

# **Oracle Solaris Cluster Data Service for WebSphere MQ Guide**

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# Preface

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*Oracle Solaris Cluster Data Service for WebSphere MQ Guide* explains how to install and configure HA for WebSphere MQ.

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**Note** – This Oracle Solaris Cluster release supports systems that use the SPARC and x86 families of processor architectures: UltraSPARC, SPARC64, AMD64, and Intel 64. In this document, x86 refers to the larger family of 64-bit x86 compatible products. Information in this document pertains to all platforms unless otherwise specified.

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This document is intended for system administrators with extensive knowledge of Oracle software and hardware. Do not use this document as a planning or presales guide. Before reading this document, you should have already determined your system requirements and purchased the appropriate equipment and software.

The instructions in this book assume knowledge of the Oracle Solaris Operating System and expertise with the volume-manager software that is used with Oracle Solaris Cluster software.

## Using UNIX Commands

This document contains information about commands that are specific to installing and configuring Oracle Solaris Cluster data services. The document does *not* contain comprehensive information about basic UNIX commands and procedures, such as shutting down the system, booting the system, and configuring devices. Information about basic UNIX commands and procedures is available from the following sources:

- Online documentation for the Oracle Solaris Operating System
- Oracle Solaris Operating System man pages
- Other software documentation that you received with your system

## Typographic Conventions

The following table describes the typographic conventions that are used in this book.

TABLE P-1 Typographic Conventions

Typeface	Meaning	Example
AaBbCc123	The names of commands, files, and directories, and onscreen computer output	Edit your <code>.login</code> file. Use <code>ls -a</code> to list all files. <code>machine_name% you have mail.</code>
<b>AaBbCc123</b>	What you type, contrasted with onscreen computer output	<code>machine_name% su</code> Password:
<i>aabbcc123</i>	Placeholder: replace with a real name or value	The command to remove a file is <code>rm filename</code> .
<i>AaBbCc123</i>	Book titles, new terms, and terms to be emphasized	Read Chapter 6 in the <i>User's Guide</i> . <i>A cache</i> is a copy that is stored locally. Do <i>not</i> save the file. <b>Note:</b> Some emphasized items appear bold online.

## Shell Prompts in Command Examples

The following table shows the default UNIX system prompt and superuser prompt for shells that are included in the Oracle Solaris OS. Note that the default system prompt that is displayed in command examples varies, depending on the Oracle Solaris release.

TABLE P-2 Shell Prompts

Shell	Prompt
Bash shell, Korn shell, and Bourne shell	\$
Bash shell, Korn shell, and Bourne shell for superuser	#
C shell	machine_name%
C shell for superuser	machine_name#

## Related Documentation

Information about related Oracle Solaris Cluster topics is available in the documentation that is listed in the following table. All Oracle Solaris Cluster documentation is available at <http://docs.sun.com>.

Topic	Documentation
Data service administration	<i>Oracle Solaris Cluster Data Services Planning and Administration Guide</i> Individual data service guides
Concepts	<i>Oracle Solaris Cluster Concepts Guide</i>
Overview	<i>Oracle Solaris Cluster Overview</i>
Software installation	<i>Oracle Solaris Cluster Software Installation Guide</i>
System administration	<i>Oracle Solaris Cluster System Administration Guide</i>
Hardware administration	<i>Oracle Solaris Cluster 3.3 Hardware Administration Manual</i> Individual hardware administration guides
Data service development	<i>Oracle Solaris Cluster Data Services Developer's Guide</i>
Error messages	<i>Oracle Solaris Cluster Error Messages Guide</i>
Command and function reference	<i>Oracle Solaris Cluster Reference Manual</i>

For a complete list of Oracle Solaris Cluster documentation, see the release notes for your release of Oracle Solaris Cluster at <http://docs.sun.com>.

## Related Third-Party Web Site References

Third-party URLs that are referenced in this document provide additional related information.

**Note** – Oracle is not responsible for the availability of third-party web sites mentioned in this document. Oracle does not endorse and is not responsible or liable for any content, advertising, products, or other materials that are available on or through such sites or resources. Oracle will not be responsible or liable for any actual or alleged damage or loss caused or alleged to be caused by or in connection with use of or reliance on any such content, goods, or services that are available on or through such sites or resources.

## Documentation, Support, and Training

See the following web sites for additional resources:

- Documentation (<http://docs.sun.com>)
- Support (<http://www.oracle.com/us/support/systems/index.html>)
- Training (<http://education.oracle.com>) – Click the Sun link in the left navigation bar.

## Oracle Welcomes Your Comments

Oracle welcomes your comments and suggestions on the quality and usefulness of its documentation. If you find any errors or have any other suggestions for improvement, go to <http://docs.sun.com> and click Feedback. Indicate the title and part number of the documentation along with the chapter, section, and page number, if available. Please let us know if you want a reply.

Oracle Technology Network (<http://www.oracle.com/technetwork/index.html>) offers a range of resources related to Oracle software:

- Discuss technical problems and solutions on the [Discussion Forums](http://forums.oracle.com) (<http://forums.oracle.com>).
- Get hands-on step-by-step tutorials with [Oracle By Example](http://www.oracle.com/technology/obe/start/index.html) (<http://www.oracle.com/technology/obe/start/index.html>).
- Download [Sample Code](http://www.oracle.com/technology/sample_code/index.html) ([http://www.oracle.com/technology/sample\\_code/index.html](http://www.oracle.com/technology/sample_code/index.html)).

## Getting Help

If you have problems installing or using Oracle Solaris Cluster, contact your service provider and provide the following information:

- Your name and email address (if available)
- Your company name, address, and phone number
- The model number and serial number of your systems
- The release number of the Oracle Solaris Operating System (for example, Oracle Solaris 10)
- The release number of Oracle Solaris Cluster (for example, Oracle Solaris Cluster 3.3)

Use the following commands to gather information about each node on your system for your service provider.

