


SOFTWARE. HARDWARE. COMPLETE.



Oracle Linux & Oracle VM (x86/sparc)

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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.

Oracle Solaris and Oracle Linux

Why are we investing in both?

ORACLE®

SOLARIS

ORACLE®

LINUX

- By far the most widely used operating systems for Oracle software
- Making both better is essential to our strategy: delivering complete hardware and software stacks engineered together

Oracle Linux - History



- Launched at Oracle Open World in 2006
- Compatible with Red Hat Enterprise Linux
- Freely available/distributable source and binaries
- Oracle offers Linux support for RHEL and Oracle Linux
- Oracle's base Linux development platform
- Oracle does not use or test on RHEL
- Customers can switch in minutes – no reinstall needed
- Applications run unchanged
- Oracle is effectively a complete independent Linux OS vendor
- **No Red Hat compatibility bug has ever been reported to Oracle**

More Than 7000 Customers Use Oracle Linux



ORACLE

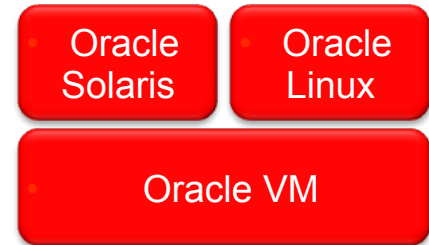
Oracle Linux and Sun Hardware



Exalogic



Exadata



x86 Blade Cluster

Linux Leadership

Oracle Linux Program

- #1 Linux Database

- Oracle Linux
- Development and Support team

- Oracle Validated Configurations

- Global Support in 145 Countries

Oracle Linux

- All Linux code goes to Linus' tree

- Pre-installed on Sun x86 blade servers

- Oracle Linux
- Consulting
- Education

- Oracle Product Development on Linux

Traditional Unix Vendor vs. Linux Vendor

Traditional Unix Vendor	Linux Vendor
<ul style="list-style-type: none">• Develops and tests hardware and OS together	<ul style="list-style-type: none">• Develops OS only
<ul style="list-style-type: none">• Oracle knowledge in development, QA, and support	<ul style="list-style-type: none">• No Oracle expertise, staff
<ul style="list-style-type: none">• Tests entire Oracle stack (hardware, OS, and Oracle Database)	<ul style="list-style-type: none">• Limited testing of OS only
<ul style="list-style-type: none">• Provides fixes for OS version customer runs	<ul style="list-style-type: none">• Customer encouraged to upgrade to latest release plus fix

The Unbreakable Enterprise Kernel

- Fast, modern, reliable and optimized for Oracle
- Used by Exadata and Exalogic for extreme performance
- Allows Oracle to innovate without sacrificing compatibility
 - Oracle Linux now includes **both** the Unbreakable Enterprise Kernel **and** our existing Red Hat Compatible Kernel
 - You choose at boot time: a system optimized for running Oracle software **or** strict Red Hat compatibility.

Oracle now recommends only the Unbreakable Enterprise Kernel for all Oracle software on Linux

The Facts

- Based on a stable 2.6.32 kernel
 - Includes a number of enhancements already in 2.6.32 contributed by Oracle
 - Plus brand new optimizations from Oracle that are **all open source**
- Free download via public yum server
- Covered as part of Oracle's Unbreakable Linux support program
 - No change in pricing
- Easy installation on top of Oracle Linux 5
- Existing applications run unchanged
- Also included in Oracle Linux 6

The Unbreakable Enterprise Kernel: **Fast**

Benchmark	Red Hat compatible kernel	Unbreakable Enterprise Kernel	Gain
8kb flash cache reads (IOPS)	197 thousand	1 million	400%
Solid State Disk access	4GB/second	9.5GB/second	137%
Infiniband RDS messages, single card (IOPS)	89 thousand	273 thousand	200%
8 socket database OLTP (transactions per minute)	1.8 million	3.2 million	75%

The Unbreakable Enterprise Kernel: Modern

- Bigger servers
 - Scales to the largest available x86 servers shipped today and foreseeable future (+x years)
 - Up to 4 PB (petabyte) clustered volumes with OCFS2
 - exabyte sized with BTRFS
 - Advanced NUMA support
- Power management
 - CPUs to stay in low power state when the system is idle
 - ACPI 4.0
- Fine grained CPU and memory resource control

