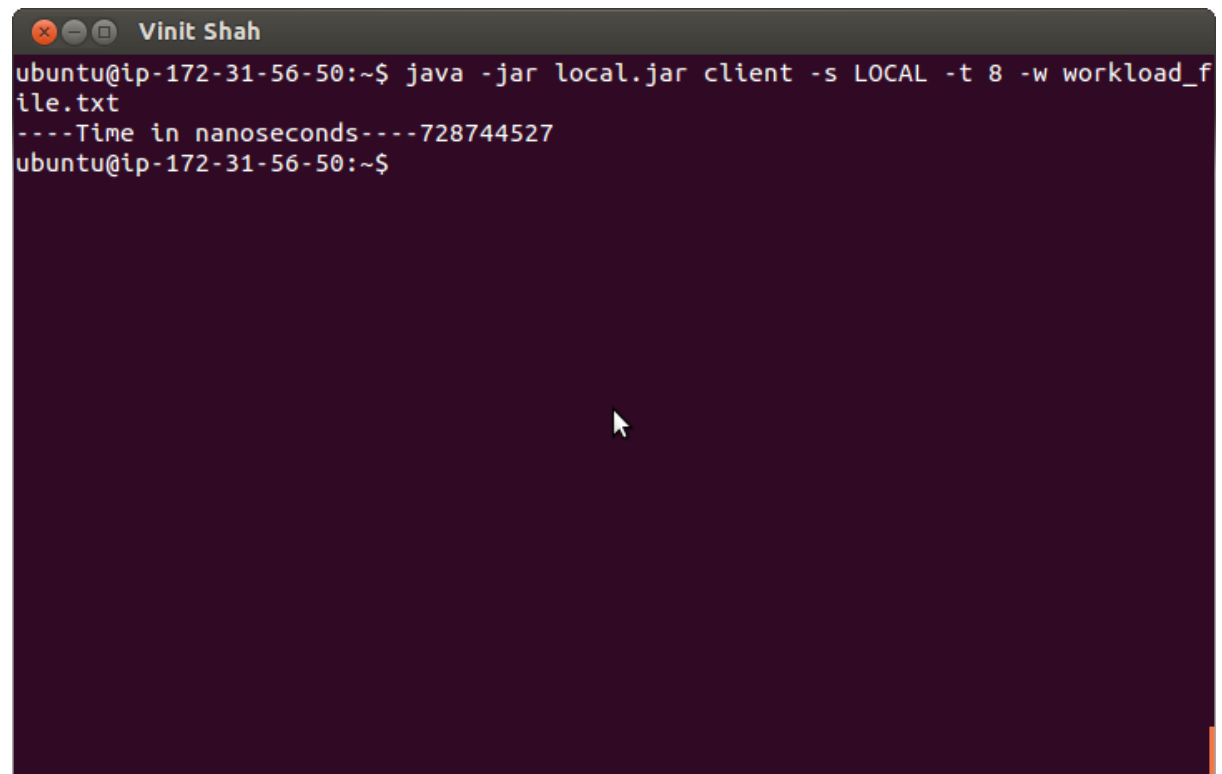
No. of Workers 4:



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt
----Time in nanoseconds----737985397
ubuntu@ip-172-31-56-50:~$
```

A terminal window titled "Vinit Shah" showing a command execution. The command is `java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt`. The output is `----Time in nanoseconds----737985397`. The prompt is `ubuntu@ip-172-31-56-50:~$`.

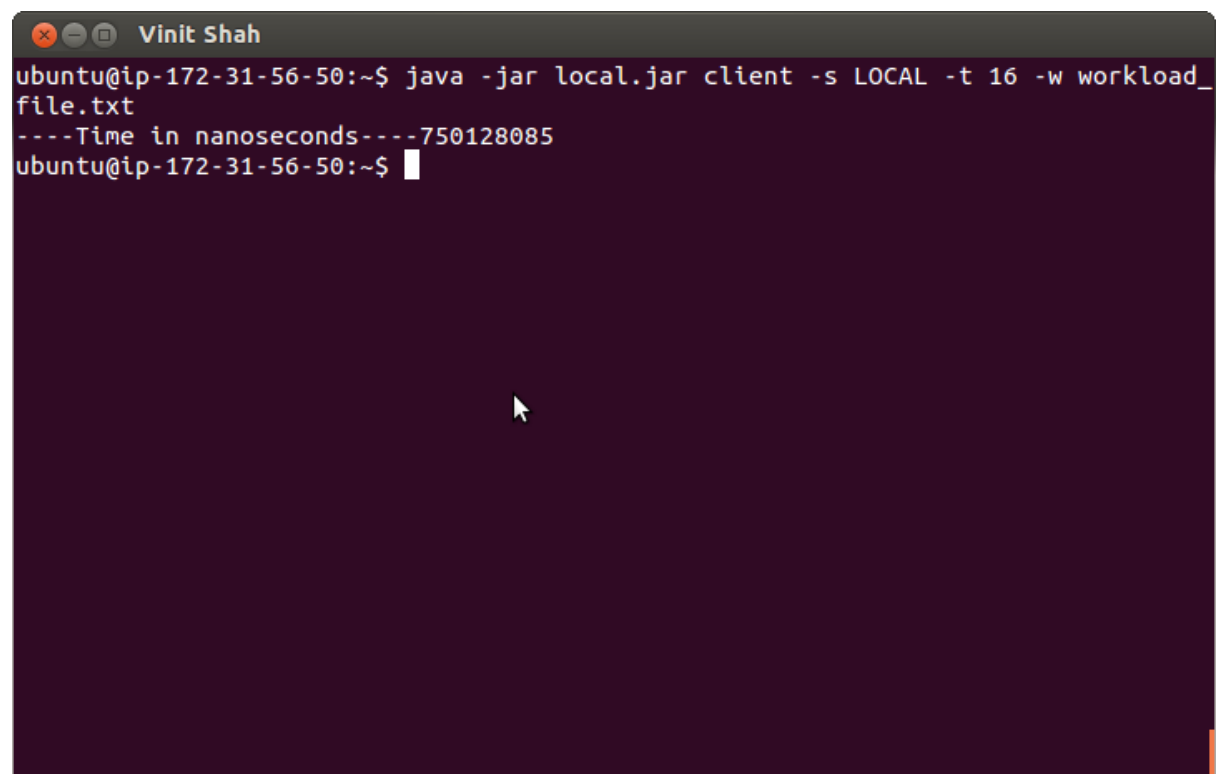
No. of Workers 8



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 8 -w workload_file.txt
----Time in nanoseconds----728744527
ubuntu@ip-172-31-56-50:~$
```

:

No. of Workers 16



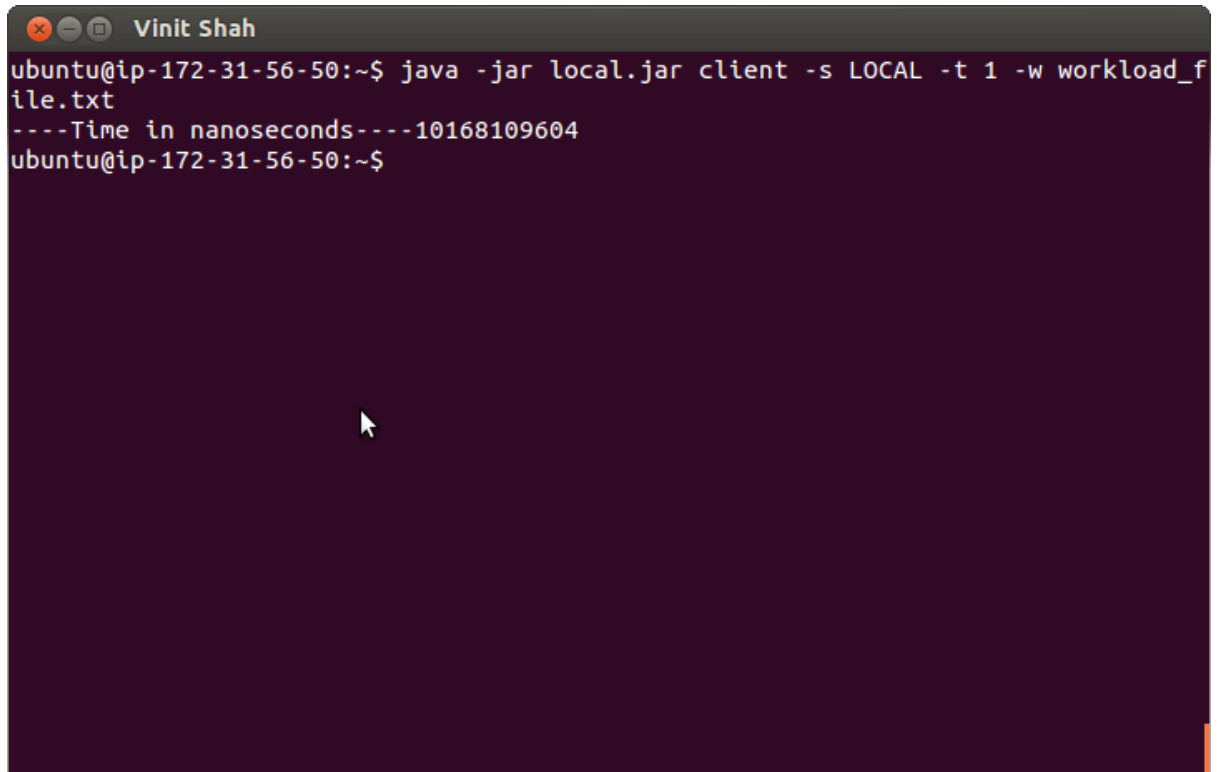
```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 16 -w workload_file.txt
----Time in nanoseconds----750128085
ubuntu@ip-172-31-56-50:~$
```

:

Local (In-memory) Execution (Efficiency):

