Survey of Web Performance Analysis

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Introduction

Who am I?

- Consultant, Principal Software Engineer, 8 years at a major internet presence, 30 years in the software industry
- Ran performance testing effort, two sophisticated performance test labs
- Committer and contributor to Apache Software Foundation

My Environment

- In a performance group
- Work with engineering organizations to facilitate and empower their performance analysis efforts
- Responsibilities clearly divided among organizations
- tiered architecture, mostly

Approach of This Talk

- Find a conceptual basis
    - the task is complex
- Provide some advice based on experience

Focus of This Talk

- Survey only, much more information is available
- Primarily concepts, some discussion of tools
- Heuristics and work processes
- General, using web examples, HTTP

Will Provide

- Definite advice
- Amusing anecdotes
- Some tool recommendations

Won't Provide

- Magic bullets
- Simple answers

Performance Analysis

Goals

- Know what performance results are
- Understand reasons for performance results
- Save money
- Save time

Two Different Web Performance Aspects

- Page delivery time
- Resource cost to deliver a page
- Not entirely unrelated but commonly confused

Why Performance Matters

- Poor performance means less traffic and therefore less revenue
- This relationship is surprizingly strong, perhaps 20% less traffic for an additional 0.1 seconds
- Infrastructure is very expensive

Why Resource Cost Matters

- A highly dynamic page may be very lightweight but require enormous effort to assemble - the example is Google
- Even if a page is fast to deliver the cost of the infrastructure to create it can be a major business problem

Performance Analysis

- is primarily analytic
  - but testing is essential
- works best when integrated into the development process

Performance Analysis Consists of

- Detecting Performance Issues
  - some sort of monitoring is needed
- Localizing Performance Issues
  - usually done with analysis
- Resolving Performance Issues
  - often easy but testing can be critical

Performance Analysis

- is not code monkey work
- is not fast
- is not highly rigorous

Types of Performance Analysis

- Capacity planning
- Acceptance testing
- Design and algorithm selection

Good & Bad News

- Meaningful results can be obtained
- Results sometimes not expected
- Requires a serious investment
- Is inherently iterative

Where to Start

- A hierarchy of
  - concepts - most important
  - policies - derived from concepts
  - tools - necessary but not dominant

Concepts

The Big Concept

- Reduction of Uncertainty
  - overarching concept
  - provides answers to why?, what? and do I care?

How to Apply the Big Concept

- Relate performance to business needs
  - provide enough information to allow management to make meaningful business decisions
  - gain enough information to allow extrapolation of trends

Other Concepts

- Intuition is likely to be wrong
- The process is inherently iterative
  - business process
  - technical process
- An early start is very helpful

Policies

Policies

- Analyze and test enough to make a business decision
- Have a clearly defined process
- Define your purpose
- Make a quantitative estimate of the traffic
- Let those who know something, do it

More Policies

- Communicate openly and often
- Compartmentalize responsibility
- Do not use performance testing to expose functional problems, this is not QA (quality assurance)

Processes

Process Attributes

- Defined
- Documented
- Public
- Includes pre and post testing

Pre-Test Process

- Assign responsibilities, be definite about who
- Declare goals
- Record configuration
- Assess traffic quantity and type

Post-Test Process

- Meet definite end criteria
- Report results
- Make recommendations
- Communicate issues

Test Process

- Dynamic, goal seeking
- Interactive
- Iterative
- Duration depends on behavior

Test Options

- Live or lab
- End-to-end or component

The Most Common Error

- Unjustified belief that the problem is code related, usually architecture, data, traffic

Common Pitfalls

- Unclear goals
- N-dimensional matrix of tests
- Emphasis on the tool
- Emphasis on the code

More Common Pitfalls

- Focus on a single tool for testing
- Belief in a single answer to the problem

Tools

Tools Issues

- Open source or proprietary?
- Proxy capture of user actions?
- Scriptable?
- Randomizable?
- Enforce policies?

Two Types of Tools

- Load generators
- Test environment managers

Load Generators

- flood
- JMeter
- many others

Load Generator Issues

- Synchronous
- Randomizable
- Script or proxy
- Load ramping

Load Generator Obsession

- What people usually mean when they talk about performance testing tools
- Necessary
- Far from sufficient
- There are many

Environment Managers

- Unlike load generators, few if any exist
- But, you can get lots of what is needed through policies and procedures

Test Environment

- Controlled
- Isolated
- Automated
- Recording

Test Facility Components

- Manager
- Load generator
- System under test
- Data recorder
- Report generator

Performance Tests

Test Design

- Much more in common with experiment design than statistical analysis
- Statistics are good, but ...
- You don't need statistics to know which tire is flat
- Good test design can make it that obvious

Test Components

- Two parts
  - load side
  - system under test side

Test Results

- Also have two sides
- Load side
  - requests/s, s/request
  - timing of parts of the request
- System under test side
  - system and application metrics

Test Analysis

- Reality check results and test parameters
- Compare to actual or derive a baseline
- Follow good analytic methodology
  - multiple tests, etc.