Command	Function
<code>prtconf -v</code>	Displays the size of the system memory and reports information about peripheral devices
<code>psrinfo -v</code>	Displays information about processors
<code>showrev -p</code>	Reports which patches are installed
<code>prtdiag -v</code>	Displays system diagnostic information
<code>/usr/cluster/bin/clnode show-rev</code>	Displays Oracle Solaris Cluster release and package version information

Also have available the contents of the `/var/adm/messages` file.



# Installing and Configuring Solaris Cluster HA for WebSphere MQ

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This chapter explains how to install and configure HA for WebSphere MQ.

This chapter contains the following sections.

- “HA for WebSphere MQ Overview” on page 11
- “Overview of Installing and Configuring HA for WebSphere MQ” on page 12
- “Planning the HA for WebSphere MQ Installation and Configuration” on page 12
- “Installing and Configuring WebSphere MQ” on page 17
- “Verifying the Installation and Configuration of WebSphere MQ” on page 25
- “Installing the HA for WebSphere MQ Packages” on page 28
- “Registering and Configuring Solaris Cluster HA for WebSphere MQ” on page 30
- “Verifying the Solaris Cluster HA for WebSphere MQ Installation and Configuration” on page 37
- “Upgrading HA for WebSphere MQ” on page 37
- “Understanding the Solaris Cluster HA for WebSphere MQ Fault Monitor” on page 38
- “Debug Solaris Cluster HA for WebSphere MQ” on page 40

## HA for WebSphere MQ Overview

The HA for WebSphere MQ data service provides a mechanism for the orderly startup and shutdown, fault monitoring, and automatic failover of the WebSphere MQ service.

The following components can be protected by the HA for WebSphere MQ data service within the global zone, whole root non-global zone or whole root failover non-global zone.

Queue Manager  
Channel Initiator  
Command Server  
Listener  
Trigger Monitor

## Overview of Installing and Configuring HA for WebSphere MQ

The following table summarizes the tasks for installing and configuring HA for WebSphere MQ and provides cross-references to detailed instructions for performing these tasks. Perform the tasks in the order that they are listed in the table.

TABLE 1-1 Tasks for Installing and Configuring HA for WebSphere MQ

Task	Instructions
Plan the installation	<a href="#">“Planning the HA for WebSphere MQ Installation and Configuration” on page 12</a>
Install and configure the WebSphere MQ software	<a href="#">“How to Install and Configure WebSphere MQ” on page 17</a>
Verify the installation and configuration	<a href="#">“How to Verify the Installation and Configuration of WebSphere MQ” on page 25</a>
Install HA for WebSphere MQ packages	<a href="#">“Installing the HA for WebSphere MQ Packages” on page 28</a>
Register and configure HA for WebSphere MQ resources	<a href="#">“How to Register and Configure Solaris Cluster HA for WebSphere MQ” on page 30</a>
Verify the HA for WebSphere MQ installation and configuration	<a href="#">“How to Verify the Solaris Cluster HA for WebSphere MQ Installation and Configuration” on page 37</a>
Upgrade the HA for WebSphere MQ data service	<a href="#">“Upgrading HA for WebSphere MQ” on page 37</a>
Tune the HA for WebSphere MQ fault monitor	<a href="#">“Understanding the Solaris Cluster HA for WebSphere MQ Fault Monitor” on page 38</a>
Debug HA for WebSphere MQ	<a href="#">“How to turn on debug for Solaris Cluster HA for WebSphere MQ” on page 40</a>

## Planning the HA for WebSphere MQ Installation and Configuration

This section contains the information you need to plan your HA for WebSphere MQ installation and configuration.

### Configuration Restrictions

The configuration restrictions in the subsections that follow apply only to HA for WebSphere MQ.



**Caution** – Your data service configuration might not be supported if you do not observe these restrictions.

## Restriction for the supported configurations of HA for WebSphere MQ

The Solaris Cluster HA for WebSphere MQ data service can only be configured as a failover service.

Single or multiple instances of WebSphere MQ can be deployed in the cluster.

WebSphere MQ can be deployed in the global zone, whole root non-global zone or a whole root failover non-global zone. See [“Restriction for multiple WebSphere MQ instances” on page 13](#) for more information.

The Solaris Cluster HA for WebSphere MQ data service supports different versions of WebSphere MQ, however you must check that the Solaris Cluster HA for WebSphere MQ data service has been verified against that version.

## Restriction for the Location of WebSphere MQ files

The WebSphere MQ files are where the queue manager data files `/var/mqm/qmgr/queue-manager` and `/var/mqm/log/queue-manager` are stored.

These WebSphere MQ files needs to be placed on shared storage as either a cluster file system or a highly available local file system.

Refer to [Step 5](#) and [Step 6](#) in [“How to Install and Configure WebSphere MQ” on page 17](#) for a more information.

## Restriction for multiple WebSphere MQ instances

The HA for WebSphere MQ data service can support multiple WebSphere MQ instances, potentially with different versions.

If you intend to deploy multiple WebSphere MQ instances with different versions you will need to consider deploying WebSphere MQ in separate whole root non-global zones.

The purpose of the following discussion is to help you decide how to use whole root non-global zones to deploy multiple WebSphere MQ instances and then to determine what `NodeList` entries are required.

Within these examples:

- There are two nodes within the cluster, `node1` and `node2`.
- Both nodes have two non-global zones each named `z1` and `z2`.
- Each example listed simply shows the required `NodeList` property value, via the `-n` parameter, when creating a failover resource group.

- Benefits and drawbacks are listed within each example as + and -.

---

**Note** – Although these examples show non-global zones z1 and z2, you may also use `global` as the zone name or omit the zone entry within the `NodeList` property value to use the global zone.

---

**EXAMPLE 1-1** Run multiple WebSphere MQ instances in the same failover resource group.

Create a single failover resource group that will contain all the WebSphere MQ instances in the same non-global zones across node1 and node2.

```
# clresourcegroup create -n node1:z1,node2:z1 RG1
```

- + Only one non-global zone per node is required.
- - Multiple WebSphere MQ instances do not have independent failover as they are all within the same failover resource group.

