CS 550 Programming Assignment – 2

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Performance Evaluation on Peer to Peer Network

The system configuration that was used to run the code:

CPUs	8
Threads(s) per core	2
Core(s) per socket	4
Socket(s)	1
CPU Frequency (MHz)	2300
Memory (RAM):	1 GB

With the above system, following performance measurements are made for the “search” requests from the client:

1) Average response time per client
2) Concurrent requests made my multiple clients

1) Average response time per client:

Steps:

- Start the Indexing Servers (1 to 8).
- Start all the peers and let them register with their servers based on their location co-ordinates.
- Let each peer has a unique set of 1500 files (each 4 KB).
- Let a peer begin downloading all the files from other servers. So a total of 10,500 (4KB) files will be downloaded over the network.
- For example, for Peer 3, we observe the following values:

  Peer-3:

  Average response time (in msecs) for Register op: 26.734
  Average response time (in msecs) for Search op: 3.85415e-06
  Average response time (in msecs) for Obtain op: 0.628525
  Number of files downloaded: 12001
  Throughput seen by the client: ***8864.63 kbps***

2) Concurrent requests made my multiple clients

I.) 2 clients:

Steps:

- Start the Indexing Servers (1 to 8).
- Start all the peers and let them register with their servers based on their location co-ordinates.
- Let each peer has a unique set of 1500 files (each 4 KB).
- Let 2 peers begin downloading all the files from other servers. So a total of 21,000 (4KB) files will be downloaded over the network.
- For example, for Peers 1 and 3 downloading the files, we observe the following values:

Peer-1:

Average response time (in msecs) for Register op: 4.247
Average response time (in msecs) for Search op: 7.05498e-06
Average response time (in msecs) for Obtain op: 0.644827
Number of files downloaded: 12002
Throughput seen by the client: ***6203.73 kbps***

Peer-3:

Average response time (in msecs) for Register op: 4.178
Average response time (in msecs) for Search op: 6.17361e-05
Average response time (in msecs) for Obtain op: 0.627631
Number of files downloaded: 12002
Throughput seen by the client: ***6373.7 kbps***

We can see the reduction in total throughput experienced by each peer, because of the increased load on the network.

II.) All (8) clients:

Steps:

- Start the Indexing Servers (1 to 8).
- Start all the peers and let them register with their servers based on their location co-ordinates.
- Let each peer has a unique set of 1500 files (each 4 KB).
- Let all the peers begin downloading all the files from other servers. So a total of 84,000 (4KB) files will be downloaded over the network.
- For example, for all peers in operation, we observe the following values:

Peer1:

Average response time (in msecs) for Register op: 6.017
Average response time (in msecs) for Search op: 1.33905e-05
Average response time (in msecs) for Obtain op: 1.14614
Number of files downloaded: 10500
Throughput seen by the client: ***3490.35 kbps***

Peer-2:

Average response time (in msecs) for Register op: 4.79
Average response time (in msecs) for Search op: 1.24793e-05
Average response time (in msecs) for Obtain op: 1.12917
Number of files downloaded: 10500
Throughput seen by the client: ***3542.81 kbps***

Peer-3:

Average response time (in msecs) for Register op: 8.058
Average response time (in msecs) for Search op: 1.80059e-05
Average response time (in msecs) for Obtain op: 1.09485
Number of files downloaded: 10500
Throughput seen by the client: ***3653.87 kbps***

Peer-4:

Average response time (in msecs) for Register op: 6.953
Average response time (in msecs) for Search op: 2.72374e-05
Average response time (in msecs) for Obtain op: 1.12164
Number of files downloaded: 10500
Throughput seen by the client: ***3566.6 kbps***

Peer-5:

Average response time (in msecs) for Register op: 4.576
Average response time (in msecs) for Search op: 1.50963e-05
Average response time (in msecs) for Obtain op: 1.08373
Number of files downloaded: 10500
Throughput seen by the client: ***3691.35 kbps***

Peer-6:

Average response time (in msecs) for Register op: 7.118
Average response time (in msecs) for Search op: 1.35516e-05
Average response time (in msecs) for Obtain op: 1.00515
Number of files downloaded: 10500
Throughput seen by the client: ***3979.96 kbps***

Peer-7:

Average response time (in msecs) for Register op: 8.128
Average response time (in msecs) for Search op: 1.56418e-05
Average response time (in msecs) for Obtain op: 1.10718
Number of files downloaded: 10500
Throughput seen by the client: ***3781.56 kbps***

Peer-8:

Average response time (in msecs) for Register op: 7.118
Average response time (in msecs) for Search op: 1.31212e-05
Average response time (in msecs) for Obtain op: 1.02536
Number of files downloaded: 10500
Throughput seen by the client: ***3509.93 kbps***

Observation*:*

- As we could see, there is a clear reduction in the throughput value when the network contention increases. Therefore, the client-server network gives minimal throughput during high traffic/resource-usage scenarios.
- The impact on performance can be reduced by using protocols with lesser overhead (in our case we use TCP) like UDP, so that we can minimize total load on the network.