Approximate Analysis of Open Exponential Queueing Networks with Blocking:General Configuration

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ABSTRACT

An arbitrary configuration of an open queueing network with exponential service times and finite buffers is analysed. We offer an iterative procedure for approximating the marginal occupancy probabilities for each queue of the system. The method decomposes the queueing network into individual queues and analyses each in isolation using information from only its nearest neighbors. Based upon the SIMP approximation previously used for tandem queues, it replaces each server's service time with a clearance time (which includes blocking), and each server's arrival rate by an equivalent "acceptance" rate. The procedure is easy to implement and requires modest memory and computer time. Extensive numerical experiments, performed for various topologies, yield accurate results compared with those obtained by exact or simulation methods.