

# 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

Previous studies have defined quality of services measurements [1] and used network emulation tools to program their own experiments [2]. 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 to test network architectures for their performance before they are implemented in real-world applications.

## 3. APPROACH

Mininet will be utilized as a network emulator, for it has seen significant use in related works [3, 1, 2] and is well-documented. The Iperf tool was used in [2] 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 [1]:

- 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)

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.

In this way, we will provide a quality of service measurement outline for future developers to consider when testing their network applications in a software-driven manner.

### 3.1. Timeline

1. Jan 31st - Feb 13th: Create project outline, gather resources, outline program and create git repository.
2. Feb 14th - Feb 27th: Build testing environment and prepare test.
3. Feb 28th - Mar 13th: Begin tests, create midterm presentation and present.
4. Mar 14th - Mar 27th: Gather results and prepare final presentation. Begin final report.
5. Mar 28th - Apr 7th: Final Presentation. Continue to work on final report.
6. Apr 8th - Apr 16th: Turn in final report.

### 3.2. Project Website

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

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Thank you to Dr. Jianping Pan at the University of Victoria for his teaching and guidance throughout this project and the course.

#### 4. REFERENCES

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- [3] 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.