Oracle Networking and High Availability Options (with Linux on System z) & Red Hat/SUSE Oracle Update

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Speakers Company: IBM

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Hynes, Room 308

Session Number: **13523**

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Agenda – Part I

- **Why use Live Guest Relocation with Oracle Database**
- **Oracle Support Policy**
- **Challenges**
- **Factors**
- **Scenarios**
- **Recommendation**

Oracle with LGR on System z: Business Value

- **Availability**
  - Improve applications availability (load balancing)
  - Planned software or hardware maintenance - Offload a physical server to allow replacement, firmware upgrade or disruptive physical upgrade

- **Performance**
  - Move guest to free resources for other partitions
  - Move guest to a more powerful physical server

- **Flexibility**
  - Move guest to follow business needs
  - Move test guests to production servers for real tests
  - Free a physical server for planned maintenance
  - Migration between z/VM maintenance levels

- **Energy efficiency**
  - Move partitions from underused physical servers to other servers to increase their resource usage and their energy efficiency
  - Shutdown underused physical servers

- **Not designed for unplanned outages**
  - Live guest relocations are initiated by a manual VMRELOCATE command.
    The command is not automatically issued for any guest.
  - **LGR is not a high availability solution, and it is not a disaster recovery solution**.
  - Think of LGR as a **continuous availability solution** for the Linux guest.

Oracle Support for LGR

- **Oracle has a process to certify running an active Oracle DB in virtualized environments to ensure customers will be able to get support when running in that virtualized environment**

- **IBM has to complete a robust set of tests to prove Oracle databases can be running when LGR is executed. (Includes tests on SLES 11 and RH6 and single instance and RAC)**

- **Similar to support for Live Partition Mobility on AIX and Live Guest Migration on Oracle VM (Intel)**

LGR mechanism

Step 0 — VMRELOCATE MOVE

Step 1 — Eligibility Checks

Step 2 — Create skeleton on destination

Step 3 — Moves guest memory Over ISCF channel(s)

Quiesce Time:

Step 4 — Quiesce guest

Step 5 — Move guest state, I/O device…

Step 6 — Final memory move pass

Step 7 — Guest resumed on destination

Oracle Support Challenge

Quiese time must be less than the RAC time out or node will reboot

Environment must be able to run with a stress load even for single instance

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Factors affecting relocation

Linux guest memory size

Linux guest memory update rate

Channel-to-channel adapter (CTCA) setup
  Number and speed

VMRELOCATE options (SYNCH, ASYNCH, IMMEDIATE, MAXTOTAL, MAXQUIESCE)
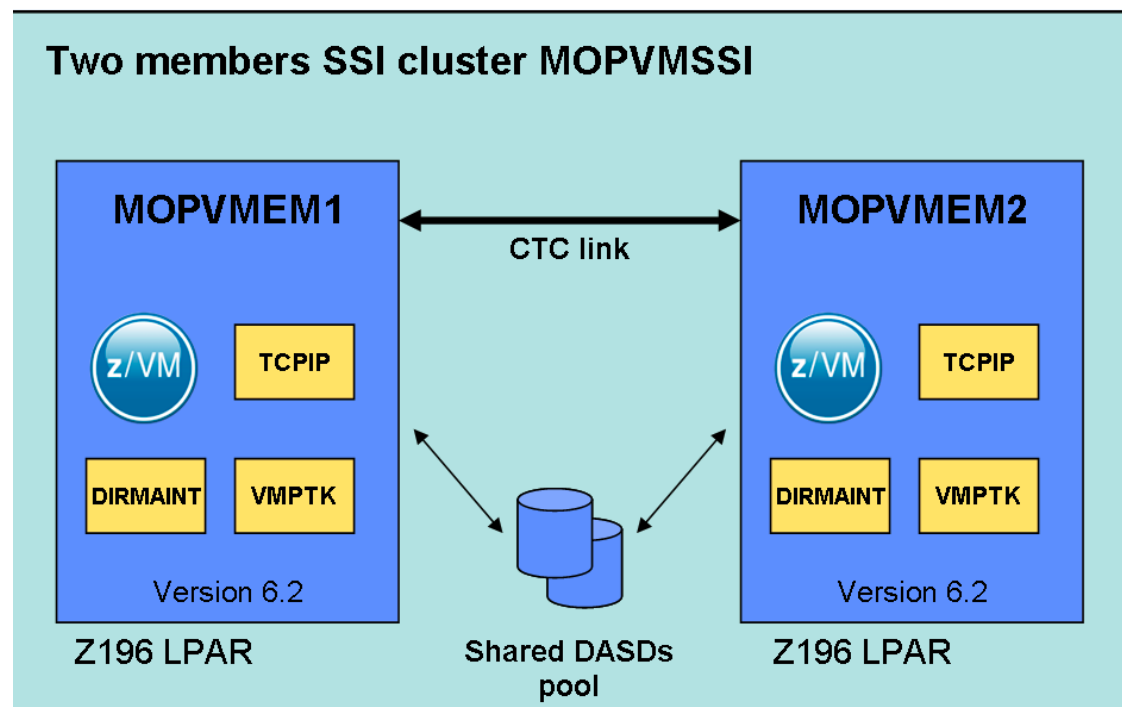 (Real Application Cluster time out is 30 seconds)

Other workloads on target system

Safe Guest Relocation

- **Eligibility checks** done multiple times throughout the relocation process.

- Checks more than just eligibility to move the virtual machine, but also checks whether it is **safe** to move.

  - Does the virtual machine really have access to all the same resources and functions?

  - Will moving the virtual machine over commit resources to the point of jeopardizing other workload on the destination system?

- **Pacing logic** to minimize impact to other work in more memory constrained environments

- **Timing Logic** that aborts a migration if the quiesce period exceeds a predefined window.
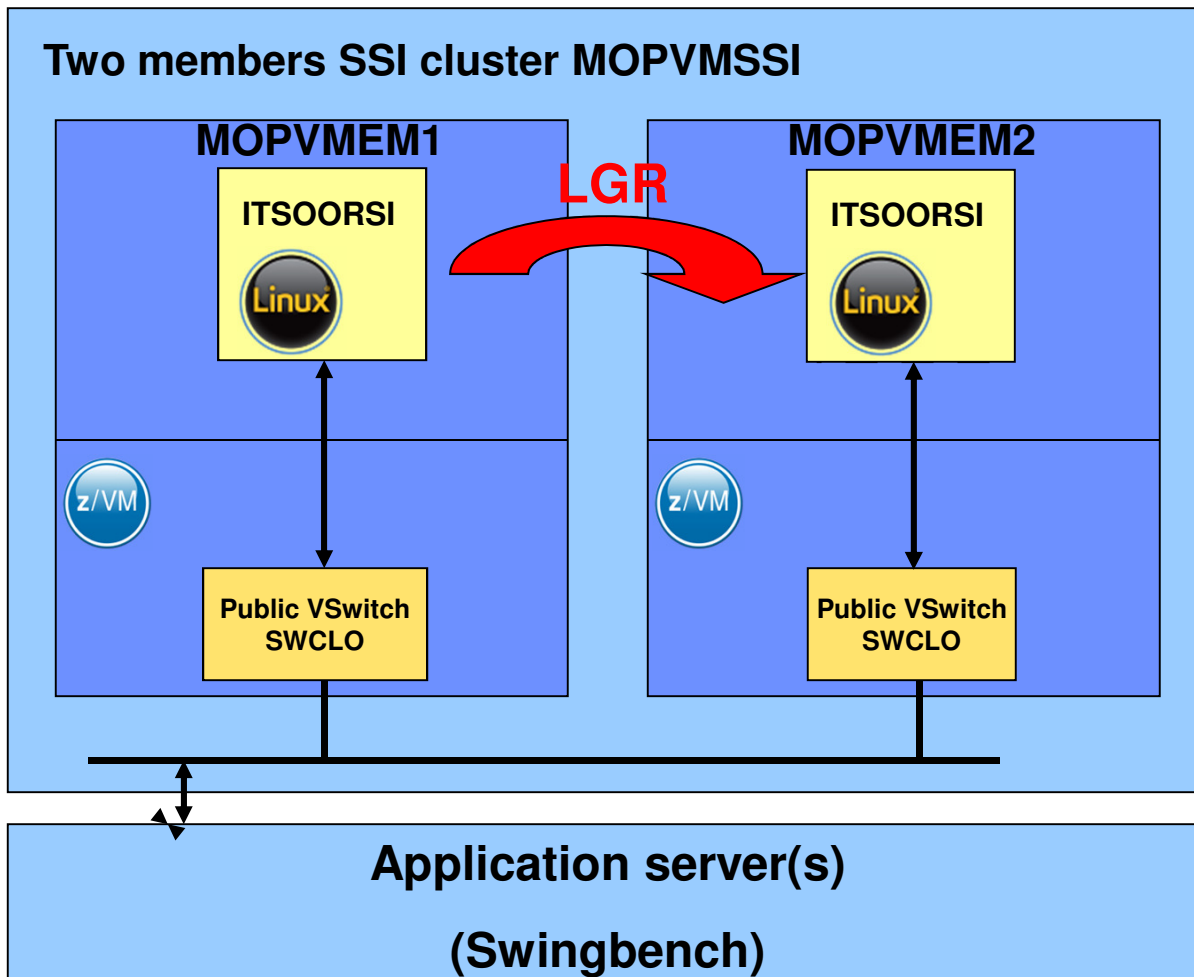
Scenarios tested for Redbook in 2012