The Unbreakable Enterprise Kernel tracks mainline Linux – users get community and Oracle enhancements faster

The Unbreakable Enterprise Kernel:

Reliable

- Eliminates silent data corruption using **Data Integrity**; stops corrupt data from being written;
- Reduces system crashes and improves application uptime via **Hardware Fault Management**;
- Improved **Diagnostics Tools**

The Unbreakable Enterprise Kernel: Optimized for Oracle

- Result of collaboration between Oracle's Linux, Database, Middleware, and Hardware engineering teams
 - **No compromises**
 - **The best Linux performance and reliability we can deliver**
- The only Linux kernel running in Oracle's development and test farms going forward
- Oracle will continue to certify our software with the Red Hat Compatible Kernel at least through Oracle Linux version 5.

Performance Improvements

- Improved asynchronous write-back performance
 - Keeping up with fast storage
- Improved buffered write accounting
 - Reduces stalls and inefficient writeback when mixing devices of different speeds
- IO affinity
 - ensures processing of a completed IO is handled by the same CPU that initiated the IO
- Receive Packet Steering (RPS)
 - distributes the load of received packet processing across multiple CPUs
- RDS
- Improved scalability on fast storage such as solid state drives
- NUMA improvements
 - Reduced page cache contention
 - Improves performance for large systems under load

Miscellaneous

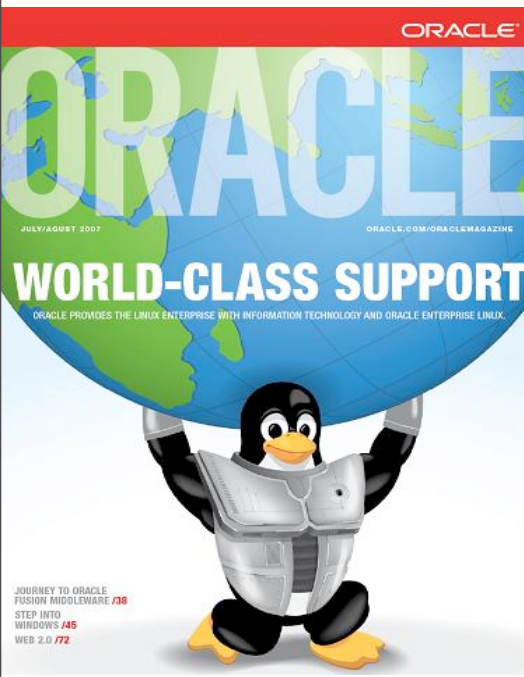
- Initial NFS IPv6 support
- RAID5 to RAID6 restripe support
- I/O topology support
 - Kernel tells application what drive requirements are
 - Improves write performance
- SSD detection
 - Block layer will try harder to dispatch IO when it knows storage device is fast
- Fallocate
 - Speed up reserving space for large files
- New floating point and cryptographic features

New Contributions

ALL Linux kernel enhancements described earlier for The Unbreakable Enterprise Kernel are open source and have been made available to the Linux community.

Oracle Linux Support

Enterprise-class support for the Linux operating system with premier backports, comprehensive management, indemnification, testing and more – all at significantly lower cost.

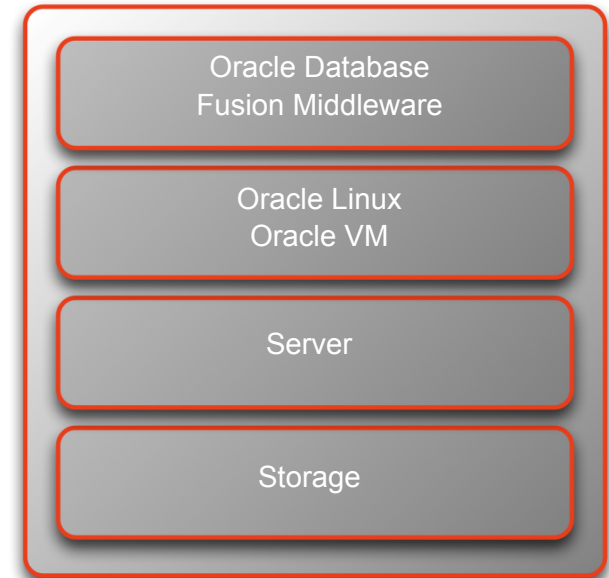


- 24x7 global coverage, 145 countries, 27 local languages
- Dedicated engineering and delivery team
- Backed by world's largest support team
- Enterprise-quality, Lower cost
- Service Excellence in Integrated Services (TSIA)
- 2008 Service Excellence in Mission Critical Support Award (SSPA)
- 2006 J.D. Powers and Associates Global Certification for Outstanding Customer Support

