Benchmarking Like a PRO

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Agenda

- Baselining & Benchmarking scenarios
- Tools
- Capturing in production
- Running the Replay
- Comparing results

WARNING:

I will demo PowerShell scripts

Nobody is going to get hurt. Promised.

Baselining and Benchmarking Scenarios

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What is a benchmark?

Describes performance in a given scenario

- Evaluates *whatif* scenarios
  - HW/Software Upgrade
  - Virtualization…

- Helps rating tuning efforts
  - Server-wide configuration changes
  - Addition / removal of indexes

Benchmarking Scenarios

- Patching
- SW Upgrade
- Consolidation
- Virtualization
- HW Upgrade
- Configuration change
- Database Tuning

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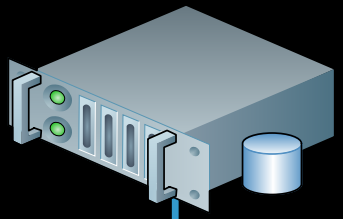
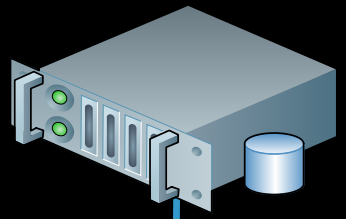
Synthetic Workload

DBA's LAPTOP





PRODUCTION

TEST

CAPTURE

CAPTURE

BASELINE

BENCHMARK

- TPC benchmarks
- DVD Store
- HammerDB

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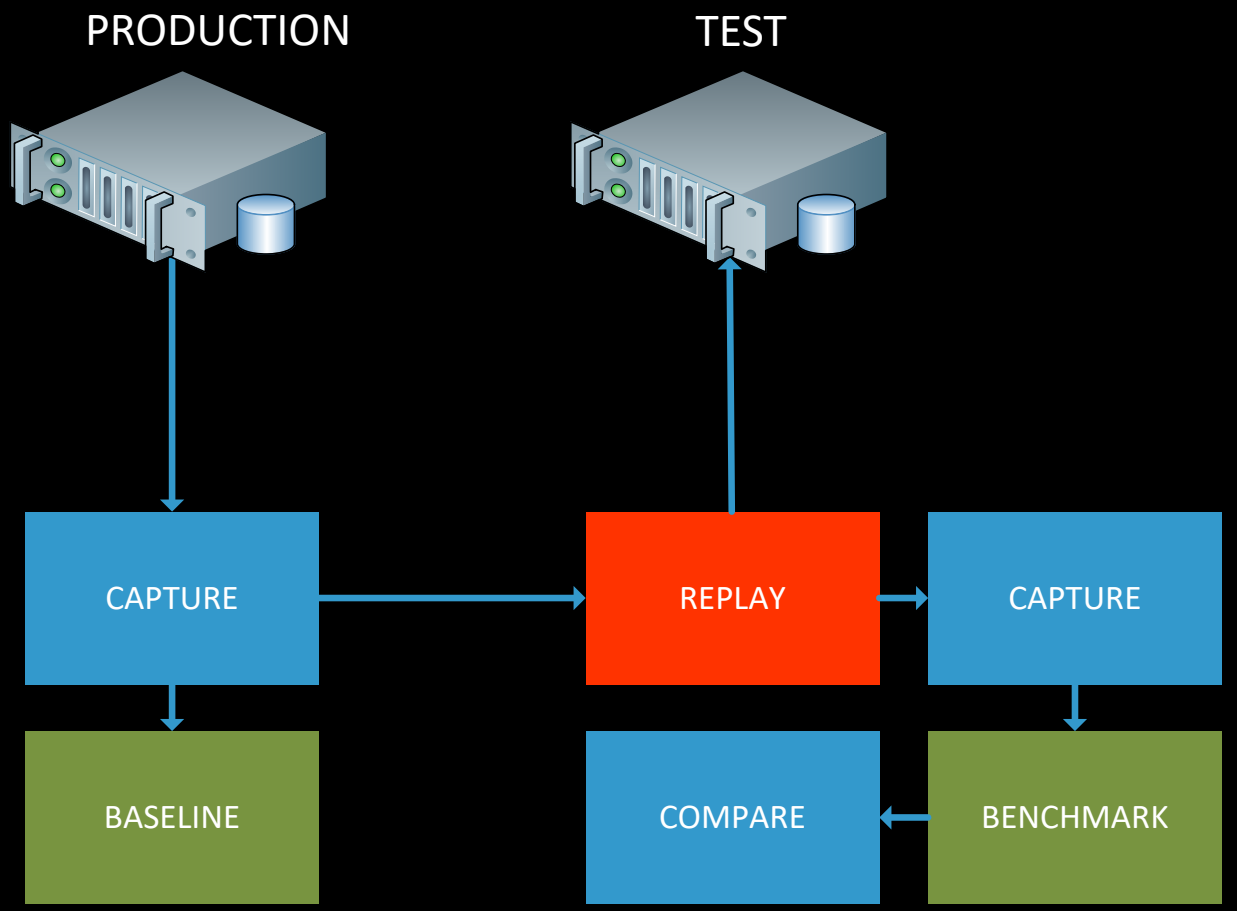
Production vs. Test

