



University
of Victoria

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Applied Science

of

NICHOLAS TURNER

BSc (University of Victoria, 2013)

**“Customer-Driven Cost-Performance Comparison of a Real-World
Distributed System”**

Department of Electrical and Computer Engineering

Friday, April 26, 2019

1:30 P.M.

Engineering Office Wing

Room 230

Supervisory Committee:

Dr. Thomas Darcie, Department of Electrical and Computer Engineering, University of Victoria
(Supervisor)

Dr. Stephen Neville, Department of Electrical and Computer Engineering, UVic (Member)

External Examiner:

Dr. Sudhakar Ganti, Department of Computer Science, UVic

Chair of Oral Examination:

Dr. Anthony Quas, Department of Mathematics and Statistics, UVic

Abstract

Many modern web applications run on distributed cloud systems, which allows them to scale their resources to match performance requirements. Scaling of resources at industry scales, however, is a financially-expensive operation, and therefore one that should involve a business justification rooted in customer quality-of-service metrics over more commonly-used utilization metrics. Additionally, changing the resources available to such a system is non-instantaneous, and thus a reasonable effort should be made to predict system performance at varying resource allocations and at various expected workloads.

Common performance monitoring solutions look at general metrics such as CPU utilization or available memory. These metrics are at best an indirect means of evaluating customer experience, and at worst may provide no information as to whether users of a commercial application are satisfied with the product they have paid for. Instead, the use of application-specific metrics that accurately reflect the experience of system users, combined with research into how these metrics are affected by various tunable parameters, allows a company to make accurate decisions as to the desired performance perceived by their users versus the costs associated with providing that level of performance.

This thesis uses a real-world software-as-a-service product as a case study in the development of quality-of-service metrics and the use of those metrics to determine business cases and costing packages for customers. The product used for this work is Phoenix, a state-of-the-art social media aggregation and analytics software-as-a-service web platform developed by Echosec Systems, Ltd. The product will be tested under real-world conditions on cloud hardware with a minimal test harness to ensure a realistic depiction of live production conditions.