Testing: Oracle Validated Configurations

- Pre-tested, validated, and supported Linux architectures, including
- Software, hardware, storage, drivers, networking components
- Best practices for Linux deployment
- Real-world testing of complete stack
- More than 120 configurations published, freely available for download

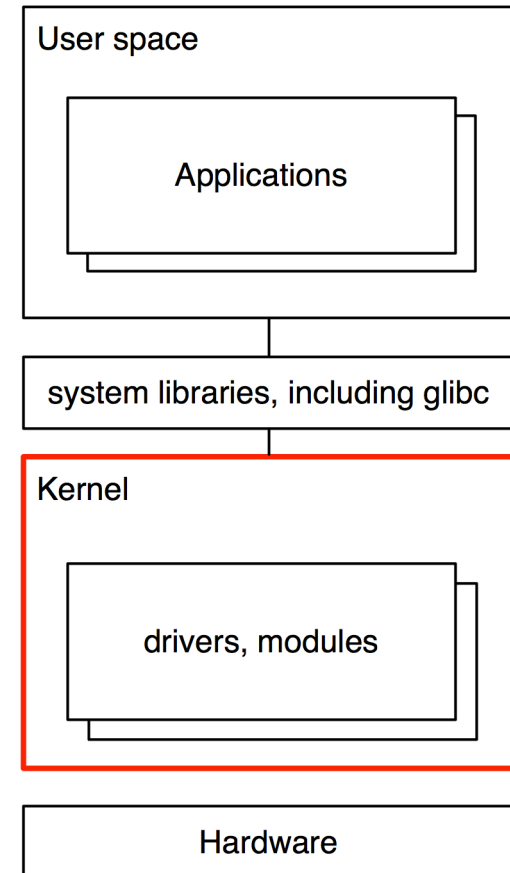
oracle.com/linux



Oracle Validated Configurations offer faster Linux deployments while lowering infrastructure costs

Certification: Unbreakable Enterprise Kernel

- No need to certify if your application doesn't have any kernel module dependencies
- Installing the Unbreakable Enterprise Kernel changes only the box labeled "Kernel."
- Installing a kernel does not change system libraries such as *glibc*
- The *glibc* version is 2.5 before and after you install the Unbreakable Enterprise Kernel on Oracle Linux 5.5.



Industry's Most Complete Virtualization Portfolio

SERVER VIRTUALIZATION



- Oracle VM Server for x86
- Oracle VM Server for SPARC
- Oracle Solaris Containers
- Dynamic Domains

DESKTOP VIRTUALIZATION



- Oracle Virtual Desktop Infrastructure
- Sun Ray Clients
- Oracle Secure Global Desktop
- Oracle VM VirtualBox

Oracle Virtual Desktop Infrastructure (VDI)

Server Hosted Desktops

Oracle Desktop Virtualization

Virtual Desktop Infrastructure Software

- VDI style desktops to users on any client device
- Brokering, management, hosting, and access all-in-one

Secure Global Desktop Software

- Presents applications and data residing on nearly any server, any OS to nearly any client device or virtual desktop
- Highly secure, remote access

Sun Ray Thin Clients

- The highest security endpoint device for a Windows, Linux or Solaris desktop
- Outstanding mobility with integrated smart card session access

Oracle VM Server Virtualization

- High performance 86 and SPARC (CMT) virtualization
- Virtualization solution for both Oracle and non-Oracle applications
- The only server virtualization software supported and certified for all Oracle software

ORACLE[®]

VM

Enterprise-quality support
Real-world deployment testing
Risk-free virtualization

