

Installation Experiences with Oracle 11gR2 on Linux on System z

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Topics to Cover

- 11gR2 Install and Patching Notes
- Current Hot Topics with Oracle on System z Linux
- Oracle 11gR2 Features with Linux on System z

11gR2 Install and Patching Notes:

Oracle Database Released Dates



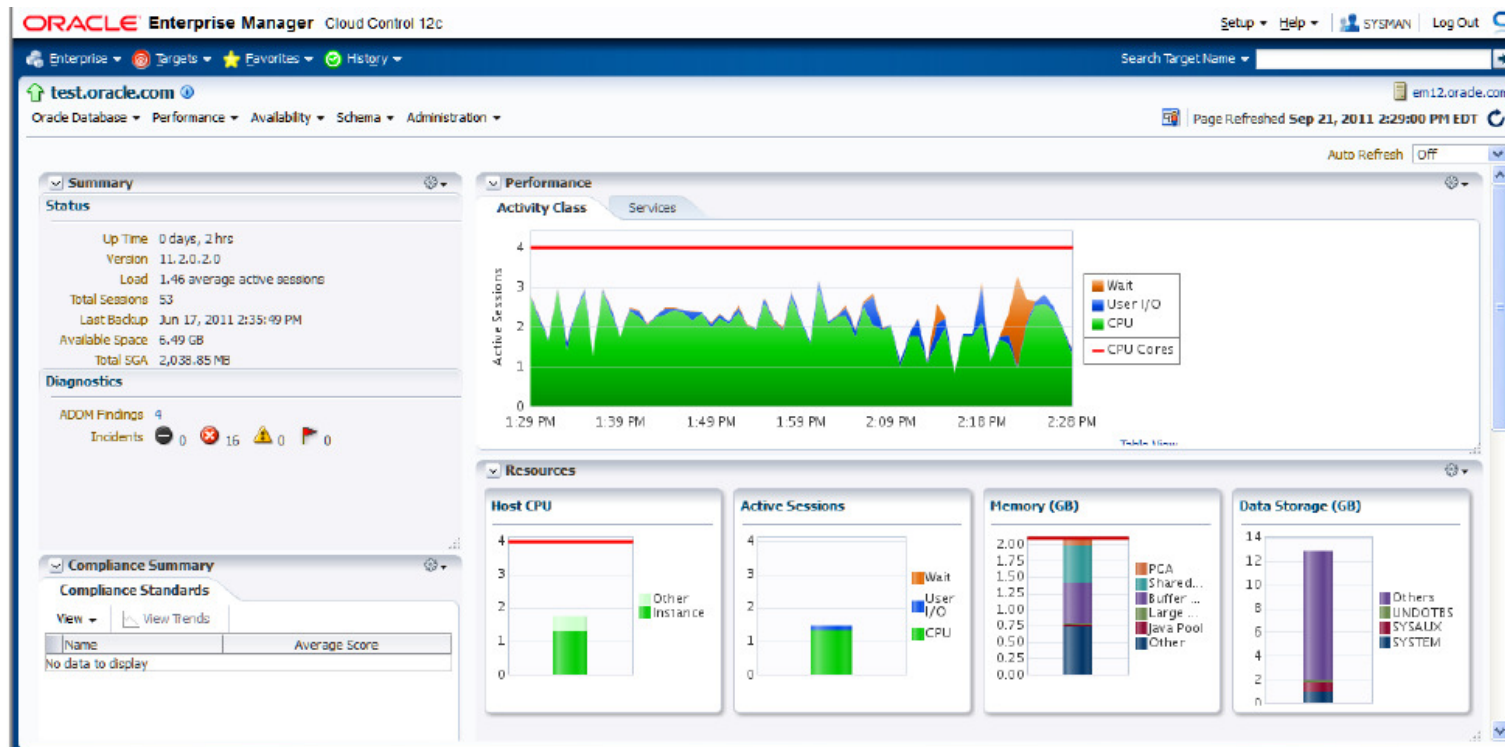
IBM Platform	<u>10.2.0.4</u>	<u>10.2.0.5</u>	<u>11.1.0.7</u>	<u>11.2.0.1</u>	<u>11.2.0.2</u>	<u>11.2.0.3</u>
Linux x86:	22-Feb-08	30-Apr-10	18-Sep-08	1-Sep-09	13-Sep-10	23-Sep-11
Linux on System z:	16-Dec-08	3-Jan-11	Not planned	Not planned	30-Mar-11	1-Dec-11
AIX on POWER:	15-May-08	3-Jun-10	6-Oct-08	22-Dec-09	19-Oct-10	29-Oct-11
System x Windows	17-Mar-08	19-Jul-10	10-Oct-08	5-Apr-10	15-Dec-10	11-Nov-11

* Oracle on System z Releases are getting better and better with every release
Patch Set Updates are the same date as other Platforms

Enterprise Manager Grid Control



- Oracle Enterprise Manager – 10.2.0.5 Agent supports running Oracle 11gR2 databases.
- **Oracle Support has published a release Date of Q4 Financial Year 2012, for the new Enterprise manager 12c Grid Control Agent – which means between **Now and May 2012** for Linux on System z.**




Install Warning - Compat-libstdc++-33

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 8 of 11

Perform Prerequisite Checks

- Download Software Updates
- Installation Option
- Installation Type
- Cluster Configuration
- Install Locations
- Create ASM Disk Group
- Create Inventory
- Prerequisite Checks**
- Summary
- Install Product
- Finish



Some of the minimum requirements for installation are not completed. Review and fix the issues listed in the following table, and recheck the system.