**EXAMPLE 1-2** Run multiple WebSphere MQ instances in separate failover resource groups.

Create multiple failover resource groups that will each contain one WebSphere MQ instance in the same non-global zones across node1 and node2.

```
# clresourcegroup create -n node1:z1,node2:z1 RG1
# clresourcegroup create -n node1:z1,node2:z1 RG2
```

- + Only one non-global zone per node is required.
- + Multiple WebSphere MQ instances have independent failover in separate failover resource groups.

**EXAMPLE 1-3** Run multiple WebSphere MQ instances within separate failover resource groups and zones.

Create multiple failover resource groups that will each contain one WebSphere MQ instance in separate non-global zones across node1 and node2.

```
# clresourcegroup create -n node1:z1,node2:z1 RG1
# clresourcegroup create -n node1:z2,node2:z2 RG2
```

- + Multiple WebSphere MQ instances have independent failover in separate failover resource groups and separate non-global zones.
- + All WebSphere MQ instances are isolated within their own separate non-global zones.
- - Each resource group requires a unique non-global zone per node.

**EXAMPLE 1-4** Run multiple WebSphere MQ instances in separate failover resource groups that contain separate HA containers across node1 and node2.

Create multiple failover resource groups that will each contain a HA container. Each HA container can then contain one or more WebSphere MQ instances.

**EXAMPLE 1-4** Run multiple WebSphere MQ instances in separate failover resource groups that contain separate HA containers across node1 and node2. *(Continued)*

```
# clresourcegroup create -n node1,node2 RG1
# clresourcegroup create -n node1,node2 RG2
```

- + Multiple WebSphere MQ instances have independent failover within separate failover resource groups and separate HA containers.
- + The same HA container per resource group is used per node.
- + Each HA container is only active on one node at a time.
- - Each resource group requires a unique HA container per node.

---

**Note** – If your requirement is simply to make WebSphere MQ highly available you should consider choosing a global or non-global zone deployment over a HA container deployment. Deploying WebSphere MQ within a HA container will incur additional failover time to boot/halt the HA container.

---

## Configuration Requirements

The configuration requirements in this section apply only to HA for WebSphere MQ.




---

**Caution** – If your data service configuration does not conform to these requirements, the data service configuration might not be supported.

---

### Determine which Solaris zone WebSphere MQ will use

Solaris zones provides a means of creating virtualized operating system environments within an instance of the Solaris 10 OS. Solaris zones allow one or more applications to run in isolation from other activity on your system. For complete information about installing and configuring a Solaris Container, see *System Administration Guide: Oracle Solaris Containers-Resource Management and Oracle Solaris Zones*.

You must determine which Solaris zone WebSphere MQ will run in. WebSphere MQ can run within a global zone, non-global zone or in an HA container configuration. [Table 1-2](#) provides some reasons to help you decide.

---

**Note** – WebSphere MQ can be deployed within the global zone, whole root non-global zone or whole root failover non-global zone, also referred as an HA container.

---

TABLE 1-2 Choosing the appropriate Solaris Zone for WebSphere MQ

Zone type	Reasons for choosing the appropriate Solaris Zone for WebSphere MQ
Global Zone	Only one instance of WebSphere MQ will be installed. Non-global zones are not required.
Non-global Zone	Several WebSphere MQ instances need to be consolidated and isolated from each other. Different versions of WebSphere MQ will be installed. Failover testing of WebSphere MQ between non-global zones on the same node is required.
HA container	You require WebSphere MQ to run in the same zone regardless of which node the HA container is running on.

**Note** – If your requirement is simply to make WebSphere MQ highly available you should consider choosing a global or non-global zone deployment over an HA container deployment. Deploying WebSphere MQ within an HA container will incur additional failover time to boot/halt the HA container.

### Requirements if multiple WebSphere MQ instances are deployed on cluster file systems.

If a cluster file system is being used for the WebSphere MQ files, it is possible to manually start the queue manager on one node of the cluster and at the same time to also manually start the same queue manager on another node of the cluster.

**Note** – Although it is possible, you should not attempt this as doing so will cause severe damage to the WebSphere MQ files.

Although it is expected that no-one will manually start the same queue manager on separate nodes of the cluster at the same time the HA for WebSphere MQ provides a mechanism to prevent someone from doing so, albeit by mistake.

To prevent against this happening you must implement one of the following two solutions.

1. Use a highly available local file system for the WebSphere MQ files.  
This is the recommended approach as the WebSphere MQ files would be mounted only on one node of the cluster at a time. This then limits starting the queue manager on only one node of the cluster at a time.
2. Create a symbolic link for `/opt/mqm/bin/strmqm` and `/opt/mqm/bin/endmqm` to `/opt/SUNWscmqs/mgr/bin/check-start`.

`/opt/SUNWscmq/mgr/bin/check-start` provides a mechanism to prevent manually starting or stopping the queue manager, by verifying that the start or stop is being attempted by the Solaris Cluster HA for WebSphere MQ data service.

`/opt/SUNWscmq/mgr/bin/check-start` will report the following error if an attempt to manually start or stop the queue manager.

```
$ strmqm qmgr1
$ Request to run </usr/bin/strmqm qmgr1> within Solaris Cluster has been refused
```

If a cluster file system is used for the WebSphere MQ files, you must create a symbolic link for `strmqm` and `endmqm` to `/opt/SUNWscmq/mgr/bin/check-start` and inform the Solaris Cluster HA for WebSphere MQ data service of this change.

To do this, you must perform the following on each node of the cluster.

```
# cd /opt/mqm/bin
#
# mv strmqm strmqm_sc3
# mv endmqm endmqm_sc3
#
# ln -s /opt/SUNWscmq/mgr/bin/check-start strmqm
# ln -s /opt/SUNWscmq/mgr/bin/check-start endmqm
```

After renaming `strmqm` and `endmqm` you must use these new program names (`strmqm_sc3` and `endmqm_sc3`) for the `START_CMD` and `STOP_CMD` variables when you edit the `/opt/SUNWscmq/mgr/util/mgr_config` file in [Step 7](#) in “[How to Register and Configure Solaris Cluster HA for WebSphere MQ](#)” on [page 30](#)

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**Note** – If you implement this workaround, then you must back it out whenever you need to apply any maintenance to WebSphere MQ. Afterwards, you must again apply this workaround.

