Oracle VM Tips and Best Practices

To become a successful Oracle VM professional

Presented by: Francisco Munoz Alvarez



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Oracle ACE director hones skills while helping others.

When it comes to learning something new, Francisco Munoz Alvarez doesn't look for a teacher; he looks for someone who has a problem.

"One of the best ways to learn is by helping others," says Alvarez. "When someone has a problem on an OTN [Oracle Technology Network] forum, I enjoy trying to assist them with it. I've learned a lot by trying to help other Oracle users to solve their problems."

Over the years, he has learned enough to become an Oracle ACE, an Oracle ACE director, and now *Oracle Magazine*'s Oracle ACE Director of the Year. Alvarez is also the founder and CEO of Database Integrated Solutions.

For Alvarez, learning—and helping others—takes legwork. This year, as an Oracle ACE director, he has appeared at 22 conferences in 18 countries, where he not only gives talks but takes the time to answer questions and assist users with complex Oracle challenges. In addition, he frequently helps his blog visitors (about 25,000 per month) solve difficult Oracle-related problems.

Given that he's also president of the New Zealand and Chilean Oracle user groups and the Latin American Oracle User Group, Alvarez' energy seems to have no limits when it comes to the Oracle community. He himself puts it best: "I never get tired of helping people learn how to share their knowledge and experience."





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Oracle Database 12c Backup and Recovery Survival Guide

A comprehensive guide for every DBA to learn recovery and backup solutions

 Francisco Munoz Alvarez
 [PACKT]
 enterprise

 Aman Sharma
 [PACKT]

Available at AMAZON.COM







Now is time to talk about Oracle VM...



1. Be careful with the domain type of the VM you are deploying. Each type will perform different.

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OVM Domain Type

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		Max. Memory (MB):	OVM/SPARC
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		Priority:	50 🖨
		Processor Cap %:	100 🚔



OVM Domain Type, Why?

Normal Performance using different domain types:

	OVM (PVM)	OVM (HVM+PV)	OVM (HVM)
TPS MAX	25	23	21
TPS AVG	14	14	13
TPM MAX	921	891	866
TPMAVG	816	742	719
RT MAX	837	532	1526
RT AVG	44	55	111
Read (mb/s)	423.14	312.37	57.06
Write (mb/s)	380.20	297.32	151.58
TRT	35:02.3	1:08:12	1:30:47
RIPS	81,953	67,198	51,441
DGPS (MB)	6.10	5.07	3.80

Do you see the difference?

If using HVMPV think about using HUGE pages.



2. Be careful when doing a V2V or P2V.

	OVM (PVM)	OVM (HVM+PV)	OVM (HVM)
TPS MAX	25	23	21
TPS AVG	14	14	13
TPM MAX	921	891	866
TPMAVG	816	742	719
RT MAX	837	532	1526
RT AVG	44	55	111
Read (mb/s)	423.14	312.37	57.06
Write (mb/s)	380.20	297.32	151.58
TRT	35:02.3	1:08:12	1:30:47
RIPS	81,953	67,198	51,441
DGPS (MB)	6.10	5.07	3.80

When a VM is created using V2V or P2V, it will be by default using the HVM domain type.



3. Avoid as much you can using OCFS2.

	OVM (PVM-RD)	OVM (PVM)	OVM (HVM+PV-RD)	OVM (HVM+PV)	OVM (HVM)
TPS MAX	25	25	25	23	21
TPS AVG	18	14	14	14	13
TPM MAX	933	921	912	891	866
TPMAVG	838	816	826	742	719
RT MAX	164	837	215	532	1526
RT AVG	18	44	29	55	111
Read (mb/s)	404.52	423.14	400.32	312.37	57.06
Write (mb/s)	380.20	380.20	388.30	297.32	151.58
TRT	31:52.0	35:02.3	59:03.3	1:08:12	1:30:47
RIPS	93,542	81,953	87,406	67,198	51,441
DGPS (MB)	7.00	6.10	6.50	5.70	3.80



Avoid as much you can using OCFS2

Avoid using virtual disks on OCFS2 and present a LUN (Raw device) directly to the guest VM. You will possible achieve a better performance than a bare metal doing this.

	Bare Metal	OVM (PVM-RD)	OVM (HVM+PV-RD)
TPS MAX	27	25	25
TPS AVG	14	18	14
TPM MAX	924	933	912
TPM AVG	810	838	826
RT MAX	277	164	215
RTAVG	35	18	29
Read (mb/s)	399.15	404.52	400.32
Write (mb/s)	469.87	380.20	388.30
TRT	53:32.0	31:52.0	59:03.3
RIPS	45,161	93,542	87,406
DGPS (MB)	3.40	7.00	6.50



- 4. Implement HA for your Oracle VM environment.
 - a) Have a DR site
 - b) Always activate HA on the VMs
 - c) When possible always use Live Migration to move your VMs (Even if the CPUs are pinned)



