Using Rational Tools to Assist in Migrating to V7 with GIS Asset Location

Greg Bek – Software Traction

greg@softwaretraction.com

PulseANZ2010

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Outline

- Maximo Project Overview
- Performance Testing Objectives
- Toolset
- Performance Testing Approach
- Early Results
- Performance Testing Engagement Guidelines

Maximo Project Overview

- Maximo 5 Replacement
  - Maximo 5 will be left running for some users
  - Requires synchronization of Maximo 5 and Maximo 7 Databases
- Significant number of connected systems
  - Legacy Maximo 5
    - Connected through Database synchronization
  - Chris21 HR/Payroll
    - Through Biztalk
  - Ellipse – General Ledger
    - Through Biztalk/Tuxedo
  - ArcGIS
    - Connected through Databases and Web UI's
- Performance:
  - "To be no worse than Maximo 5"

Maximo Project Overview - Architecture
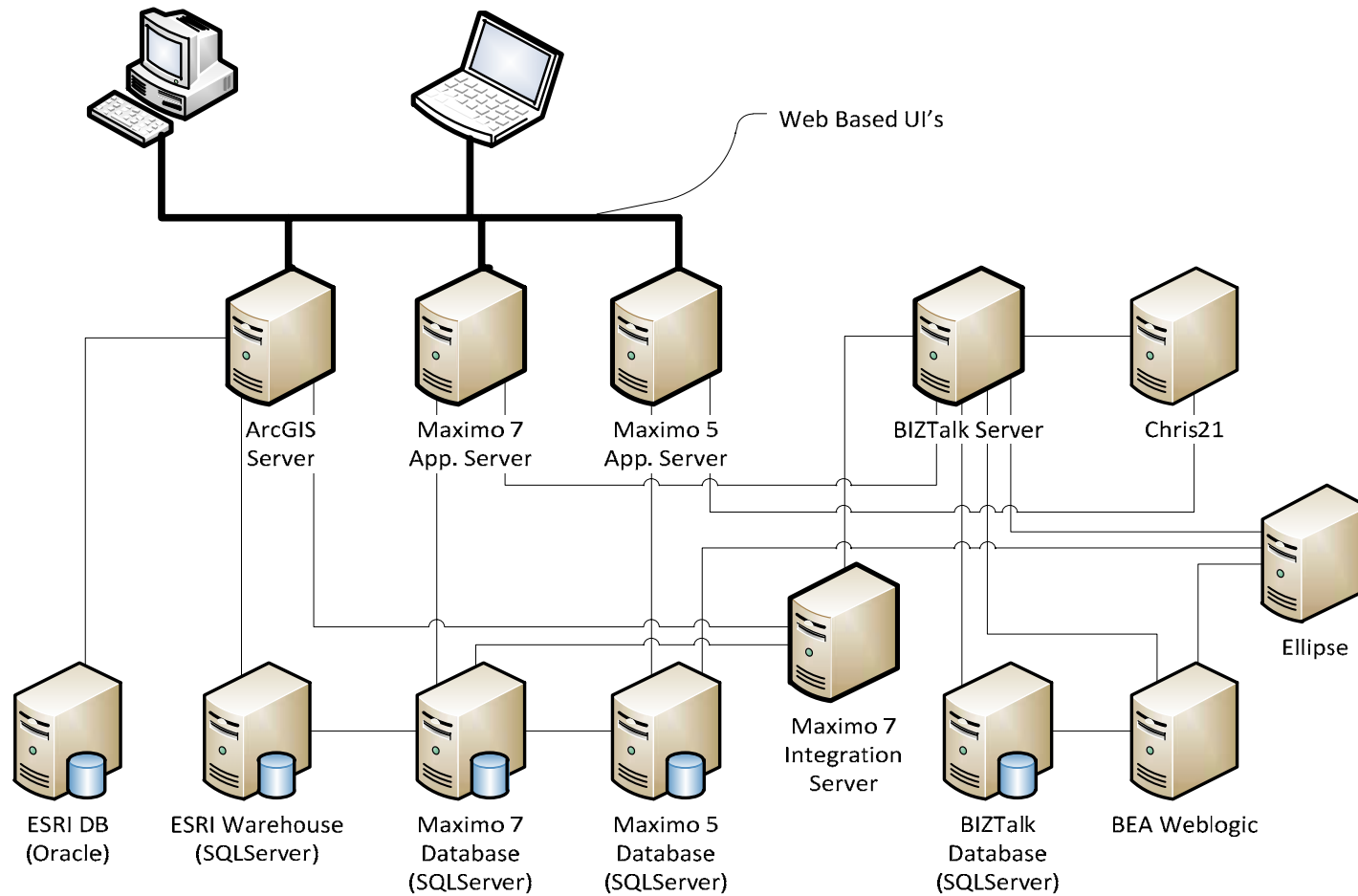
Performance Testing Objectives