Oracle VM Server Virtualization

Platform Choice & Flexibility

Solaris

Oracle VM Server for SPARC

SPARC (CMT) Hardware

Solaris

Linux

Windows

Oracle VM Server for x86

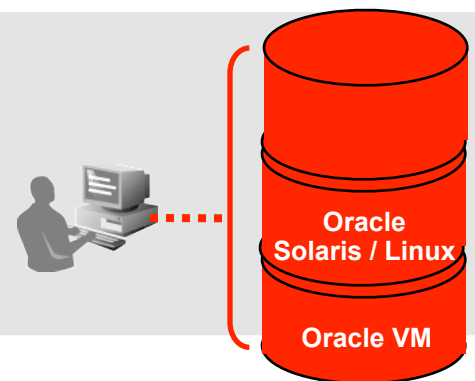
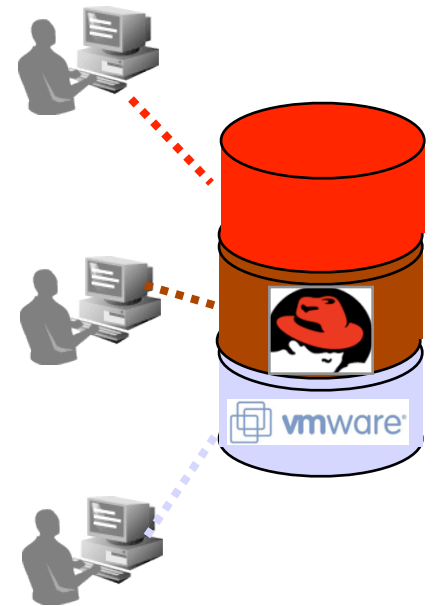
x86 Hardware

- **Evolution of Solaris Logical Domains; Integration with Oracle VM family**
 - **Highly efficient hypervisor for Sun Chip Multithreading (CMT) servers**
 - **Multiple, independent Solaris OS instances**
 - **Live migration support**
 - **Solaris 10 and Solaris 11 domains**
- **High performance hypervisor for x86/x64 architecture**
 - **Supported guests: Linux, Windows, Solaris**

Oracle VM Support

Full-Stack Knowledge

- Compute platform issues a complex interaction of OS, virtualization, and drivers
- Can be challenging to isolate between these layers, particularly in a multi-vendor environment
 - Resolution may require involvement from each vendor
 - Multiple “round-trips” for information to every vendor to resolve
- Oracle VM and Oracle Solaris/Linux: One company to call for full-stack support
 - Vs. one for virtualization, one for OS, one for app...
- Minimized resolution time, maximum uptime



