



SOLUTION
READINESS

Oracle[®] Databases on VMware[®] Frequently Asked Questions (FAQ)

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VMware, Inc
3401 Hillview Ave
Palo Alto, CA 94304
www.vmware.com

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1. Oracle and VMware Overview

Why is Oracle relevant to VMware?

The high volume of x86 server revenue driven each year by Oracle workloads makes Oracle an influential business partner for key VMware OEMs. This represents a significant market for VMware to tap with Oracle and its channel and OEM partners. Oracle is not just the largest enterprise software company in the world—Oracle drives more server sales to more companies than practically any other ISV of any size. The impact that VMware can have on the Oracle ecosystem is profound, and likewise, Oracle's relationship with VMware is crucial to providing a successful customer experience with Oracle databases on VMware.

From a technology perspective, VMware provides underlying infrastructure and management products that effectively support expanded or simplified Oracle product portfolio deployments. Oracle has its own database virtualization software, Oracle VM, but VMware is the leading x86 virtualization company and provides a large portfolio of best-in-class virtualization products. Though a competitor, Oracle recognizes the importance of VMware for its own growth.

VMware is focused on building out the Oracle marketplace—a marketplace that is eager to consume Oracle databases deployed on VMware. We will continue to support ISVs, OEMs, and channel partners in this endeavor as interest in Oracle on VMware grows.

How do the VMware and Oracle customer bases intersect?

VMware presently claims 99 of the Fortune 100 as customers, and Oracle can likely make the same claim. The intersection of VMware/Oracle customer bases cuts across all industries and segments. The sharing of so many customers in common forms the basis for a field-level engagement strategy that captures this opportunity for both companies.

Will Oracle be a driver of VMware vSphere™ adoption, and what are the implications for long-term VMware revenue?

Oracle databases and applications provide mission-critical software foundations for the majority of large enterprises worldwide. For every server running Oracle software in production, there are several pre-production systems supporting development, test, staging, QA and other crucial functions. VMware vSphere reduces the total cost of deploying Oracle software in pre-production environments. VMware offers datacenter administrators the opportunity to host much larger Oracle infrastructures due to the lower associated physical server costs.

Virtualizing the Oracle pre-production environment can enable customers to invest in additional test environments, distributed staging, distributed QA and other features that would be cost-prohibitive with purely physical infrastructure. VMware and VMware partners can benefit from harnessing the spending power of Oracle's global customers as they continue to grow their overall Oracle footprint (as Oracle expands into the far corners of the application ecosystem) over time.

As Oracle adoption continues to grow, vSphere adoption should grow with it.

2. Oracle Databases on VMware

What does VMware provide to rapidly deploy Oracle Databases for Dev/QA/Test environments?

VMware vCenter™ Lab Manager enables users to create snapshots and makes extensive use of linked clone technology. This results in rapid cloning and provisioning times while achieving significant storage savings. Development (Dev), QA, and Test resources can have access to clones of databases, thus enabling more frequent and thorough testing. Users can build multi-tier environments from a library of standard VM images and ISOs that system and DB administrators publish—providing more control and consistency.

Lab Manager also helps eliminate the risk of failed production system updates. Database owners can create faithful replicas of production systems for patch testing and seamlessly transition updated system configurations across testing, staging and production environments connected to different networks, server and storage systems. Lab Manager allows release teams to update production systems more quickly, shorten maintenance windows and avoid downtime.

Because Lab Manager automatically manages storage and networking in an extremely efficient manner, system and storage administrators are able to concentrate on production-related tasks.

Does VMware provide load balancing for my vSphere Oracle HA cluster?

Yes, VMware vSphere 4 includes a load balancing mechanism called VMware Distributed Resource Scheduler (DRS). DRS monitor the resource needs of the VMs at the time of their power on and allocate resources by placing the VMs on the appropriate hosts in the cluster. If the resource demands change after the initial placement of VM, DRS automatically relocates the VMs to hosts where the resources are more readily available. VMs continue to get the resources their workloads demand and thus deliver the same performance as if they were running on dedicated hardware. Recently, the VMware Performance Team demonstrated tangible benefits of using DRS in a vSphere 4 cluster running virtualized SQL workloads.