▾
 ▾
 Ignore All

Checks	Status	Fixable
Checks		
Swap Size	Warning	No
Packages		
Package: compat-libstdc++-33-3.2.3-47.3	Warning	No
Device Checks for ASM	Warning	No

The libstd c++ package replaces the compat-libstdc++ package

Compat-libstdc++-33 Error

- **libstdc++33** package replaces the **compat-libstdc++** package

- **rpm -q --provides libstdc++33.rpm**

compat-libstdc++

libstdc++5 = 3.3.3-7.8.1

libstdc++.so.5()(64bit)

libstdc++.so.5(CXXABI_1.2)(64bit)

libstdc++.so.5(CXXABI_1.2.1)(64bit)

libstdc++.so.5(CXXABI_1.2.2)(64bit)

libstdc++.so.5(GLIBCXX_3.2)(64bit)

libstdc++.so.5(GLIBCXX_3.2.1)(64bit)

libstdc++.so.5(GLIBCXX_3.2.2)(64bit)

libstdc++.so.5(GLIBCXX_3.2.3)(64bit)

libstdc++.so.5(GLIBCXX_3.2.4)(64bit)

libstdc++.so.5(GLIBCXX_3.2.5)(64bit)

libstdc++.so.5(libstdc++.so.5)(64bit)

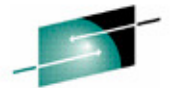
libstdc++33 = 3.3.3-7.8.1

- To complete the installation, click the Ignore Requirements box, then, hit the install/next button to finish the Oracle 11g R2 installation.

- Suse Link ->

<http://www.novell.com/support/dynamicckc.do?cmd=show&forward=nonthreadedKC&docType=kc&externalId=7004995&sliceId=1>

Oracle 10gR2 -> 11gR2 Upgrade



Some of the minimum requirements for installation are not completed. Review and fix the issues listed in the following table, and recheck the system.

Ignore All

Checks	Status	Fixable
Checks		
OCR Integrity	Ignored	No
Swap Size	Ignored	No

Details

OCR Integrity - This test checks the integrity of OCR across the cluster nodes.

Error:

- PRVF-10037 : Failed to retrieve storage type for "/dev/dasdj1" on node "orausr03" Could not get the type of storage
 - Cause: The storage location specified may be non-existent or invalid or the user running the check may not have permissions to access the specified storage.
 - Action: Specify a valid existing location, and ensure that the user running the check has valid read permissions to this location.
- PRVF-10037 : Failed to retrieve storage type for "/dev/dasdj1" on node "orausr13" Could not get the type of storage
 - Cause: The storage location specified may be non-existent or invalid or the user running the check may not have permissions to access the specified storage.
 - Action: Specify a valid existing location, and ensure that the

This test check
Operation Failed

Close

TIP => Safe to Ignore the OCR Integrity Check for Upgrades

Oracle Patch Set Update Notes

- Are released on the **same** date as other platforms quarterly.
- With Linux on System z, the “**opatch auto**” currently has a bug, so use the manual steps in the appendix, but don’t forget to run “catbundle.sql psu apply” for any existing or newly created databases.
- **Bug 13722527** - OPATCH AUTO FUNCTIONALITY NOT AVAILABLE IN 11.2.0.1.9 VERSION ON IBM: ZLINUX logged.
- **Tip** Apply per 3.2 Case 5 of the Patch Notes before running root.sh
 - **opatch napply -oh \$ORACLE_HOME -local /u01/stage/13343438**

Linux UDEV Rules for Oracle

Create a `/etc/udev/rules.d/99-udev-oracle.rules` file to assign permissions for DASD devices.

```
vi /etc/udev/rules.d/99-udev-oracle.rules
```

Result:

```
KERNEL=="dasd*1",ID=="0.0.0300",OWNER="grid",GROUP="oinstall",MODE="0660",SYMLINK+="ASM0300"  
KERNEL=="dasd*1",ID=="0.0.0305",OWNER="grid",GROUP="oinstall",MODE="0660",SYMLINK+="ASM0305"
```