- Not only the Maximo, but test the infrastructure as well
  - Upgraded communications links
  - Database servers
  - Interconnects to financial systems (GL, Payroll)
- Verification Testing
  - Simulate a realistic transaction load across multiple sites
  - Based on historical transaction rates and kinds
- Reliability Testing
  - Simulate transaction load for extended period of time
- Load/Stress Testing
  - Increase transaction load to identify performance / system bottlenecks

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Toolset

- Rational Performance Tester

Toolset

- Rational Performance Tester (RPT)
  - HTML Recording / Playback
  - Virtual Users
  - Remote Agents for executing tests

- During test execution RPT captures
  - Page request contents
  - Response headers
  - Page response times
  - Page success codes
  - Limited amount of actual response contents
    - Needs to be limited as data set can be large

- Collected data is dynamically displayed
  - Can be overlayed with resource monitoring information
    - CPU, I/O, Memory etc.

Performance Testing Approach

- Record individual Maximo transactions through Web GUI
- Create additional test scripts for capturing other system actions
    - Initiate Maximo 7 to Maximo 5 synchronization
    - Initiate daily batch tasks such as "Close aged work orders"
- Modify recorded scripts to use data pools
- Analyse historical usage patterns to guide creation of performance schedules – site profiles
- Create Performance Schedules to execute a mixture of the various transactions – matched to site profiles

Performance Testing Approach

- Recorded scripts are:
  - Complete Simple transactions
    - Such as
      - Create Service Request
      - Create Work Order
      - Simple Update Work Order
      - Update Work Order through GIS
      - Complete Work Order
    - No conditional flow - Scripts are played back through a robot so limited flow control is available
    - From login to logout
    - Contain a sequence of simple steps that work through a set of Maximo pages
  - Edited during/after recording to provide meaningful page names for analysis
    - Browser sees page title as "Component Output" for many Maximo screens
  - Constructed so that they can easily be extended to include loops for multiple transactions on a single login

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Performance Testing Approach

- Recorded Script

Performance Testing Approach

- Performance Schedules:
  - Define the transaction mix to be executed during a performance test
  - Define what resources should be monitored during the execution of a performance test
    - CPU load, Memory, Paging, I/O, Database metrics
  - Define what servers/components should have resources monitored
    - WMI
    - Tivoli
    - rstatd (Unix/Linux)
  - Define Virtual User loads
  - Define timing profile
    - Ramp up, Think Times, Iterations
  - Define what testing agents should be used to execute performance test

Performance Testing Approach

- Performance Schedule

Performance Testing Approach

- Data Pools
  - Table based mechanism for providing data for multiple tests
  - Rational Performance Tester automatically highlights locations in recorded test scripts where Data Pool substitution can take place
  - Examples where they can be used
    - Login/Authentication – to distinguish virtual testers
    - Transaction specific information – address/account/order information
    - Parameters to queries to separate/restrict work loads to specific sites
  - Careful design of data pool contents can aid in examining specific areas of system performance, or deliberately defeat known sources of misleading results
    - Address data pool constructed so that GIS caching of recent images wouldn't skew results for remote sites
  - Project data pools were constructed by extracting data from Maximo tables

Performance Testing Approach

- Data pools

Performance Testing Approach

- **Performance Testing Agents**
  - Simple software installation on any workstation (Windows or Linux)
  - Agent software is controlled by central Performance Testing controller during execution
  - Performance Test is downloaded and executed under central control
  - Agent executes test and collects application response information and timing
  - Page timing/performance information is reported during test execution
    - Dynamically displayed by Rational Performance Tester during test run
  - Virtual users have relatively small overhead, single PC can support several hundred VU's (HTML testing)

Performance Testing Approach

- Performance Testing Agents
  - Can be located at any network accessible point
    - Remote – permits verification of communications infrastructure
    - Local – host larger number of VU's for load/stress testing
  - 10 Separate Testing Agents used for hosting virtual users
    - 7 Deployed to remote sites
      - Used to verify performance of communications infrastructure
    - 1 Used with 3G connection
      - Expected usage model with low volume
    - 2 Locally in Adelaide to host user load for load/stress testing

