

Performance Analysis

Critique

Communication Protocols

There are many communication Protocols like TCP, UDP, IP etc.

TCP divides any message into a series of packets that are sent from source to destination. All these packets are reassembled at the destination, This is the most commonly used protocol.

UDP is lightweight and slightly faster than TCP, But UDP is an unreliable and connection-less protocol as there is no need to establish a connection before data transfer.

We used TCP protocol as it is a more secure and lightweight protocol, and TCP guarantees the delivery of the messages to the destination, unlike UDP.

Load Balancing Strategy

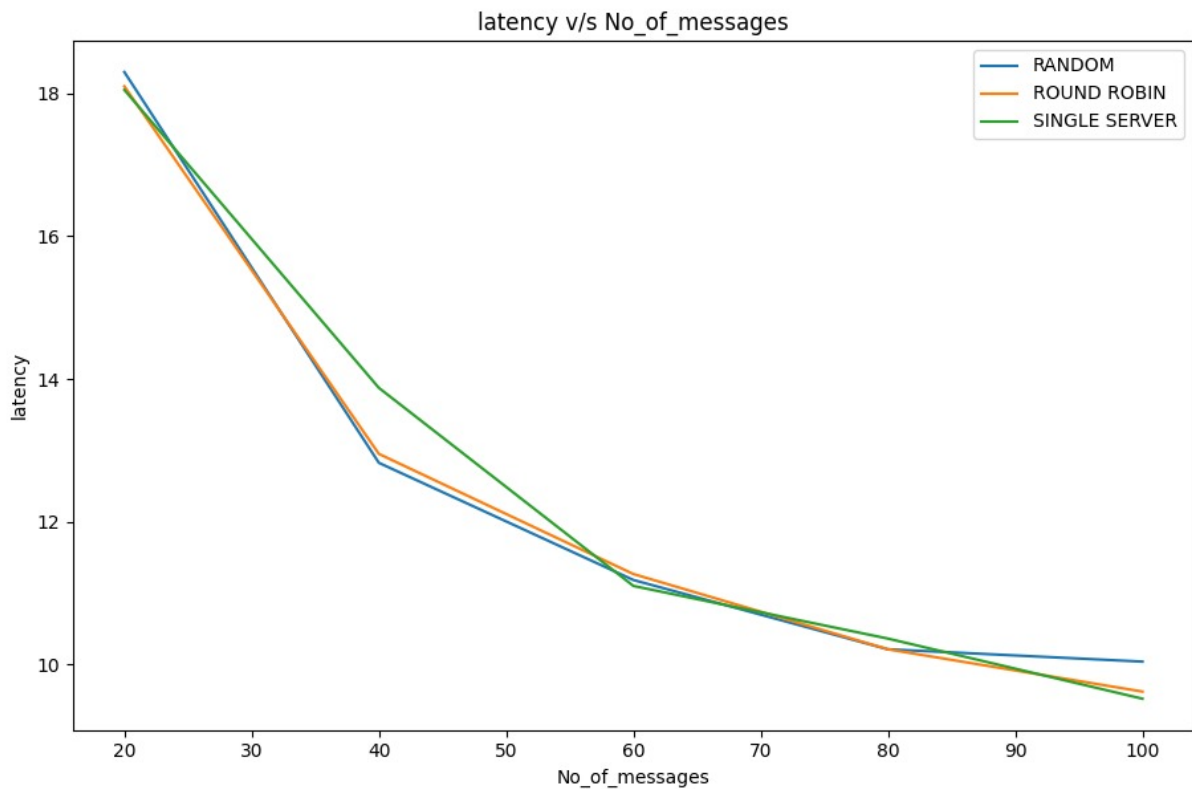
We have created the main server and 3 or 4 other servers. The task of this main server is to select a server to transmit the message,

We have calculated latency, throughput and Bandwidth for the following three strategies and made some inferences.