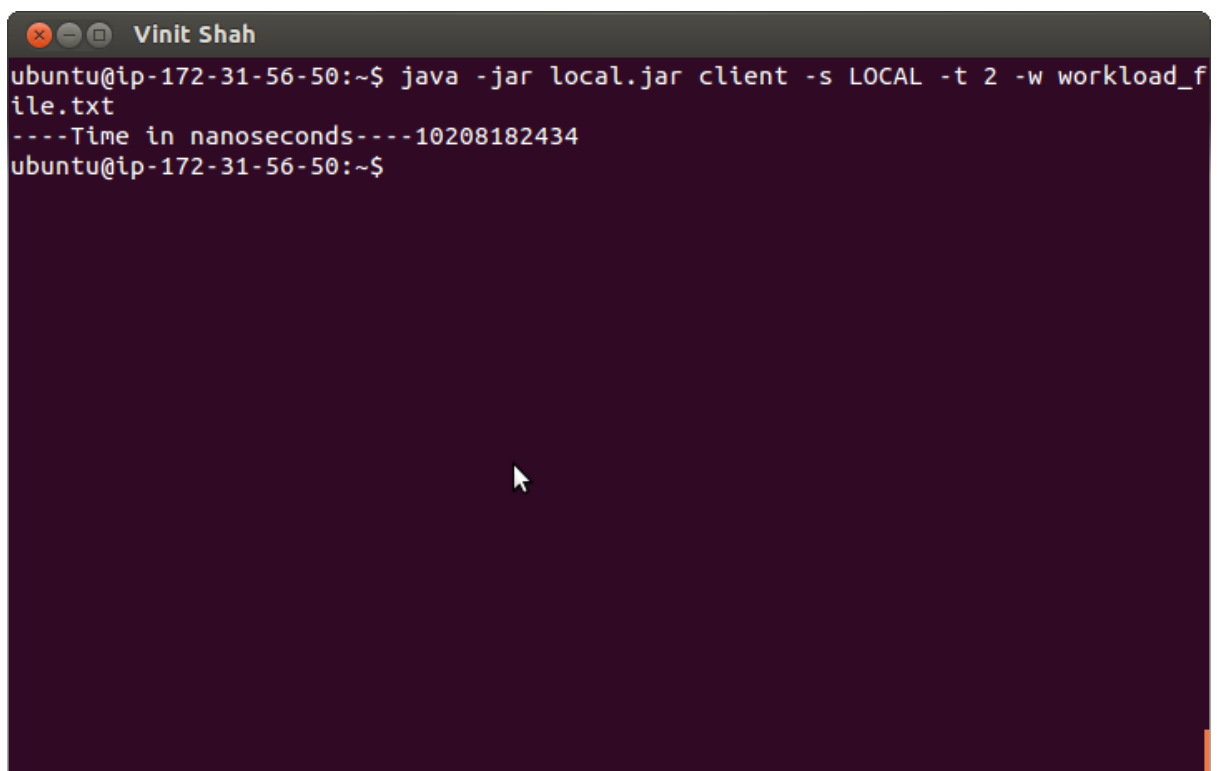
Task Time 10 ms:

No. of Workers 1



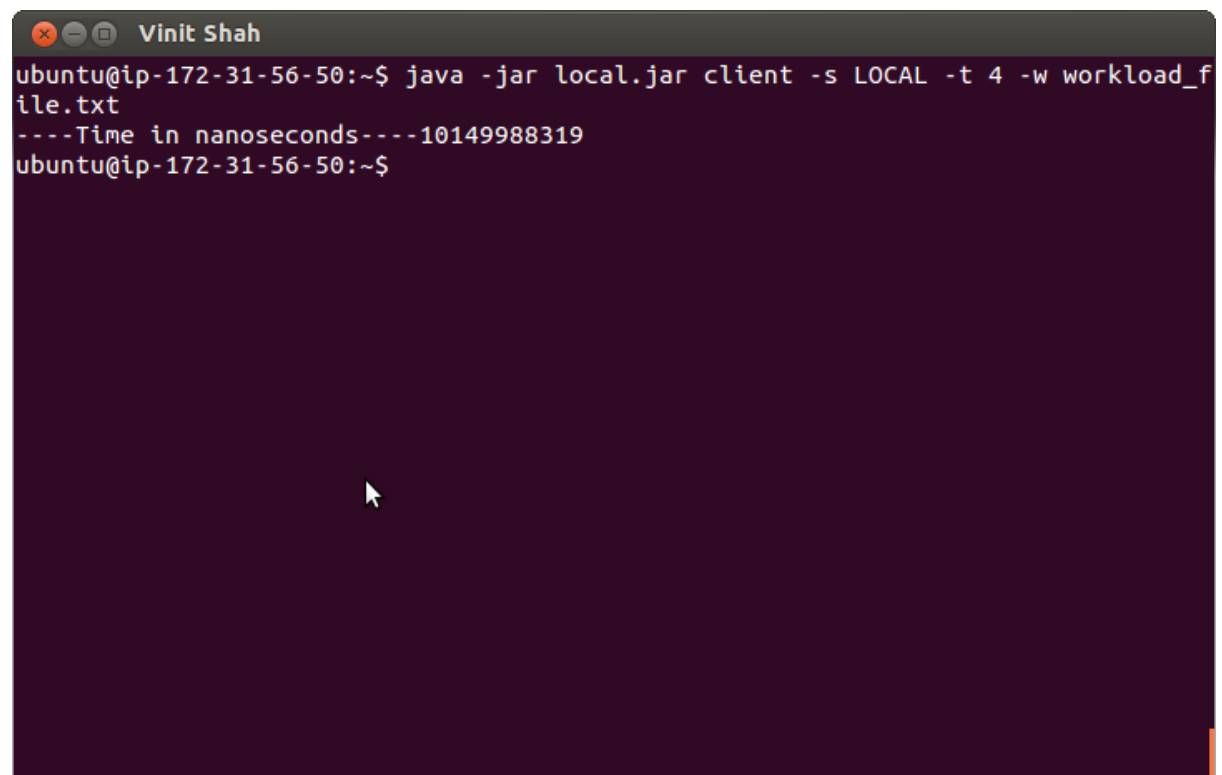
```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt
----Time in nanoseconds----10168109604
ubuntu@ip-172-31-56-50:~$
```

No. of Workers 2



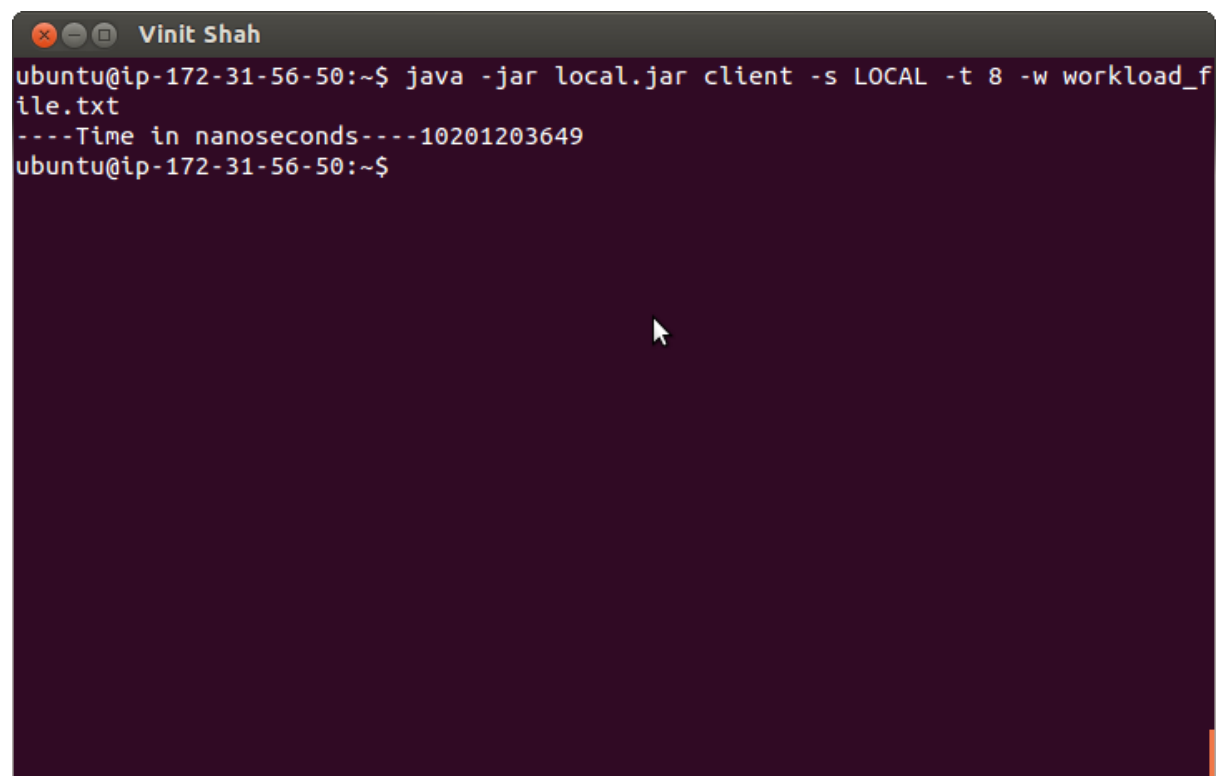
```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 2 -w workload_file.txt
----Time in nanoseconds----10208182434
ubuntu@ip-172-31-56-50:~$
```

No. of Workers 4:

A terminal window titled "Vinit Shah" with a dark purple background. The prompt is "ubuntu@ip-172-31-56-50:~\$". The command entered is "java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt". The output is "----Time in nanoseconds----10149988319". The prompt returns to "ubuntu@ip-172-31-56-50:~\$".

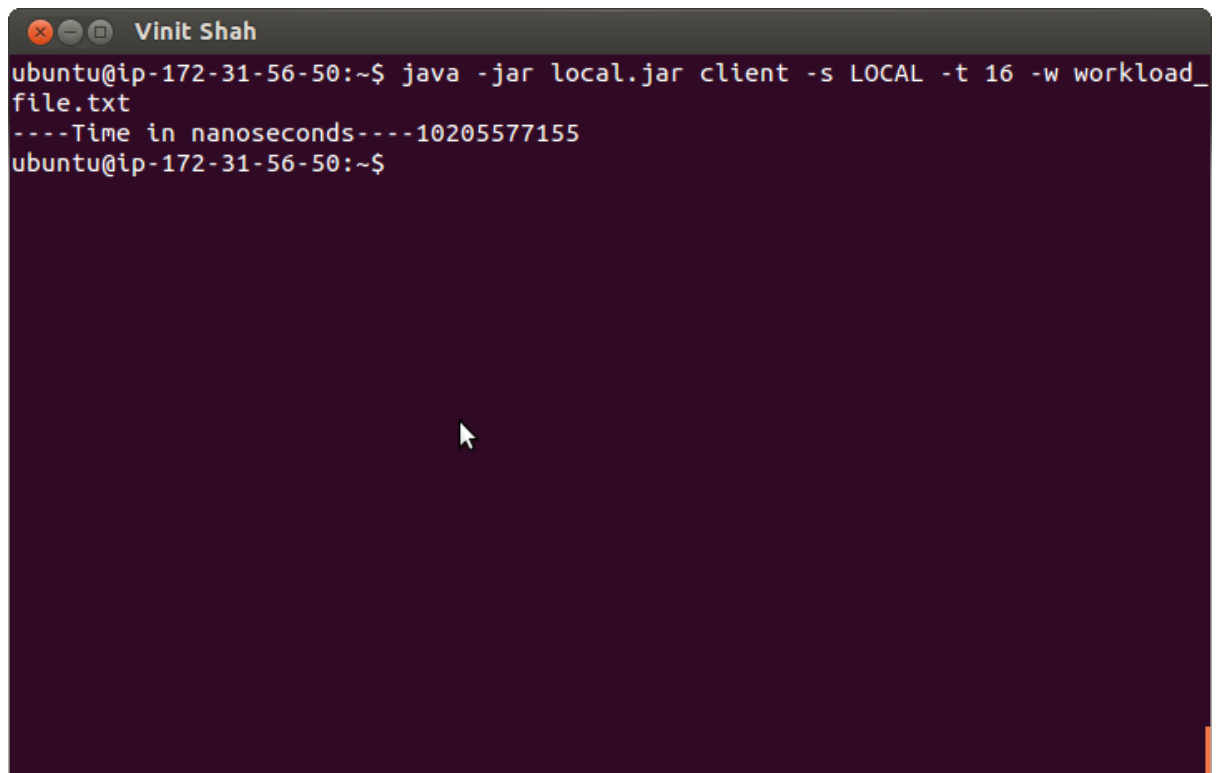
```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt
----Time in nanoseconds----10149988319
ubuntu@ip-172-31-56-50:~$
```

