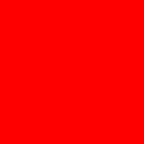# ORACLE®

Infrastructure as a Service (IaaS) Cloud Computing for Enterprises

Speaker
Title

The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Agenda

- **Why Private Clouds?**

- Cloud Computing Service Models

- Oracle's Infrastructure as a Service (IaaS) Capabilities

  - Key Infrastructure Building Blocks

  - Resource Pooling and Management

- Oracle VM Blade Cluster Reference Configuration

- Case Studies

- Next Steps

Today's Data Center
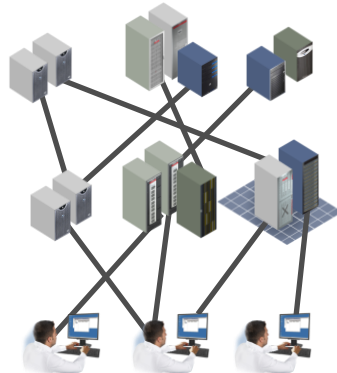## Dispersed, Inefficient Infrastructure Pieces

REALITY CHECK

- No single vendor is responsible for optimizing end-to-end infrastructure

- Unmanageable proliferation of data centers to support growing business needs

- Existing infrastructure creates obstacles to delivering new applications

OpEx

Productivity

ORACLE

Datacenters Are Evolving
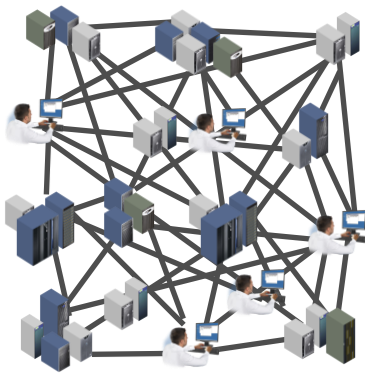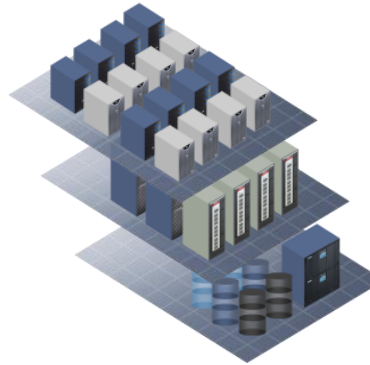
| Silo | Consolidated | Optimized | Cloud |

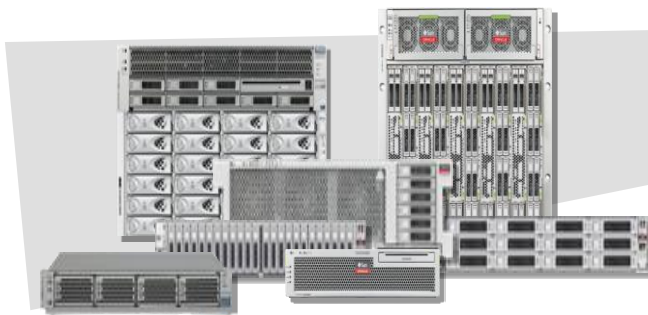## Transforming the Technology Stack

Compute, Storage, Network Building Blocks

Optimized Systems and Solutions

Engineered Systems

ORACLE

Datacenter Trends

Physical ➡ Virtual

Dedicated ➡ Shared

Heterogeneous ➡ Standardized

Manual management ➡ Automated management

IT managed ➡ Self-service

Components assembled by customer ➡ Engineered systems assembled at factory

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Evolution of Private and Public Clouds

Public Cloud Evolution   **Public Clouds**   **Hybrid**

ISP   MSP   CSP/Telcos   ASP   ISV

SaaS   IaaS   PaaS

PaaS   IaaS   SaaS

Virtual Private Cloud

Private Cloud Evolution

App1 App2 App3

Consolidate Standardize

App1 App2 App3
Private PaaS
Private IaaS

App1 App2 App3
Private PaaS
Private IaaS

App1 App2 App3
Private PaaS
Private IaaS

Silo'd	**Grid**	**Private Cloud**	**Hybrid**
• **Physical**	• **Virtual**	• **Self-service**	• **Federation with public clouds**
• **Dedicated**	• **Shared services**	• **Policy-based resource mgmt**	• **Interoperability**
• **Static**	• **Dynamic**	• **Chargeback**	• **Cloud bursting**
• **Heterogeneous**	• **Standardized appliances**	• **Capacity planning**	

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Public Clouds and Private Clouds
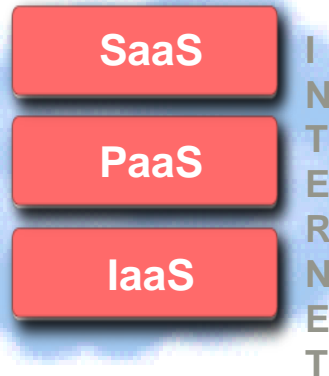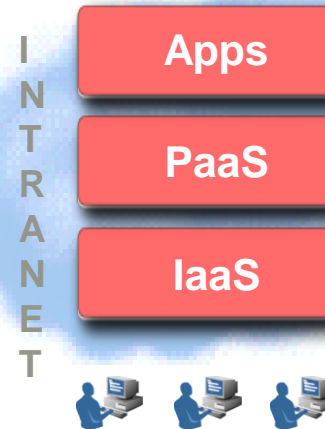
Public Clouds

Private Cloud

- **Used by multiple tenants on a shared basis**
- **Hosted and managed by cloud service provider**

| SaaS |
| PaaS |
| IaaS |

INTERNET

INTRANET

| Apps |
| PaaS |
| IaaS |

- **Exclusively used by a single organization**
- **Controlled and managed by in-house IT**

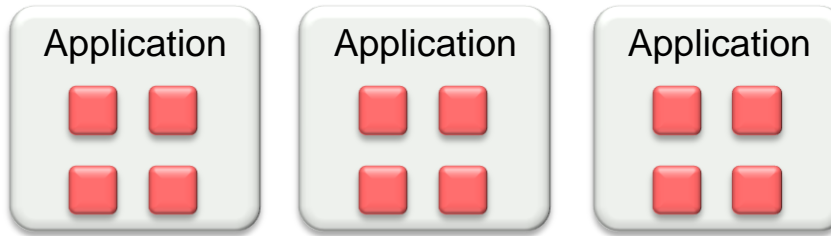**Trade-offs**

Lower *upfront* costs ⟷ Lower *total* costs

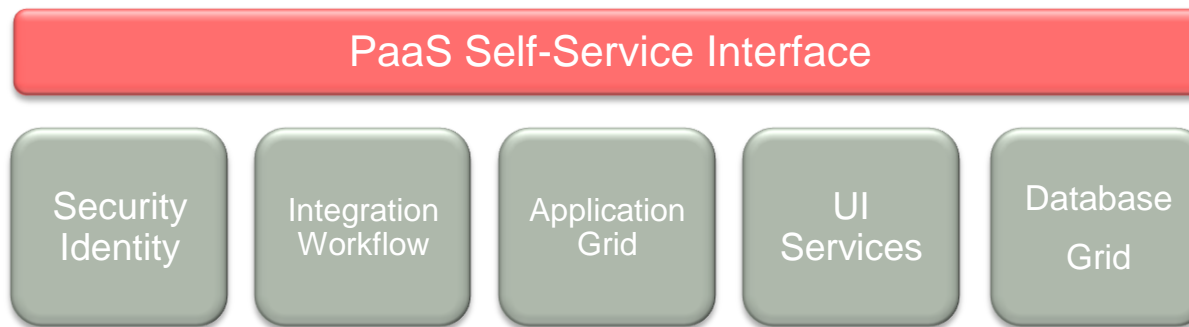Outsourced management ⟷ Greater control over security, compliance, QoS

OpEx ⟷ CapEx & OpEx

Enterprises will adopt a mix of public and private clouds

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Cloud Computing Service Models

