

Business-Driven IT Management

Managing Engineered Systems

Alaa Shaaban
Alaa.shaaban@oracle.com
MBL: 20 1981 9988

DBA 2.0

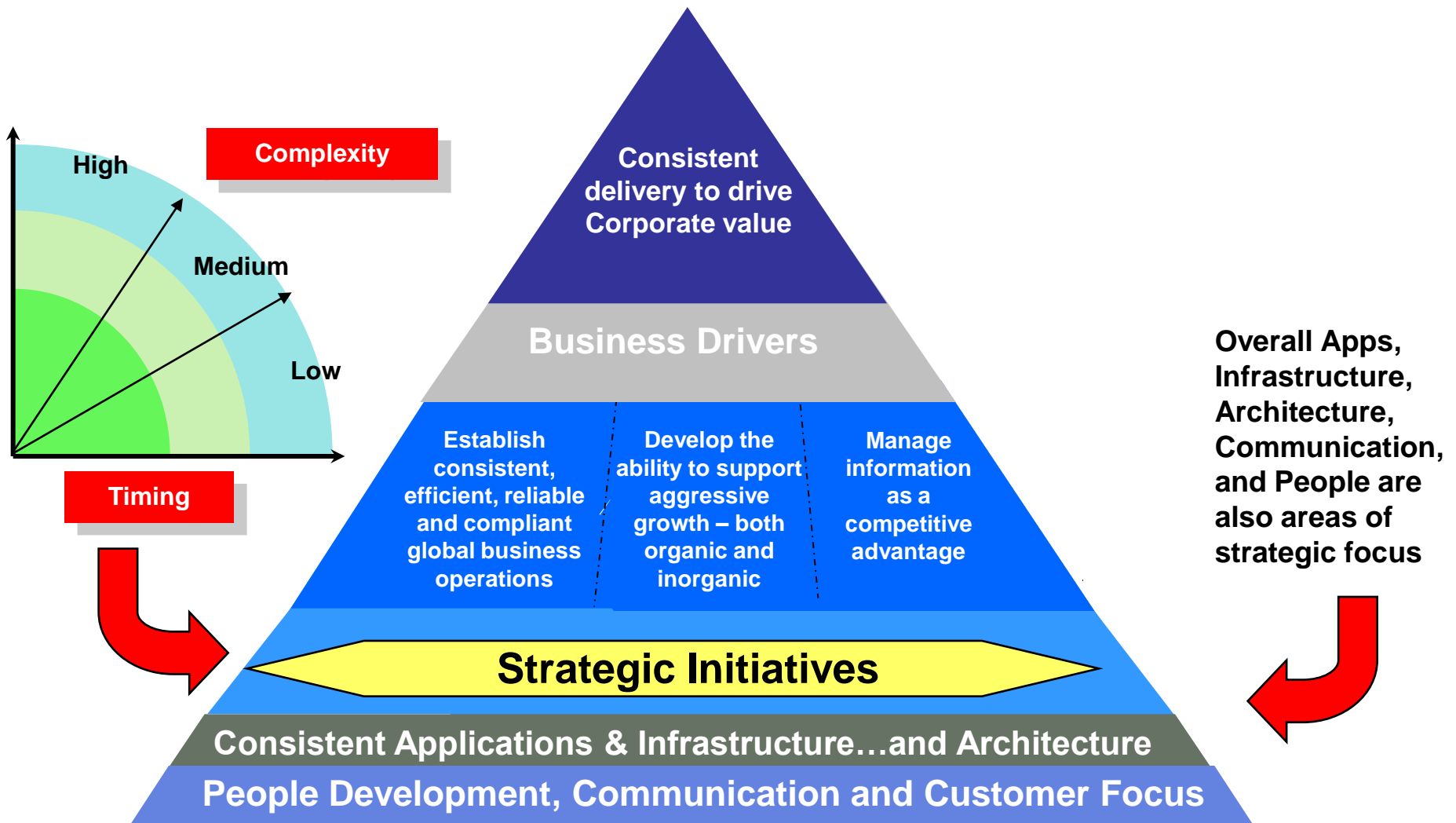
Reactive

Proactive

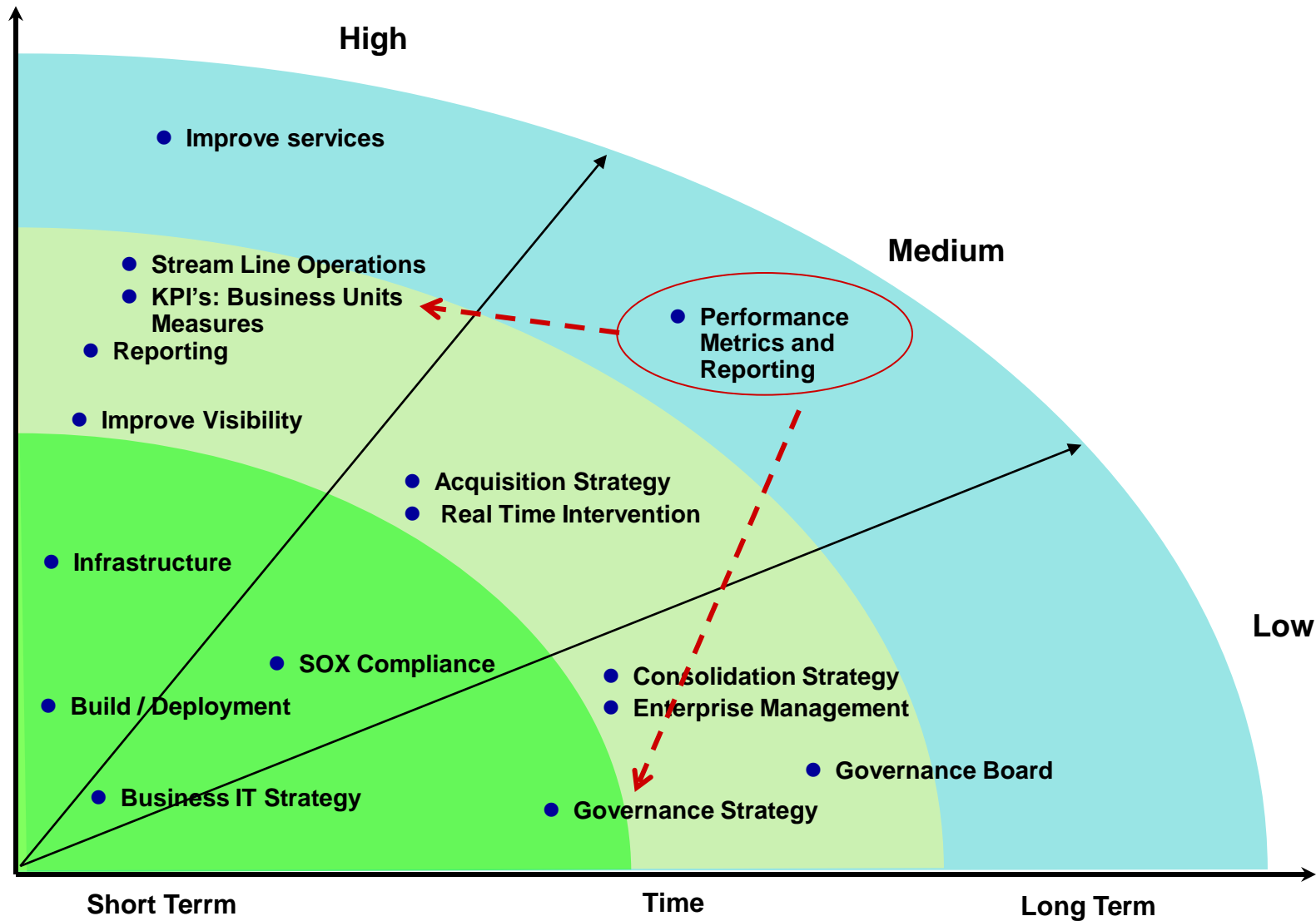
Preemptive



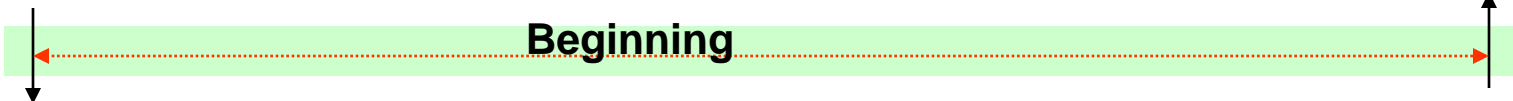
Our Initiatives form the basis for our strategic areas of focus



Strategy Map



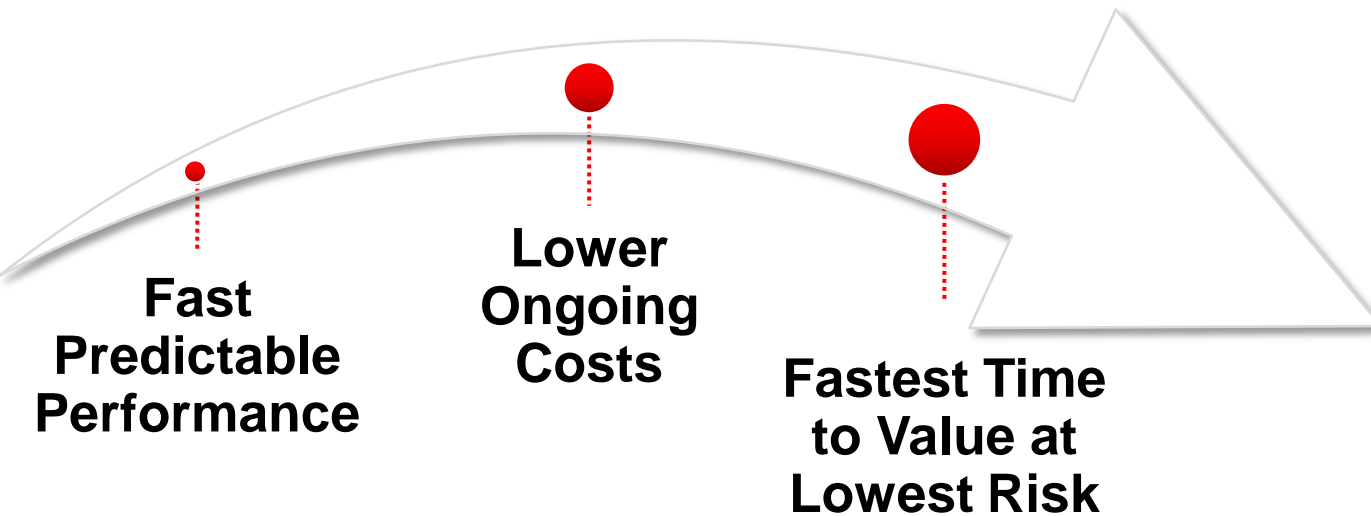
IT Strategy & Maturity Levels

Maturity Level	Managing IT Budget	Managing IT Capability	Managing IT For Business Value	Managing IT Like A Business
5-Optimizing	Sustainable Economic Model	Corporate Core Competence	Optimized Value	Value Center
4-Advanced	Expanded Funding Options	Strategic Business Partner	Options & Portfolio Management	Investment Center
3-Intermediate	Systematic Cost Reduction	Technology Experts	ROI & Business Case	Service Center
2-Basic	Predictable Performance	Technology Supplier	TCO	Cost Center
1- Initial				

