Maximizing the performance of your Teamcenter PDM database

Dramatically Increased Scalability with Microsoft SQL2005

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Premium Partners:

Agenda

- Microsoft SQL Server Overview
- Microsoft SQL 2005 Testing for Teamcenter Engineering V10.0
  - Testing Objectives
  - Benchmark Process Overview
  - Results
  - Conclusions
- Q & A

SQL Server Generations
History of Innovation

1st Generation

SQL Server 6.0/6.5

- Differentiation from Sybase SQL Server
- Windows integration
- First to include Replication

2nd Generation

SQL Server 7.0

- Re-architecture of relational server
- Extensive auto resource management
- First to include OLAP & ETL

SQL Server 2000

- Performance, scalability focus
- XML support
- First to include Notification
- First to include Data Mining & Reporting

3rd Generation

SQL Server 2005

- High availability
- Security
- Developer productivity
- Native XML
- First to include Enterprise ETL & Deep Data Mining

Cross-release objectives

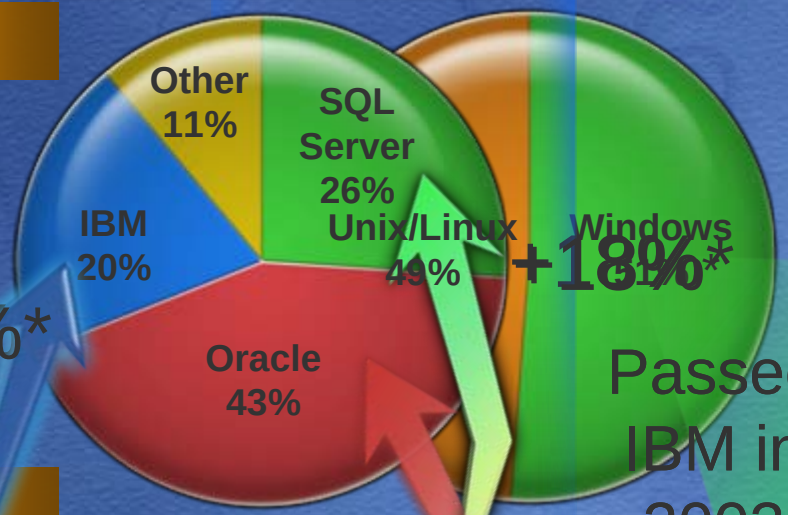
- *Reliability & Security*
- *Integrated Business Intelligence*
- *Lowest TCO*
- *Automatic Tuning*