SaaS

Application	Application	Application

PaaS

PaaS Self-Service Interface

Security Identity	Integration Workflow	Application Grid	UI Services	Database Grid

Admin Services

- Packaging
- Configuration
- Deployment
- Scaling
- Lifecycle Management
- Utilization
- User Mgmt
- IDE Integration

IaaS

IaaS Self-Service Interface

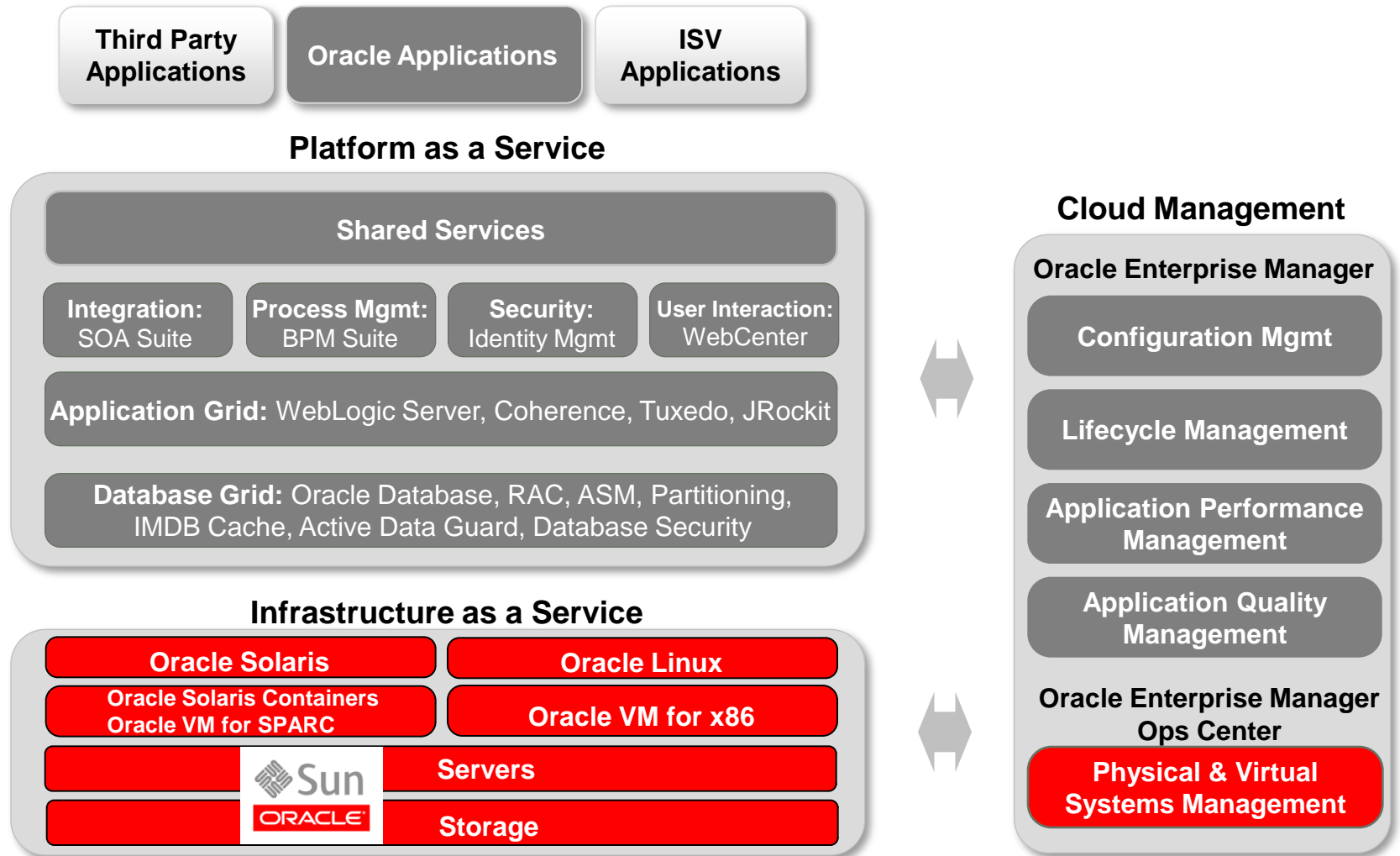| Virtual Machine	Virtual Storage	Virtual Network

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Oracle Private IaaS Cloud Capabilities

Third Party Applications

Oracle Applications

ISV Applications

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

Cloud Management

Oracle Enterprise Manager

Configuration Mgmt

Lifecycle Management

Application Performance Management

Application Quality Management

Oracle Enterprise Manager Ops Center

Physical & Virtual Systems Management

Infrastructure as a Service

| Oracle Solaris | Oracle Linux |
| Oracle Solaris Containers Oracle VM for SPARC | Oracle VM for x86 |

Sun ORACLE **Servers**

Storage

ORACLE

Key IaaS Building Blocks

Sun Blade Modular Systems for Private Clouds

- Choice of optimized operating and virtualization platforms
- Industry leading SPARC and Intel (Westmere) x86 blade servers
- Increased storage capability and flexibility using SAS2
- 10GbE and InfiniBand Networking options with easy integration
- Unified Oracle ILOM Remote Management

**Most Flexible Blade Architecture for Cloud IaaS**

ORACLE VM

ORACLE SOLARIS

ORACLE LINUX

vmware
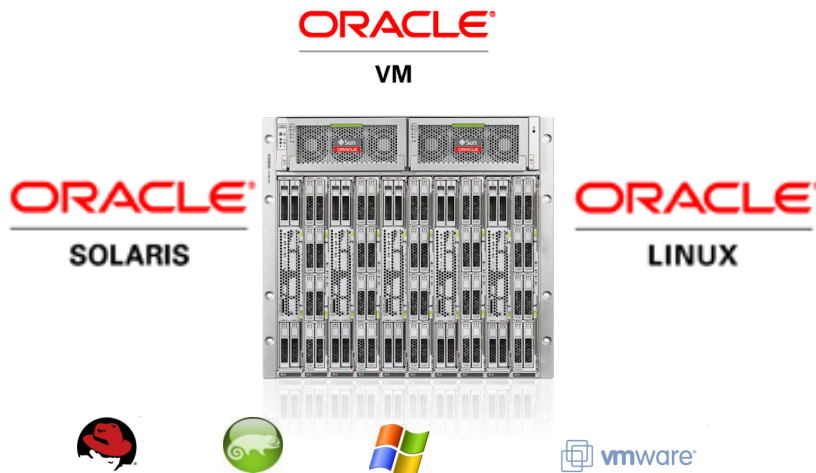
Integrated Compute, Networking, Storage, and Management

ORACLE ENTERPRISE MANAGER OPS CENTER

ORACLE

Key IaaS Building Blocks

Sun x86 Rack-Mount Servers for Private Clouds

- Comprehensive portfolio refreshed with Intel Xeon Processor 5600 & 7500 Series

- Array of flash options to accelerate application performance and lower operating cost

- Choice of leading operating systems and virtualization platforms
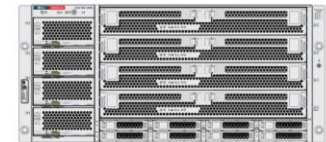
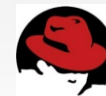**Sun Fire X4800 Server**

