

The Spectral Expansion Method for the Performance Evaluation of ICT Systems

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Abstract

The concept of Quasi Birth-Death (QBD) processes, as a generalization of the classical birth and death processes (e. g. the $M/M/1$ queue) was first introduced in the late 1960s by Wallace and Evans. The state space of a QBD process, in the Markovian framework, is defined on a two-dimensional lattice, finite in one dimension (finite or infinite in the other). The random variable in the finite dimension is the phase and the other variable is called the level. Transitions in a QBD process are possible within the same level or between adjacent levels. The QBD framework is a mature technique for the performance evaluation of many problems in telecommunications and computer networks. The spectral expansion method is the well-known procedure to obtain the stationary probabilities of QBD processes with the use of the eigenvalues and left eigenvectors of a certain matrix polynomial.

In this talk, the short overview of the spectral expansion method and its application to the performance evaluation of some systems ICT systems will be presented.

Keywords: multiserver, queueing, performance evaluation, spectral expansion

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