S316976: Mission Accomplished: Virtualization
Powered by Oracle Enterprise Manager

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Safe Harbor Statement

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Mission Accomplished: Virtualization powered by Oracle Enterprise Manager

Virtualization is incomplete without a proper management tool. Unfortunately, most management solutions do not provide a holistic application-centric view, thereby limiting the utility of virtualization. In this session, learn how Enterprise Manager can manage both Sparc and x86 virtual infrastructure from a top-down perspective.
Program Agenda

• Enterprise Manager Product Strategy
• Oracle Server Virtualization Technologies
• Managing Oracle VM for SPARC
• Managing Oracle VM for x86
• Foundation for Cloud Computing
• Customer Success
• Q&A
Business-Driven IT Management

User Experience

Business Transactions
- WEB PORTAL
- PRODUCT CATALOG
- ORDER ENTRY
- OTHER SERVICES

Business Users and Customers

Business-Driven Application Management
- Understand business needs
- Manage from business perspective

Integrated Application-to-Disk & Cloud Management
- Eliminate management silos
- Create agile IT for dynamic business

Integrated Systems Management & Support
- Proactively identify and fix problems
- Maximize business productivity

Services Cloud
- Oracle Support

Integrated Application-to-Disk and Cloud Management

APPLICATIONS
MIDDLEWARE
DATABASES
SERVERS
STORAGE
Oracle: Industry’s Most Complete Virtualization Portfolio

SERVER VIRTUALIZATION
- Oracle VM Server for x86
- Oracle VM Server for SPARC
- Solaris Containers

STORAGE VIRTUALIZATION
- Exadata
- ASM
- Storage Connect
- Open Storage

DESKTOP VIRTUALIZATION
- Virtual Desktop Infrastructure
- Sun Ray
- Secure Global Desktop
- VirtualBox
## Server Virtualization Technologies

### Multiple choices from Oracle

<table>
<thead>
<tr>
<th>Technology</th>
<th>Benefits</th>
</tr>
</thead>
</table>
| Oracle VM for x86           | ✓ Virtualize Commodity Servers  
|                             | ✓ Consolidate  
|                             | ✓ Migrate Workloads  
|                             | ✓ OS-level Isolation  
|                             | ✓ Archive Application Environments                                      |
| Oracle VM for SPARC         | ✓ Highly Scalable technology  
|                             | ✓ Consolidate  
|                             | ✓ Complete hardware-level application isolation  
|                             | ✓ Resize Domains without rebooting                                       |
| Solaris Containers          | ✓ Single OS to manage and patch  
|                             | ✓ Largest UNIX/Linux OS Install base                                     |
Server Virtualization Management
Delivered via Enterprise Manager

EM Applications Management
(provided via Enterprise Manager Grid Control)

Oracle VM for x86 Management
(provided via Enterprise Manager Grid Control)

Oracle VM for Sparc Management
(provided via Enterprise Manager Ops Center)

Hardware Management
(provided by Enterprise Manager Ops Center)
## Virtualization Management

**Existing Challenges and High Level Solution requirements**

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Solution Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Unmanaged virtualization can lead to over-saturation and throttling of physical resources</td>
<td>• Comprehensive Monitoring and Performance management</td>
</tr>
<tr>
<td>• Ever changing business requirements need provisioning or rebalancing of resources in short order</td>
<td>• Agile Provisioning and Resource Management</td>
</tr>
<tr>
<td>• Over provisioning can lead to server sprawl</td>
<td>• Configuration Management and Change Control</td>
</tr>
<tr>
<td>• Top-down dependency mapping resulting in challenges in impact analysis and problem resolution</td>
<td></td>
</tr>
</tbody>
</table>
Managing Oracle VM for SPARC using Oracle Enterprise Manager Ops Center
Monitoring and Performance Management
For Solaris Containers and Oracle VM Server for SPARC

- Monitors and manages
  - Oracle VM for Sparc (LDOMs)
    - Control Domain Solaris 10 OS 5/09
    - Guest OS Solaris 10 8/07 and later
    - LDOM version 1.2
  - Zones Solaris 8/9/10 and later
- Monitoring of virtual resource
  - CPU, memory, storage, etc.
- Monitoring of physical hardware
  - Aggregated monitoring for power consumption to aid VM placements
- Alerts can published to Grid Control using the connector
Integration with Enterprise Manager Grid Control

