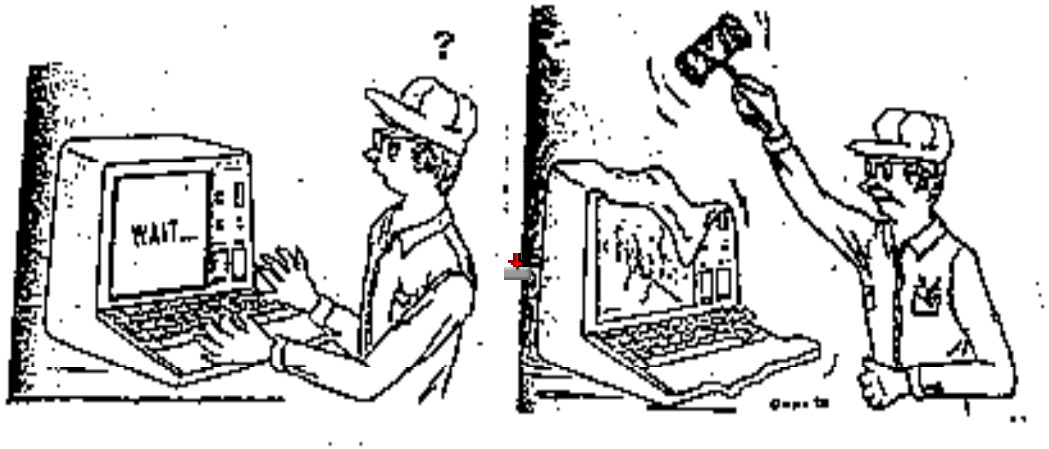
CS5239 Computer System Performance Evaluation

2009/10 – Semester 2



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What I do?

- **Teaching**
  - Systems Modeling & Simulation
  - Performance Analysis of Computer Systems
  - Distributed Systems
  - Applied Parallel Computing (joint teaching with MIT)
  - Computer Systems Engineering (joint teaching with MIT)
  - ....

- **Research -** parallel & distributed computing and performance evaluation
  - resource sharing
  - composable parallel simulation
  - parallelism theory and many-core systems
  - fault tolerance & check-pointing in distributed systems

