




Strategic Briefing

Oracle's New Storage Architecture for Data Warehousing - Exadata

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Oracle





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Oracle Exadata Overview

Juan Loaiza

Senior Vice President, Systems Technologies

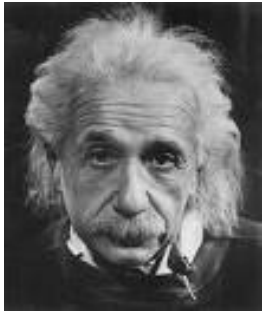
Oct, 2008



EXADATA

**Extreme Performance
Data Warehousing**

Data Warehouse Approaches



- “**Brainy Software**” approach - use smart database software to minimize the need for hardware
 - OLAP, Bitmap Indexing, Join indexing, Materialized Views, Result Caches, Range Partitioning, etc.



- “**Brawny Hardware**” approach - use powerful hardware to perform brute-force scans and joins
 - Brawny hardware approach only works if the rate of scanning data scales with size of data

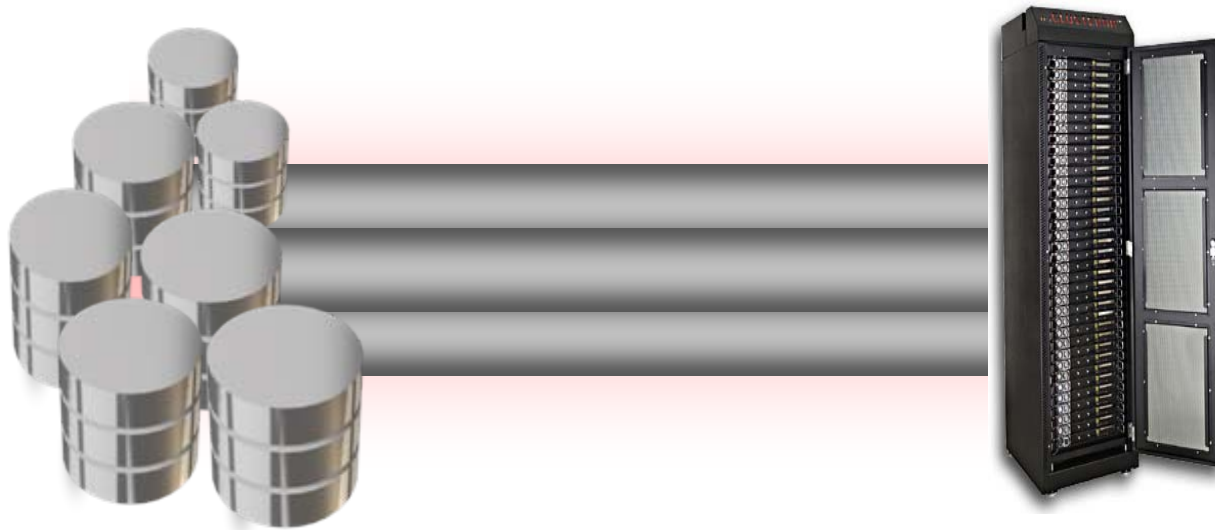
The Brawny Hardware Challenge

Storage Data Bandwidth



- Current warehouse deployments often have bottlenecks limiting the movement of data from disks to servers
 - Storage Array internal bottlenecks on processors and Fibre Channel Loops
 - Limited Fibre Channel host bus adapters in servers
 - Under configured and complex SANs

Solutions To Data Bandwidth Bottleneck



- Ship less data through pipes
- Add more pipes
- Make pipes bigger

Exadata – A New Architecture

Breaks Data Bandwidth Bottleneck

- Exadata Ships Less Data Through Pipes
 - Query processing is moved into storage to dramatically reduce data sent to servers while offloading server CPUs
- Exadata has More Pipes
 - Modular storage “cell” building blocks organized into Massively Parallel Grid
 - Bandwidth scales with capacity
- Exadata has Bigger Pipes
 - InfiniBand interconnect transfers data 5x faster than Fibre Channel