Oracle VM Templates

Rapid Application Deployment

ORACLE E-Delivery

Download from Oracle

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

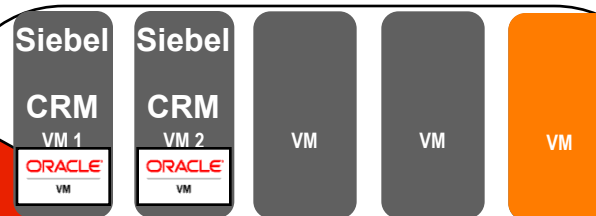


Enterprise Manager

Import via
Oracle VM
Manager



Save days or weeks in installation and configuration time



Customize & Save
as Golden Images

Oracle VM Server Pool

Oracle VM Servers

NAS, SAN, iSCSI

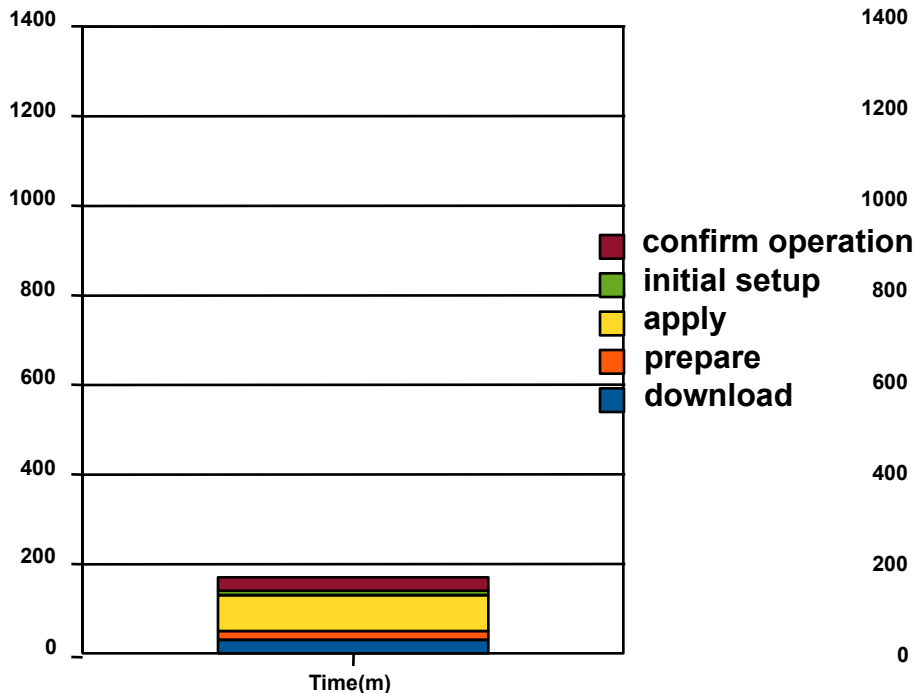


Oracle VM Templates Save Time

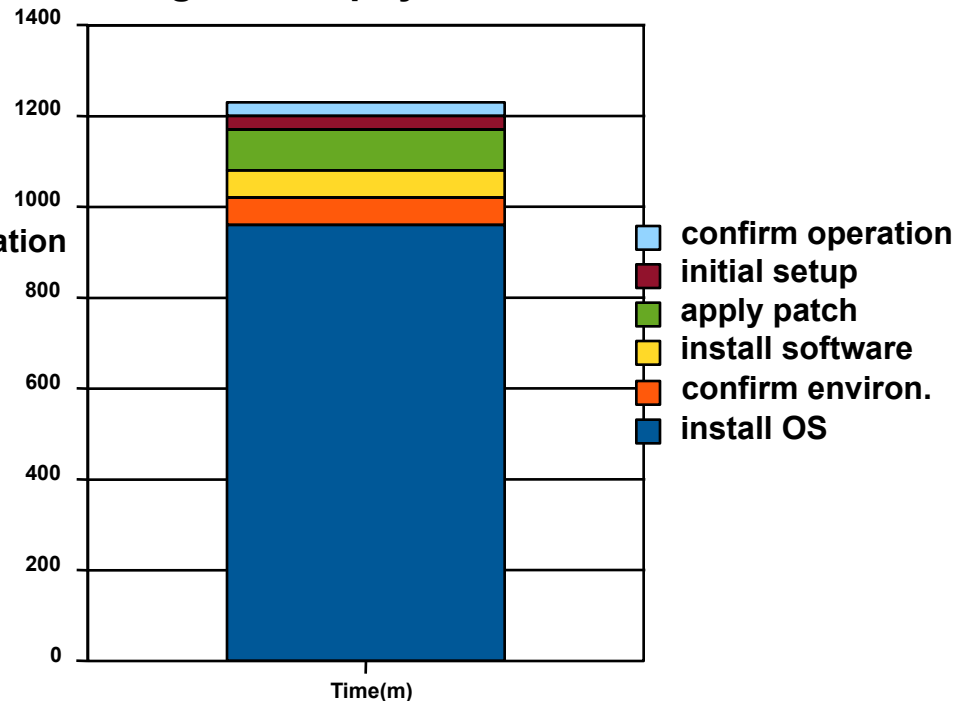
Templates enable the set up of applications within Oracle VM partitions by using scripts that pre-set many of the necessary settings to run within a virtualized environment.

- **Implementation time for using Oracle VM Templates**
 - ✓ Required only 1/6 of the usual time required for set up a major reduction in man hours.