Performance Testing Approach

Main Site
• Adelaide

Major Site
• Mt Barker

Major Regional Sites:
• Mt Gambier
• Crystal Brook

Minor Regional Sites:
• Balaklava
• Murray Bridge
• Clare

Minor Site with historical comms. issues:
• Port Elliot

Mobile Site:
• Laptop with 3G
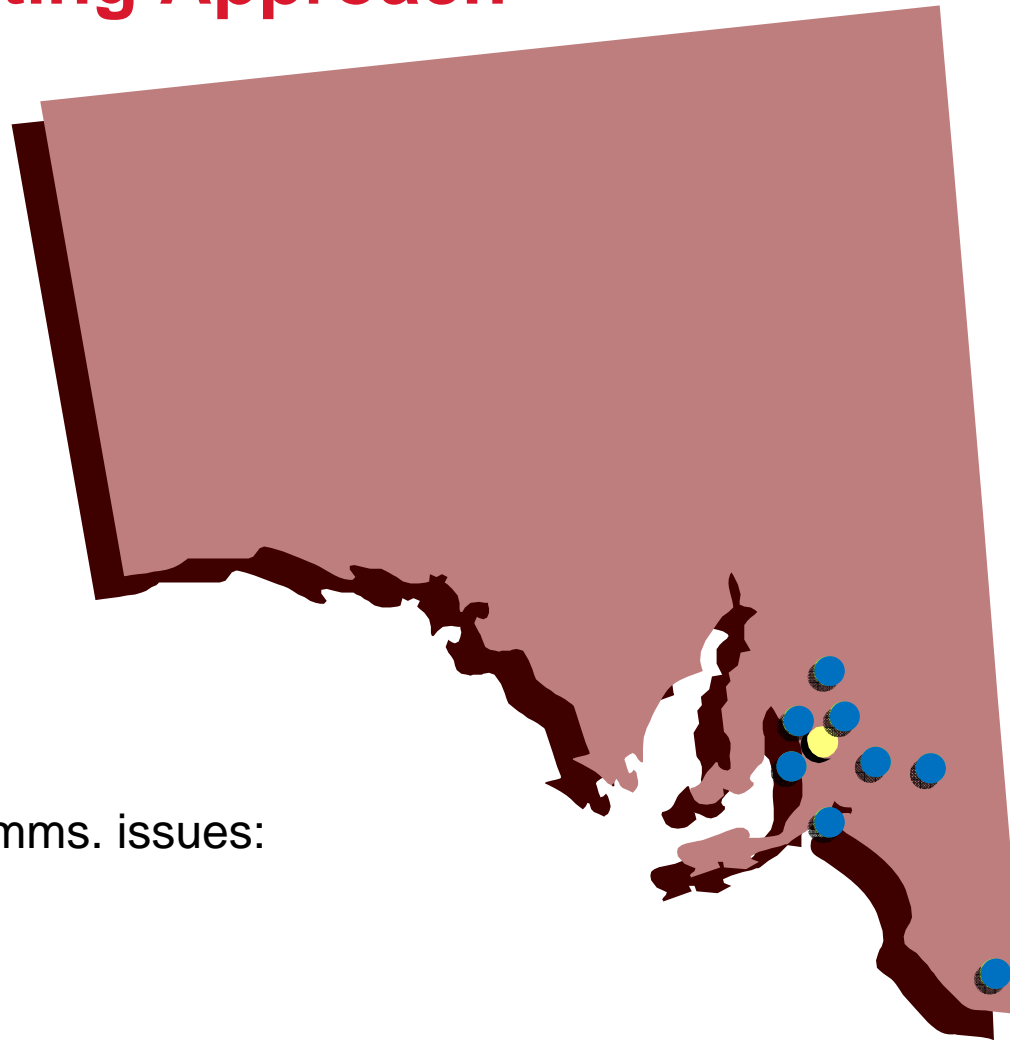
Early Results

- Some results obtained during script and schedule development
  - Highlighted less than optimal queries being used
    - Pathological query response is one of the tests being executed, based on historical user behaviour
      - All Work Orders in All Suburbs
  - Sawtooth Response Pattern
  - Performance issues with GIS Web services layer