Software Investment Guide

Failover - In this type of recovery, nodes are arranged in a cluster and share one disk array. A Failover cluster is a group of systems, bound together into a common resource pool. In this type of recovery method, the Production node acts as the primary node. When the primary node fails, one of the surviving nodes in the cluster acts as the primary node. Solutions like Oracle Failsafe (included with Oracle Database EE or SE, SE1), or third party vendor solutions (e.g. Veritas, HP Service Guard, HACMP, Linux HA - Heartbeat) are used to manage Failover environments. In this type of environment, Oracle permits licensed Oracle customers to run some Technology Programs on an unlicensed spare computer for up to a total of ten separate days in any given calendar year. Once the primary node is repaired, you must switch back to the primary node. Once the failover period has exceeded ten days, the failover node must be licensed. In addition, only one failover node per clustered environment is at no charge for up to ten separate days even if multiple nodes are configured as failover. Downtime for maintenance purposes counts towards the ten separate days limitation. Any other use requires the environment to be fully licensed. . In a failover environment, the same license metric must be used for the production and failover nodes when licensing a given clustered configuration. Additionally, when licensing options on a failover environment, the options must match the number of licenses of the associated database. See illustration #4.



Software Investment Guide



Illustration #4: Failover

Failsafe included with Oracle
Database EE is installed on nodes 1 and 2; it is running on node 1 only
If node 1 fails, node 2 takes over (there is always an idle node with Failsafe or other vendor cluster solutions)



Migrating your VMs with pinned vCPUs

When live migrating a Guest VM that have vCPUs pinned (due that you need to patch/upgrade the Oracle VM server where the VM is running), always remember to:

- 1. Manually pin the VM vCPUs to physical CPUs in the destination server just after the live migration of the VM is completed.
- 2. When the patching/upgrade required on the Source server is completed, live migrate the guest VM back to this server and manually pin the vCPUs again.
- 3. Be careful to not use Live Migration for more than 10 days per year (as per the example in the previous 2 slides). If you violate this policy you will need to license your whole cluster.



5. OEM12c is a good friend!

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OEM12c

Benefits when using Portal:

- User will only see their own VM's
- When the user right click on the VM they will get the following options:
 - Modify Configuration
 - Clone
 - Delete
 - Start
 - Stop
 - Restart
 - Start and stop
 - Suspend
 - Resume
 - Launch VNC console

They will not be able to Clone or modify the configuration of any VM if you have removed their quotas.

And it is free for laaS without charge back!

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6. Do not over allocate the CPU of a Oracle VM Server.

Example:

- OVM Server has 2 hexa core = 12 CPUs
- With Multithread activated = 24 vCPUs

Always reserve 1 physical CPU per Processor. In this case 2 hexa core = 2 CPUs = 4 vCPUs.

Maximum available for VMs: 20 vCPUs

```
# xm info
nr_cpus : 8
nr_nodes : 1
cores_per_socket : 4
threads_per_core : 2
cpu_mhz : 3200
```



- 7. If want to save money in Licenses, always remember to PIN your VMs vCPU.
 - PIN using the Oracle VM Utilities (ovm_vmcontrol) [OVM 3.1 and up]
 - PIN it at configuration file Level (vm.cfg) [OVM 2]

"Hard partitioning means binding a virtual machine CPU to a physical CPU or core, and preventing it from running on other physical cores than the ones specified."

xm vcpu-list command shows a summary of which virtual CPUs are running on which physical CPUs.



The Oracle VM 3 Utilities are a collection of command line scripts that allow you to perform a set of basic management tasks. The Oracle VM Utilities are available for download as a .zip file from My Oracle Support, search for patch ID 13602094.



- 8. Have on mind all OS you can run on Oracle VM.
 - Red Hat
 - Oracle Linux
 - Solaris
 - Windows

Is these all? Think Again....



Guest OS for PV, HVM and HVMPV

able 1. 64-bit CPU Hardware Virtualized Supported Guest Operating Systems (Linux and Solaris)							
Guest Operating System	Hardware Virtualized 32-bit	Hardware Virtualized 32-bit with PV Drivers	Hardware Virtualized 64-bit	Hardware Virtualized 64-bit with PV Drivers			
Oracle Linux 7.x	N/A	N/A	Yes	Yes			
Oracle Linux 6.x	Yes	Yes	Yes	Yes			
Oracle Linux 5.x	Yes	Yes	Yes	Yes			
Oracle Linux 4.x	Yes	Yes	Yes	Yes			
Oracle Solaris 11 ^[a]	N/A	N/A	N/A	Yes			
Oracle Solaris 10 ^[a]	N/A	Yes	N/A	Yes			
Red Hat Enterprise Linux 7.x	N/A	N/A	Yes	Yes			
Red Hat Enterprise Linux 6.x	Yes	Yes	Yes	Yes			
Red Hat Enterprise Linux 5.x	Yes	Yes	Yes	Yes			
Red Hat Enterprise Linux 4.x	Yes	Yes	Yes	Yes			
CentOS 6.x	Yes	Yes	Yes	Yes			
CentOS 5.x	Yes	Yes	Yes	Yes			
CentOS 4.x	Yes	Yes	Yes	Yes			
SUSE Linux Enterprise Server 11.x ^[b]	No	No	Yes	Yes			



