

Sojourn Times and Steady-state Probabilities in a Retrieval Queueing System

Ivan Atencia
University of Málaga
iatencia@ctima.uma.es

Abstract

This paper analyses a discrete-time $Geo/G/1$ retrieval queue with general retrieval times in which the arriving customers may opt to follow a LCFS-PR discipline or to join the orbit where it is contemplated the movement of jobs, customers, etc., from one place to another. The Markov chain underlying the system has been studied, the generating functions of the number of customers in the orbit and in the system as well as their expected values are derived. The stochastic decomposition law and, as an application, bounds for the proximity between the steady-state distribution for the system under study and its corresponding standard system has been derived. Recursive formulae for calculating the steady-state distributions of the orbit and system size have been developed. Besides, it has proved that the $M/G/1$ continuous-time version of the studied model can be approximated by the discrete-time system considered.

A complete study of the sojourn time of a customer in the server, the orbit and the system has been carried out. Numerical examples to illustrate the effect of the most significant parameters of the system on several performance characteristics are given. Finally, a section of conclusions and research results is presented.

References

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