DBA's LAPTOP



- Patching
- SW Upgrade
- Consolidation
- Virtualization
- HW Upgrade

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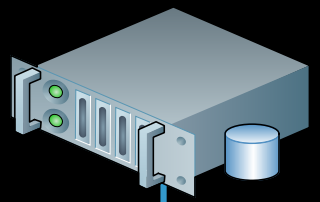
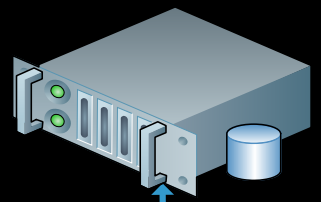
Test vs. Test



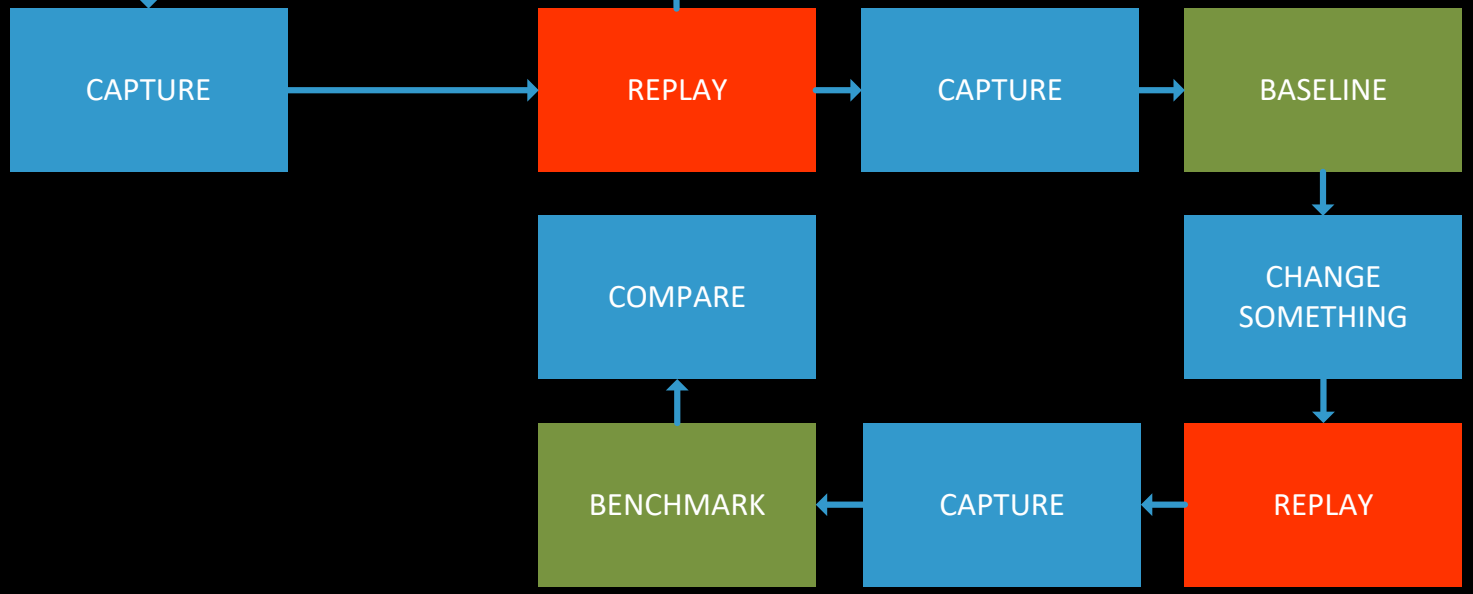
PRODUCTION



TEST

- Configuration change
- Database Tuning

DBA's LAPTOP



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Tools

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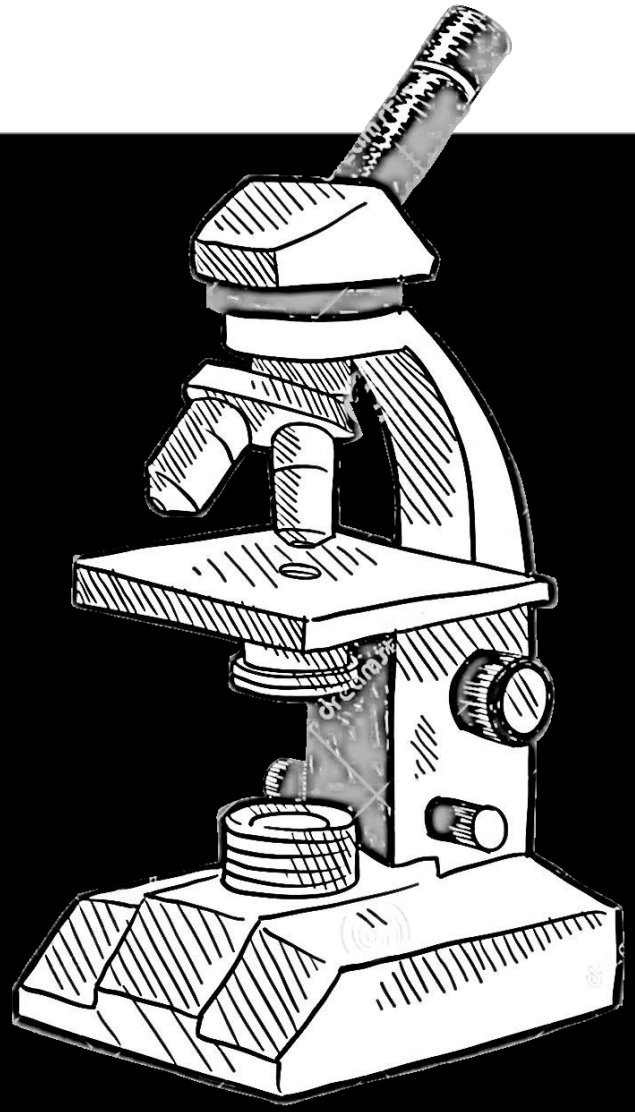
Capture Tools

- Profiler
  - Non-negligible performance impact on the server
- Extended Events
  - Low performance overhead
  - Big files
  - Non compatible with all versions of SQL Server
- SQL Trace
  - «Old school»
  - Compatible with all versions
  - Compatible with more analysis/replay tools

Analysis Tools

- RML Utilities
  - ReadTrace
  - Reporter
- SQLNexus
  - Based on RML Utilities
- ClearTrace
  - Can analyze trace files
- PAL
  - Performance counters analysis with thresholds



Replay Tools

- Profiler
  - Can set breakpoints for debugging
- RML Utilities
  - Ostress
  - Stress / Replay mode
- Distributed Replay
  - Introduced in SQL Server 2012
  - Can replay a workload from multiple clients
  - Supports synchronization mode

Capturing in production

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What to capture

Queries

- SQL Trace vs. Profiler vs. Extended Events
- Which events?
- Which columns?
- Any templates?

