پژوهشگاه دانش‌های بنیادی
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سخنرانی علمی

Processor Sharing Queues with Impatient Customers and State-dependent Rates

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Abstract

In classical queueing theory, M/M/1 is the most widely studied queueing system. However, this system is usually studied without considering the impatience behavior of customers. Queueing with impatience has recently gained attention since it emerges in many fields such as communication networks and real-time systems. The impatience behavior of customers has a very important effect on the efficiency of the system especially in Processor Sharing (PS) queues, where the deadlines are effective until the end of the service and customers receive service right after their arrival. However, there are few limited works regarding PS discipline with impatient customers, all of which are only confined to asymptotic or approximation studies.

In this talk, we study queues with impatient customers and PS discipline as well as its variants, namely, Discriminatory Process Sharing (DPS) and Generalized Process Sharing (GPS). Customers with general impatience distribution arrive according to a state-dependent Poisson process and have exponential service times with state-dependent service rates. Analytical methods based on simple Markov chains are given for the performance analysis of such queues. The principal measures of performance are the steady-state probability of missing deadline and the steady-state probability of blocking. Similar results are obtained for related queues with Random Order Service (ROS) and First Come First Served (FCFS) disciplines with state-dependent rates. The efficacy and accuracy of the approach are illustrated by some numerical examples and simulation experiments.

Biography

Mahdieh Ahmadi is a postdoctoral researcher at Institute for Research in Fundamental Sciences (IPM). She received her PhD in computer engineering from Sharif University of Technology in 2020. Her research interests include network performance modeling and optimization, cache networks, and service orchestration in 5G.

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