The Shift from **IT Cost Center** to **IT Value Center**

Oracle Exadata Database Machine

Extreme ROI Platform



Management Challenges

Challenges

- Reduce deployment cost and errors—rapid time to value
- Migrate application while ensuring business continuity
- Proactively monitor all components
- Maximize availability
- Ensure quality of service

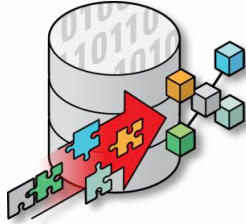
Oracle Enterprise Manager

- Manages all stages of Exadata lifecycle from deployment to maintenance
- Automates deployment reducing cost and effort
- Mitigates migration risk
- Maximizes performance, availability and service quality



Exadata Management

Deploy



- **Validate Application Performance**
- **Test For Response Time & Throughput**
- **Identify and Resolve Issues**

Manage



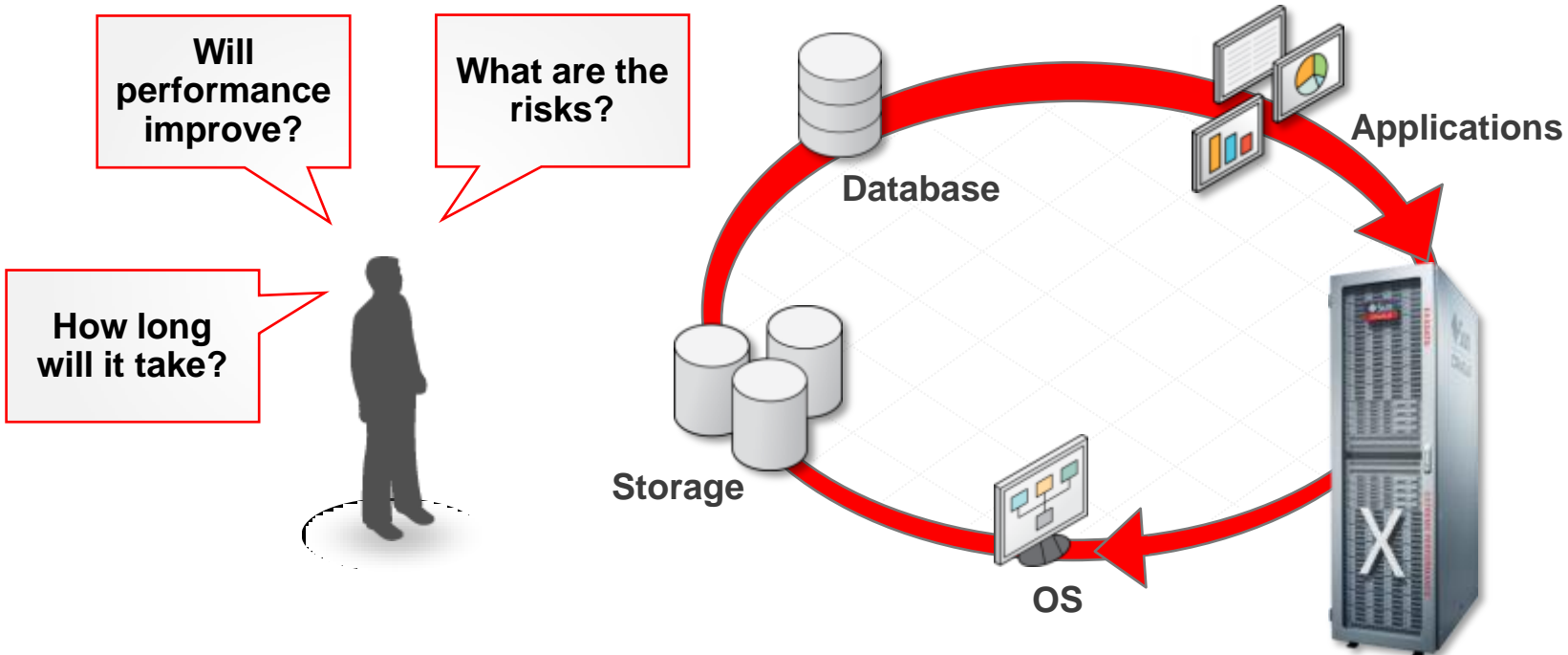
- **Monitoring**
- **Diagnostics and Tuning**
- **Administration**

Maintain



- **Configuration Compliance**
- **Support Automation**
- **Patch Automation**
- **Provision Secure Test Environments**

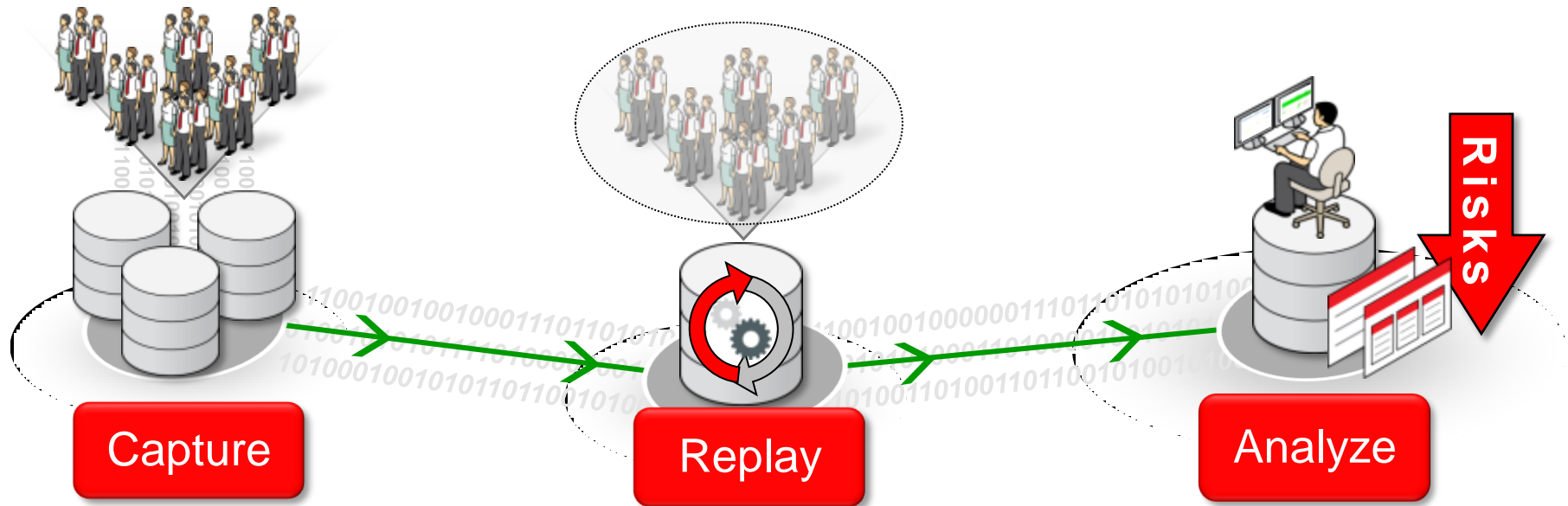
Deployment Challenges



- Deploying application to Exadata involves multiple changes:
 - O/S migrations
 - Storage subsystem changes
 - Database upgrades
 - Single database instance to RAC
- Proper testing required for risk mitigation.

