BENCHWARE

Industry Benchmarks and Proof of Concepts

Technical Presentation

June 2014

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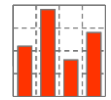
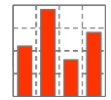


Overview



Industry Benchmarks

- CPU and Server benchmarks
  - SPEC www.spec.org
- Application specific database benchmarks
  - TPC-C, TPC-E www.tpc.org
  - TPC-H www.tpc.org
  - SAP www.sap.com
- I/O benchmark tools
  - Iometer www.iometer.org
  - Vdbench www.oracle.com
  - Orion www.oracle.com
  - SPC www.storageperformance.org
- Mixed Workloads
  - RPE2 www.gartner.com

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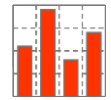
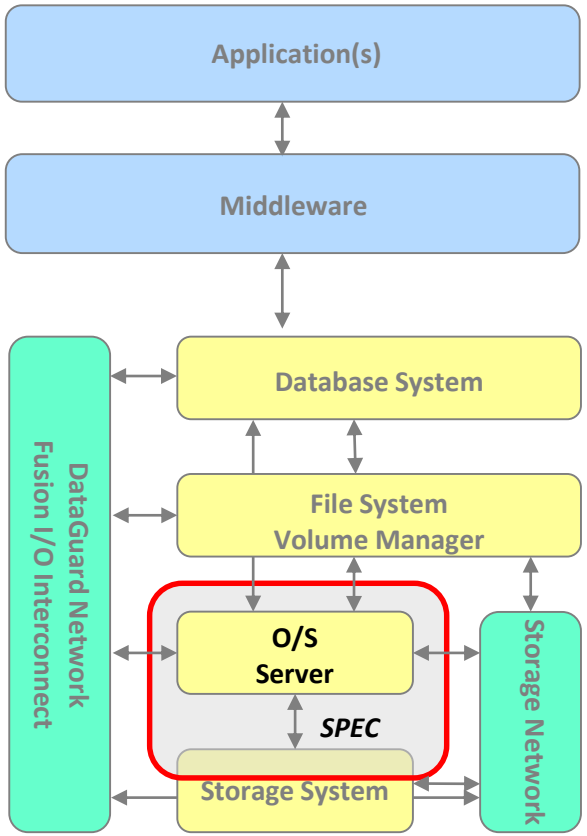


SPEC Benchmarks



- Most used data types in Oracle applications need software library for basic operations and SQL built in functions
  - NUMBER [1)]
  - VARCHAR2, CHAR, NCHAR
  - DATE, TIMESTAMP
  - BLOB, CLOB, BFILE
  - Performance of these data types may not correlate with SPEC benchmark results

[1)] This very unique numerical data type uses a binary code decimal (BCD) implementation. This data type can not use hardware arithmetic.

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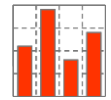
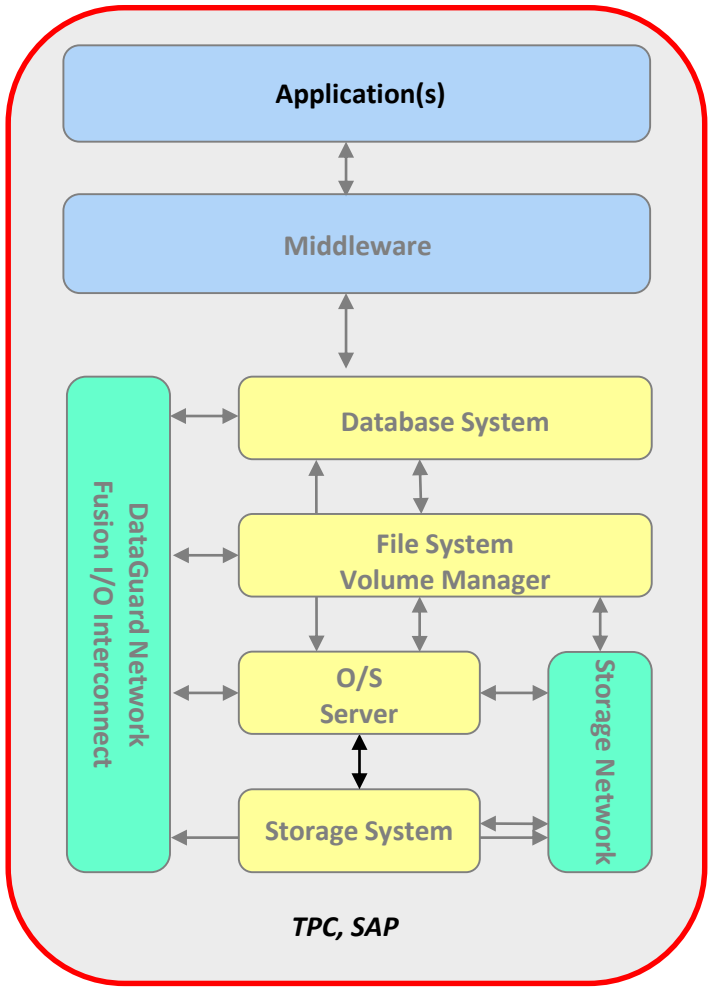


