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Cost saving
with Oracle Database 11g Release 2

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Modern Data Center Architecture
Key Challenges

- Consolidating the data infrastructure
- Delivering extreme performance
- Providing maximum availability
- Securing the data infrastructure
- Managing the data infrastructure

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Modern Data Center Architecture
Key Challenges

- Consolidating the da...
- Delivering ex...
- Provid...
- ...structure
- ...ata infrastructure

Standardize on Oracle Database 11g!
**Lower IT costs AND improve Quality of Service**

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Data Center Architecture

► **What: Standardize and Consolidate Systems Infrastructure**

- Consolidate onto private clouds
- Virtualize Servers into a shared platform
- Virtualize Storage with Automated Management & Compression
- Use High Performance Integrated Systems as Building Blocks

Standardize and Consolidate Systems Infrastructure

- Consolidate onto private clouds

- Virtualize Servers into a shared platform

- Virtualize Storage with Automated Management & Compression

- Use High Performance

  Integrated Systems as Building Blocks
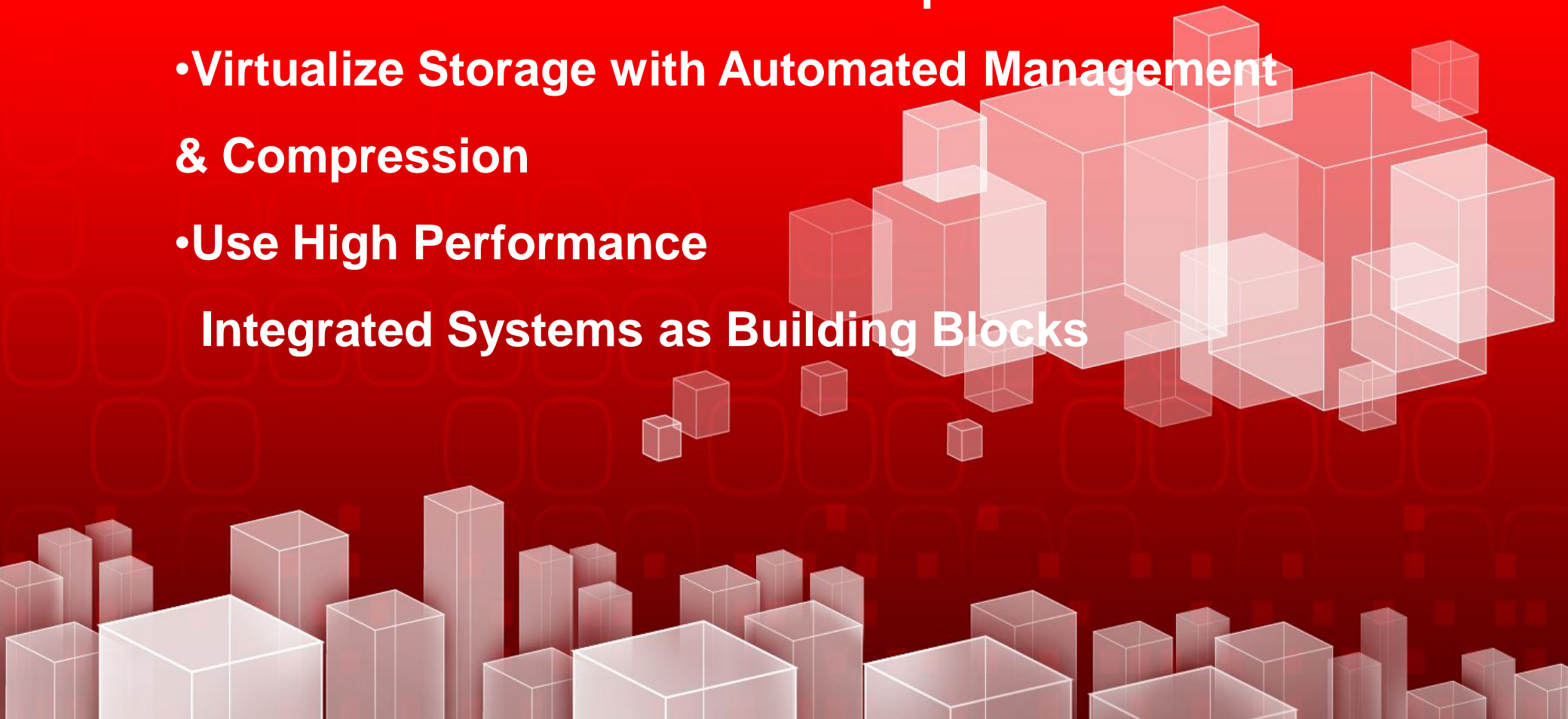
Consolidate onto Private Clouds
Using server and storage grids

Automatic Storage Management

Grid Control

Real Application Clusters

In-Memory Database Cache

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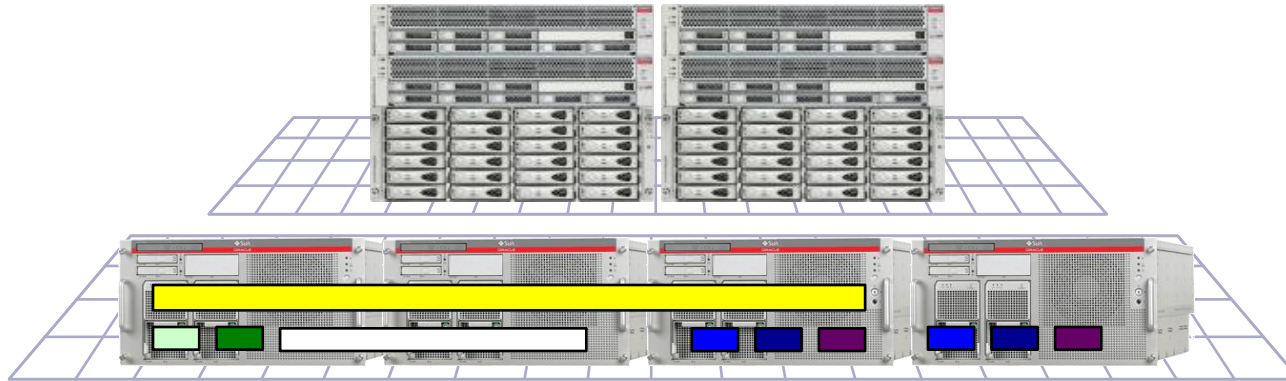© 2010 Oracle Corporation