Early Results

- Sawtooth response time on Work Order Creation
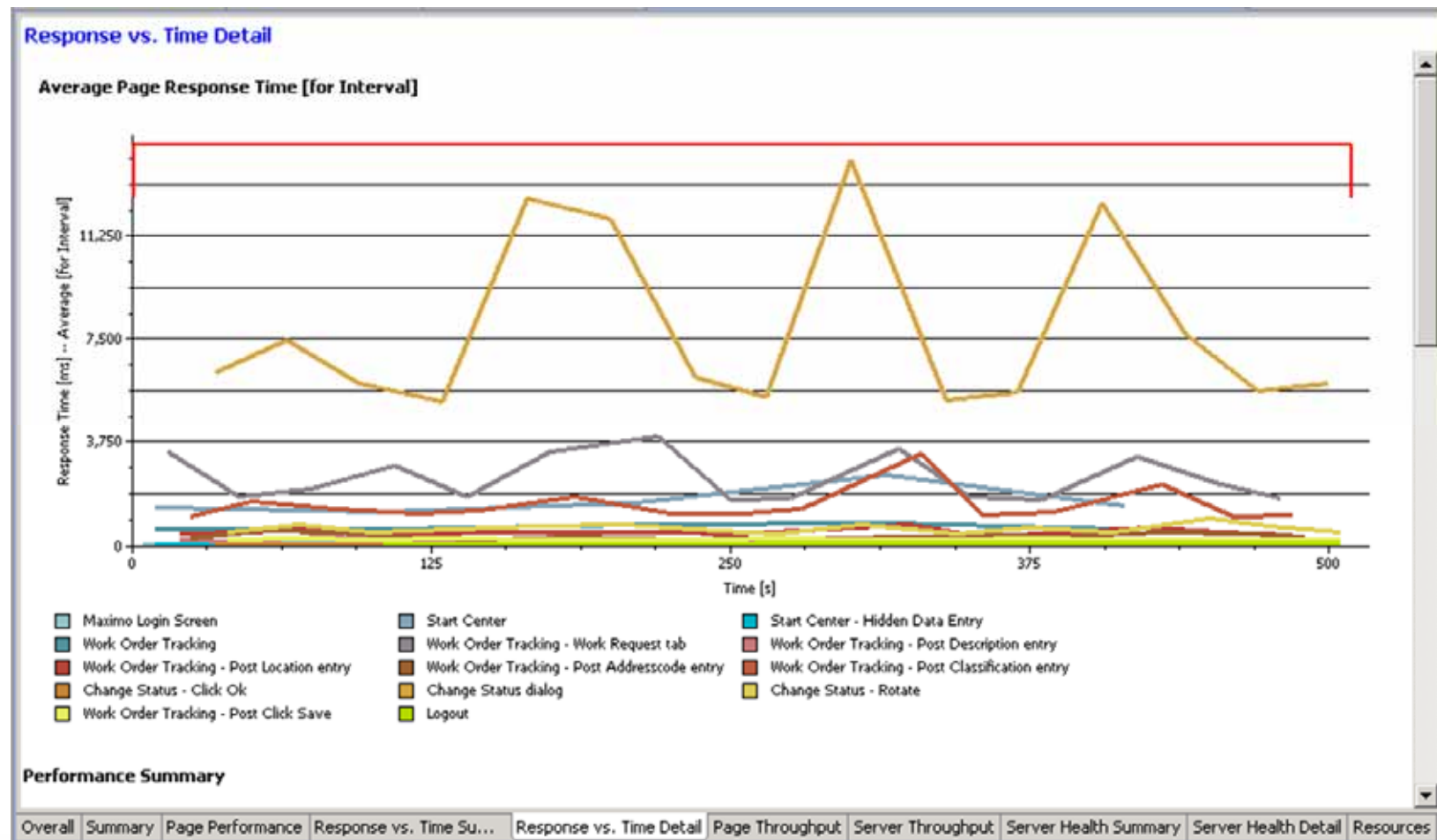
Early Results

