OS LAB 2
140050018 140050019

Exercise 1

Client Machine
- CPU - i7 5500U
- RAM - 8 GB

Server Machine
- CPU - i5-3210M
- RAM - 4 GB

Setup
The client and server are connected through a router via ethernet cables.

Disk Bandwidth
The server has a disk read speed of about 53 MB/s which we calculated by running the disk command and using iostat. This gives us about 26.5 requests/sec for our 2MB files.

Network Bandwidth
Used iperf -c <Server-IP> on client and iperf -s on server to find network bandwidth. The network bandwidth in our setup is about 94.2 Mbps, which is justifiable because we are connected using Ethernet.
This roughly translates to 5.71 requests/sec for file size of 2MB.

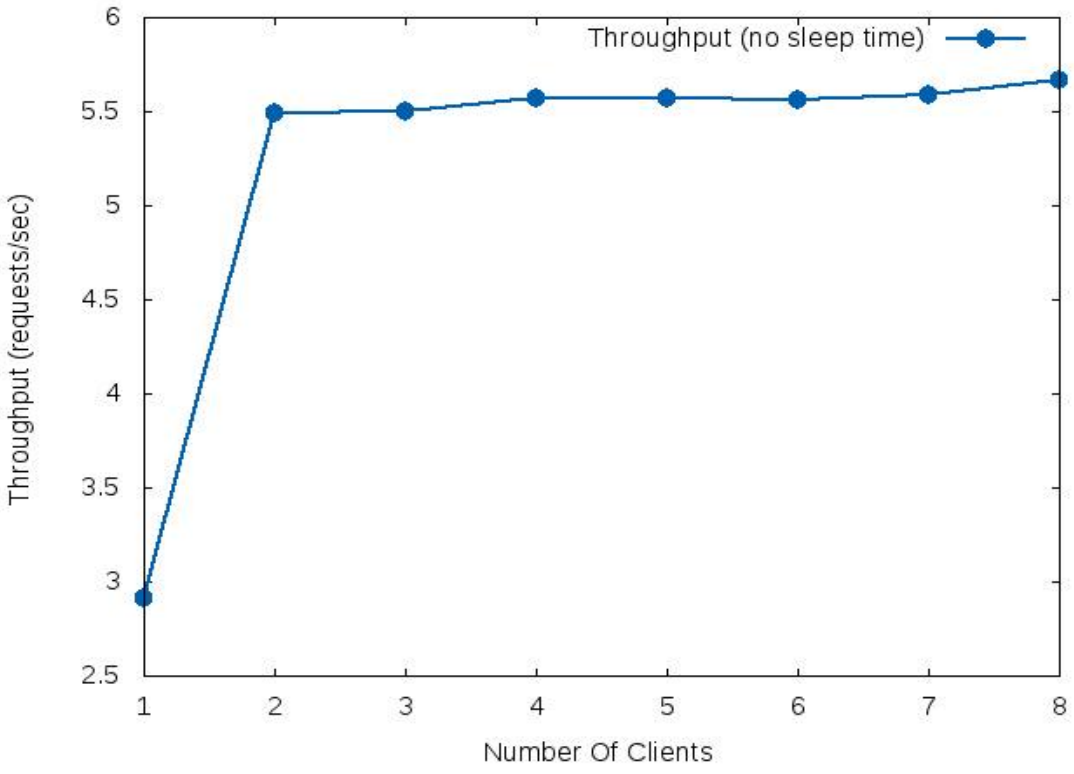
Exercise 2

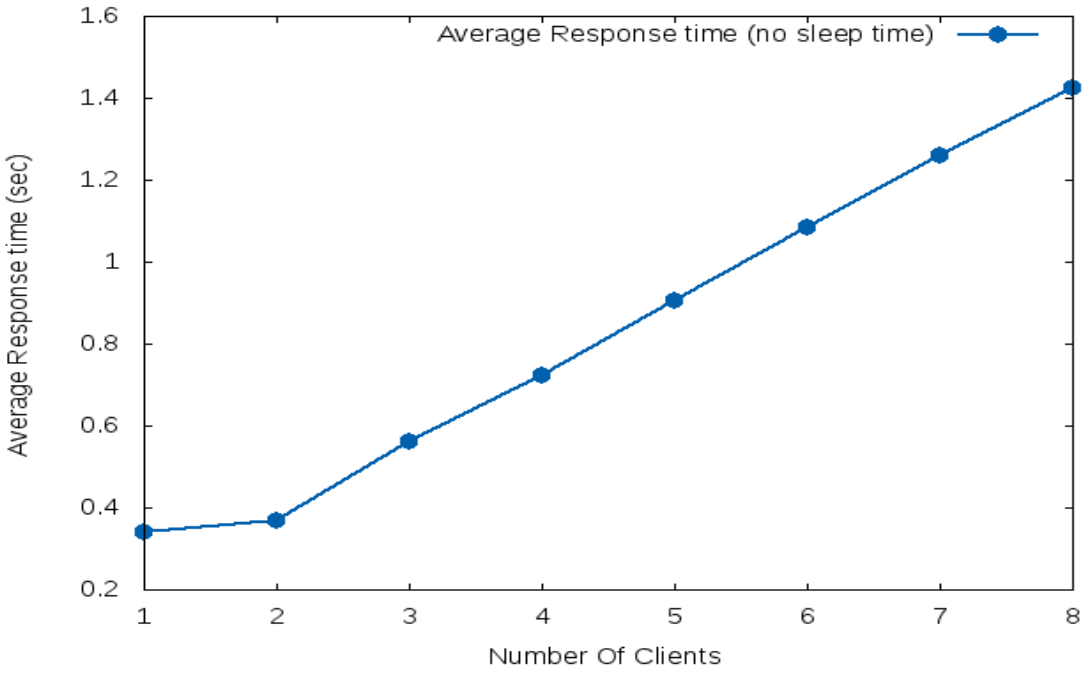
a. For 0 sleep time, the throughput saturates at 5.66 requests/sec for N = 2 threads.

b. We plotted number of threads in the client (N) against the throughput and average response time for N = 1 to 8. We observe that we achieve the maximum throughput for N = 2 after that it saturates. The throughput saturates at about 5.66 requests/sec. The average response time increases with increase in number of threads. This is because of increased number of requests at a time at server. The waiting time for accessing the network link to send file increases and hence the response time increases.

c. At saturation the bottleneck resource is network bandwidth. The throughput observed by experiment (5.66 req/sec)is approximately equal to the limiting bandwidth of the network.

d. The saturation throughput is 5.66 req/sec, which is equal to the limiting bandwidth of the network.




Average Response time (no sleep time)
Average Response time (sec)
Number Of Clients
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
1
2
3
4
5
6
7
8

