

Performance Evaluation

Evaluation 1

1 client

File Number: 10K

File Range: 1KB

Test_register	Test_lookup	Test_obtain
0:00:46.787718	0:00:29.754574	0:00:03.436828

Average Time for 10K operations:

Test_register: 0:00:46.787718 s

Test_lookup: 0:00:29.754574 s

Test_obtain: 0:00:03.436828 s

Average Time for 1 operation:

Test_register: 46.787718×10^{-5} s

Test_lookup: 29.754574×10^{-5} s

Test_obtain: 3.436828×10^{-5} s

```
ubuntu@p-172-31-31-0: ~/PA3-Client$ python
Peer.py
Program Assignment 3: Client
Version: 1.0
Author: XI AQLIANG WU
Usage:
'Peer --help' for more help.
```

```
Input listen port:
> 6666
Input server IP address:
> 172.31.20.58
Input server port:
> 2333
Input command:
> Test_register
0:00:46.787718
Input command:
> Test_lookup
0:00:29.754574
Input command:
> 10.test
172.31.31.0: 6666/home/ubuntu/PA3-Client/0.
test
```

```
Input command:
> Test_obtain 172.31.31.0: 6666/home/ubuntu
/PA3-Client
0:00:03.436828
Input command:
> |
```

2 clients

File Number: 10K

File Range: 1KB

Test_register	Test_lookup	Test_obtain
0:00:50.735557	0:00:33.989532	0:00:08.935088
0:00:58.366677	0:00:33.814004	0:00:08.943831

Average Time for 10K operations:

Test_register: 54.551117 s

Test_lookup: 33.901768 s

Test_obtain: 8.939459.5 s

Average Time for 1 operation:

Test_register: 54.551117×10^{-5} s

Test_lookup: 33.901768×10^{-5} s

Test_obtain: $8.939459.5 \times 10^{-5}$ s

```

wu@wu-PCZ2100C: ~
ubuntu@ip-172-31-18-233: ~/PA3-Client
ubuntu@ip-172-31-22-238: ~/PA3-Server

> 6666
Input server IP address:
> ^C
ubuntu@p-172-31-31-0: ~/PA3-Client$ python Peer.py
Program Assignment 3: Client
Version: 1.0
Author: XI AQLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.233
Input server port:
> 2333
Input command:
> Test_register
0:00:50.735557
Input command:
> Test_lookup
0:00:33.989532
Input command:
> 1 0.test
172.31.31.0: 6666/home/ubuntu/PA3-Client/0.test
172.31.18.233: 6666/home/ubuntu/PA3-Client/0.test

Input command:
> Test_obtain 172.31.18.233: 6666/home/ubuntu/PA3-Client
0:00:08.935088
Input command:
> ^C
ubuntu@p-172-31-31-0: ~/PA3-Client$

Input server IP address:
> 172.31.31.0: 6666/home/ubuntu/PA3-Client
^C
ubuntu@p-172-31-18-233: ~/PA3-Client$ python Peer.py
Program Assignment 3: Client
Version: 1.0
Author: XI AQLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.20.58
Input server port:
> 2333
Input command:
> Test_register
0:00:58.366677
Input command:
> Test_lookup
0:00:33.814004
Input command:
> 1 0.test
172.31.31.0: 6666/home/ubuntu/PA3-Client/0.test
172.31.18.233: 6666/home/ubuntu/PA3-Client/0.test

Input command:
> Test_obtain 172.31.31.0: 6666/home/ubuntu/PA3-Client
0:00:08.943831
Input command:
> ^C
ubuntu@p-172-31-18-233: ~/PA3-Client$

```

4 clients

File Number: 10K

File Range: 1KB

Test_register	Test_lookup	Test_obtain
0:00:42.345876	0:00:50.024007	0:00:17.431240
0:01:02.609038	0:00:47.408819	0:00:08.809214
0:00:46.988712	0:00:49.197561	0:00:08.266136
0:01:02.162448	0:01:05.806423	0:00:16.762581

Average Time for 10K operations:

Test_register: 53.5265185 s

Test_lookup: 53.1092025 s

Test_obtain: 12.81729275 s

Average Time for 1 operation:

Test_register: $53.5265185 \times 10^{-5}$ s

Test_lookup: $53.1092025 \times 10^{-5}$ s

Test_obtain: $12.81729275 \times 10^{-5}$ s

```
wu@wu-VPCZ2100C: ~
Client 2
0: 00: 42. 345876
Input command:
> Test_lookup
0: 00: 50. 024007
Input command:
> 1 0. test
172. 31. 18. 232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est
172. 31. 18. 233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est
172. 31. 31. 0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est
172. 31. 17. 60: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est

Input command:
> Test_obtain 172. 31. 18. 232: 6666/ home/ ubuntu u/ PA3- Cl i ent
0: 00: 17. 431240
Input command:
>

Peer --hel p' for more hel p.

Input listen port:
> 6666
Input server IP address:
> 172. 31. 20. 58
Input server port:
> 2333
Input command:
> Test_regi ster
0: 00: 46. 988712
Input command:
> Test_lookup
0: 00: 49. 197561
Input command:
> Test_obtain 172. 31. 18. 233: 6666/ home/ ubuntu u/ PA3- Cl i ent
0: 00: 08. 266136
Input command:
>

Peer --hel p' for more hel p.

Client 2
0: 00: 42. 345876
Input command:
> Test_lookup
0: 00: 50. 024007
Input command:
> 1 0. test
172. 31. 18. 232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est
172. 31. 18. 233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est
172. 31. 31. 0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est
172. 31. 17. 60: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est

Input command:
> Test_obtain 172. 31. 18. 232: 6666/ home/ ubuntu u/ PA3- Cl i ent
0: 00: 17. 431240
Input command:
>

Peer --hel p' for more hel p.

Input listen port:
> 6666
Input server IP address:
> 172. 31. 22. 239
Input server port:
> 2333
Input command:
> Test_regi ster
0: 01: 02. 609038
Input command:
> Test_lookup
0: 00: 47. 408819
Input command:
> Test_obtain 172. 31. 31. 0: 6666/ home/ ubuntu u/ PA3- Cl i ent
0: 00: 08. 809214
Input command:
>

Peer --hel p' for more hel p.

Input listen port:
> 6666
Input server IP address:
> 172. 31. 22. 238
Input server port:
> 2333
Input command:
> Test_regi ster
0: 01: 02. 162448
Input command:
> Test_lookup
0: 01: 05. 806423
Input command:
> Test_obtain 172. 31. 17. 60: 6666/ home/ ubuntu u/ PA3- Cl i ent
0: 00: 16. 762581
Input command:
>
```

8 clients

File Number: 10K

File Range: 1KB

Test_register	Test_lookup	Test_obtain
0:00:43.270973	0:01:26.168643	0:00:11.639198
0:00:54.592377	0:01:25.079346	0:00:15.464951
0:01:02.419746	0:01:23.609545	0:00:08.090359
0:00:50.712737	0:01:35.807770	0:00:08.817620
0:00:54.637873	0:01:22.259105	0:00:08.894615
0:00:50.663217	0:01:27.190370	0:00:17.094383
0:00:58.166328	0:01:36.755483	0:00:11.354870

0:00:54.397964	0:01:24.112065	0:00:08.718804
----------------	----------------	----------------

Average Time for 10K operations:

Test_register: 53.607651875 s

Test_lookup: 86.811939875 s

Test_obtain: 11.25935 s

Average Time for 1 operation:

Test_register: $53.607651875 \times 10^{-5}$ s

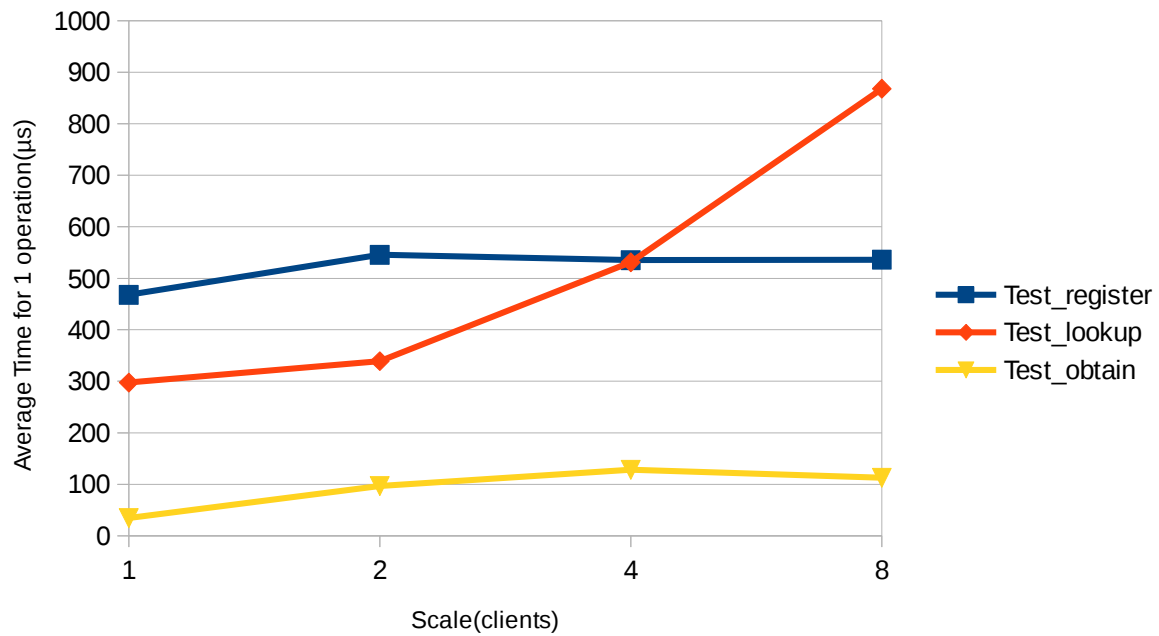
Test_lookup: $86.811939875 \times 10^{-5}$ s

Test_obtain: 11.25935×10^{-5} s

<pre>wu@wu-VP CZ2100C: ~ > 2333 Input command: > Test_register 0: 00: 43. 270973 Input command: > Test_lookup 0: 01: 26. 168643 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 17. 60: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>	<pre>ubuntu@ip-172-31-18-230: ~/PA3-Client 0: 01: 25. 079346 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 31. 0: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 90: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 17. 60: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>	<pre>ubuntu@ip-172-31-20-58: ~/PA3-Server > 2333 Input command: > Test_register 0: 01: 02. 419746 Input command: > Test_lookup 0: 01: 23. 609545 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>	<pre>wu@wu-VP CZ2100C: ~ > Test_register 0: 00: 50. 712737 Input command: > Test_lookup 0: 01: 35. 807770 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 31. 0: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>
<pre>Input command: > Test_lookup 0: 01: 22. 259105 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 31. 0: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 90: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>	<pre>0: 01: 27. 190370 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 31. 0: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 90: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 17. 60: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>	<pre>> 2333 Input command: > Test_register 0: 00: 58. 166328 Input command: > Test_lookup 0: 01: 36. 755483 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>	<pre>Input command: > Test_lookup 0: 01: 24. 112065 Input command: > 1 0. test 172. 31. 17. 61: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 232: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 231: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 230: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 233: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 31. 0: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est 172. 31. 18. 90: 6666/ home/ ubunt u/ PA3- Cl i ent / 0. t est</pre>

Figures

Time & Client number relation



Explanation

As the scale improves, the efficiency of the system is decreasing. First, when more clients access the server at the same time, the load of the server is increasing, so the server needs more time to handle requests from clients. Second, when the scale of the hash table becomes bigger, servers need more time to register and look up pairs.

Evaluation 2

1 KB

File number: 100K

	Time
Node1	0:02:13.264636
Node2	0:01:35.922974
Node3	0:02:05.822766
Node4	0:00:51.053157
Node5	0:01:36.489386
Node6	0:02:49.688847
Node7	0:01:55.696130
Node8	0:03:08.237809