2004 Relational DB Market

Non-mainfram
Growth &

Non-mainframe DB ($6 Bil)
By OS Platform

2004

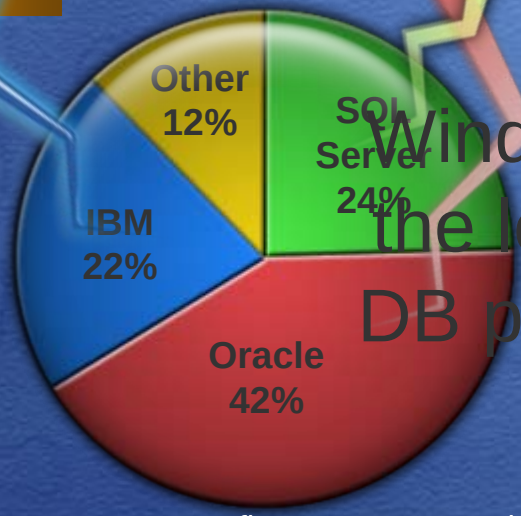


+18%*

+2%*

Passed IBM in 2003

2003



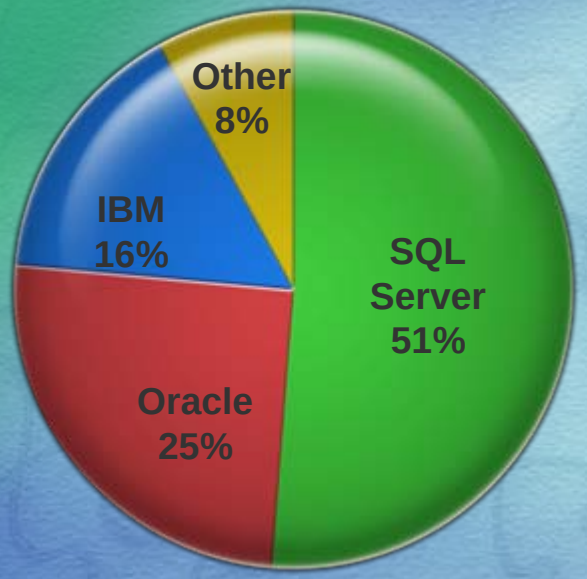
+15%*

Windows the leading DB platform

*Percentages reflect revenue growth

SQL Server Holds Majority Lead on Windows

Windows Database
Market ($3.1 Bil)



Source: Gartner

Top Architects

Architect	Background/Expertise
Jim Gray	IBM, Tandem Distributed DB, Scalable OLTP
David Lomet	DEC, IBM Database Kernels, Application Recovery
Bill Baker	Oracle/IRI, Softbridge & Interactive Data Corp Data Warehouse, Enterprise Computing
Bob Gerber	Chief Scientist, Informix Parallel database systems
Peter Spiro	Chief Engineer RDB, DEC Advanced DBMS Internals
Goetz Graefe	DSA Architect, Informix Parallel Query
Anil Nori	Computer Corp of America, DEC, Oracle Object Relational Databases, Workflow Applications
James Hamilton	IBM DB2 DBMS Internals, Lang Compiler, Security, Full Text Search
Pedro Celis	Ph. D. Waterloo, Tandem Query Processing
David Campbell	Developer RDB, DEC Storage Engine
Amir Netz	Tel-Aviv University OLAP, Data Mining, originator of XML/A, MDX & DMX
Surajit Chaudhuri	Ph. D. Stanford, HP AutoAdmin, Data Management, Mining

SQL Server Winter Corp Survey

Result Summary

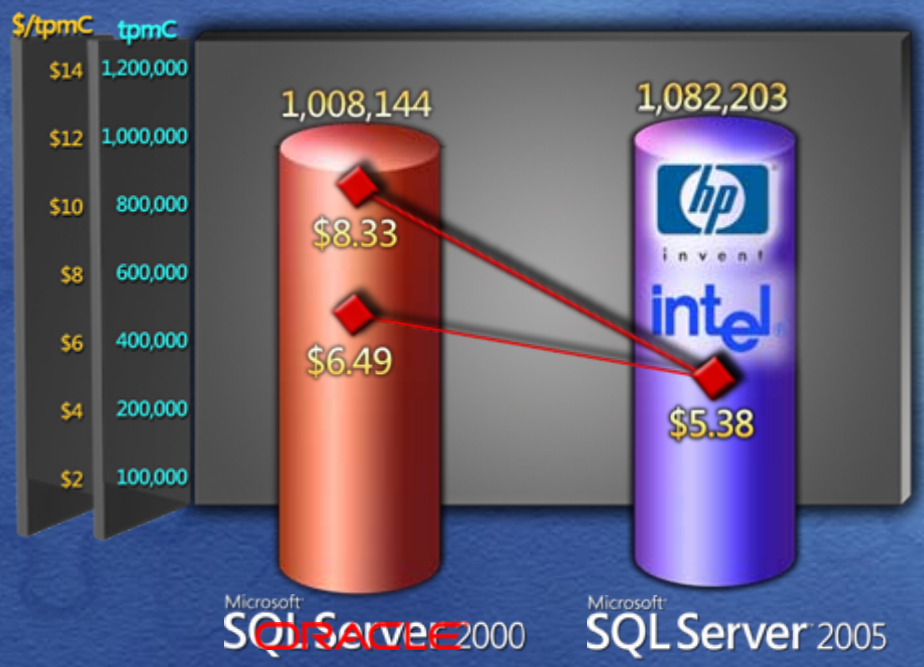
- Largest OLTP database on Windows
  - 7 of top ten are SQL Server databases
- Most rows in OLTP database on Windows
  - 9 of top ten are SQL Server databases
- OLTP Top Ten for All Environments
  - 3rd largest database by rows, 6th largest OLTP
  - 4 of the top ten OLTP databases by rows
- Total of 20 validated entries over half TB
  - 10 Databases over 1TB

