

CS 621: Performance Evaluation of Computer Systems

Odd Semester (Aug.-Nov.) 2007, G Slot (W: 3pm, Th: 11am, Fr: 10am), CS 34
Prof. Krishna Sivalingam
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TAs: Nikhil Ranjan, Bimal Viswanath

1 Course objectives

The objective of this course to understand the fundamental concepts of computer system performance evaluation. This will include introduction to mathematical modeling techniques, discrete event simulation modeling, experiment design, workload characterization, measurement of performance metrics, and presentation of results.

2 Course prerequisite

Undergraduate Operating Systems course, Undergraduate Computer Networks course, Basics of Probability and Statistics.

3 Reference Textbooks

- RJ** Raj Jain, "The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation, and Modeling", Wiley-Interscience, 1991
- QSP** E.D. Lazowska, J. Zahorjan, G.S. Graham and K.C. Sevcik, "Quantitative System Performance", Prentice-Hall, 1984. (PDF available from: www.cs.washington.edu/homes/lazowska/qsp/)
- KT** K.S. Trivedi, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", Prentice-Hall, 1982. Contains many examples from computer systems.
- LK1** L. Kleinrock, "Queueing Systems, Vol. 1: Theory", Wiley 1975. A classic text on queueing theory, very well written.
- LK2** L. Kleinrock, "Queueing Systems, Vol. 2: Applications", Wiley 1976. A classic text on application of queueing theory to computer systems and networks, very well written.
- FSZ** D. Ferrari, G. Serazzi and A. Zeigner, "Measurement and Tuning of Computer Systems", Prentice-Hall, 1983.

4 Course Requirements

You are *required* to attend all the lectures. If you miss any of them it is your responsibility to find out what went on during the classes and to collect any materials that may be handed out.

Class participation is strongly encouraged to demonstrate an appropriate level of understanding of the material being discussed in the class. Regular feedback from the class regarding the lectures will be very much appreciated.

5 Planned Syllabus

The following topics will be covered, but not necessarily in the order listed below:

1. Introduction, Design for performance [RJ] Ch. 1 [QSP] Ch. 1
2. Systematic approach, pitfalls [RJ] Ch. 2, 3 [QSP] Ch. 2
3. Bounds on performance [QSP] Ch. 3-5
4. Probability Theory review [KT] Ch. 1-3 [RJ] Ch. 29
5. Measurement, workloads, tools [RJ] Ch. 4-6
6. Data presentation, Experiment design [RJ] Ch. 10-11,16-17,20
7. Simulation [RJ] Ch. 24
8. MVA [QSP] Ch. 6, 7
9. Hierarchical modelling [QSP] Ch. 8, 10
10. Queueing theory: single server [KT] Ch 6 [RJ] Ch. 30, 31
11. Queueing theory: network of servers [RJ] Ch. 32
12. Case studies

6 Tentative Grading Policy

The following allocation of points is tentative. These may change during the semester.

Quiz 1 (Sep 19):	20%
Quiz 2 (Oct 24):	20%
Programming and Other Assignments:	20%
Final (Nov 30):	40%