Average Time for 100K files: 122.021963125 s

Average Throughput: 819.524595728 KB/s

```
wu@wu-VP CZ2100C: ~
Client2 ubuntu@ip-172-31-18-230: ~/PA3-Client-80K
est
172.31.18.231: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.233: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.230: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.90: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0. t
est
172.31.18.232: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test

Input command:
> Test_ obt ai n 172.31.17.60: 6666/ home/ ubuntu w/
PA3- Cl i ent
0: 02: 13. 264636
Input command:
>

Client2 ubuntu@ip-172-31-18-230: ~/PA3-Client-80K
est
172.31.18.231: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.233: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.230: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.90: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0. t
est
172.31.18.232: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test

Input command:
> Test_ obt ai n 172.31.18.233: 6666/ home/ ubuntu w
/ PA3- Cl i ent
0: 01: 36. 489386
Input command:
>

Client2 ubuntu@ip-172-31-18-230: ~/PA3-Client-80K
est
172.31.18.231: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.233: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.230: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.90: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0. t
est
172.31.18.232: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test

Input command:
> Test_ obt ai n 172.31.18.230: 6666/ home/ ub
unt w/ PA3- Cl i ent
0: 02: 49. 688847
Input command:
>

Client2 ubuntu@ip-172-31-20-58: ~/PA3-Server
est
172.31.18.231: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.233: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.230: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.90: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0. t
est
172.31.18.232: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test

Input command:
> Test_ obt ai n 172.31.17.61: 6666/ home/ ubuntu w/
PA3- Cl i ent
0: 02: 05. 822766
Input command:
>

Client2 ubuntu@ip-172-31-18-231: ~/PA3-Client-80K
est
172.31.18.231: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.233: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.230: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test
172.31.18.90: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0. t
est
172.31.18.232: 6666/ home/ ubuntu w/ PA3- Cl i ent / 0.
test

Input command:
> Test_ obt ai n 172.31.18.232: 6666/ home/
ubuntu w/ PA3- Cl i ent
0: 00: 51. 053157
Input command:
>
```

10 KB
File number: 80K

	Time
Node1	0:01:49.883668
Node2	0:02:28.649089
Node3	0:01:28.335286
Node4	0:02:34.653708
Node5	0:01:52.001100
Node6	0:03:08.680727
Node7	0:03:16.063790
Node8	0:01:49.252980

Average Time for 80K files: 138.4400435 s
Average Throughput: 5778.67486729 KB/s

```
wu@wu-VP CZ2100C: ~
client2 ubuntu@ip-172-31-18-90: ~/PA3-Client$ ./PA3-Client 172.31.18.90:6666/home/ubuntu/PA3-Client/0.t
test
172.31.31.0:6666/home/ubuntu/PA3-Client/0.t
st
172.31.18.90:6666/home/ubuntu/PA3-Client/0.t
est
172.31.17.61:6666/home/ubuntu/PA3-Client/0.t
est
172.31.18.232:6666/home/ubuntu/PA3-Client/0.t
est
172.31.18.231:6666/home/ubuntu/PA3-Client/0.t
est

Input command:
> Test_obtai n 172.31.18.233:6666/home/ubunt
/PA3-Client
0:01:49.883668
Input command:
>

ubuntu@ip-172-31-18-90: ~/PA3-Client$ ./PA3-Client 172.31.17.60:6666/home/ubu
nt/PA3-Client
0:02:28.649089
Input command:
>

ubuntu@ip-172-31-20-58: ~/PA3-Server$ ./PA3-Server 172.31.18.230:6666/home/ubunt
/PA3-Client
0:01:28.335286
Input command:
>

wu@wu-VP CZ2100C: ~
client2 ubuntu@ip-172-31-18-90: ~/PA3-Client$ ./PA3-Client 172.31.18.90:6666/home/ubuntu/PA3-Client/0.t
test
172.31.31.0:6666/home/ubuntu/PA3-Client/0.t
st
172.31.18.90:6666/home/ubuntu/PA3-Client/0.t
est
172.31.17.61:6666/home/ubuntu/PA3-Client/0.t
est
172.31.18.232:6666/home/ubuntu/PA3-Client/0.t
est
172.31.18.231:6666/home/ubuntu/PA3-Client/0.t
est

Input command:
> Test_obtai n 172.31.18.90:6666/home/ubunt
/PA3-Client
0:01:52.001100
Input command:
>

ubuntu@ip-172-31-18-90: ~/PA3-Client$ ./PA3-Client 172.31.17.61:6666/home/ubu
nt/PA3-Client
0:03:08.680727
Input command:
>

ubuntu@ip-172-31-18-90: ~/PA3-Client$ ./PA3-Client 172.31.18.232:6666/home/ubunt
/PA3-Client
0:03:16.063790
Input command:
>

ubuntu@ip-172-31-18-230: ~/PA3-Client$ ./PA3-Client 172.31.18.231:6666/home/
ubunt/PA3-Client
0:01:49.252980
Input command:
>
```

100 KB

File number: 20K

	Time
Node1	0:01:26.257927
Node2	0:01:36.045714
Node3	0:02:02.055532
Node4	0:02:02.255715
Node5	0:01:34.489039
Node6	0:01:39.156819
Node7	0:01:34.397556
Node8	0:01:49.803016