TPC and SAP Benchmarks

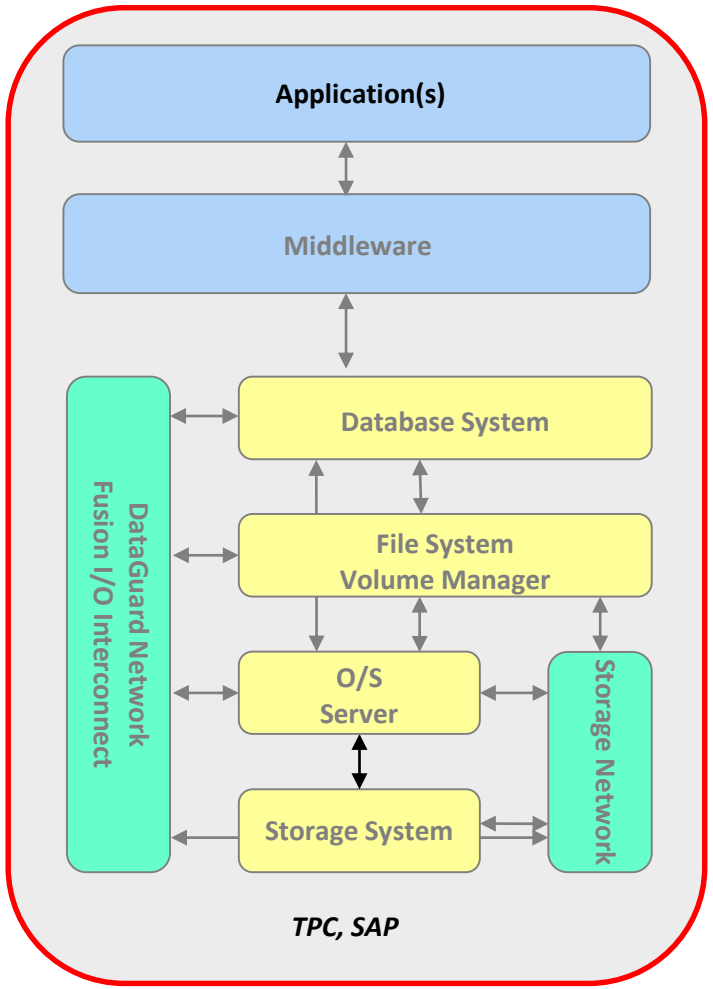
No benchmark results for YOUR platform



- Customer wants to know the key performance metrics of his own platform
- Huge effort to run TPC on customer platform
  - Complexity
  - Rules
- Impossible to run SAP benchmarks on customer platform
  - Lack of documentation