As a vSphere 4 cluster aggregates the compute and memory resources across all hosts, it also uses resource pools as a mechanism to partition and manage those resources and guarantee minimum resource levels are available to different groupings; for example, to create and manage one resource pool for Oracle RAC databases, another for Oracle single-instance databases, another for infrastructure workloads, and so on. Resource pools and DRS are used to effectively protect performance SLAs in a vSphere cluster.

Can Oracle Database Administrators use their current DBA skills in virtualized Oracle database environments?

Yes, DBAs can fully leverage their current skill set while benefiting from all of the benefits associated with virtualization.

Why should customers consider deploying Oracle databases in a vSphere HA cluster?

Here are some reasons for customers to run Oracle databases in a vSphere HA cluster:

- Virtualizing workloads on vSphere 4 significantly reduces the number of physical systems your organization requires while also achieving more effective utilization of those assets. Customers realize tangible savings from consolidation, along with operational savings from reduced datacenter floor space, power and cooling requirements—which also reduces your CO2 footprint.
- Planned maintenance on hardware (host or storage) no longer requires after-hours downtime as vSphere 4 features such as VMware VMotion™ and Storage vMotion enable you to seamlessly move the workload elsewhere while the maintenance is performed.
- The encapsulation of each database and network operating system within a VM allows customers to run combinations that best suit their application stacks.

- As the VM is abstracted from the underlying hardware layer (host, storage and network), infrastructure upgrades or replacements may be carried out without the need for major reinstallation and data migrations.

Client-specific savings can be modeled using the online VMware Virtualization TCO and ROI Calculator.

I am a DBA. How do I meet SLAs for database performance, availability and disaster recovery?

Oracle Database and IT Administrators must meet Service Level Agreements (SLAs) to provide availability and performance to Oracle users. VMware technologies such as VMware HA, VMware vMotion, and VMware DRS help DBAs and IT administrators meet SLAs and provide high availability. Protecting production datacenters running Oracle databases during disasters is critical to any business. VMware vCenter Site Recovery Manager provides effective disaster recovery, protecting against data loss and minimizing downtime for the datacenter in the event of a disaster.

How do I control Oracle server sprawl?

Oracle database deployments can generate significant server sprawl due to the need to provision separate systems for development, quality assurance/test and production environments. As a result, Oracle database implementations can increase exponentially, and even smaller implementations can have a relatively large IT footprint. In a typical deployment, every database server environment is hosted on dedicated physical systems that are not fully utilized much of the time. Many businesses also have a hardware-replacement policy that states all hardware must be refreshed every three to five years. Oracle database server consolidation with VMware vSphere helps to reduce hardware costs and increases in server utilization.

Does VMware support my dynamic business environment?

Yes. Mergers and acquisitions present significant challenges to an IT organization. IT integration is often incomplete, delayed, and costly, and this can frustrate business goals and undermine the success of a merger. VMware virtualization reduces the cost and complexity of merging disparate IT environments by converting their current Oracle database server environments to virtual machines. These virtualized workloads can run on the latest industry-standard servers and are easily incorporated into one environment. As the data and processes of the acquired company are integrated into the existing database servers, the virtualized architecture provides greater flexibility to effectively address the mixed load on the systems.

How does VMware address my need for dynamic Oracle Datacenter Resource Management?

Running on dedicated physical servers, resizing applications requires reprovisioning on larger physical hosts, which is a time-consuming and highly disruptive undertaking. Databases administrators have to forecast capacity requirements years in advance and translate that estimate into system specifications, including CPU and memory. If conditions change, the database must be reprovisioned, causing downtime, disruption, and negative business impact. VMware vSphere provides capabilities that enable IT operations to scale applications dynamically set using VMware Hot Add to add CPU and memory on the fly, and VMware DRS to perform live migrations of virtual machines in a DRS cluster from an over utilized host to one with more available capacity.