New Benchmarks

Microsoft SQL Server 2005

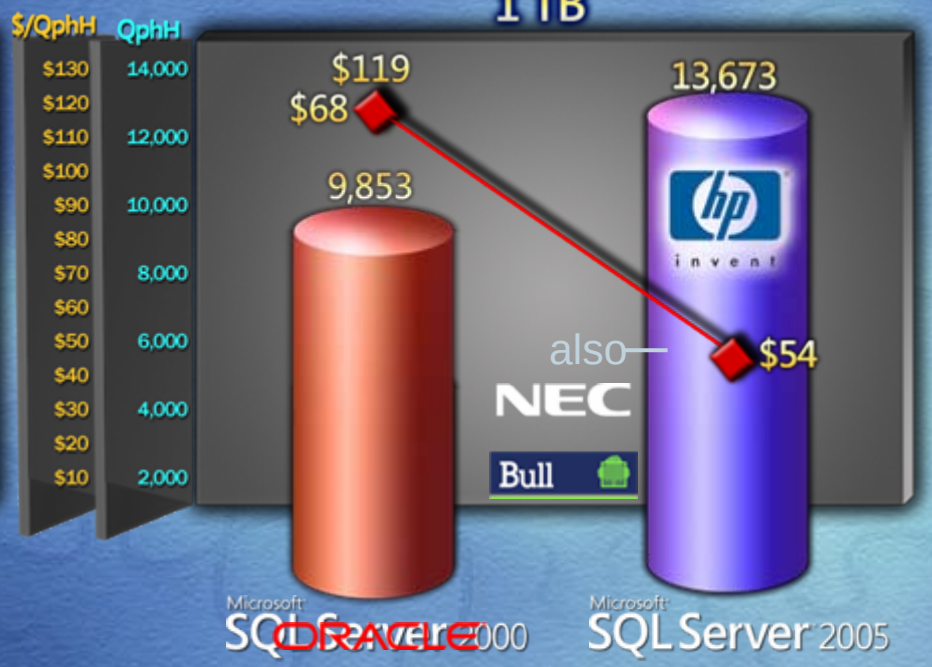
7% better performance,
17% lower cost vs. SQL Server 2000
(scale-up on 64-P Itanium)

TPC-C



182% better performance,
54% lower cost vs. SQL Server 2000
(scale-up on 16-P Itanium)