TPC and SAP Benchmarks

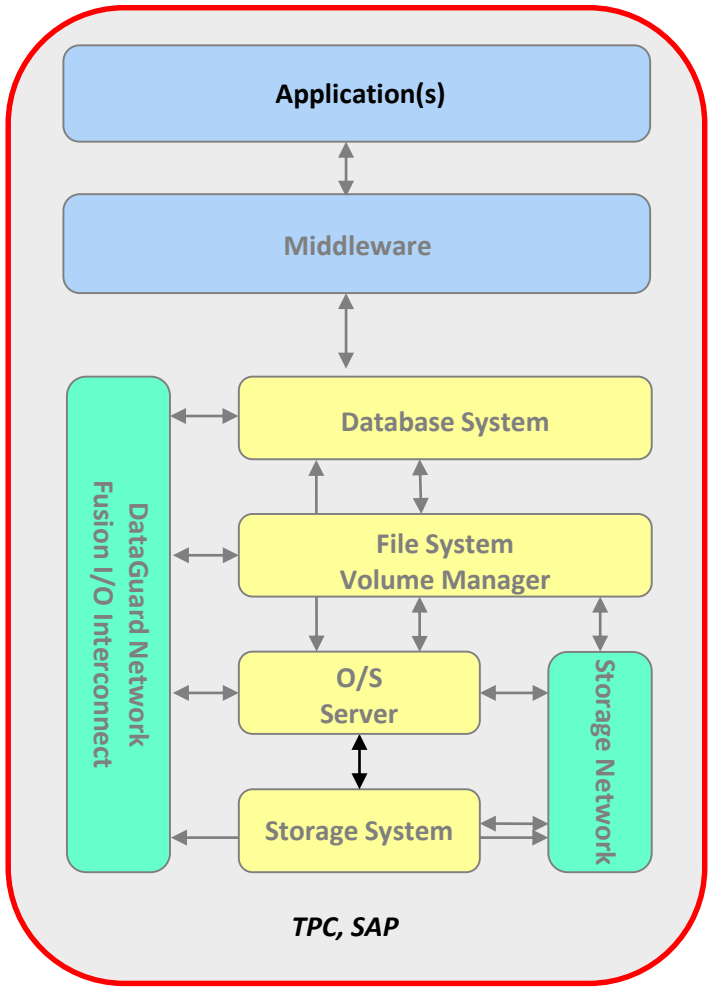
Unpractical performance metrics



- The TPC performance metric is just one number, e.g.
  - TPC-H: Qph@Size (Query per hour at given database size)
  - What does it mean?
- TPC and SAP do not make any predictions about
  - CPU performance
  - Server performance
  - Storage performance
  - Database performance for data load, data scan, backup, etc.
- TPC benchmark metrics do not relate to something that can be readily understood by users

SAP Benchmarks

SAP Sales and Distribution (SD) Benchmark



- SAP does not document storage system configuration for its benchmarks
  - Storage system is not the limiting factor in SAP benchmarks
  - What is about price of such a storage system?
- Benchware opinion
  - Storage system performance is essential for Oracle database environments
  - Storage system performance should be part of
    - » platform evaluation
    - » platform performance calibration

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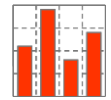
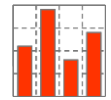
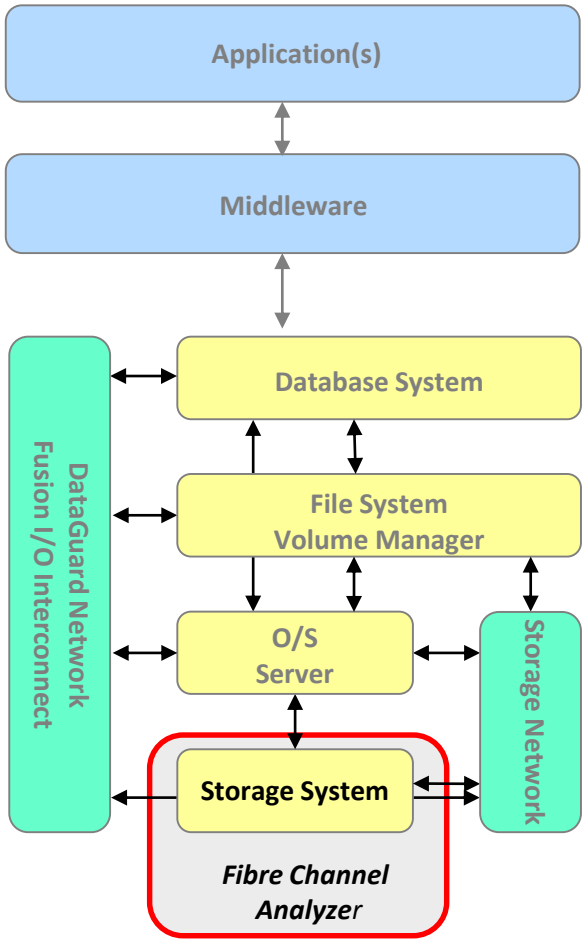