- Sawtooth Response Time – CPU Graphs
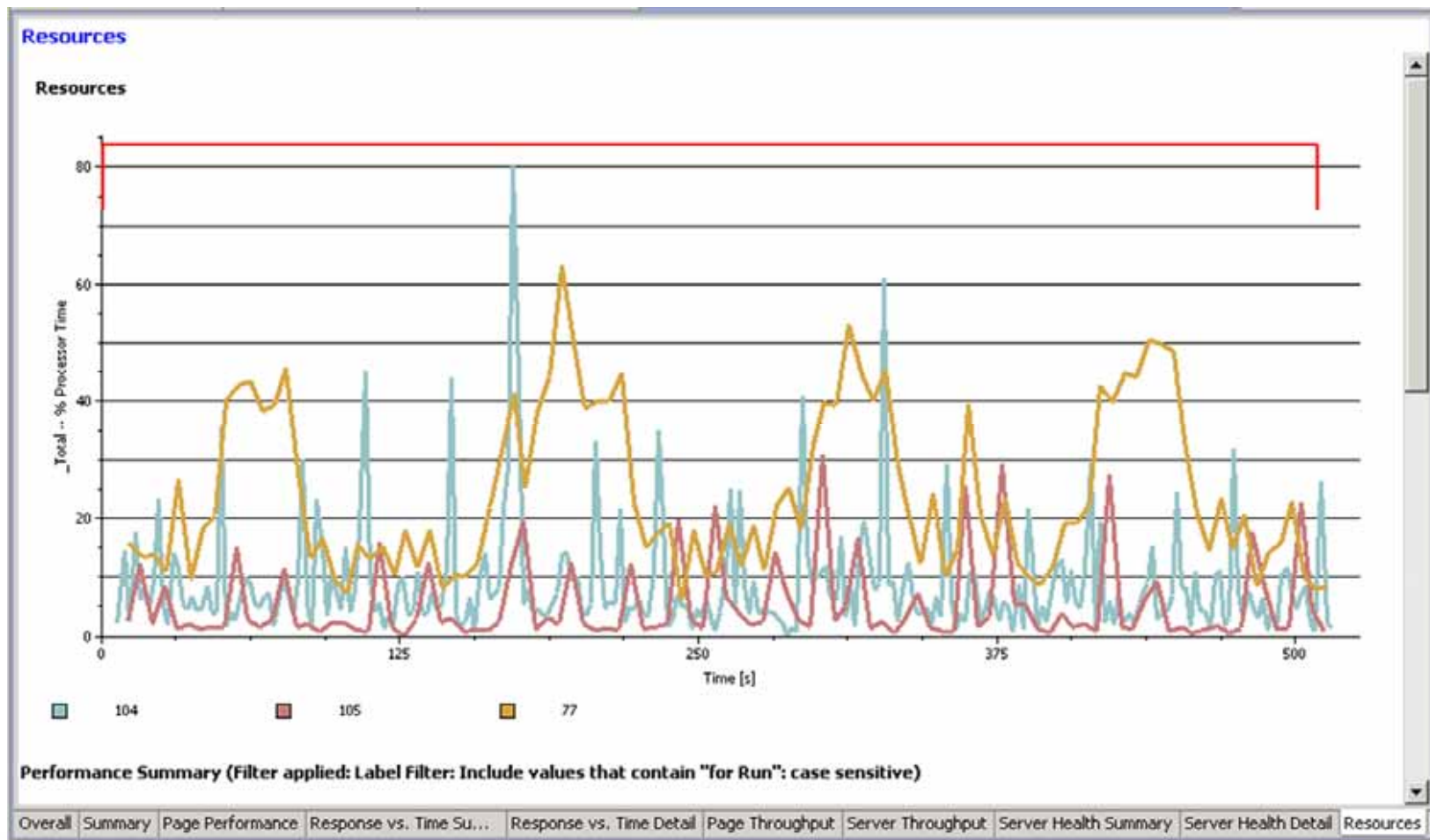
Early Results