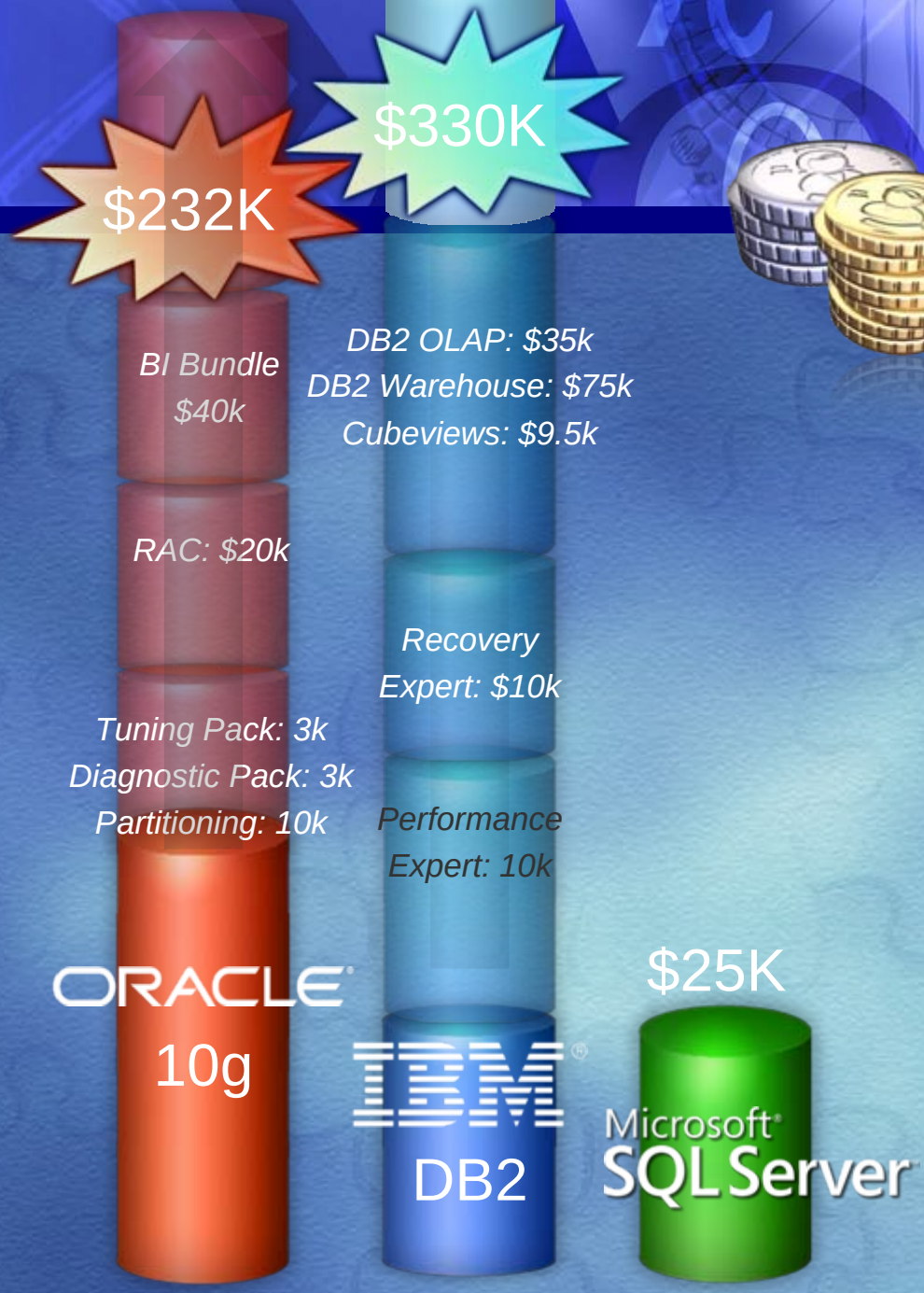
TPC-H
1 TB



TPC-C results referenced above are HP Integrity Superdome running SQL Server 2005, 1,082,203 tpmC, 5.38 $/tpmC, available 12/7/05, and HP Integrity Superdome running Oracle 10g, 1,008,144 tpmC, 8.33 $/tpmC, available 4/14/04. TPC-H results referenced above are the following three results running SQL Server 2005: HP Integrity rx8620, 13,637 QphH@1000GB, 54 $/QphH@1000GB, available 12/7/05; NEC Express5800/1320Xe, 13,453 QphH@1000GB, 99 $/QphH@1000GB, available 12/7/05; Bull NovaScale® 5160, 12,865 QphH@1000GB, 44 $/QphH@1000GB, available 12/7/05; and Unisys ES7000 Aries 420 Enterprise Server running Oracle 10g, 9,853 QphH@1000GB, 68 $/QphH@1000GB, available 11/30/04. Results as of 6/7/05.

Microsoft SQL Server 2005

- Multi-core
- BI
- High Availability
- Manageability
- Base Product



SQL Server's Key Differentiators

Why SQL Server

- Price & TCO leadership
  - Industry-standard hardware
  - Industry-leading pricing
- Single Scalable Architecture – Single code-base
  - Small Business to Enterprise
  - Mobile Devices to Data Center
- Low Management Foot-print
  - Automation & self-management
  - Reduced surface-area through platform integration
- End-to-end BI & DW platform
  - Integrated, Top-of-breed BI components