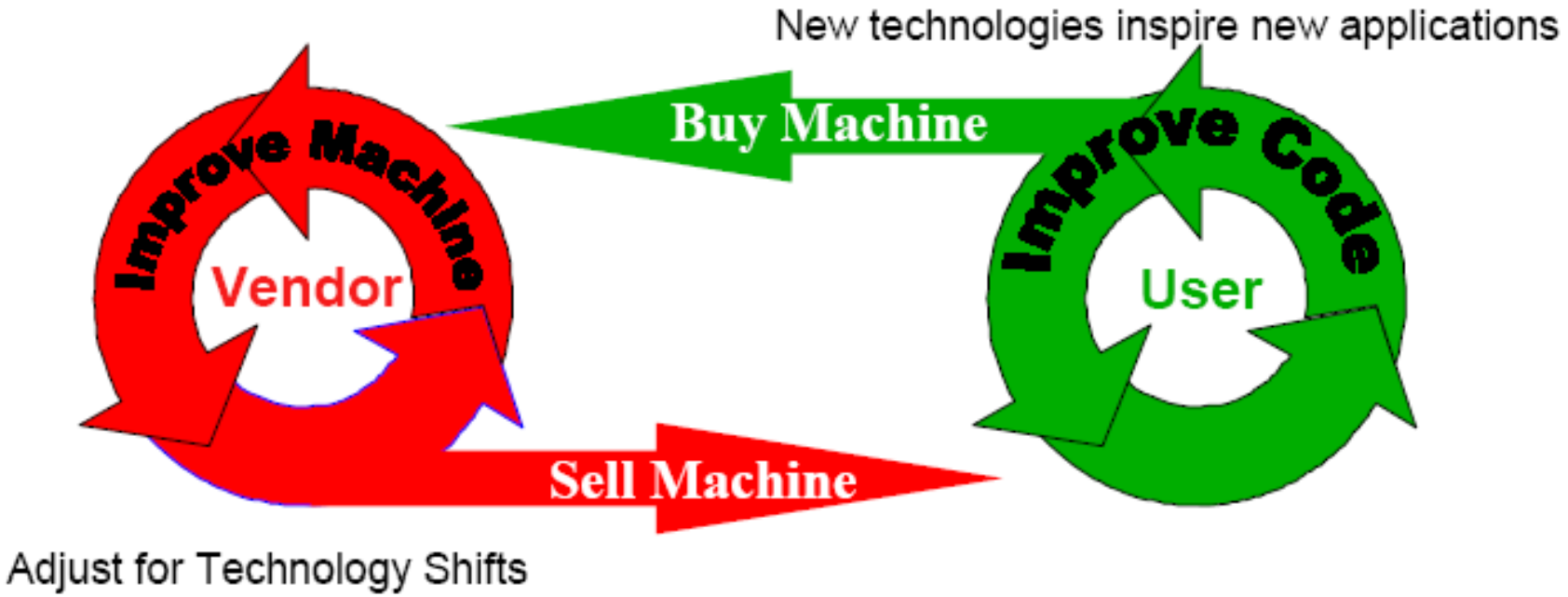
Performance

My Apple is faster than your Cray!

What is hard?

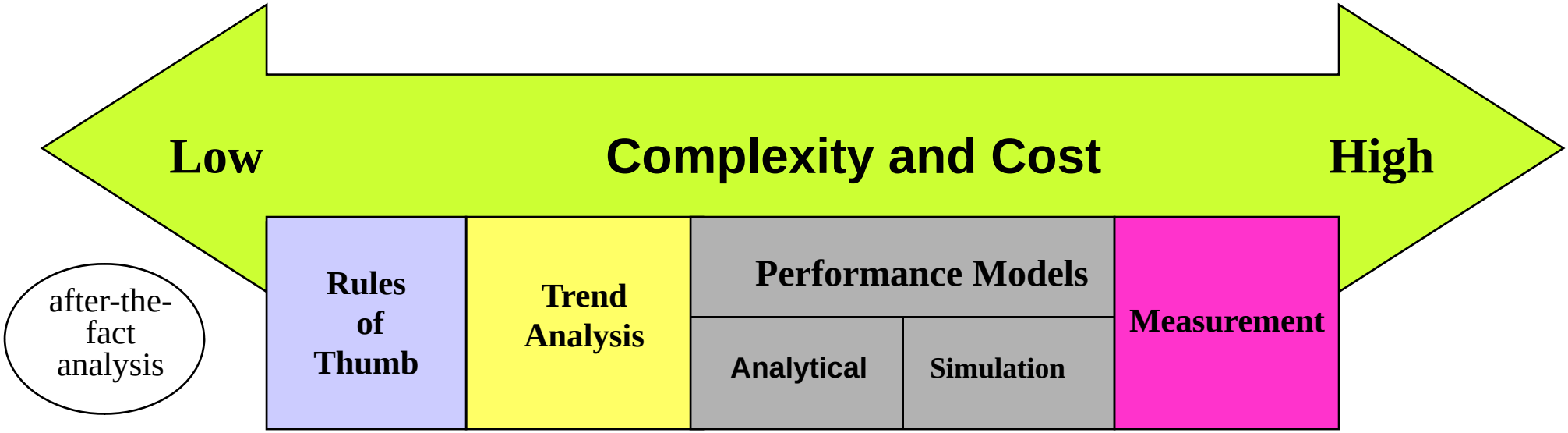
Performance of a computer system
is multidimensional.

Why Evaluated Performance?