Sun Fire X4470 Server

Sun Fire X4270 M2 Server

Sun Fire X4170 M2 Server

Sun Fire X2270 M2 Server

ORACLE
SOLARIS

ORACLE
VM

ORACLE
ENTERPRISE MANAGER
OPS CENTER

vmware

ORACLE
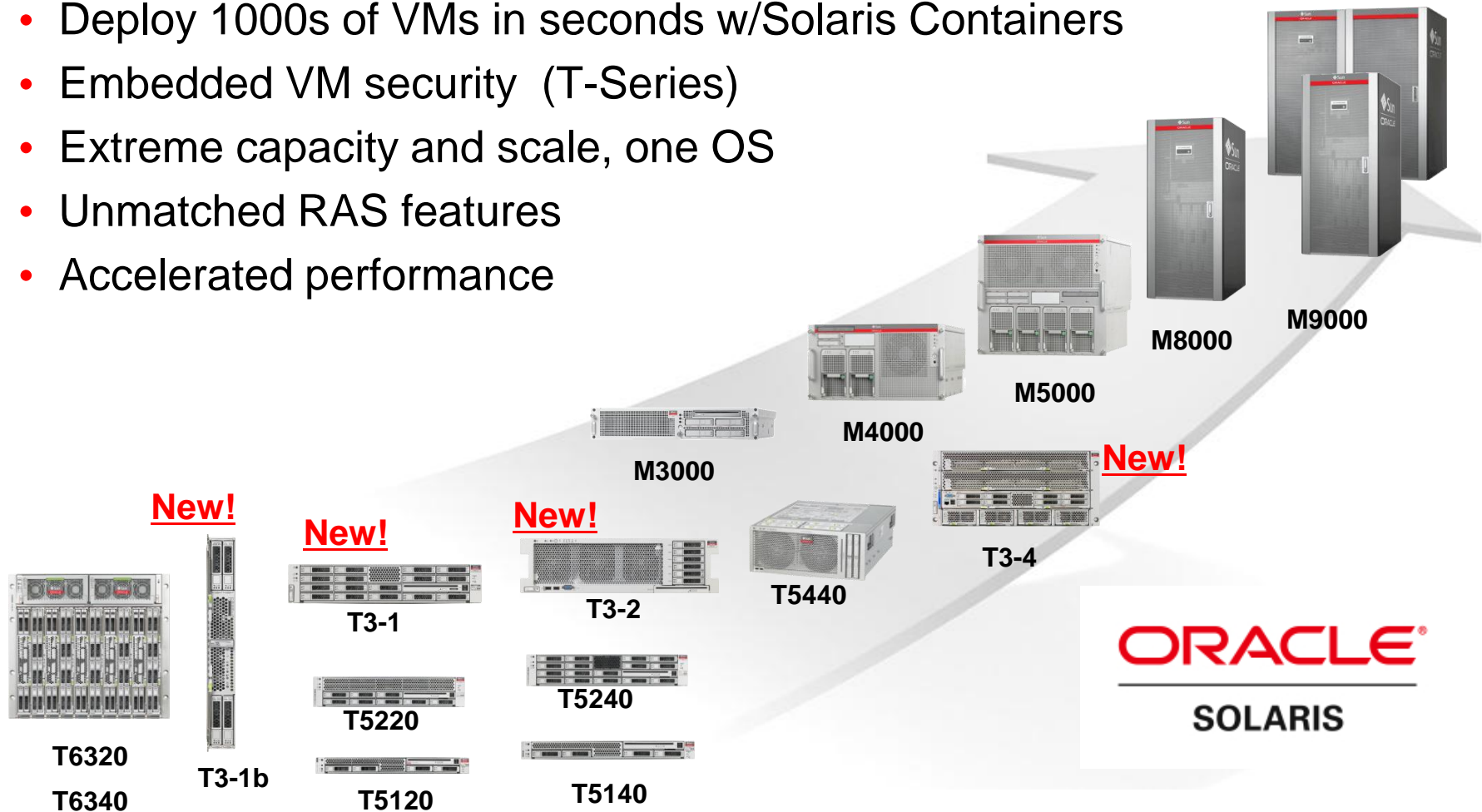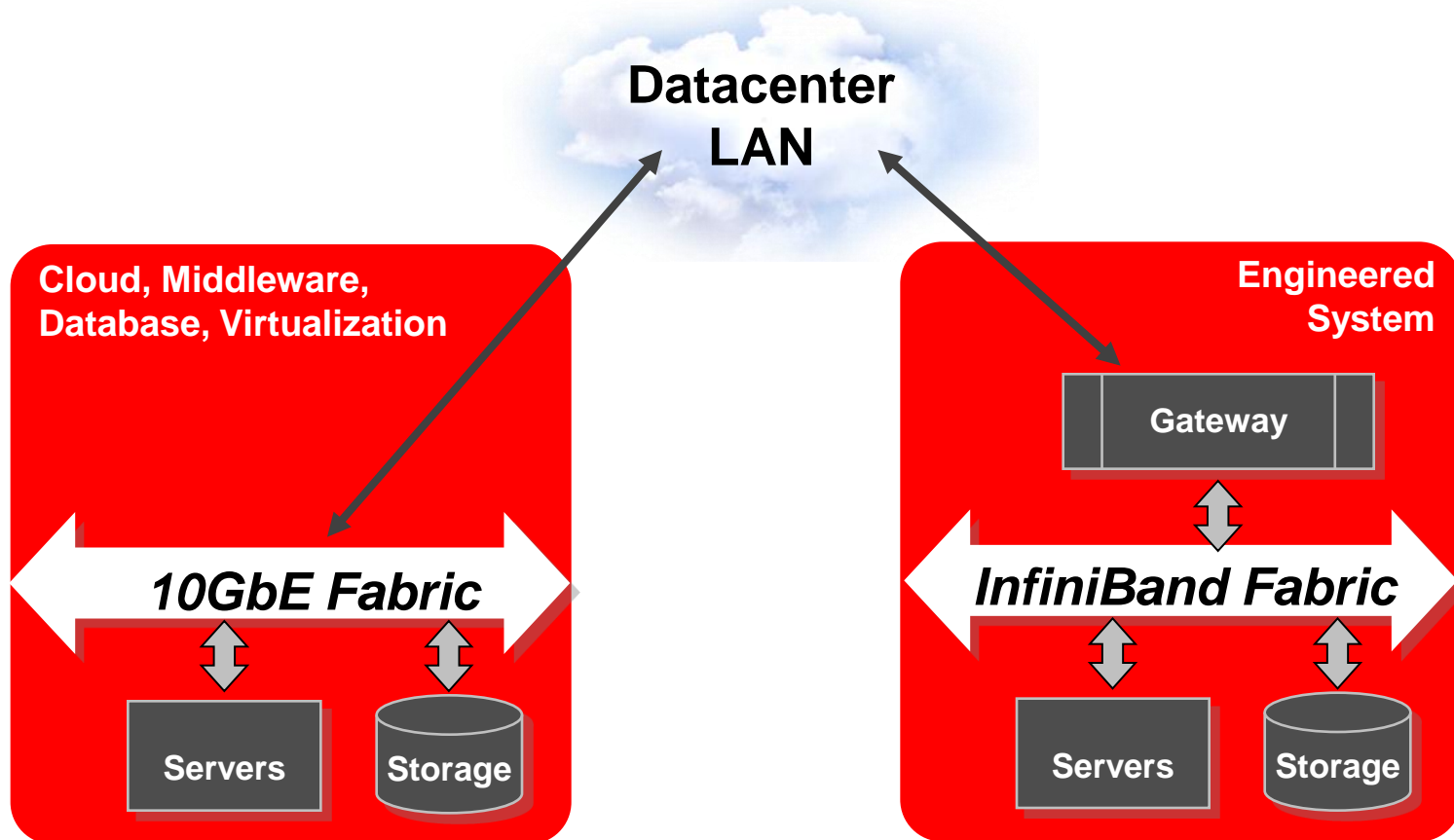
Key IaaS Building Blocks
SPARC Enterprise Servers for Private Clouds

- Deploy 1000s of VMs in seconds w/Solaris Containers
- Embedded VM security (T-Series)
- Extreme capacity and scale, one OS
- Unmatched RAS features
- Accelerated performance

M9000

M8000

M5000

M4000

M3000

New!
T3-4

New!
T3-2

T5440

New!
T3-1

T5240

T5220

T5140

T6320
T6340

New!
T3-1b

T5120

ORACLE®
SOLARIS

ORACLE®

Key IaaS Building Blocks

Oracle's Network Fabric for Private Clouds

Datacenter LAN

Cloud, Middleware, Database, Virtualization

Engineered System

Gateway

10GbE Fabric

InfiniBand Fabric

Servers

Storage

Servers

Storage

Fabric technology selected and engineered for application and datacenter LAN requirements