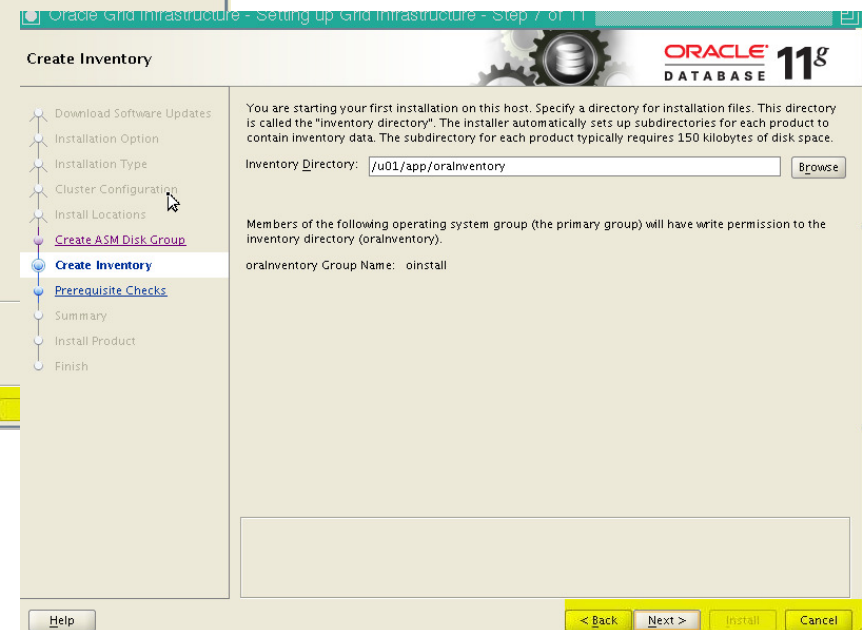
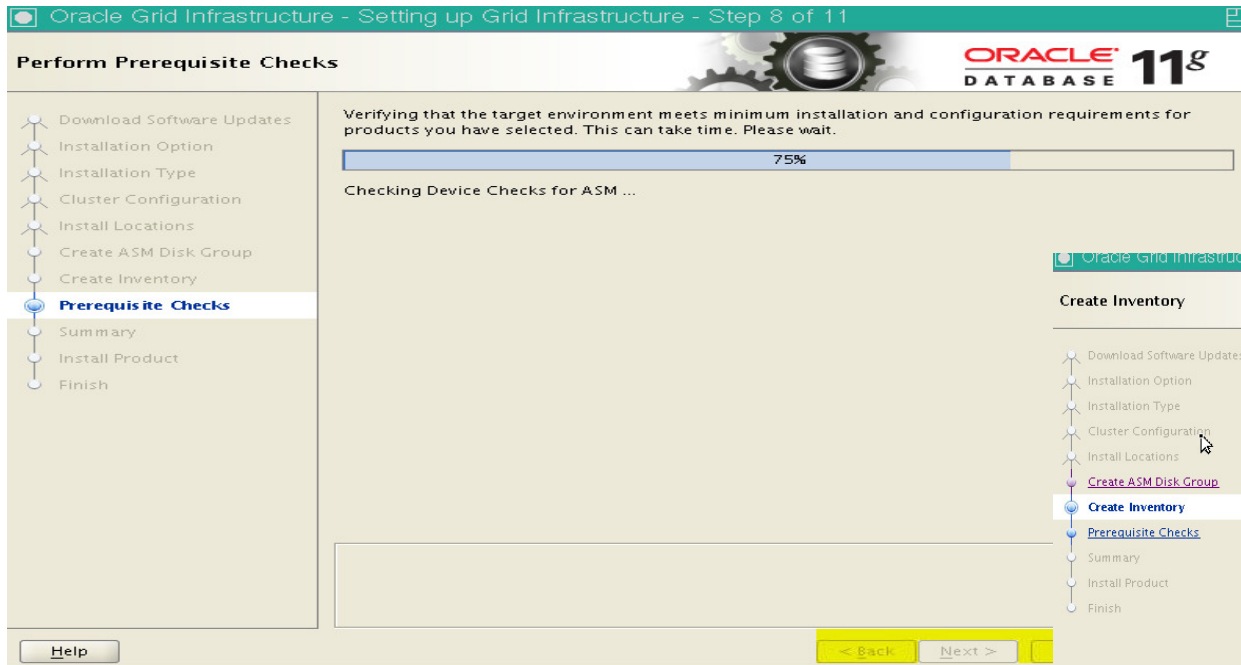
Make an entry for each device you plan to use with Oracle ASM.

From Oracle we can now work with the new ASM Disk Device:

```
ALTER DISKGROUP DG2 add disk '/dev/ASM0305';
```

```
ALTER DISKGROUP DG2 rebalance power 2;
```

11.2.0.3 RAC Install with UDEV Symbolic Links



Issue – Can hang at 75% for System Pre-check

Workaround - Download Patch – 13497268 and `cp exectask /tmp/CVU_11.2.0.3.0_grid` on all nodes while on screen panel 7 of Grid install

Problem can occur on all distributions of Linux (x86, Power etc)



Current Hot Topics with Oracle on System z Linux

Oracle's VKTM Process



- **New in 11gR2 Oracle VKTM process (Virtual Time Keeper)**
 - VKTM is responsible for providing centralized time tracking
 - wall-clock time (updated every second)
 - reference-time counter (updated every 20 ms)
 - **When System is CPU Idle – vktm still runs.**
- Non idle Linux Guest z/VM consistently stays in Q3 Status (which means it will never swap/release it's memory).
- If DB is stopped the database the Linux Guest goes to Q1 (or Q2) releasing memory. Restart DB, the machine stays in Q3.
- You can Disable tracing -> 11.2.0.3 + Oracle Note: **1381270.1**
 - To turn off VKRM tracing:
`alter system set events '10720 trace name context forever, level 0x10000000';`
 - To turn off VKTM tracing:
`alter system set events '10795 trace name context forever, level 2';`