No. of Workers 8:

A terminal window titled "Vinit Shah" with a dark purple background. The prompt is "ubuntu@ip-172-31-56-50:~\$". The command entered is "java -jar local.jar client -s LOCAL -t 8 -w workload_file.txt". The output is "----Time in nanoseconds----10201203649". The prompt returns to "ubuntu@ip-172-31-56-50:~\$".

```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 8 -w workload_file.txt
----Time in nanoseconds----10201203649
ubuntu@ip-172-31-56-50:~$
```

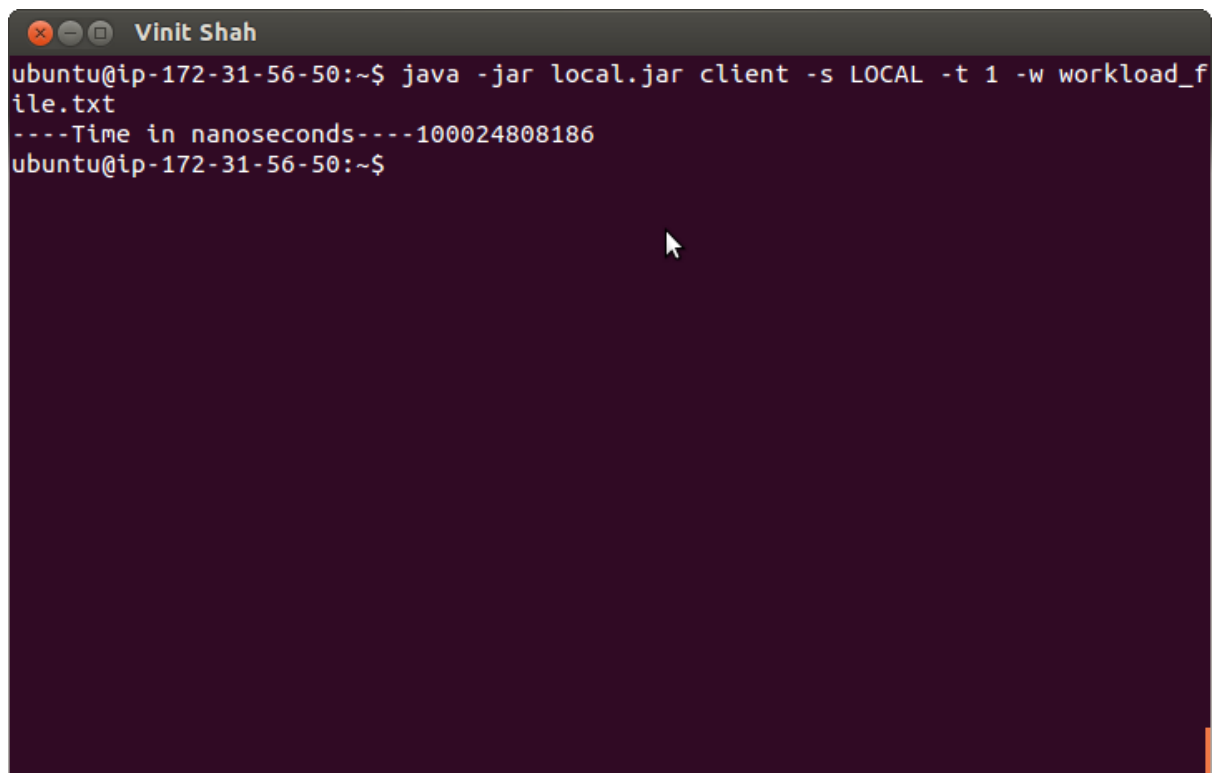
No. of Workers 16:

A terminal window titled "Vinit Shah" with a dark purple background. The prompt is "ubuntu@ip-172-31-56-50:~\$". The command entered is "java -jar local.jar client -s LOCAL -t 16 -w workload_file.txt". The output is "----Time in nanoseconds----10205577155". The prompt returns to "ubuntu@ip-172-31-56-50:~\$".

```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 16 -w workload_file.txt
----Time in nanoseconds----10205577155
ubuntu@ip-172-31-56-50:~$
```

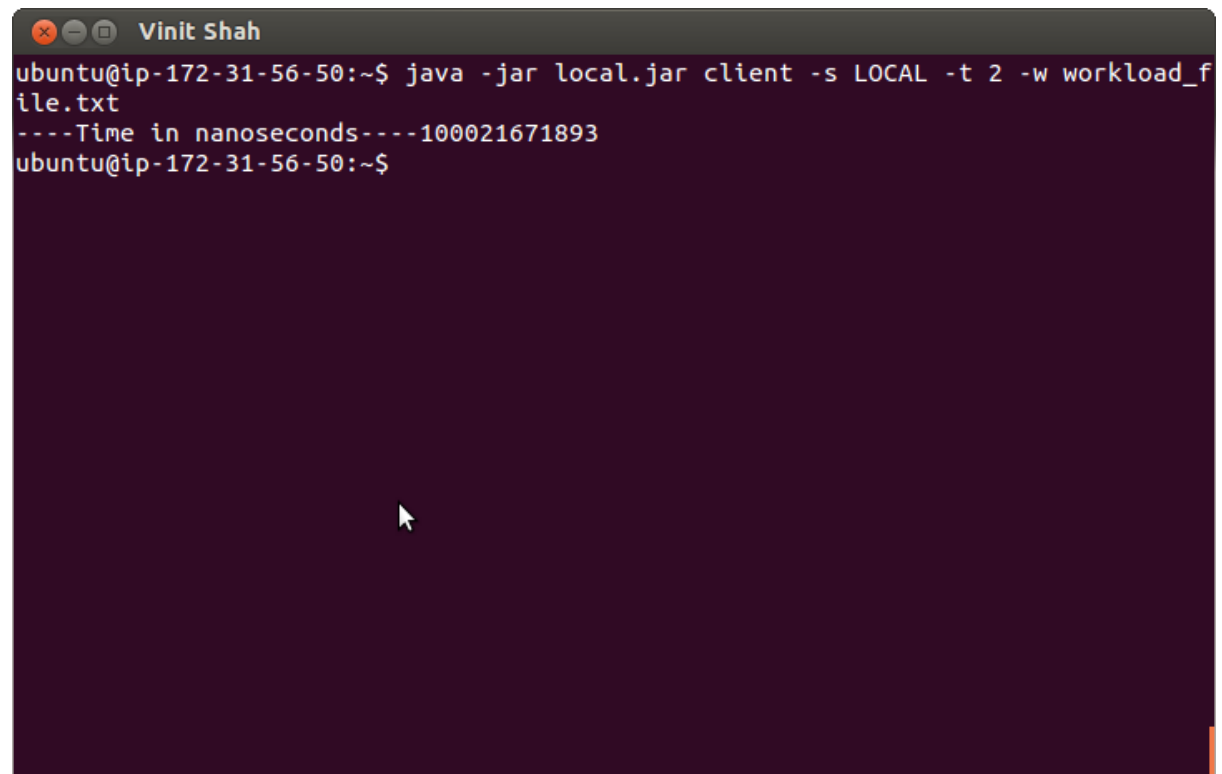
Task Time 1 sec:

No. of Workers 1:

A terminal window titled "Vinit Shah" with a dark purple background. The prompt is "ubuntu@ip-172-31-56-50:~\$". The command entered is "java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt". The output is "----Time in nanoseconds----100024808186". The prompt returns to "ubuntu@ip-172-31-56-50:~\$".

```
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt
----Time in nanoseconds----100024808186
ubuntu@ip-172-31-56-50:~$
```