Instead the recommended approach is to use a highly available local file system for the WebSphere MQ files.

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## Installing and Configuring WebSphere MQ

This section contains the procedures you need to install and configure WebSphere MQ.

### ▼ How to Install and Configure WebSphere MQ

This section contains the procedures you need to install and configure WebSphere MQ.

#### 1 Determine how many WebSphere MQ instances will be used.

Refer to “[Restriction for multiple WebSphere MQ instances](#)” on [page 13](#) for more information.

**2 Determine which Solaris zone to use.**

Refer to “Determine which Solaris zone WebSphere MQ will use” on page 15 for more information.

**3 If a zone will be used, create the whole root non-global zone or HA container.**

Refer to *System Administration Guide: Oracle Solaris Containers-Resource Management and Oracle Solaris Zones* for complete information about installing and configuring a zone.

Refer to *Oracle Solaris Cluster Data Service for Solaris Containers Guide* for complete information about creating an HA container.

**4 If a non-global zone or HA container is being used, ensure the zone is booted.**

Repeat this step on all nodes of the cluster for a non-global zone and on one node of the cluster if an HA container is being used.

Boot the zone if it is not running.

```
# zoneadm list -v
# zoneadm -z zonename boot
```

**5 Determine how WebSphere MQ should be deployed in the cluster.**

WebSphere MQ can be deployed onto a cluster file system or highly available file system on the cluster. The following discussion will help you determine the correct approach to take.

Within this section, a single instance or multiple instances of WebSphere MQ will be considered within a global zone, non-global zone, or HA container.

In each scenario, file system options for `/var/mqm` and the WebSphere MQ files will be listed together with a recommendation.

**a. Single Instance of WebSphere MQ****i. Global zone deployment**

`/var/mqm`

Can be deployed on a cluster file system, highly available local file system or on local storage on each cluster node.

It is recommended to deploy `/var/mqm` on local storage on each cluster node.

`/var/mqm/qmgrs/queue-manager` and `/var/mqm/log/queue-manager`

Can be deployed on a cluster file system or highly available local file system.

It is recommended to deploy `/var/mqm/qmgrs/queue-manager` and `/var/mqm/log/queue-manager` on highly available local file system.

**ii. Non-global zone deployment**

*/var/mqm*

Can be deployed on a highly available local file system or on non-global zone local storage on each cluster node.

It is recommended to deploy */var/mqm* on non-global local storage on each cluster node.

*/var/mqm/qmgrs/queue-manager* and */var/mqm/log/queue-manager*

Must be deployed on a highly available local file system.

### iii. HA container deployment

If considering an HA container, you must be aware that an HA container will incur additional failover time to boot/halt the HA container.

*/var/mqm*

Can be deployed on a highly available local file system or in HA container's zonepath.

It is recommended to deploy */var/mqm* on the HA container's zonepath.

*/var/mqm/qmgrs/queue-manager* and */var/mqm/log/queue-manager*

Must be deployed on a highly available local file system.

## b. Multiple Instances of WebSphere MQ

### i. Global zone deployment

*/var/mqm*

Can be deployed on a cluster file system or on local storage on each cluster node.

It is recommended to deploy */var/mqm* on local storage on each cluster node.

*/var/mqm/qmgrs/queue-manager* and */var/mqm/log/queue-manager*

Can be deployed on a cluster file system or highly available local file system.

It is recommended to deploy */var/mqm/qmgrs/queue-manager* and */var/mqm/log/queue-manager* on highly available local file system.

### ii. Non-global zone deployment

*/var/mqm*

Must be deployed on non-global zone local storage on each cluster node.

*/var/mqm/qmgrs/queue-manager* and */var/mqm/log/queue-manager*

Must be deployed on a highly available local file system.

### iii. HA Container deployment

If considering an HA container, you must be aware that an HA container will incur additional failover time to boot/halt the HA container.

`/var/mqm`

Can be deployed on a highly available local file system or on HA container's zonepath.

It is recommended to deploy `/var/mqm` on the HA container's zonepath.

`/var/mqm/qmgrs/queue-manager` and `/var/mqm/log/queue-manager`

Must be deployed on a highly available local file system.

---

**Note** – Refer to [Appendix A, “Deployment Example: Installing a WebSphere MQ Queue Manager in Non-Global Zones,”](#) for Deployment Example: Installing a WebSphere MQ Queue Manager in Non-Global Zones and [Appendix B, “Deployment Example: Installing a WebSphere MQ Queue Manager in an HA Container,”](#) for Deployment Example: Installing a WebSphere MQ Queue Manager in an HA Container for examples on how to set up the WebSphere MQ files.

---

## 6 Create a cluster file system or highly available local file system for the WebSphere MQ files.

Within this step you will create file systems for the WebSphere MQ files and `/var/mqm`. Once you have determined how WebSphere MQ should be deployed in the cluster, you can choose one of the sub steps below.

- Create the WebSphere MQ files and `/var/mqm` on cluster file systems by using [Step a](#).
- Create the WebSphere MQ files on SVM highly available local file systems and `/var/mqm` on cluster file system by using [Step b](#).
- Create the WebSphere MQ files on ZFS highly available local file systems and `/var/mqm` on local storage or within an HA container's zonepath by using [Step c](#).

### a. WebSphere MQ files and `/var/mqm` on cluster file systems.

Within this deployment:

- The WebSphere MQ files are deployed on cluster file systems.
- The WebSphere MQ instances are `qmgr1` and `qmgr2`.
- `/var/mqm` uses a cluster file system with a symbolic link for `/var/mqm/qmgrs/@SYSTEM` to a local file (`/var/mqm_local/qmgrs/@SYSTEM`) on each node in the cluster.