- Information flow from Ops Center to Grid Control
- Expose OC Notifications as GC alerts
Provisioning and Resource Management
For Solaris Containers and Oracle VM Server for SPARC

• Lifecycle management of virtual machines
  - Create, delete, configure, etc.
• Operating system Provisioning for Bare Metal servers and guest VMs
• Resource management
  - Resource pools
  - Dynamic allocation within resource pools
• Workload migration
  • cold migration for Oracle Solaris Containers and warm migration for Oracle VM Server for SPARC
Workload Migration
For Solaris Containers and Oracle VM Guests
Configuration Management
For Solaris Containers and Oracle VM Server for SPARC

- Automated discovery of servers and VMs
  - Tracking of version and patch levels
  - Prevents virtual server sprawls
- Configuration comparisons between two environments
- Automated Patch Management using Oracle’s Knowledge Services
  - Compliance report for Patching against a baseline
Upcoming Enhancements:

- Auto deployment of LDOMs
- Easier Zone Cloning for conversion into greenfield
- More Agnostic Storage Choices
- Support of Complex Network Topologies
- 7-series Storage Integration
- LDOM Configuration
  - More tunables on Dom0
  - Vdisk attachments
- Increased Monitoring and Alarming
Managing Oracle VM for x86 using Oracle Enterprise Manager Grid Control
## Comparison of Oracle’s Management Tools

### For Oracle VM-x86 Management

<table>
<thead>
<tr>
<th>Feature</th>
<th>Oracle VM Manager</th>
<th>Enterprise Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scope</strong></td>
<td>Hypervisor Management</td>
<td>Application to Disk Data Center Mgmt</td>
</tr>
<tr>
<td>Virtual Server and VM Monitoring</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>VM (ISO/PXE/Template) provisioning</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Configuration comparison, tracking, policies</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Guest Patching</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Live Migration</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Target/Process/Log Monitoring for Guests</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Alerts, Notifications and integration with other monitoring frameworks</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Reporting</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Customers get excellent flexibility to start small and then scale up for large scale production usage.
Monitoring and Performance Management
For Oracle VM for x86

- Supports Oracle VM 2.1.2 and 2.2
- Monitoring of guest VMs and underlying virtual servers
  - CPU, Memory, storage, network
  - Deep log and process monitoring for guests
- Agentless (remote) monitoring of the hypervisor/VM Server
  - Best practice: 32 virtual servers/agent
- In-context drilldown and aggregation
  - E.g. VM as part of a Siebel system
- Integrated with notification system for lights out monitoring
  - Configurable metric thresholds

![Monitoring and Performance Management](image)
Provisioning and Resource Management
For Oracle VM for x86

• Bare Metal Provisioning of Virtual Machines
  • Provisioning of Hypervisor on bare metal hardware
  • Guest creation and deletion

• Support for multiple guest provisioning methods
  • ISO, PXE, Virtual Templates

• Template driven provisioning of entire stack
  • Deployment of templates created on-premise by
  • Oracle provided templates for Database, WLS, Siebel, EM…

• Live migration
  • Automatically migrate for maintenance and workload balancing
  • Can be used for minimizing planned maintenance time for hardware
Provisioning and Resource Management
For Oracle VM for x86

Template driven provisioning in minutes

- Download templates from Oracle
  - Pre-built, pre-configured VM
  - Complete App, Middleware, DB installation
    - Siebel CRM, Database 11g, Weblogic Server, ……
Configuration Management
For Oracle VM for x86

- Hierarchical representation of servers and VMs
- Helps understand dependency and hardware downtime impact
- Prevents virtual server sprawls
- Configuration comparisons between two environments
- History tracking: Who changed, What and When
- Automated Patch Management using Unbreakable Linux Network
- Support for YUM and Up2Date
Oracle: Application Aware Virtualization
Full Stack Data Center Virtualization