- ## Environment
  - z/VM 6.2 cluster (2 members)
  - Linux SLES11 SP1
  - Oracle 11.2.0.3
    - ➢ Oracle Single Instance
    - ➢ Oracle RAC
  - Swingbench

Two members SSI cluster MOPVMSSI

MOPVMEM1 ←→ MOPVMEM2
CTC link

z/VM   TCPIP

DIRMAINT   VMPTK

Version 6.2

Z196 LPAR

Shared DASDs pool

z/VM   TCPIP

DIRMAINT   VMPTK

Version 6.2

Z196 LPAR

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Oracle Live Guest Relocation Scenario

- **3 scenarios:**
  - Oracle Single Instance relocation using LGR
  - Oracle RAC Node relocation with stopping the Node before relocation (recommended while LGR is not certified with Oracle RAC)
  - Oracle RAC Node relocation using Live Guest Relocation on an active node

Scenario 1: Oracle Single Instance relocation

Two members SSI cluster MOPVMSSI

MOPVMEM1

ITSOORSI

Linux

LGR

MOPVMEM2

ITSOORSI

Linux

z/VM

z/VM

Public VSwitch SWCLO

Public VSwitch SWCLO

Application server(s)

(Swingbench)

•Application Server (swingbench) simulates users and generates workload to the Oracle DB

•The Oracle DB is run as a Single Instance in a z/VM 6.2

•You need to:
-perform a maintenance on the left z/VM server partition
-or run additional workload on the z/VM LPAR
-or migrate the production to a new z/VM LPAR.

Today the supported way is to bring down the database and move Linux guest

Oracle Single Instance relocation

- The application server (Swingbench) simulates users and generates workload to the Oracle DB.

Oracle Single Instance relocation

- After the load of all swingbench users, we moved the Oracle guest

```
QUERY USER ITSOORSI AT ALL
MOPVMEM1 : ITSOORSI - DSC
Ready; T=0.01/0.01 16:27:47
VMRELOCATE TEST ITSOORSI TO MOPVMEM2
User ITSOORSI is eligible for relocation to MOPVMEM2
Ready; T=0.01/0.01 16:28:17
VMRELOCATE MOVE ITSOORSI TO MOPVMEM2
Relocation of ITSOORSI from MOPVMEM1 to MOPVMEM2 started
User ITSOORSI has been relocated from MOPVMEM1 to MOPVMEM2
Ready; T=0.01/0.01 16:56:06
QUERY USER ITSOORSI AT ALL
MOPVMEM2 : ITSOORSI - DSC
Ready; T=0.01/0.01 16:58:09
```
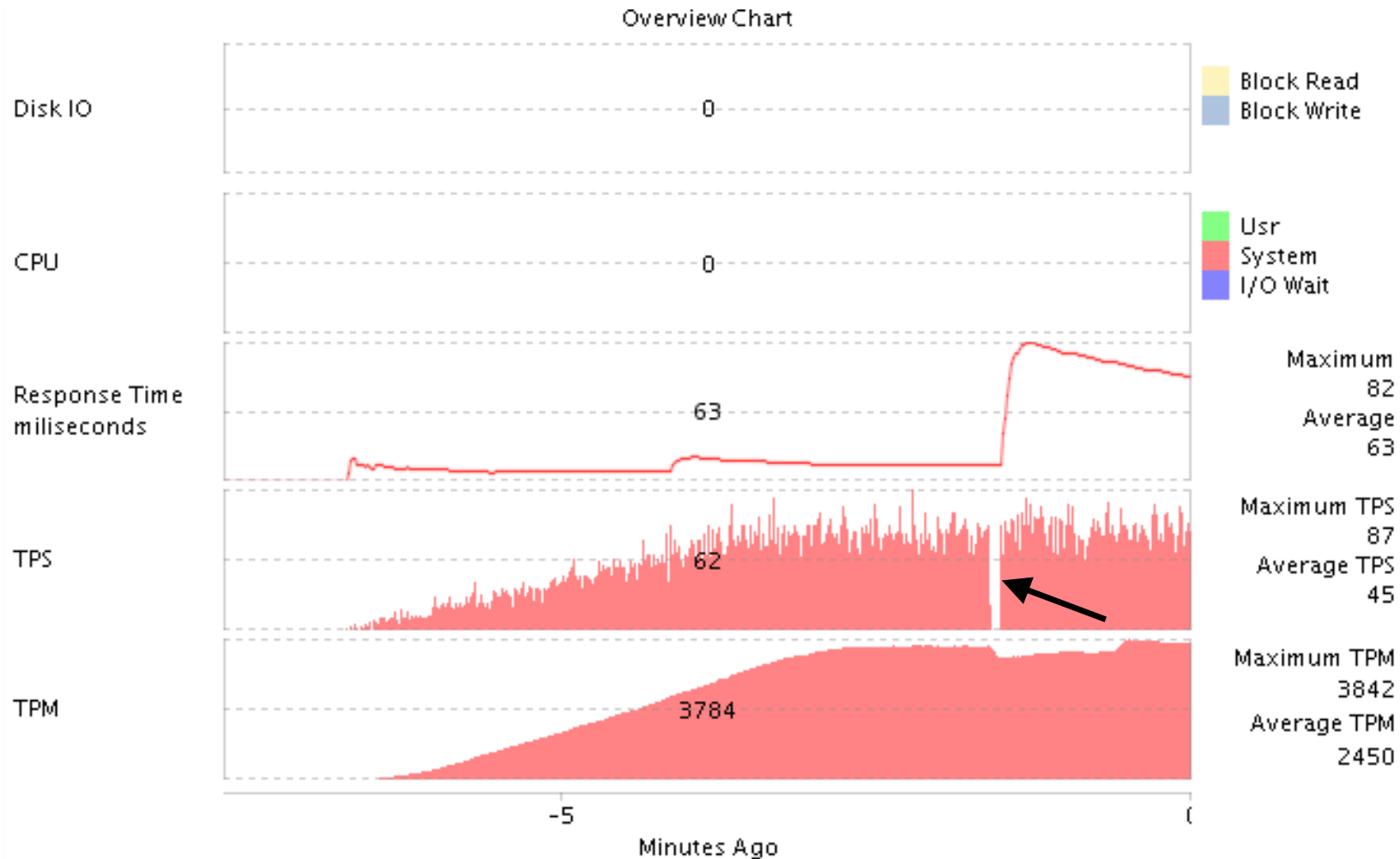
- Using a ping command running each second, we can evaluate the guest *quiesce* time (≈5 seconds)

```
64 bytes from 10.3.58.254: icmp_seq=41 ttl=255 time=1.02 ms    Tue Nov 20 15:55:57 CET 2012
64 bytes from 10.3.58.254: icmp_seq=42 ttl=255 time=0.766 ms   Tue Nov 20 15:55:58 CET 2012
64 bytes from 10.3.58.254: icmp_seq=43 ttl=255 time=0.643 ms   Tue Nov 20 15:55:59 CET 2012
64 bytes from 10.3.58.254: icmp_seq=45 ttl=255 time=8.54 ms    Tue Nov 20 15:56:06 CET 2012
64 bytes from 10.3.58.254: icmp_seq=46 ttl=255 time=0.436 ms   Tue Nov 20 15:56:07 CET 2012
64 bytes from 10.3.58.254: icmp_seq=47 ttl=255 time=0.516 ms   Tue Nov 20 15:56:08 CET 2012
```
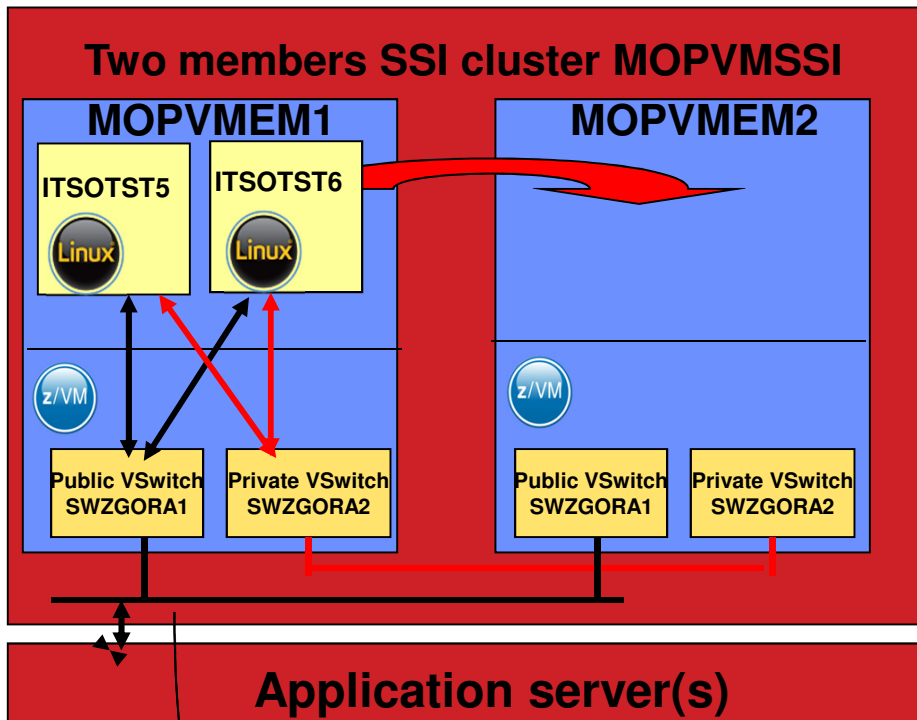
Oracle Single Instance relocation