---

**Note** – Refer to [Step d](#) for more information about setting up this symbolic link.

---

```
# ls -l /var/mqm
lrwxrwxrwx 1 root  other      11 Jan  8 14:17 /var/mqm ->
/global/mqm
#
# ls -l /global/mqm/qmgrs
total 6
```

```

lrwxrwxrwx  1 root    other          512 Dec 16 09:57 @SYSTEM ->
/var/mqm_local/qmgrs/@SYSTEM
drwxr-xr-x  4 root    root          512 Dec 18 14:20 qmgr1
drwxr-xr-x  4 root    root          512 Dec 18 14:20 qmgr2
#
# ls -l /global/mqm/log
total 4
drwxr-xr-x  4 root    root          512 Dec 18 14:20 qmgr1
drwxr-xr-x  4 root    root          512 Dec 18 14:20 qmgr2
#
# more /etc/vfstab (Subset of the output)
/dev/md/dg_d4/dsk/d40 /dev/md/dg_d4/rdisk/d40 /global/mqm
    ufs      3      yes      logging,global
/dev/md/dg_d4/dsk/d43 /dev/md/dg_d4/rdisk/d43 /global/mqm/qmgrs/qmgr1
    ufs      4      yes      logging,global
/dev/md/dg_d4/dsk/d46 /dev/md/dg_d4/rdisk/d46 /global/mqm/log/qmgr1
    ufs      4      yes      logging,global
/dev/md/dg_d5/dsk/d53 /dev/md/dg_d5/rdisk/d53 /global/mqm/qmgrs/qmgr2
    ufs      4      yes      logging,global
/dev/md/dg_d5/dsk/d56 /dev/md/dg_d5/rdisk/d56 /global/mqm/log/qmgr2
    ufs      4      yes      logging,global

```

#### b. WebSphere MQ files on SVM highly available local file systems and /var/mqm on cluster file system.

Within this deployment:

- The WebSphere MQ files are deployed on SVM highly available local file systems.
- The WebSphere MQ instances are qmgr1 and qmgr2.
- /var/mqm uses a cluster file system with a symbolic link for /var/mqm/qmgrs/@SYSTEM to a local file (/var/mqm\_local/qmgrs/@SYSTEM) on each node in the cluster.

---

**Note** – Refer to [Step d](#) for more information about setting up this symbolic link.

---

```

# ls -l /var/mqm
lrwxrwxrwx  1 root    other          11 Sep 17 16:53 /var/mqm ->
/global/mqm
#
# ls -l /global/mqm/qmgrs
total 6
lrwxrwxrwx  1 root    other          512 Sep 17 09:57 @SYSTEM ->
/var/mqm_local/qmgrs/@SYSTEM
lrwxrwxrwx  1 root    other          22 Sep 17 17:19 qmgr1 ->
/local/mqm/qmgrs/qmgr1
lrwxrwxrwx  1 root    other          22 Sep 17 17:19 qmgr2 ->
/local/mqm/qmgrs/qmgr2
#
# ls -l /global/mqm/log
total 4
lrwxrwxrwx  1 root    other          20 Sep 17 17:18 qmgr1 ->
/local/mqm/log/qmgr1
lrwxrwxrwx  1 root    other          20 Sep 17 17:19 qmgr2 ->
/local/mqm/log/qmgr2

```

```
#
# more /etc/vfstab (Subset of the output)
/dev/md/dg_d4/dsk/d40 /dev/md/dg_d4/rdisk/d40 /global/mqm
    ufs      3      yes      logging,global
/dev/md/dg_d4/dsk/d43 /dev/md/dg_d4/rdisk/d43 /local/mqm/qmgrs/qmgr1
    ufs      4      no      logging
/dev/md/dg_d4/dsk/d46 /dev/md/dg_d4/rdisk/d46 /local/mqm/log/qmgr1
    ufs      4      no      logging
/dev/md/dg_d5/dsk/d53 /dev/md/dg_d5/rdisk/d53 /local/mqm/qmgrs/qmgr2
    ufs      4      no      logging
/dev/md/dg_d5/dsk/d56 /dev/md/dg_d5/rdisk/d56 /local/mqm/log/qmgr2
    ufs      4      no      logging
```

**c. WebSphere MQ files on ZFS highly available local file systems and /var/mqm on local storage or within a HA container's zonepath.**

Within this deployment:

- The WebSphere MQ files are deployed on ZFS highly available local file systems.
- The WebSphere MQ instances are qmgr1 and qmgr2.
- /var/mqm uses local storage on each cluster node or the zonepath of a HA container.

As /var/mqm is on a local file system you must copy /var/mqm/mqs.ini from the node where the queue managers was created to all other nodes or zones in the cluster where the queue manager will run.

---

**Note** – Refer to [Step 10](#) for more information about copying /var/mqm/mqs.ini.

---

```
# df -k /var/mqm
Filesystem      kbytes    used    avail capacity  Mounted on
/                59299764 25657791 33048976    44%    /
#
# ls -l /var/mqm/qmgrs
total 6
drwxrwsr-x    2  mqm      mqm           512 Sep 11 11:42 @SYSTEM
lrwxrwxrwx    1  mqm      mqm           14 Sep 11 11:45 qmgr1 -> /ZFSwmq1/qmgrs
lrwxrwxrwx    1  mqm      mqm           14 Sep 11 11:50 qmgr2 -> /ZFSwmq2/qmgrs
#
# ls -l /var/mqm/log
total 4
lrwxrwxrwx    1  mqm      mqm           12 Sep 11 11:44 qmgr1 -> /ZFSwmq1/log
lrwxrwxrwx    1  mqm      mqm           12 Sep 11 11:54 qmgr2 -> /ZFSwmq2/log
#
# df -k /ZFSwmq1
Filesystem      kbytes    used    avail capacity  Mounted on
HAZpool1        4096453   13180 4083273      1%    /ZFSwmq1
#
# df -k /ZFSwmq2
Filesystem      kbytes    used    avail capacity  Mounted on
HAZpool2        4096453   13133 4083320      1%    /ZFSwmq2
```

**d. Cluster file system is used for /var/mqm.**

Within this deployment:

- If `/var/mqm` is placed on shared storage as a cluster file system, a symbolic link is made from `/var/mqm/qmgrs/@SYSTEM` to local file `/var/mqm_local/qmgrs/@SYSTEM`.
- You must perform this step on all nodes in the cluster *only* if `/var/mqm` is a cluster file system.

```
# mkdir -p /var/mqm_local/qmgrs/@SYSTEM
# mkdir -p /var/mqm/qmgrs
# ln -s /var/mqm_local/qmgrs/@SYSTEM /var/mqm/qmgrs/@SYSTEM
```

This restriction is required because WebSphere MQ uses keys to build internal control structures. Mounting `/var/mqm` as a cluster file system with a symbolic link for `/var/mqm/qmgrs/@SYSTEM` to a local file ensures that any derived shared memory keys are unique on each node.