- Sawtooth Response Time – Change Status Dialog, CPU
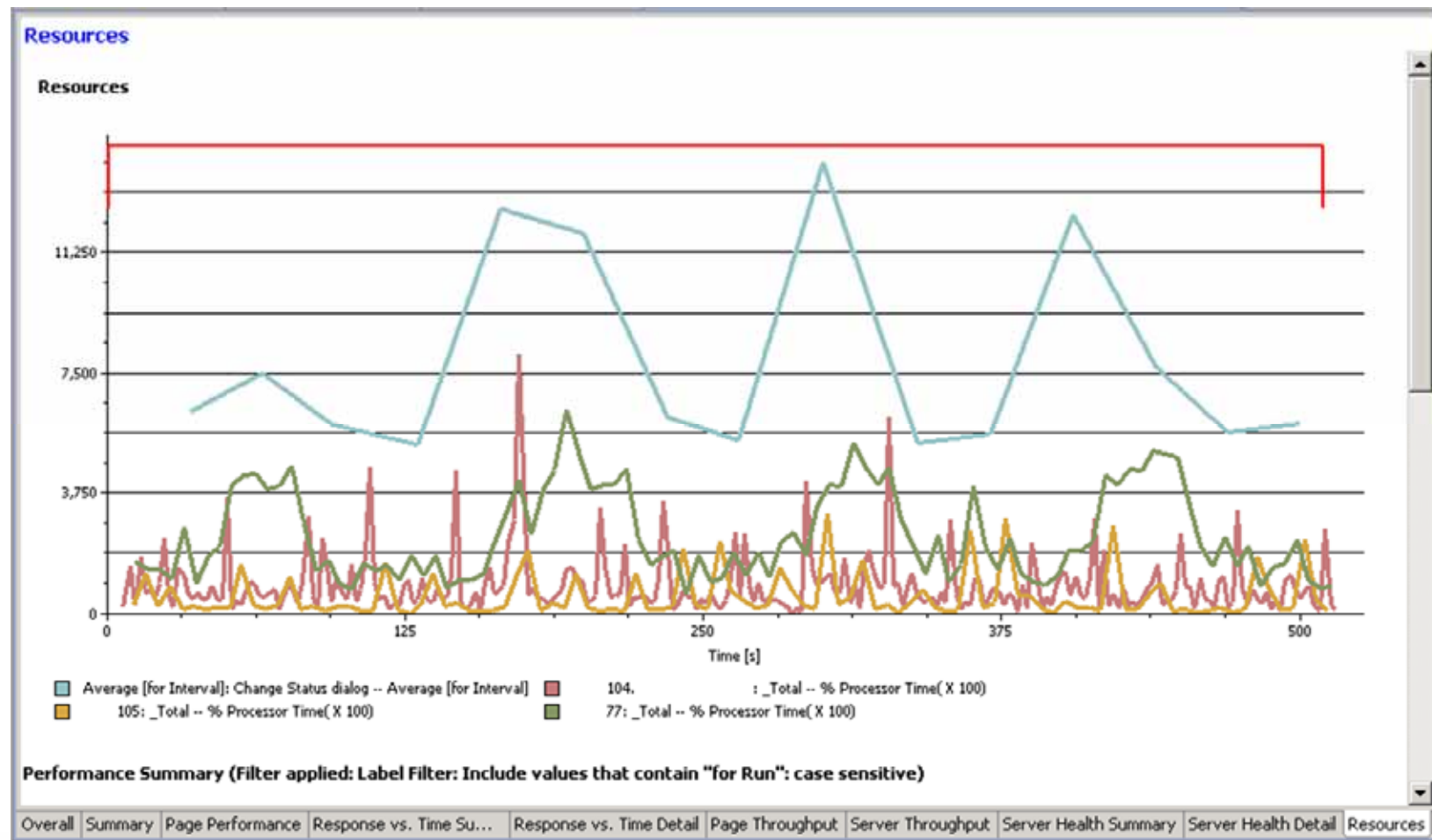
Early Results