Introduction to Storage Performance Tests



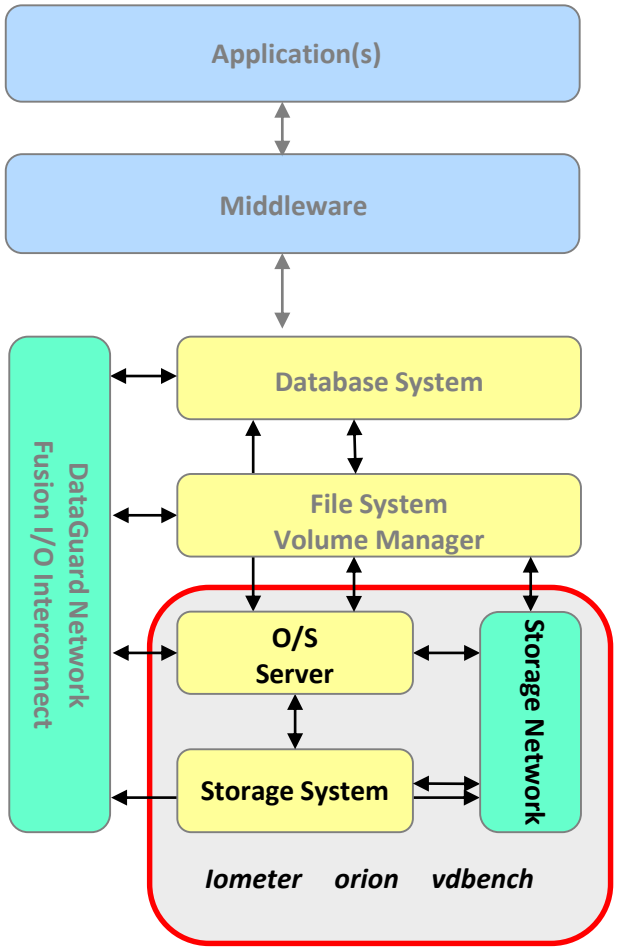
Comparison of I/O Benchmarks



- Storage System I/O Performance
  - Useful to test storage system performance at port level
  - Vendors data sheet numbers

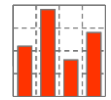
Introduction to Storage Performance Tests

Comparison of I/O Benchmarks

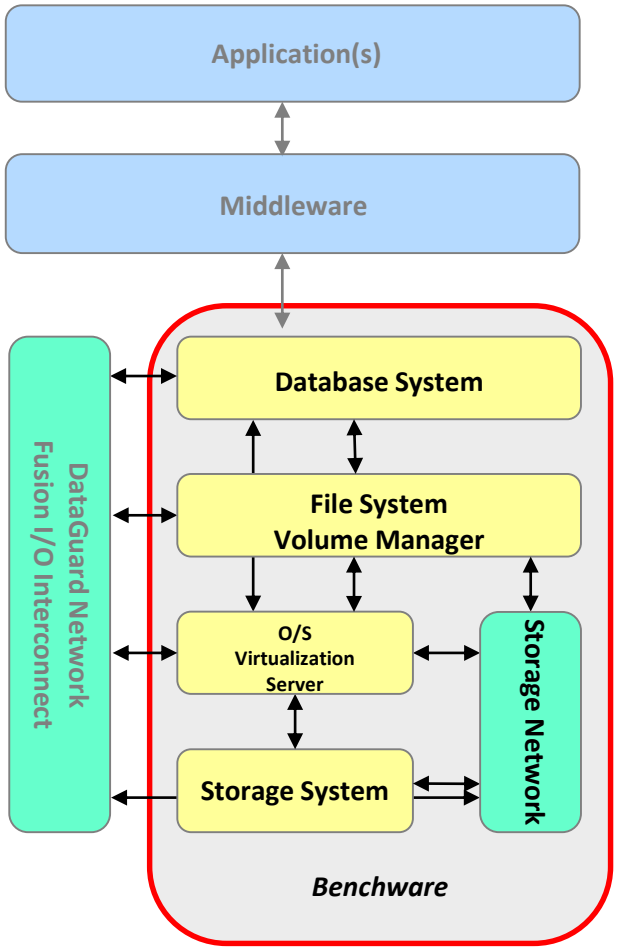


- Server System I/O Performance
  - Tools like vdbench, Iometer, Orion, etc. just generate I/O system calls, but no further I/O processing
  - Useful to analyze transfer performance between storage system and server system
  - Unable to benchmark storage grids
  - Unable to benchmark Oracle ASM infrastructure

Introduction to Storage Performance Tests



Comparison of I/O Benchmarks



- Database System I/O Performance
  - Most complex I/O operation
  - Database buffer cache management
    - » find a free slot
    - » replace older blocks
    - » synchronize access to buffer cache
    - » database block consistency checks
  - Database I/O needs much more cpu resources than simple I/O generator
    - » Rule of thumb: 25'000 IOPS per x86 core
    - » Throughput does not scale linear
  - `dbms_resource_manager.calibrate_io` does not recognize hybrid storage systems and delivers wrong results