Real Application Clusters
Virtualize database servers into a shared platform

- Run all databases for all applications on shared platform
- Highly available and scalable
- No changes required to applications
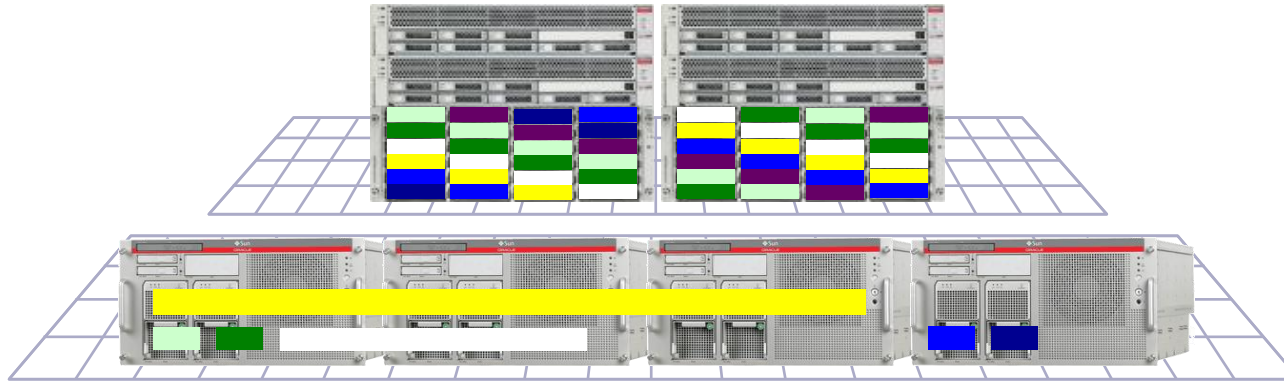
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Workload and Resource Management
Databases run as Services across shared platform

- Resource Manager allocates CPU and Memory
  - Also I/O usage on Exadata
- Instance caging allocates cores per instance
- According to Service Level Agreement

Automatic Storage Management
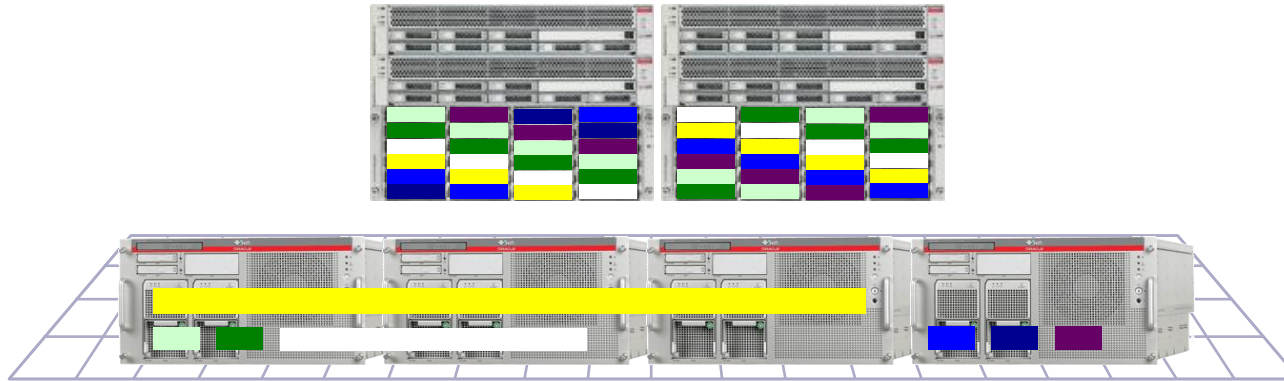## Virtualize and share storage resources

- Automates storage management of storage devices
- Online addition and migration of storage (+rebalancing)
- Advanced data striping, layout optimizations for max I/O performance
- Mirroring protects from disk failure

OCFS - Cloud Edition
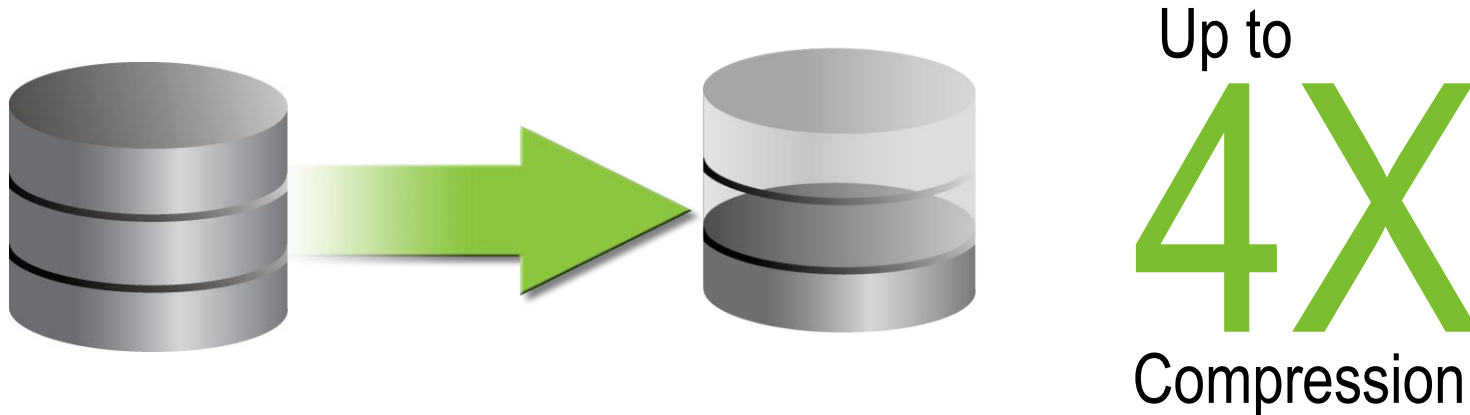## Standard solution for Oracle environments