**Exadata Moves a Lot
Less Data a Lot Faster**

Storage Server Building Block



HP Oracle Exadata Storage Server

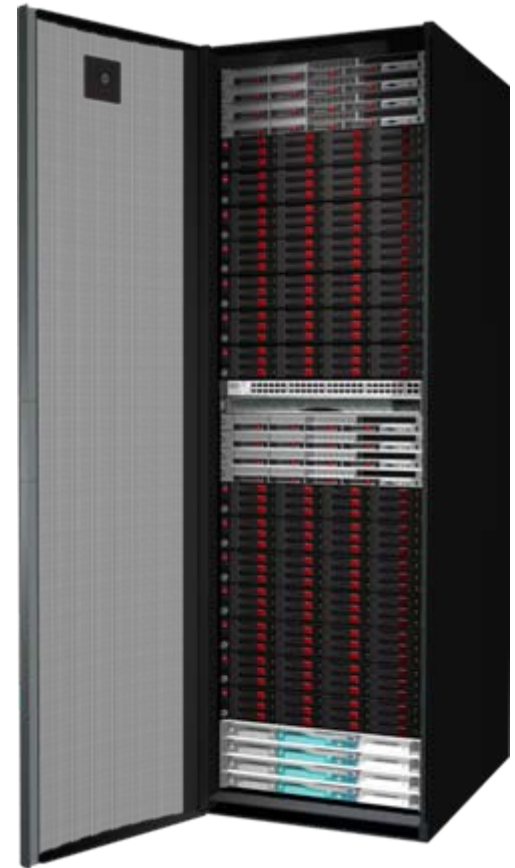
- Hardware by HP
- Software by Oracle

- Industry standard components
 - 2 Intel processors
 - 12 SAS or SATA disks
 - Up to 12 TB raw storage
 - InfiniBand connectivity
- Building block of a massively parallel storage grid
 - Up to 1 GB/Sec. of data bandwidth

HP Oracle Database Machine

Configured for High Performance Data Warehousing

- 8 Oracle Database servers
 - 64 Intel processor cores
 - Oracle Enterprise Linux
- 14 Exadata Storage Servers
 - Up to 168 TB raw storage
- InfiniBand switches
- Optimized, Certified, and Supported by Oracle

