

Accepted Manuscript

Multi-server preemptive priority queue with general arrivals and service times

Alexandre Brandwajn, Thomas Begin

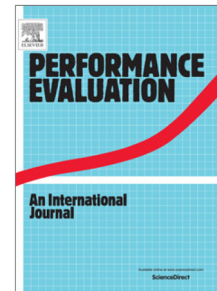
PII: S0166-5316(17)30049-4
DOI: <http://dx.doi.org/10.1016/j.peva.2017.08.003>
Reference: PEVA 1921

To appear in: *Performance Evaluation*

Received date : 14 February 2017
Revised date : 19 June 2017
Accepted date : 12 August 2017

Please cite this article as: A. Brandwajn, T. Begin, Multi-server preemptive priority queue with general arrivals and service times, *Performance Evaluation* (2017), <http://dx.doi.org/10.1016/j.peva.2017.08.003>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Multi-server preemptive priority queue with general arrivals and service times

Alexandre Brandwajn
Baskin School of Engineering
University of California Santa Cruz
USA
alex@soe.ucsc.edu

Thomas Begin
LIP UMR CNRS - ENS Lyon - UCB Lyon 1 -
INRIA 5668
France
thomas.begin@ens-lyon.fr

ABSTRACT

We present a simple approximate solution for preemptive-resume queues with multiple servers, general (phase-type) service and general (phase-type) interarrival time distributions. In our solution, priority levels are solved one at a time in the order of decreasing priorities. Each priority level is solved approximately using a reduced state description. The complexity of our approximate solution in terms of the number of equations solved grows linearly with the number of servers and priority levels.

We studied a large number of numerical examples with a range of values for mean service times and offered loads across priority levels, varying the number of servers from 8 to 48. Discrete-event simulation was used to assess the accuracy of our approximate solution. Overall, in the case of Poisson and quasi-Poisson arrivals, expected relative error for the mean number of customers in the system was below 2% while the corresponding median relative error was below 0.25%. The good accuracy of our approximation appears to extend to the case of phase-type times between arrivals, with expected relative errors for the mean number in system below 5% even for a Pareto-like distribution of interarrival times with a large coefficient of variation. Our numerical results indicate that the proposed approximation provides a relatively simple and generally accurate approach to preemptive-resume queues with larger numbers of servers and general distributions of service and interarrival times.

Keywords: Multiple servers, priority, preemptive-resume, general service, general arrivals, $Ph/Ph/c/N$ queue, reduced-state approximation, linear complexity.

Download English Version:

<https://daneshyari.com/en/article/4957262>

Download Persian Version:

<https://daneshyari.com/article/4957262>

[Daneshyari.com](https://daneshyari.com)