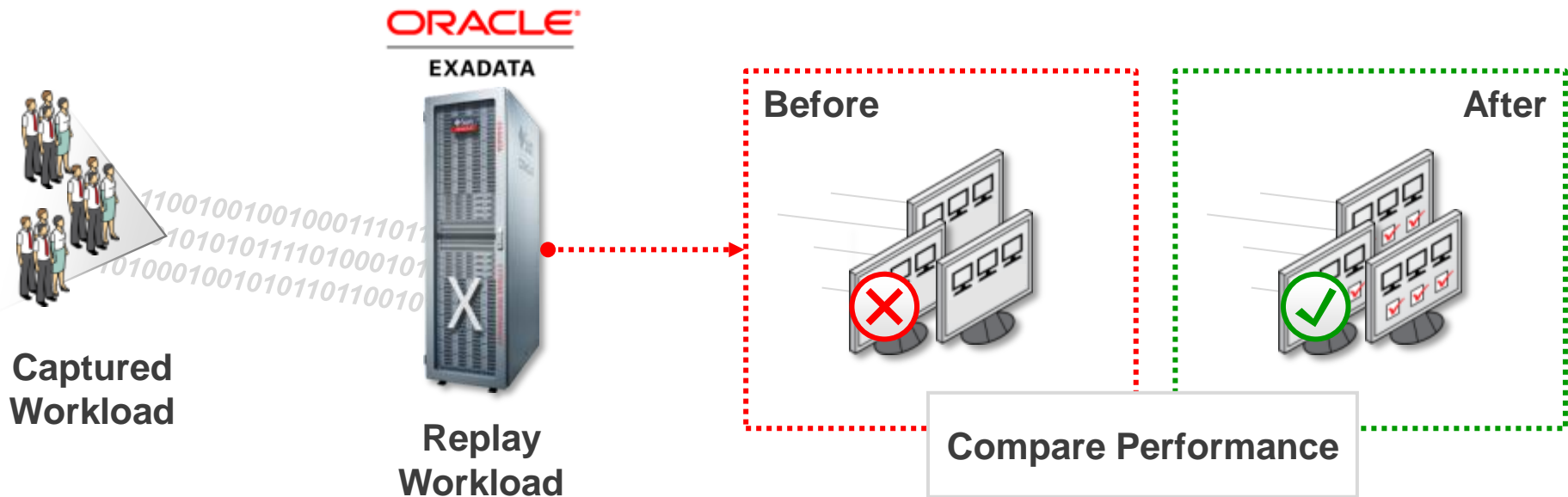
Testing Applications on Exadata

Solution: Real Application Testing



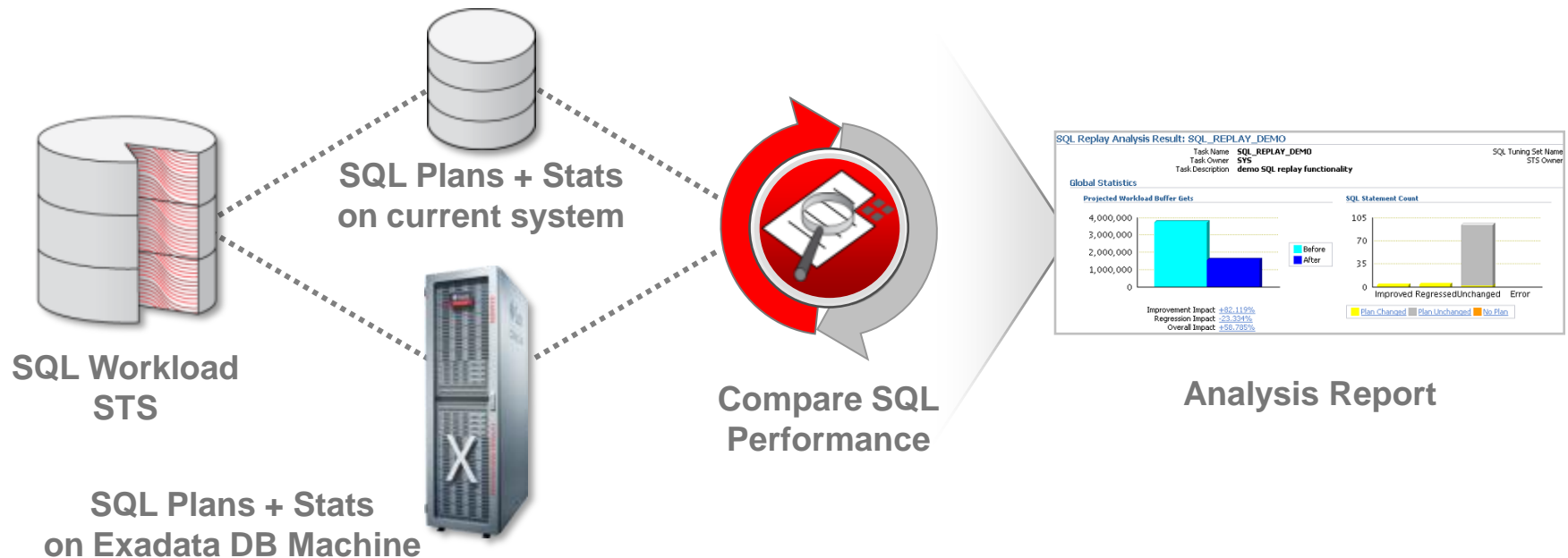
- Load test database infrastructure changes
- Capture complete production application workloads
- Replay in test environments
 - Throughput – Database Replay
 - Response time – SQL Performance Analyzer
- Reduce testing time and effort

Database Replay



- Database load and performance testing with real production workloads
- Workload characteristics such as timing, transaction dependency, think time
- Test and measure transaction throughput for improvements
- Identify application scalability and concurrency problems on new Exadata hardware
- Remediate issues pre-production for risk-free migration
- Supports migrations from Oracle Database 9i R2 and Oracle Database 10g R2

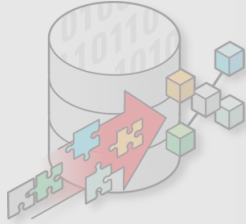
SQL Performance Analyzer (SPA)



- SQL unit testing for response time
- Test and measure Exadata impact on response time for real, production SQL statements
- Identify all plan changes and/or regressions
- Eliminate SQL regressions with SQL Tuning Advisor and SQL Plan Baselines
- For data warehouse workloads SPA Exadata simulation helps estimate I/O savings without provisioning Exadata hardware

Exadata Management

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Maintain



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- Support Automation
- Patch Automation
- Provision Secure Test Environments

Exadata Monitoring

- Exadata consists of multiple components—hardware and software
- All components have to be monitored

Database Grid

- 8 compute servers (1U)
- 64 Intel cores



InfiniBand Network

- Redundant 40Gb/s switches
- Unified server & storage network

Storage Grid

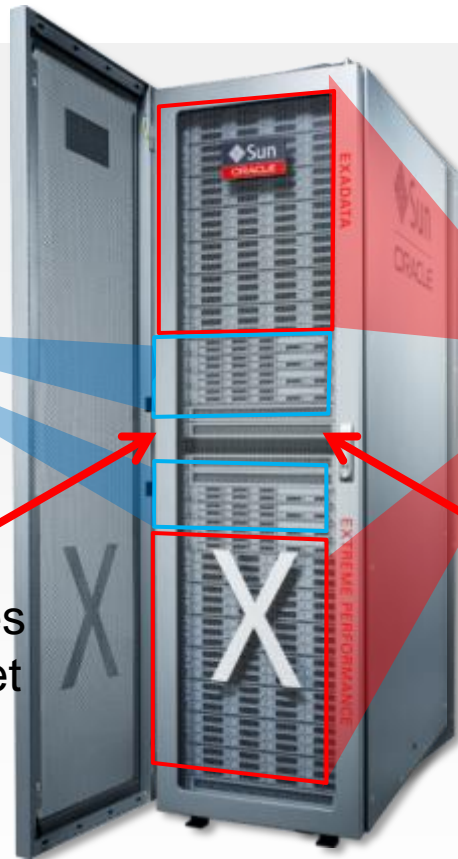
- 14 storage servers (2U)



Cisco Switch for Management Network

Highly Available Hardware

- PDU, KVM



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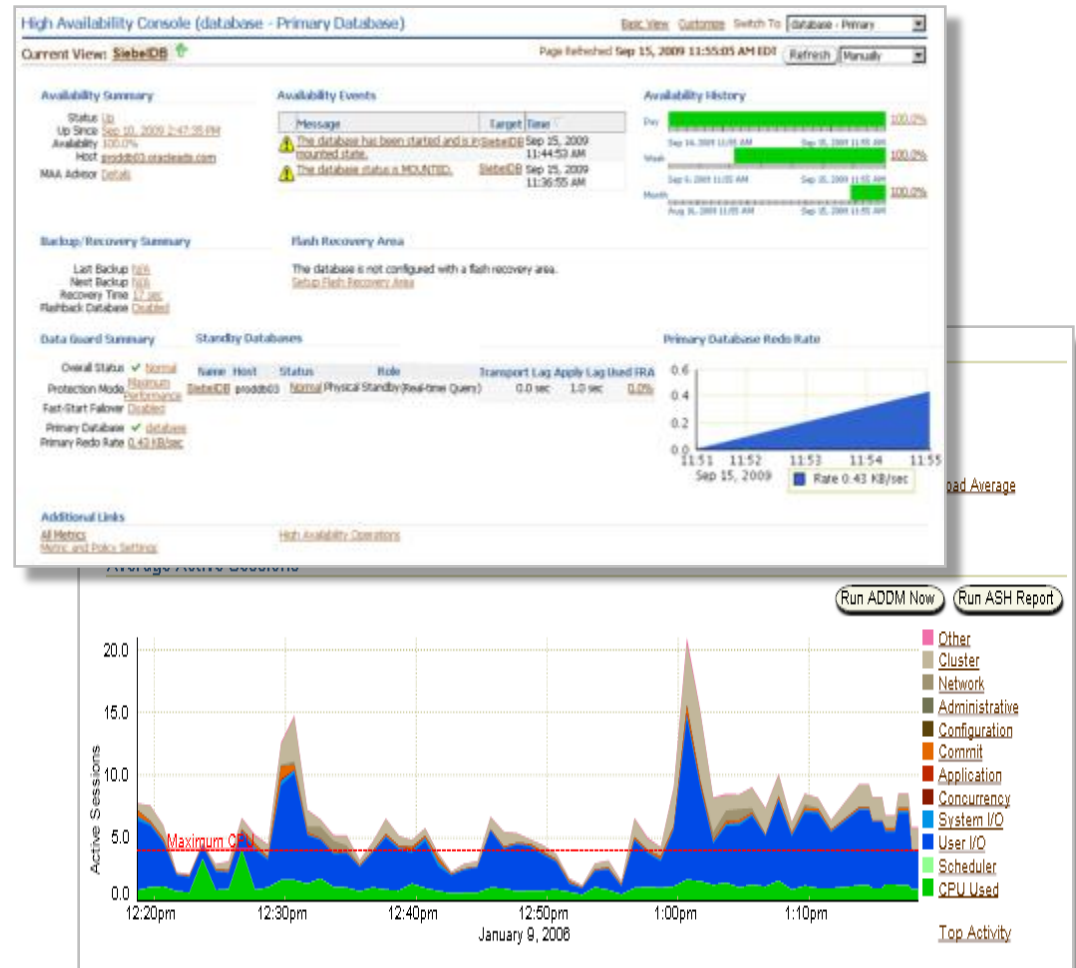
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Highly Available Hardware