If multiple queue managers are required and your queue manager was created before you setup a symbolic link for `/var/mqm/qmgrs/@SYSTEM`, you must copy the contents, with permissions, of `/var/mqm/qmgrs/@SYSTEM` to `/var/mqm_local/qmgrs/@SYSTEM` before creating the symbolic link.

You must stop all queue managers before doing this and perform this on each node of the cluster.

```
# mkdir -p /var/mqm_local/qmgrs/@SYSTEM
# cd /var/mqm/qmgrs
# cp -rp @SYSTEM/* /var/mqm_local/qmgrs/@SYSTEM
# rm -r @SYSTEM
# ln -s /var/mqm_local/qmgrs/@SYSTEM @SYSTEM
```

## 7 Mount the highly available local file system

Perform this step on one node of the cluster.

### a. If a non ZFS highly available file system is being used for the WebSphere MQ files.

Ensure the node has ownership of the disk set or disk group.

For Solaris Volume Manager.

```
# metaset -s disk-set -t
```

For Veritas Volume Manager.

```
# vxdg -C import disk-group
# vxdg -g disk-group startall
```

### i. If the global zone is being used for WebSphere MQ.

```
# mount websphere-mq-highly-available-local-file-system
```

**ii. If a non-global zone or HA container is being used for WebSphere MQ.**

Create the mount point on all zones of the cluster that are being used for WebSphere MQ.

Mount the highly available local file system on one of the zones being used .

```
# zlogin zonename mkdir websphere-mq-highly-available-local-file-system
#
# mount -F lofs websphere-mq-highly-available-local-file-system \
> /zonepath/root/websphere-mq-highly-available-local-file-system
```

**b. If a ZFS highly available file system is being used for WebSphere MQ.**

```
# zpool export -f HAZpool
# zpool import -R /zonepath/root HAZpool
```

**8 Install WebSphere MQ on all nodes or zones of the cluster.**

After you have created and mounted the appropriate file systems for the WebSphere MQ files and `/var/mqm`, you must install WebSphere MQ on *each* node of the cluster, either in the global zone and/or the non-global zone or HA container as required.

Follow the IBM *WebSphere MQ for Sun Solaris Quick Beginnings* manual to install WebSphere MQ.

---

**Note** – You may choose to locate the mqm userid and group within `/etc/passwd` and `/etc/group` or within a name service such as NIS or NIS+. However, as the Solaris Cluster HA for WebSphere MQ uses the `su` user command to start, stop and probe WebSphere MQ, it is recommend that the mqm userid/group is located within `/etc/passwd` and `/etc/group` in the cluster. This is to ensure that the `su(1M)` command is not impacted if a name service such as NIS or NIS+ is unavailable.

If you choose to locate the mqm userid/group within a network information name service such as NIS or NIS+, WebSphere MQ maybe affected if the network information name service is unavailable.

---

**9 Create the WebSphere MQ queue manager.**

Follow the IBM *WebSphere MQ for Sun Solaris Quick Beginnings* manual to create a WebSphere MQ queue manager.

**10 If a local file system is used for `/var/mqm`, copy `/var/mqm/mqs.ini` to all nodes or zones of the cluster.**

Within this deployment:

- If `/var/mqm/mqs.ini` is placed on local storage as a local file system, you must copy `/var/mqm/mqs.ini` from the node or zone where the queue manager was created to all other nodes or zones in the cluster where the queue manager will run.
- You must perform this step on all nodes or zones in the cluster *only* if `/var/mqm` is a local file system.

**a. If the global zone is being used for WebSphere MQ.**

```
# rcp /var/mqm/mqs.ini remote-node:/var/mqm/mqs.ini
```

**b. If a non-global zone or HA container is being used for WebSphere MQ.**

```
# rcp /zonepath/root/var/mqm/mqs.ini \  
> remote-node:/zonepath/root/var/mqm/mqs.ini
```

## Verifying the Installation and Configuration of WebSphere MQ

This section contains the procedure you need to verify the installation and configuration.

### ▼ How to Verify the Installation and Configuration of WebSphere MQ

This procedure does not verify that your application is highly available because you have not yet installed your data service.

Perform this procedure on one node or zone of the cluster unless a specific steps indicates otherwise.

**1 Ensure the zone is booted, if a non-global zone or HA container is being used.**

Repeat this step on all nodes on the cluster for a non-global zone and on one node of the cluster if a HA container is being used.

Boot the zone if it is not running.

```
# zoneadm list -v  
# zoneadm -z zonename boot
```

**2 Login to the zone, if a non-global zone or HA container is being used.**

```
# zlogin zonename
```

**3 Start the queue manager, create a persistent queue and put a test message to that queue.**

```
# su - mqm  
$ strmqm queue-manager
```

```

$ runmqsc queue-manager
def ql(sc3test) defpsist(yes)
end
$
$ /opt/mqm/samp/bin/amqspu SC3TEST queue-manager
test test test test test
^C

```

#### 4 Stop the queue manager.

```

$ endmqm -i queue-manager
$ exit

```

#### 5 Logout from the zone, if a non-global zone or HA container is being used.

```
# exit
```

#### 6 Unmount the highly available local file system.

Perform this step in the global zone only.