•During the guest relocation, we can observe a freeze time (transactions are suspended) but all users stayed logged on and no transaction have been lost.
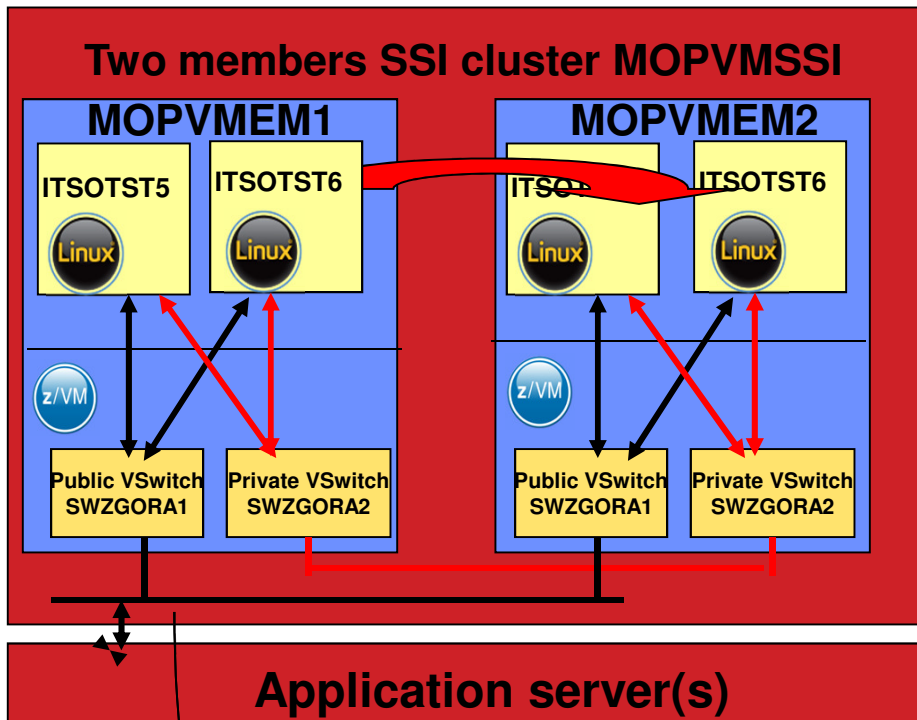

"Order Entry (PLSQL)"   Users Logged On : 200

Scenario 2 & 3: Oracle RAC Nodes relocation

Two members SSI cluster MOPVMSSI

MOPVMEM1	MOPVMEM2

- ITSOTST5 / Linux
- ITSOTST6 / Linux
- z/VM

Public VSwitch SWZGORA1 | Private VSwitch SWZGORA2 | Public VSwitch SWZGORA1 | Private VSwitch SWZGORA2

Application server(s)

vmrelocate

- Application Server (swingbench) simulates users and generates workload to the Oracle DB
- The Oracle DB is run as a Real Application Cluster (RAC) with 2 nodes in a single z/VM 6.2 instance .
- You need to:
  - perform a maintenance on the left z/VM server partition
  - or run additional workload on the z/VM LPAR
  - or migrate the production to a new z/VM LPAR...

Scenario 2: Oracle RAC inactive **Nodes relocation**

Two members SSI cluster MOPVMSSI

MOPVMEM1

ITSOTST5   ITSOTST6

Linux   Linux

z/VM

Public VSwitch
SWZGORA1

Private VSwitch
SWZGORA2

MOPVMEM2

ITSO   ITSOTST6

Linux   Linux

z/VM

Public VSwitch
SWZGORA1

Private VSwitch
SWZGORA2

Application server(s)

Shutdown Node
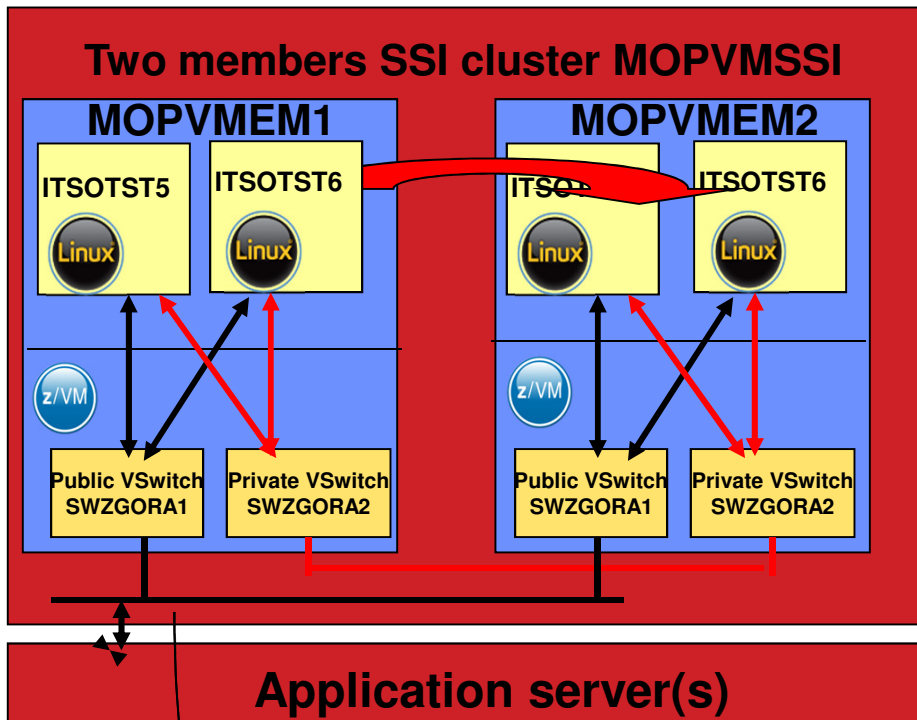*vmrelocate*
Restart Node

Here is the scenario if you need to stop the cluster first. This is because LGR is not yet certified on Oracle RAC.

- Stop the Oracle cluster on the node on first z/VM LPAR, keep Linux alive.

  crsctl stop cluster

- Eventually activate more IFL on second z/VM LPAR

- z/VM relocate the Linux node on second z/VM

- Restart the Oracle cluster on the migrated node

  crsctl start cluster

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Scenario 3: Oracle RAC active Nodes relocation

Two members SSI cluster MOPVMSSI

MOPVMEM1

ITSOTST5   ITSOTST6
Linux   Linux

z/VM

Public VSwitch   Private VSwitch
SWZGORA1   SWZGORA2

MOPVMEM2

ITSO...   ITSOTST6
Linux   Linux

z/VM

Public VSwitch   Private VSwitch
SWZGORA1   SWZGORA2

Application server(s)

vmrelocate

In the scenario we relocate the nodes without taking them down

- Eventually activate more IFL on second z/VM LPAR

- z/VM relocate the nodes on second z/VM one after the other

- Must be certified by Oracle

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Recommendation

- **For production workloads use only Oracle supported methods Bring down the Oracle instance or node, relocate Linux guest, restart instance or node.**

- **For test workloads try the relocate command with active database in your environments on smaller Linux guests to determine if there is no impact**

- **Avoid very large Linux guests in a stressed environment on source or target VM.**

Agenda – Part II

- Networking alternatives for running Oracle RAC databases and Application servers connecting to Oracle databases. running Linux on System z.

- Oracle updates.

- Oracle 12c Cloud Control – How to deploy the monitoring agent.

Networking Design with Linux on System z

- **High Availability Network designs are important not only for Oracle RAC but for Configurations with Applications connecting to Oracle databases running on System z.**
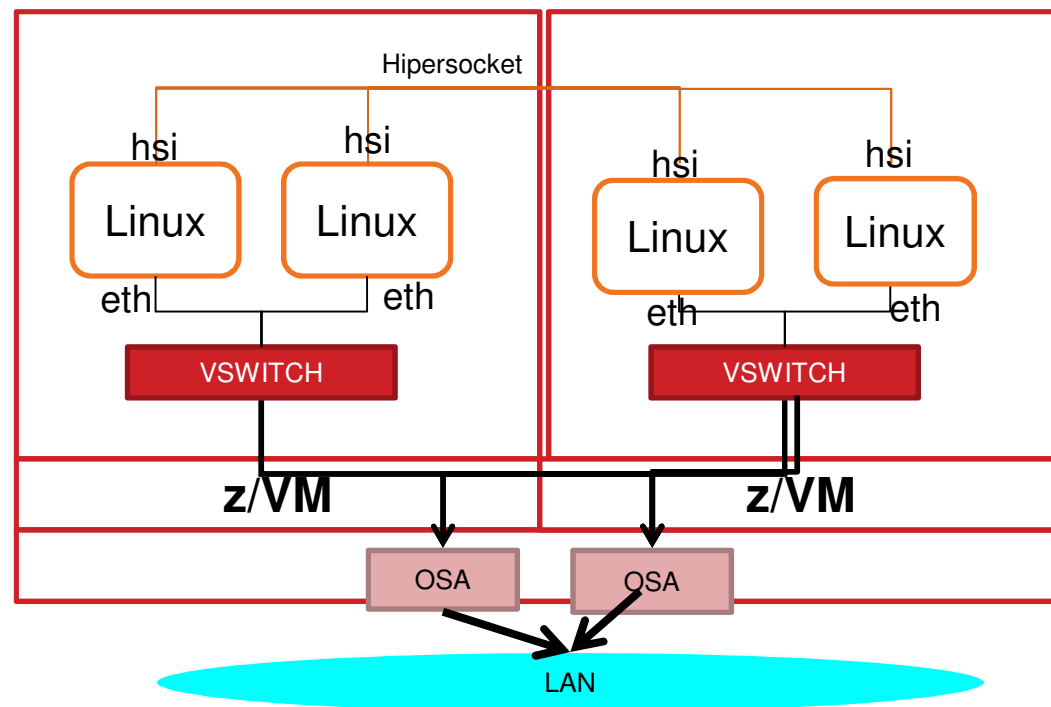
Oracle Virtualization Support Policy:
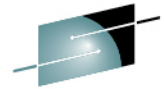
☆ **Oracle Linux Support Policies for Virtualization and Emulation [ID 417770.1]**

Modified: Jul 3, 2012   Type: REFERENCE   Status: PUBLISHED   Priority: 1   💬 Comments (0)   Rate this document   ✉   ↗   Printable Pag

This document applies to anyone wishing to use Oracle Linux running under a virtualized or emulated environment.