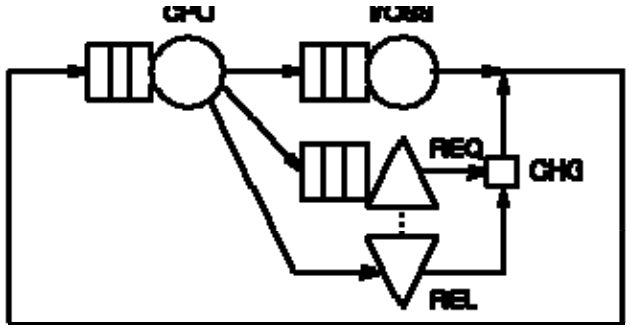
Goal: advance the state-of-the-art of computer architecture

Performance Evaluation



Three Fundamental Techniques

- **Measurements** of actual systems
- **Simulations** using software models
- **Mathematical modeling** using such techniques as queuing analysis



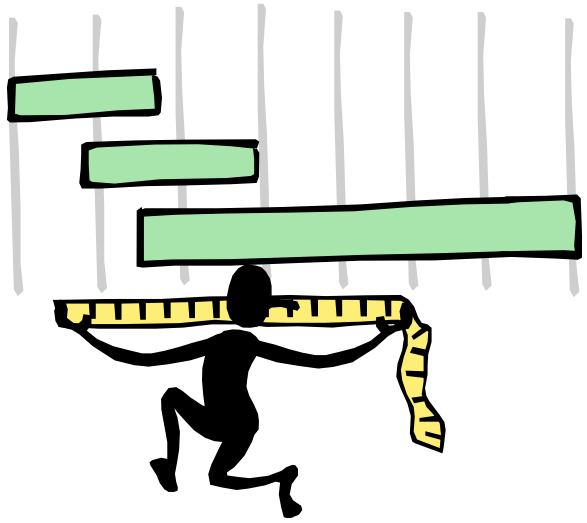
Course Schedule

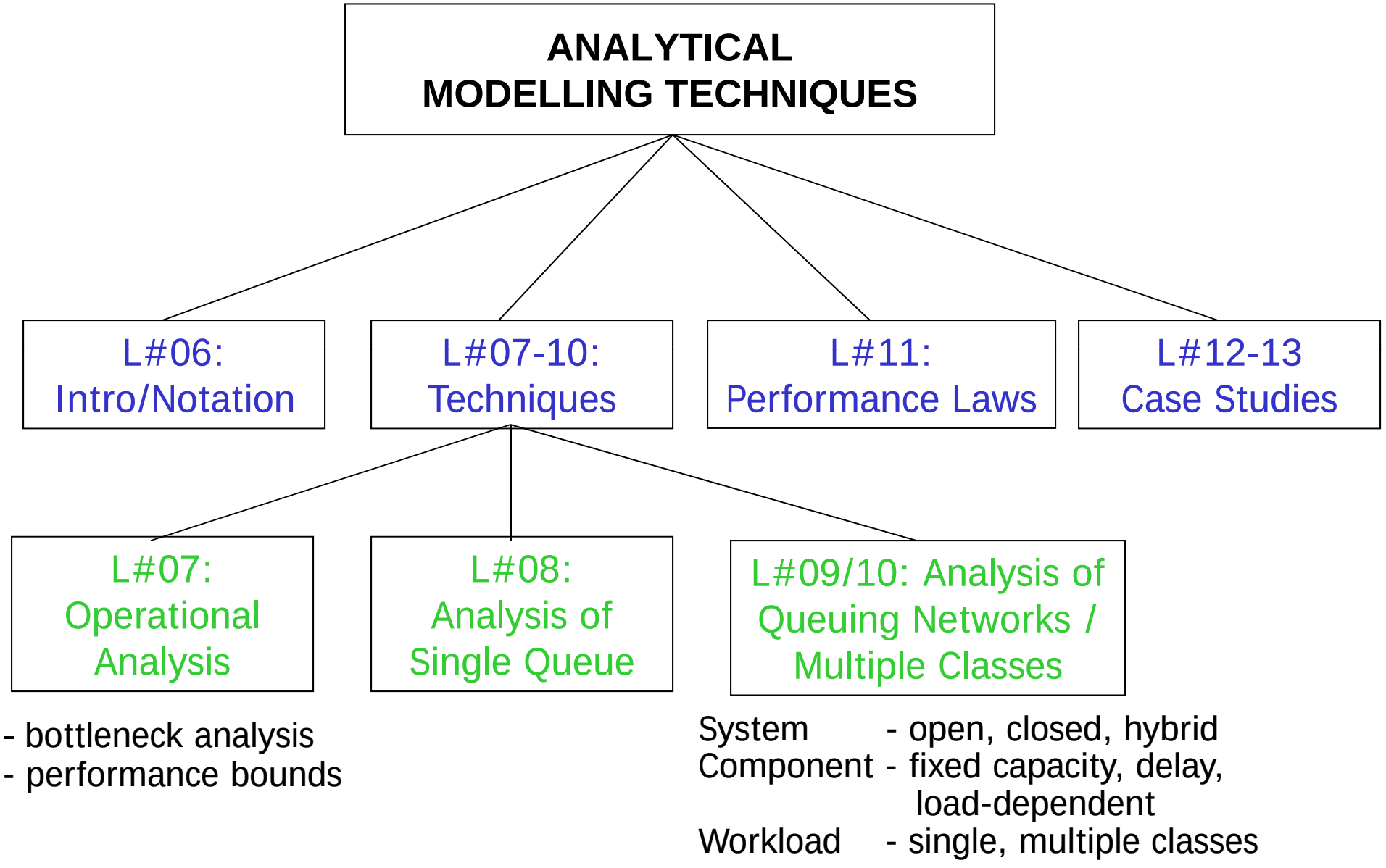
- Click here

MEASUREMENT TECHNIQUES AND TOOLS

- Performance Metrics – L03
- Workload – L04
- Instrumentation – L05
- Representation of Measurement Data – L05

"Measurements are
not to provide numbers but insights."
Ingrid Bucher




ANALYTICAL
MODELLING TECHNIQUES
L#06:
Intro/Notation
L#07-10:
Techniques
L#11:
Performance Laws
L#12-13
Case Studies
L#07:
Operational
Analysis
L#08:
Analysis of
Single Queue
L#09/10: Analysis of
Queuing Networks /
Multiple Classes
- bottleneck analysis
- performance bounds
System - open, closed, hybrid
Component - fixed capacity, delay,
load-dependent
Workload - single, multiple classes

Books

Main Textbooks