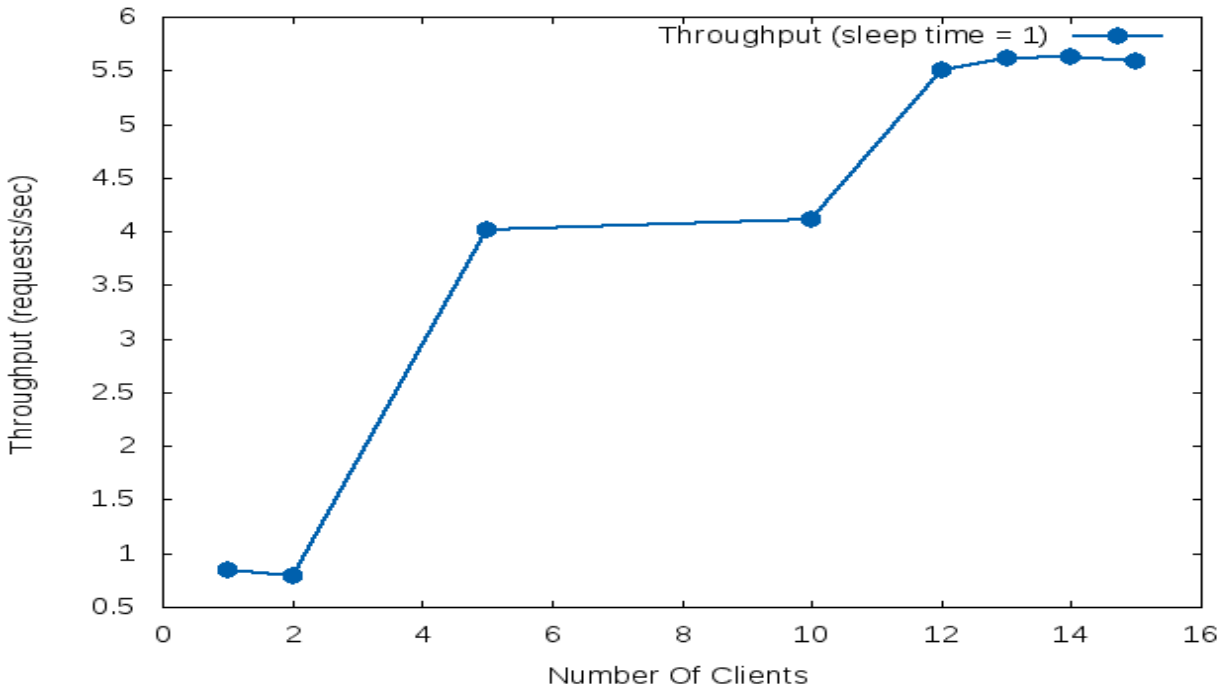
Exercise 3

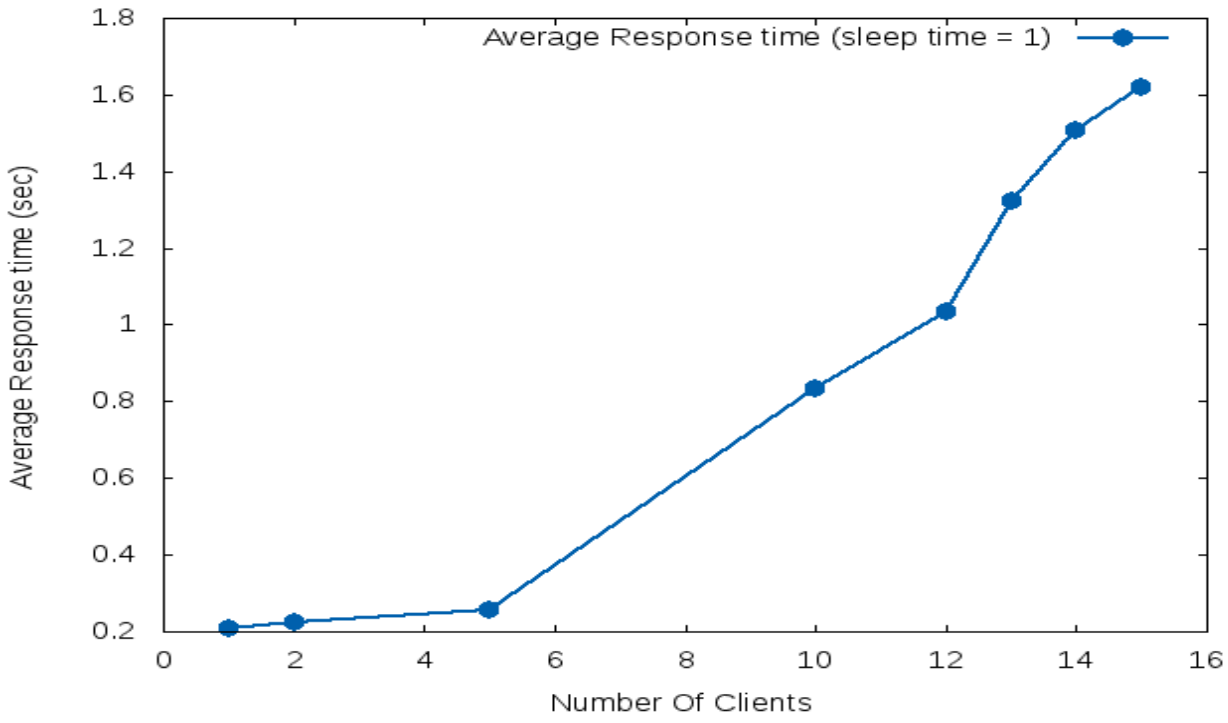
a. For 0 sleep time, the throughput saturates at 5.61 requests/sec for N = 13 threads.