• Most comprehensive
• Fully tested with applications
• Designed for full stack deployments
• Integrated, full stack management
• Integrated support

Taking you beyond consolidation…

Oracle provides the most COMPLETE solution
Foundation for Oracle Cloud Platform

Platform as a Service

Shared Services
- Integration: SOA Suite
- Process Mgmt: BPM Suite
- Security: Identity Mgmt
- User Interaction: WebCenter
- Application Grid: WebLogic Server, Coherence, Tuxedo, JRockit
- Database Grid: Oracle Database, RAC, ASM, Partitioning, IMDB Cache, Active Data Guard, Database Security

Infrastructure as a Service
- Operating Systems: Linux, Solaris
- Virtualization: Oracle VM, LDOMs
- Servers
- Storage

Cloud Management

Enterprise Manager
- Application Performance Management
- Lifecycle Management
- Configuration Management
- Application Quality Management
- Ops Center
- Physical & Virtual Systems Management
Cloud Management Roadmap

3rd Party Apps
Oracle Applications
Custom Apps

Platform as a Service
Oracle Fusion Middleware
Oracle Database

Infrastructure as a Service

Cloud Management

Enterprise Manager
- Application Performance Management
- Lifecycle Management
- Configuration Management
- Application Quality Management

Ops Center
- Physical & Virtual Systems Management

Self-Service
Chargeback
Resource Scheduling
Capacity Planning
Customer Success
Agenda

• Introduction to National Ignition Facility (NIF)

• Our Application and Infrastructure Environment

• Our Challenge

• Oracle Enterprise Manager Solution

• Conclusion
Introduction to NIF

NIF - the world’s largest and highest–energy laser

- Located in California
- Managed by Department of Energy (DoE)
- https://www.llnl.gov/

Capable of creating temperatures and pressures similar to those that exist only in the cores of stars and giant planets and inside nuclear weapons.
Instruments Capture Experimental Results in Semi-Structured Formats (HDF5)
Grid Applications:
Scientific Analysis Is Modeled as a Workflow
Grid Applications: Implemented Using BPEL
Infrastructure view of environment

- Camera
- FEP
- Netapp
- ICCS app server
- Controls Network
- Netapp
- OI cluster
- ETL servers
- DB cluster
- CMAN server
- 3Par SAN
- App server 2
- App server 1
- IT Prod Network
- Hitachi SAN
- NIFNET
- NIFNET 581
- NIFNET 583
- NIFNET 490
- NIFNET 482
- NIFNET 481
Application and Infrastructure Components

Enterprise-strength infrastructure for designing, deploying and managing BPEL based Applications

BPEL Processes and Partner Links
- BPEL Engine
- Dehydration store
- Gateway to BPEL Engine

Application server and adapters
- JVM

Database and RAC

Operating Systems
- Linux, Oracle Solaris, Windows

Hosts

Oracle VM Virtual Servers

<table>
<thead>
<tr>
<th>Target Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>cluster</td>
<td>14</td>
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<tr>
<td>ETL Monitoring Plug-in</td>
<td>12</td>
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<tr>
<td>generic_apache</td>
<td>2</td>
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<tr>
<td>generic_snmp</td>
<td>1</td>
</tr>
<tr>
<td>Host</td>
<td>384</td>
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<tr>
<td>Linux</td>
<td>289</td>
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<tr>
<td>SunOS</td>
<td>39</td>
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<tr>
<td>Windows</td>
<td>56</td>
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<tr>
<td>j2ee_application</td>
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<tr>
<td>jvm</td>
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<tr>
<td>metadata_repository</td>
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<td>new_content_q_monitor</td>
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<tr>
<td>oc4j</td>
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<td>oc4jjvm</td>
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<td>oracle_apache</td>
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<td>weblogic_domain</td>
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<td>weblogic_j2eeserver</td>
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<tr>
<td>win_snmp</td>
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<table>
<thead>
<tr>
<th>Target Type</th>
<th>Count</th>
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<tr>
<td>oracle_database</td>
<td>158</td>
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<tr>
<td>10gR1</td>
<td>2</td>
</tr>
<tr>
<td>10gR2</td>
<td>60</td>
</tr>
<tr>
<td>10gR203</td>
<td>38</td>
</tr>
<tr>
<td>11gR1</td>
<td>46</td>
</tr>
<tr>
<td>11gR2</td>
<td>10</td>
</tr>
<tr>
<td>9iR2</td>
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<tr>
<td>oracle_emd</td>
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<td>oracle_emrep</td>
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<tr>
<td>oracle_forms</td>
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<td>oracle_ias</td>
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<td>1013plus</td>
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<td>904plus</td>
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<td>oracle_ias_farm</td>
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<td>oracle_ifs</td>
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<td>oracle_integrationbpm</td>
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<td>oracle_listener</td>
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<td>oracle_repser</td>
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<tr>
<td>oracle_vm_server</td>
<td>24</td>
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<td>oracle_webcache</td>
<td>11</td>
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<tr>
<td>osm_instance</td>
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<tr>
<td>rac_database</td>
<td>29</td>
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<tr>
<td>10gR203</td>
<td>14</td>
</tr>
<tr>
<td>11gR1</td>
<td>11</td>
</tr>
<tr>
<td>11gR2</td>
<td>4</td>
</tr>
</tbody>
</table>
Our Challenge

