Requirements for installation of Oracle RAC 11g R2/12c R1 with PowerHA SystemMirror 7.1/7.2 on AIX 7.1/7.2

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APPLIES TO:

Oracle RAC Database 11g R2/12c R1 - Enterprise Edition

PowerHA SystemMirror 7.1/7.2

PURPOSE

This note explains the requirements for successful installation of Oracle RAC Database 11g R2/12c R1 with PowerHA 7.1/7.2 on AIX 7.1/7.2. It is meant to provide a list of supported software product versions, and required patches and configuration.

DETAILS

1. AIX versions/releases

The minimum requirement for AIX 7.1 is 7.1 TL4 SP3 (Released Dec 20, 2016)

The minimum requirement for AIX 7.2 is 7.2 TL1 SP1 (Released Dec 21, 2016)

Ensure the following file sets are installed:

* bos.cluster.rte
* bos.ahafs
* bos.clvm.enh
* devices.common.IBM.storfwork.rte

1. AIX tunables

When using shared-processor pools, it is required to set the vpm\_xvcpus scheduler tunable parameter to 2 for Oracle RAC to function properly.

# schedo –p -o vpm\_xvcpus=2

1. RSCT versions

The required versions of the RSCT file sets are installed by default when you install AIX 7.1 TL4 or later, or AIX 7.2 or later. Verify the following file sets are present before installing PowerHA SystemMirror:

* rsct.core.rmc
* rsct.basic
* rsct.compat.basic.hacmp
* rsct.compat.clients.hacmp

1. PowerHA SystemMirror versions

* For PowerHA 7.1, it is required to update to 7.1.3 SP4 or later
* For PowerHA 7.2, it is required to install SP1 or later

1. PowerHA SystemMirror IFIX Bundles

It is required to install the IFIX Bundles according to the specific PowerHA version and AIX version and meet the minimum requirements as stated section 1 AIX versions/releases and section 4 PowerHA SystemMirror versions.

IFIX Bundles information and downloads are available from [PowerHA SystemMirror IFIX Bundles Information](https://aix.software.ibm.com/aix/ifixes/PHA_Migration/ha_install_mig_fixes.htm) which provides tables for IFIX download links to the combination of specific AIX version and specific PowerHA version.

The tested IFIX combination used in the Oracle RAC 12c R2 certification was PowerHA 7.2 SP1 and AIX 7.1 TL4 SP3. The actual fix installed was [MIG\_PHA\_7201.tar](https://aix.software.ibm.com/aix/ifixes/PHA_Migration/MIG_PHA_7201.tar), there is no applicable fix for AIX 7.1 TL4 SP3. The IFIX Bundles is maintained to provide the latest fixes. Newer IFIX bundle should be installed when they become available.

1. PowerHA SystemMirror APAR

On PowerHA cluster with 3 or more nodes, one or more nodes may occasionally not joining the PowerHA cluster if all the nodes are rebooted at the same time.

Install the fix for APAR IV93378 DELAY IN CLUSTER START WITH 3 OR MORE NODES.

1. Multicast communications

For PowerHA SystemMirror 7.1.3 or later, multicast is an available option for communications. Set up PowerHA SystemMirror clustering using unicast or multicast based on your needs.

1. Required PowerHA communications configuration

To support high availability and safeguard cross kill exposure (discussed in the next section), the required PowerHA communications configuration includes at least three IP-based networks and two repository disks (primary and backup).

In a typical Oracle RAC environment, there is an Oracle public Ethernet network and at least two Ethernet networks for Oracle private (Interconnect) networks. By default, PowerHA automatically makes use of all IP-based networks for its communications.

When creating PowerHA cluster as part of the initial configuration, a disk has to be configured as the repository disk which also serves as a communication device. To satisfy the PowerHA communication requirements, the only extra step is to manually add a backup repository disk.

1. Cross kill exposure

When failures in the Oracle Interconnect paths occur such that partitions are formed and all partitions have the same number of nodes, a "split brain" scenario is created. The "split brain" scenario is characterized by nodes within a partition that can communicate with each other over the Interconnect but not across the partitions. Oracle resolves the "split brain" scenario by keeping the partition which has a lower node number up and evicting the nodes in the other partition. If I/Os from the Oracle processes cannot be fenced off on these nodes, instead of reboot less node evictions, they are forced to reboot.

PowerHA "split brain" occurs when communications to all the repository disks fail and the IP-based networks have partial communications whereby the nodes are partitioned with the same number of nodes in each partition and there is no IP-based communications between any two partitions. PowerHA resolves the "split brain" scenario by keeping the nodes in a partition up and reboot the nodes in other partitions.

Cross kill is a scenario where both Oracle and PowerHA detect a "split brain" and each tries to kill a different partition because PowerHA and Oracle RAC use different algorithm to determine which partition to kill. When PowerHA detects a "split brain" scenario, Oracle detects it too because PowerHA communication paths are a superset of Oracle's Interconnect paths. However, when PowerHA is configured as stated in the communication requirements, failure in all PowerHA's disk-based communications and all IP-based communications experience partial failure that have equal number of nodes in the partitions simultaneously is rather rare.