Note that the scope also limited to the hardware architectures supported by Oracle Linux releases.

Details

Oracle Linux Support Program provides support for:

- Oracle VM Server for x86
- The Oracle Unbreakable Enterprise Kernel running on Oracle Linux 5.5 or higher.
- Operating system support for Oracle Linux 4 (and higher) under the Oracle Linux Support Program on Oracle VM
- Operating system support for Oracle Linux 4 (and higher) under the Oracle Linux Support Program on VMware vSphere (ESX Server).
- Operating system support for Oracle Linux 4 (and higher) under the Oracle Linux Support Program on Citrix XenServer Enterprise Edition
- Xen components as part of Oracle Linux 5 and RHEL5 under the Oracle Linux Support Program. This does not include Oracle Product support on Xen offerings (see below)
- KVM components as part of Oracle Linux 5, Oracle Linux 6, RHEL5 and RHEL6 under the Oracle Linux Support Program. This does not include Oracle Product support on KVM offerings (see below)

Oracle products have been certified to run with Oracle VM. Document 464754.1 lists additional information and exceptions for some Oracle products running under Oracle VM.

Oracle Products are not certified to run on Virtual Machines/guests provided by Xen or KVM offerings by Red Hat, Novell or XenSource.

Oracle Products are not certified to run on VMware vSphere (ESX Server). For more information on Oracle Product Support of Oracle Products running under VMware vSphere - refer to Document 249212.1.

Oracle Products are not certified to run on operating systems on top of Red Hat, Novell SLES or Citrix XenServer Enterprise Edition Xen Hypervisors.

Oracle software stack is certified and supported on certified distributions of Linux (RHEL, SLES) running natively in LPARs or as a guest OS in z/VM Virtual Machines deployed on IBM System z 64-bit servers.

Oracle RAC Recommended Configurations for System z

Architecture	Oracle Private Network (interconnect)	Oracle Public Network
All z/VM Linux guests in one LPAR	•Private Layer2 VSwitch Guest LAN OSA recommended •Real layer 2 Hipersocket possible •Guest LAN Hipersocket not supported	•Shared Public VSwitch recommended •Shared or dedicated OSA card is possible
z/VM Linux guests on different LPARs	•Real Layer 2 Hipersocket recommended •Private Layer 2 Gigabit OSA card possible	•Shared Public VSwitch recommended •Shared or dedicated OSA card
z/VM Linux guests on different physical machines	•Private Layer 2 Gigabit OSA card recommended with physical switch in between (one hop)	•Dedicated OSA card Possible

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Great Paper- June 2012 Author: John P. McHugh (Oracle)

Oracle Real Application Clusters (RAC) and Oracle Clusterware Interconnect Virtual Local Area Networks (VLANs) Deployment Considerations
http://www.oracle.com/technetwork/database/clusterware/overview/interconnect-vlan-06072012-1657506.pdf
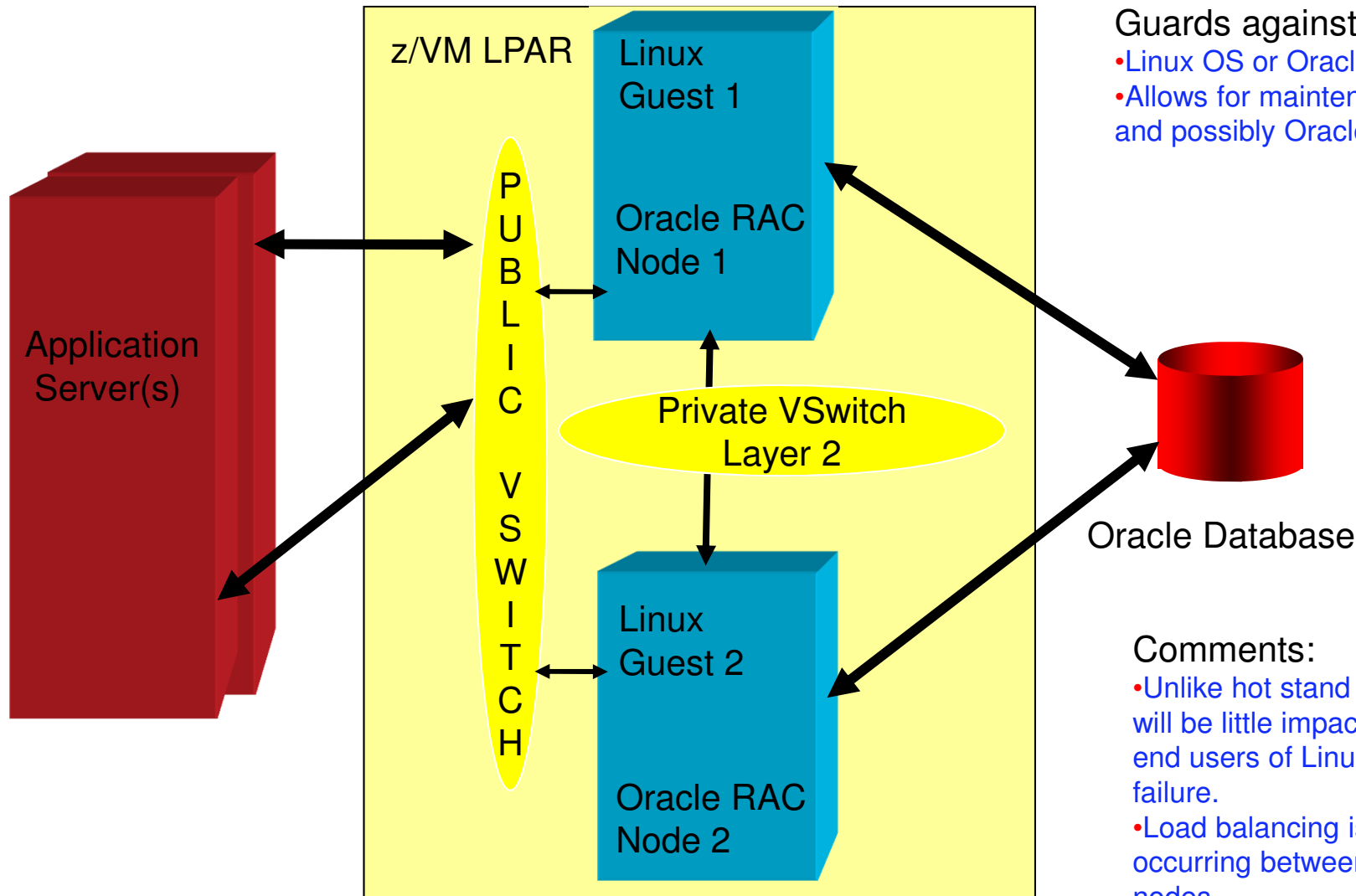
Consolidation and Converged Networks

Consolidation of RAC databases implies that network traffic can be consolidated. For Oracle Clusterware interconnect deployment, this is entirely possible. Oracle supports consolidation of RAC databases and associated private interconnect traffic on dedicated network adapters. A common consolidation is the simultaneous migration of databases to a RAC environment along with the upgrade of 1GbE network interfaces to 10GbE. The consolidated databases in the RAC environment can share the same network interface. The network interface must respect the same interconnect requirements of a dedicated, non-routed subnet. Just as in 1GbE deployments, the consolidated interconnect may be deployed in a single VLAN. If the environment requires segregated networks for the interconnect, tagged VLANs on the interface are supported for network isolation. A common consequence of network consolidation may be a reduction of required IP subnets and supporting VLANs where like-traffic is consolidated from multiple subnets to a single subnet. A common use case is where consolidated RAC databases in a single cabinet may share a single, non-routed subnet mapped to a single static VLAN on the switch.