- **Strategy 1** Assigning servers in the round-robin fashion
- **Strategy 2** Assigning random servers
- **Strategy 3** A single server is assigned

1 Latency

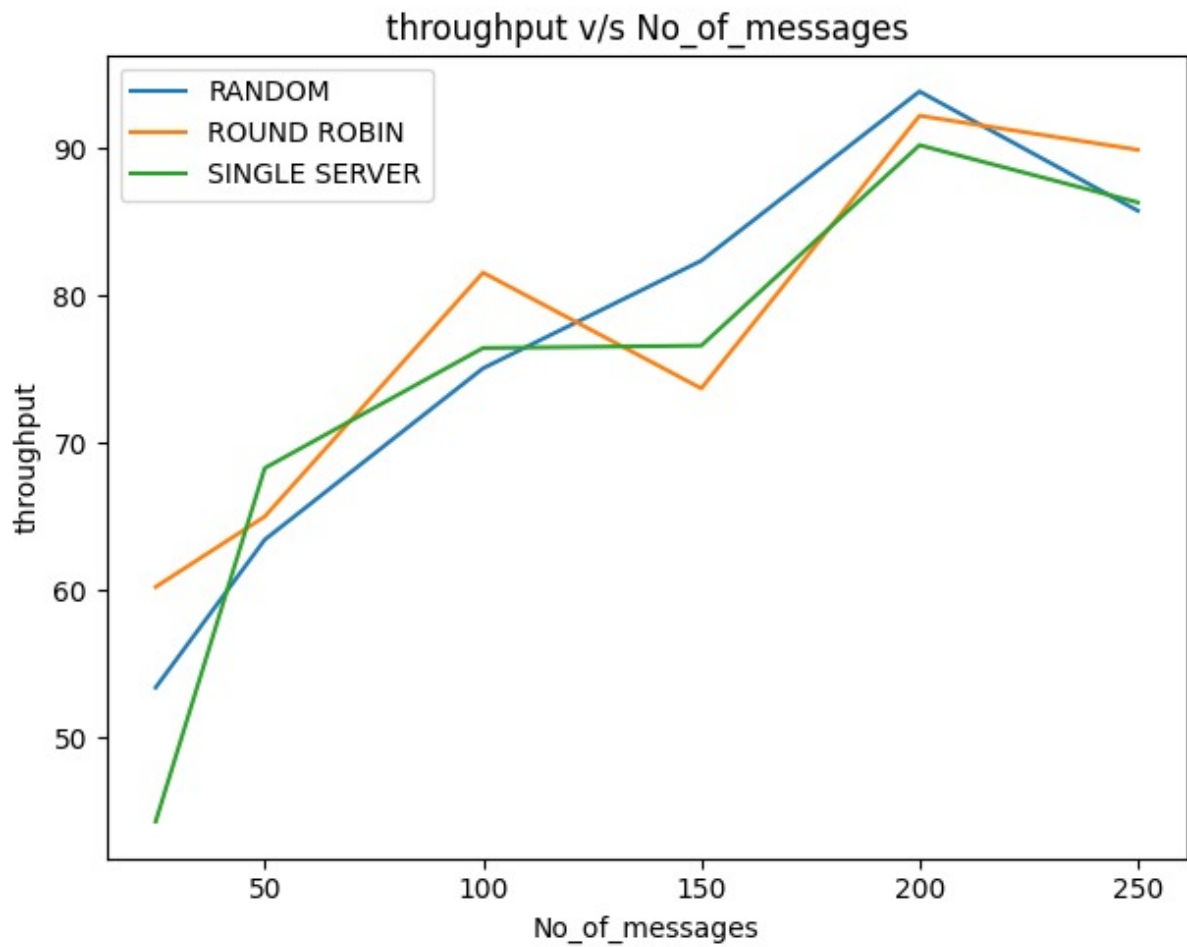
- Latency is the average time taken for a message sent from a client to reach the destination.
- The following graph is calculated from the data collected by sending messages from one client to two other clients. Here the sleep time is 0.5 seconds.



- Larger the value of latency, the larger the time taken for the transmission
- Here single server has a large latency compared to others, as the load on a single server is more than the load on multiple servers.
- The round-robin and the random server have nearly the same latency because the load on the servers is distributed nearly equally on both servers.