Objectives

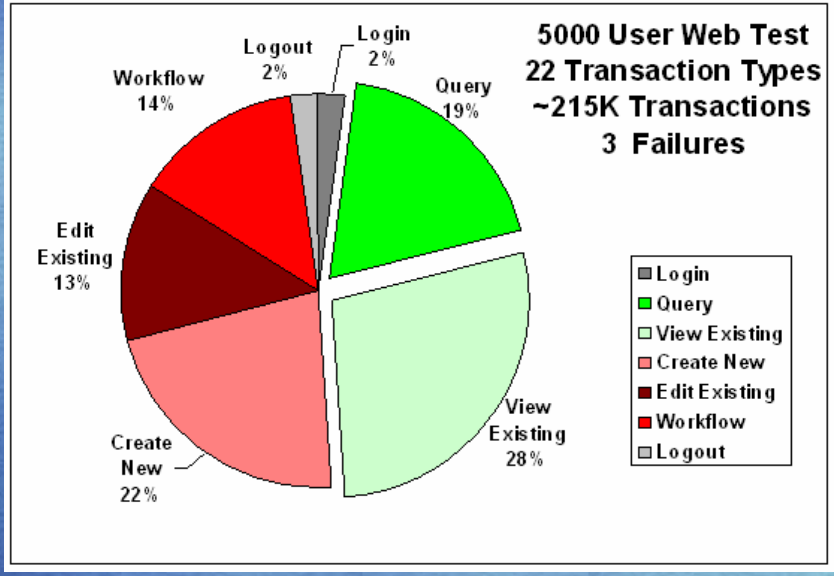
- Evaluate Microsoft SQL Server 2005 (MSSQL) scalability with Teamcenter Engineering V10.0
  - Using standard UGS benchmarking process
- Capture key SQL Server utilization metrics
- Assess both 64 bit and 32 bit MSSQL versions
- Compare system resource requirements for EM64T, IA32, and IA64* platforms

- Caveats:
- Successful 5,000 user benchmark required on EM64T before proceeding to IA32.
- Successful 5,000 user benchmark required on IA32 before proceeding to IA64.

* Intel® Extended Memory 64 Technology®, Intel® Architecture 32-bit, Intel® Architecture 64-bit

UGS Benchmark Process Overview

- 5,000 concurrent user target with 25K user database
- Full V10.0 4-tier environment with 250GB volume data
- 3 user types in 10 Tc Eng groups
- LoadRunner 7.8 with standard UGS V10.0 scripts
  - ~ 50% query/view, 50% create/update/workflow
- Aggressive login/logout ramps, ~ 1hr steady state
- For each benchmark:
  - Reset the environment
  - Activate system utilization capture with PerfMon
    - CPU, RAM, processes, syscalls, cpu queue, swap
  - Start / monitor the run
  - Collect system utilization metrics
  - Generate Windows system utilization graphs
  - Generate LoadRunnerR HTML report
  - Post the run



Methodology – Persistent Baseline Database

Regression Database for Development Phases

- 5000 active users, 20,000 additional named users
  - 100 unique items for each user
    - .prt, .jt, .gif, .tso (true shape volume sweep)….
    - 10 read volumes/10 write volumes; 260 GB
  - Unique copy of GM 87 comp benchmark assembly (NX2)
- Data
  - > 500K Items, 300K datasets, 225K manfiles
  - > 8M pom objects, 40K workspace objects
  - > 24K BOMs with geometry
    - 3400 line CTS 310, 8200 line aerospace assembly
    - ~100 to 16,000 lines
    - > 500K occurrences
  - 125K man relations, 234M pom backpointer rows