Linux strace of Oracle's VKTM Process

```
$ ps -ef | grep vktm
```

```
oracle 6723 1 0 09:08 ? 00:00:00 ora_vktm_TEST11202
```

```
[root@orarac1 ~]# strace -p 6723
```

```
Process 6723 attached - interrupt to quit
```

```
gettimeofday({1323711237, 10495}, NULL) = 0
```

```
gettimeofday({1323711237, 10555}, NULL) = 0
```

```
nanosleep({0, 10000000}, {1323711237, 10495}) = 0
```

```
gettimeofday({1323711237, 21947}, NULL) = 0
```

```
gettimeofday({1323711237, 21999}, NULL) = 0
```

```
nanosleep({0, 10000000}, {1323711237, 21947}) = 0
```

- Oracle does a lot of Linux **gettimeofday** calls (up to 100 per second) particularly with `statistics_level` set to **'typical'** or **'all'**
- SuSe 11 SP1 and Red Hat 6.1 (Perhaps Future 5.x) versions have **reduced cpu consumption** for **gettimeofday()**

Reference ->

<http://linuxmain.blogspot.com/2011/11/vdso-or-how-to-read-time-faster.html>

11.2.0.3 Oracle CPU Utilization Observation

One Customer's 11.2.0.3 Experience:

- Oracle's **VKTM** process still uses almost the same amount of CPU minutes (about **0.08** vs. 0.09 with 11.2.0.2)
- However, we can see a great improvement with **ora_dia0** process. (about **0.07** sec cpu/minute vs. **0.28** with 11.2.0.2)

- database 1:
installed with NO options
The "gettimeofday" function is called 300 times every 15 seconds.

database 2:
installed with all options : (java, xml, Text, spatial, APEX, etc)
The "gettimeofday" function is called 1500 times every 15 seconds.

Additional VKTM - Suggestions

Collect SAR Data on an idle system:

Red Hat:

```
/usr/lib64/sa/sadc -d -F -I 2 150 vktmtest.sadc
```

SuSe:

```
/usr/lib64/sa/sadc -S ALL -F 2 150 vktmtest.sadc
```

Convert the raw sadc data into readable text with:

- `sar -A -f vktmtest.sadc > vktmtest.sar`

	CPU	%usr	%nice	%sys	%iowait	%steal	%irq	%soft	%guest	%idle
Average:	all	0.16	0.00	0.21	0.08	0.16	0.04	0.01	0.00	99.34

Oracle RAC Inter-Connect Considerations

- With System z you can use an Open System's Adapter Interface (OSA) e.g. eth1 or a Real Hipersocket configured on Layer 2 for the Oracle RAC Interconnect.
- Must Have Linux interface configured with ARP enabled due to Oracle's new Redundant Interconnect capabilities in 11.2+
- System z SAP processor's assist with Network offload of cpu utilization.

Various Network Interfaces on an Oracle RAC Node:



eth0 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
eth0.1859 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
inet addr:XXX.XXX.155.57 Bcast:158.151.155.255 Mask:255.255.254.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1

<- Public Interface -> **NOTE ARP is Enabled**
<- Public Interface ->w/ VLAN Tagging

eth0.1859:1 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
inet addr:XXX.XXX.155.61 Bcast:158.151.155.255 Mask:255.255.254.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1

← 1st Oracle SCAN IP Setup in DNS

eth0.1859:2 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
inet addr:XXX.XXX.155.62 Bcast:158.151.155.255 Mask:255.255.254.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1

← 2nd Oracle SCAN IP Setup in DNS

eth0.1859:3 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
inet addr:XXX.XXX.155.63 Bcast:158.151.155.255 Mask:255.255.254.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1

← 3rd Oracle SCAN IP Setup in DNS

eth0.1859:4 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
inet addr:XXX.XXX.155.65 Bcast:158.151.155.255 Mask:255.255.254.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1

eth0.1859:5 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
inet addr:XXX.XXX.155.59 Bcast:158.151.155.255 Mask:255.255.254.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1

eth0.1859:6 Link encap:Ethernet HWaddr 02:00:00:0F:00:01
inet addr:XXX.XXX.155.60 Bcast:158.151.155.255 Mask:255.255.254.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1

hsi0 Link encap:Ethernet HWaddr 06:00:F0:01:00:0E
inet addr:192.168.1.57 Bcast:192.168.1.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:8192 Metric:1

← Oracle Private Interconnect (RAC)

hsi0:1 Link encap:Ethernet HWaddr 06:00:F0:01:00:0E

inet addr:169.254.232.188 Bcast:169.254.255.255 Mask:255.255.0.0
UP BROADCAST RUNNING MULTICAST MTU:8192 Metric:1

← Oracle HA IP Redundant Interconnect



Oracle Automatic Memory – MEMORY_TARGET



- New memory parameter **MEMORY_TARGET**(AMM – Automatic Memory management)
- Combines ASMM (Automatic Shared Memory Management) parameters **SGA_TARGET** and **PGA_AGGREGATE_TARGET**
- If setting **MEMORY_TARGET** too large you may see...
ORA-00845: MEMORY_TARGET not supported on this system
Oracle alert log shows:
WARNING: You are trying to use the MEMORY_TARGET feature. This feature requires the /dev/shm file system to be mounted for at least 847249408 bytes.
- The error is really that the **MEMORY_TARGET** needs a larger **/dev/shm**
Run the following to resize tmpfs:
umount tmpfs
mount -t tmpfs shmfs -o size=1300m /dev/shm
df -k /dev/shm