- Partitioning the architecture into different components makes end-to-end monitoring a challenge
  - Queues
  - Middle-tier java code
  - BPEL
  - Compute servers running algorithms
  - Database

- Enable pro-active management & problem avoidance in virtual environments

- Provide timely, standardized access to meaningful information

- Identify and remove configuration exceptions
Enterprise Manager Solution

Service Catalog

Are we monitoring everything?

Discovery

Application/Database s/Hosts etc.

ORACLE Enterprise Manager 10g
Grid Control

Targets
- BPEL Server
- Databases
- OS
- Oracle VM

Grid Control Web Interface

Repository views

Targets

Apply nightly (emcli)

Templates

Metrics/Policies

Sustainable?

Out of the box & Custom Reports

Violation Reports

Security policy

Application Admin, DBA, SysAdmins

Current state?
Where to put effort?

Management
Single Enterprise Manager Console for All

Application Administrator

How can I detect problems in process execution quickly?

How do I monitor and ensure service quality, predictability and performance of business processes?

How can I implement a business processes to work in accordance to corporate policies and consumer/provider agreements?

System and Database Administrator

How do I optimize and tune Oracle VM virtualized environment for workloads?

How do I provision and patch database and operating system environments for added security?

How do I track authorized and unauthorized configuration changes?
## Cost Benefits: Sample use case

**Monitoring Oracle VM servers and Guest virtual machines**

### Without Enterprise Manager:

<table>
<thead>
<tr>
<th>Monitoring task</th>
<th>Time consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent on a monitoring task per Oracle VM server or Guest per month</td>
<td>1 task x 5 mins x 1 month x 1server = 5 mins/month</td>
</tr>
<tr>
<td>Time spent on a task for 25 Oracle VM servers and 100 Guests per month</td>
<td>1 task x 5 mins x 1 month x 125 = 10 hours/month</td>
</tr>
<tr>
<td>Time spent on 10 tasks for the 125 Oracle VM servers and Guests</td>
<td>10 hours x 10 tasks = 100 hours/month</td>
</tr>
</tbody>
</table>

### With Enterprise Manager:

<table>
<thead>
<tr>
<th>Monitoring task</th>
<th>Time consumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent in the initial effort in setting up Grid control for: Oracle VM server monitoring Guest VM Monitoring</td>
<td>One time setup of few hours. Ongoing performance monitoring and administrative tasks take few seconds from the console.</td>
</tr>
<tr>
<td>Time spent on 10 tasks for the 125 Oracle VM servers and Guests</td>
<td>Conclusion =&gt; The FTE can invest the time in taking new projects without increasing costs</td>
</tr>
</tbody>
</table>

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The National Ignition Facility
Furthermore... Enterprise Manager reduces manpower needs by:

- Providing centralized access to meaningful information for application and Oracle VM virtualized environments
- Enforcing compliance with our standards
- Decreasing time consumed by daily operations
- Reducing downtime by pro-active monitoring
- Assisting Application and System Administrators in their tuning and performance improvement tasks