3. Selling and Positioning Oracle databases on VMware

What are key trigger events for deploying Oracle databases on vSphere?

Key trigger events include:

- Hardware refreshes
- Solving compliance and security issues
- New business units requiring Oracle Databases
- Migrating from traditional Unix/mainframe environment to x86 platforms to reduce costs and provide an open platform
- Creating cost-effective development and testing environment quickly
- Creating or modifying a disaster recovery plan
- Growing virtualization footprint within IT business unit.
- Underutilized Oracle Database servers that need consolidation

Who are the key stake holders for a virtualizing Oracle database server opportunity?

The key stake holders are:

- Vice President, WW IT Operations – Responsible for all IT operations. Controls and manages datacenter operations, server, networks, databases and storage. Interest: reducing costs through maximum utilization and consolidation.
- Manager, Databases – Manages all production and development databases with a team of DBAs. Interest: Provide required resources and make the environment available.
- Production DBAs and Database Architects – Concerned with scalability, performance and overall resource management. DB architects are interested in providing cost-effective architectures that include efficient consolidation, rapid provisioning and automation capabilities. Interest: leverage their current skill sets to perform their roles.
- Business Owners (CIO, CFO, Line of Business VPs, etc.) – Decision makers responsible for controlling budgets. Interest: Lower TCO and Higher ROI.

What are the benefits customers get by deploying Oracle databases on VMware?

VMware customers who run Oracle databases on vSphere enjoy the following benefits:

- Effective utilization of datacenter resources
- Maximize availability of Oracle environment at lower cost
- Rapidly deploy Oracle Database servers for development and testing
- Maximize uptime during planned maintenance
- Minimize Oracle datacenter costs for floor space, energy, cooling, hardware and labor
- Minimize planned and unplanned downtime
- Automated testing and failover of Oracle datacenter environments for disaster recovery and business continuity
- Helps to achieve IT Compliance
- Realize immediate ROI

Where can I find customer success stories?

Many customers have successfully deployed Oracle databases on VMware. See the success stories at <http://vmware.com/solutions/partners/alliances/oracle-database-customers.html>.

4. Oracle Support and Certification for VMware

What is the Oracle support statement for VMware?

Oracle's support note 249212.1 for VMware, published in MyOracleSupport, defines Oracle's policy for supporting applications on VMware. This support policy is very similar to the types of support provided by other ISVs. And just like at other ISVs, Oracle's known bug repository, MyOracleSupport, has not had a single ESX-related issue logged in more than four years. Based on our experience with many VMware customers running Oracle in production on VMware, what it comes down to is that Oracle's support organization will provide support when customers call.

The following are facts from Oracle's support statement:

- Oracle will accept support requests on VMware for bugs already known to Oracle
- Oracle may accept support requests on VMware for bugs that are not seen by Oracle as being caused by virtualization
- Oracle maintains the right to require physical reproduction if they suspect VMware is "at fault"
- Oracle RAC support is now included for 11.2.0.2 and above(**Updated Nov 8, 2010**)

VMware Technology and System Integration partners also have support commitments for Oracle on VMware. For examples, see the following support statements :

- [Technology Partner for Oracle Support - EMC](#)
- [Service and Integration Partner for Oracle Support – House of Brick](#)

VMware Oracle Support Policy - VMware GSS provides support for our customers running Oracle products. VMware GSS will open a Support Request for all Oracle cases referred to VMware technical support, and will take complete ownership of the issue until resolution. For more information, visit <http://www.vmware.com/support/policies/oracle-support.html>

How does Oracle certify products and what does that mean to VMware?

At present, Oracle has only certified its own virtualization solution, Oracle VM. From a VMware perspective, this makes sense—as a rule, Oracle certifies their solutions to an operating system. If the certified OS will support a given hardware platform, then by design the Oracle solution will run on that hardware platform. This is actually a good thing for VMware, but has caused concern among customers who do not understand the difference between VMware ESX™ (bare-metal) technology and Oracle's/competitors' Para-virtualized (OS-modifying) virtualization solutions.