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
shmfs	1331200	0	1331200	0%	/dev/shm

***** make permanent in the /etc/fstab file or startup file.**

Oracle 11gR2 – Changes in Mutex Locking



11gR2 Experience -> If using **cursor_sharing** = "FORCE" or "SIMILAR"

- 1) ORA-600 errors as workload increases [kkspsc0: basehd] or [kglLockOwnersListAppend-ovf] - **applied patches to address**
- 2) **AWR showing** -> *cursor: mutex S and library cache lock*
 1. Download and apply the 11.2.0.2.3PSU [Patch 11724916](#)
 2. Enable event 106001 to address Bug 10187168.

To enable the fix "**_cursor_features_enabled**" needs to be set
- 3) **Oracle 11.2.0.2.2 PSU (Patch Set Update)** includes new parameters that you can tweak based on workload characteristics. Even more fixes have been added

Note: **10411618 - Enhancement to add different "Mutex" wait schemes [ID 10411618.8]**

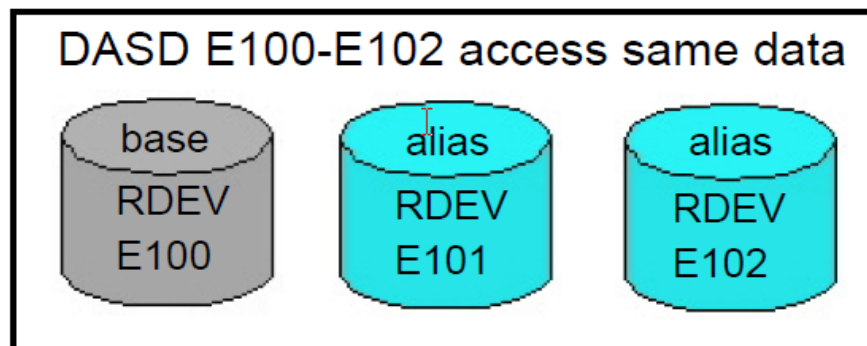
- 4) **11.2.0.3** Has even more Mutex enhancement's

PAV Support



Overview

- z/VM provides support for the Parallel Access Volumes (PAV) feature of IBM System Storage subsystems.
- With PAV, a real DASD volume is accessed through a Base subchannel (device) and one or more Alias subchannels
 - ▶ Volume (represented by Base) shadowed by 1 or more Aliases
 - ▶ Looks like multiple separate, real DASD to host operating system

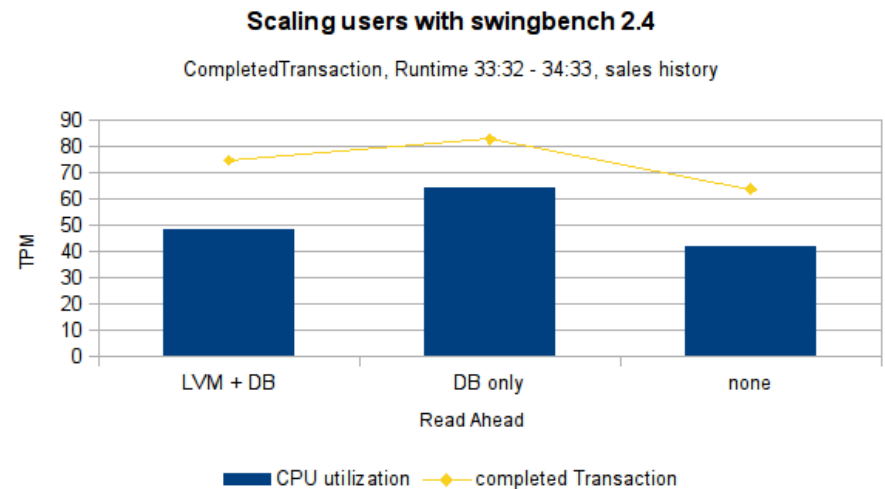


Oracle I/O Performance Tips:



- 1) I/O scheduler on Red Hat - zipl.conf parameters "elevator=noop" helps with reducing cpu usage.
- 2) Reduce Read ahead for LVM file systems containing Oracle datafiles only.
`lvchange -r none <lv device name>`
`lvdisplay /dev/oradb-vg/oradb-lv`
- 3) Oracle parameter – `_fastpin_enable=1` will result in utilizing "Consistent Gets from cache (fast path)"
- 4) Oracle Parameters that can reduce cpu 5-10%
`statistics_level = 'basic'`
`timed_statistics=TRUE`

Dynamic, effects the total data used on AWR reports, **can reduce cpu utilization by 5-10%**