Oracle Solaris support begins with Solaris 10 10/09. The Solaris 10 or Solaris 11 OS runs as a hardware virtual machine (HVM), which requires HVM support (Intel VT or AMD-V) on the underlying hardware platform. By default, Solaris 10 or Solaris 11 OS already has the required paravirtualized (PV) drivers installed as part of the OS. Oracle Solaris 10 supports x86 32-bit and 64-bit architecture. 32-bit or 64-bit mode is selected at OS boot time by examining the hypervisor and the underlying hardware. Oracle Solaris 11 supports x86 64-bit architecture only.

The minimum required kernel version for SLES 11 is 3.0.31-0.9. To start a PVHVM guest on SLES 11, the following steps are required:

- 1. Install the operating system and upgrade to the 3.0.31-0.9 kernel version.
- 2. Shutdown the virtual machine.
- 3. In Oracle VM Manager, edit the Domain Type for the virtual machine to set it to "Xen PVM".
- 4. Restart the virtual machine.



Guest OS for PV, HVM and HVMPV

Guest Operating System	Hardware Virtualized 32-bit	Hardware Virtualized 32-bit with PV Drivers 3.x	Hardware Virtualized 64-bit	Hardware Virtualized 64-bit with PV Drivers 3.x
Microsoft Windows Server 2012 R2	N/A	N/A	Yes	Yes
Microsoft Windows Server 2012	N/A	N/A	Yes	Yes
Microsoft Windows 8.1	Yes	Yes	Yes	Yes
Microsoft Windows 8	Yes	Yes	Yes	Yes
Microsoft Windows™ 7 SP1	Yes ^[a]	Yes	Yes ^[a]	Yes
Microsoft Windows™ Vista SP2	Yes ^[a]	Yes	Yes ^[a]	Yes
Microsoft Windows™ Server 2008 R2 SP1	N/A	N/A	Yes ^[a]	Yes
Microsoft Windows™ Server 2008 SP2	Yes ^[a]	Yes	Yes ^[a]	Yes
Microsoft Windows™ Server 2003 R2 SP2	Yes ^[a]	Yes	Yes ^[a]	Yes
Microsoft Windows™ Server 2003 SP2	Yes ^[a]	Yes	Yes ^[a]	Yes

Table 2. 64-bit CPU Hardware Virtualized Supported Guest Operating Systems (Microsoft Windows)

Note: HVM-only mode is used to facilitate the Windows PV Drivers installation. Windows PV Drivers are reuired on the Windows OS if available in order to be supported as a guest OS.



More Oracle VM Server/Windows Guests

Windows paravirtual (PV) drivers are high-performance network and disk drivers that significantly reduce the overhead of the traditional implementation of I/O device emulation. These drivers provide improved network and disk throughput to run fully virtualized Windows guests in an Oracle VM Server for x86 environment.

Oracle VM Windows PV Drivers are signed by Microsoft. Oracle is a participant of Microsoft Windows Server Virtualization Validation Program (SVVP). Windows PV Drivers along with Oracle VM Server for x86 have passed the SVVP requirements, <u>read the details here</u>. The Microsoft SVVP program enables the vendor such as Oracle to validate Oracle VM Server for x86 along with Windows PV Drivers so that Microsoft customers running copies of Windows Server they have acquired and licensed from Microsoft directly can receive technical support for Windows Server in virtualized environments,

learn the details of the supported Microsoft server software (e.g. SQL Server, Exchange Server, etc.) <u>here</u>.

Plus Oracle VM Server for x86 SPARC Guest Operating Systems

The guest virtual machines you create in an Oracle VM Server for SPARC-based server pool must be one of the following supported configurations.

- Oracle Solaris 11
- Oracle Solaris 10 8/11 or later



Oracle VM and CPU Over Commiting (2 sockets, 12 cores)





Oracle VM and CPU Over Commiting (1 core for Oracle DB License)





Conclusions

- Choose the domain type correctly due that it will affect the performance of your VM.
- Be careful when doing V2V or P2V.
- If possible do not use virtual disk, present a LUN directly to the VM instead.
- Implement HA in your environment and use live migration even if you have your VM vCPUs pinned.
- Use OEM12c to manage your Oracle VM environment.
- Do not over use physical CPU of a Oracle VM Server.
- Use Hard Partitioning to save in Oracle Licenses.
- Oracle VM is flexible and can run multiple OS as a Guests.
- Oracle VM and CPU over commiting



References:

My Blog: http://www.oraclenz.org

Certificate Software on Oracle VM: My Oracle Support 464754.1

Oracle VM Resource page: http://www.oracle.com/us/technologies/virtualization/ oraclevm/resources/index.html



Questions? Comments?

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Thank you!!