Database Files   OS Files   Oracle Binaries

- General purpose clustered or local file system
- Optimized disk layout, online rebalance, mirroring
- Volume management, read-only snapshots

Reduce Storage Requirements
Advanced OLTP Compression

Up to

4X

Compression

- Compress large OLTP and Data Warehouse tables
- Improve query performance for table scans
- No changes to existing applications
- Savings cascade across test, backups & mirrors
- 2.4x and 2.6x compression on SAP/R3 and SAP/BW

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Global Single Instance @ Oracle
215 TB of Total Storage Savings

Tables — **4x**

Indexes — **2x**

LOBs — **2.3x**

- Original (gray)
- Compressed (red)
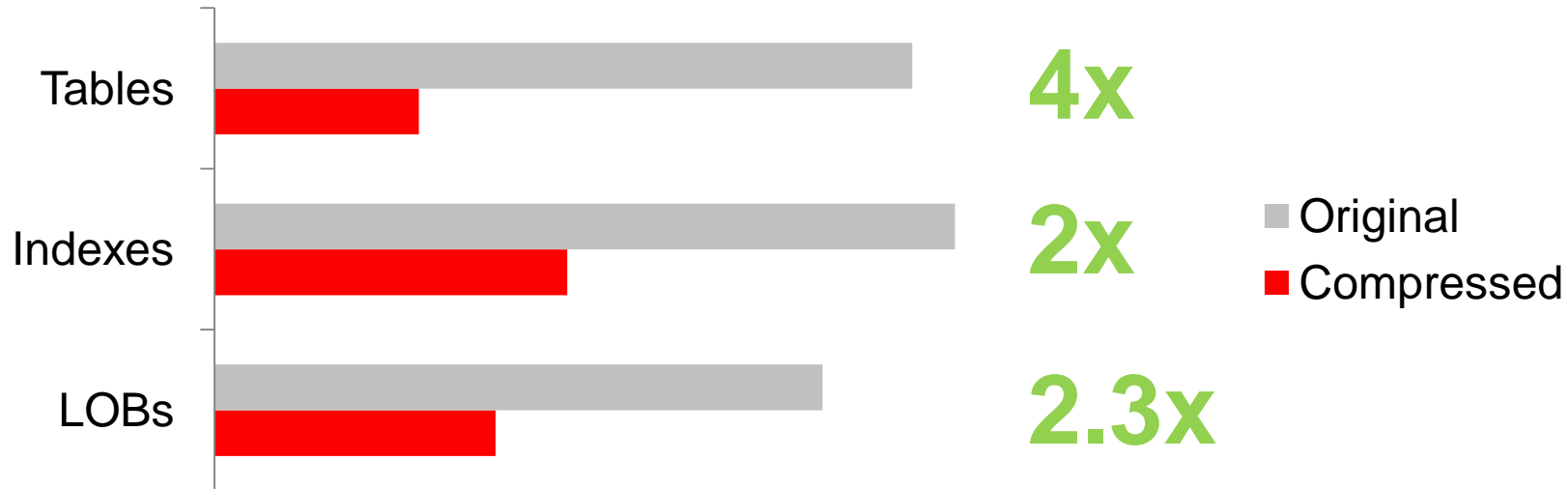
- Eight test copies + 1 test standby
- One production + 1 standby
- Total 9 +2 =11 copies (including production & standby)
- Saving by copy = 6,5 TB - *11 copy
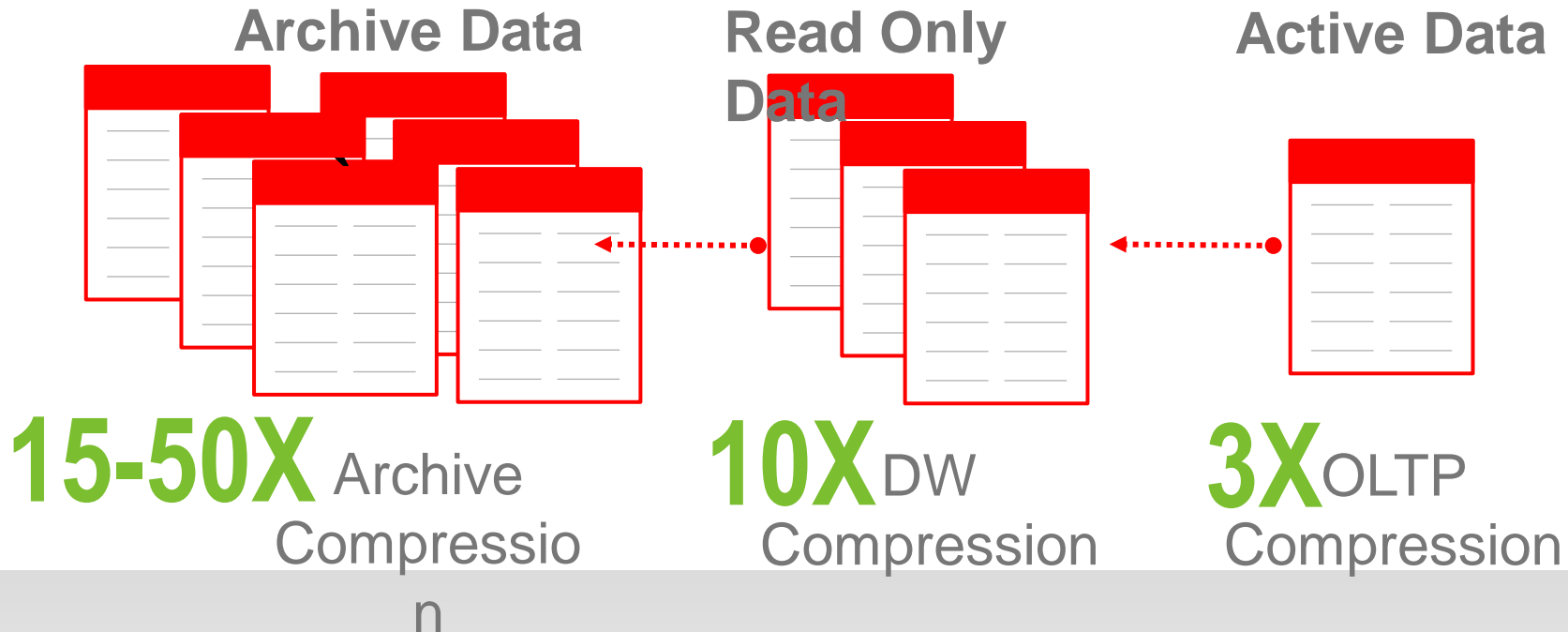- 3x storage saving on Oracle's eBusiness Suite database