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Key IaaS Building Blocks

Oracle Storage for Private Clouds

TAPE

ARRAYS

FLASH

UNIFIED NAS and SAN

- Aligns the value of your data assets with the most appropriate storage media

- Reduce cost and effectively manage data throughout its lifecycle

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Key IaaS Building Blocks
Solaris & Linux Offer Choice for Private Clouds

Reduce Complexity

- Oracle Solaris offers the best built-in virtualization for improving server utilization
- More efficient storage management with Oracle Solaris' file system, ZFS
- Best Linux performance and single support call for Oracle software running on Linux
- Single support offering for Linux, Solaris and Virtualization with x86 hardware

Increase Innovation

- Superior scale, security and availability of Oracle Solaris enable it to run any application
- Best options for Infrastructure-as-a-Service (IaaS) or Platform-as-a-Service (PaaS)
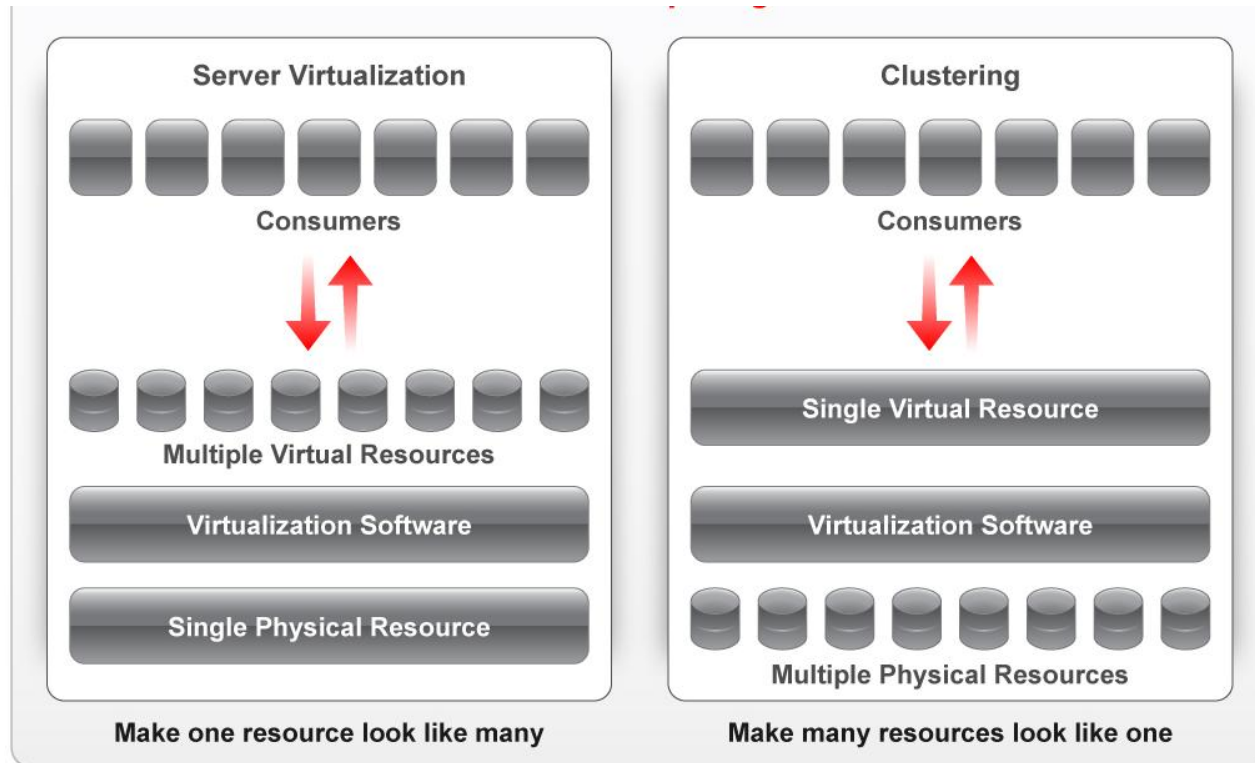
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Server Virtualization and Clustering
## Deliver Resource Pooling and Elastic Scalability

Server virtualization and clustering are key technologies for cloud

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Oracle VM for x86 Systems

Server Virtualization and Management

- **Oracle VM Manager & Enterprise Manager**
  - Manage hundreds- or thousands of servers
  - Central Java management server
  - Web browser-based management console
  - Advanced virtualization management including Live Migration, HA / auto-restart, load balancing…

- **Oracle VM Server for X86**
  - Installs on "bare-metal" servers in about a minute
  - Pre-installed options on select Sun X86 systems
  - Guest operating systems:
    - Oracle Linux
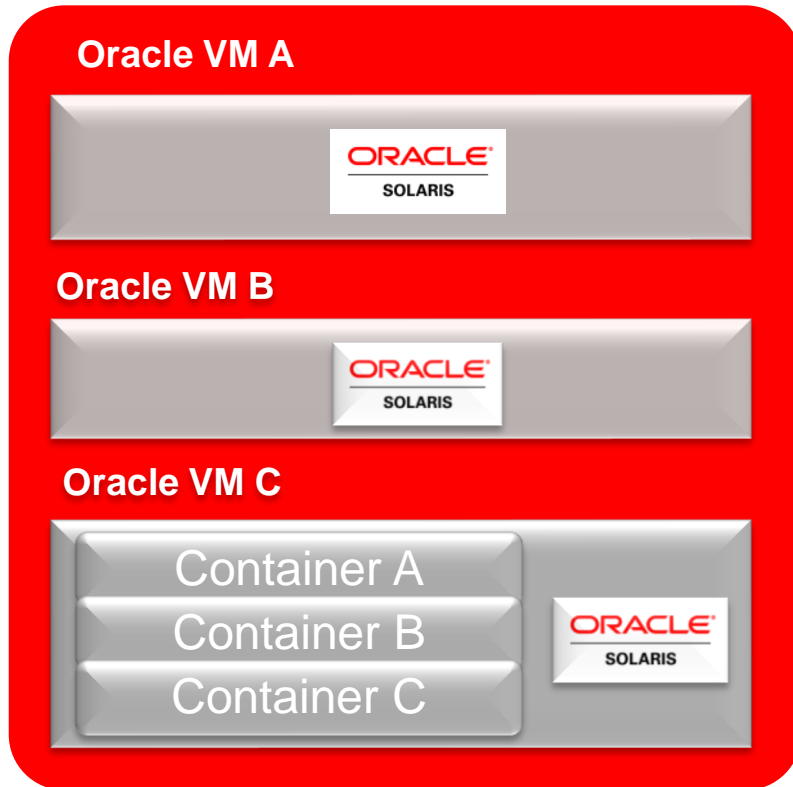   - Microsoft Windows
    - Oracle Solaris

ORACLE

VM
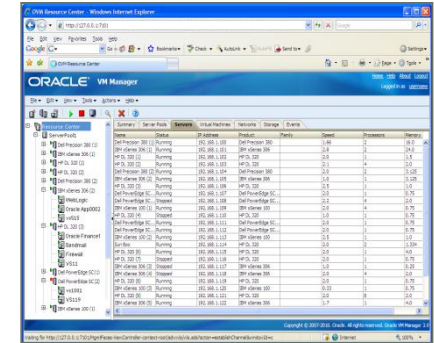
Server Virtualization for SPARC Systems