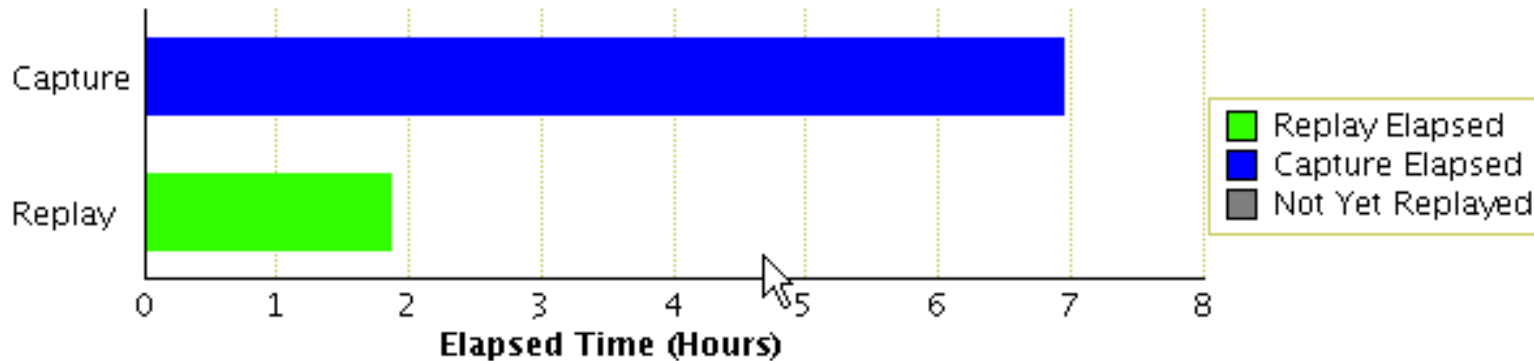


Oracle 11gR2 Features with Linux on System z

Oracle Real Application Testing:



Record Production Load on Test System and Replay on Another System:



Network Time (hh:mm:ss) **111:12:22**
 Think Time (hh:mm:ss) **01:20:39**

Clients **5**
 Clients Finished **5**

Replay Statistics

Statistic	Replay	Capture
DB Time	101113.652 seconds	345295.467 seconds
Average Active Sessions	14.98	13.79
User calls	37189662	96100235
Network Time	400342.054 seconds	N/A
Think Time	4838.536 seconds	N/A

Capture Considerations



- **Planning:**
 - Adequate disk space for captured workload (binary files) with nfs read-write
 - Database restart is needed **(care is needed)**
 - Startup restrict
 - *Capture will un-restrict*
 - *If RAC Start on one node – other nodes down then bring other nodes up.*
 - A way to restore database for replay purposes:
 - Physical restore (scn/time provided)
 - Logical restore of application data
 - Flashback/snapshot-standby
 - Filters can be specified to capture subset of workload.
- **Overhead:**
 - Performance overhead ~ 4.5%
 - Memory overhead : 64 KB per session
 - Disk space

Oracle Real Application Testing - Replay Workload Wizard



Choose Initial Options **Customize Options** Prepare Replay Clients Wait for Client Connections Review

Replay Workload: Customize Options

Database **orcl** Step 2 of 5

Capture Name **capturejfv1**

Logged In As **SYS**

[Connection Mappings](#) **Replay Parameters**

Some replay parameters can be modified to change the behavior of the replay. Refer to system documentation for more information.

Name	Description	Value
synchronization	This parameter determines if synchronization will be used during workload replay. If this parameter is set to TRUE, the COMMIT order in the captured workload will be preserved during replay and all replay actions will be executed only after all dependent COMMIT actions have completed. The default value is TRUE.	TRUE ▾
connect_time_scale	This parameter scales the elapsed time from when the workload capture started to when the session connects with the specified value and is interpreted as a % value. The default value is 100.	100 %
think_time_scale	This parameter scales the elapsed time between two successive user calls from the same session and is interpreted as a % value. Setting this parameter to 0 will send user calls to the database as fast as possible during replay. The default value is 100.	100 %
think_time_auto_correct	This parameter reduces the think time if workload replay goes slower than workload capture. If this parameter is set to TRUE, the system will correct the think time (based on the think_time_scale parameter) between calls when user calls take longer to complete during replay than during capture. The default value is TRUE.	TRUE ▾

Database Migration With Transportable Database / Tablespaces

- Transportable Databases Methodology is the easiest if DB is same “endian binary format”, AIX, Solaris, HP-UX, Linux on System z are all Big.
- Transportable tablespaces is another methodology which can be used when going from Little Endian to Big Endian.

Transportable Tablespace Suggestions

- Perform an Assessment of the source database.

```
select * from nls_database_parameters where parameter like '%SET%';
NLS_NCHAR_CHARACTERSET      AL16UTF16
NLS_CHARACTERSET            AL32UTF8
```

**When you create your target database you will need to create with these values.

- Are the tables in the transportable set that use **TIMESTAMP WITH TIMEZONE (TSTZ)** columns?

col name for a24

col value\$ for a10

```
select name,value$ from props$ where name='DST_PRIMARY_TT_VERSION';
```

- Source DB :

```
NAME          VALUE$
-----
```

```
DST_PRIMARY_TT_VERSION  14
```


Transportable Tablespace Check

```
BEGIN
```

```
SYS.dbms_tts.transport_set_check
```

```
(‘USERS, DAVE’, incl_constraints=>TRUE,  
  full_check=>TRUE);
```

```
END;
```

```
/
```

```
SELECT * FROM TRANSPORT_SET_VIOLATIONS;
```

no rows selected

Additional Migration Tip

- **If Possible perform SAN Disk Replication between Source and Target for the migration file system.**
 - Went from **60 hours** with NFS mount to **12 hours** by unmounting the transporatable filesystem, performing a SAN replication, and then remounting opposed to using Network.

