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

of

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## "Parameter Estimation of Queueing System using Mixture Model and the EM Algorithm"

Department of Computer Science

Wednesday, November 2, 2016
1:00 P.m.
Engineering and Computer Science Building
Room 467

Supervisory Committee:
Dr. Kui Wu, Department of Computer Science, University of Victoria (Supervisor)
Dr. Venkatesh Srinivasan, Department of Computer Science, UVic (Member)

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Dr. Geoff Steeves, Department of Physics and Astronomy, UVic

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## Abstract

Parameter estimation is a long-lasting topic in queueing systems and has attracted considerable attention from both academia and industry. In this thesis, we design a parameter estimation framework for a tandem queueing system that collects end-to-end measurement data and utilizes the finite mixture model for the maximum likelihood (ML) estimation. The likelihood equations produced by ML are then solved by the iterative expectation-maximization (EM) algorithm, a powerful algorithm for parameter estimation in scenarios involving complicated distributions.

We carry out a set of experiments with different parameter settings to test the performance of the proposed framework. Experimental results show that our method performs well for tandem queueing systems, in which the constituent nodes' service time follow distributions governed by exponential family. Under this framework, both the Newton-Raphson (NR) algorithm and the EM algorithm could be applied. The EM algorithm, however, is recommended due to its ease of implementation and lower computational overhead.