Course: Computer Network for Communication
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Assignment 4

Tcp Server Performance Evaluation

- **Scenario**

A Single Tcp Server continously handles requests from 800 clients within a time span of 1 hour. Each client sends one request to the Server, and the Server responds accordingly. The size of each request is estimated to be 500 KB, and the average Round Trip Time (RTT) between the clients and the Server is 100 milliseconds(ms).

- **Given Parameters**

Parameter	value
Total client/hour	800 clients
Average request size	500 KB
RTT(Round Trip Time)	100 ms
Duration	1 hour = 3600 seconds

- **Objective Questions**

Q1. ~~Each~~ what is total data served per hour?

Each client sends a request of 500 KB for 800 clients:

$$\text{Total Data} = 800 \times 500\,KB = 400{,}000\,KB$$

Now convert into MB.

$$400000\,KB = \frac{400{,}000}{1024} = 390.63\,MB$$

So the total data served per hour is approx 390.63 MB (rounded to 400 MB for simplicity in further calculations.

Q2. What is minimum bandwidth required to serve all clients in 1 hour?

Bandwidth can be calculated as:

$$\text{Bandwidth} = \frac{\text{Total Data Served}}{\text{Total Time}}$$

$$\text{Bandwidth} = \frac{400\,\text{MB}}{3600\,\text{sec}} = 0.111\,\text{MB/s}$$

Convert to Kbps:

$$0.111\,\text{MB/s} = 0.111 \times 1024 \times 8 = 911.36\,\text{Kbps}$$

So, minimum required bandwidth is approximately 911 Kbps to serve all 800 clients in 1 hour.

Q3. What is the average throughput per client?

Through per client can be defined as the amount of data received over a specific time.

$$\text{Throughput} = \frac{500}{0.1\,\text{sec}} = 500\,\text{KB/sec}$$

$$500\,\text{KB/s} = 40\,\text{Mbps (Megabits/sec)}$$

This is the peak throughput per individual client, assuming only one client is being served at a time. However, since all 800 clients share the same server and ~~Server~~ network, average Throughput per client becomes:

$$\text{Average Throughput} = \frac{\text{Total Bandwidth}}{\text{Number of clients}}$$

$$= \frac{911.36 \text{ Kbps}}{800}$$

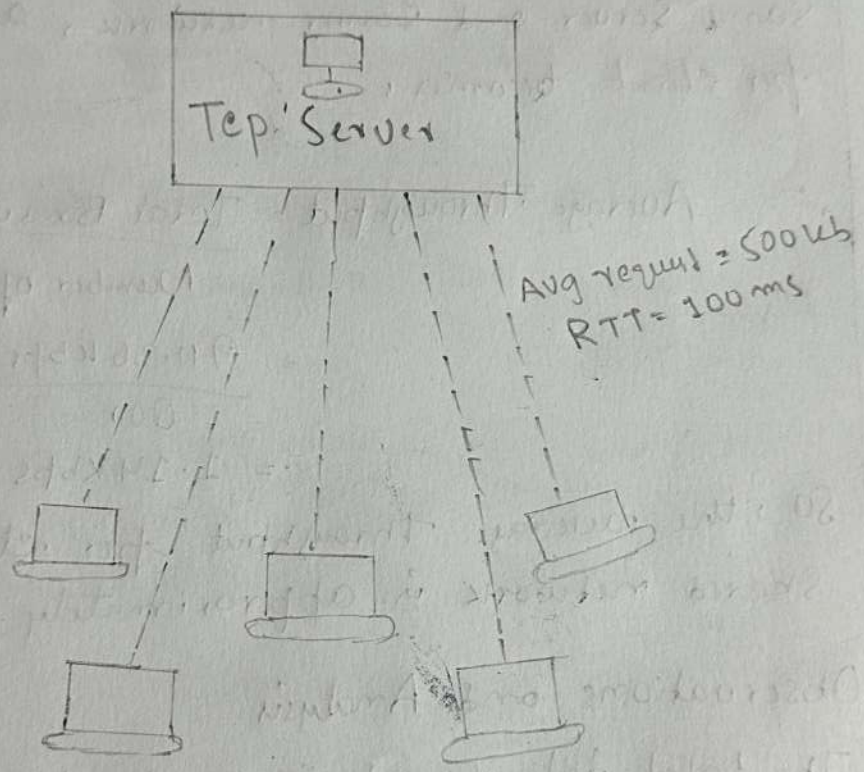
$$= 1.14 \text{ Kbps}$$

So, the average Throughput per client over the shared network is approximately 1.14 Kbps

- Observations and Analysis
- The total data served is moderately high for a single server.
- A minimum bandwidth of 911 Kbps is required, which is well within the range of many broadband connections.
- The Throughput per client under load-sharing is low, which could impact Latency-Sensitive applications such as Video Conferencing or online gaming.
- RTT of 100ms is moderate, not too high, but still impactful depending on the application type.

- Diagram

Below is a diagram that summarizes the Tcp client - server - interaction.



Tcp Server Serving 800 Clients (one Hour Session)