Average Time for 20K files: 43.05766475 s

Average Throughput: 46449.337455069 KB/s

```
wu@wu-PCZ2100C: ~
tPart.py
ubuntu@p-172-31-31-0: ~/PA3-Client$ python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.234
Input server port:
> 2333
Input command:
> Test_register
0: 01:26.257927
Input command:

ClientPart.py
ubuntu@p-172-31-18-233: ~/PA3-Client$ python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.235
Input server port:
> 2333
Input command:
> Test_register
0: 01:36.045714
Input command:

ntPart.py
ubuntu@p-172-31-18-90: ~/PA3-Client$ python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.236
Input server port:
> 2333
Input command:
> Test_register
0: 02:02.055532
Input command:

python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.237
Input server port:
> 2333
Input command:
> Test_register
0: 02:02.255715
Input command:
> ^C

ClientPart.py
ubuntu@p-172-31-17-60: ~/PA3-Client$ python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.238
Input server port:
> 2333
Input command:
> Test_register
0: 01:34.489039
Input command:

ClientPart.py
ubuntu@p-172-31-18-232: ~/PA3-Client$ python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.239
Input server port:
> 2333
Input command:
> Test_register
0: 01:39.156819
Input command:

ntPart.py
ubuntu@p-172-31-17-61: ~/PA3-Client$ python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.22.233
Input server port:
> 2333
Input command:
> Test_register
0: 01:34.397556
Input command:

python Peer.py
Program Assignment3: Client
Version: 1.0
Author: XIAOLIANG WU
Usage:
'Peer --help' for more help.

Input listen port:
> 6666
Input server IP address:
> 172.31.20.58
Input server port:
> 2333
Input command:
> Test_register
0: 01:49.803016
Input command:
```

