CMG 2008

Panel: Building Responsive and Scalable Applications

Session 512

December 11, 2008

Today's Topic

- A short discussion of different software performance engineering aspects (including requirements, modeling, profiling, load/performance testing). Experts will be available to answer questions in a Q&A session.
- Moderated by Alex Podelko

Agenda

- Topic introduction
  - What should we do to build responsive and scalable applications?
- Panelist introduction
  - Panelist views of the topic
- Q&A

Software Performance Engineering (SPE)

- ***SPE is a comprehensive way of managing performance that includes principles for creating responsive software, performance patterns and antipatterns for performance-oriented design, techniques for eliciting performance requirements, techniques for gathering the data needed for evaluation, and guidelines for the types of evaluations to be performed at each stage of the development process.***

  – ***Performance Solutions*** **by C. Smith and L.Williams**

Software Development Life Cycle

- If we think about activities we use to ensure responsiveness and scalability of applications during each stage of Software Development Life Cycle

Software Requirements

- Performance Requirements
- Performance Risk Assessment

Software Design

- Modeling
- Architecture Patterns/Anti-patterns
- Performance Design Reviews

Software Construction

- Implementation patterns/anti-patterns
  - product/platform specific
- Performance implementation reviews
- Instrumentation
- Profiling

Software Testing

- Performance Testing
  - Load, stress, volume and other kinds of testing

Software Maintenance

- Measurements
- Performance analysis
- Performance troubleshooting

Panelists

- Greg Dawe, RSA
- Ellen Friedman, SRM Associates
- Robert Gray, Freddie Mac
- Thad Jennings, IBM
- Connie Smith, Performance Engineering Services

Panelist Introductions

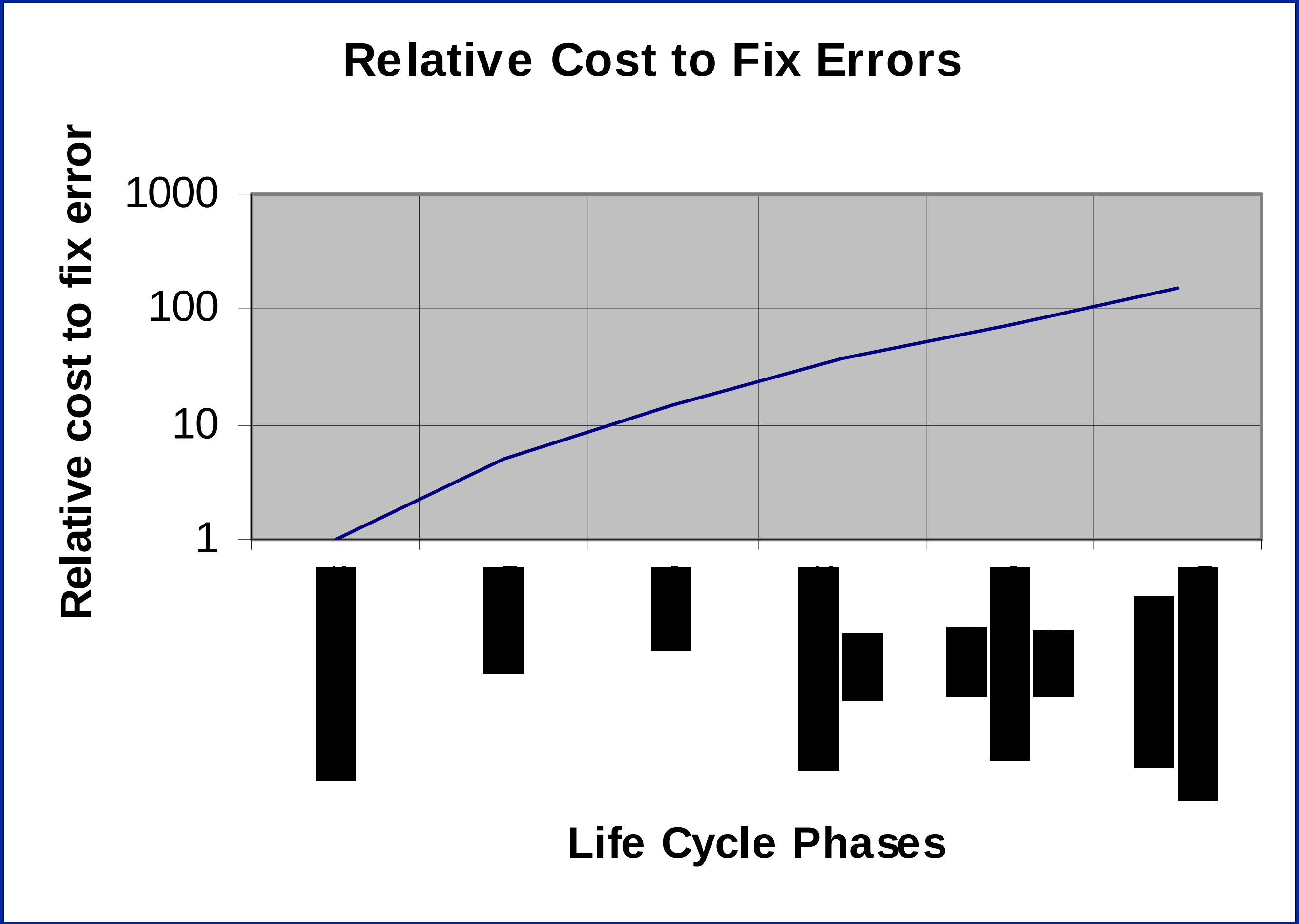
Greg Dawe

- Senior Engineering Mgr accountable for delivering scalable services to development at RSA, the security division of EMC
- Created RSA's Performance Competency Center
- Active evangelist within Management for SPE and test-driven development that includes performance testing