V9.1 Thin Client transactions

Data Analysis Group

- LoginWeb
  - PerformSearch
  - ViewBom
  - ViewProperties
- LogoutWeb

Data Review Group

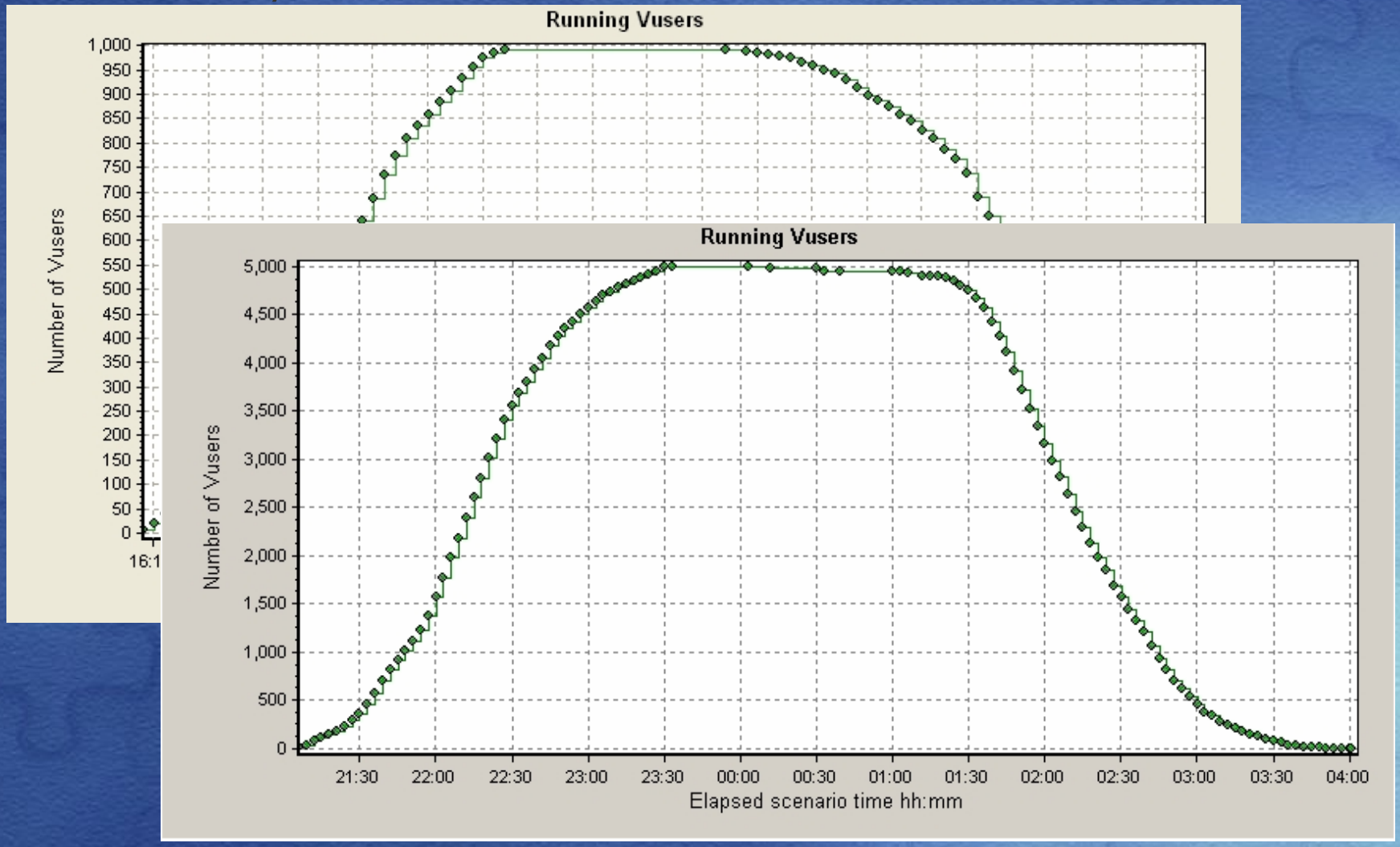
- LoginWeb
  - CheckInBox
  - PerformSearch
  - ViewImage
  - WhereRef
  - WhereUsedAll
  - CreateForm
  - EditForm
  - InitiateReview
  - CompleteReview
- LogoutWeb

Documentation Group

- LoginWeb
  - CreateFolder
  - OpenFolder
  - CreateItem
  - OpenItem
  - CreateTextDataset
  - ItemSaveAs
  - OpenDataset
  - ReviseDataset
  - ReleaseLock
- LogoutWeb