For PowerHA 7.1 and later versions, it is required to configure at least three IP-based networks and two repository disks (the primary and the backup) for heart beating to minimize the cross kill exposure.

Typically, an Oracle RAC environment would have at a minimum of an Oracle public Ethernet network and at least two Oracle private Ethernet networks (Interconnects). By default, PowerHA will automatically use all IP-based networks for communications and thus include at least the three IP-based networks for heart beating. During the configuration step to create a PowerHA cluster, it will prompt for the path of the repository disk. To achieve the required five redundant heartbeat paths, the only extra manual step is to add a backup repository disk.

1. Oracle bug

Bug 20601073: ACFSROOT NEEDS TO HANDLE PARTIAL DRIVERS BEING LOADED

Download patch 20601073 from My Oracle Support, "Patches & Updates" tab.

1. Configuring Oracle voting disks

The Oracle voting disks were placed in an ASM diskgroup configured from raw disk devices in the Oracle RAC 12c R2 certification tests. While they can be configured differently, they have not been tested. It is recommended voting disks be placed in an ASM diskgroup backed by raw disk devices.

1. Using Virtual I/O Server (VIOS) and Oracle RAC

When using Virtual I/O Server, the minimum required version is VIOS 2.2.3 SP3.

Oracle RAC requires public and private (Interconnect) networks that are highly available. There are two possible solutions to implement highly available virtual Ethernet adapters: the Shared Ethernet Adapter (SEA) and Etherchannel. The SEA failover method is configured on the VIO server and the network switch. Etherchannel is configured on the VIO client.

For more information about SEA and Etherchannel, see the following IBM Redbook:

• IBM PowerVM Virtualization Introduction and Configuration

<http://www.redbooks.ibm.com/abstracts/sg247940.html>

When using SEA make sure these switch settings are configured.

• Spanning tree protocol = enable (set spantree enable port)

• Start port fast = enable (set spantree portfast mod/port enable)

• Delay forwarding = 15 secs (set spantree fwddelay 15 vlans)

• Trunking = off (set trunk mod/port off)

• Etherchannel = off (set port channel mod/port off)

The command, in parenthesis, may be different on your network switch.

1. Configure GNS checkbox is grayed out in Oracle Grid Infrastructure GUI installer

Refer to [*Oracle Grid Infrastructure Installation Guide for IBM AIX on POWER Systems (64-bit)*](http://docs.oracle.com/database/121/CWAIX/networks.htm), 4.5.3 IP Name and Address Requirements For Grid Naming Service (GNS) for details.

REFERENCES

IBM Redbooks ([www.redbooks.ibm.com](http://www.redbooks.ibm.com))

* [IBM PowerHA SystemMirror for AIX 7.1.3 Best Practices and Migration Guide](http://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/sg248234.html)
* [IBM PowerHA SystemMirror for AIX Cookbook](http://www.redbooks.ibm.com/redpieces/abstracts/sg247739.html)
* [Guide to IBM PowerHA SystemMirror for AIX Version 7.1.3](http://www.redbooks.ibm.com/redpieces/abstracts/sg248167.html)

White Papers, FAQ, Knowledge Center

* [PowerHA Home Page](http://www.ibm.com/systems/power/software/availability/)
* [IBM Knowledge Center - PowerHA SystemMirror](http://www.ibm.com/support/knowledgecenter/SSPHQG)
* [PowerHA Wikis](https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/Power%20Systems/page/High%20Availability)
* [PowerHA FAQ](http://www.ibm.com/systems/power/software/availability/aix/faq_support.html)
* [IBM PowerHA SystemMirror rapid deploy cluster worksheets for IBM AIX](https://www.ibm.com/developerworks/aix/tutorials/au-ibm-powerha-system-mirror/)
* [PowerHA v6.1 to v7.1.3 migration Youtube video](https://www.youtube.com/watch?v=MaPxuK4poUw)
* [VIOS Version 2.2.3.3 Release Notes](https://www.ibm.com/support/knowledgecenter/POWER8/p8eeo/p8eeo.pdf)
* [PowerHA for AIX Version Compatibility Matrix](http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/TD101347)
* [IBM Support - Fix Central](https://www.ibm.com/support/fixcentral/)

My Oracle Support

* Bug 21523234 - 12.1.0.2.5 (Oct 2015) Grid Infrastructure Patch Set Update (GI PSU)(Doc ID 21523234.8)
* Bug 21359755 12.1.0.2.5 (Oct 2015) Database Patch Set Update (DB PSU)
* Bug 21948354 12.1.0.2.160119 (Jan 2016) Database Patch Set Update (DB PSU)
* Oracle Bug 23273958 - AIX/HP/zLinux: 12.1.0.1.160719 (Jul 2016) Grid Infrastructure Patch Set Update (GI PSU) (Doc ID 23273958.8)
* Bug 22139226 Oracle JavaVM Component 12.1.0.2.160119 Database PSU (Jan 2016) (OJVM PSU)
* Oracle 12.1.0.1 Patch Set Updates - List of Fixes in each PSU (Doc ID 1591141.1)