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Oracle Exadata
Hybrid Columnar Compression

Up to

50X
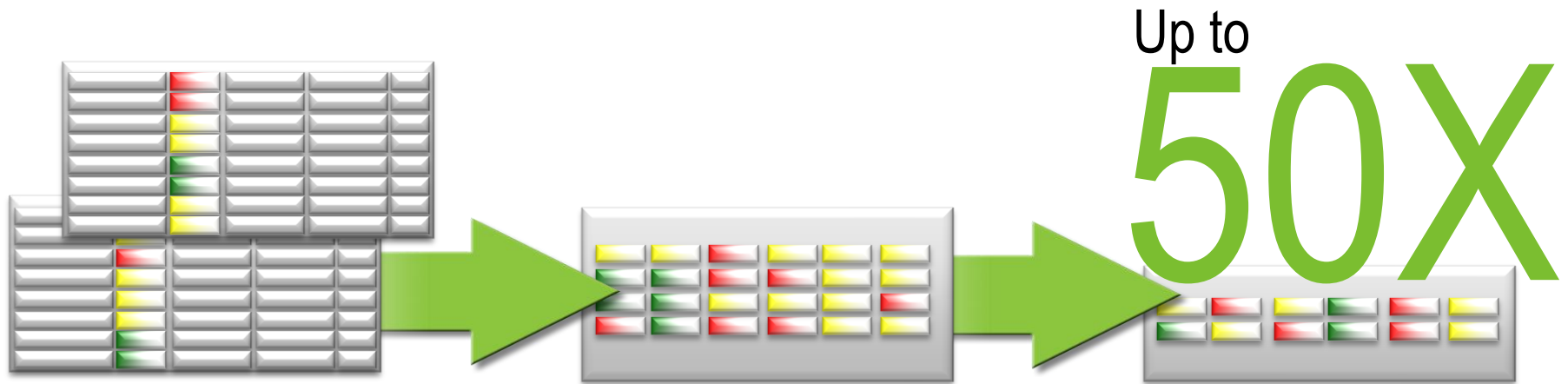
- Data stored by column and then compressed
- **Query mode** for data warehousing tables
  - Typical 10X compression ratios
- **Archival mode** for old data
 - Typical 15- 50X compression ratios

Partition to Manage Data Growth
Compress Data and Lower Storage Costs

Archive Data   **Read Only Data**   **Active Data**

15-50X Archive Compression   **10X** DW Compression   **3X** OLTP Compression
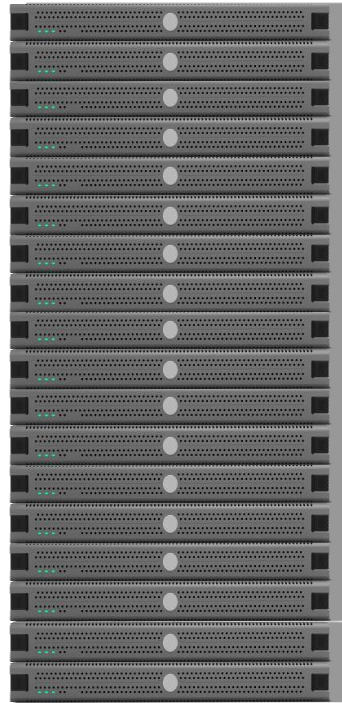
- Distribute partitions across multiple compression tiers
- Free up storage space and execute queries faster
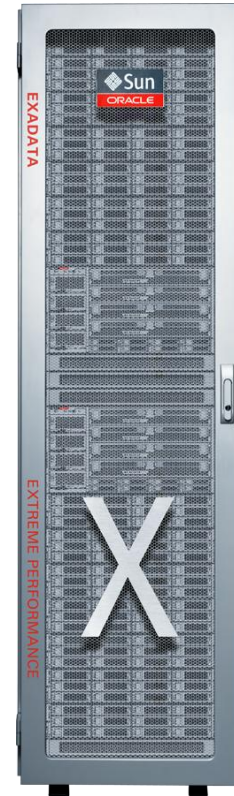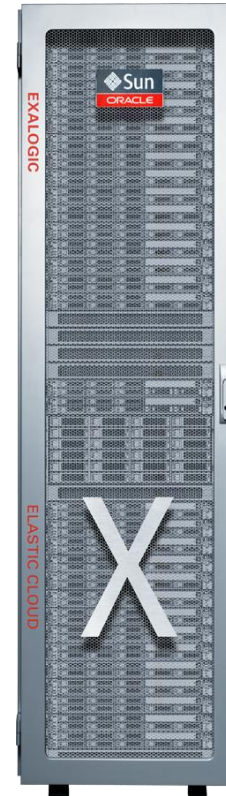- No changes to existing applications