Ellen Friedman

- Founder of SRM Associates, a consulting firm specializing in resource planning and application optimization.
- Many load testing papers focusing on application and system performance:
  - Web services/SOA, Database performance, and Virtualization across all platforms.
- Critical Systems: Planning, Stress Testing in the lab, early Alpha and Beta testing.

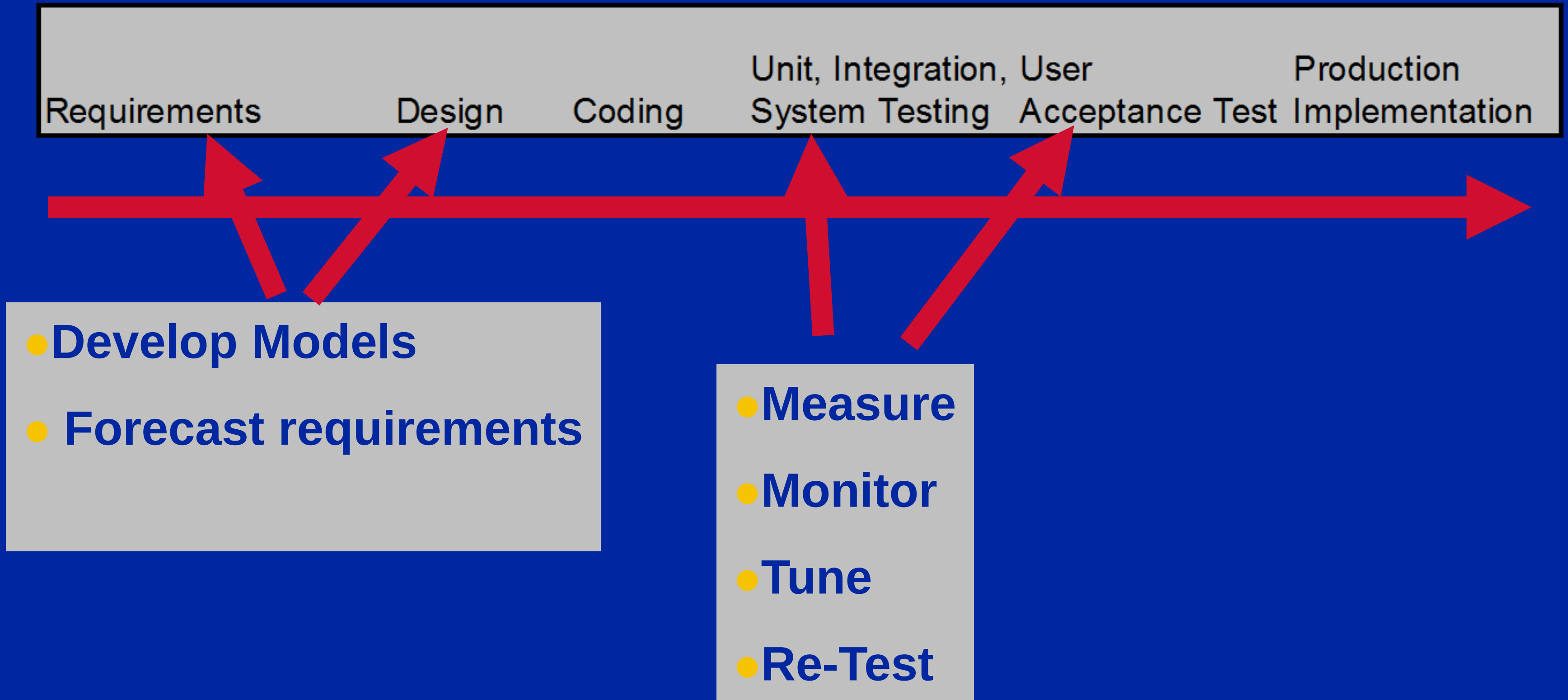
Stress/Load testing



Design Phase/Data Gathering

- System Logic flow
- System Software Architecture
- Software Component Definition
- Database Logical and Physical Design
- Transaction Details
  - Map Functions to processing and data requirements
  - Determine transaction instrumentation requirements
- Initial Performance Assessment Process
  - Evaluate design alternatives and performance impact

Testing throughout the life-cycle



Requirements | Design | Coding | Unit, Integration, System Testing | User Acceptance Test | Production Implementation

- Develop Models
- Forecast requirements

- Measure
- Monitor
- Tune
- Re-Test

Robert Gray

- Director of Capacity Planning and Performance Management at Freddie Mac.
- 30 Year experiences in IT Infrastructure, Capacity Planning and System Tuning as both practitioner and executive.
- Engaged in the practice of SPE methods and techniques for 20 Years, previous SPE CMG Panelist.
- Telecommunications and Financial Services background (Riggs Bank, Comsat, MCI, Bell Atlantic, Verizon).