You should unmount the highly available file system you mounted in [Step 7](#) in “[How to Install and Configure WebSphere MQ](#)” on page 17

##### a. If a non ZFS highly available local file system is being used for WebSphere MQ.

##### i. If the global zone is being used for WebSphere MQ.

```
# umount websphere-mq-highly-available-local-file-system
```

##### ii. If a non-global zone or HA container is being used for WebSphere MQ.

Unmount the highly available local file system from the zone.

```
# umount /zonepath/root/websphere-mq-highly-available-local-file-system
```

##### b. If a ZFS highly available file system is being used for WebSphere MQ.

```
# zpool export -f HAZpool
```

#### 7 Relocate the shared storage to other node.

Perform this step on another node of the cluster.

##### a. If a non ZFS highly available local file system is being used for the WebSphere MQ files.

Ensure the node has ownership of the disk set or disk group.

For Solaris Volume Manager.

```
# metaset -s disk-set -t
```

For Veritas Volume Manager.

```
# vxdg -C import disk-group
# vxdg -g disk-group startall
```

**i. If the global zone is being used for WebSphere MQ.**

```
# mount websphere-mq-highly-available-local-file-system
```

**ii. If a non-global zone or HA container is being used for WebSphere MQ.**

Create the mount point on all zones of the cluster that are being used for WebSphere MQ.

Mount the highly available local file system on one of the zones being used .

```
# zlogin zonename mkdir websphere-mq-highly-available-local-file-system
#
# mount -F lofs websphere-mq-highly-available-local-file-system \
> /zonepath/root/websphere-mq-highly-available-local-file-system
```

**b. If a ZFS highly available file system is being used for WebSphere MQ.**

```
# zpool import -R /zonepath/root HAZpool
```

**8 Login to the zone, if a non-global zone or HA container is being used.**

Perform this step on the other node of the cluster.

```
# zlogin zonename
```

**9 Start the queue manager, get the test message and delete the queue.**

Perform this step on the other node or zone of the cluster.

```
# su - mqm
$ strmqm queue-manager
$ /opt/mqm/samp/bin/amqsget SC3TEST queue-manager
^C
$ runmqsc queue-manager
delete ql(sc3test)
end
```

**10 Stop the queue manager.**

Perform this step on the other node or zone of the cluster.

```
$ endmqm -i queue-manager
$ exit
```

**11 Logout from the zone, if a non-global zone or HA container is being used.**

```
# exit
```

**12 Unmount the highly available local file system.**

Perform this step in the global zone only.

You should unmount the highly available file system you mounted in [Step 7](#) in “[How to Install and Configure WebSphere MQ](#)” on page 17

**a. If a non ZFS highly available local file system is being used for WebSphere MQ.**

**i. If the global zone is being used for WebSphere MQ.**

```
# umount websphere-mq-highly-available-local-file-system
```

**ii. If a non-global zone or HA container is being used for WebSphere MQ.**

Unmount the highly available local file system from the zone.

```
# umount /zonepath/root/websphere-mq-highly-available-local-file-system
```

**b. If a ZFS highly available file system is being used for WebSphere MQ.**

```
# zpool export -f HAZpool
```

**13 Shutdown the zone, if a HA container is being used.**

---

**Note** – This step is *only* required if a HA container is being used.

---

```
# zlogin zonename halt
```

## Installing the HA for WebSphere MQ Packages

If you did not install the HA for WebSphere MQ packages during your initial Oracle Solaris Cluster installation, perform this procedure to install the packages. To install the packages, use the `installer` program.

---

**Note** – You need to install the HA for WebSphere MQ packages in the global cluster and not in the zone cluster.

---

### ▼ How to Install the HA for WebSphere MQ Packages

Perform this procedure on each cluster node where you are installing the HA for WebSphere MQ packages.

You can run the `installer` program with a command-line interface (CLI) or with a graphical user interface (GUI). The content and sequence of instructions in the CLI and the GUI are similar.

---

**Note** – Even if you plan to configure this data service to run in non-global zones, install the packages for this data service in the global zone. The packages are propagated to any existing non-global zones and to any non-global zones that are created after you install the packages.

---

**Before You Begin** Ensure that you have the Oracle Solaris Cluster installation media.

If you intend to run the `installer` program with a GUI, ensure that your `DISPLAY` environment variable is set.

- 1 On the cluster node where you are installing the data service packages, become superuser.**
- 2 Load the Oracle Solaris Cluster installation media into the DVD-ROM drive.**

If the Volume Management daemon `vold(1M)` is running and configured to manage DVD-ROM devices, the daemon automatically mounts the DVD-ROM on the `/cdrom` directory.
- 3 Change to the installation wizard directory of the DVD-ROM.**
  - **If you are installing the data service packages on the SPARC platform, type the following command:**

```
# cd /cdrom/cdrom0/Solaris_sparc
```
  - **If you are installing the data service packages on the x86 platform, type the following command:**

```
# cd /cdrom/cdrom0/Solaris_x86
```
- 4 Start the installation wizard.**

```
# ./installer
```
- 5 When you are prompted, accept the license agreement.**
- 6 From the list of Oracle Solaris Cluster agents under Availability Services, select the data service for WebSphere MQ.**
- 7 If you require support for languages other than English, select the option to install multilingual packages.**

English language support is always installed.
- 8 When prompted whether to configure the data service now or later, choose Configure Later.**

Choose Configure Later to perform the configuration after the installation.

**9 Follow the instructions on the screen to install the data service packages on the node.**

The installation wizard displays the status of the installation. When the installation is complete, the wizard displays an installation summary and the installation logs.

**10 (GUI only) If you do not want to register the product and receive product updates, deselect the Product Registration option.**

The Product Registration option is not available with the CLI. If you are running the installation wizard with the CLI, omit this step.

**11 Exit the installation wizard.**

**12 Unload the installation media from the DVD-ROM drive.**

a. To ensure that the DVD-ROM is not being used, change to a directory that does *not* reside on the DVD-ROM.

b. Eject the DVD-ROM.

```
# eject cdrom
```

**Next Steps** See “[Registering and Configuring Solaris Cluster HA for WebSphere MQ](#)” on page 30 to register HA for WebSphere MQ and to configure the cluster for the data service.

## Registering and Configuring Solaris Cluster HA for WebSphere MQ

This section contains the procedures you need to configure Solaris Cluster HA for WebSphere MQ.

