



Modelling of Network Performance for Large-Scale System with QoS Constrains

Visiting student

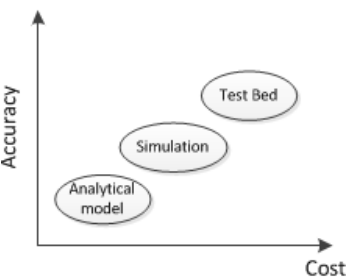
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Part 1 Background and aims

Computer and Communication networks are usually considered to be large-scale systems. How to evaluate the performance of such networks is what we care most. There are three main methods: Analytical model, Simulation and Test Bed.



Simulation and test bed are very expensive and the complexity is high, which is not suitable for large-scale system. Analytical model is what we adopted in this project.

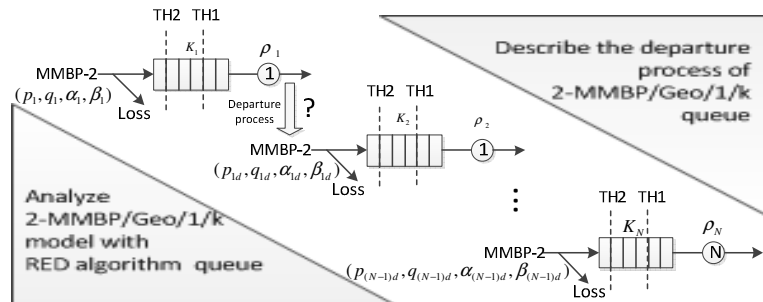
Part 3 Solution of the system

Exact closed-form solutions Numerical technique Analytical approximations

Suitable for just a few special cases

Work well just for small configurations

Suitable for analyzing large-scale system

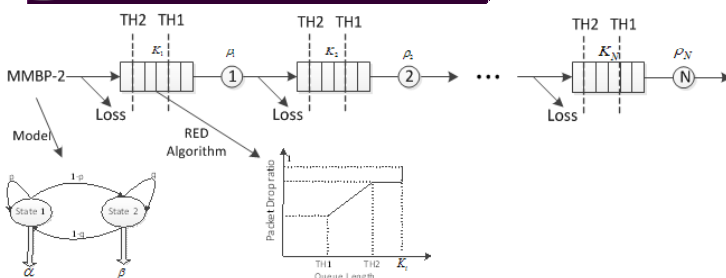


The most difficult aspect of such a decomposition is the characterization of the arrival process to an intermediate queue. We want to fit the departure process of MMBP-2/Geo/1/k (considering RED algorithm) with an MMBP-2 model, so the following queue can still be analyzed as an MMBP-2/Geo/1/k queue.

Performance metrics

$$DL_{EE} = \sum_{i=1}^N DL_i \quad Var_{EE} = \sum_{i=1}^N Var_i \quad PL_{EE} = 1 - \prod_{i=1}^N (1 - PL_i)$$

Part 2 System model



The large-scale system is abstracted as an open tandem queueing network consisting of N nodes with finite capacity. MMBP-2 is used as a source model since it can capture the properties of both burstiness and correlation while maintaining analytical tractability. Service time is assumed to be Geo distribution. RED algorithm is operated in queue. It is obvious that this network is difficult to treat since it hasn't product-form solution as Jackson network.

Part 4 Future work

