

CS 555: Analytic Models and Simulation of Computer Systems

Objectives

- The course presents analytic and simulation techniques used for performance evaluation and modeling of computer systems and networks.
- Fundamentals of probability theory are discussed first followed by rigorous development of different probability distributions and queueing systems.
- Various aspects of discrete-event and Monte Carlo simulations are studied including the methodology of statistical evaluation of simulation results.
- The covered material is illustrated with many practical examples.

Prerequisites

- CS 450.

Syllabus

- Methodology of modeling and performance evaluation
- Review of probability theory
- Probability measures
- Conditional probability
- Combinatorial analysis
- Random variables
- Probability density function
- Probability mass function
- Cumulative distribution function
- Exponential distribution
- Poisson distribution
 - Queueing models
- Birth-and-death equations
- Single Markovian queueing systems
- The Erlang B formula
- The Equivalent Random Method
- The Gauss-Seidel iteration
- Overrelaxation method
 - Simulation
 - Discrete event simulation
 - Monte Carlo simulation
 - Generation of probability distributions
 - Statistical evaluation of simulation results
 - Goodness-of-fit tests
 - Applications
- Packet switching
- Circuit switching
- Teletraffic engineering

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