Routing Simulation for Network Load Balancing

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Abstract

The Client-Server Model often faces limitations in communication efficiency when supporting many users. This independent study aims to analyze the performance differences between the traditional client-server model and a hybrid model that utilizes a client agent to distribute information to group members.
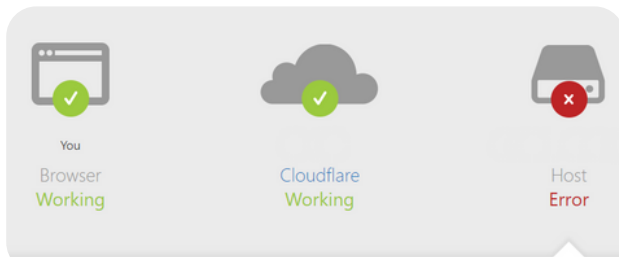
The simulation system is developed using the NS-3 network simulator, and it is devided to sections: creating a network simulation with servers and clients in the same and different local networks, simulating network communication using TCP and UDP, selecting efficient members for data transmission, and distributing tasks through client agents.

The test results indicate performance differences between the models, showing that the average delay from data generation to transmission is less than 0.11 ms, the average delay from data generation to result reception exceeds 0.62 ms, the number of results received within 1 second is below 420, and the average job size sent by the server is reduced by 24.34 bytes.

Introduction

Many users access online services, requiring fast, secure, and scalable server performance. However, high user traffic increases the server's workload beyond its capacity, leading to delays and potential service failures.
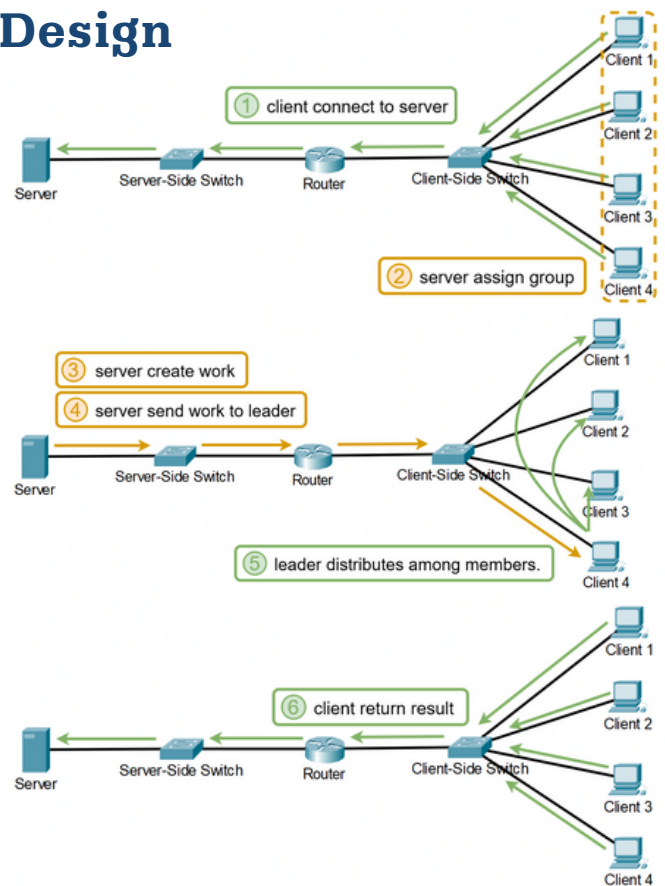
- **Aims:** Studying network communication and using the NS-3 Network Simulator to optimize server connection paths.
- **Proposed Solution:** Redirecting communication through a user representative in a group to reduce server workload.
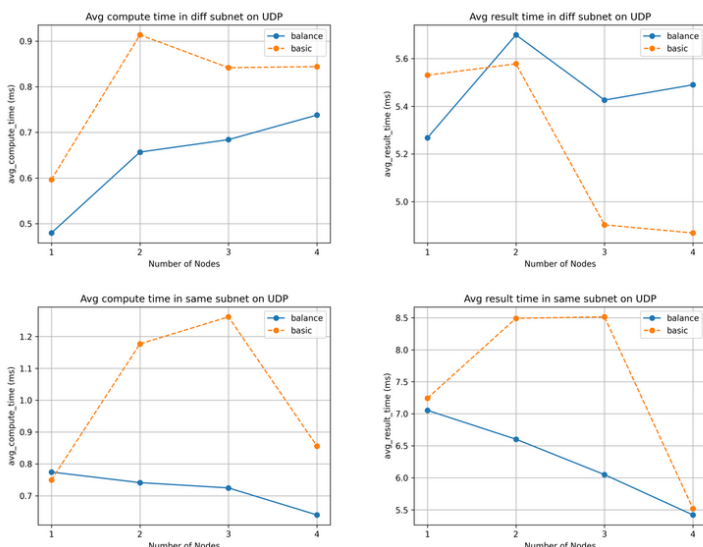

Technology

Design

Result

Conclusion

- In a different subnet, the hybrid model uses less computational time than the client-server model but takes more time to obtain results.
- In the same subnet, the hybrid model not only reduces computational time compared to the client-server model but also achieves faster results. However, when the number of nodes is four, the differences are minimal.

Reference

- Cisco Systems, Inc. "Interconnecting Cisco Networking Devices, Part 1: Student Guide. Version 2.0," Cisco Systems, Inc., 2013.
- https://www.nsnam.org