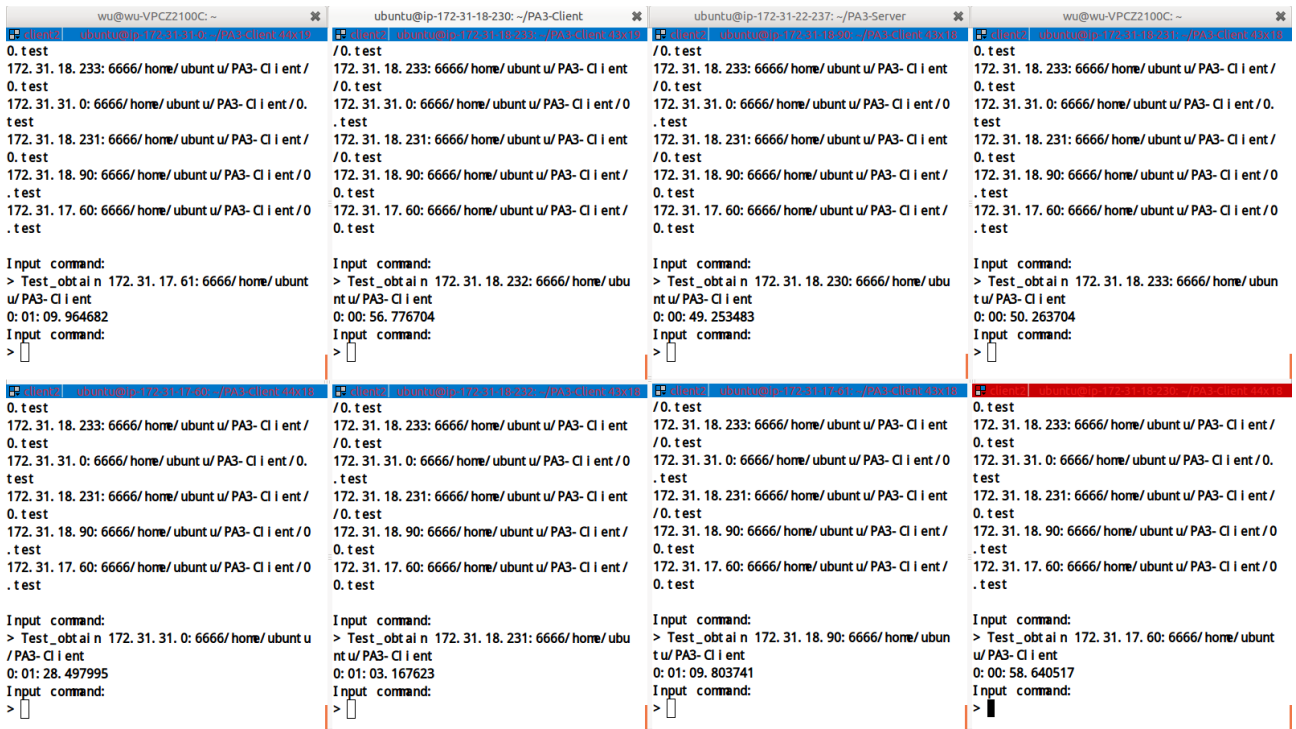
1 MB

File number: 3K

	Time
Node1	0:01:09.964682
Node2	0:00:56.776704
Node3	0:00:49.253483
Node4	0:00:50.263704
Node5	0:01:28.497995
Node6	0:01:03.167623
Node7	0:01:09.803741
Node8	0:00:58.640517

Average Time for 3K files: 63.296056125 s

Average Throughput: 48533.829563303 KB/s



10 MB

File number: 300

	Time
Node1	0:01:00.721909
Node2	0:00:50.932809
Node3	0:01:10.035846
Node4	0:01:20.841087
Node5	0:00:52.217926
Node6	0:00:50.598904
Node7	0:00:58.204081
Node8	0:01:20.947353

Average Time for 300 files: 63.062489375 s

Average Throughput: 48713.586007244 KB/s

Image damaged. Sorry!

100 MB

File number: 30

	Time
Node1	0:00:48.457463
Node2	0:00:48.184282

Node3	0:01:31.356267
Node4	0:00:48.582262
Node5	0:00:54.424906
Node6	0:01:35.128004
Node7	0:01:08.924798
Node8	0:00:48.380435

Average Time for 30 files: 62.929802125

Average Throughput: 48816.298419276

<pre>wu@wu-VP CZ2100C: ~ . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_ obt ai n 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 00: 48. 457463 Input command: > </pre>	<pre>ubuntu@ip-172-31-18-90: ~/PA3-Client . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_ obt ai n 172.31.17.61: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 00: 48. 184282 Input command: > </pre>	<pre>ubuntu@ip-172-31-22-238: ~/PA3-Server . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test Input command: > Test_ obt ai n 172.31.17.60: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 01: 31. 356267 Input command: > </pre>	<pre>wu@wu-VP CZ2100C: ~ . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test Input command: > Test_ obt ai n 172.31.18.232: 6666/ home/ u bunt u/ PA3- Cl i ent 0: 00: 48. 582262 Input command: > </pre>
<pre>wu@wu-VP CZ2100C: ~ . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_ obt ai n 172.31.18.231: 6666/ home/ ubun t u/ PA3- Cl i ent 0: 00: 54. 424906 Input command: > </pre>	<pre>ubuntu@ip-172-31-18-90: ~/PA3-Client . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_ obt ai n 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 01: 35. 128004 Input command: > </pre>	<pre>ubuntu@ip-172-31-22-238: ~/PA3-Server . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test Input command: > Test_ obt ai n 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 01: 08. 924798 Input command: > </pre>	<pre>wu@wu-VP CZ2100C: ~ . test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i e nt / 0. test Input command: > Test_ obt ai n 172.31.18.230: 6666/ home/ u bunt u/ PA3- Cl i ent 0: 00: 48. 380435 Input command: > </pre>

1 GB

File number: 3

	Time
Node1	0:00:52.314314
Node2	0:00:52.599806
Node3	0:01:37.317310
Node4	0:00:49.659276
Node5	0:00:51.350218
Node6	0:01:36.770351
Node7	0:01:00.670450
Node8	0:00:49.389992