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Oracle Database Single LPAR with Oracle RAC

z/VM LPAR

Linux
Guest 1

Oracle RAC
Node 1

P
U
B
L
I
C

V
S
W
I
T
C
H

Private VSwitch
Layer 2

Application
Server(s)

Linux
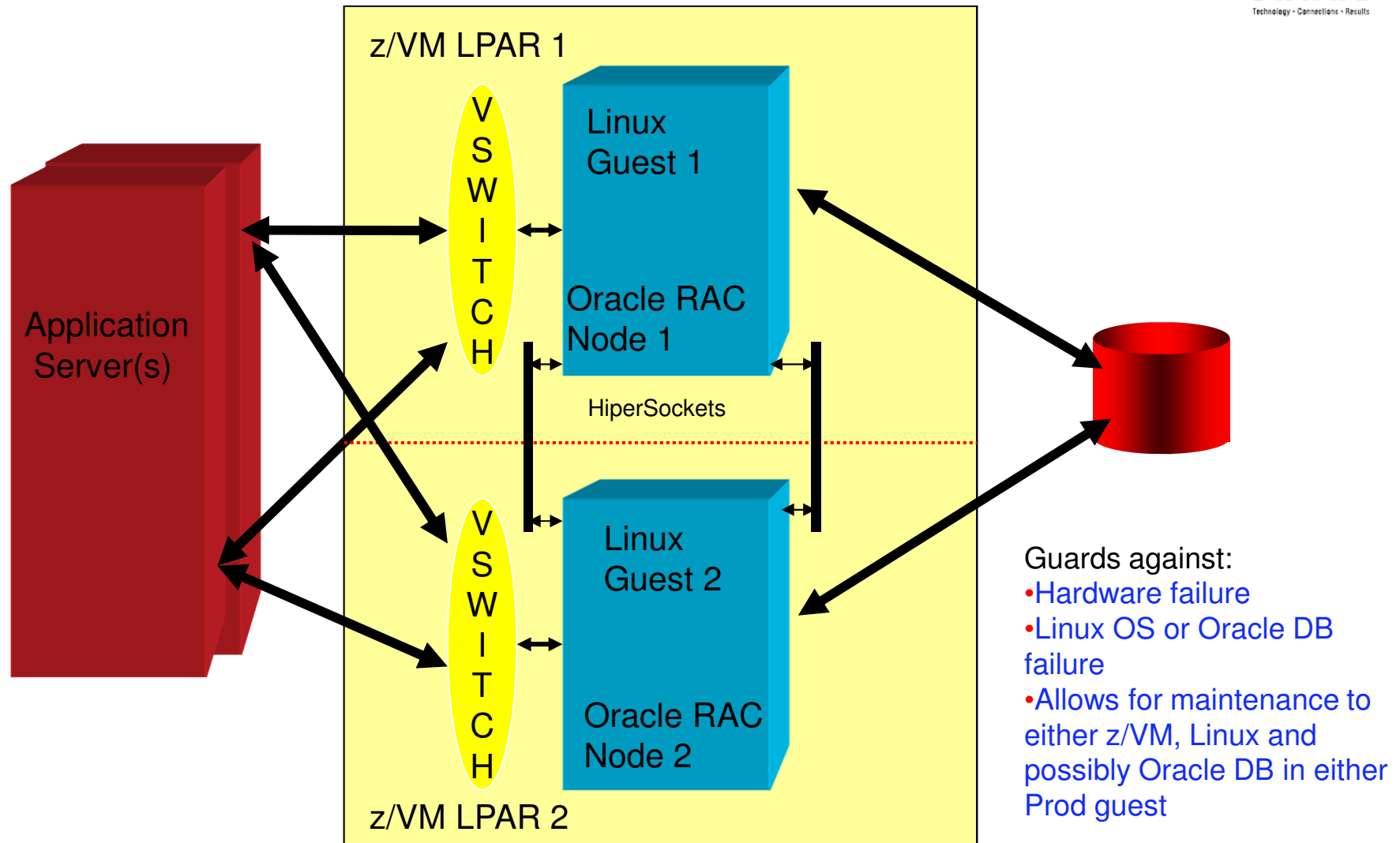Guest 2

Oracle RAC
Node 2

Oracle Database

Guards against
•Linux OS or Oracle DB failure
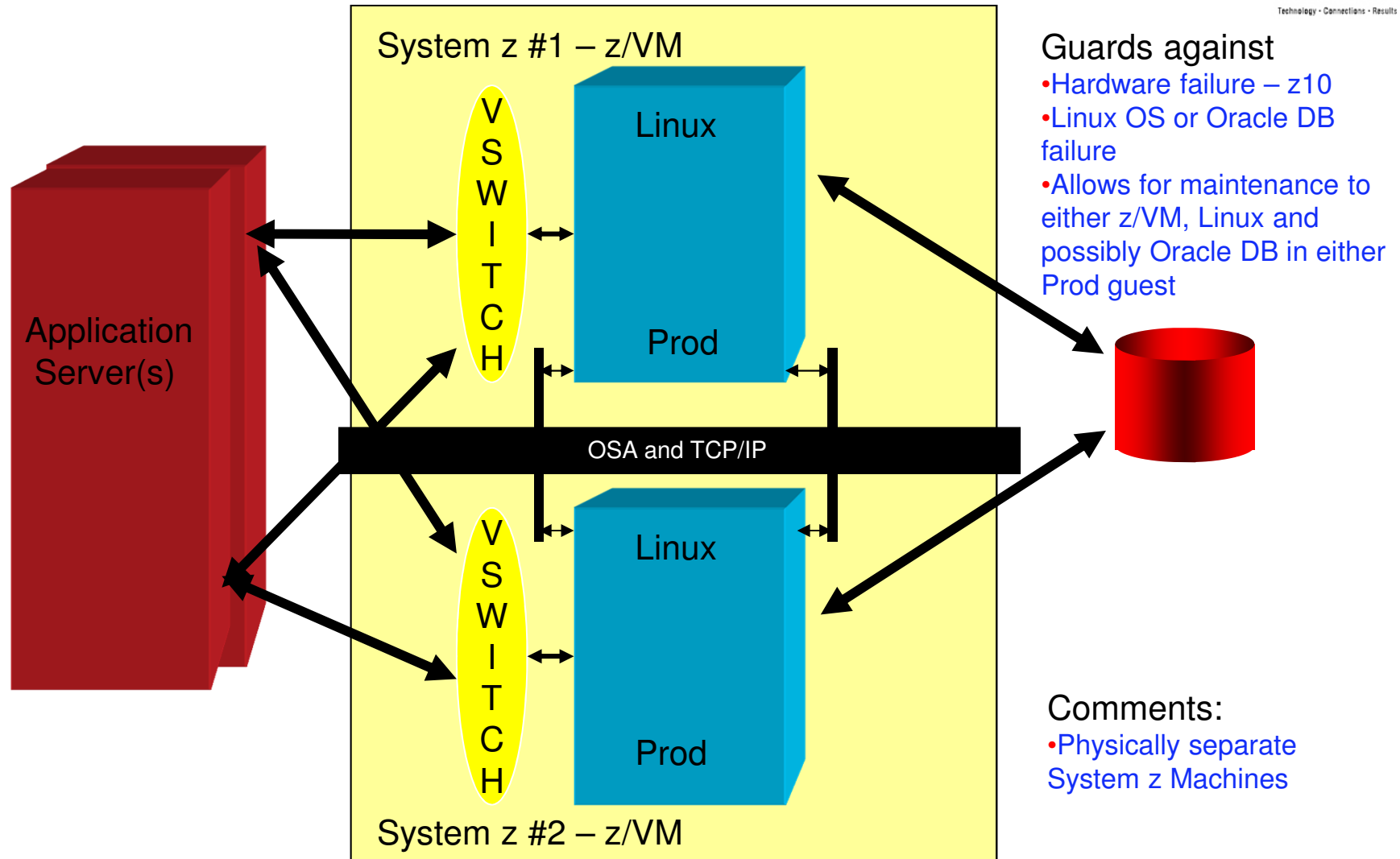•Allows for maintenance to Linux
and possibly Oracle

Comments:
•Unlike hot stand by there
will be little impact to the
end users of Linux node
failure.
•Load balancing is
occurring between the RAC
nodes.

Oracle Database – Multiple LPAR with Oracle RAC

z/VM LPAR 1

V S W I T C H

Linux Guest 1

Oracle RAC Node 1

HiperSockets

V S W I T C H

Linux Guest 2

Oracle RAC Node 2

z/VM LPAR 2

Application Server(s)

Guards against:
- Hardware failure
- Linux OS or Oracle DB failure
- Allows for maintenance to either z/VM, Linux and possibly Oracle DB in either Prod guest

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Oracle Database Oracle RAC across Multiple System z Machines

System z #1 – z/VM

V
S
W
I
T
C
H

Linux

Prod

OSA and TCP/IP

Application Server(s)

V
S
W
I
T
C
H

Linux

Prod

System z #2 – z/VM

Guards against
•Hardware failure – z10
•Linux OS or Oracle DB failure
•Allows for maintenance to either z/VM, Linux and possibly Oracle DB in either Prod guest

Comments:
•Physically separate System z Machines

High Availability Network Options:

- **Virtual Switch** – (Active / Passive) – When one Open System Adapter (OSA) Network port fails, z/VM will move workload to another OSA Card port. Highly available configurations should consider failover time.

- **Link Aggregation** – (Active / Active) Allow up to 8 OSA-Express adapters to be aggregated per virtual switch Each OSA-Express port must be exclusive to the virtual switch (eg. can not be shared).

- **Linux Bonding** – create 2 Linux interfaces – e.g. **eth1** & **eth2** and create a bonded interface **bond0** made up of eth1 and eth2.

- **Oracle HAIP** – New in 11.2.0.2 Oracle can have up to 4 Private interconnect interfaces to load balance interconnect traffic.