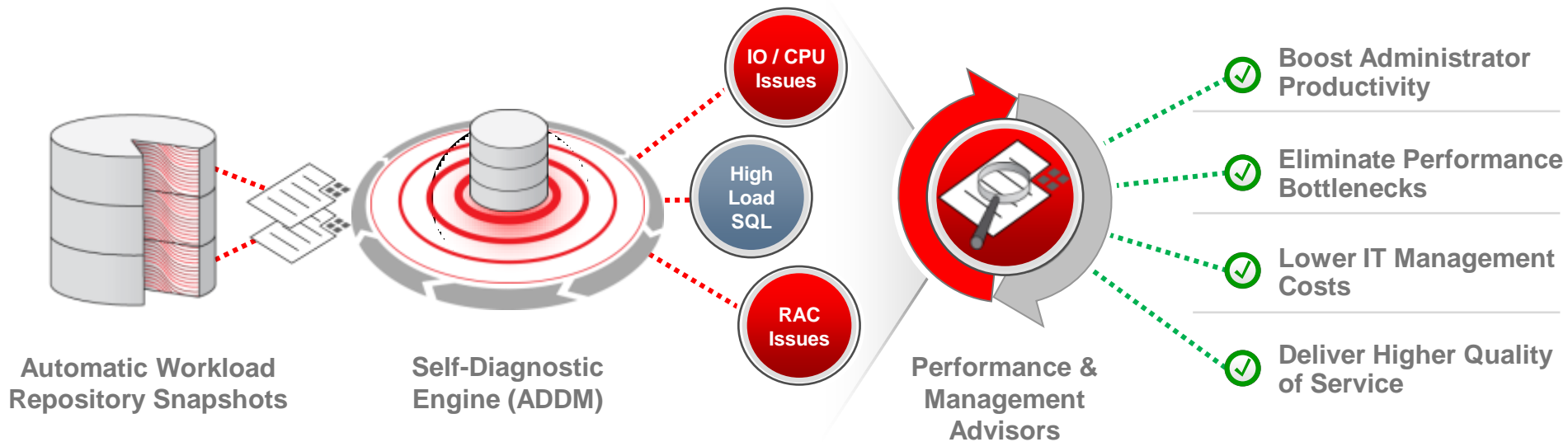
- PDU, KVM

Monitoring the Database Grid

- Out-of-box availability, space, performance and health monitoring
- HA Console for MAA configurations
- Non-intrusive, always-on, performance monitoring
- Smart alerting with adaptive thresholds

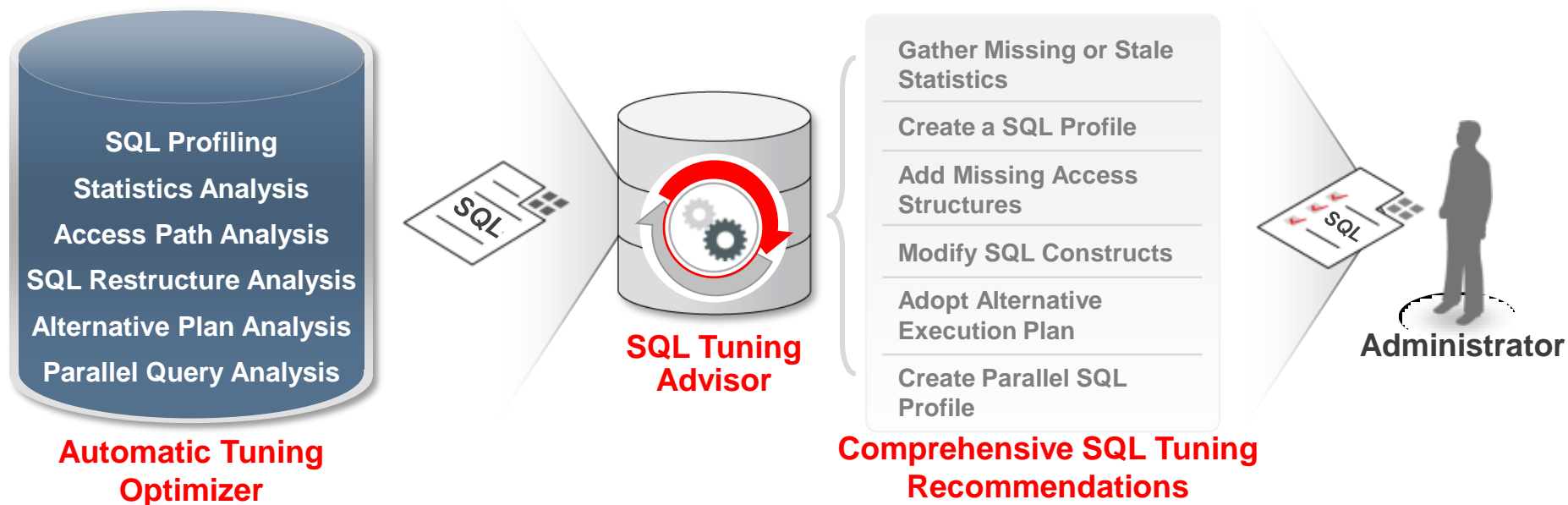


Performance Diagnostics and Tuning



- Oracle Database 11g's Automatic Performance Diagnostics helps maximize Exadata performance
- Top-down performance analysis using Automatic Workload Repository
- Real-time performance analysis with Automatic Database Diagnostic Monitor
- Resolve performance issues faster with drill-down root-cause analysis
- Classification tree based on Oracle performance tuning expertise
- Fully automates database performance diagnostics

Performance Diagnostics and Tuning



- Automatic SQL Tuning
 - Analyze high-load SQL → tune using SQL Profiles → implement improved SQL plans (optional)
- Comprehensive SQL analyses across 6 dimensions: statistics, SQL profiling, index, alternate plan, parallelization and SQL structure
- SQL Profiles tunes execution plan without changing SQL text
- Enables transparent tuning for packaged applications