Complete portfolio to meet diverse datacenter requirements

**Oracle VM Server for SPARC
and
Oracle Solaris Containers**

**Dynamic Domains
and
Oracle Solaris Containers**

Oracle VM A

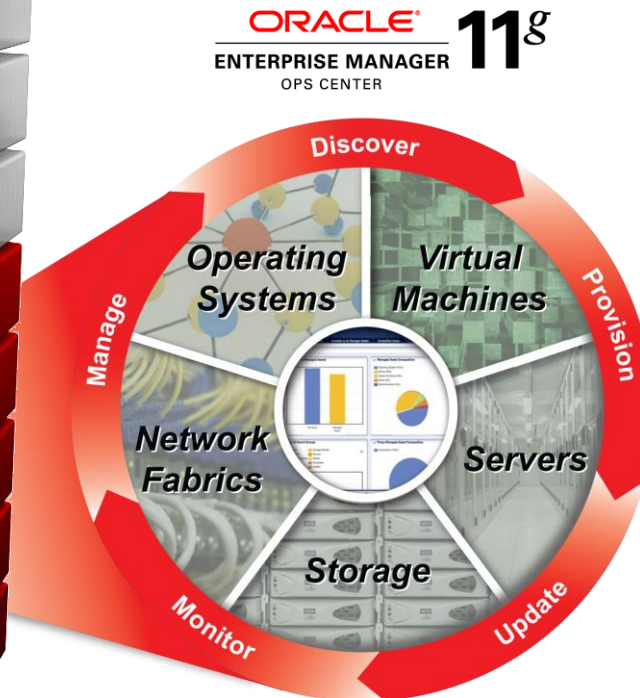ORACLE
SOLARIS

Oracle VM B

ORACLE
SOLARIS

Oracle VM C

Container A
Container B
Container C

ORACLE
SOLARIS

Domain A

Container A
Container B
Container C

ORACLE
SOLARIS

Domain B

ORACLE
SOLARIS
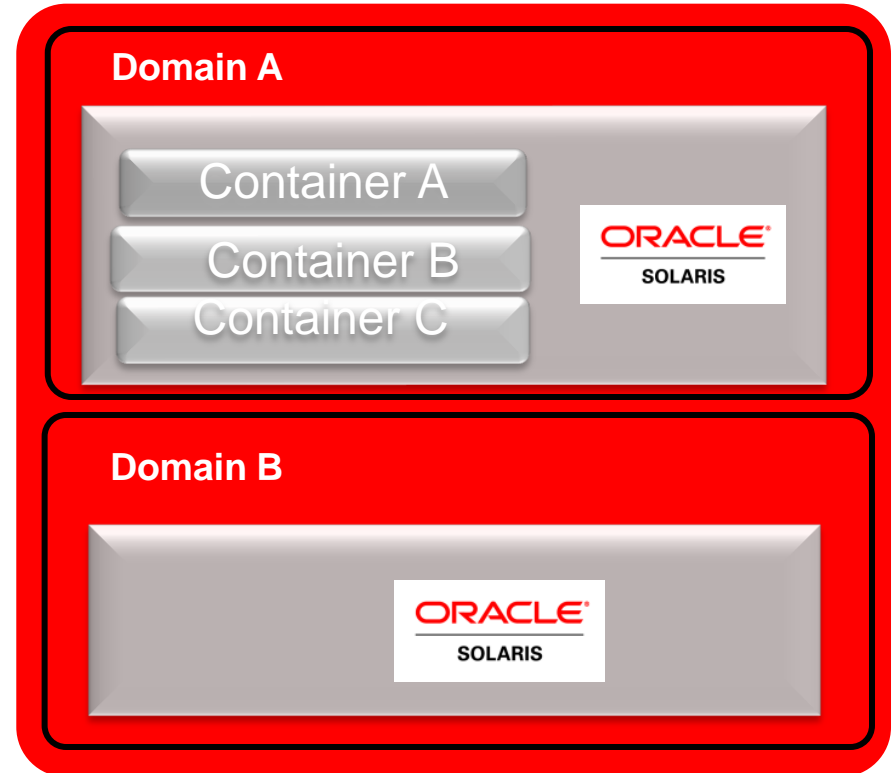
T-Series

M-Series

ORACLE

Oracle Enterprise Manager 11*g* Ops Center

First Converged Hardware Management Solution for Sun

Applications
Middleware
Database
Operating System
Virtual Machine
Servers
Storage
Network

ORACLE®
ENTERPRISE MANAGER 11*g*
OPS CENTER

Discover
Provision
Update
Monitor
Manage

Operating Systems
Virtual Machines
Network Fabrics
Servers
Storage

Integrated Infrastructure Management
+
Integrated Application-to-Disk Management
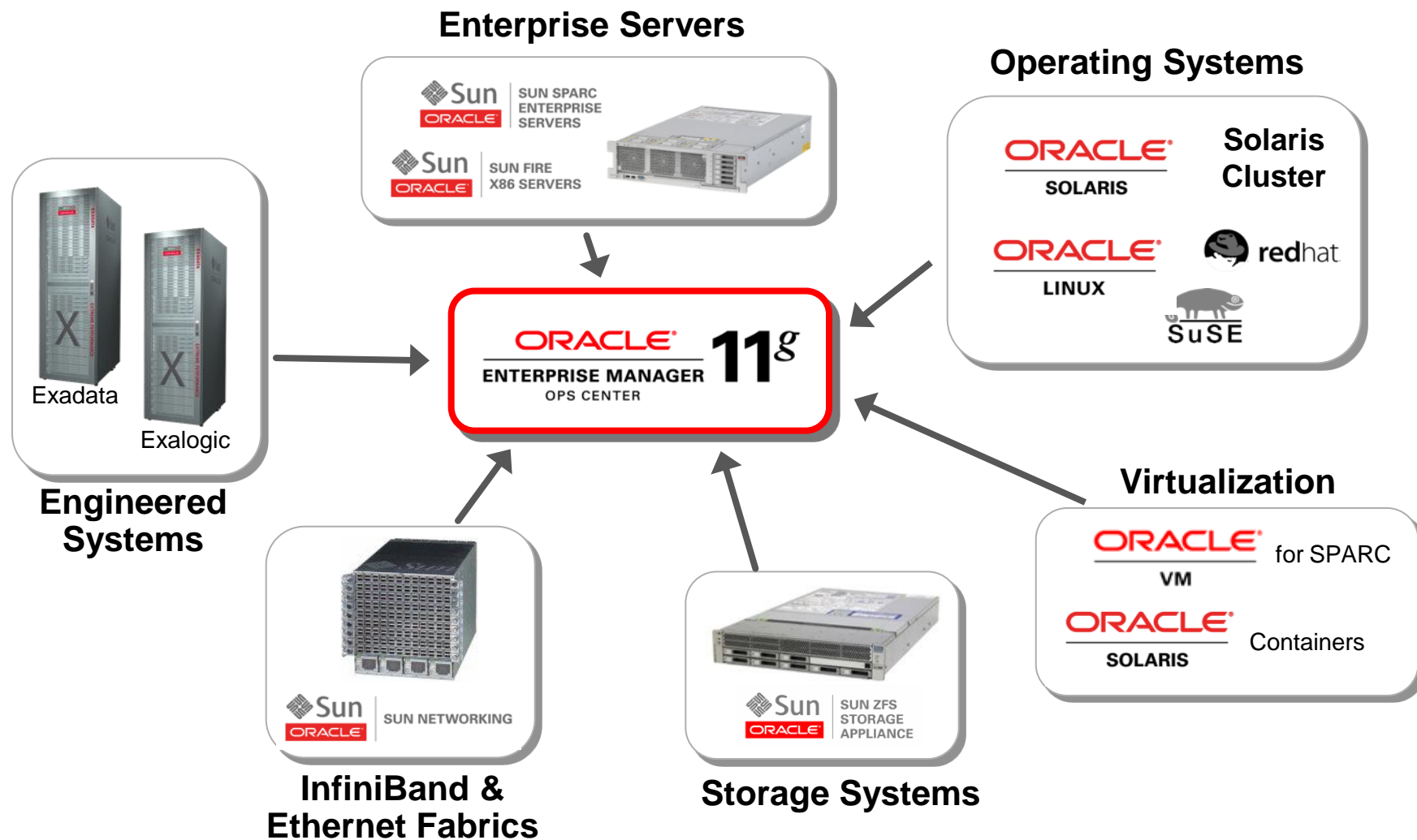**+**
Integrated Lifecycle Management
+
Integrated Systems Management & Support