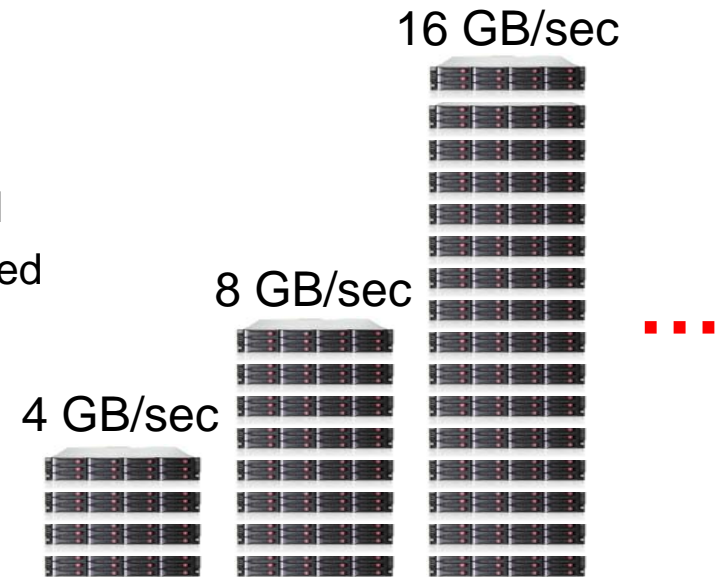


Add Performance and Capacity by Adding More Database Machines



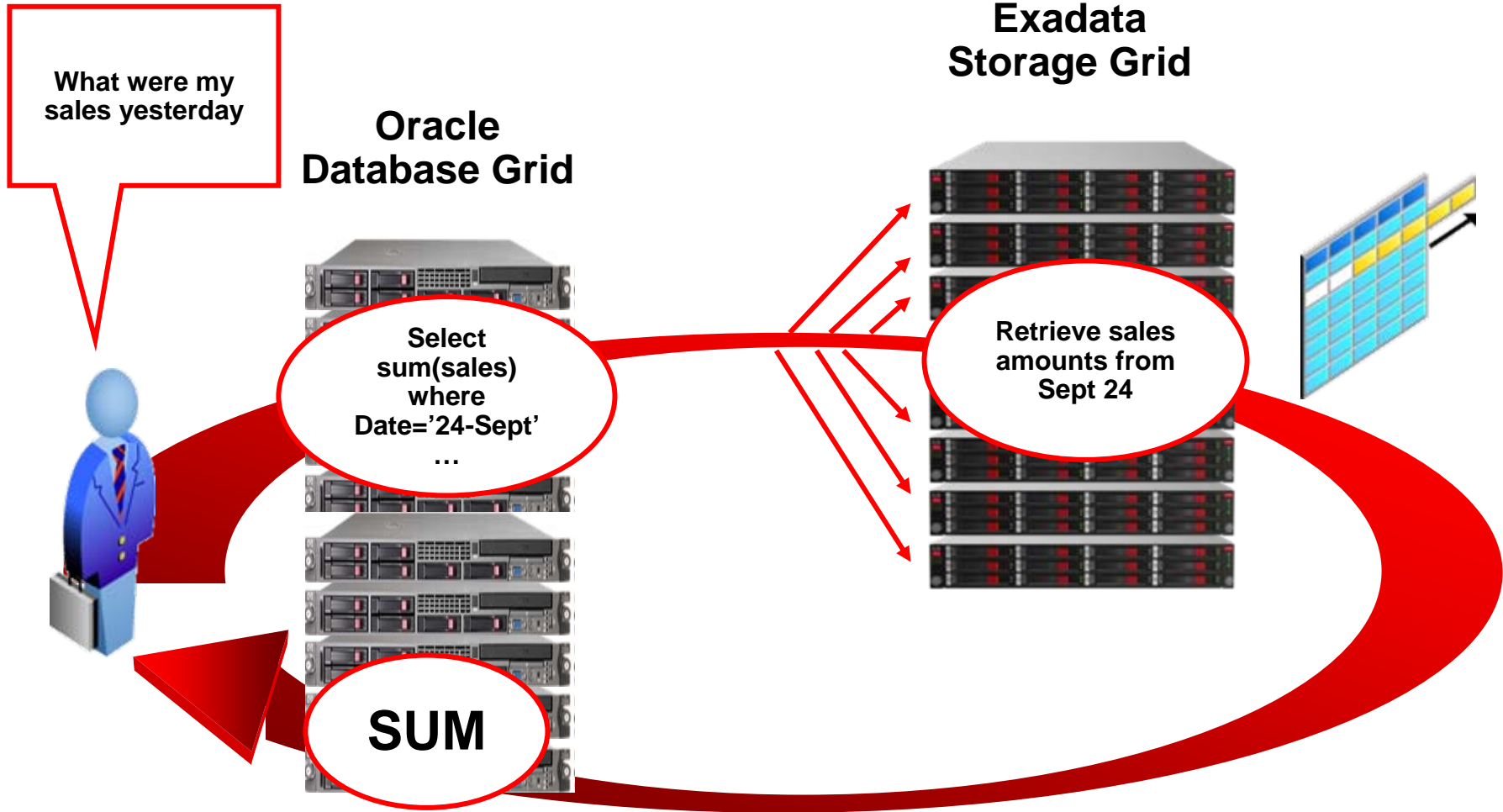
Massively Parallel Storage Grid

- Storage cells are organized into a massively parallel storage grid
- **Scalable**
 - Scales to hundreds of storage cells
 - Data automatically distributed across cells by ASM
 - Transparently redistributed when cells are added or removed
 - Data bandwidth scales linearly with capacity
- **Available**
 - Data is mirrored across cells
 - Failure of disk or cell transparently tolerated
- **Simple**
 - Works transparently - no application changes