Exadata Aware SQL Monitoring

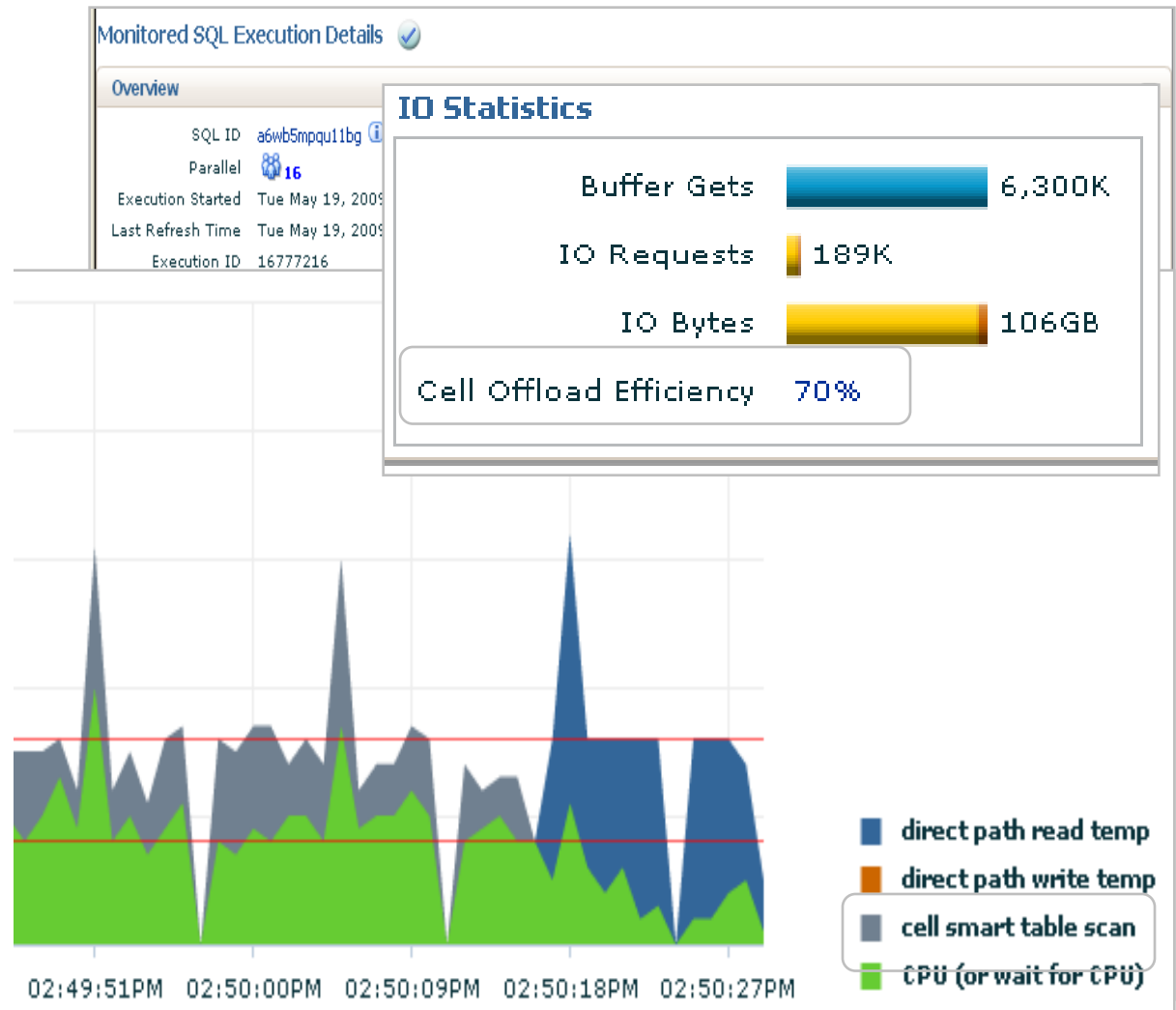
Real time monitoring of application SQL

I/O performance graphs with Exadata information

- Cell offload efficiency
- Cell smart scan

Rich metric data

- CPU
- I/O requests
- I/O throughput
- PGA Usage
- Temp Usage



Monitoring—Storage Grid

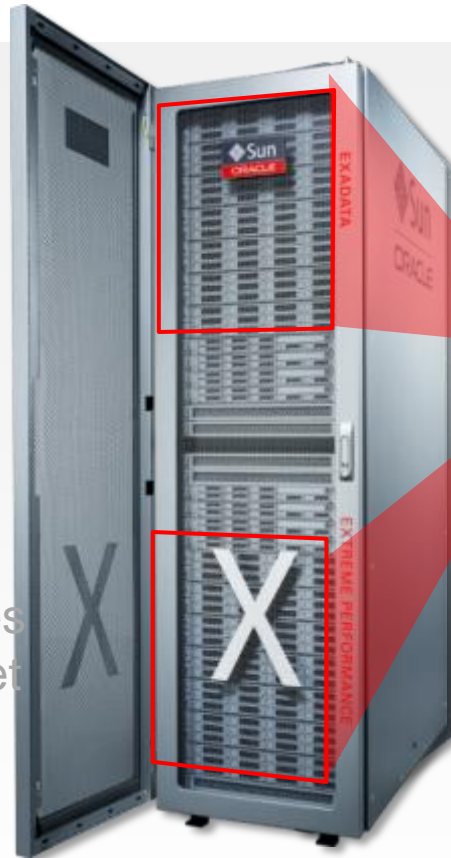
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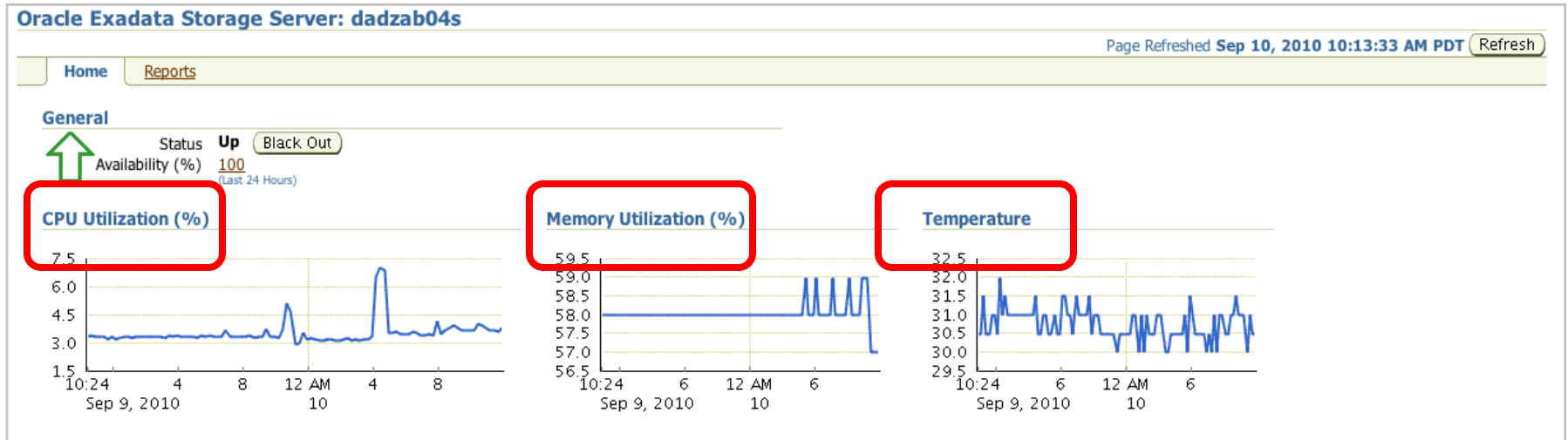


Cisco Switch for Management Network

Highly Available Hardware

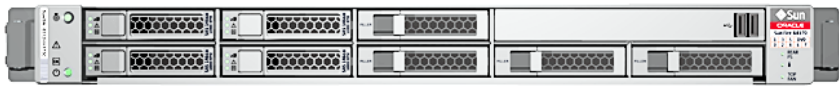
- PDU, KVM

Exadata Storage Cell Plug-in



- Home page shows critical components
 - Monitors data from MS
 - Storage cell email alerts
 - Notifications can also be done outside GC
 - 34 out-of-box reports provide monitoring breadth and depth

Storage Cell: What Do We Monitor?



- Hardware Failure and sensor state
- Storage Server Availability
- Disk I/O Errors
- Network Errors
- File System Free Space
- CPU and Memory Utilization

No third party monitoring agents are permissible on the Storage server.

Alerts From the Storage Cell

Oracle Exadata Storage Server: dscqicel13 > [All Metrics](#) > [Cell Alert](#) > [Alert Type/Alert Object/Alert Sequence Object](#) >

Metric Alert : Cell Alert

Page Refreshed May 24, 2010 6:35:33 PM PDT [Refresh](#)

Alert Details

Metric [Cell Alert](#)
Alert Type **Hardware**
Alert Object
Alert Sequence 99
Severity **✖ Critical** [Clear Alert](#)
Alert Triggered **May 18, 2010 11:38:58 AM**
Last Updated **May 18, 2010 11:38:58 AM**
Acknowledged **No** [Acknowledge](#)
Acknowledged By n/a
Message: **Alert Severity: critical Message: A field replaceable unit at /SYS/DBP/HDD1 has been removed from the system. Action: If the FRU is not intentionally removed, contact Oracle Support. .**

Metric Data

Last Known Value **Not available**
Last Collection Timestamp **Not available**

Metric Settings

☐ Warning Threshold **INFO**
☒ Critical Threshold **Critical**
Occurrences Before Alert **1**

Actions

[Edit Thresholds](#)

Updates

New Comment [Add Comment](#)

Timestamp ▾	Type	Administrator	Message
May 18, 2010 11:38:58 AM	✖	<SYSTEM>	Alert Severity: critical Message: A field replaceable unit at /SYS/DBP/HDD1 has been removed from the system. Action: If the FRU is not intentionally removed, contact Oracle Support. .

Monitoring—InfiniBand Network

Database Grid

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InfiniBand Network

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Storage Grid

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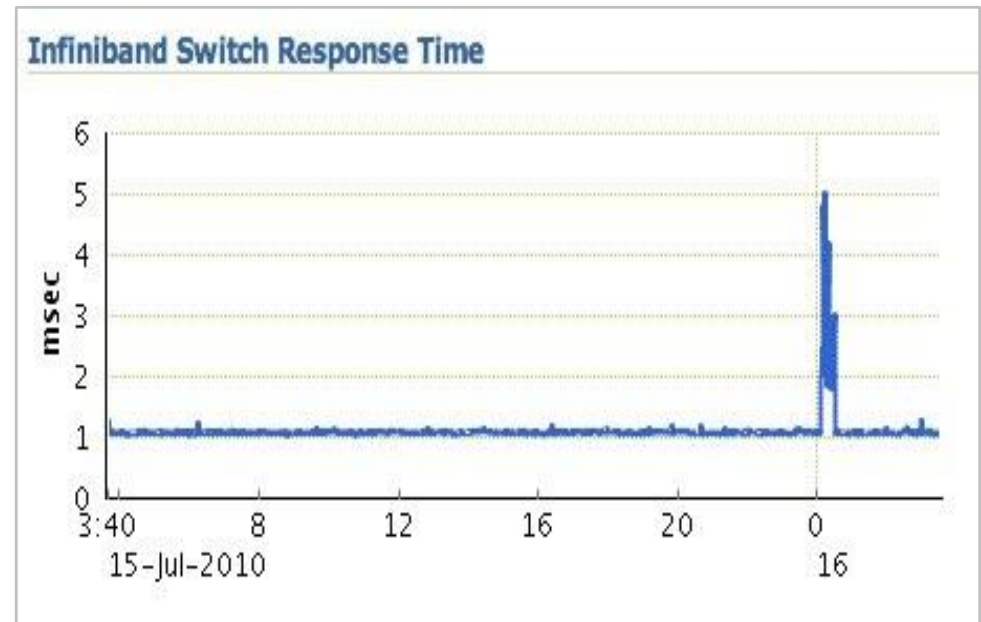
Cisco Switch for Management Network

Highly Available Hardware

- PDU, KVM

Infiniband Switch Monitoring

- Monitors management network interface pulse
- Can provide alerting based on failure of service
- Aggregate sensor switch health monitoring provides early warning to failures, such as
 - Temperature out of range
 - Voltage
 - Fan failure



Monitoring—Cisco Switch, KVM, PDU

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InfiniBand Network

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Storage Grid

- 14 storage servers (2U)



Cisco Switch for Management Network

Highly Available Hardware

- PDU, KVM

Database Server ILOM, Cisco Switch, KVM, Monitoring



Common metrics monitored

- Power supply failure
- Fan failure
- Temperature out of range

Specific metrics monitored

- Cisco Switch
 - Configuration change tracking and reporting
 - Unauthorized SNMP access
- Keyboard, Video, Mouse (KVM)
 - Server connected to KVM added/removed, powered on/off

Power Distribution Unit Monitoring

- Measures power consumption used by Exadata components and provides early warning of impending thresholds
- Monitors electric current being used by equipment connected in Exadata rack