ORACLE

Oracle Enterprise Manager Ops Center 11g
Manage Your Infrastructure in One Place

Enterprise Servers

Operating Systems

Solaris Cluster

Engineered Systems

Exadata

Exalogic

Virtualization

for SPARC

Containers

InfiniBand & Ethernet Fabrics
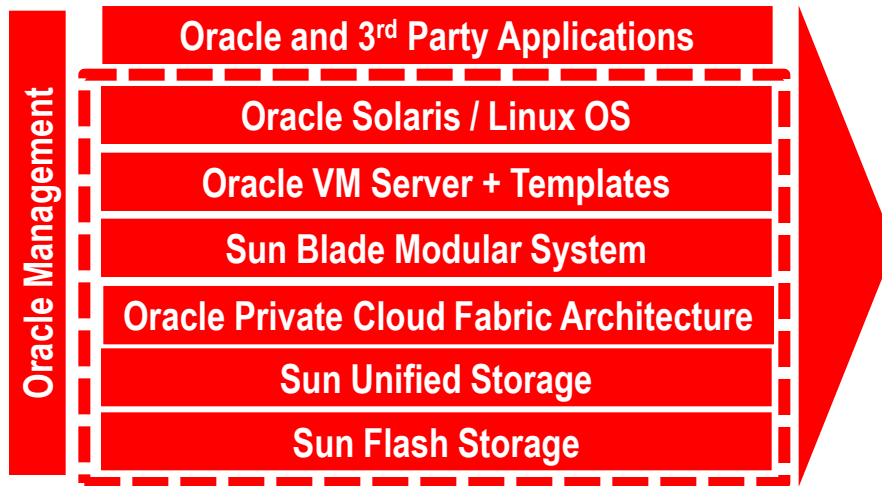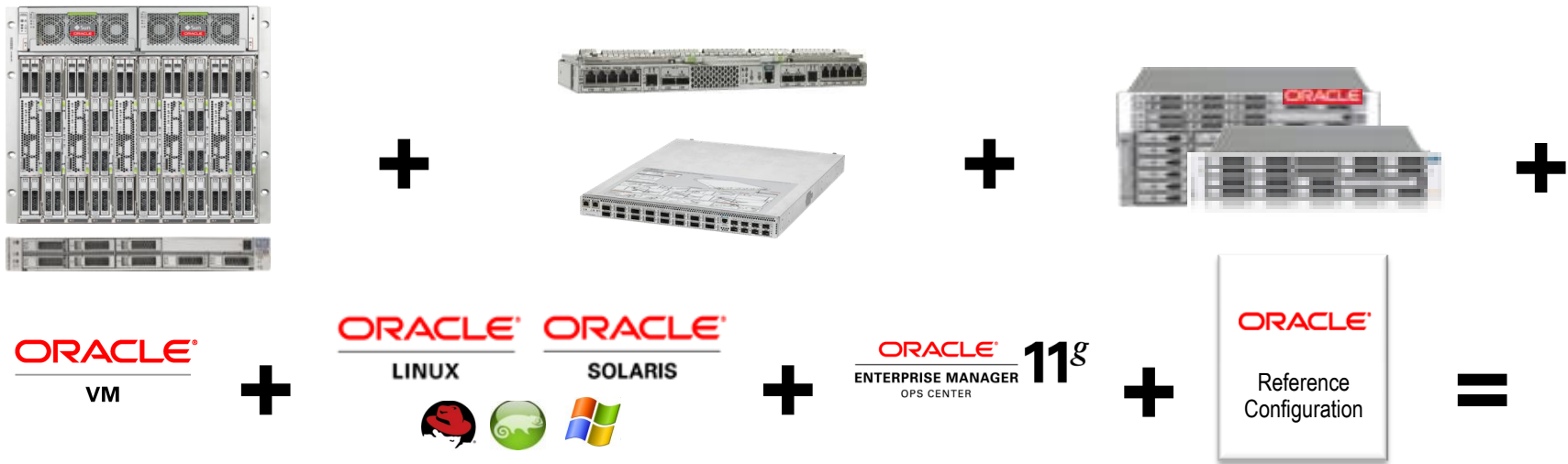
Storage Systems

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Oracle VM Blade Cluster Reference Configuration

Build Customized Enterprise Private Cloud IaaS
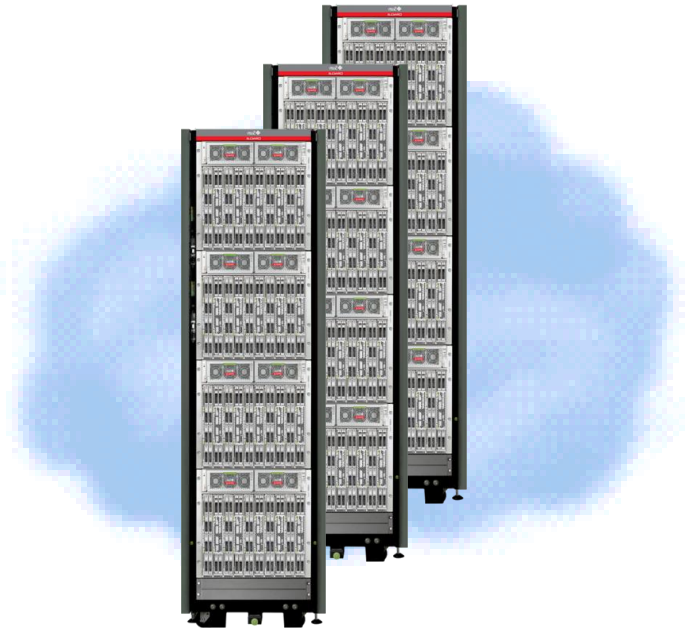

Oracle and 3rd Party Applications

Oracle Management

- Oracle Solaris / Linux OS
- Oracle VM Server + Templates
- Sun Blade Modular System
- Oracle Private Cloud Fabric Architecture
- Sun Unified Storage
- Sun Flash Storage

Oracle VM Blade Cluster Reference Configuration

Speed Deployments and Reduce Errors

- **Save Time**: Deployed together
  - Sun x86 Servers pre-installed with Oracle VM reduce virtualization server deployment times from weeks to hours
- **Reduce Errors**: Configured together
  - Ready to run Server+Oracle VM with guest OS
  - Oracle Linux + Oracle Solaris configured together at install
- **Lower TCO**: Managed together
  - Simplified management with Oracle VM Manager in the Oracle Linux Guest Image
- **Vendor Accountability**: Supported together

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Easily Deploy Apps on IaaS Cloud