- The Art of Computer Systems Performance Analysis: Techniques for Experimental Design, Measurement, Simulation and Modeling, R. Jain, John-Wiley, 1991.
- Quantitative System Performance, E.D. Lazowska et al., Prentice-Hall, 1984, http://www.cs.washington.edu/homes/lazowska/qsp/.
- Measuring Computer Performance - A Practitioner's Guide, D.J. Lilja, Cambridge University Press, 2000.

Reference Books

- Capacity Planning and Performance Modeling - From Mainframes to Client-Server Systems, Daniel A. Menasce, et al., Prentice-Hall, 1994.
- Capacity Planning for Web Performance – Metrics, Models and Methods, D.A. Menasce, et al., Prentice-Hall, 1998.
- Simulation Modeling and Analysis, A.M. Law and W.D. Kelton, McGraw Hill, 3rd edition, 2000.
- Introduction to Parallel Computing, A. Grama, et al., Addison-Wesley, 2nd Edition, 2003.

Module Assessment

1. Continuous Assessment (60%)
   - Quiz (5%)
   - Assignment 1 (10%)
   - Assignment 2 (10%)
   - Project (15%)
   - Test (20%)

2. Open Book Exam (40%)
   - 2 hrs

Everything should be made as simple as possible, but no simpler – attributed to Albert Einstein

Problems

- consultation hours – Wed, 9-11am, email, catch me after lectures ….