Using Oracle Enterprise Manager Templates

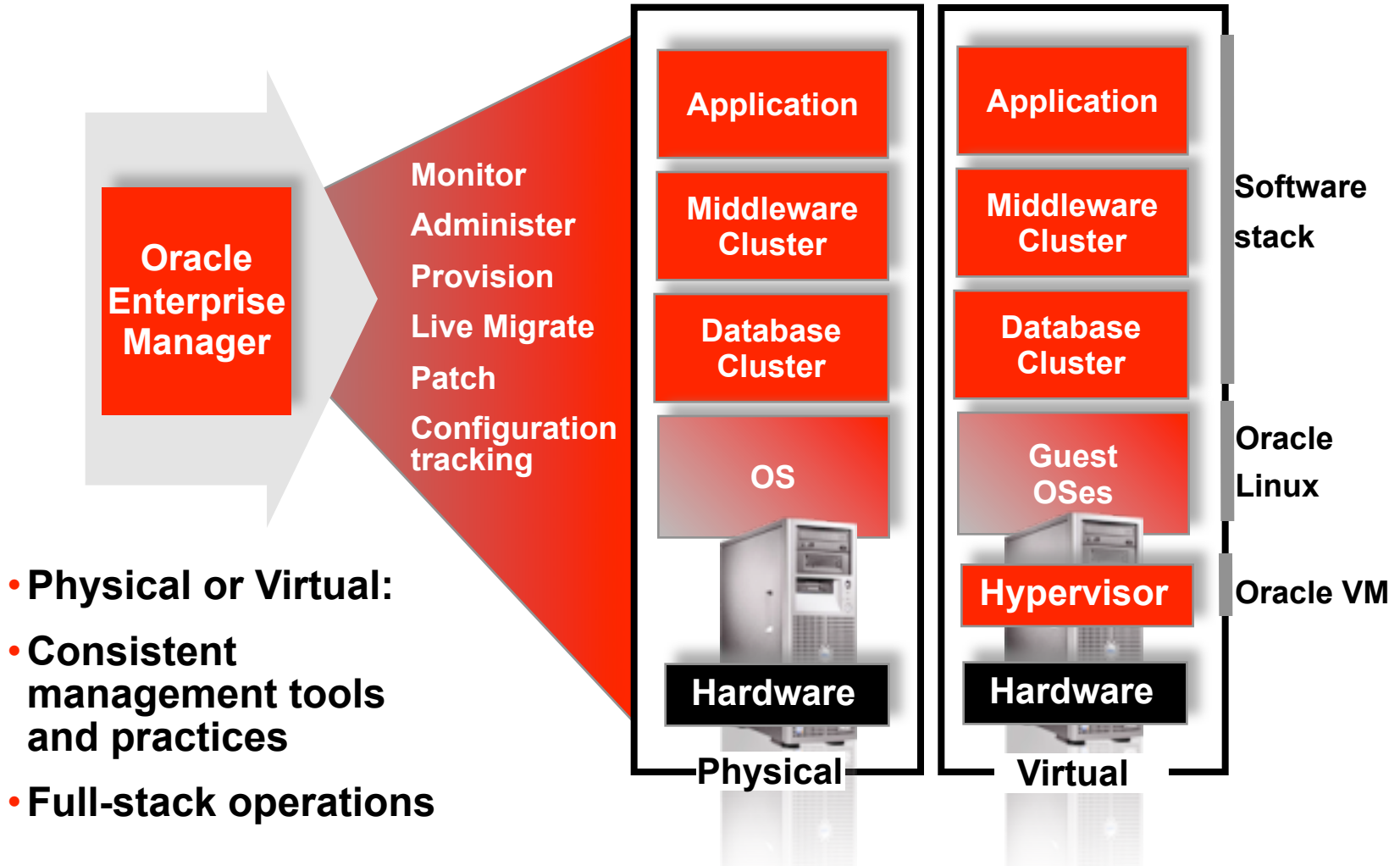


Using normal physical environment



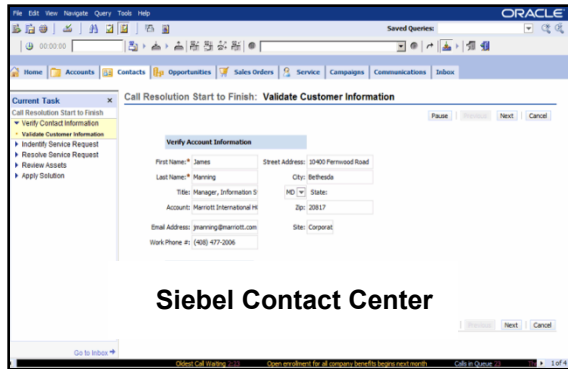
Oracle Enterprise Manager

Integrated Management for Physical and Virtual Environments

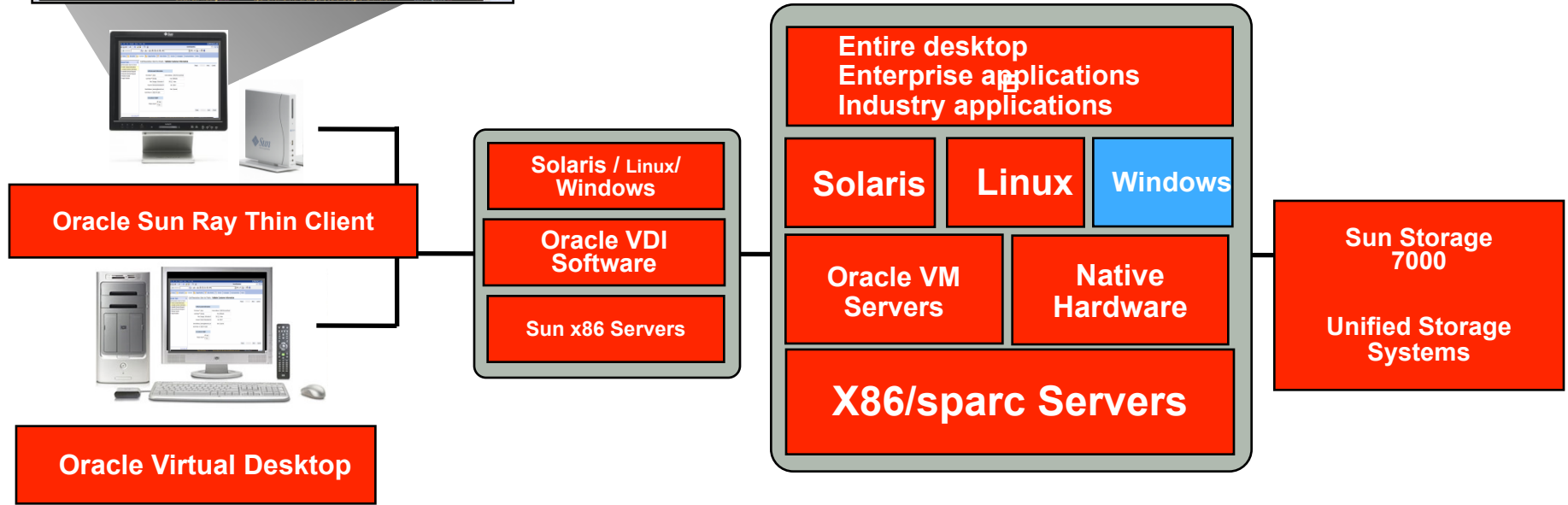


Oracle Virtualization

End-to-End, Application to Disk Solutions

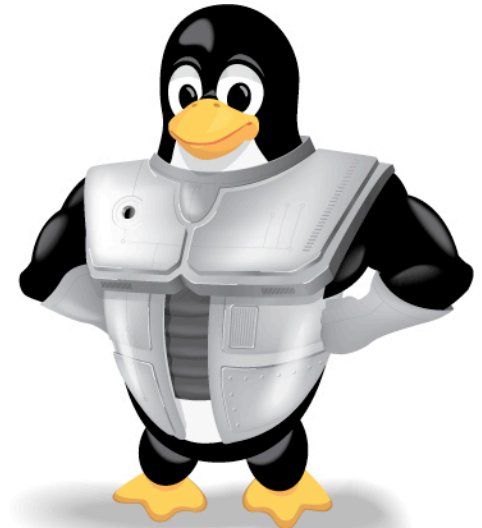


- Unique delivery of complete, open, integrated solutions



External Resources

- **Linux Home Page**
oracle.com/linux
- **Follow us on Twitter**
www.twitter.com/ORCL_Linux
- **Free Download: Oracle Linux**
edelivery.oracle.com/linux
- **OPN Linux Knowledge Zone**
oracle.com/partners



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