Exadata bandwidth scales linearly with capacity

Simple Query Example



Delivery Model



- System Delivery
- Hardware Service



- System Sales
- System Support

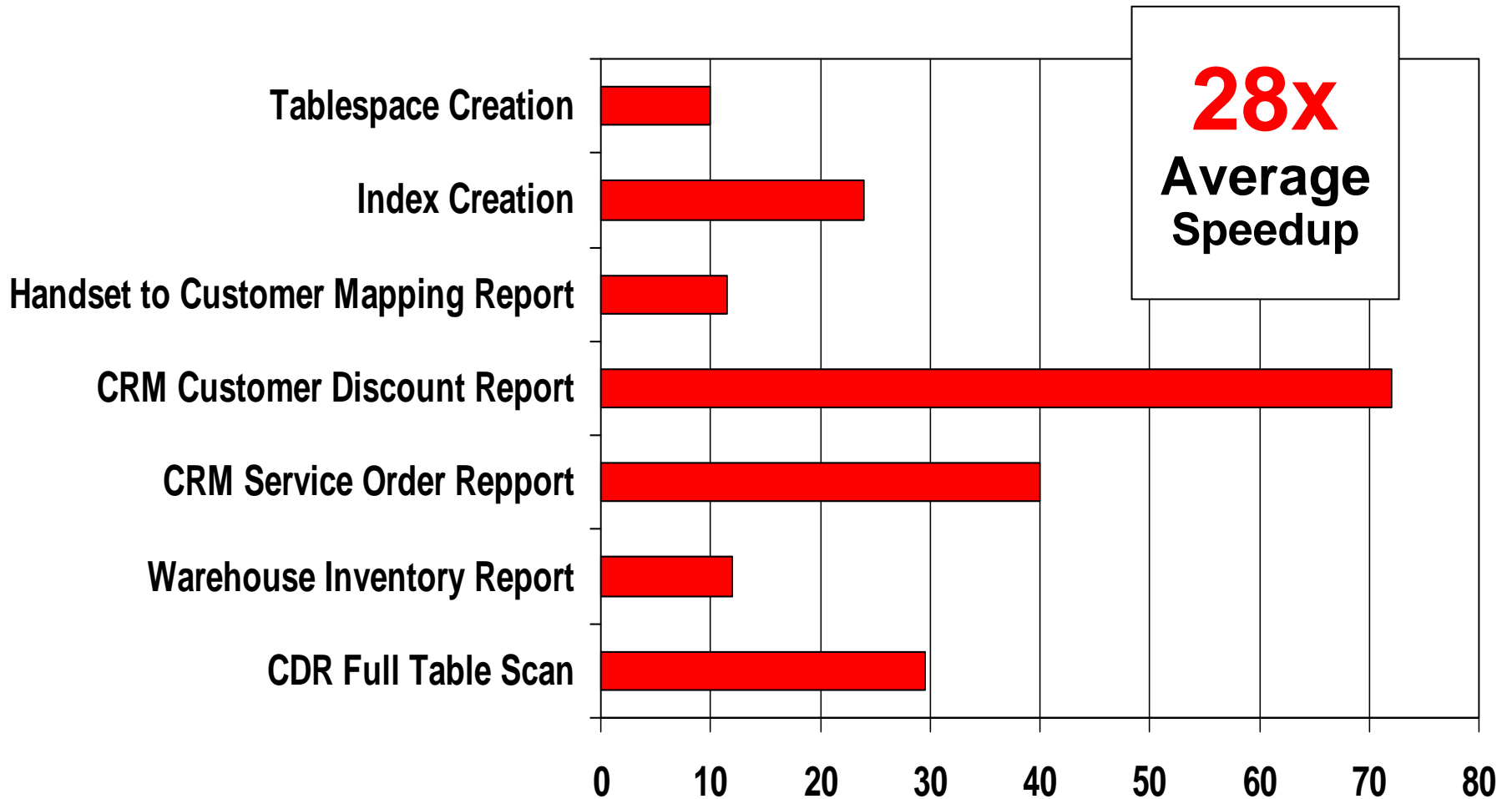


Simeon Dimitrov

Enterprise Resources Manager, M-Tel
European Telecommunications Provider

“**Every query was faster** on Exadata compared to our current systems. The smallest performance improvement was **10x** and the biggest one was an incredible **72x.**”

M-Tel Exadata Speedup – 10X to 72X





Grant Salmon
CEO, LGR Telecommunications
Telecomms Business Intelligence Solutions

“Call Data Record queries that used to run for **over 30 minutes** now complete in **under 1 minute**.
That's extreme performance.”