Oracle VM Templates
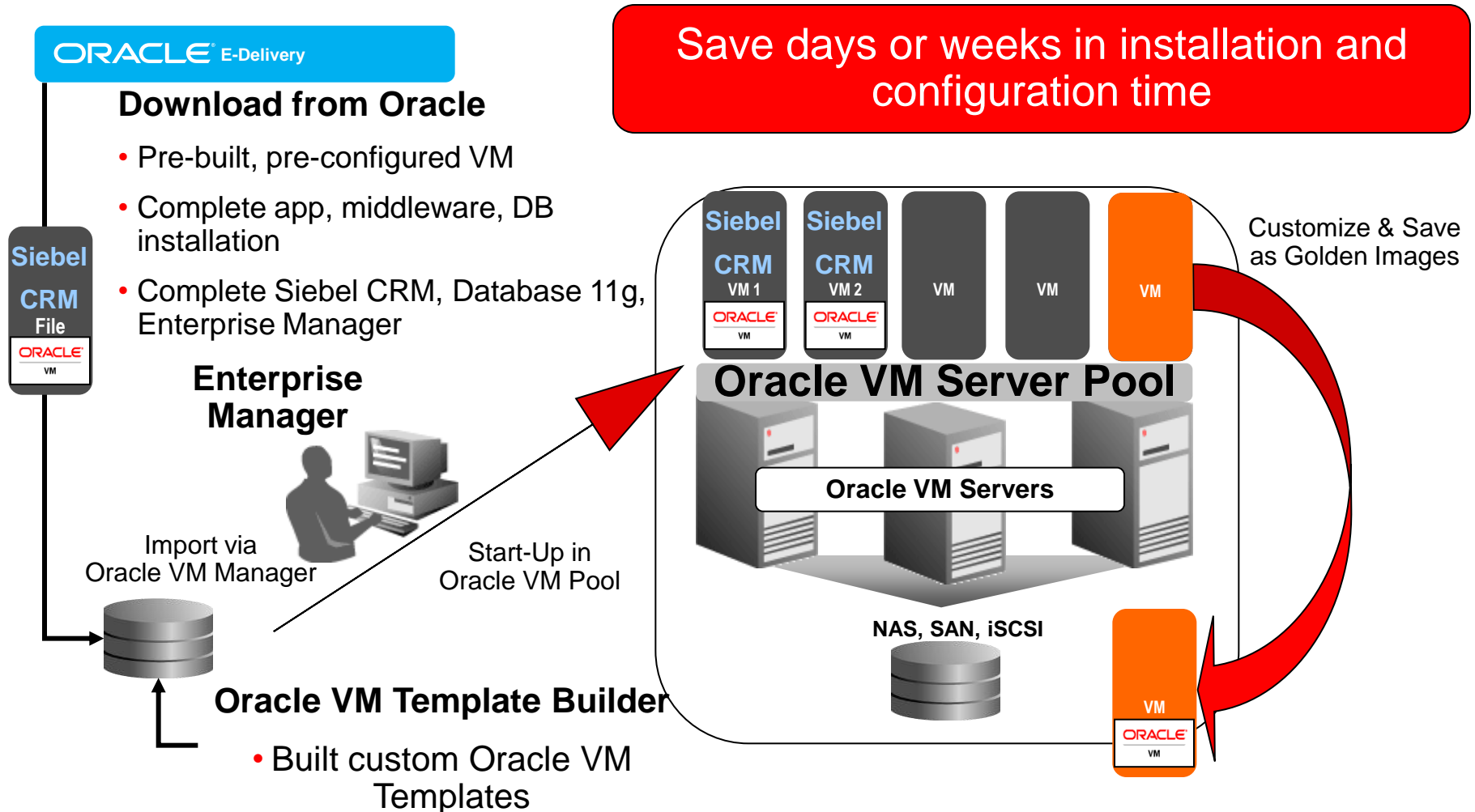
ORACLE E-Delivery

Download from Oracle

- Pre-built, pre-configured VM
- Complete app, middleware, DB installation
- Complete Siebel CRM, Database 11g, Enterprise Manager

Siebel CRM File
ORACLE VM

Enterprise Manager

Import via Oracle VM Manager

Start-Up in Oracle VM Pool

Oracle VM Template Builder

- Built custom Oracle VM Templates

Save days or weeks in installation and configuration time

Siebel CRM VM 1 ORACLE VM
Siebel CRM VM 2 ORACLE VM
VM
VM
VM

Oracle VM Server Pool

Oracle VM Servers

NAS, SAN, iSCSI

Customize & Save as Golden Images
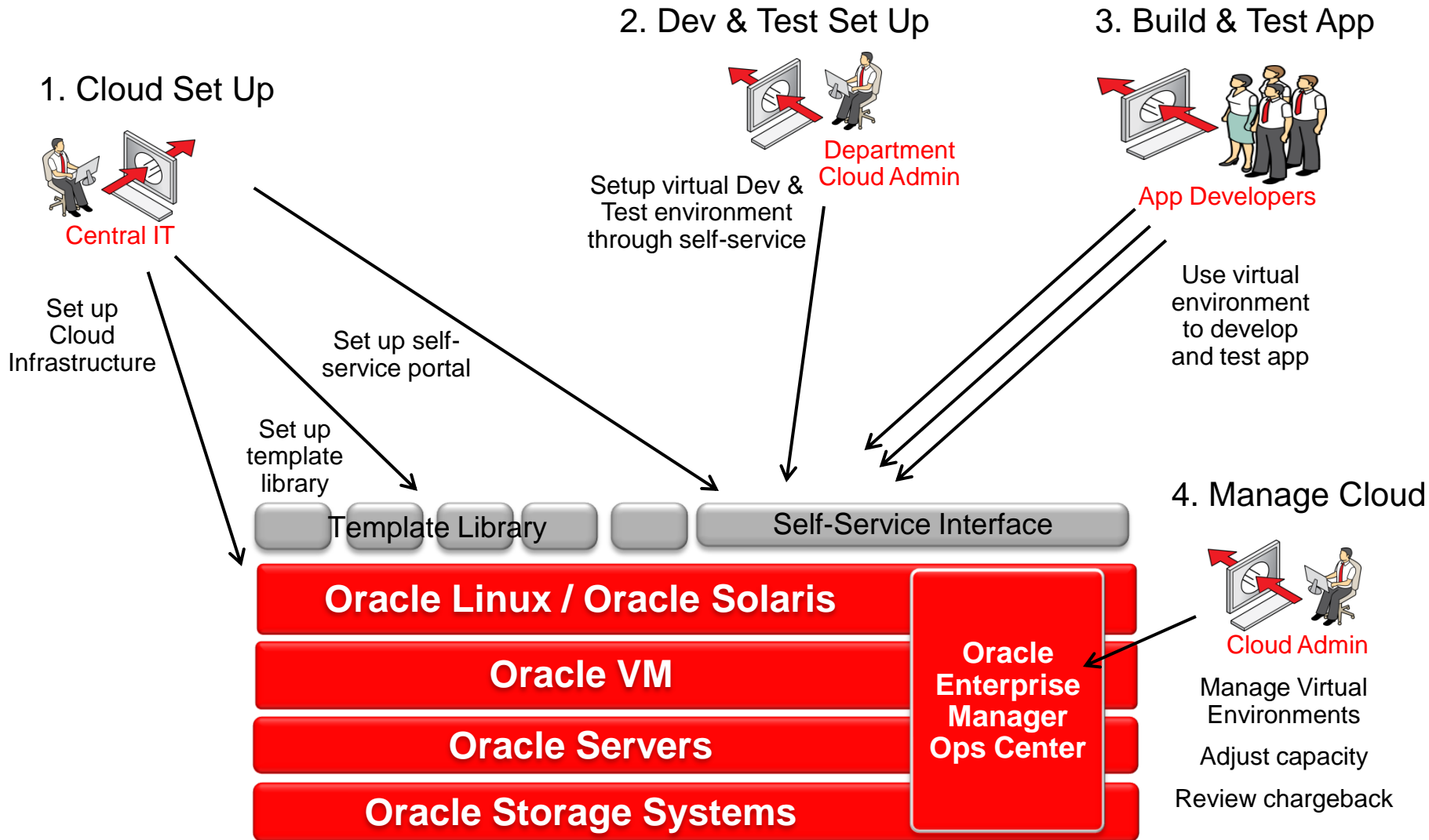
VM
ORACLE VM