V10.0 Thin Client login profile

Profile – 5,000 users



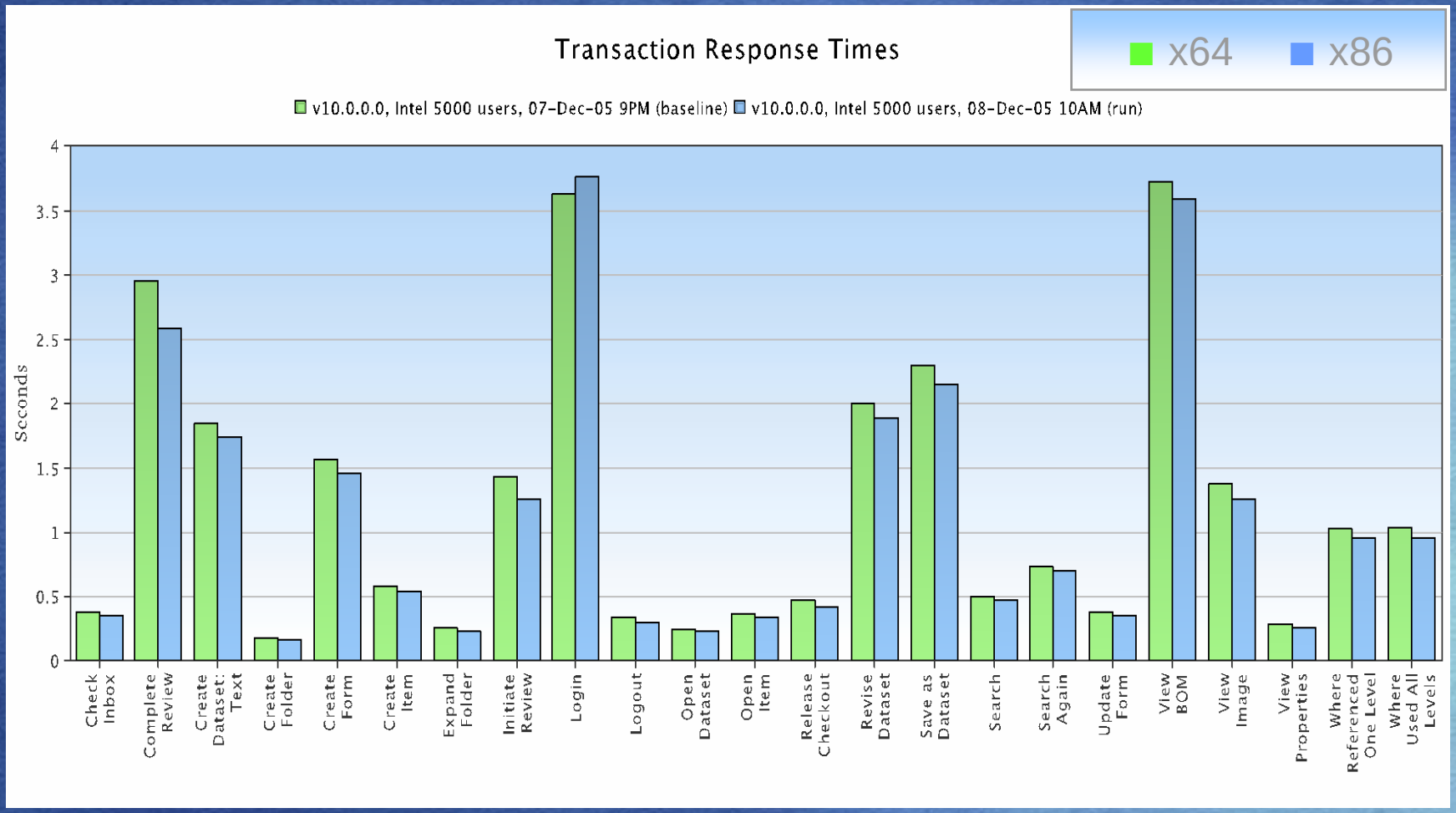
Hardware

SQL Server 2005, Ent SID: apa5k	MS SQL 64 bit (SQLx64)	Unisys ES7000-600 8 x 3.33GHz EM64T 32GB RAM Windows 2003 Ent x64, SP1	
	MS SQL 32 bit (SQLx86)	HP DL740 8 x 3GHz Xeon 16GB RAM Windows 2003 Ent, SP1	
	Tc Eng Web (svr01 – svr11)	Various HP DL380, DL740, Unisys ES7000-600 (see full report)	

