CSCD58 Assignment 1
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1. LAN with 100 users sharing 2.5Mb/s link with each user active 5% of the time utilizing an average of 75kb/s of transmission. The idea to switch to a circuit switching network would not be a good idea. Under a circuit-switched network, the system would only allow a simultaneous use of 33 users utilizing an average of 75kb/s. If 100 users were to use the network, each user would only receive a transmission speed of 25kb/s. It would be a better idea to switch to a packet-switched network.
   The probability that 33 users are on the network at the same time is
   $P(33) = (100/33)(0.05^{33} \times (1 - 0.05)^{100-33})$
   which equals to
   $P(33) = 1.104 \times 10^{-18}$.
   The odds where the system is fully loaded is
   $P(100) = 7.889 \times 10^{-131}$.

2. The game company would likely see better performance utilizing a hybrid method to distribute their video game. Some advantages of a Client-Server model are fast download speeds for the client and always up to date software. By having direct control of the servers, the company can ensure people are getting newest versions and at a reasonable speed. Problems with this method is that with a large client base, servers or data centers can get very expensive. With peer-to-peer transfers, the companies do not have to spend much money hosting the files because the clients themselves are hosting as well. Another advantage of peer-to-peer is that users can get download at high speed given a large seeding group. The issue with P2P is files of different versions would still be out on the Internet and download speeds vary depending on the number of seeders.
   By taking advantage of both methods, we can have a small server to start as client-server to get the game out to many users quickly, then switch it to a p2p and have the server as a node when enough users have the newest copies. We can even use the hosting server to redirect connecting clients to other re-hosting clients that have the latest versions of the file.

3. No, the time to take to load wouldn't make much difference to load. Using the traceroute command, we can see that connecting with www.google.com and www.google.jp we both take the same route and land at the same ip address.

```
traceroute to www.google.com (74.125.226.116), 30 hops max, 60 byte packets
 1  DD-WRT (---.---.-.-)  1.010 ms  0.928 ms  1.587 ms
 2  ---.---.-.- (---.---.-.-)  11.526 ms  11.531 ms  11.521 ms
 3  209.148.245.149 (209.148.245.149)  16.288 ms  16.474 ms  17.189 ms
 4  so-4-2-2.gw02.ym.phub.net.cable.rogers.com (64.71.240.185)  17.200 ms  17.189 ms  17.963 ms
 5  204.197.190.137 (204.197.190.137)  16.097 ms  16.101 ms  16.044 ms
 6  10ge15-1.core1.tor1.he.net (216.66.39.81)  16.029 ms  10.342 ms  11.246 ms
 7  gw-google.torontointernetxchange.net (206.108.34.6)  12.004 ms  15.561 ms  15.439 ms
 8  216.239.47.114 (216.239.47.114)  17.588 ms  14.020 ms  13.968 ms
 9  209.85.250.207 (209.85.250.207)  13.928 ms  13.891 ms  15.758 ms
10  yyz08s13-in-f20.1e100.net (74.125.226.116)  15.689 ms  17.066 ms  15.708 ms

traceroute to www.google.jp (74.125.226.120), 30 hops max, 60 byte packets
 1  DD-WRT (---.---.-.-)  1.010 ms  0.928 ms  1.587 ms
 2  ---.---.-.- (---.---.-.-)  9.902 ms  9.856 ms  9.842 ms
 3  209.148.245.149 (209.148.245.149)  15.350 ms  15.362 ms  15.353 ms
 4  so-4-2-2.gw02.ym.phub.net.cable.rogers.com (64.71.240.185)  13.577 ms  13.546 ms  18.540 ms
 5  204.197.190.137 (204.197.190.137)  17.334 ms  17.346 ms  18.480 ms
 6  10ge15-1.core1.tor1.he.net (216.66.39.81)  19.161 ms  11.137 ms  11.117 ms
 7  gw-google.torontointernetxchange.net (206.108.34.6)  11.047 ms  8.393 ms  13.292 ms
 8  216.239.47.114 (216.239.47.114)  13.294 ms  11.379 ms  11.355 ms
 9  209.85.250.207 (209.85.250.207)  11.414 ms  11.366 ms  11.331 ms
10  * yyz08s13-in-f24.1e100.net (74.125.226.120)  11.404 ms  12.117 ms
```

As seen above at hop 10, both traces lead back to the same ip 74.125.226.xxx which leads us to believe that when connecting to google, we are connecting to Google's DNS servers instead of directly to the top level domains. With dig command we can confirm it is google with the matching ip.

```
dig +noall +answer www.google.com
www.google.com. 127 IN A 74.125.226.115
www.google.com. 127 IN A 74.125.226.116
www.google.com. 127 IN A 74.125.226.113
www.google.com. 127 IN A 74.125.226.112
www.google.com. 127 IN A 74.125.226.114
```

In response to my friend's question, connecting to *www.google.com* and *www.google.ca* would not make a difference as both url's will lead back to the exact same url. In addition, attempting to connecting to *www.google.jp* would not actually bring you to the servers in japan.