ORACLE

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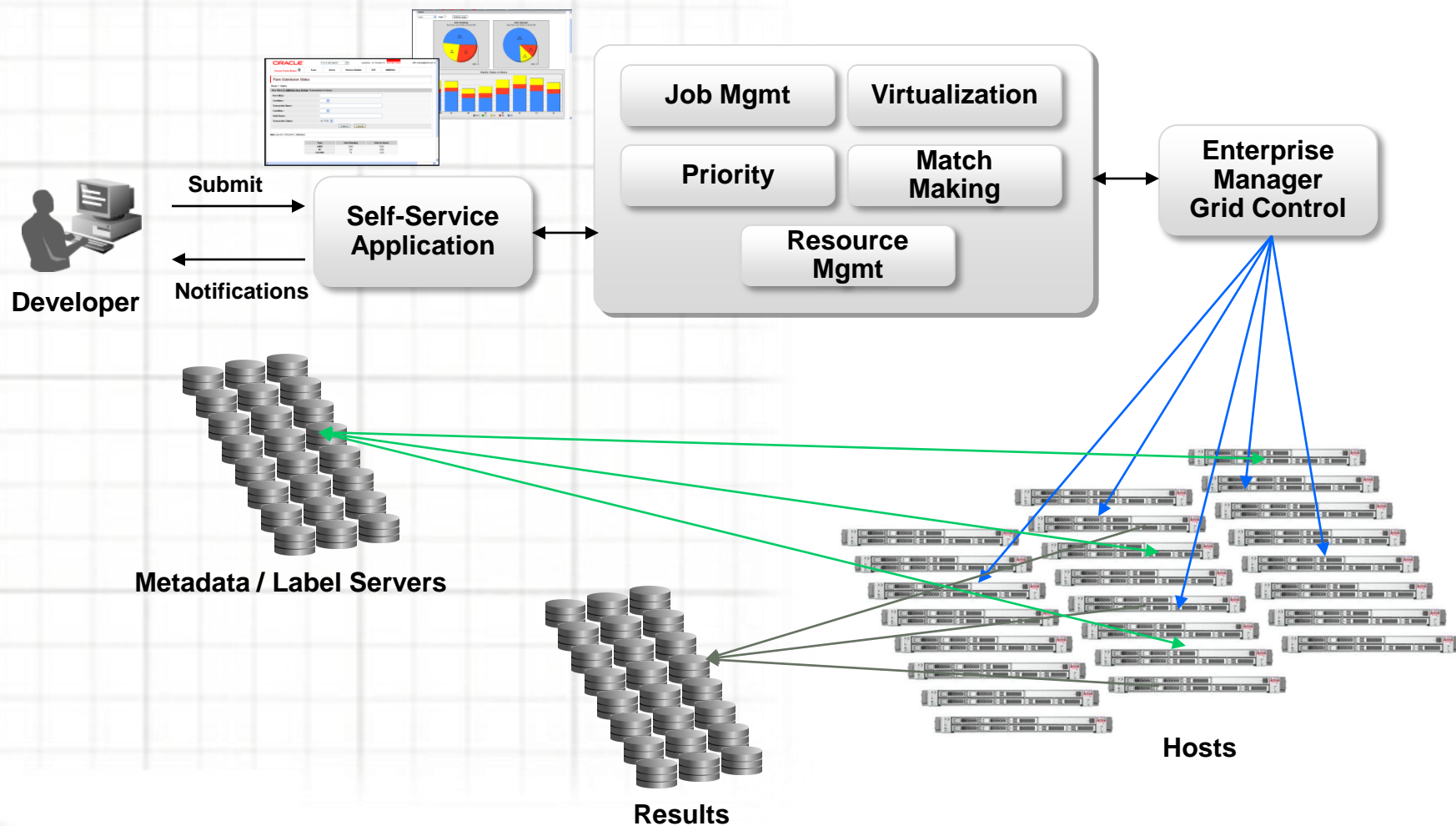
- Case Studies

- Next Steps

Private IaaS Lifecycle

2. Dev & Test Set Up

3. Build & Test App

1. Cloud Set Up

Department
Cloud Admin

App Developers

Central IT

Setup virtual Dev &
Test environment
through self-service

Use virtual
environment
to develop
and test app

Set up
Cloud
Infrastructure

Set up self-
service portal

Set up
template
library

4. Manage Cloud

Template Library

Self-Service Interface

Oracle Linux / Oracle Solaris

Oracle VM

Oracle Servers

Oracle Storage Systems

**Oracle
Enterprise
Manager
Ops Center**

Cloud Admin

Manage Virtual
Environments

Adjust capacity

Review chargeback

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Oracle IT: Oracle Development

Self-Service Private IaaS for Dev/Test

Developer

Submit →

← Notifications

Self-Service Application

- **Job Mgmt**
- **Virtualization**
- **Priority**
- **Match Making**
- **Resource Mgmt**

Enterprise Manager Grid Control

Metadata / Label Servers

Results

Hosts

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Oracle IT: Oracle Development

Self-Service Private IaaS for Dev/Test

- **Implementation Overview:**
  - **Scope/Scale** - Over **2600** physical servers with over **6000** Virtual Servers used by over **3500 developers**
  - Activations – Processing over 70 jobs per day, this translates into over **45,000 jobs** processed supporting production and test requirements.
  - Utilization – Rates on these servers averages **80%** 7 days a week and can reach **90%** during peak times.

- **Results/Benefits**:
  - Increase in development productivity
  - Self-Service system for creation of development environments
  - Cleaner code lines as environments are created quickly for more thorough testing/validation.
  - Physical Server/Environmental Reduction by **75%**
  - Server/Apps Deployment reduced by **80%**

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Next Steps

✓ Download Oracle whitepapers **Today** ▶
   - ✓ Oracle VM Blade Cluster Reference Configuration
   - ✓ Oracle Network Fabric Architecture
   - ✓ Sun Blades Architecture

✓ Contact your Oracle sales representative or Oracle partner

www.oracle.com/goto/x86cloud

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For More Information Visit

www.oracle.com/cloud

X86 Cluster Products for Enterprise Clouds
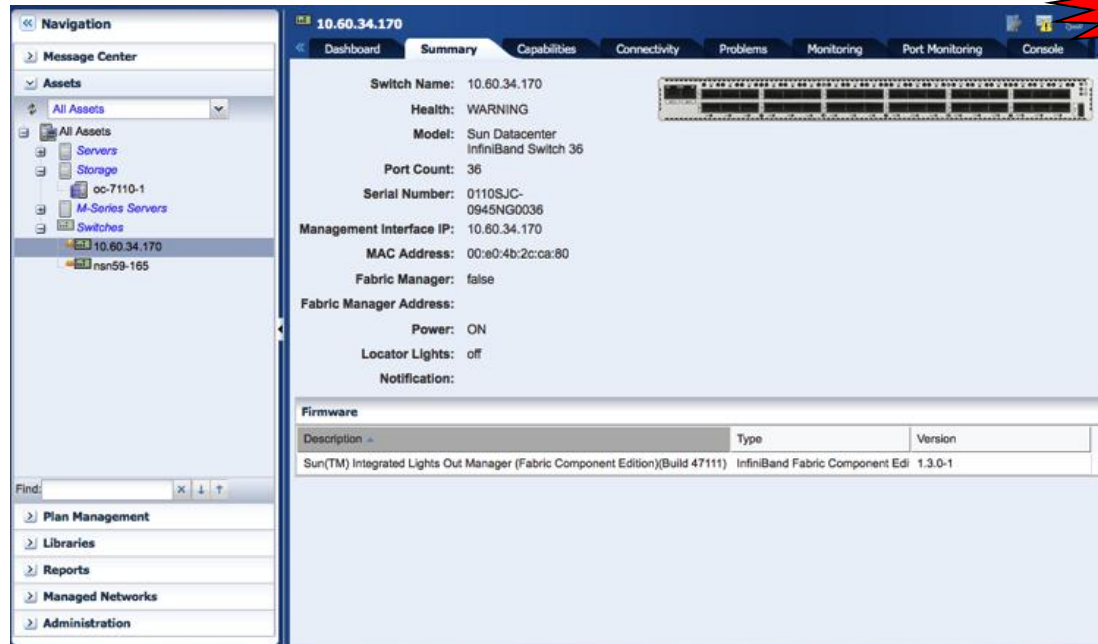
Performance, Fast ROI,

- Performance for cloud and virtualization
- Industry leading compute density
- Oracle Network Fabric Architecture
- Simplified end-to-end management

Hardware and Software
Engineered to Work Together

ORACLE

Oracle Enterprise Manager Ops Center 11g
Network Fabric Management

New

- Auto-discovery of Sun Network InfiniBand & Ethernet elements
- View network performance in context of application architecture
- Collate alarms based on topology
- Perform fabric wide maintenance and firmware upgrades
- Automated escalation of alarms

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