Performance data

- Performance counters
- Which counters?
- PAL threshold file

Database

- Full database backup
- All databases involved
- Synchronize with the trace

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DEMO

Capturing workloads in production

Running the replay

Prepare the environment

Server

- Logins
- Any server object captured in the source workload

Database

- Restore the database(s)

Queries

- Pre-process the trace files
- (Synchronize with the backup time, apply filters…)

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Replay Tools

	Profiler	Ostress	Distributed Replay
Multithreading	YES	YES	YES
Debugging	YES	NO	NO
Synchronization mode	NO	YES	YES
Stress mode	YES	YES	YES
Distributed mode	NO	NO	YES
Input format	Trace	Trace RML SQL XEL	Trace

DEMO

Running the replay

Comparing executions

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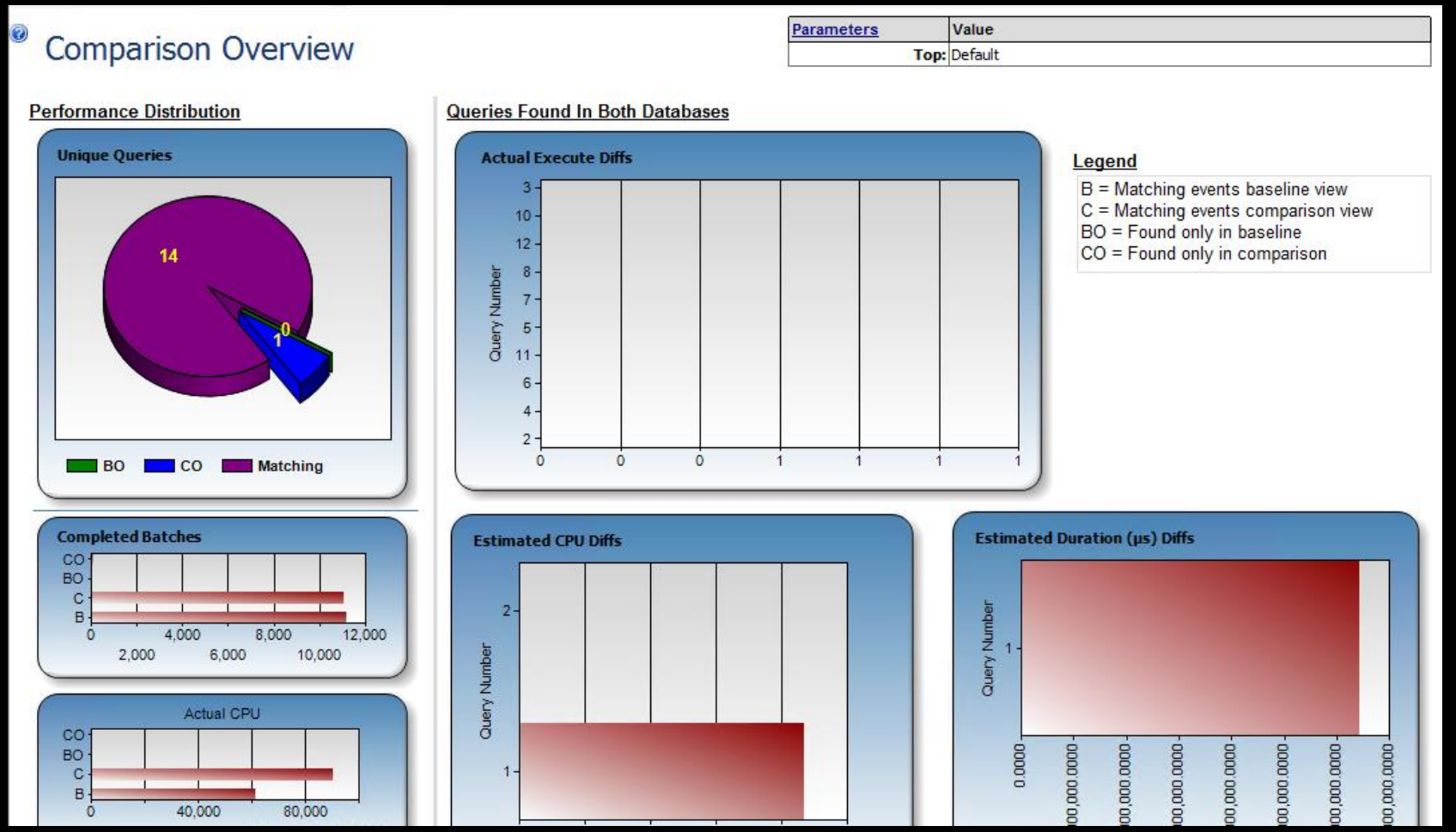
RML Reporter



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PAL

PAL Wizard v2.7.4

Welcome | Counter Log | Threshold File | Questions | Output Options | File Output | Queue | Execute

Welcome to the Performance Analysis of Logs (PAL) tool analysis wizard. This wizard will guide you through the process of analyzing your log file(s).