Test Plan:

- **Tests involved running a single baseline test in each of the clusters, with the various network configuration options (VSwitch, Linux Bonding, and Oracle HAIP).**

- **Then tests were made concurrently with workload running on multiple clusters at the same time using shared Virtualized infrastructure.**

- **Each interconnect test consisted of 4 tests READ/READ, READ/WRITE, WRITE/READ and WRITE/WRITE**

  create table stress_ipc

  (id number not null,compteur number not null, c2 varchar(30))

  partition by range (id)

  (

  partition stress_ipc1 values less than (1) tablespace USERS,

  partition stress_ipc2 values less than (2) tablespace USERS,

  partition stress_ipc3 values less than (3) tablespace USERS,

  partition stress_ipc4 values less than (4) tablespace USERS,

  …

  partition stress_ipcmax values less than (MAXVALUE) tablespace USERS);

  create unique index pk_stress_ipc on stress_ipc(id,compteur) local tablespace USERS;

- **Two dedicated 1 Gb OSA Cards were used for the Private InterConnect shared among 3 separate RAC Clusters. 10 Gb would be recommended for shared production.**

Collecting Data from Oracle AWR Reports

- **Review the Avg Latencies for 500B and 8K messages from AWR Reports for All Nodes in the Cluster**

```
Interconnect Ping Latency Stats              DB/Inst: RACC/racc1  Snaps: 393-394
-> Ping latency of the roundtrip of a message from this instance to -> target in
-> The target instance is identified by an instance number.
-> Average and standard deviation of ping latency is given in miliseconds
-> for message sizes of 500 bytes and 8K.
-> Note that latency of a message from the instance to itself is used as
-> control, since message latency can include wait for CPU

      Target 500B Pin Avg Latency      Stddev  8K Ping Avg Latency      Stddev
    Instance    Count      500B msg   500B msg   Count      8K msg      8K msg
    -------- -------- ----------- ---------- -------- ----------- ----------
           1       74         .19       .06       74         .17        .07
           2       74         .76      1.97       74         .94       1.94
                   -------------------------------------------------------------
```

- Latencies for Instance 1 where this report was ran to be baseline

3 Clusters Read Test Comparison – HAIP – Test18 RR
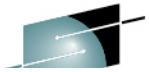
Red Hat 6.2 - 1 Node sharing Private OSA Baseline

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	9	.31	.05	9	.54	.15
2	9	.08	.00	9	.07	.00

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	9	.18	.00	9	.16	.00
2	9	.29	.05	9	.46	.03

Red Hat 6.2 - 2 Nodes sharing Private OSA Cluster B

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	10	.35	.11	10	.60	.17
2	10	.11	.00	10	.10	.00

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	10	.35	.11	10	.60	.17
2	10	.11	.00	10	.10	.00

Red Hat 6.2 - 3 Nodes sharing Private OSA Cluster C

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	10	.44	.17	10	.67	.18
2	10	.07	.00	10	.07	.00

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	10	.20	.01	10	.18	.00
2	10	.37	.18	10	.52	.13

3 Clusters Intensive Writes Comparisons – Test 20 WW HAIP

Red Hat 6.2 Baseline
1 Node

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	64	.63	1.41	64	.85	1.38
2	64	.13	.06	64	.12	.07

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	64	.14	.06	64	.13	.05
2	64	.42	.38	64	.64	.36

Cluster B Red Hat 6.2
2 Nodes

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	71	.55	.80	71	.78	.79
2	71	.12	.04	71	.11	.04

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	71	.16	.18	71	.15	.16
2	71	.64	1.06	71	.82	1.02

Cluster C Red Hat 6.2
3 Nodes

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	74	.74	1.95	74	.97	1.91
2	74	.08	.02	74	.07	.01

Target Instance	500B Pin Count	Avg Latency 500B msg	Stddev 500B msg	8K Ping Count	Avg Latency 8K msg	Stddev 8K msg
1	74	.19	.06	74	.17	.07
2	74	.76	1.97	74	.94	1.94

Choose the Correct Network MTU size

netstat –s of Interconnect	MTU Size of 1492 (default)	MTU Size of 8992 (with 8K DB block size)
Before reassemblies	43,530,572	1,563,179
After reassemblies	54,281,987	1,565,071
Delta assemblies	10,751,415	1,892

Network Queue Length

- The device queue length should be increased from the default size of 1000 to at least 2000 using sysctl:

  sysctl -w net.core.netdev_max_backlog =2000

Oracle RAC - Scaling device queue length
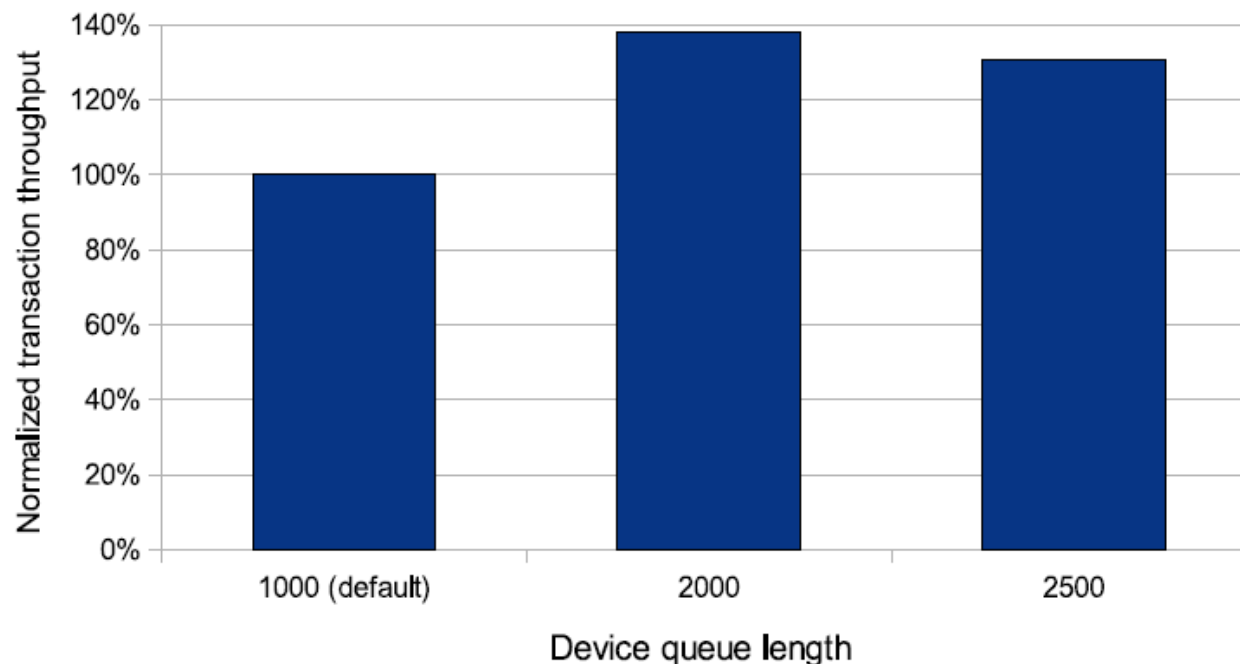
Best Practices for Consolidating on System z

- **Dedicated Multiple 1Gb or Greater NICs per Oracle cluster for the Private Interconnect.**

- **Private Interconnect can be shared but watch AWR Ping latencies.**

- **Isolate Oracle RAC Interconnect traffic from other network traffic.**

- **Utilize VLANs to segregate Cluster interconnect network traffic. VLANs are fully supported for Oracle Clusterware interconnect deployments on System z.**

- **Utilize Server Pools - Logical division of the cluster into pools of servers with many Linux Guests utilizing one cluster interconnect.**

- **Oracle RAC nodes on the same System z can utilize System z Hipersocket(s) for the interconnect traffic defined on layer 2.**

- **Guest LAN Hipersocket does not support Layer 2, hence is not supported.**

- **Single LPAR RAC configurations should be used for Test/Development only.**

- **Configure Network switches so that VLAN Interconnect traffic is Pruned from Uplink traffic.**

