CS333 LAB 2

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1)
Setup Description:
Connected Two Machines with CAT 6 Lan cable
File size = 2047000 bytes
Maximum disk read capacity of server machine – 60814 KB/s
Number of requests/sec = (60814*1024)/2047000 = 30.421 req/sec

Maximum Bandwidth = 11.74 MiB/s
Number of request/sec = (11.74*1000)/2047 = 5.735 req/sec

2)
Client mode : random
Sleep : 0
Duration : 120

a) 10

b) Throughput increases from 5.366 req/sec to 5.74 and saturates afterwards .i.e remains almost constant for further increase in N .
Throughput remains almost constant.
Data send rate is almost constant 11.74 MiB/s and each req has size of 2.047MiB
Therefore upper limit of req/sec ~= 5.74

Response Time increases as N increases (almost linearly).
As the number of user increases, server forks a process for each client.Due to which the time to cater each client is distributed with limited CPU processing time for each process ,limited bandwidth and limited disk read capability of the server.

c)Identification:

Command	Output
For disk : iostat -x 1 10	Disk Read Rate ~=11894 KiB/s
For Network : bmon	Tx speed : 11.73~11.74 Mib/s

Clearly the network bandwidth reached its upper limit.
Disk read Rate<< 60MB/s(max capability)

d)Server Throughput = 5.733 req/s
File Size = 2047000 bytes
Total Bytes sent per sec = 5.733*2047000 bytes/sec ~= 11.735 MiB/s

3)

Client mode : random
Sleep : 1
Duration : 120

a)N = 20

b)Throughput increases from 0.833 to 5.72 and remains saturated with error of 0.1 in ts value on further increase of N.
On further increase of N , rather a variation is observed.This is due to 1 second sleep that occurs in every thread almost after regular interval of time(until the difference b/w the time , two threads that are running concurrently changes significantly) , network utilization keeps fluctuating from 10-11.73 MB/s.
In other case, a constant bandwidth of 11.73-11.74 MB/s was observed.

Response Time increases as N increases (almost linearly).
As the number of user increases, server forks a process for each client.Due to which the time to cater each client is distributed with limited CPU processing time for each process ,limited bandwidth and limited disk read capability of the server.

c)Identification:

Command	Output
For disk : iostat -x 1 10	Disk Read Rate ~=11894 KiB/s
For Network : bmon	Tx speed : 11.73~11.74 Mib/s(after certain interval of time)

d)Server Throughput = 5.72 req/s
File Size = 2047000 bytes
Total Bytes sent per sec = 5.72*2047000 bytes/sec ~= 11.70 MiB/s
This is equal to bottleneck speed

4)
Client Mode : fixed
Duration : 120
Sleep : 0

a) N = 10
The Bottleneck is reached before than the first case , because CPU of server can read from its cache memory faster than that of disk.

b) Throughput increases from 5.6833 to 5.74 and remains saturated on further increase of N.
Network Bandwidth remains constant 11.73-11.74 MB/s.Throughput remains almost constant.
Data send rate is almost constant 11.74 MiB/s and each req has size of 2047000 bytes
Therefore upper limit of req/sec ~= 5.733.

Response Time increases as N increases (almost linearly).
As the number of user increases, server forks a process for each client.Due to which the time to cater each client is distributed with limited CPU processing time for each process ,limited bandwidth and limited disk read capability of the server.

c)

Command	Output
For disk : iostat -x 1 10	Disk Read Rate ~=0 KiB/s
For Network : bmon	Tx speed : 11.73~11.74 Mib/s

Clearly the network bandwidth reached its upper limit.

d)Server Throughput = 5.74 req/s
File Size = 2047000 bytes
Total Bytes sent per sec = 5.74*2047000 bytes/sec ~= 11.749 MiB/s