...and all with little additional effort even for a constantly expanding IT infrastructure
Oracle Enterprise Manager 11g
Resource Center
Access Videos, Webcasts, White Papers, and More

Oracle.com/enterprisemanager11g
Key Resources

- Ops Center Resource page and demo
  http://www.oracle.com/technology/products/oem/prod_focus/ops_center.html
    - Demo
    - Datasheets
    - IDC whitepaper

- Oracle VM Management Pack Resource page
    - Datasheet
    - Demo
## Oracle Enterprise Manager

<table>
<thead>
<tr>
<th>DEMO TITLE</th>
<th>LOCATION</th>
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<tbody>
<tr>
<td>Oracle Real Application Testing: Database Replay</td>
<td>Moscone West</td>
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<tr>
<td>Oracle Real Application Testing: SQL Performance Analyzer</td>
<td>Moscone West</td>
</tr>
<tr>
<td>Self-Managing Database: Automatic Performance Diagnostics</td>
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<td>Self-Managing Database: Automatic Fault Diagnostics</td>
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<td>Self-Managing Database: Automatic Application and SQL Tuning</td>
<td>Moscone West</td>
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<td>Application Quality Management: Application Testing Suite</td>
<td>Moscone South - S022</td>
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<td>Real User Monitoring with Oracle Enterprise Manager</td>
<td>Moscone South - S021</td>
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<td>Siebel CRM Application Management</td>
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<td>Real User Monitoring with Oracle Enterprise Manager</td>
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<td>Oracle WebLogic Server Management and Java Diagnostics</td>
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<td>SOA Management with Oracle Enterprise Manager</td>
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<td>Oracle Business Transaction Management</td>
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<td>Push Button Provisioning and Patch Automation</td>
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<td>Smart Configuration Management</td>
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<td>Oracle Enterprise Manager Ops Center</td>
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<td>Managing the Enterprise Private Cloud</td>
<td>Moscone West</td>
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<tr>
<td>System Management, My Oracle Support, and Oracle Enterprise Manager</td>
<td>Moscone West</td>
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<tr>
<td>Self Managing Database: Change Management for DBAs</td>
<td>Moscone West</td>
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<tr>
<td>Oracle Enterprise Manager: Complete Datacenter Management</td>
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<td>Self-Managing Database: Data Masking for DBAs</td>
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</tr>
<tr>
<td>Company</td>
<td>Benefit</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Oracle</td>
<td>Saves weeks on application testing time</td>
</tr>
<tr>
<td>Nokia</td>
<td>Saves 80% time and effort for managing Databases</td>
</tr>
<tr>
<td>TomTom</td>
<td>Avoids online revenue losses up to 25%</td>
</tr>
<tr>
<td>AmTrust Bank</td>
<td>Improves IT productivity by 25%</td>
</tr>
<tr>
<td>Commonwealth Bank</td>
<td>Drives asset utilization up by 70%</td>
</tr>
<tr>
<td>Cummins</td>
<td>Cuts configuration management effort by 90%</td>
</tr>
<tr>
<td>Telstra</td>
<td>Saves $1.9 million with Oracle Enterprise Manager</td>
</tr>
<tr>
<td>Commonwealth Bank</td>
<td>Saves $170,000 per year with Oracle Enterprise Manager</td>
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<tr>
<td>City University London</td>
<td>Replaces manual tools with automation; saves time by 50%</td>
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<tr>
<td>Starwood</td>
<td>Reduces Database testing time by 90%</td>
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<tr>
<td>Bayer</td>
<td>Reduces provisioning effort by 75%</td>
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<tr>
<td>NetApp</td>
<td>Deploys SOA infrastructure 92% faster</td>
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<tr>
<td>Cumis</td>
<td>Cuts application testing from weeks to hours</td>
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<tr>
<td>APL</td>
<td>Reduces critical patching time by 80%</td>
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<tr>
<td>City of Evanston</td>
<td>Delivers 24/7 uptime with Oracle Enterprise Manager</td>
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</tbody>
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