

A Fast Simulation for Thousands of M/2M/2 Parallel Homogeneous Fork/Join Pipelines

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Abstract

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Abstract:

We study a parallel K-pipeline HFJ (Homogeneous Fork/Join queueing) system in which each pipeline has two identical exponential first-in-first-out services where each service has an infinite capacity queue. Jobs arrive with Poisson arrival distribution. Upon arrival, a job forks into K tasks. Task k, $k = 1, 2, \dots, K$, is assigned to the kth pipeline. A job leaves the HFJ system as soon as all its tasks complete their service. We call the system M/2M/2 HFJ pipelines. In this paper, we present a speed and memory solution to simulate thousands of pipelines in minutes for the mean response time, which we denote by T_K . On a regular DELL INSPIRON 1464-138 laptop with 2G memory, the simulation for 10,000 M/2M/2 HFJ pipelines lasts only 36 minutes for 5 million warm-up jobs and 20 million analysis jobs. As an application, we compare simulation results for $K = 2,000$ with two mean response time solutions in and. Reusable source code is also offered for others to use.

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