2 Throughput

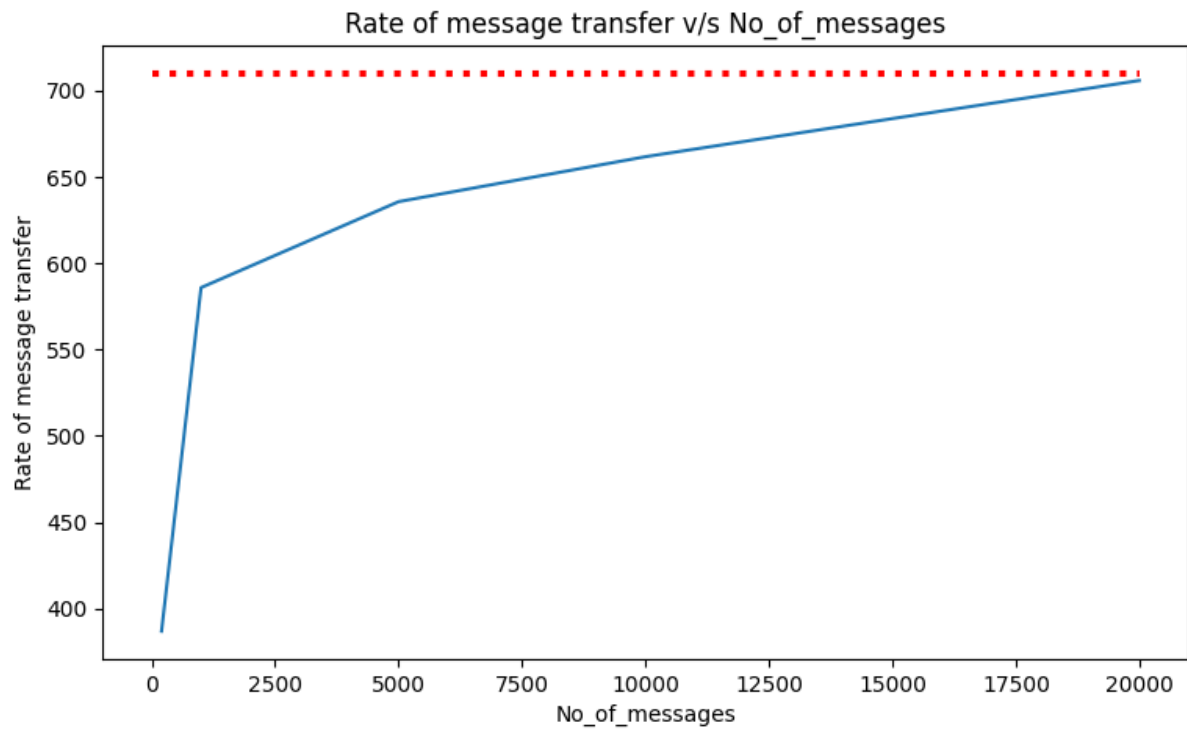
- Throughput is the data transferred per unit of time.
- Due to the encryption, our code sends a fixed memory of the encrypted text, irrespective of the size of the message.
- The output throughput is almost the same as the input throughput.
- As the memory per message is fixed, throughput will be proportional to the number of messages sent/received per unit time
- The following graph is generated for Throughput vs No of messages with a delay of 0.01 second between 2 messages



- The throughputs for different load balancing strategies are almost similar because we used only two servers and three clients
- The throughput is much less than the bandwidth here, also the sleep time (simulating the delay time) is comparable to the latency.
- Also as the sleep time is 0.01 seconds here, the maximum throughput we can expect is 100 messages per seconds, where the values tend to, as we increase the number of messages.

3 BandWidth

- Bandwidth is a measure of the data transfer rate or capacity
- We tried to achieve the maximum capacity by making the delay time between messages 0 and increasing the no of messages
- We tried to measure the bandwidth using the no of messages sent per unit time
- The following graph is generated for the round-robin strategy.
- From the graph, we can infer that the value tends to a constant value; it is the bandwidth value.



4 Inference

- The throughput and latency vary with the messaging pattern.
- The single server strategy is not a better strategy as it gives comparatively more latency and less throughput.
- Because all the transmission is done only by one server, which increases the load on that server.