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**Chapter 2 Application Layer**

**Homework 3**

1. Consider distributing a file of ***F*** = 20 Gbits to ***N*** peers. The server has an upload rate of ***us*** = 40 Mbps, and each peer has a download rate of ***di*** = 2 Mbps and an upload rate of ***uc***. For N = 10, 100, and 1000 and u = 500 Kbps and 2 Mbps, prepare a chart giving the minimum distribution time for each of the combinations of N and u for both client-server and peer-to-peer distribution.

Program Output

File Size: 20000000000 bits

Server Upload Speed: 40000000 bits

Peer Download Speed: 2000000 bits

Peer Upload Speed: [500000 2000000] bits

Peers: [10 100 1000]

Client Server

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Peers: 10

Server upload time: 5000 seconds

Slowest Peer time: 10000 seconds

Distribution=83.33mins

Peers: 100

Server upload time: 50000 seconds

Slowest Peer time: 10000 seconds

Distribution=166.67mins

Peers: 1000

Server upload time: 500000 seconds

Slowest Peer time: 10000 seconds

Distribution=166.67mins

Peer2Peer

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Peer Upload Speed: 500000

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Peers: 10

Server upload time: 5000 seconds

Slowest Peer time: 10000 seconds

nPeerTime time: 4444 seconds

Distribution=74.07mins

Peers: 100

Server upload time: 50000 seconds

Slowest Peer time: 10000 seconds

nPeerTime time: 22222 seconds

Distribution=166.67mins

Peers: 1000

Server upload time: 500000 seconds

Slowest Peer time: 10000 seconds

nPeerTime time: 37037 seconds

Distribution=166.67mins

Peer Upload Speed: 2000000

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Peers: 10

Server upload time: 5000 seconds

Slowest Peer time: 10000 seconds

nPeerTime time: 3333 seconds

Distribution=55.55mins

Peers: 100

Server upload time: 50000 seconds

Slowest Peer time: 10000 seconds

nPeerTime time: 8333 seconds

Distribution=138.88mins

Peers: 1000

Server upload time: 500000 seconds

Slowest Peer time: 10000 seconds

nPeerTime time: 9803 seconds

Distribution=163.38mins