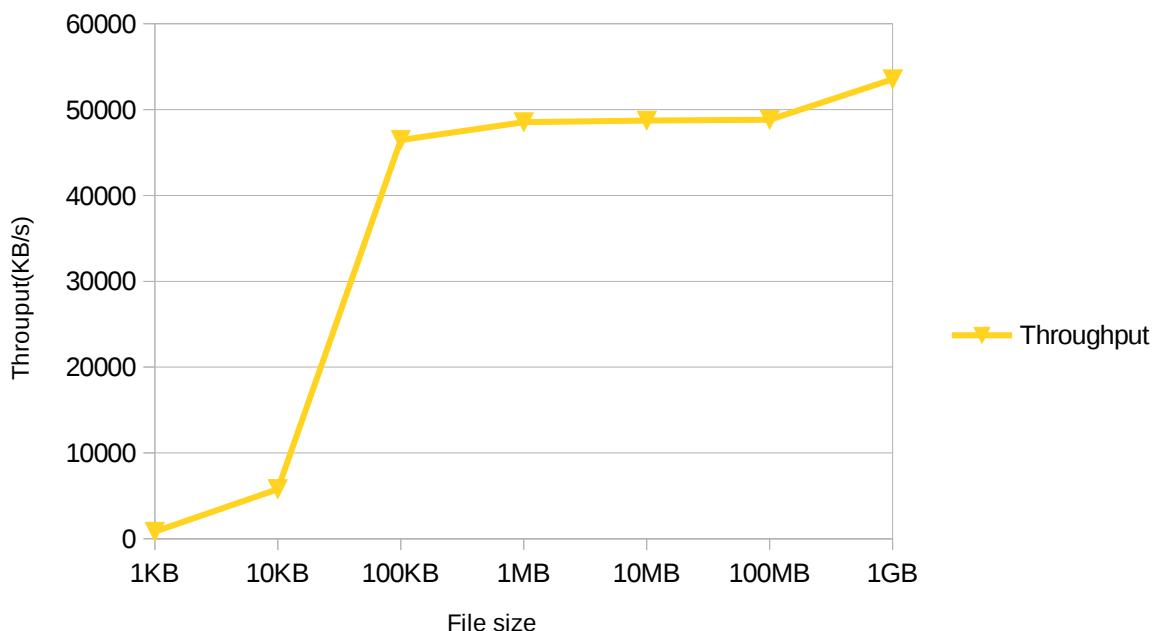
Average Time for 3 files: 58.7718193333 s

Average Throughput: 53524.427790134 KB/s

wu@wu-PCZ2100C: ~	ubuntu@ip-172-31-31-0: ~/PA3-Client	ubuntu@ip-172-31-22-239: ~/PA3-Server	wu@wu-PCZ2100C: ~
<pre>. test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_obt a i n 172.31.17.61: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 00: 52.314314 Input command: ></pre>	<pre>. test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_obt a i n 172.31.18.231: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 00: 52.599806 Input command: ></pre>	<pre>test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test Input command: > Test_obt a i n 172.31.17.60: 6666/ home/ ubuntu u / PA3- Cl i ent 0: 01: 37.317310 Input command: ></pre>	<pre>t/0. test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i e nt/0. test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i en t/0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent /0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i e nt/0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i e nt/0. test Input command: > Test_obt a i n 172.31.18.232: 6666/ home/ u bunt u/ PA3- Cl i ent 0: 00: 49.659276 Input command: ></pre>
<pre>. test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_obt a i n 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 00: 51.350218 Input command: ></pre>	<pre>. test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test Input command: > Test_obt a i n 172.31.31.0: 6666/ home/ ubuntu u / PA3- Cl i ent 0: 01: 36.770351 Input command: ></pre>	<pre>test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0. t est 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i ent / 0 . test Input command: > Test_obt a i n 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i ent 0: 01: 00.670450 Input command: ></pre>	<pre>t/0. test 172.31.18.232: 6666/ home/ ubuntu u/ PA3- Cl i e nt/0. test 172.31.18.90: 6666/ home/ ubuntu u/ PA3- Cl i en t/0. test 172.31.31.0: 6666/ home/ ubuntu u/ PA3- Cl i ent /0. test 172.31.18.233: 6666/ home/ ubuntu u/ PA3- Cl i e nt/0. test 172.31.18.230: 6666/ home/ ubuntu u/ PA3- Cl i e nt/0. test Input command: > Test_obt a i n 172.31.18.230: 6666/ home/ u bunt u/ PA3- Cl i ent 0: 00: 49.389992 Input command: ></pre>

Figures

Throughput & File size relation



Explanation

As the size of file increasing, the throughput of client is increasing, and gradually the throughput become stable. Because this system use TCP as transportation protocol, if the size of file is small and the bandwidth is large, clients will cost more time on establish connection. When the size of file become large enough, the time that is used to establish connection occupy only a few of transfer

time, so it cannot limit the throughput. However, it is a limited bandwidth network, so the throughput gradually become stable.