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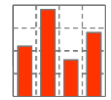
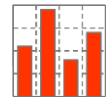


RPE2



Relative Performance Estimate 2 (RPE2)

- Previous methodology from Ideas International, since 2012 Gartner Inc.
- RPE2 is a theoretical performance estimate and not an actual observed measurement of server performance
- It is based on published benchmark results and relative performance ratings from server manufacturers
- The published or estimated performance points for each server processor option are aggregated by calculating a geometric mean value
- The current RPE2 set includes the following six benchmark inputs in its calculation: SAP SD Two-Tier, TPC-C, TPC-H, SPECjbb2005, and two SPEC CPU2006 components

[3] Gartner Inc.: *Gartner RPE2 Methodology Overview*, 2012

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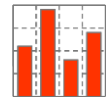
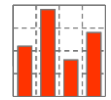


Proof of Concept

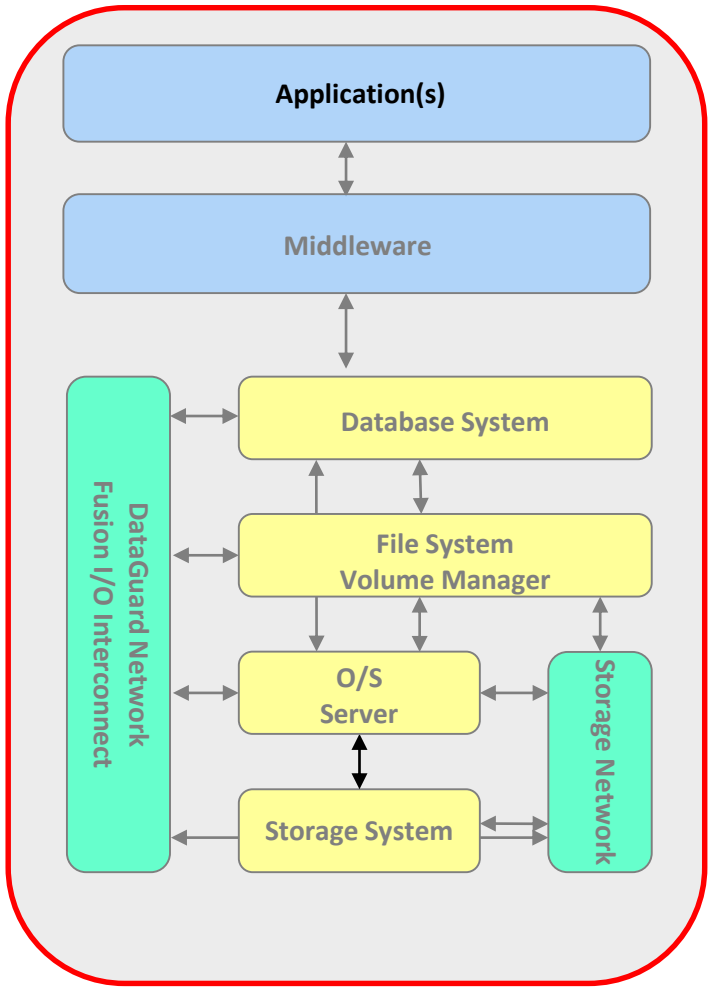


Prototype in lab environment

- Time Consuming – Complicated – Expensive
  - Installation
  - Data Migration
  - Data masking
  - Simulation of large OLTP user populations
  - Simulation of SOA and ESB interfaces
  - …

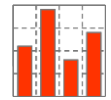
Proof of Concept

Prototype in lab environment



- Application as load generator
  - Measures performance of current software on new hardware technology
  - PoC provides a snapshot result - any change of application or data may change PoC result
- PoC does not necessarily
  - Identify performance capabilities and limitations of new hardware
  - Reflect correct price performance ratio of new hardware technology

Proof of Concept



Customer statement

“My applications and my data are so specific, I must run a proof-of-concept”

- Platform components like CPU, storage system, database system or network do not recognize neither any specific application nor any specific data

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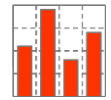
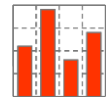


Conclusion



Weaknesses of industry benchmarks and proof of concepts

- Current industry benchmarks are inappropriate to calibrate performance of customers Oracle database platform
- Proof of Concept with application software
  - May be helpful to become familiar with new technologies
  - May be helpful for a draft capacity planning of new platforms
  - Are in general inappropriate to test performance limitations of new technologies and therefore are inappropriate for price performance considerations

swiss precision in performance measurement

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