Exadata Monitoring

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InfiniBand Network

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Storage Grid

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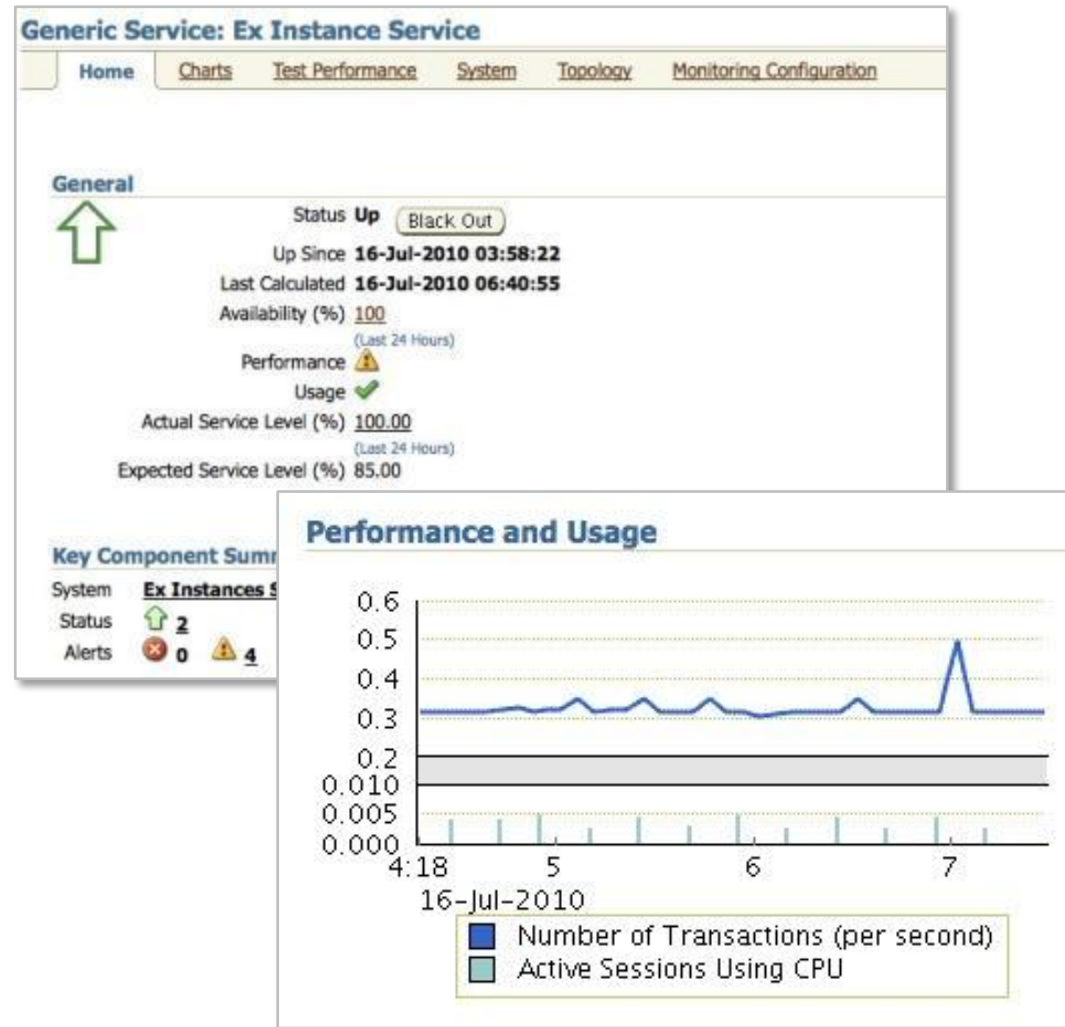
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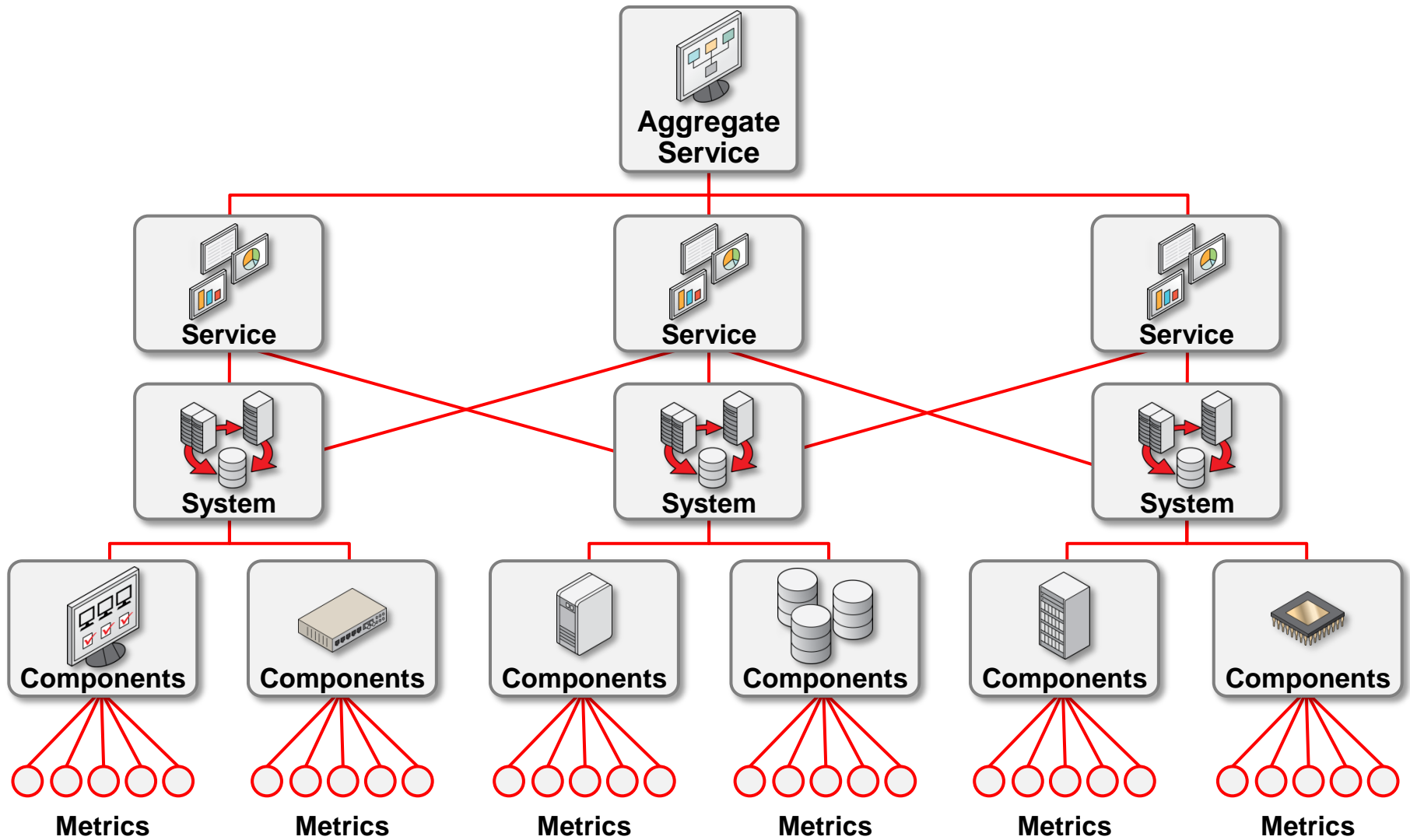
Monitor Exadata Database Machine as One

Exadata Service Monitoring

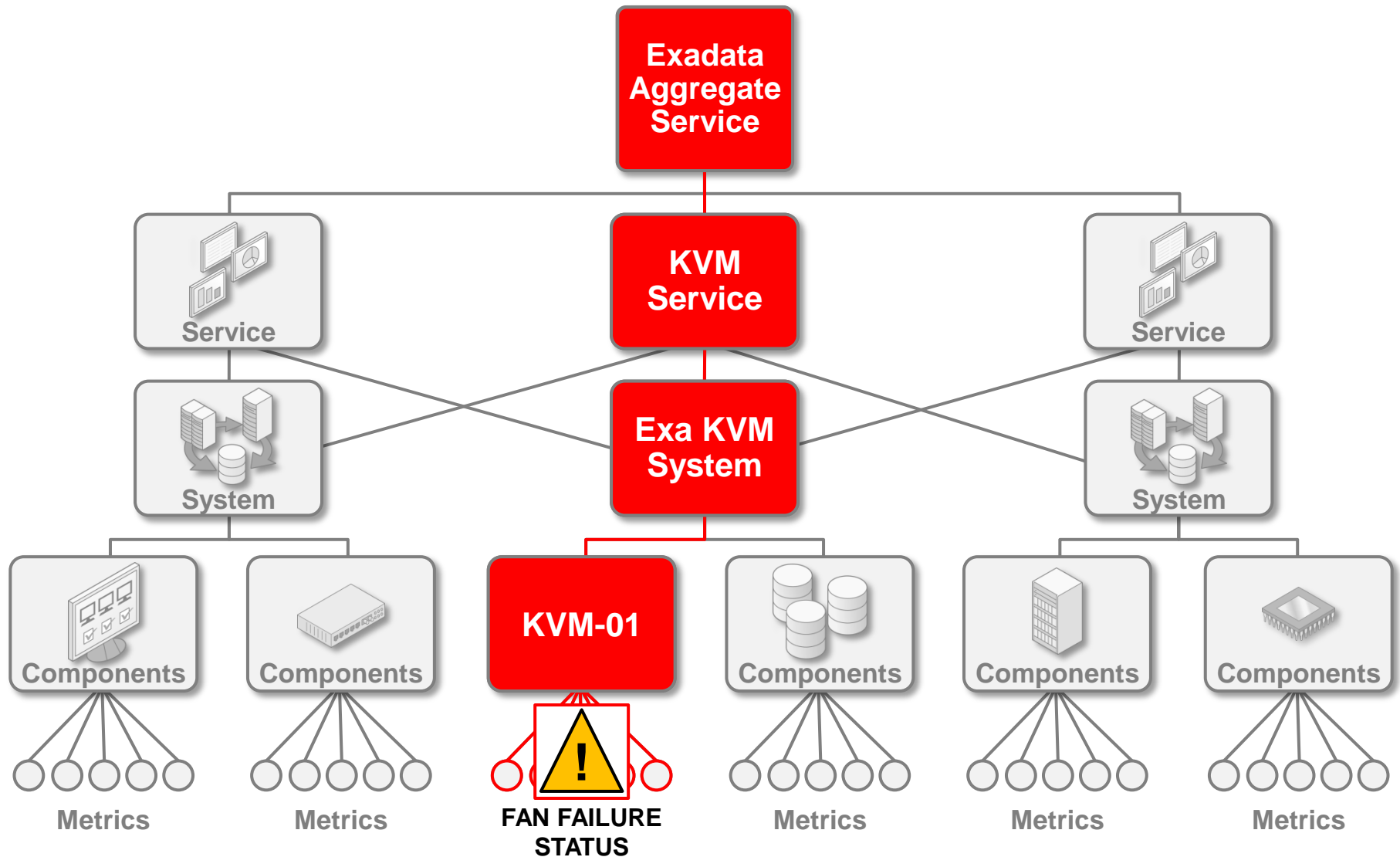
- Service view of Exadata components
- Detailed charts of key performance and usage information
- Service model and topology displaying relationships between components
- Tests can validate service availability from service endpoints



Service Topology



Exadata Aggregate Service



Exadata Service Dashboards

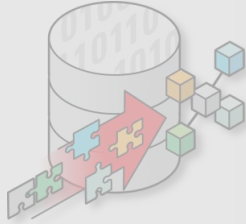
Monitor Many as One



- Service dashboard for executives and business owners
- Many components reporting up to one Exadata Service

Exadata Management

Deploy



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- Identify and Resolve Issues