b. We plotted number of threads in the client (N) against the throughput and average response time. We observe that we achieve the maximum throughput for N = 13 after that it saturates. The throughput saturates at about 5.61 requests/sec. The average response time increases with increase in number of threads. This is because of increased number of requests at a time at server. The waiting time for accessing the network link to send file increases and hence the response time increases.

c. At saturation the bottleneck resource is network bandwidth. The throughput observed by experiment (5.61 req/sec)is approximately equal to the limiting bandwidth of the network.

d. The throughput at saturation is 5.61 req/sec, which is same as the limiting bandwidth of the network.




Average Response time (sleep time = 1)
Average Response time (sec)
Number Of Clients
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
2
4
6
8
10
12
14
16

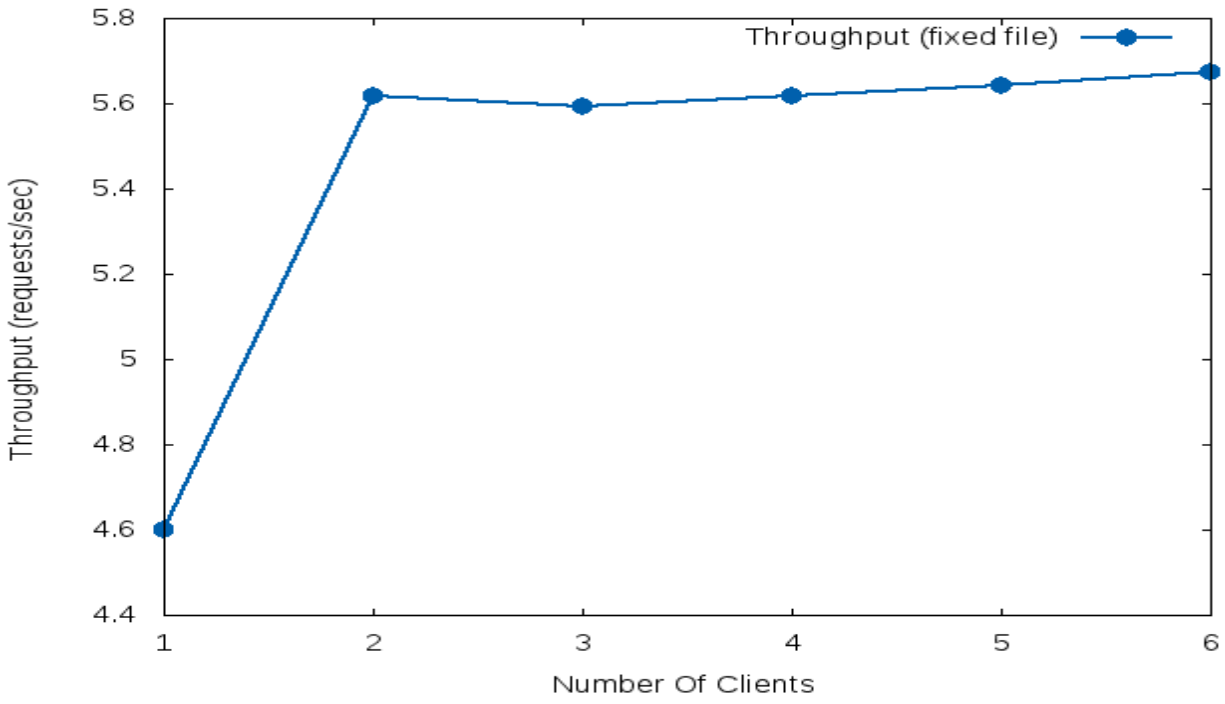
Exercise 4

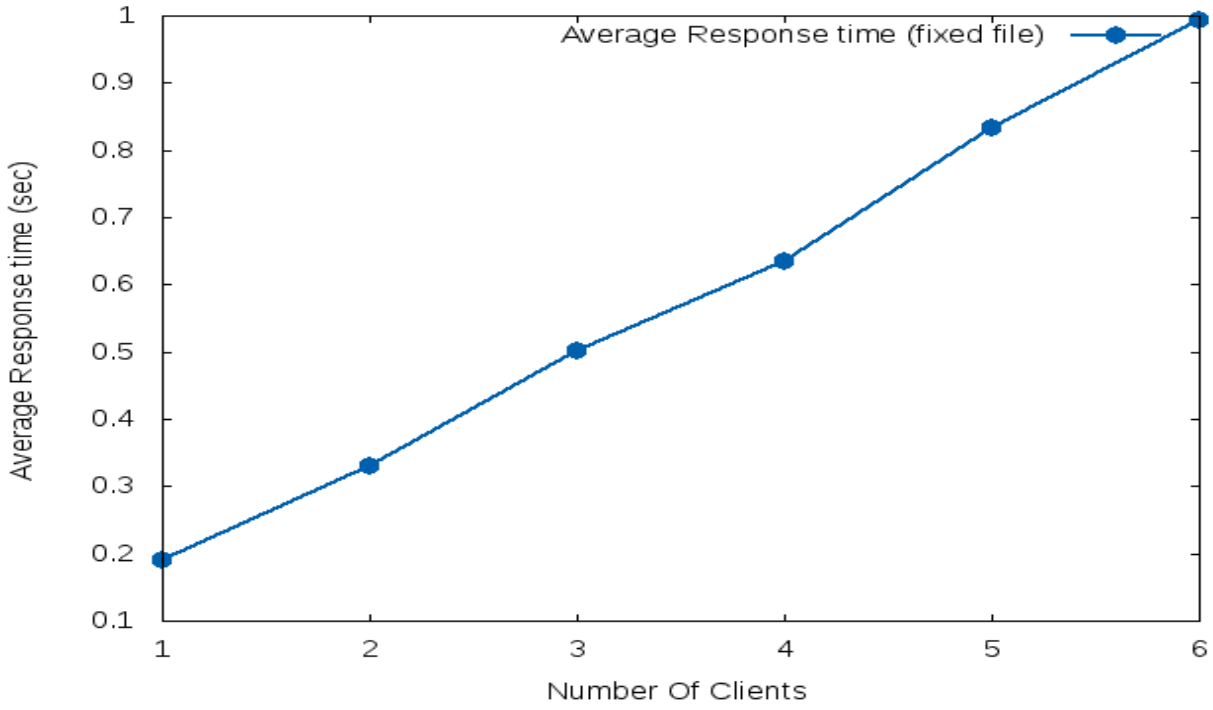
a. For a fixed file, the throughput saturates at 5.64 requests/sec for N = 13 threads.

b. We plotted number of threads in the client (N) against the throughput and average response time. We observe that we achieve the maximum throughput for N = 2 after that it saturates. The throughput saturates at about 5.64 requests/sec. The average response time increases with increase in number of threads. This is because of increased number of requests at a time at server. The waiting time for accessing the network link to send file increases and hence the response time increases.

c. At saturation the bottleneck resource is network bandwidth. The throughput observed by experiment (5.64 req/sec)is approximately equal to the limiting bandwidth of the network.

d. The throughput at saturation is 5.64 req/sec, which is equal to the limiting bandwidth of the network.




Average Response time (fixed file)
Average Response time (sec)
Number Of Clients
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
1
2
3
4
5
6