Single Client Access Name (SCAN) - Easier Configuration



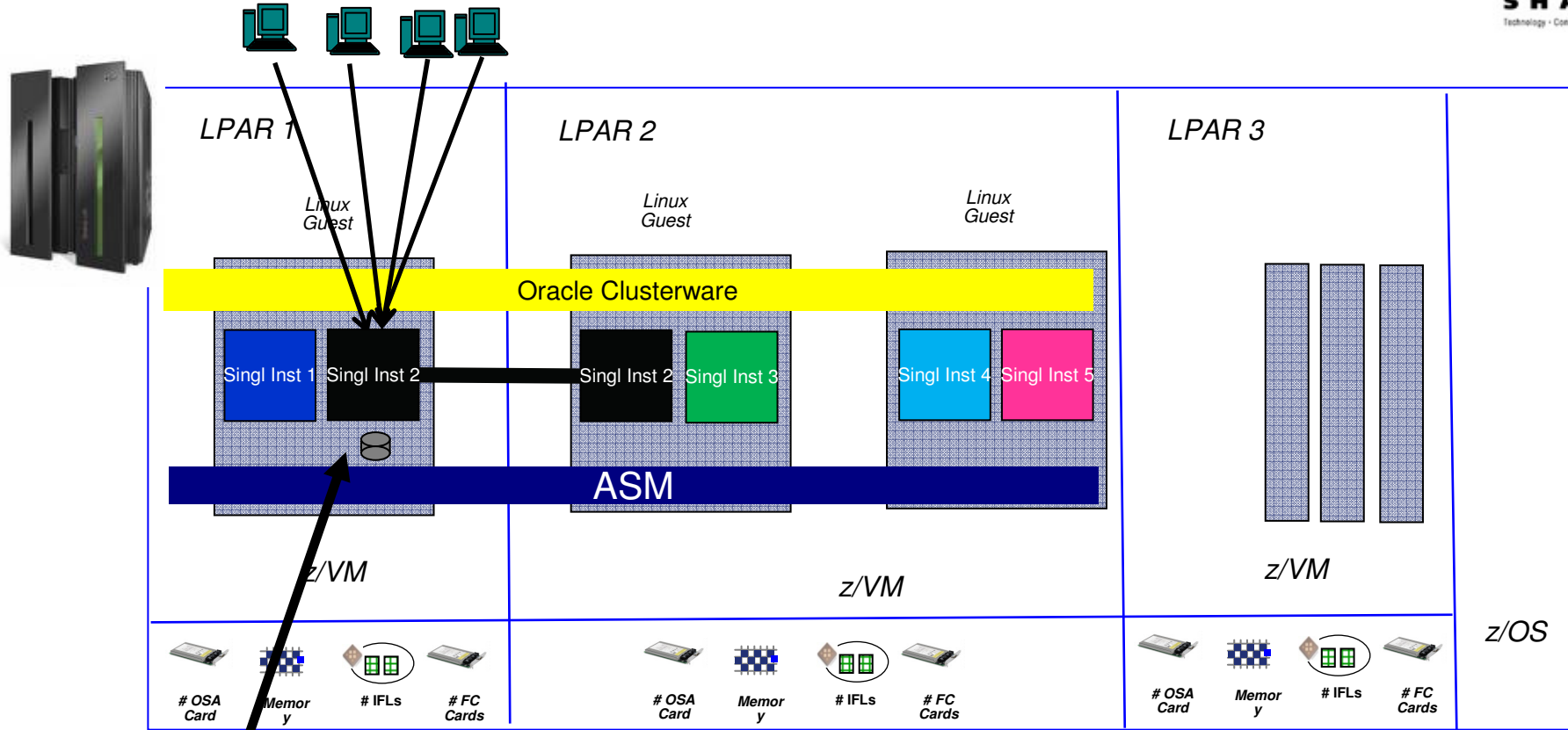
Without a SCAN (pre-11g Rel. 2) - TNSNAMES entry *1 entry per node*
With a system change, **all** client TNSNAMES would need to be changed

```
ORAClass =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = orausr07) (PORT = 1521))
    (ADDRESS = (PROTOCOL = TCP) (HOST = orausr08) (PORT = 1521))
    ...
    (ADDRESS = (PROTOCOL = TCP) (HOST = orausr17) (PORT = 1521))
    (CONNECT_DATA =
      ... ))
```