Because Oracle certifies to the OS, VMware is considered part of the hardware. To run on ESX, operating systems need not be modified—they are the same OS to which Oracle products bind. Therefore, we have a distinct advantage over our competitors (including Oracle VM) who modify OS source to achieve their virtualization solutions. For Oracle, such modified operating systems would not represent a certified OS, and would not qualify for Oracle support.

5. Licensing

What is the licensing technology Oracle counts for VMware?

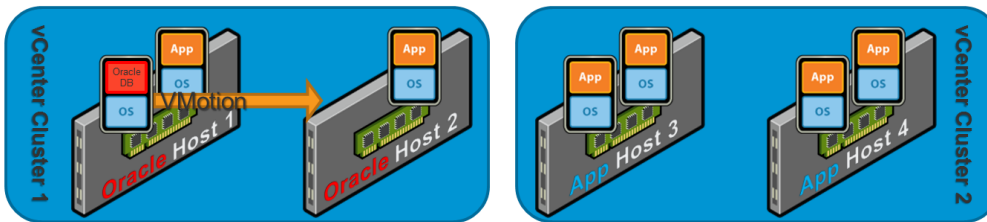
Oracle counts VMware as soft partition technology, so it must license for the entire server. After licensing, multiple instances of Oracle databases can be run with no additional charge.

Can you provide an example for Oracle database Licensing Model on VMware?

See the following License example on the current Licensing Model for Oracle databases on VMware:

License Example: A DRS Cluster with Oracle

- Four blades, each w/4 CPU cores; each VM is 2 vCPU (2-core)



- Solution:
 - Both ORACLE HOSTS must be licensed for all 8 cores on 2 blades
 - **Same physical or virtual:** (8 cores) x (0.5 x86 factor) = 4 licenses
 - Free to move that Oracle DB VM back & forth between Host 1 & 2
 - **Do not let Oracle DB VMs migrate to App Host 3 or App Host 4!**
 - Create vCenter logical clusters to isolate Oracle hosts & comply
 - See Gartner Research Doc ID #G00165003 for similar guidance

Figure 1. License Example: A DRS Cluster with Oracle

VMware does not offer guidance on third-party licensing. Oracle has publicly available pricing and licensing information at <http://www.oracle.com/corporate/pricing/index.html>.

6. Performance and Best Practices

What's the performance like when running Oracle on vSphere?

It is excellent. This should no longer be of concern for any but the most intensive production workloads for Oracle on x86. We can be confident that vSphere is capable of handling Oracle workloads of all magnitudes, and move the customer focus to issues of optimized deployment.

For those customers who have "extreme production workloads" (as defined as x86 servers fully-utilized by design), the VMware Performance Team has compiled a comparison between Oracle database throughput on vSphere and native hardware as summarized in the following table:

Metric	Native	VM
Throughput in business transactions per minute	293K	250K
Disk IOPS	71K	60K
Disk bandwidth	305MB/s	258MB/s
Network packet rate	12K/s receive, 19K/s send	10K/s receive, 17K/s send
Network bandwidth	25 Mb/s receive, 66 Mb/s send	21 Mb/s receive, 56 Mb/s send

In this performance exercise, when running a very large deployment (Eight CPU's, very busy Oracle DB on a fully committed vSphere 4 host. The number of vCPUs = number of pCPUs), there is less than a 15% difference between virtual and native performance. When there are additional pCPUs, the ESX host can effectively offload certain tasks such as I/O processing to idle cores and provides more flexibility in scheduling decisions. This achieves results even closer to those obtained on native hardware. For more information refer to http://www.vmware.com/pdf/Perf_ESX40_Oracle-TPC-C-eval.pdf.

Does VMware provide best practices or tips for deploying Oracle databases on VMware vSphere?