Data Center Architecture Consolidation
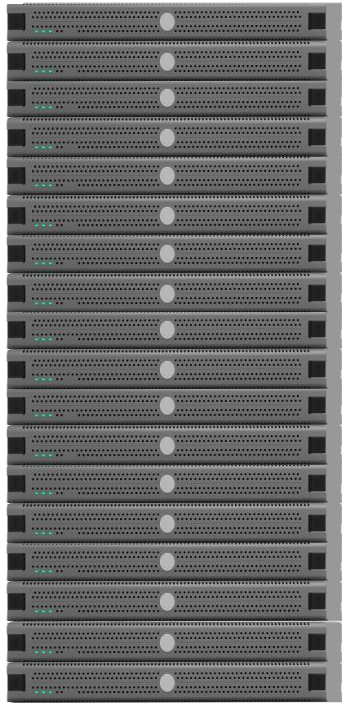
100s of
Application Server
Machines

100s of
Database Server
Machines

1 Oracle Exalogic Elastic Cloud
1 Oracle Exadata Database Machine

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Delivering Extreme Performance
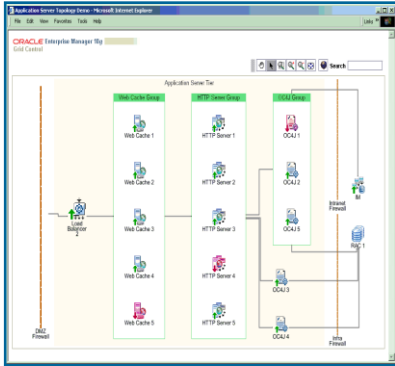
Exadata

Oracle Exadata Database Machine

- X2-2 Extreme performance at lowest cost
  - 8 DB Servers, 8x2 Intel CPU 96 Cores, 768 GB RAM
  - Quarter, Half and Full rack config
- X2-8 Extreme Performance on the data tier
  - Best Data Warehouse & OLTP Cost/Performance
  - 2 DB Servers, 2x8 Intel CPU 128 Cores, 2 TB RAM
- Extreme performance for OLTP, DHW, consolidation
  - Full rack has 14 storage servers with
    - 5 TB of Smart Flash Cache, 168 HDD High Perormance or High capacity
  - Can process over 1 million IOs per second
  - 50 GB/sec query throughput on uncompressed data
  - 5x more I/Os than 1000 Disk Enterprise Storage Array
  - Components connected w/multiple 40 Gb/sec Infiniband links
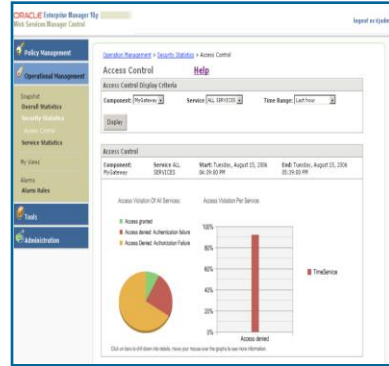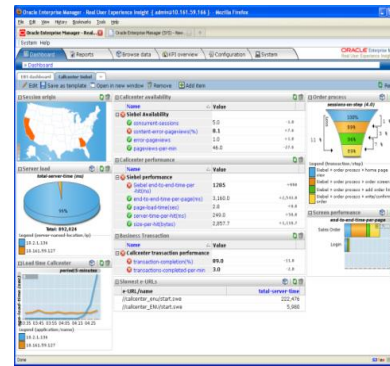 - Completely Fault Tolerant

Management
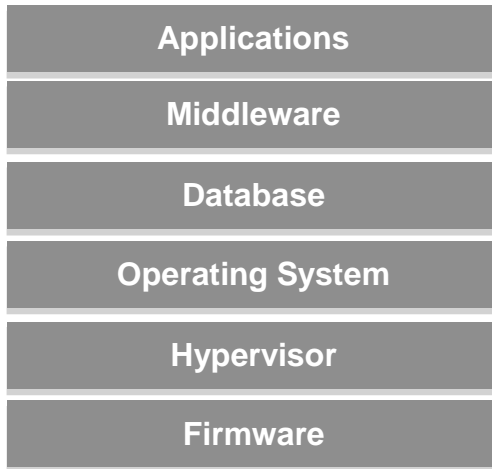
Systems Management

Model Topology

Define SLAs & Capacity Needs

Self-Monitoring

Self-Optimizing

Applications
Middleware
Database
Operating System
Hypervisor
Firmware

Phone Home

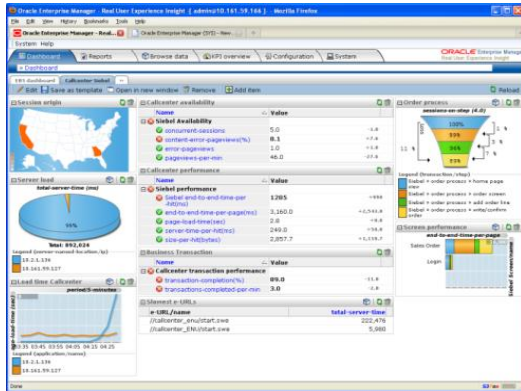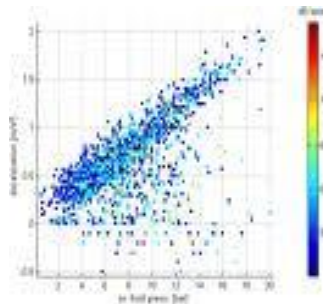| Provisioning |
| :---: |
| Monitoring |
| Diagnostics & Tuning |
| Configuration Mgmt. |
| Patching & Upgrade |

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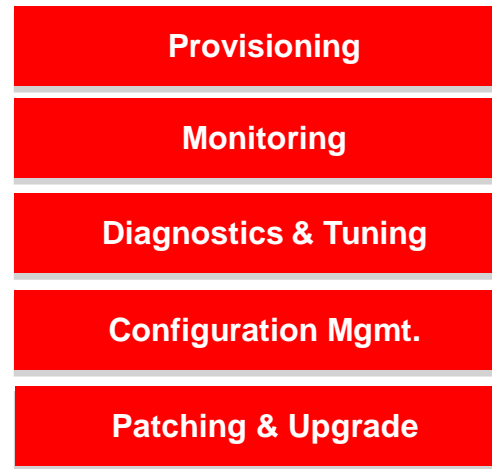
Business Service Level Management