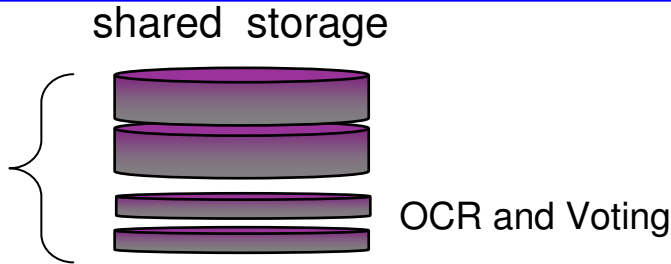
With SCAN only *1 entry per cluster* is used, **regardless of # of nodes:**

```
ORAClass =
  (DESCRIPTION =
    (ADDRESS = (PROTOCOL = TCP) (HOST = ORAClass-SCAN) (PORT = 1521))
    (CONNECT_DATA =
      ... ))
```

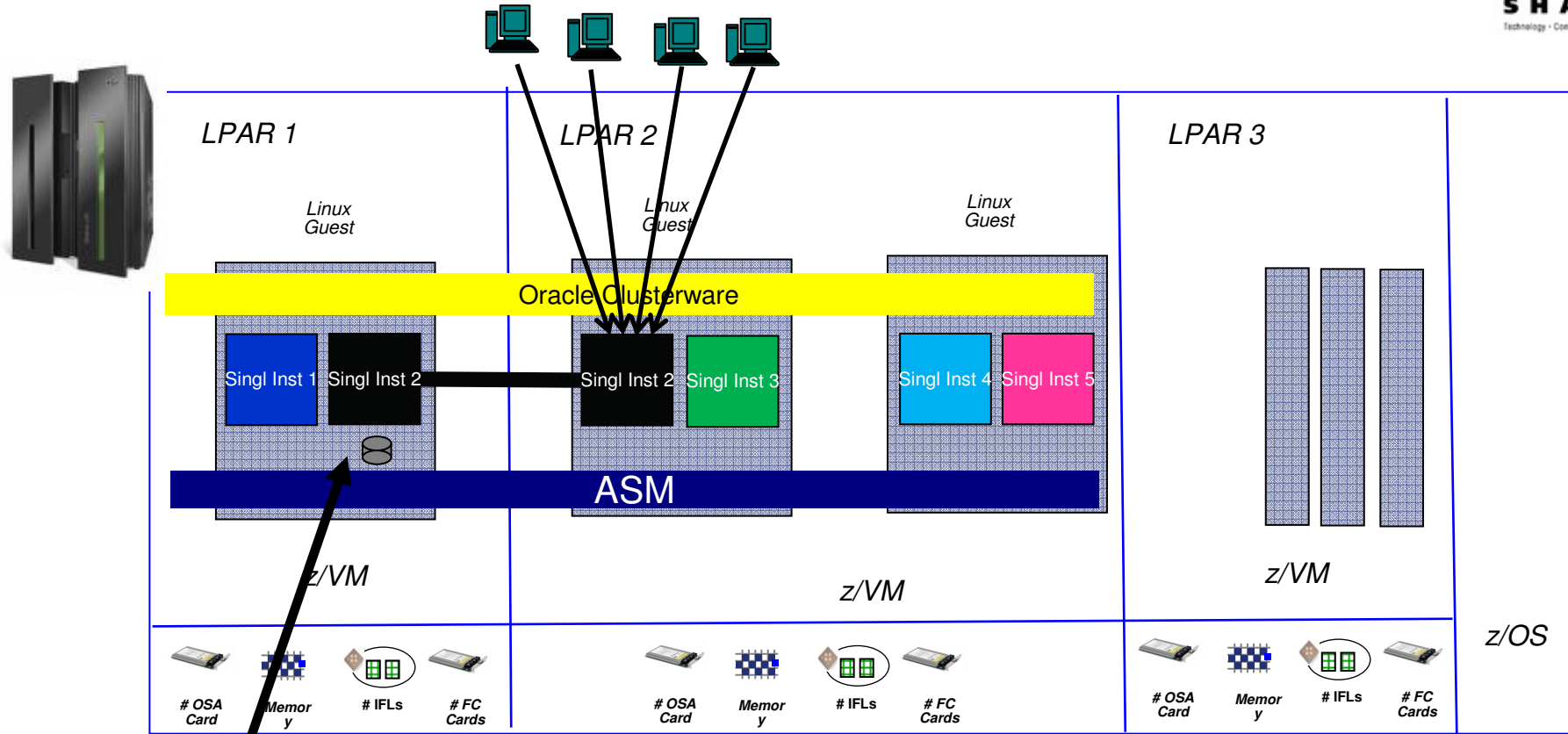
Oracle RAC One Node - deployment Omotion



- Patch Oracle binaries, modify Linux parameters, etc..
- Groups**

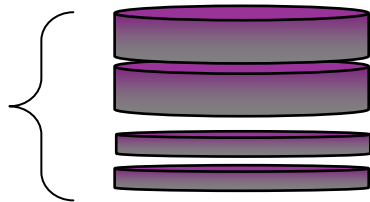


Oracle RAC One Node – deployment Omotion



• Restart Instance Service

ASM Disk Groups



OCR and Voting

RAC ONE – Transparent Application Failover - TAF



- Oracle Support Note – **453293.1**
- Step that needs to be configured Post Install of Clusterware, or else failover will not work properly.

```
srvctl modify service -d test -s testone -P BASIC -e SELECT -z 180 -w 5 -m BASIC -j SHORT
```

*** Demo of Oracle RAC ONE with IBM Linux on System z ***

Thank YOU