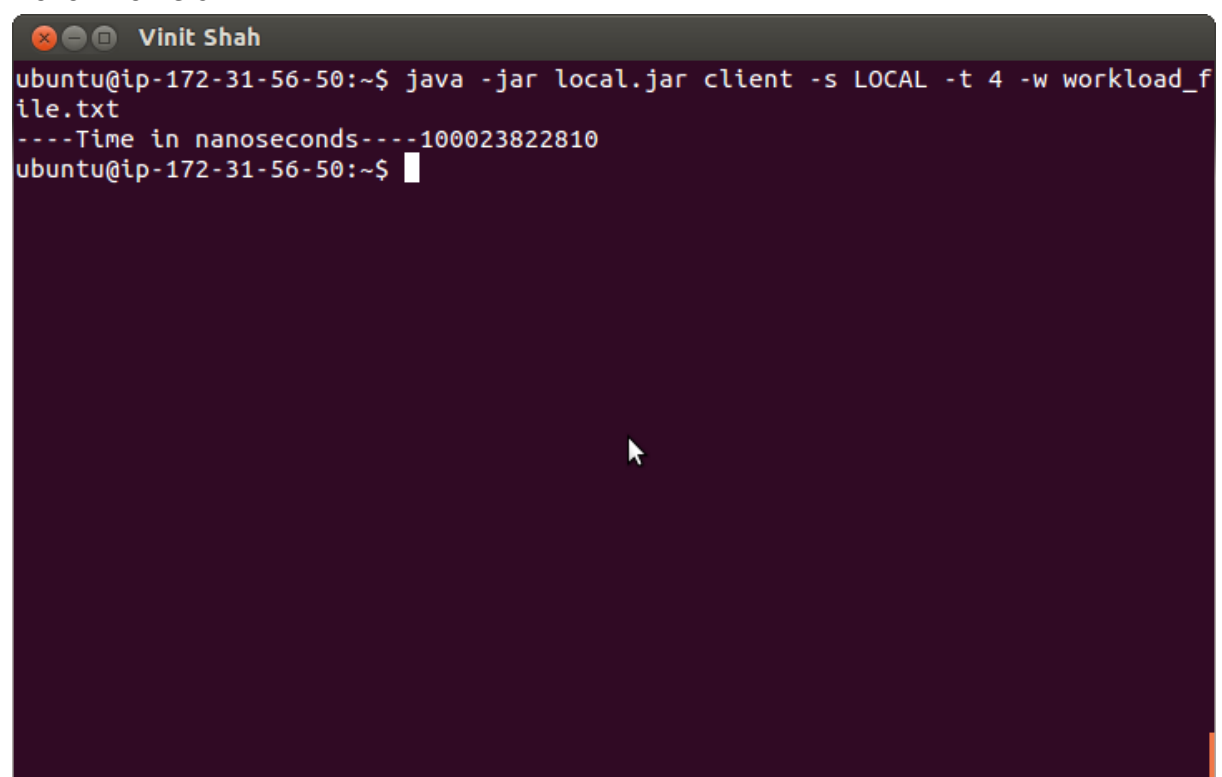

No. of Workers 2



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 2 -w workload_file.txt
----Time in nanoseconds----100021671893
ubuntu@ip-172-31-56-50:~$
```

:

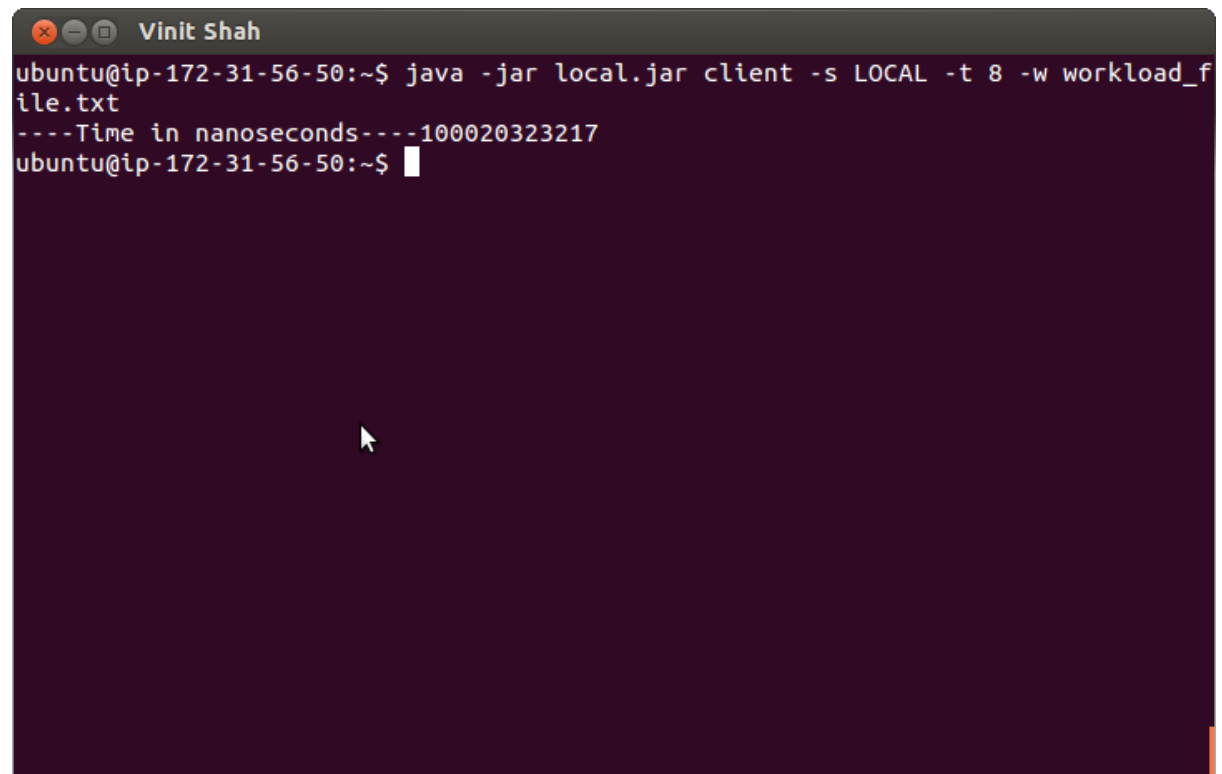
No. of Workers 4



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt
----Time in nanoseconds----100023822810
ubuntu@ip-172-31-56-50:~$
```

:

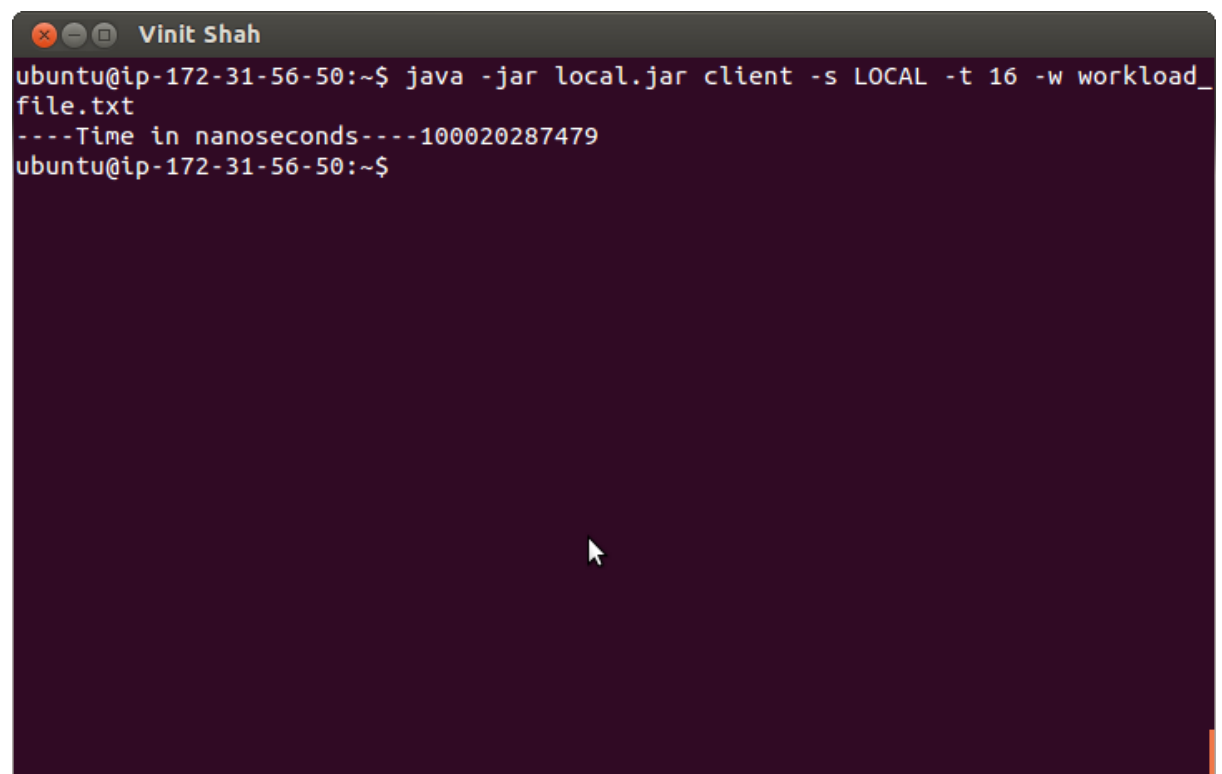
No. of Workers 8



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 8 -w workload_file.txt
----Time in nanoseconds----100020323217
ubuntu@ip-172-31-56-50:~$
```

:

No. of Workers 16




```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 16 -w workload_file.txt
----Time in nanoseconds----100020287479
ubuntu@ip-172-31-56-50:~$
```

:

Task Time 10 sec:

No. of Workers 1:



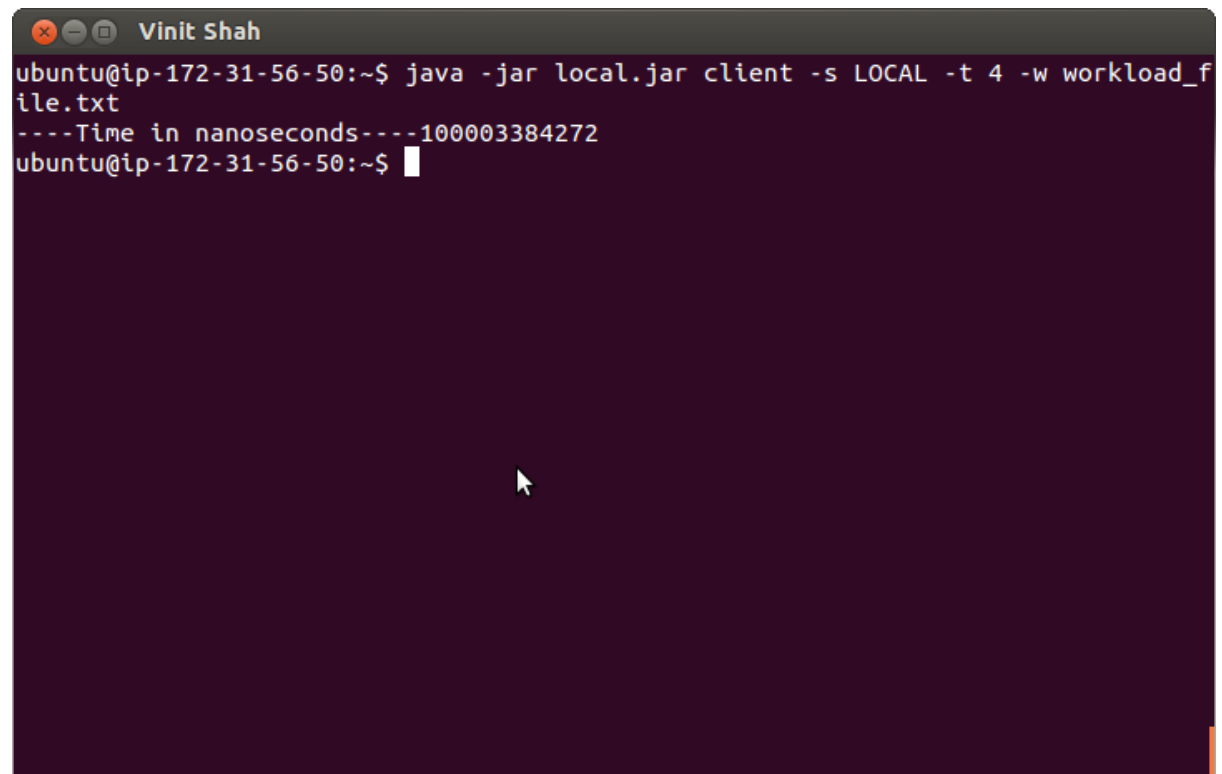
```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 1 -w workload_file.txt
----Time in nanoseconds----100002939727
ubuntu@ip-172-31-56-50:~$
```

No. of Workers 2:



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 2 -w workload_file.txt
----Time in nanoseconds----100002845347
ubuntu@ip-172-31-56-50:~$
```