Service Levels

Business Service Levels

Web Server Metrics

Application Server Metrics

Database Server Metrics

Host Metrics

Automatic Correlation & Diagnostics

Projects Completed

Manufacturing Parts Ordered

Purchase Orders Approved

Sales Orders Booked

Invoices Processed
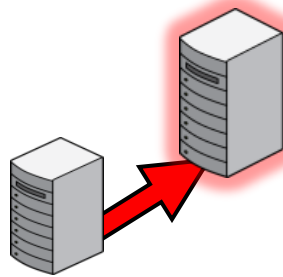
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Provisioning Software to Private Cloud
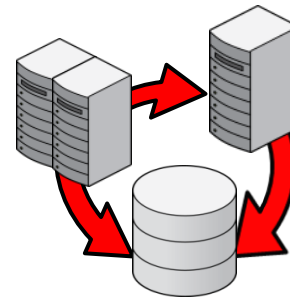
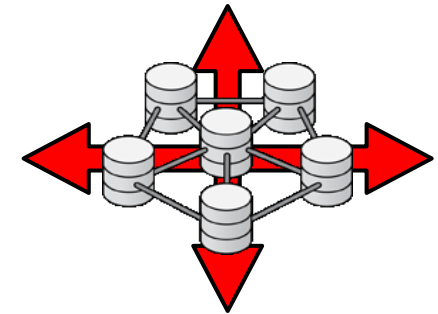## Lower cost via standard Reference Configurations
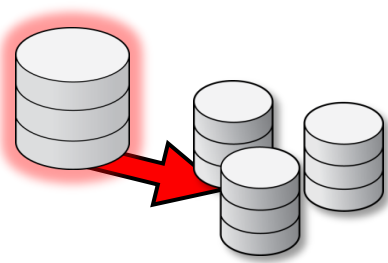
Create Reference System   Stage Gold Image   Create Production System   Scale Provisioning
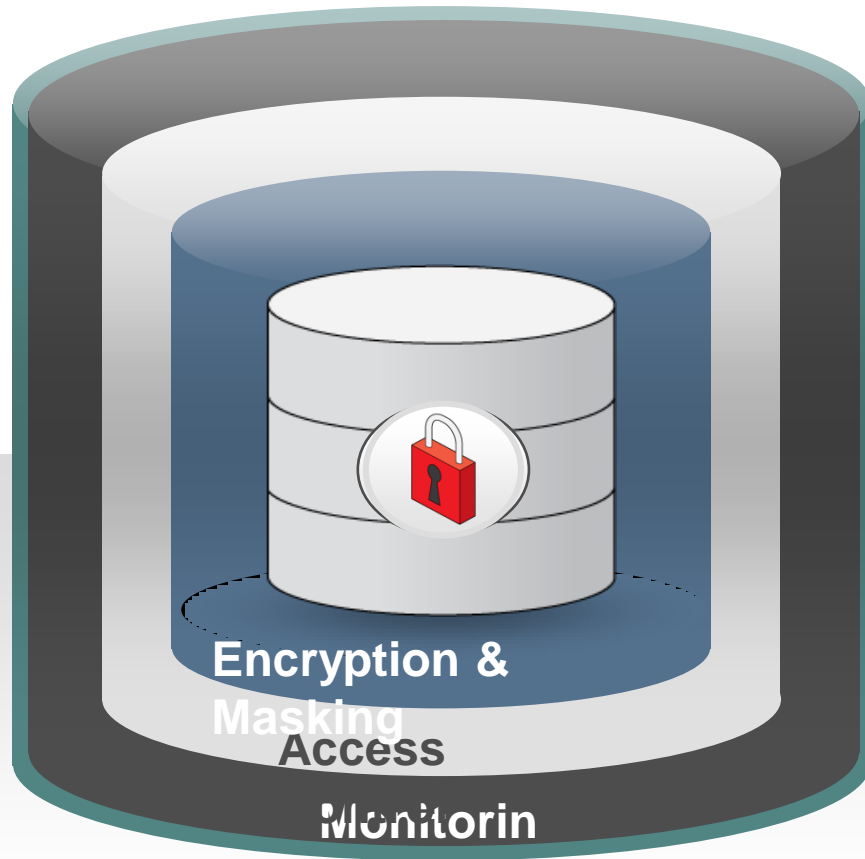
- Gold image reference configurations
- Simplified database provisioning via profiles
- Provision full RAC, ASM and Clusterware systems
- Single click RAC scale-out and scale-back

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Security

Oracle Database 11g
Complete Information Security

Monitoring

- Configuration Management
- Audit Vault
- Total Recall

Access Control

- Database Vault
- Label Security

Encryption & Masking

- Advanced Security
- Secure Backup
- Data Masking

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Oracle Database 11g
New Oracle Database Firewall