Gbit ethernet

MS SQL Server 2005 Results

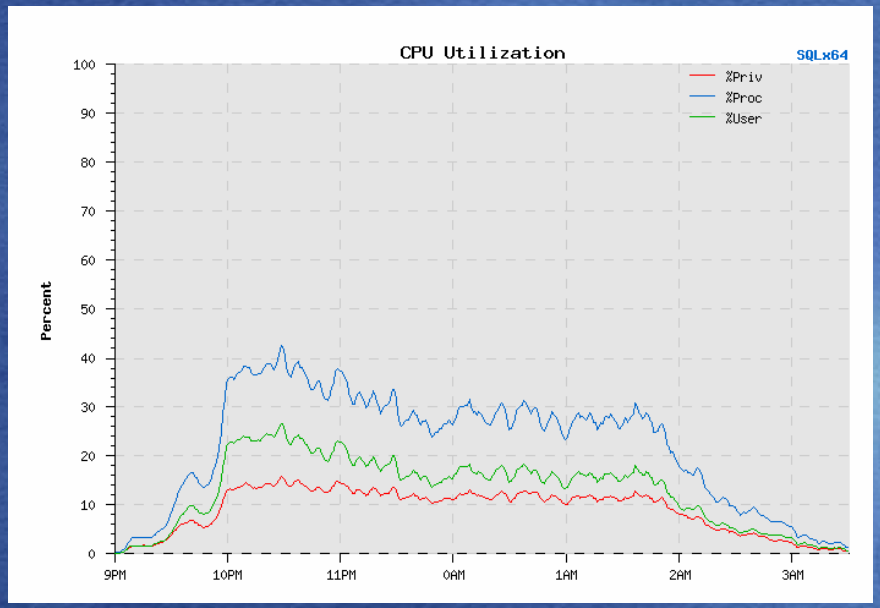
X64 vs. x86 Performance – 5,000 users



MS SQL Server 2005 Results

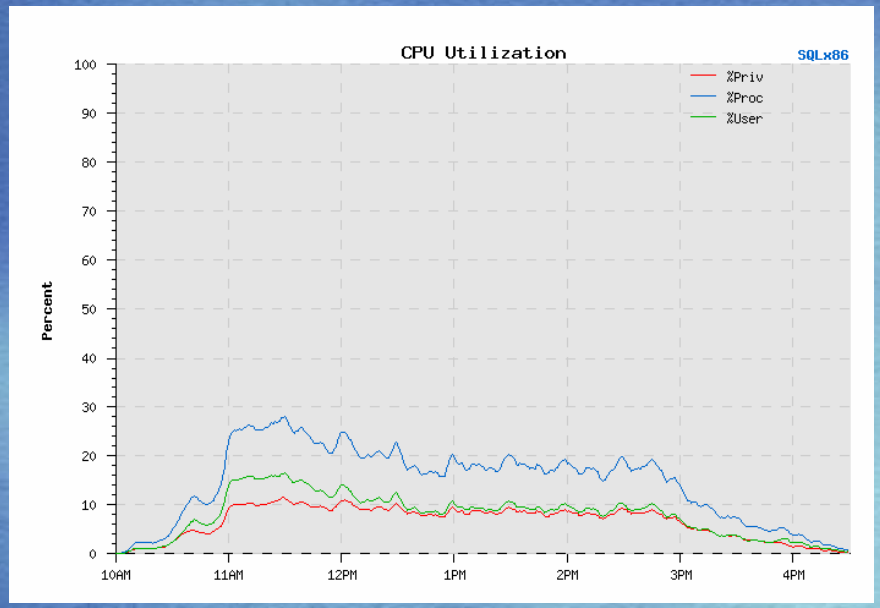
CPU Utilization – 5,000 users

x64 CPU Utilization
~ 44% peak, 22% average



Unisys ES7000-600
8 x 3.33GHz EM64T
32GB RAM

x86 CPU Utilization
~ 29% peak, 15% average



HP DL740
8 x 3GHz Xeon
16GB RAM

Conclusions

- Microsoft SQL Server 2005 recommended to 5,000 users
- Performance on 64-bit comparable to 32-bit Xeon
- Teamcenter Engineering v10 scales to 5,000 users on exclusively Windows servers

UGS certifies MS SQL 2005 with Tc Engineering V10

Q & A

Microsoft®

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