A SIMPLE LOAD TESTING QOS MEASUREMENT FRAMEWORK

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ABSTRACT

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Index Terms— Quality of Service, Software Defined Network, Network emulation, Mininet

1. INTRODUCTION

The design of computer networks is driven by a drive towards a target quality of service (QoS), a set of performance measurements. Further, the implementation of network architectures demands time and money, and implementations that fail to meet quality of service standards waste time for both companies and customers. Software-defined networks (SDN) addresses the project of static architectures by enabling programming and measurement in a dynamic setting. It is important to understand and harness the strengths of SDN in a methodical way, so developers can focus more on the design goals and less on tedious implementation tasks.

2. RELATED WORK

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3. APPROACH

Mininet will be utilized as a network emulator, for it has seen significant use in related works [1, 2, 3] and is well-documented. The Iperf tool was used in [3] for generating network traffic, and we think that this tool will be appropriate for the same purposes in this study. We will reuse the quality of service metrics outlined in [2]:

- Throughput (total transmitted data in bits)/(total time taken in seconds)

- Delay (time required to transmit the data from sender to receiver)

- Packet loss (the number of packets not delivered to their destination)

- Jitter (the variance in latency)

Previous studies have defined quality of services measurements and used network emulation tools to program their own experiments. However, there does not seem to be a general method through which network emulation tools can be used, in association with quality of service measurement techniques, in order to test network architectures for their performance before they are implemented in real-world applications.

We will use Mininet's toolkit create a server around a given application (i.e. a simple Node.js application), and artificially adjust flow control, packet drop rate, and jitter from the server-side. Mininet will be able to measure packet return trip time (RTT), delay, and throughput from the server to clients, and the results of these measurements will determine how the overall quality of service changes as various server-side features are tweaked dynamically. Further, we will show how to use Mininet to simulate DoS attacks by a large number of clients in order to observe how attacks affect quality of service to benign users.

3.1. Timeline

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3.2. Project Website

Please see the associated website for progress reports and results at https://oscarsandford.github.io/qoemf/.

4. REFERENCES

[1] Rogério Leão Santos de Oliveira, Christiane Marie Schweitzer, Ailton Akira Shinoda, and Ligia Rodrigues Prete, "Using mininet for emulation and prototyping software-defined networks," in *2014 IEEE Colombian Conference on Communications and Computing (COLCOM)*, 2014, pp. 1–6.

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[3] Pinkey Chauhan and Mithilesh Atulkar, "Achieving enhanced network performance in udp and tcp traffic of software defined networking by selecting java based controllers decisively," *International Journal of Innovative Technology and Exploring Engineering*, vol. 9, no. 7, pp. 268–274, May 2020.