Pet Peeves

- Load ramping
  - if you want different loads, run different tests
  - actual load changes hard to match
- Proxy capture
  - better to get real traffic from logs

Wrap Up

Key Points

- Strong concepts
- Well-defined process
- Experiment design
- Iterative

How to Solve Your Problem

- I'm available for consulting
- Introductory talks for Managers and Engineers
- tools, instruction, procedures, policies

Further Info - General Information

- http:/opensourcetesting.org/performance.php
- http:/www.softwareqatest.com/qatweb1.html/#LOAD
- search for 'web performance testing'

Further Info - Proprietary

- TestRunner
- OpenLoad

Further Info - Load Generators

- JMeter
  - http://jakarta.apache.org/jmeter/
- Flood
  - http://httpd.apache.org/test/flood/

Further Info - Environment Managers

- OpenSTA
  - http://opensta.org
- Faban
  - http://faban.sunsource.net
- The Grinder
  - http://grinder.sourceforge.net

Excellent Book

- Programming Pearls, Jon Bentley

Thanks!

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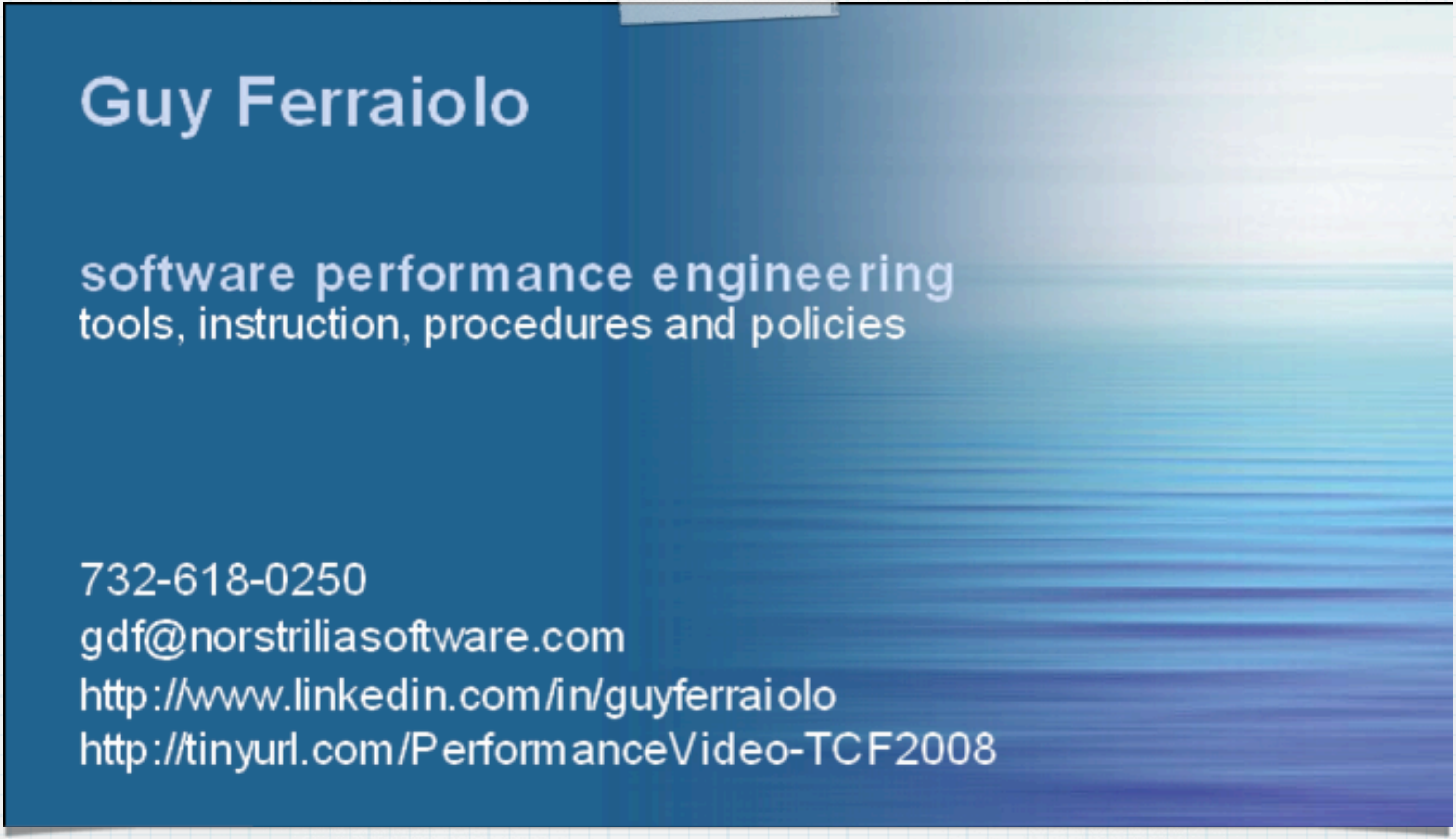

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software performance engineering
tools, instruction, procedures and policies

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