Oracle RAC One Node - deployment Omotion

LPAR 1

LPAR 2

LPAR 3

Linux Guest

Linux Guest

Linux Guest

Oracle Clusterware

Singl Inst 1 Singl Inst 2

Singl Inst 2 Singl Inst 3

Singl Inst 4 Singl Inst 5

ASM

z/VM

z/VM

z/VM

z/OS

OSA Card Memory # IFLs # FC Cards

OSA Card Memory # IFLs # FC Cards

OSA Card Memory # IFLs # FC Cards

shared storage
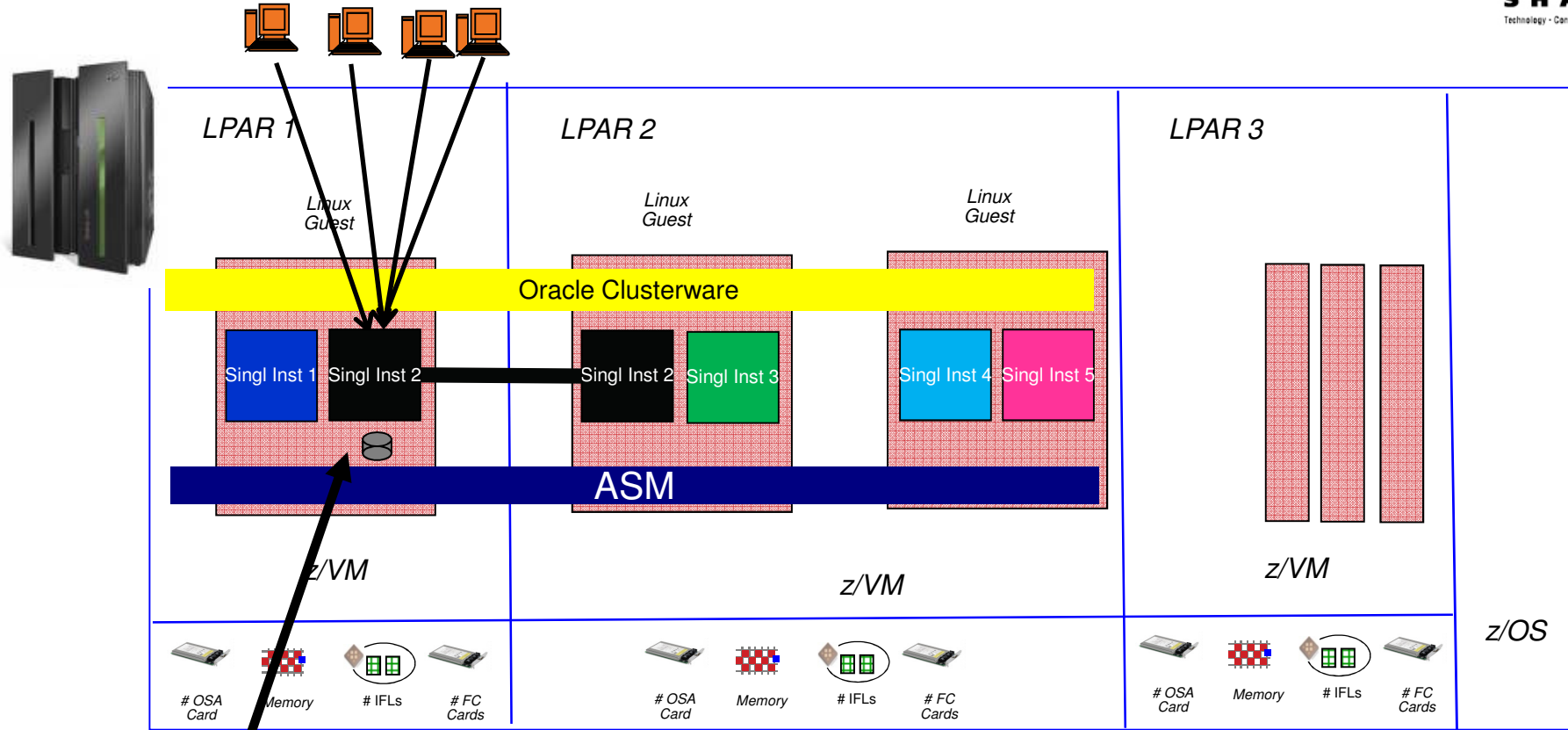
- Patch Oracle binaries, modify Linux parameters, etc..

Groups
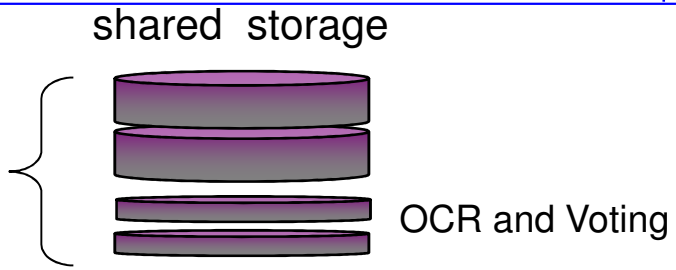
OCR and Voting

Oracle RAC One Node –Omotion

LPAR 1   LPAR 2   LPAR 3

Linux Guest

Oracle Clusterware

Singl Inst 1   Singl Inst 2   Singl Inst 2   Singl Inst 3   Singl Inst 4   Singl Inst 5

ASM

z/VM   z/VM   z/VM

z/OS

OSA Card   Memory   # IFLs   # FC Cards

OSA Card   Memory   # IFLs   # FC Cards

OSA Card   Memory   # IFLs   # FC Cards
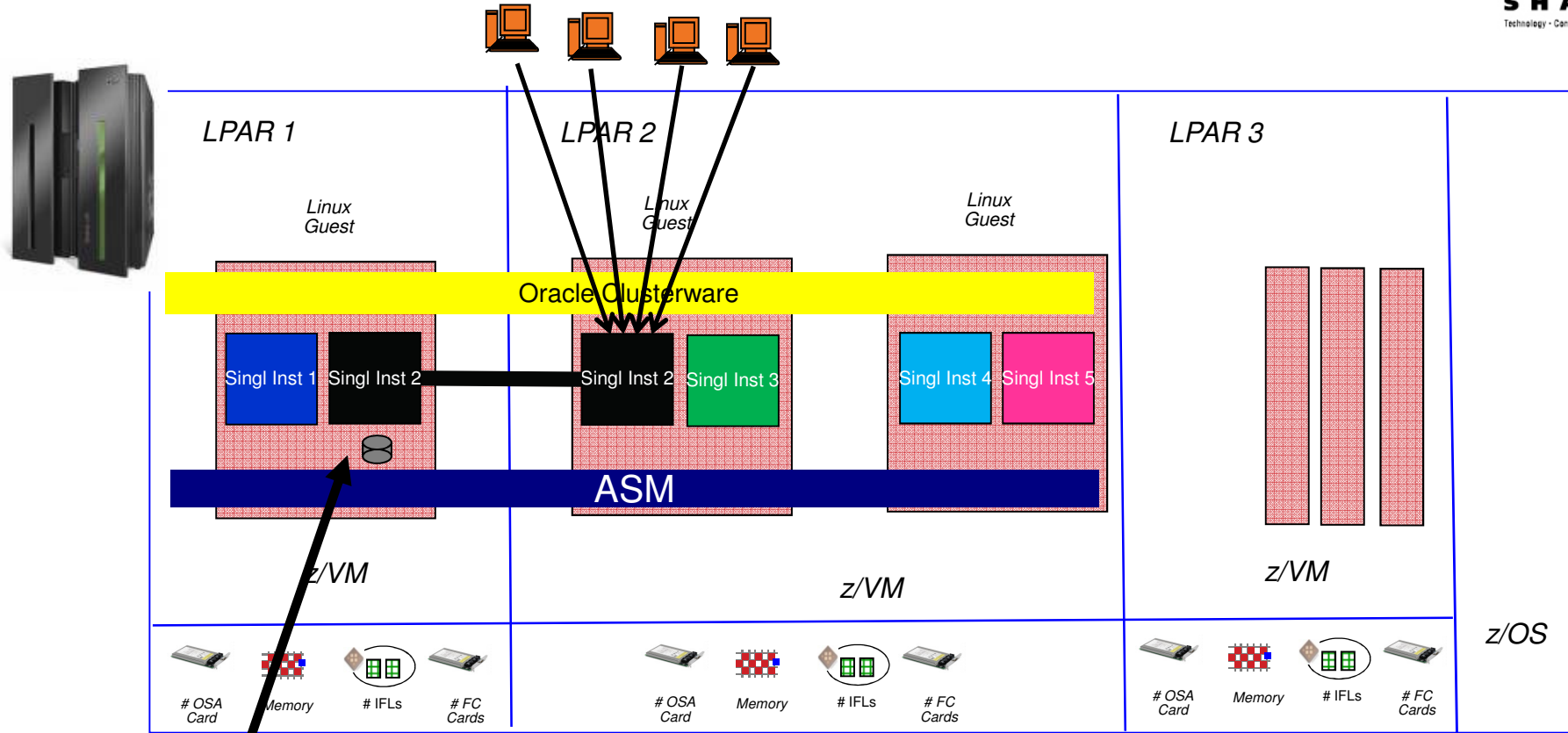
- Restart Instance Service

ASM Disk Groups

shared storage

OCR and Voting

SHARE in Boston
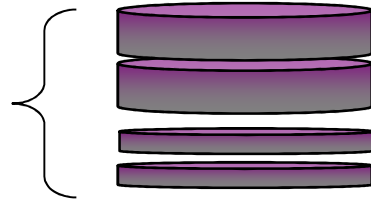
RAC ONE – Transparent Application Failover (TAF)

- My Oracle Support (MOS) Note – **453293.1**
- TAF is required to be configured post install or else failover will not work properly.
- 11gR2 allows for selects to failover seamlessly (READ TAF)
- Database 12c will allow for READ-WRITE TAF where an API can replay on failover instance.

```
srvctl modify service -d <db> -s<service> -P BASIC -e SELECT -z 180 -w 5 -m BASIC –j SHORT

MODULE        MACHINE          LOGON_TIM    INST_ID OSUSER         FAILOVER_TYPE FAILOVER_M
-----------   --------------   ---------    ------- ------------   ------------- ----------
SQL*Plus      ora-raca-2       01-FEB-13          2 oracle         SELECT        BASIC
SQL*Plus      ora-raca-2       01-FEB-13          4 oracle         SELECT        BASIC
```

-e :failover type (NONE, SESSION, SELECT)

-z: failover retries

-w: fail over retry time

-m: failover method

-j: connection load balancing

Suggestion: check that your connections show as Failover eligible.

Best Practices for Consolidating Networks

- Keep Private Interconnect traffic separate from Public network interfaces. (separate network, cards, VSWITCH etc.)

- Private Interconnect's can be shared but watch AWR Ping latencies.

- Utilize VLANs to segregate Cluster interconnect network traffic. VLANs fully supported for Oracle Clusterware interconnect deployments on System z.