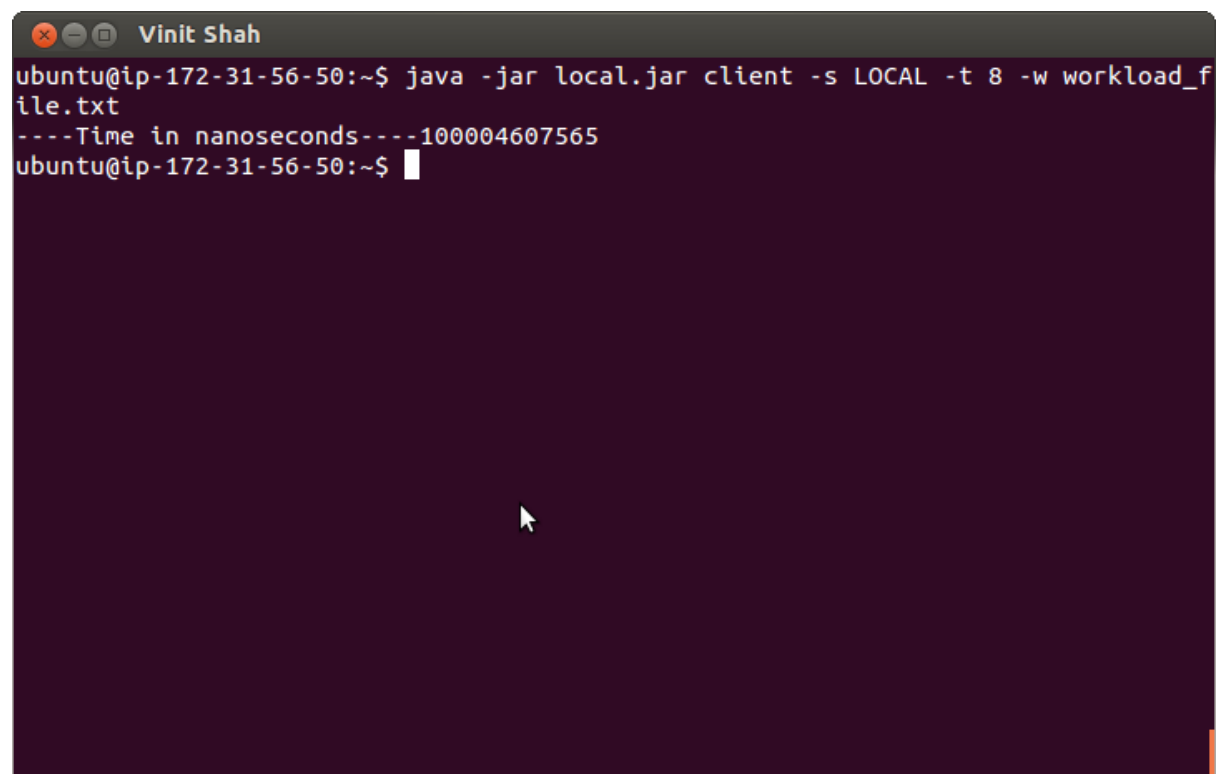
No. of Workers 4



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 4 -w workload_file.txt
----Time in nanoseconds----100003384272
ubuntu@ip-172-31-56-50:~$
```

:

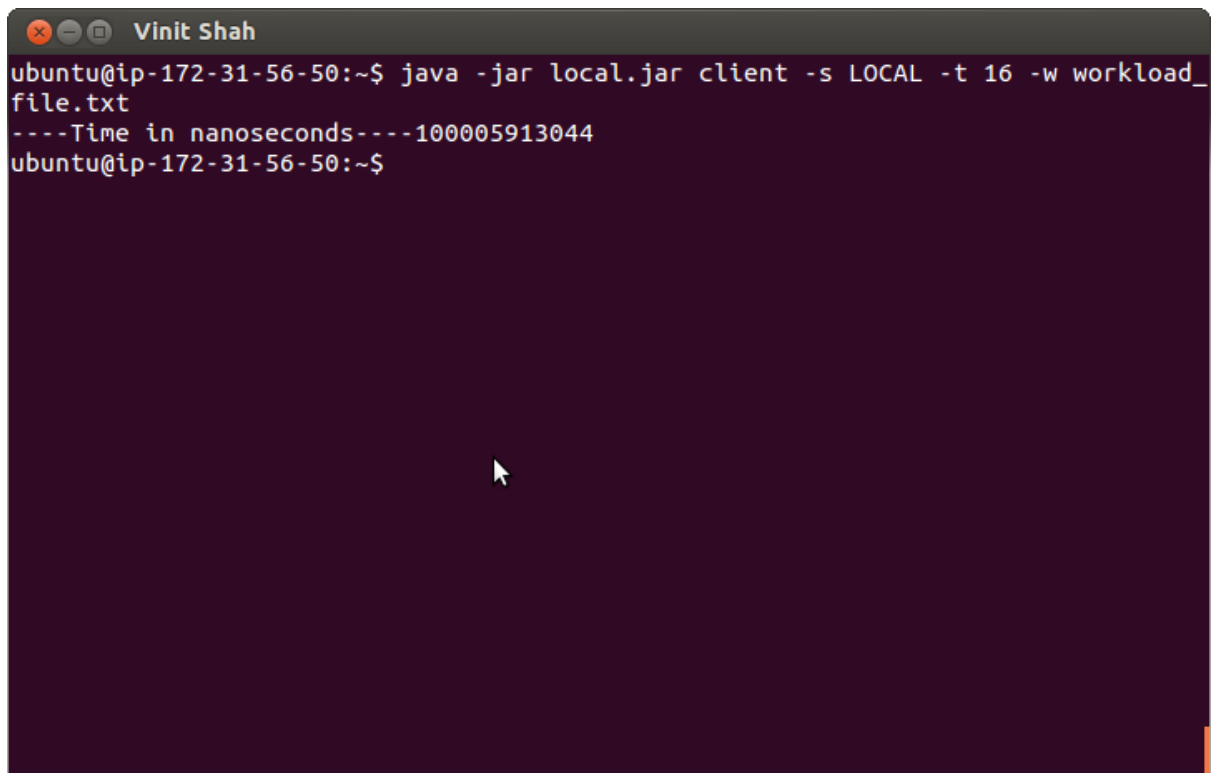
No. of Workers 8



```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 8 -w workload_file.txt
----Time in nanoseconds----100004607565
ubuntu@ip-172-31-56-50:~$
```

:

No. of Workers 16:

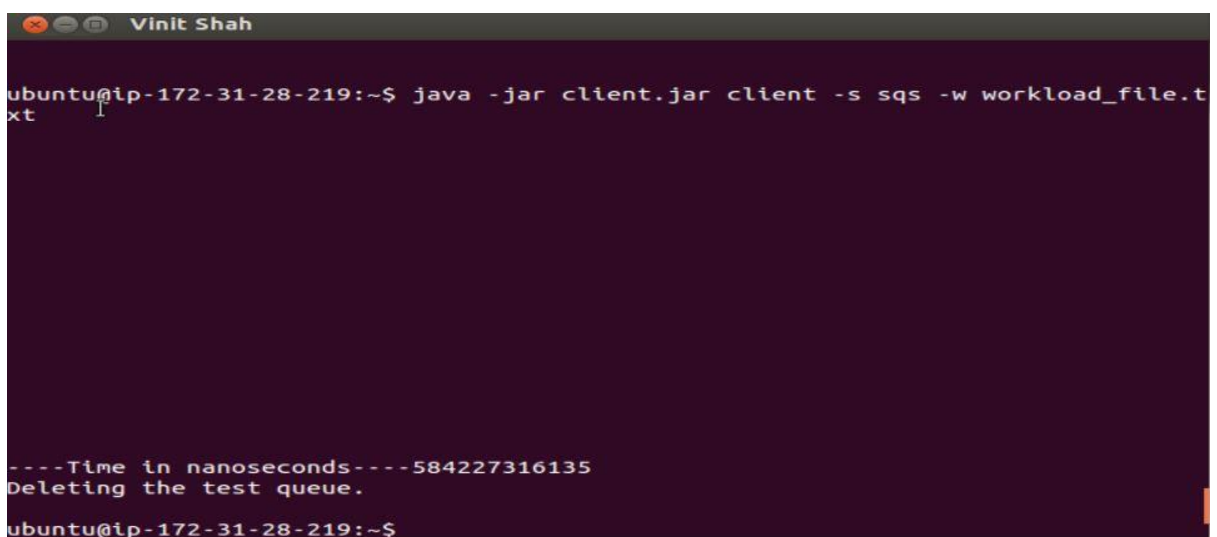


```
Vinit Shah
ubuntu@ip-172-31-56-50:~$ java -jar local.jar client -s LOCAL -t 16 -w workload_
file.txt
----Time in nanoseconds----100005913044
ubuntu@ip-172-31-56-50:~$
```

Remote Execution (SQS) Throughput:

Sleep 0 10K tasks:

Number of workers 1:



```
Vinit Shah
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.t
xt
----Time in nanoseconds----584227316135
Deleting the test queue.
ubuntu@ip-172-31-28-219:~$
```

Number of workers 2:

```
Vinit Shah
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.txt
---Time in nanoseconds---241917358313
Deleting the test queue.

ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
```

Number of workers 4:

```
Vinit Shah
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.txt
---Time in nanoseconds---133463834801
Deleting the test queue.

ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
```

Remote Execution (SQS) Efficiency:

Sleep Time 10ms:

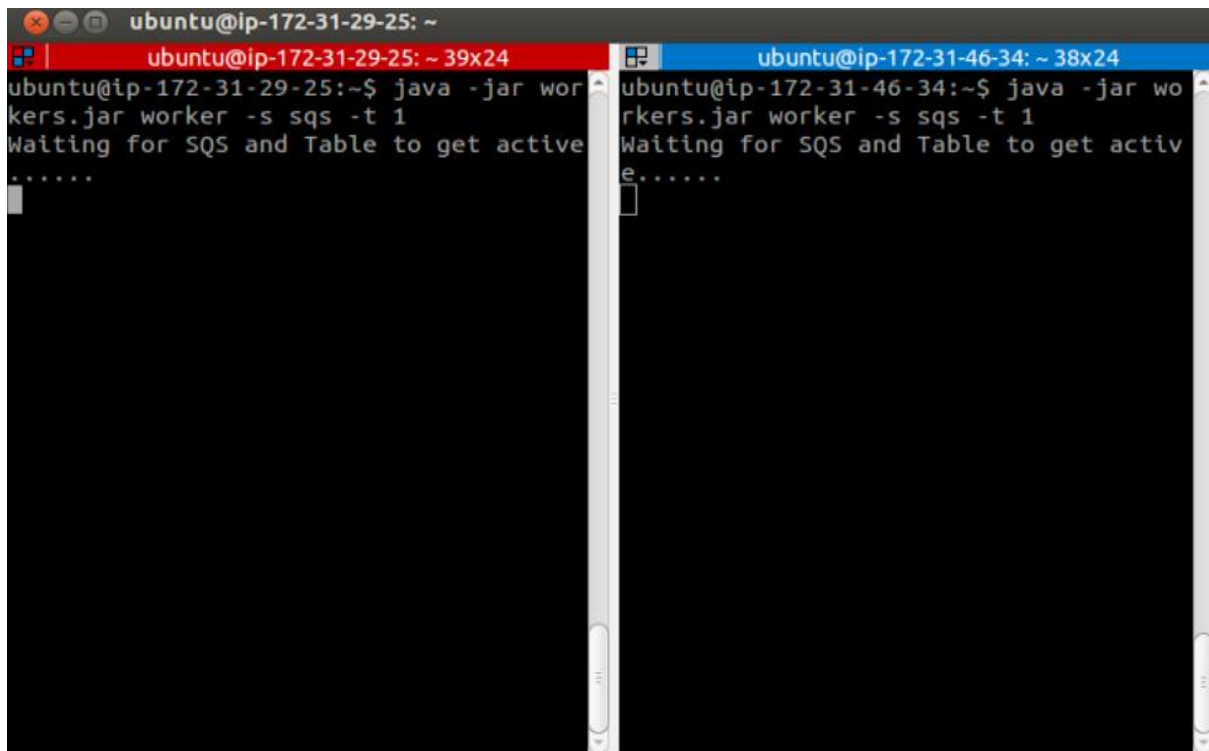
Number of workers 1:

```
Vinit Shah
ubuntu@ip-172-31-24-59:~$ java -jar client.jar client -s sqs -w workload_file.tx
t
----Time in nanoseconds----46564088464
Deleting the test queue.
ubuntu@ip-172-31-24-59:~$
```

Number of workers 2:

```
Vinit Shah
ubuntu@ip-172-31-24-59:~$ java -jar client.jar client -s sqs -w workload_file.tx
t
----Time in nanoseconds----42081647998
Deleting the test queue.
ubuntu@ip-172-31-24-59:~$
```

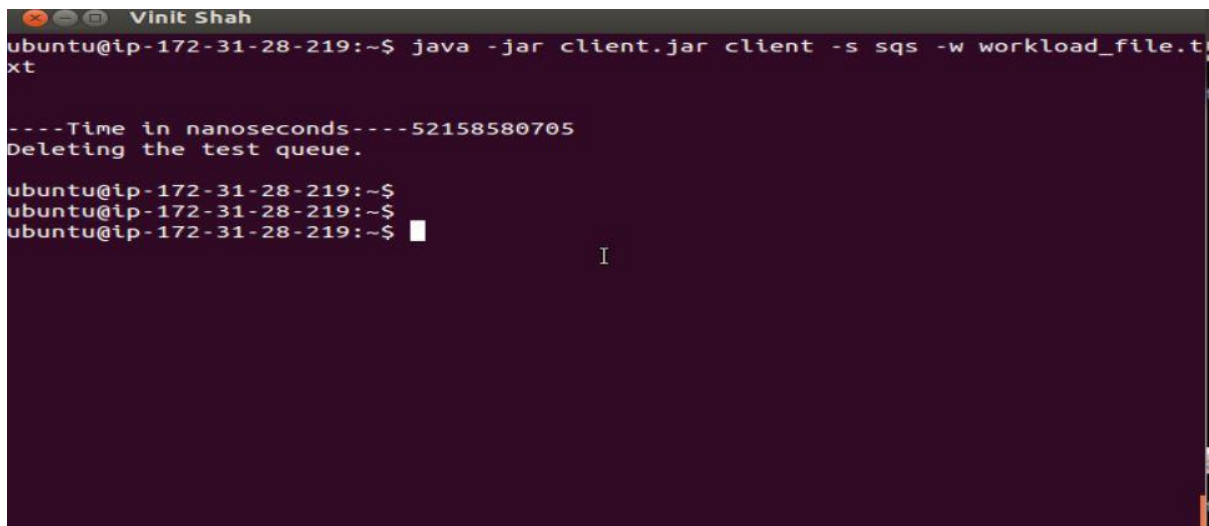
Workers Running:



The image shows two terminal windows side-by-side. The left window has a red title bar and shows the command `java -jar workers.jar worker -s sqs -t 1` being executed. The output indicates it is waiting for SQS and Table to get active, followed by a series of dots. The right window has a blue title bar and shows the same command being executed, with similar output indicating it is waiting for SQS and Table to get active, followed by a series of dots.

```
ubuntu@ip-172-31-29-25: ~  
ubuntu@ip-172-31-29-25: ~ 39x24  
ubuntu@ip-172-31-29-25:~$ java -jar workers.jar worker -s sqs -t 1  
Waiting for SQS and Table to get active  
.....  
[ ]  
  
ubuntu@ip-172-31-46-34: ~ 38x24  
ubuntu@ip-172-31-46-34:~$ java -jar workers.jar worker -s sqs -t 1  
Waiting for SQS and Table to get active  
.....  
[ ]
```

Number of workers 4

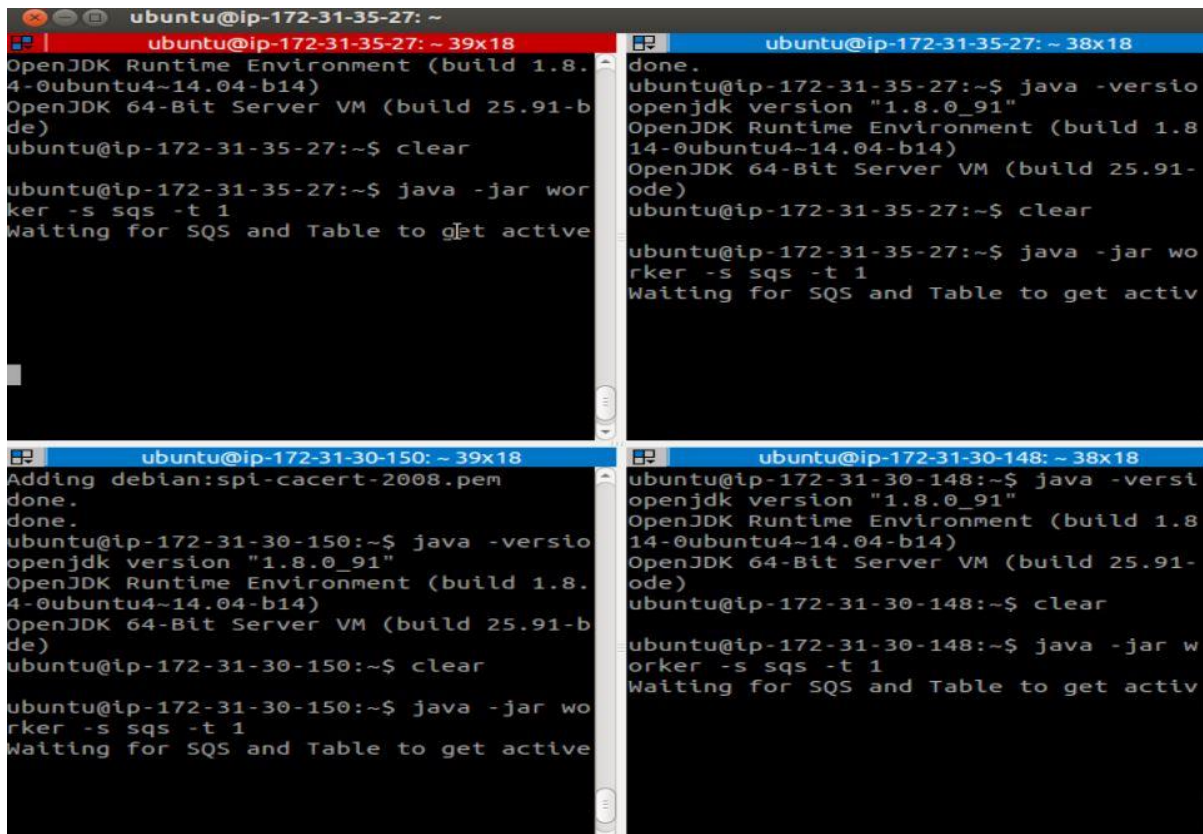


The image shows a terminal window with a dark purple background. The title bar says "Vinit Shah". The command `java -jar client.jar client -s sqs -w workload_file.txt` is executed. The output shows the time in nanoseconds as 52158580705 and a message "Deleting the test queue." followed by three empty lines.