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Blog
Support

PAL v2

http://pal.codeplex.com/

Written by Clint Huffman (clinth@microsoft.com) and various other contributors.
If you have any questions, problems, or feedback with this tool, then please post it to the discussion forum at http://pal.codeplex.com
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Database Experimentation Assistant

Analysis Reports

+ New analysis report

Connect to server

swjain-dev

Connect

AnalysisBlankSpaceIssue636102672971567

AnalysisBuildE2ETest636100044503280772

AnalysisFailedWorkloadTest6361001724899

AnalysisFailWorkload636100171351978657

AnalysisGoldenBits636093094768620934

AnalysisImagefromDB636101017294141 57

AnalysisImageReva636101724753968348

AnalysisImageTransfer63610094796509756

Analysisswikritit636101934346846241

AnalysisTest636102677882095716

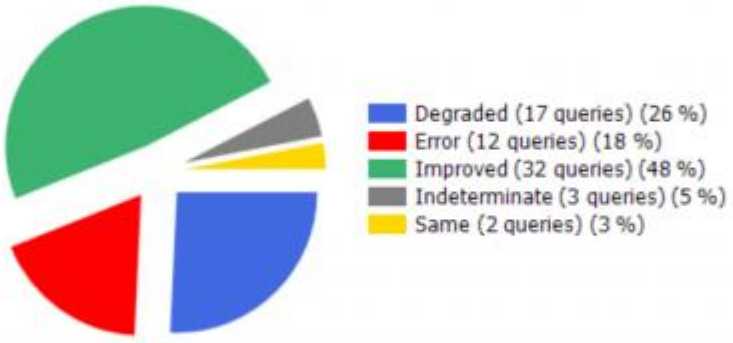
AnalysisTest636102686066953768

1 of 1 100% Find Next Threshold 5%

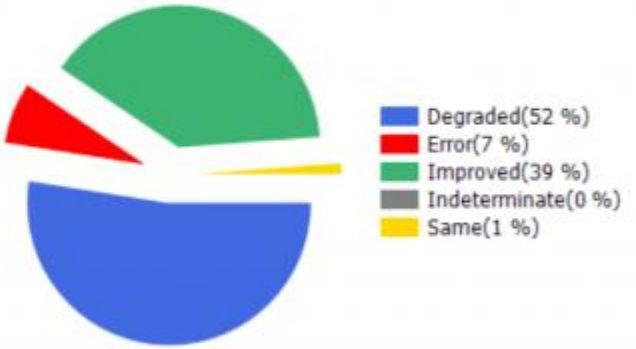
Workload Comparison Report

Instance A	SQL2008SOURCE
Instance B	SQL2014TRACE

Distinct Queries in Workload



Query Distribution by Execution Count



* Data prepared using Welch's or Mann-Whitney U statistical test with alpha level .05

Workload Representation

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DEMO

Comparing Executions

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Alternatives?

Frequent issues

- Database is too big for backup / restore (e.g. 10 TB)
- Workload is too heavy to capture
  - Too much space on disk, too many .TRC files to analyze
  - Not enough time captured => not meaningful enough

Possible solutions

- Replay events with XEvents streaming API
- Avoid replay completely and run a representative workload
- Query Store

Resources

- Samples on GitHub
  https://github.com/spaghettidba/DBA-Scripts/tree/master/Replay
- RML Utilities
  https://support.microsoft.com/en-us/kb/944837
- PAL
  https://pal.codeplex.com/
- ClearTrace
  http://www.scalesql.com/cleartrace/
- Database Experimentation Assistant
  https://blogs.msdn.microsoft.com/datamigration/2017/03/24/dea-2-0-how-to-use-database-experimentation-assistant/
  https://www.microsoft.com/en-us/download/details.aspx?id=54090

Q&A

Questions?

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Q&A

More Questions?

Ask me!

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