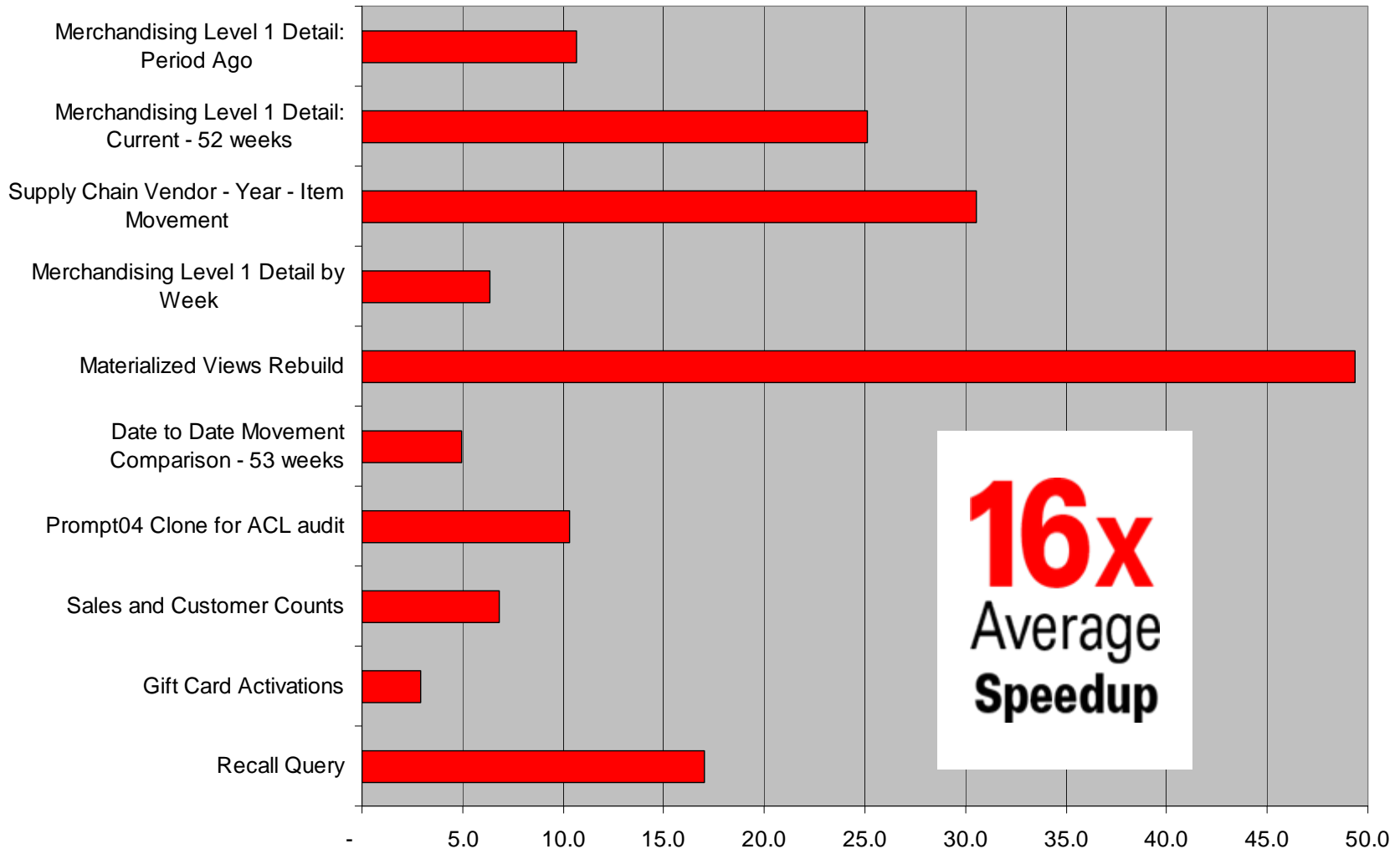
A CME/Chicago Board of Trade Company

Walt Litzenberger

Director Enterprise Database Systems, CME Group
World's Largest Futures Exchange

“Oracle Exadata outperforms anything we’ve tested to date by 10 to 15 times.
This product flat-out screams.”

Giant Eagle Exadata Speedup – 3X to 50X



Exadata Changes the Game

- Delivers database intelligence and massively parallel scaling in the storage tier
 - Industry standard hardware
- Eliminates all bottlenecks preventing high performance query processing
- Dramatic performance improvement for data warehousing
- Simplicity of appliance seamlessly integrated with the database



Exadata and Storage Community

- Data Warehousing community is moving towards specialized architectures
 - Teradata, Netezza, IBM, Microsoft, Oracle
- Oracle is preserving separation of Storage Tier and Database Tier (unlike others)
- Think of it as new class of storage – SAN, NAS, Content, now Warehouse
- Storage Administrators have a role to play and should become educated on Exadata
- Oracle will continue to enhance integration with traditional storage
 - E.g. Direct NFS client



A large, stylized, dark grey 'QA' logo is centered in the background. The 'Q' is a large, thick, rounded letter. The 'A' is a tall, thin, serif letter. The 'Q' and 'A' are intertwined, with the 'Q' overlapping the 'A'.

Q U E S T I O N S
A N S W E R S



Thank you

Danke