- Run to Run Comparison – Some query optimization
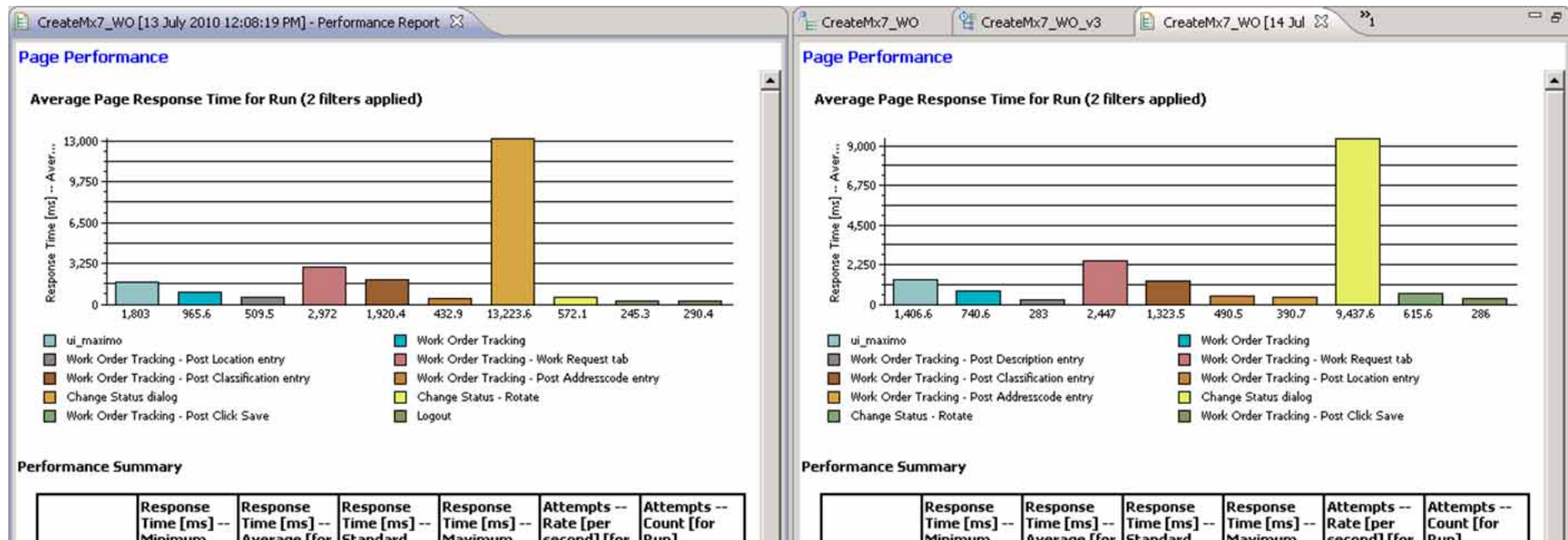
Performance Testing Engagement Guidelines

- ## Start planning early
  - Don't underestimate the level of planning needed to conduct a successful performance testing campaign
  - You need to involve many different organizational groups:
    - Network Management
      - Gateways/Firewalls/Remote Access
      - Quality of Service configuration
    - Server Management – Monitoring permissions, Daemon enablement
      - Do you need a specific domain user account with just WMI permissions?
    - Application Team – need their help constructing meaningful performance scripts, they know the system
    - Other System Teams – they know the connected systems
    - Operations Team - Scheduled outages
      - You do not want to run stress/load tests during normal business hours on production infrastructure
    - Remote site staff
      - Someone has to setup that laptop you send to Mt Gambier or Auckland

Performance Testing Engagement Guidelines

- Planning
  - Conduct a meeting with representatives with all the groups affected/impacted/involved/interested in the Performance Testing campaign
  - Outline approach, toolset, monitoring objectives, required resources
  - Listen to feedback and concerns
  - Develop a Performance Testing Plan that:
    - Describes the objectives of the performance testing campaign
    - Lists the specific performance requirements
    - Identifies the resources needed
    - Catalogues the transactions to be scripted
    - Lists the performance characteristics to be measured

Performance Testing Engagement Guidelines

- Scripts
  - Keep the number of scripts manageable
    - Don't need to test every possible transaction or permutation
    - Do need to cover the common/frequent use cases
  - Don't over-invest in script creation
    - Often have a short lifetime – coupled to system behaviour, simple application changes can invalidate scripts
  - Make sure each script is composed of granular operations
    - Makes measuring performance and timing of each step easier
    - For example: Use Save followed by Change status, rather than just Change Status (with implicit save), this highlighted an issue in the performance of the GIS web services that had been hidden, this prevented time being wasted looking at a suspected database interaction problem
  - Finish transactions at the starting point of the next transaction if possible

Performance Testing Engagement Guidelines

- Schedules
  - Historical usage data can provide significant guidance on the transaction mix and the rate of execution
  - If well constructed they allow for the easy replacement of old scripts with new scripts

- Data Pools
  - Best constructed from production databases
    - Accurate Address/Location information
  - Data confidentiality
    - Use IBM Optim to construct and desensitise/cleanse production data
  - Construct carefully so that you have a spread of information
    - Geographically
    - Alphabetically
    - Demographically

Performance Testing Engagement Guidelines

- Browser Render Times not measured
  - At execution time a fake browsing environment is being used, so only the timing of traffic is possible
  - This can be a sticking point if there is considerable variation in the SOE within an organisation
    - The actual user experience may vary
  - SAP/Citrix playback uses actual clients, so render times are measurable

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