```
Vinit Shah  
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.txt  
-----Time in nanoseconds-----52158580705  
Deleting the test queue.  
  
ubuntu@ip-172-31-28-219:~$  
ubuntu@ip-172-31-28-219:~$  
ubuntu@ip-172-31-28-219:~$
```

:

Workers Running:

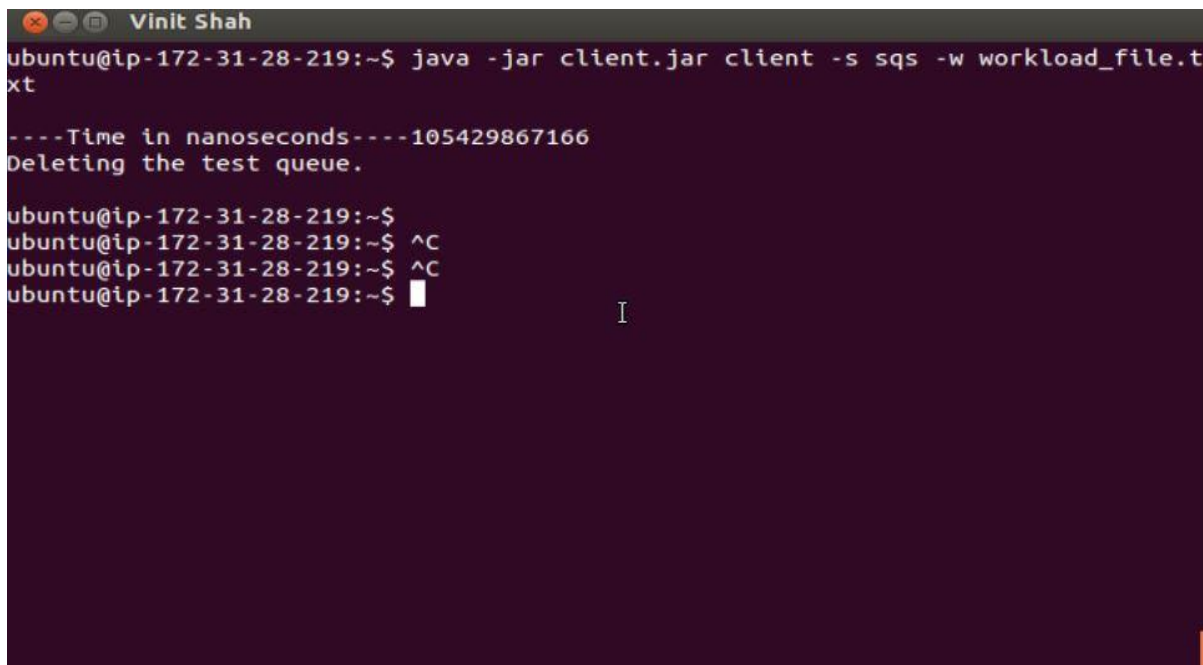


The image displays four terminal windows arranged in a 2x2 grid, each showing the setup and execution of a Java worker on a different Ubuntu instance. The top-left window (ip-172-31-35-27) shows the installation of OpenJDK and the execution of a worker command. The top-right window (ip-172-31-35-27) shows the verification of the OpenJDK version and the execution of the worker command. The bottom-left window (ip-172-31-30-150) shows the installation of a certificate and the execution of the worker command. The bottom-right window (ip-172-31-30-148) shows the verification of the OpenJDK version and the execution of the worker command. All windows show the worker command as 'Waiting for SQS and Table to get active'.

```
ubuntu@ip-172-31-35-27: ~  
OpenJDK Runtime Environment (build 1.8.0_91-b14-0ubuntu4~14.04-b14)  
OpenJDK 64-Bit Server VM (build 25.91-b04-0ubuntu4~14.04-b14)  
ubuntu@ip-172-31-35-27:~$ clear  
ubuntu@ip-172-31-35-27:~$ java -jar worker -s sqs -t 1  
Waiting for SQS and Table to get active  
  
ubuntu@ip-172-31-35-27:~$ java -version  
openjdk version "1.8.0_91"  
OpenJDK Runtime Environment (build 1.8.0_91-b14-0ubuntu4~14.04-b14)  
OpenJDK 64-Bit Server VM (build 25.91-b04-0ubuntu4~14.04-b14)  
ubuntu@ip-172-31-35-27:~$ clear  
ubuntu@ip-172-31-35-27:~$ java -jar worker -s sqs -t 1  
Waiting for SQS and Table to get active  
  
ubuntu@ip-172-31-30-150: ~ 39x18  
Adding debian:spi-cacert-2008.pem  
done.  
done.  
ubuntu@ip-172-31-30-150:~$ java -version  
openjdk version "1.8.0_91"  
OpenJDK Runtime Environment (build 1.8.0_91-b14-0ubuntu4~14.04-b14)  
OpenJDK 64-Bit Server VM (build 25.91-b04-0ubuntu4~14.04-b14)  
ubuntu@ip-172-31-30-150:~$ clear  
ubuntu@ip-172-31-30-150:~$ java -jar worker -s sqs -t 1  
Waiting for SQS and Table to get active  
  
ubuntu@ip-172-31-30-148: ~ 38x18  
openjdk version "1.8.0_91"  
OpenJDK Runtime Environment (build 1.8.0_91-b14-0ubuntu4~14.04-b14)  
OpenJDK 64-Bit Server VM (build 25.91-b04-0ubuntu4~14.04-b14)  
ubuntu@ip-172-31-30-148:~$ clear  
ubuntu@ip-172-31-30-148:~$ java -jar worker -s sqs -t 1  
Waiting for SQS and Table to get active
```

Sleep Time 1 Sec:

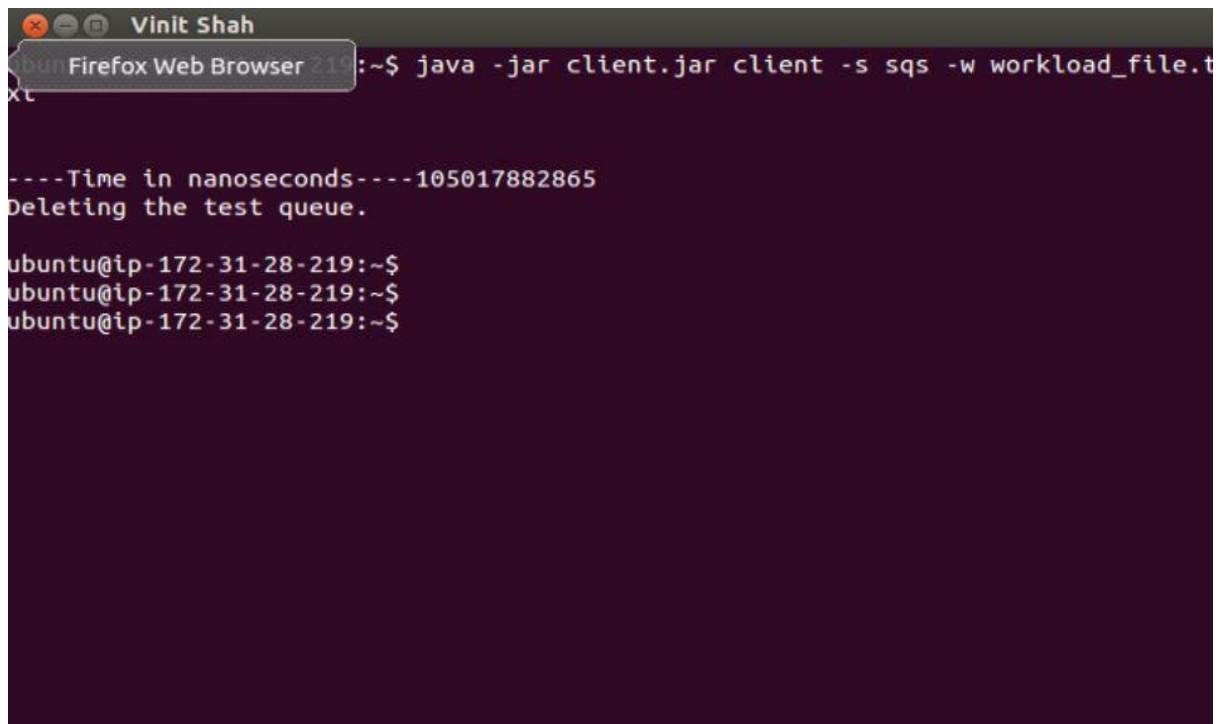
Number of workers 1



The image shows a terminal window titled 'Vinit Shah' on an Ubuntu instance (ip-172-31-28-219). The user runs the command 'java -jar client.jar client -s sqs -w workload_file.txt'. The output shows the time taken in nanoseconds (105429867166) and the message 'Deleting the test queue.' The user then presses Ctrl+C three times to exit the program.

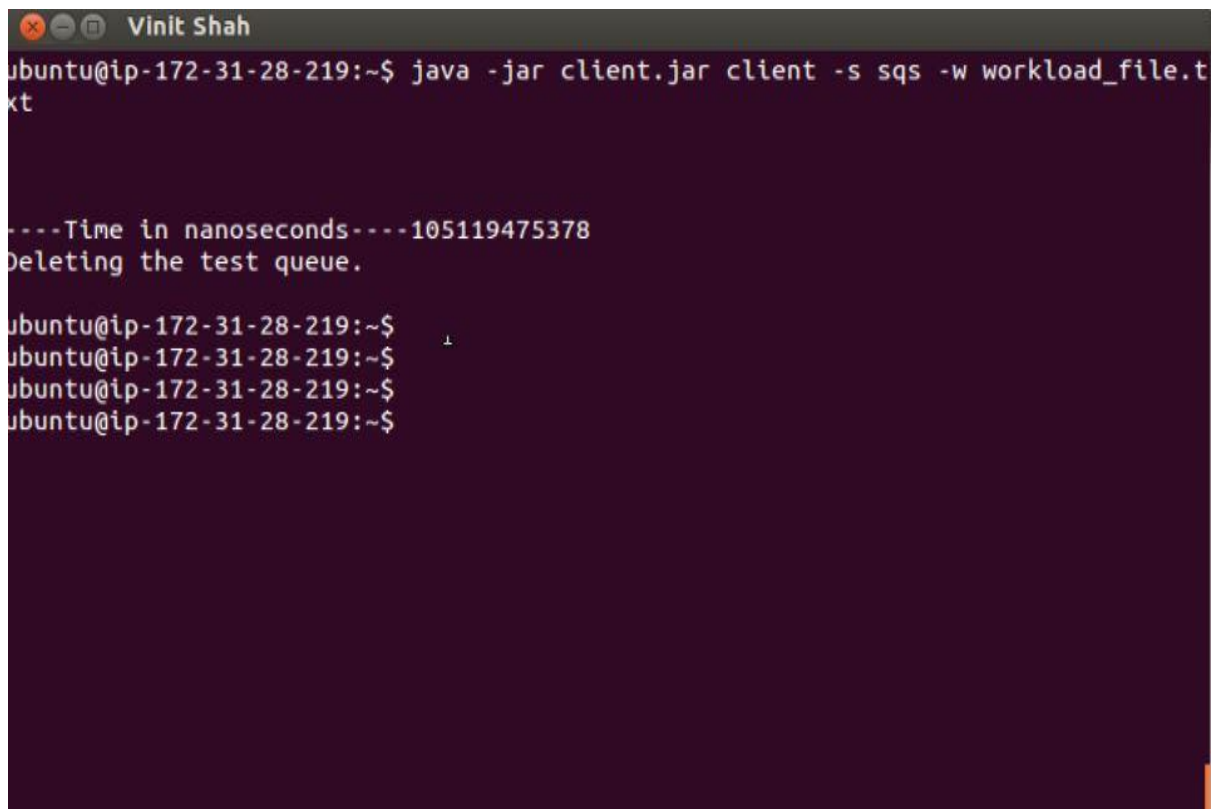
```
Vinit Shah  
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.txt  
----Time in nanoseconds----105429867166  
Deleting the test queue.  
ubuntu@ip-172-31-28-219:~$  
ubuntu@ip-172-31-28-219:~$ ^C  
ubuntu@ip-172-31-28-219:~$ ^C  
ubuntu@ip-172-31-28-219:~$
```

Number of workers 2:



```
Vinit Shah
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.txt
---Time in nanoseconds---105017882865
Deleting the test queue.
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
```

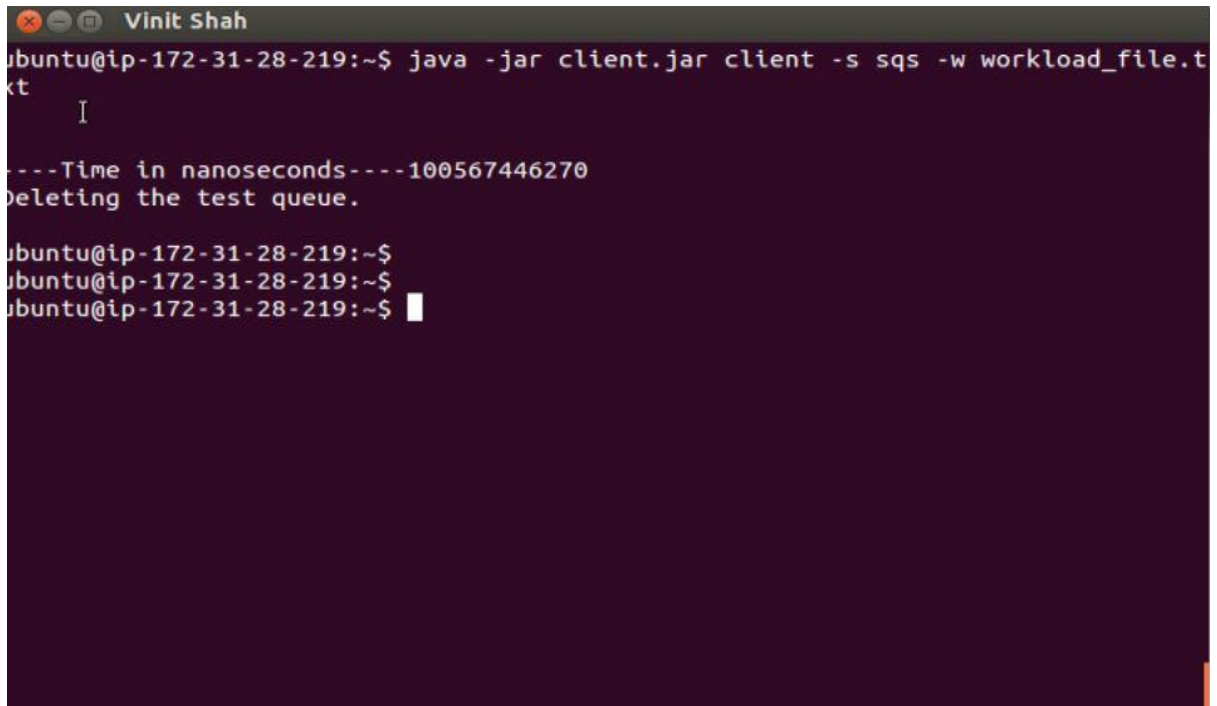
Number of workers 4:



```
Vinit Shah
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.txt
---Time in nanoseconds---105119475378
Deleting the test queue.
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
```

Sleep Time 10 Sec:

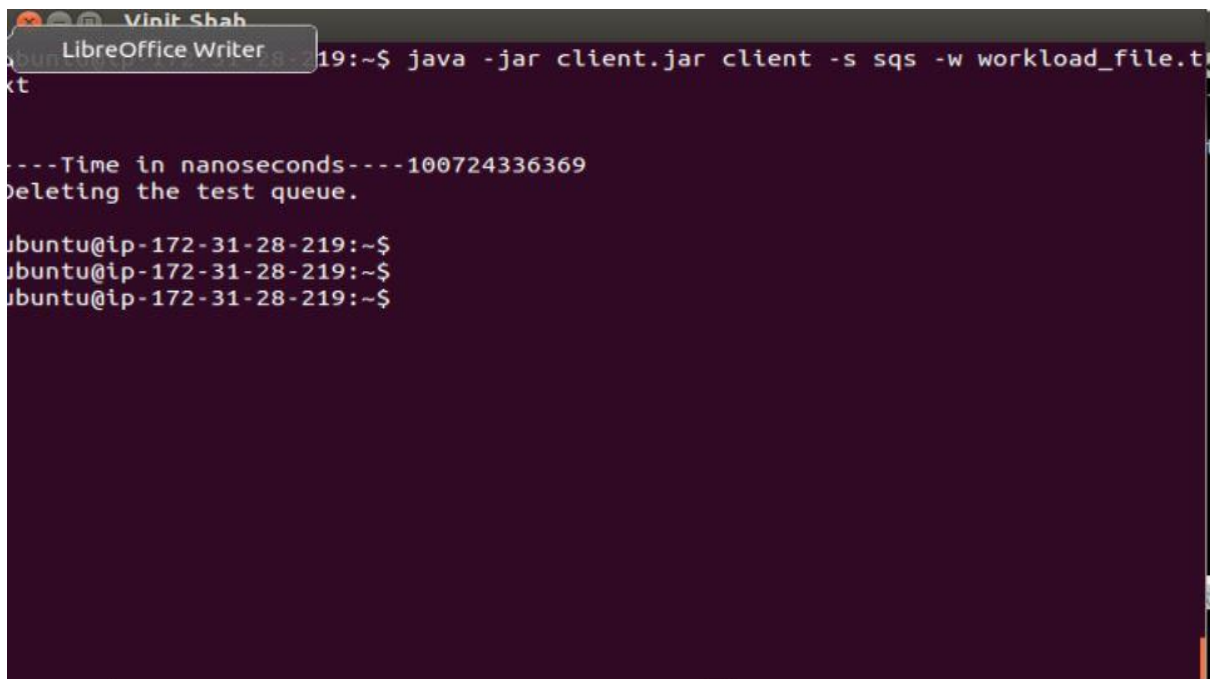
Number of workers 1:



```
Vinit Shah
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.t
xt
I
---Time in nanoseconds---100567446270
Deleting the test queue.

ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
```

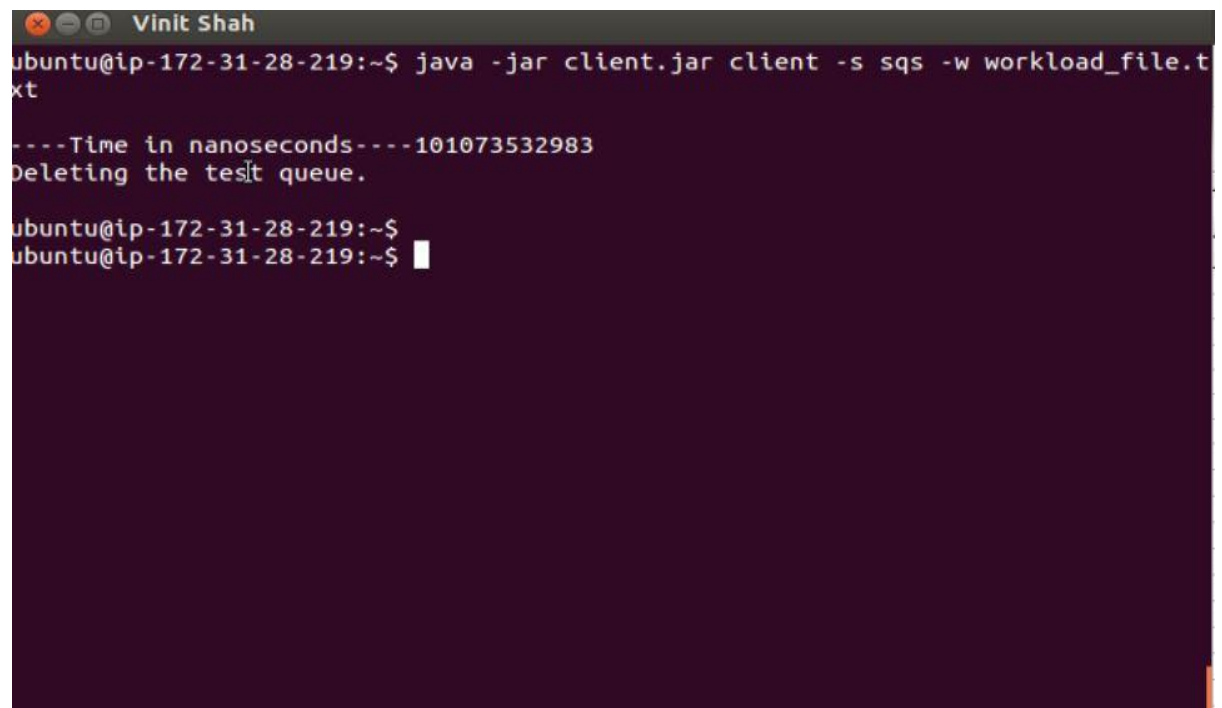
Number of workers 2:



```
Vinit Shah
LibreOffice Writer
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.t
xt
---Time in nanoseconds---100724336369
Deleting the test queue.

ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
```

Number of workers 4:

A terminal window titled "Vinit Shah" with a dark background. The prompt is "ubuntu@ip-172-31-28-219:~\$". The command "java -jar client.jar client -s sqs -w workload_file.txt" has been executed. The output shows "----Time in nanoseconds----101073532983" and "Deleting the test queue.". The prompt "ubuntu@ip-172-31-28-219:~\$" is shown again, followed by another "ubuntu@ip-172-31-28-219:~\$" prompt with a cursor.

```
ubuntu@ip-172-31-28-219:~$ java -jar client.jar client -s sqs -w workload_file.txt
----Time in nanoseconds----101073532983
Deleting the test queue.
ubuntu@ip-172-31-28-219:~$
ubuntu@ip-172-31-28-219:~$
```