- Utilize Server Pools - Logical division of the cluster into pools of servers with many Linux Guests/ databases utilizing the one cluster interconnect.

- RAC nodes on the same System z host can utilize System z Hipersocket(s) for interconnect traffic defined on Layer 2. (Guest LAN Hipersocket not supported)

- Single LPAR RAC configurations recommended for Test/Development only to avoid outages for z/VM maintenance.

- Configure Network switches so that VLAN Interconnect traffic is Pruned from Uplink network traffic.

Oracle Certification Updates – Linux on System z

- **Grid Agent 12c** - **12.1.0.3** - July 2013

- **WebLogic 12c - 12.1.2** - July 2013

- **Oracle Database Patch Set 11.2.0.3.7** - July 2013
  same date as other platforms (patch - 16619182).

- **SuSe 11 SP3** just released and is certified (and tested)
  for 11gR2 on System.

Oracle 12c Cloud Control Monitoring Agent

- **New Oracle 12.1.0.3 grid agent** certified for Linux on System z

- Create repository database on any supported platform (including System z)
- Install Oracle Management Server (OMS) on a supported platform.
- Deploy / "push" Oracle agent to System z databases by simply entering hostname and login credentials.
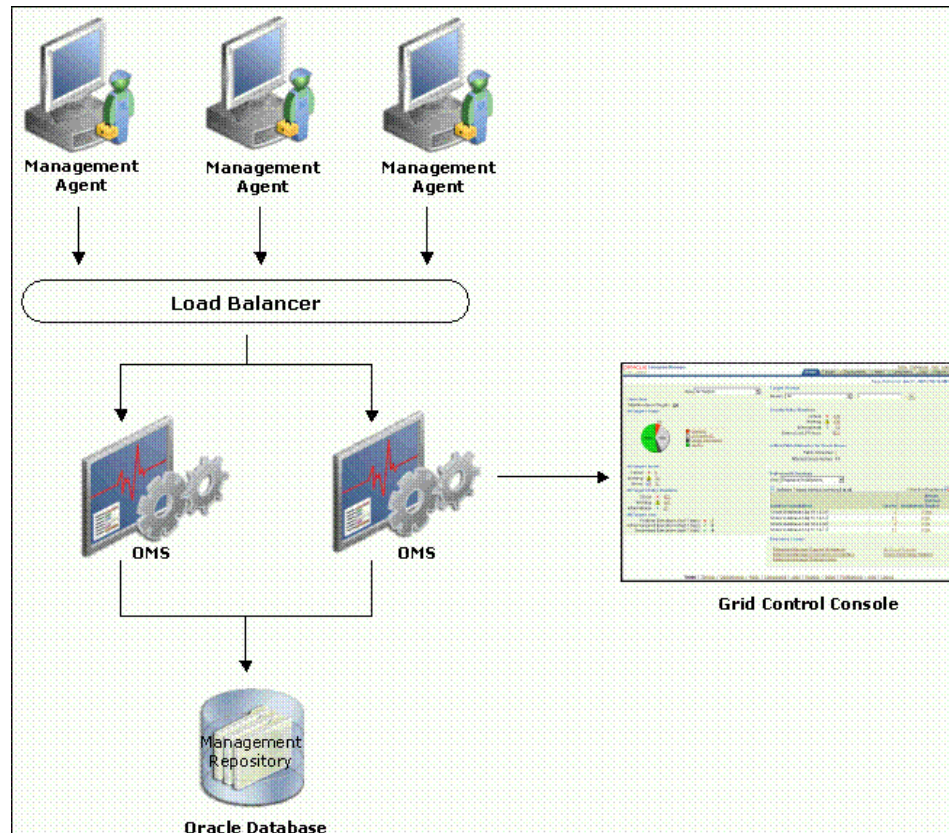
Oracle Cloud Control – Adding a monitoring target (1)
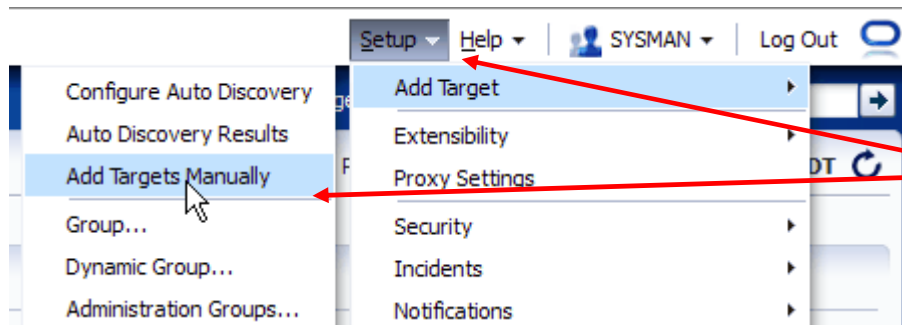
Got to Setup-> Add Targets manually -> Add Target

Click Add Host Targets, then Add Hosts button

Oracle Cloud Control – Adding a monitoring target (2)

Enter the hostname(s) to monitor then "Next"

Oracle Cloud Control – Adding a monitoring target (4)

Enter your Installation details, logon credentials etc.

Oracle Cloud Control – Adding a monitoring target (5)

Agent Deployment begins with a bunch of checks.

Oracle Cloud Control – Adding a monitoring target (6)

May see warning about "root" privileges, select *continue all hosts* option

Oracle Cloud Control – Adding a monitoring target (7)

ORACLE Enterprise Manager Cloud Control 12c

Enterprise ▼   Targets ▼   Favorites ▼   History ▼

Add Host Status

✔ Agent Deployment S

Agent Deployment Summary : ADD_HOST_SYSMAN_Oct_23_2012_1:47:52_PM_EDT

Platform	Host
IBM: Linux on System z	lnxcl2n1.itso.ibm.com

Agent Deployment Details : lnxcl2n1.itso.ibm.com

▽ **Agent Deployment Details**
   OMS Log Location   zs2l20-l1.itso.ibm.com:/oracle/mw/gc_inst/em/EMGC_OMS1/sysman/agentpush//2012-10-23_13-47-52-PM/applog
   ☐ Show only warnings and failures

Deployment Phase Name	Status	Error	Cause
Installation and Configuration	✔		
Secure Agent	✔		
Root.sh	◯	The root.sh script was not run because the user did not have the privilege to run as root using the Privilege Delegation tool.	
Collect Log	✔		
Clean up	✔		

Oracle 12c agent then continues and is now installed monitoring your System z Oracle database.

Latest IBM/Oracle Red Book – SG24-8104 Q1 2013

- Collaboration:
  IBM / Oracle / Velocity Software
- **Now Available!**

References - Key Oracle & IBM Whitepapers:

- Oracle Real Application Clusters (RAC) and Oracle Clusterware Interconnect Virtual Local Area Networks (VLANs) Deployment Considerations

http://www.oracle.com/technetwork/database/clusterware/overview/interconnect-vlan-06072012-1657506.pdf

- **Oracle Real Application Clusters in Oracle VM Environments**

http://www.oracle.com/technetwork/products/clustering/oracle-rac-in-oracle-vm-environment-131948.pdf

- **Oracle Real Application Clusters on Linux on IBM System z: Set up and network performance tuning – Dr. Juergen Doelle & Margaret Phillips**

http://public.dhe.ibm.com/software/dw/linux390/perf/ZSW03185-USEN-02.PDF

References – Key Oracle Notes

Note 1306465.1 Getting Started 11gR2 Grid Infrastructure, Single Instance ASM and DB IBM:Linux on System z
Note 1470834.1 Requirements for Installing Oracle 11gR2 on RHEL 6 on IBM: Linux on System z (s390x)
Note 1290644.1 Requirements for Installing Oracle 11gR2 on SLES11 on IBM: Linux on System z (s390x)

Note:1476511.1 OHASD fails to start on SuSE 11 SP2 on IBM: Linux on System z
Note 1308859.1 Requirements for Installing Oracle 11gR2 on SLES 10 on IBM: Linux on System z   (s390x)
Note 1306889.1 Requirements for Installing Oracle 11gR2 on RHEL 5 on IBM: Linux on System z (s390x)
Note 1086769.1 Ensure you have prerequisite rpms to install Oracle Database & AS10g IBM:Linux on System z
Note 1377392.1 How to Manually Configure Disk Storage devices for use with Oracle ASM 11.2 IBM:Linux on System z
Note 1400185.1 How to Upgrade Oracle Restart i.e. Single Node Grid Infrastructure/ASM from 11.2.0.2 to 11.2.0.3
Note 1276058.1 Oracle GoldenGate Best Practices: Instantiation from an Oracle Source Database
Note 1413787.1 How to completely remove 11.2 Grid Infrastructure, CRS and/or Oracle Restart

Note 259301.1 CRS and 10g Real Application Clusters
Note 268937.1 Repairing or Restoring an Inconsistent OCR in RAC
Note 239998.1 10g RAC How to clean up after a failed CRS Install
Note 220970.1 RAC Frequently Asked Questions Topic

Note 1082253 Requirements for Installing Oracle 10gR2 RDBMS on SLES 10 zLinux (s390x)
Note 741646.1 Requirements for Installing Oracle 10gR2 RDBMS on RHEL 5 on zLinux (s390x).
Note 415182.1 DB Install Requirements Quick Reference - zSeries based Linux .

Note 741146.1 Installing Standalone Agent 10.2 on Linux on z