Encryption & Masking
Access
Monitoring
Blocking & Logging

Monitoring

- Configuration Management
- Audit Vault
- Total Recall

Access Control
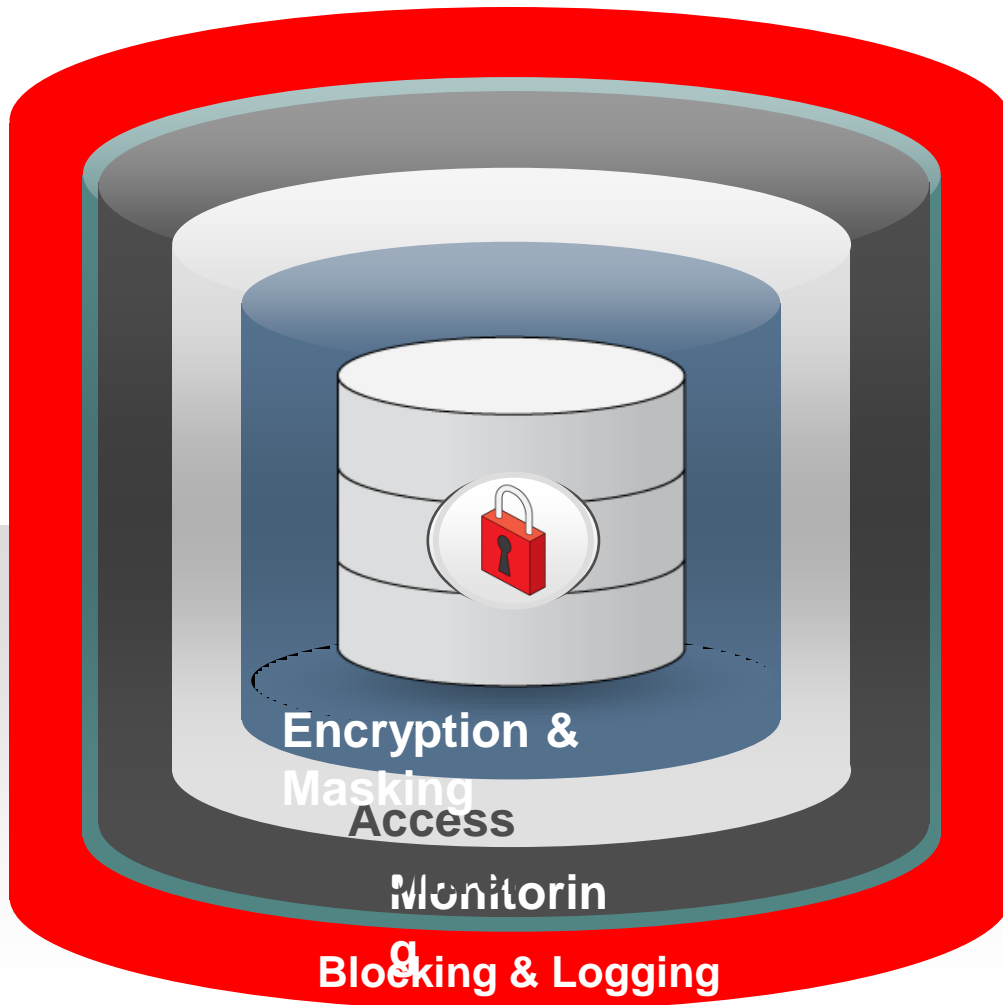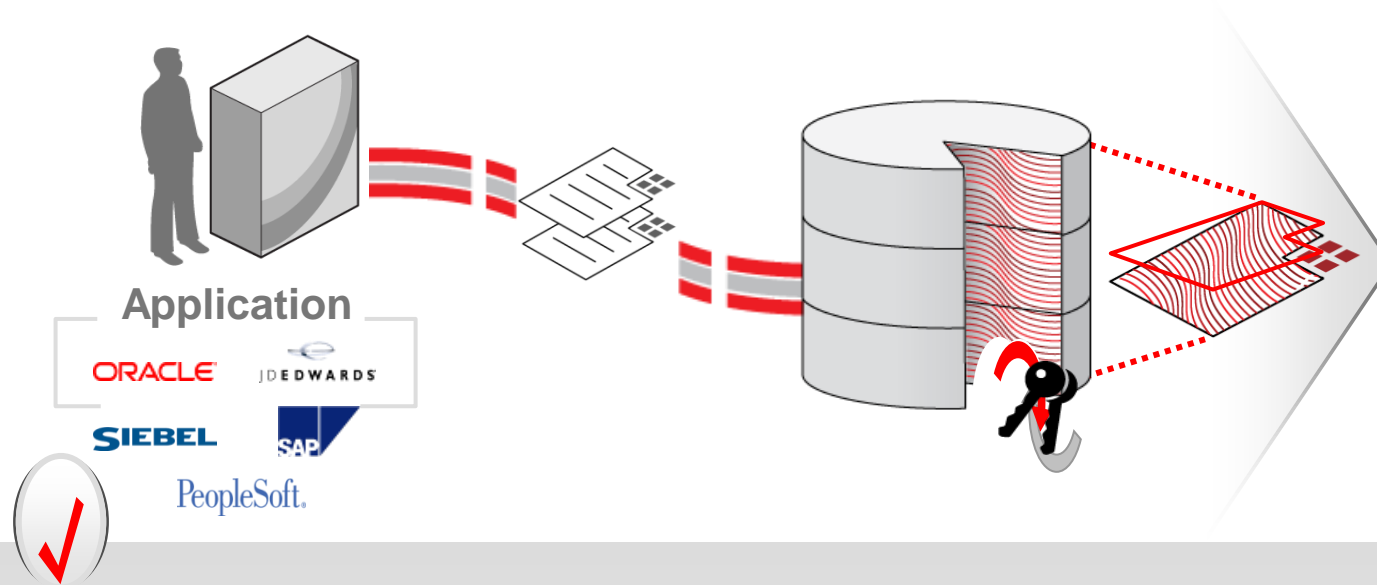
- Database Vault
- Label Security

Encryption & Masking

- Advanced Security
- Secure Backup
- Data Masking

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Oracle Database Firewall
First Line of Defense