Manage



- Monitoring
- Diagnostics and Tuning
- Administration

Maintain



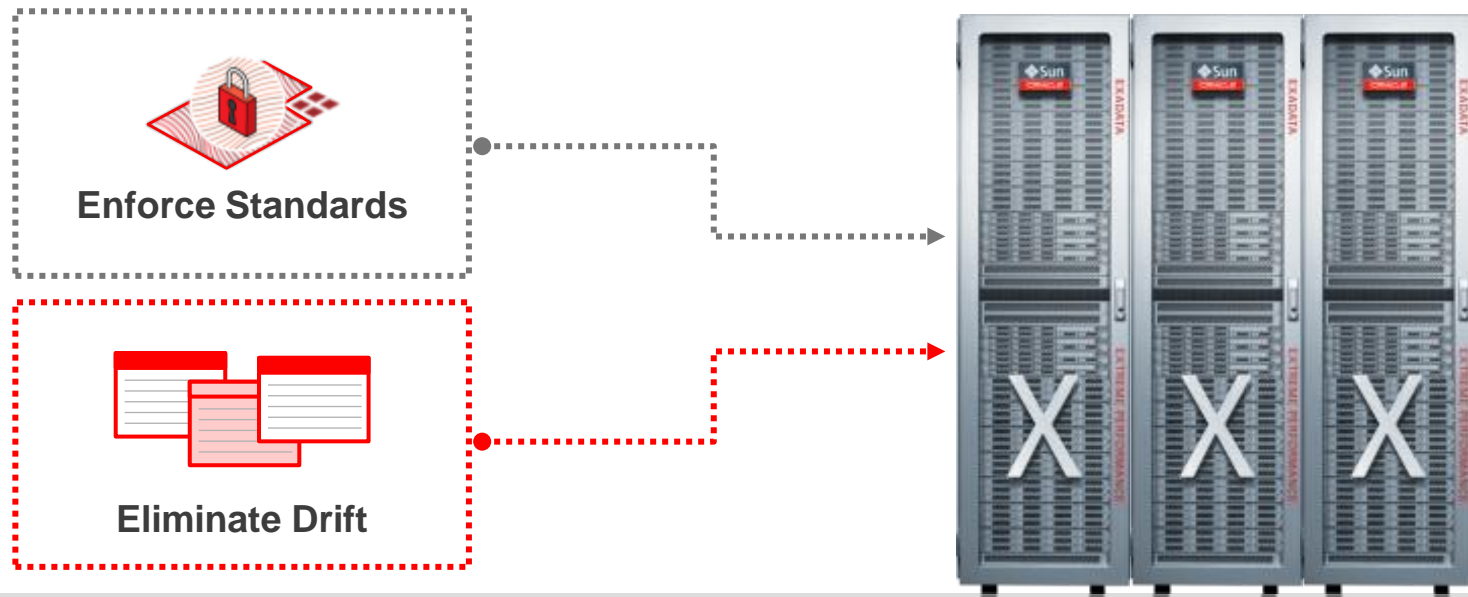
- **Configuration Compliance**
- **Support Automation**
- **Patch Automation**
- **Provision Secure Test Environments**

Comprehensive Configuration Management

- Rich Configuration Collection
 - Know what you have
- Search for configuration properties
- Detect drifts through comparison
 - Between servers
 - Against golden configurations
- Track and audit configuration change history
 - Who changed what and when
- Enforce best practices through Policies
 - Oracle provided and Admin defined



Maintain Configuration Management



Automated Configuration Management

- Enforcement of Exadata configurations using Policies
- Detection of configuration drifts and changes
 - From defined golden standards
 - Between storage servers and between database machines
- Detect database targets that do not have required patches

Maintain Configuration Management

Example

- Identify configuration differences between two Exadata Storage Servers
 - Why does one server not send email alerts?
- Comparing two database machines
 - Why is one behaving differently from other—archiving turned off

The screenshot displays the Oracle Enterprise Manager Grid Control 11g interface. The main content area is titled "Compare: Oracle Cell Configuration". It shows two configurations being compared: "First: dscbas01s" and "Second: dscbas02s". Both configurations are for hosts "dscbas01.us.oracle.com" and were collected on "15-Jul-2010 17:23:55" and "15-Jul-2010 17:24:00" respectively.

Under the "Summary" section, several configuration items are listed with expand/collapse icons: Oracle Cell Configuration, Cell Griddisk Configuration, Cell Celldisk Configuration, Cell LUN Configuration, Cell Physicaldisk Configuration, and Cell IORM Configuration.

The "Oracle Cell Configuration" section is expanded, showing a table of attributes. The table has columns for "Result /", "Attribute", "dscbas01s", and "dscbas02s". The attributes listed are Name, SMTP Server, SMTP Port, and IP Address 1. The SMTP Server attribute for dscbas01s is "stbeehive.oracle.com", while for dscbas02s, it is missing, indicated by a red "X" and the text "Configuration Data Missing" with a red arrow pointing to the empty cell.

Result /	Attribute	dscbas01s	dscbas02s
X	Name	dscbas01s	dscbas02s
X	SMTP Server	stbeehive.oracle.com	Configuration Data Missing
X	SMTP Port	465	
X	IP Address 1	192.168.72.102/22	192.168.72.103/22

Secure Test System Deployment

Oracle Data Masking



- Deploy secure test system by masking sensitive data
- Sensitive data never leaves the database
- Extensible template library and policies for automation
- Sophisticated masking: Condition-based, compound, deterministic
- Integrated masking and cloning
- Leverage masking templates for common data types
- **NEW:** Masking of heterogeneous databases via database gateways
- **NEW:** Command line (EMCLI) support for data masking actions

Automating Patching

Fully Integrated with My Oracle Support

ORACLE®
MY ORACLE SUPPORT



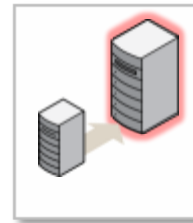
Analyze



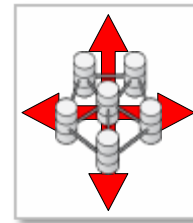
Patch



Test



Stage



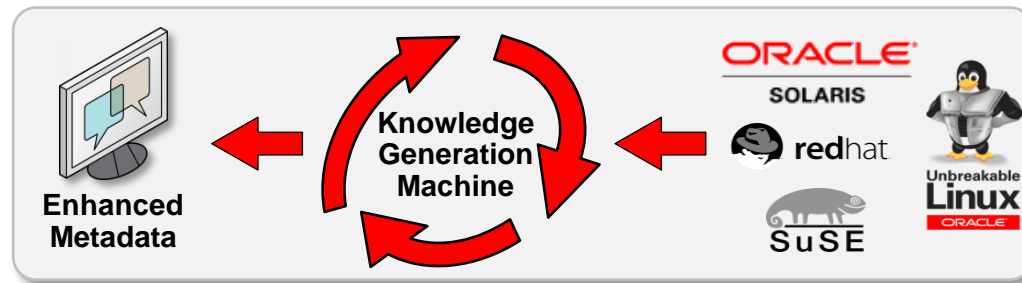
Provision



Report

- Proactive advisories, recommendations, and analysis
 - One-off patches, patch set updates, and critical patch updates
- Zero downtime for patching
- Integrated patch management & deployment automation
- Patch intelligence and community
- Streamlined conflicts and merge patch process

OS Patch Management Using Ops Center



- Central Repository for iso images
- Unique knowledge base, analysis and How to Install
- Uses plans, profiles and policy based Patch Management
- Track and audit change history
- Audit patch and configuration compliance
- Protect RPM by blacklisting
- Only for use on the Compute Nodes



RAID, Disk, and ILOM Firmware Management

- Leverage Ops Center to automatically download the required firmware from Oracle
- Run compliance reports to see if the environment is up to date
 - Take Action only if it is the Compute Node
- Ops Center Uses Both Service Processor and OS level APIs to determine Disk Health
 - Leverages and Installs the *hwmgmt* daemon
 - *hwmgmt* Sends Event information to Ops Center via the Service Processor



Ops Center Integration with Enterprise Manager Application-to-Disk Visibility

- Manage hardware in context of database and applications
- Facilitate communication between DBAs and Sysadmins
- Information flow from Ops Center to Grid Control
- Expose Ops Center Notifications as Enterprise Manager alerts

The screenshot displays the Oracle Enterprise Manager 10g Grid Control interface. The top navigation bar includes links for Home, Targets, Deployments, Alerts, Compliance, Jobs, and Reports. The main content area is titled 'Host: xvm-t2000-2' and shows the latest data collected from the target on Mar 3, 2010 at 6:52:57 PM PST. The interface is divided into several sections: General, Configuration, and Alerts.

General

- Status: Up (with a green up arrow icon)
- Last Booted: Before 107 Days 10 Hours (Nov 16, 2009 8:51:00 AM (UTC-08:00))
- Logons: 1
- Availability: 100% (Last 24 Hours)
- Buttons: Black Out, View Current Users

Configuration

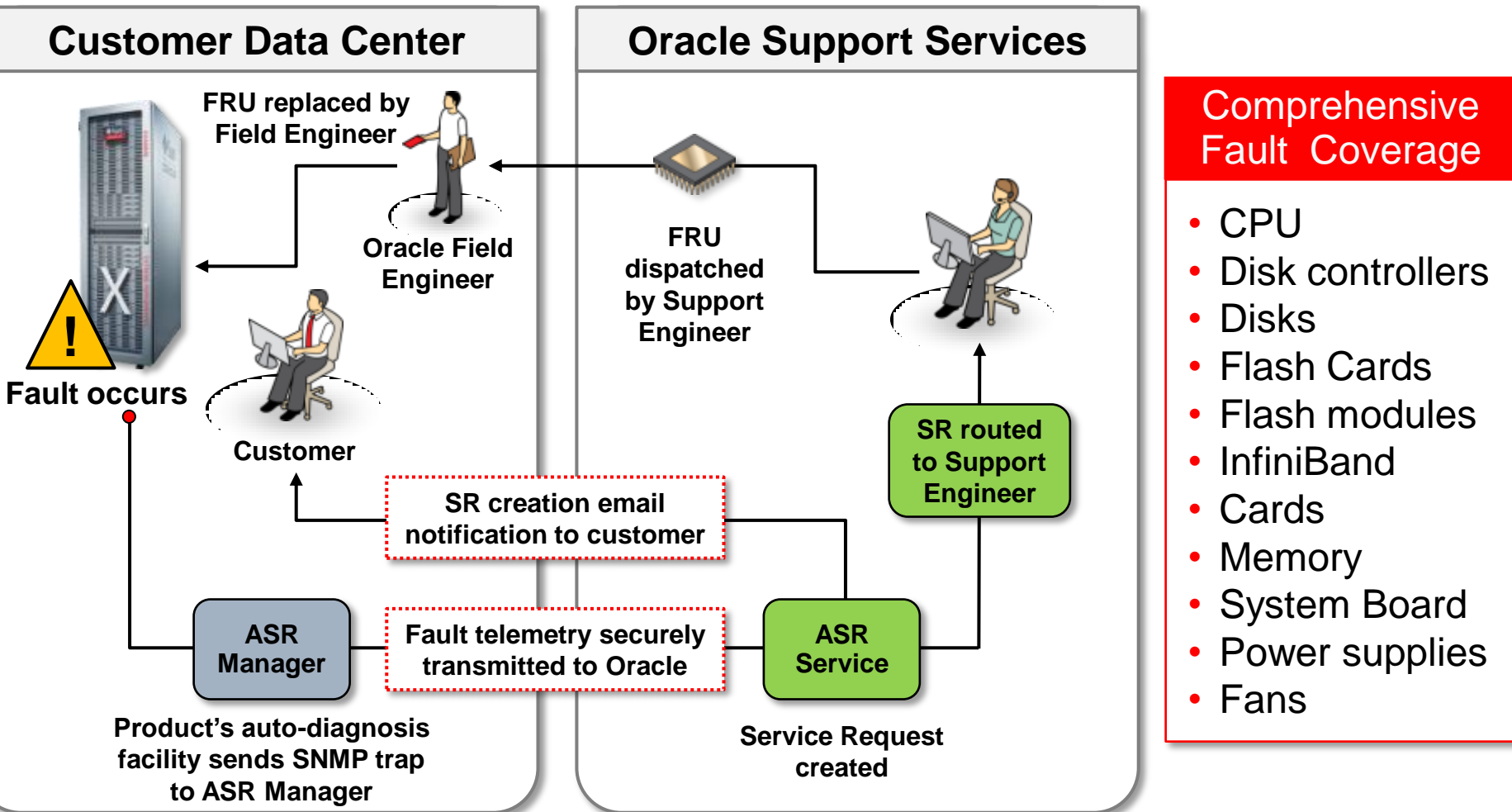
- Operating System: SunOS 5.10 Generic_120011-14 (64-bit)
- Hardware Platform: Sun Fire T200
- IP Address: 10.5.155.50
- CPUs: 4
- Memory Size (MB): 8184
- Local File Systems (GB): 59.44