Thad Jennings

- Software performance engineer since joining IBM in 1985
- Focus on design analysis, measurement and modeling of various Tivoli systems and network management products in Software Group
- Core team member of internal performance and capacity community with members from across IBM (Global Services, Server Group, Research, etc.)
- Former president of Southern CMG region; three CMG papers (92, 94 and 01), and SPE CMG panelist in 2002

Favorite tools for isolating problems in performance test

- CPU profiling/tracing
  - Performance Inspector (Windows/Linux)

    Sampling and instruction tracing for Java and C/C++

    Open Source project, available at http://perfinsp.sourceforge.net/
  - AIX tprof command

    cd to directory containing executable that you want to profile

    ```
    tprof -k -s -e -P <pid> -x sleep 30
    ```

    Produces sleep.prof report showing distribution of activity
- Disk I/O analysis
  - Finding out which process is hitting the disk and which file is getting the activity
  - FileMon for Windows – detailed I/O tracing, available at

    http://technet.microsoft.com/en-us/sysinternals/bb896642.aspx)
  - AIX filemon and procfiles commands

    ```
    filemon -T 4000000 -P -v -u -o /tmp/filemon.out -O all
    ```

    `trcstop` - stops the trace and produces report

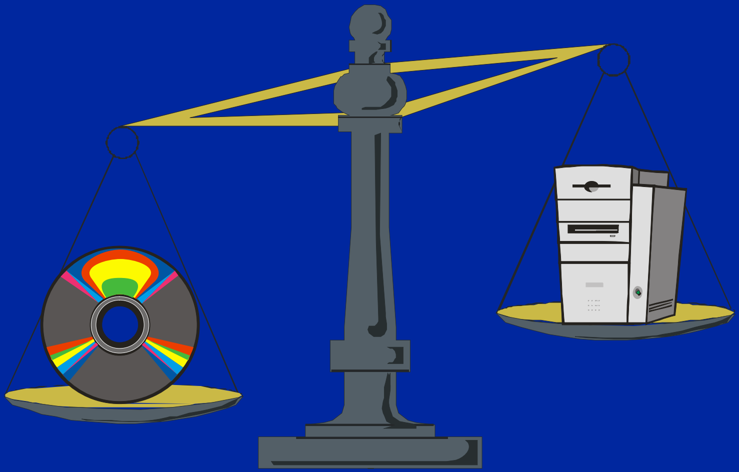
    Files already open at start of trace will show up as file descriptors only. To see open file descriptors,

    ```
    procfiles -n <pid>
    ```

Connie Smith

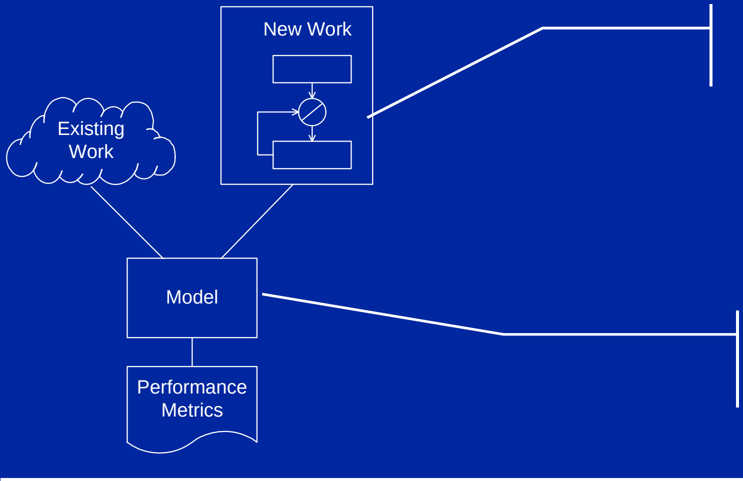
- Active in defining the field of Software Performance Engineering
  - AA Michelson award for SPE
  - SPE Publications
    - 2 SPE books, many book chapters, numerous technical papers
    - www.spe-ed.com
  - *SPE·ED* Performance Engineering Tool
  - SPE consulting, research & development

Quantitative Assessment



- Begins early, frequency matches system criticality
- Often find architecture & design alternatives with lower resource requirements
- Select cost-effective performance solutions early

Software Versus System Modeling Tools



Software Performance Model

Execution Graphs (may be spread-sheet, pseudo-code, etc. views of EGs)

System Execution Model

Queueing Networks

System	Software
Requires more modeling expertise	**Requires less modeling expertise**
Device usage, overall response time and throughput	**Time and resource requirements of processing steps and overall**
Useful to evaluate hardware changes	**Useful to evaluate software alternatives**

A combination is best.

Q & A