- Accurate SQL grammar analysis

- SQL level enforcement based on white lists and black lists

- Fast, reliable and scalable architecture

- Built-in and custom compliance reporting

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Summary

Oracle as an Example
Oracle Austin Data Center: Oracle on Demand

Governance

Refresh/Reuse

Consolidate

Virtualize
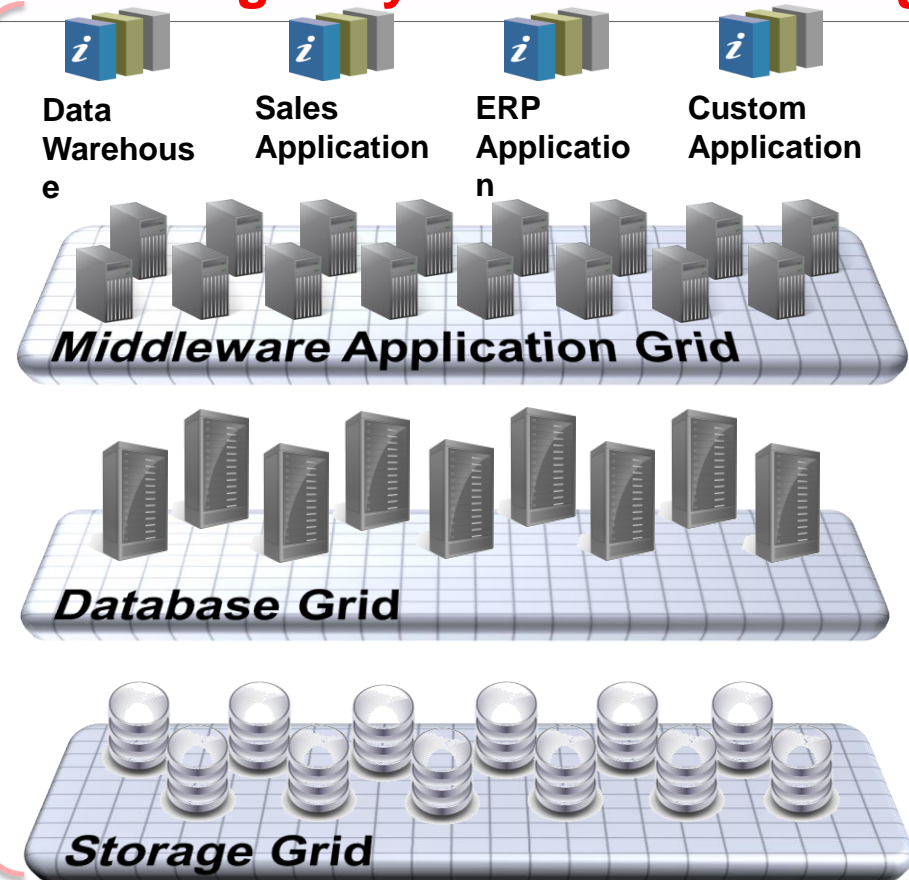
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Oracle's Grid Approach

The solution used in the Austin Data Center

Virtualization, Clustering & Dynamic Provisioning

- Shared pools of resources for high efficiency / utilization
- Dynamic resource provisioning on demand
- Unlimited, incremental scale-out
- High availability
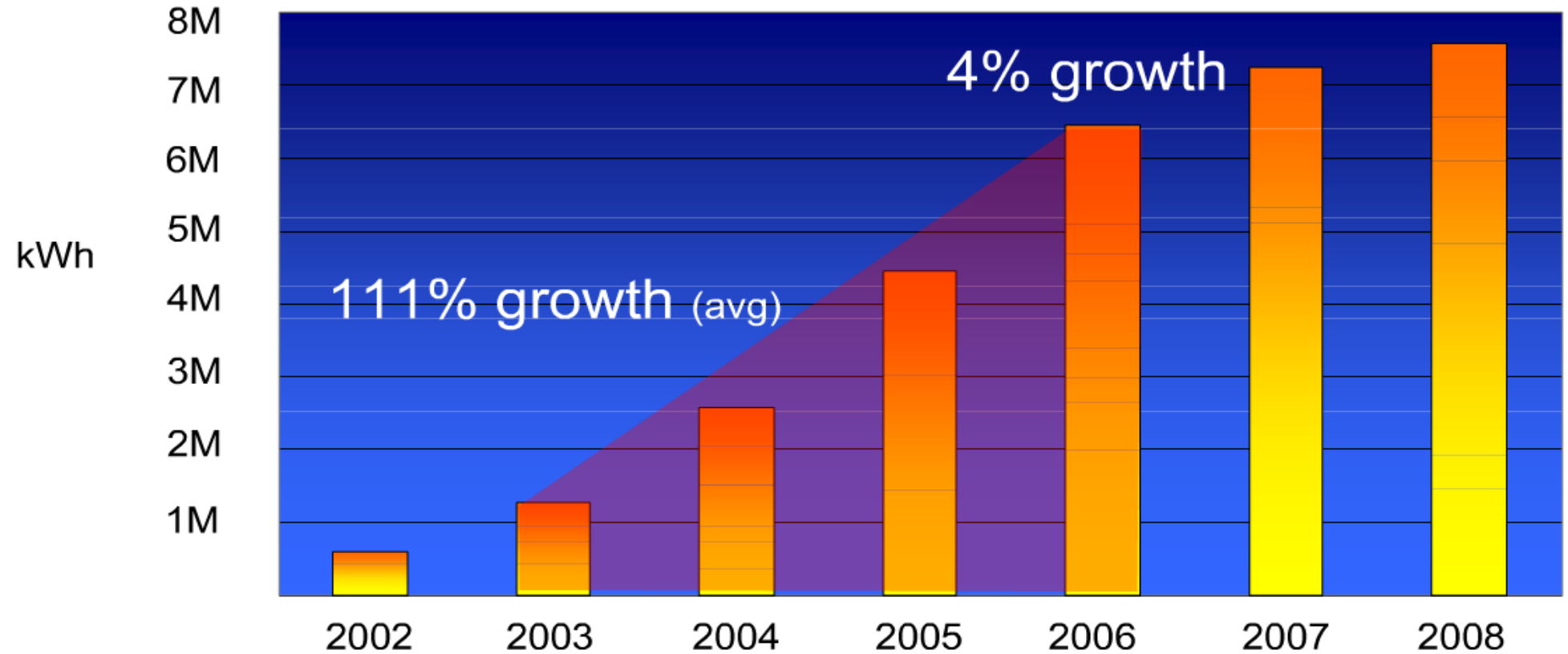- Predictable performance
- Automated monitoring & management

Management

Data Warehouse

Sales Application

ERP Application

Custom Application

Middleware Application Grid

Database Grid

Storage Grid

Virtualization & Clustering Throughout The Stack

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Oracle Austin Data Center
Better power utilization

Oracle Austin Data Center
Lower IT costs

LOB Expenses as a % of Revenue

Fiscal Year

2005   2006   2007   2008   2009   2010

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