Alerts

Metric Name	Severity	Message	Alert Triggered/Value	Last Checked
Generic_Alert for 1250:Ops Center System Issue:::	Warning	Server Threshold high. (30045)Attribute /SYS/MB/T_AMB with value 56.0 Exceeded Threshold of Type UPPER_CRITICAL (xvm-t2000-2) : The alert was triggered from Ops Center at time: Mar 03, 2010 18:43:22 PM PST	Mar 3, 2010 N/A 6:51:50 PM	Mar 3, 2010 6:51:50 PM
Filesystem Space Available (%) for /	Warning	Filesystem / has 19.64% available space, fallen below warning (20) or critical (5) threshold.	Feb 14, 2010 15:22 1:47:31 AM	Mar 3, 2010 3:47:31 PM

Maintain

Fault Diagnostics: ASR Flow



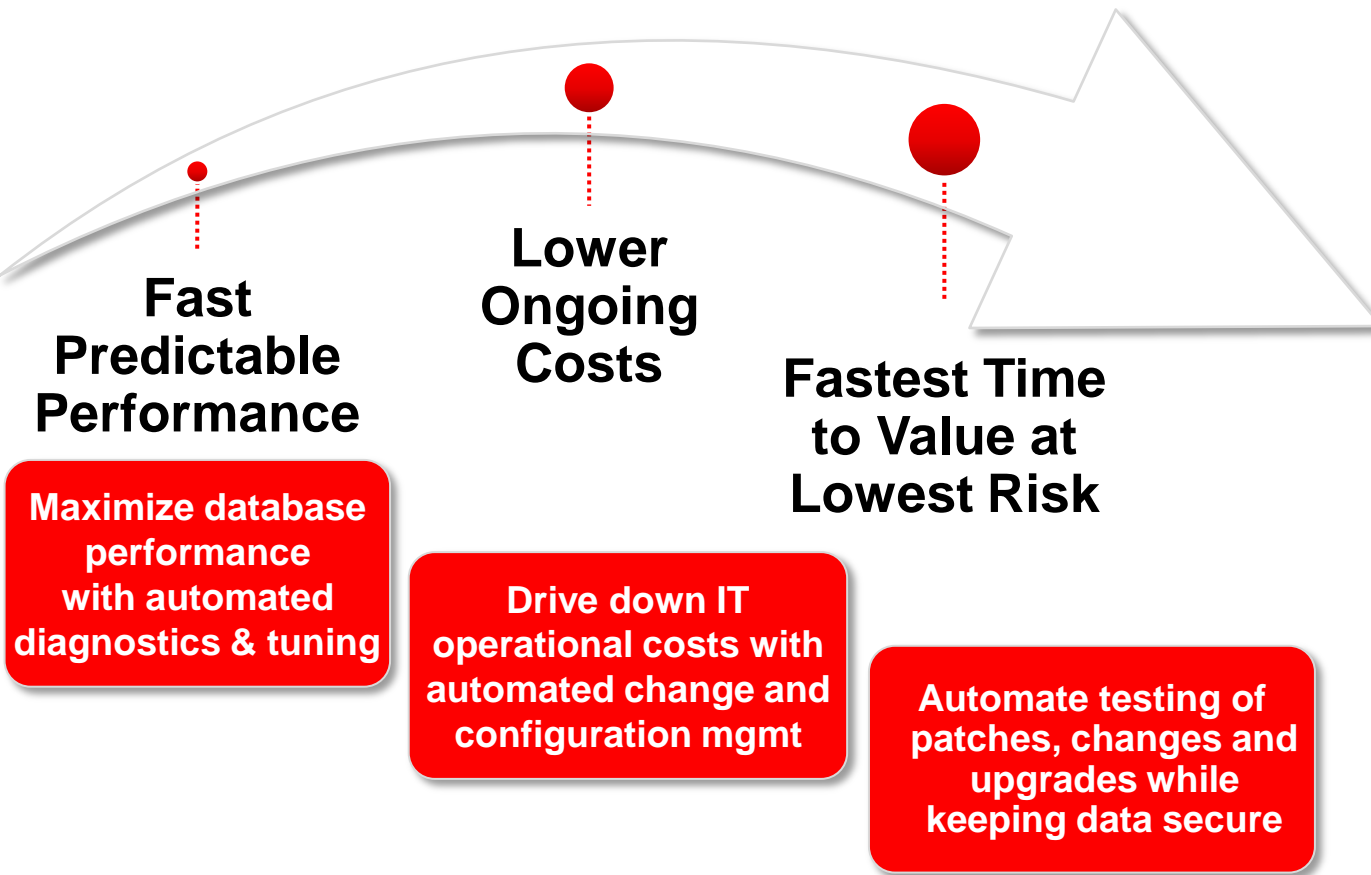
Maintain

Fault Diagnostics: Call Home & My Oracle Support Integration

- **Automatically file support requests for:**
 - Database problems via Support Workbench
 - Hardware faults via Automatic Service Request (ASR)
- **Faster resolution of problems:**
 - Service requests filed electronically and securely with Oracle
 - Configuration details and related incidents are packaged with the request
 - Closed loop remediation of database problems using Patch Automation
 - Results in improved availability, and less downtime
- **Proactive problem avoidance:**
 - Proactive advisories from My Oracle Support
 - Collects & validates multiple patches via 'Patch Plan' for potential conflicts

Oracle Exadata Database Machine

Extreme ROI Platform



Oracle Enterprise Manager

Proven Solution. Trusted by Customers.



Saves weeks on application testing time



Saves 80% time and effort for managing Databases



Ensures seamless user experience for 50,000,000 users



90% of IT issues addressed before they impact users



Drives asset utilization up by 70%



Cuts configuration management effort by 90%



Saves \$1.9 million with Oracle Enterprise Manager



Saves \$170,000 per year with Oracle Enterprise Manager



Replaces manual tools with automation; saves time by 50%



Reduces Database testing time by 90%



Reduces provisioning effort by 75%



Deploys SOA infrastructure 92% faster



Cuts application testing from weeks to hours



Reduces critical patching time by 80%



Delivers 24/7 uptime with Oracle Enterprise Manager

Oracle Enterprise Manager 11g Resource Center

Access Videos, Webcasts, White Papers, and More

Oracle.com/enterprisemanager11g

The screenshot displays the Oracle Enterprise Manager 11g Resource Center website. At the top, the Oracle logo and '11g' are prominently featured. Below this, a navigation bar includes links for Home, Solutions, Launch Webcast, and Events and Community, along with a 'Stay Connected' section with social media icons. The main content area is divided into two columns. The left column features a large image of a person interacting with a grid of small images, with the text 'ORACLE 11g Business-Driven IT Management' overlaid. The right column contains a section titled 'Watch the Launch Event Webcast' with the subtitle 'Introducing Oracle Enterprise Manager 11g' and a list of presenters: Charles Phillips, President, Oracle, and Richard Sarwal, Senior Vice President, Oracle. A 'WATCH NOW' button is positioned below the list. Below the main content area, there are three columns of text. The first column, titled 'EMPOWER IT. DRIVE BUSINESS VALUE', lists 'Integrated Application-to-Disk Management', 'Business-Driven Application Management', and 'Integrated Systems Management and Support'. The second column, titled 'MAKE THE RIGHT IT DECISIONS', lists 'Improve customer satisfaction, increase IT efficiency. Achieve ROI of up to 140% in three years.' and 'Get the ROI reports, customer case studies, white papers, and videos to help you make the right IT investments.' The third column, titled 'PUT YOUR IT MANAGEMENT TO THE TEST', lists 'Take the assessment quiz that measures the effectiveness of your current management practices.' and 'Discover where and how you can achieve greater business value and exceptional IT efficiency.' Each of these three columns has a corresponding 'Access Now' or 'Start Now' button. At the bottom of the page, there is a footer with the text 'SOFTWARE. HARDWARE. COMPLETE.' and a navigation bar with links for About Oracle, Contact Us, Legal Notices, Terms of Use, and Your Privacy Rights.

ORACLE[®] **11g** Business-Driven IT Management

Watch the Launch Event Webcast
Introducing Oracle Enterprise Manager 11g
Presented by:
Charles Phillips, President, Oracle
Richard Sarwal, Senior Vice President, Oracle

WATCH NOW

EMPOWER IT. DRIVE BUSINESS VALUE
Increase business agility and efficiency with integrated IT management. Only Oracle gives you the power of:
[Integrated Application-to-Disk Management](#)
[Business-Driven Application Management](#)
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