Yes. The most demanding Oracle database workloads can be virtualized with VMware vSphere and ESX 4, with greater than 95 percent of Oracle instances matching native performance. Essential tips for successfully deploying Oracle databases on vSphere (enabling DBAs to meet their performance and availability goals), can be accessed at

http://www.vmware.com/files/pdf/Oracle_Databases_on_vSphere_Deployment_Tips.pdf

7. General Questions

Oracle Database Versions: What are the Oracle Database editions and which one should i choose?

Oracle's current database release is 11g. Previous versions relevant in x86 contexts include 10g, 9i, and 8i. The three primary versions of Oracle 11g are the Enterprise Edition (EE), Standard Edition (SE) and Standard Edition One (SE-1). All editions are built using the same common code base, which means your database applications can easily scale from small, single processor servers to clusters of multi-processor servers without changing a line of code.

The following are descriptions of the Oracle database editions:

<p>Enterprise Edition (EE)</p> <p>Customers' choice for production databases. All Oracle features and add-ons can be applied to Oracle EE. This is the workhorse of the mix and is the database that customers typically run in production and pre-production environments.</p>	<p>Licensed by Core</p> <p>Customers count the number of cores on a given server and license every core, regardless of how many cores that Oracle applications actually use. Once licensed, a box can support unlimited virtual machines.</p>
<p>Standard Edition (SE)</p> <p>Same database as EE, but limited to four sockets. A key feature of SE is that it includes RAC. At about one-third the cost of Oracle EE, this version is an excellent choice for customers looking to affordably extend their Oracle footprint to more users, deploy a small RAC configuration, or do other useful work with Oracle on a smaller 4-socket scale.</p>	<p>Licensed by Socket</p> <p>Customers can license up to 4 sockets with SE, and once licensed, run unlimited virtual machines on the box. This is an attractive option for x86 deployments. The SE license limits SE to 4-socket clusters. That is, one 4-socket host, two 2-socket hosts, or four 1-socket hosts. If customers attempt to use SE in vCenter clusters larger than that, Oracle requires the upgrade of licenses to Oracle EE. The easy solution: isolate SE editions in 4-socket <i>vCenter logical clusters</i> to comply with licensing</p>
<p>Standard Edition One</p> <p>Same database as EE, but limited to two sockets; also lacks RAC functionality. The SE-1 version is the "ultimate" developer edition for runtime, as it is 1/8th the price of EE, but can still support the same DB as a production server licensed with the EE version.</p>	<p>Licensed by Socket</p> <p>Customers can license up to two sockets with SE-1 and, once licensed, run unlimited virtual machines on the box. There is real extension potential with SE-1 running on VMware vSphere. Database Administrators can host multiple Oracle virtual machines on a 2-socket box running SE-1 and add additional developers to the Oracle mix very affordably. This option is largely underutilized by customers of all sizes and is a great way for VMware to add value to the Oracle development environment. The caveat for clustering also applies here: SE-1 may not be clustered beyond a single 2-socket box or two 1-socket boxes</p>

More information can be obtained from <http://www.oracle.com/us/products/database/product-editions-066501.html>

How do I migrate Oracle databases from UNIX to Linux (x86)?

Endianness is the byte ordering of blocks in a file system, which differs between host operating systems. Platforms such as Linux®, Windows®, OpenVMS, and Tru64 are *small endian* platforms, and Solaris™, HP-UX (Intel® IA64 and PA-RISC), AIX, IBM zSeries-based Linux, and IBM Power-based Linux are *big endian* platforms.

For example, Solaris SPARC is big endian and Solaris x86 is little endian. They are not compatible and copying related files will not work. Conversion is a straightforward matter; MyOracleSupport DocID 243303.1 describes the migration process. Essentially, the DBA uses Transportable Tablespaces to create an export of the metadata and then use RMAN to convert the datafiles to the correct endian, a very well-understood process in the context of Oracle.

As proof of this, VMware is showcasing successful RISX/UNIX to x86 migrations for vSphere. We have an excellent case study showing the move from Power/AIX to Linux/vSphere for Oracle at Indiana University. The details of that successful customer migration can be found at:
<http://www.vmware.com/a/customers/customer/610/Indiana+University>.