

# System Performance

Requirements and Analysis

# Performance Requirements

- Who, what, where, when, why, how much?
- Who? All users
- What? Time, temperature, power, usage
- Where? In unit components, subsystems, system
- When? At the most stressful scenarios
- Why? Why is the requirement value say 3.1?
- How much? Value & units of the req't, methodology

# Examples

- Response time to query  $\leq 5$  seconds
- Query packet size  $\leq 1024$  bytes
- Network bandwidth  $> 2$  megabits/second
- Number of concurrent users  $\leq 30$
- System reliability  $\geq 99\%$
- Database holds  $\geq 1$  million rows

# SDLC and Perf Reqts

- Business needs
- System architecture
- System design alternatives
- Physical design alternatives
- Unit tests
- Prototyping tests
- Deployed system

# Perspectives

- User wants good response time
- Application needs resources (RAM, CPU)
- Network (packet loss, delay, utilization)
- Operating system shares resources

# Impact on components

- Application design
- Client platform sizing
- Application server sizing
- Network design
- Server sizing
- Storage design

# Perf Analysis Tools

- Tools
  - Spreadsheet
  - OPNET, OmNET++, NS2
- Methodologies
  - Queueing analyses
  - MATLAB general tool
- Instrumentation
  - Operating system (taskman, WMI)
  - Code instrumentation, incl. logs

# Performance Design

- Threads of execution
- Multiple CPUs
- Multiple networks
- Parallelism
- RAID
- Assume failures will occur
- Error detection, correction, recovery
- Redundancy
- Multiple tiers

# What If?

- You the analyst have on staff a skilled developer who can build a system model using OPNET. Think about how you would direct the developer's efforts.
- Begin with a question
- Develop input traffic patterns
- Construct blocks of functions
- Simulate the system
- Gather output statistics
- Analyze results

# Exercise

- Refer to your pilot project system
- Write down the performance requirements
- Are requirements complete? Flesh them out
- Will your system meet these requirements?
- Describe how your system will scale
- Describe your system's stressing behavior
- Propose analysis for proving scalability
- Describe changes to make the system scale