Some procedures within this section require you to use certain Oracle Solaris Cluster commands. Refer to the relevant Oracle Solaris Cluster command man page for more information about these command and their parameters.

### ▼ How to Register and Configure Solaris Cluster HA for WebSphere MQ

Determine if a single or multiple WebSphere MQ instances will be deployed.

Refer to “[Restriction for multiple WebSphere MQ instances](#)” on page 13 to determine how to deploy a single or multiple WebSphere MQ instances.

Once you have determined how WebSphere MQ will be deployed, you can chose one or more of the steps below.

- 1 **Register and Configure Solaris Cluster HA for WebSphere MQ in a Failover Resource Group.**  
Use “[How to Register and Configure Solaris Cluster HA for WebSphere MQ in a Failover Resource Group](#)” on page 31 for Example 1–1, Example 1–2 and Example 1–3.
- 2 **Register and Configure Solaris Cluster HA for WebSphere MQ in a HA container.**  
Use “[How to Register and Configure Solaris Cluster HA for WebSphere MQ in an HA Container](#)” on page 34 for Example 1–4.

## ▼ How to Register and Configure Solaris Cluster HA for WebSphere MQ in a Failover Resource Group

This procedure assumes that you installed the data service packages during your initial Oracle Solaris Cluster installation.

If you did not install the Solaris Cluster HA for WebSphere MQ packages as part of your initial Oracle Solaris Cluster installation, go to “[How to Install the HA for WebSphere MQ Packages](#)” on page 28.

---

**Note** – Perform this procedure on one node of the cluster only.

---

- 1 **On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify` RBAC authorization.**
- 2 **Register the following resource types.**  

```
# clresourcetype register SUNW.HAStoragePlus
# clresourcetype register SUNW.gds
```
- 3 **Create a failover resource group for WebSphere MQ.**

---

**Note** – Refer to “[Restriction for multiple WebSphere MQ instances](#)” on page 13 for more information on the *nodelist* entry.

---

```
# clresourcegroup create -n nodelist websphere-mq-resource-group
```

- 4 **Create a resource for the WebSphere MQ Logical Hostname.**  

```
# clreslogicalhostname create -g websphere-mq-resource-group \
> -h websphere-mq-logical-hostname \
> websphere-mq-logical-hostname-resource
```

## 5 Create a resource for the WebSphere MQ Disk Storage.

### a. If a ZFS highly available local file system is being used.

```
# clresource create -g websphere-mq-resource-group \
> -t SUNW.HAStoragePlus \
> -p Zpools=websphere-mq-zspool \
> websphere-mq-hastorage-resource
```

### b. If a cluster file system or a non ZFS highly available local file system is being used.

```
# clresource create -g websphere-mq-resource-group \
> -t SUNW.HAStoragePlus \
> -p FilesystemMountPoints=websphere-mq-file-system-mountpoint \
> websphere-mq-hastorage-resource
```

## 6 Bring online the failover resource group for WebSphere MQ that now includes the Logical Hostname and Disk Storage resources.

```
# clresourcegroup online -M websphere-mq-resource-group
```

## 7 Create a resource for the WebSphere MQ queue manager.

Edit `/opt/SUNWscmq/mgr/util/mgr_config` and follow the comments within that file. After you have edited `mgr_config`, you must register the resource.

```
# cd /opt/SUNWscmq/mgr/util
# vi mgr_config
# ./mgr_register
```

The following deployment example has been taken from [Step 1 in Appendix A, “Deployment Example: Installing a WebSphere MQ Queue Manager in Non-Global Zones,”](#) and shows `/opt/SUNWscmq/mgr/util/mgr_config` that has been edited to configure a queue manager resource.

```
Vigor5# cat > /var/tmp/mgr1_config <<-EOF
# +++ Required parameters +++
RS=wmq1-qmgr
RG=wmq1-rg
QMGR=qmgr1
LH=wmq1-lh
HAS_RS=wmq1-ZFShas
LSR_RS=
CLEANUP=YES
SERVICES=NO
USERID=mqm

# +++ Optional parameters +++
DB2INSTANCE=
ORACLE_HOME=
ORACLE_SID=
START_CMD=
STOP_CMD=

# +++ HA container parameters +++
# These parameters are only required when WebSphere MQ should run
# within a HA container managed by the Solaris Cluster Data Service
```

```
# for Solaris Containers.
RS_ZONE=
PROJECT=default
TIMEOUT=300
EOF
```

```
Vigor5# /opt/SUNWscmq/mgr/util/mgr_register -f /var/tmp/mgr1_config
```

## 8 Enable the resource.

```
# clresource enable websphere-mq-resource
```

## 9 Create and register a resource for any other WebSphere MQ components.

Repeat this step for each WebSphere MQ component that is required.

Edit `/opt/SUNWscmq/xxx/util/xxx_config` and follow the comments within that file. Where `xxx` represents one of the following WebSphere MQ components:

```
chi      Channel Initiator
csv      Command Server
lsr      Listener
trm      Trigger Monitor
```

After you have edited `xxx_config`, you must register the resource.

```
# cd /opt/SUNWscmq/xxx/util/
# vi xxx_config
# ./xxx_register
```

The following deployment example has been taken from [Step 4 in Appendix A, “Deployment Example: Installing a WebSphere MQ Queue Manager in Non-Global Zones,”](#) and shows `/opt/SUNWscmq/lsr/util/lsr_config` that has been edited to configure a listener resource.

```
Vigor5# cat > /var/tmp/lsr1_config <<-EOF
# +++ Required parameters +++
RS=wmq1-lsr
RG=wmq1-rg
QMGR=qmgr1
PORT=1414
IPADDR=
BACKLOG=100
LH=wmq1-lh
QMGR_RS=wmq1-qmgr
USERID=mqm

# +++ HA container parameters +++
# These parameters are only required when WebSphere MQ should run
# within a HA container managed by the Solaris Cluster Data Service
# for Solaris Containers.
RS_ZONE=
PROJECT=default
EOF
```

```
Vigor5# /opt/SUNWscmq/lsr/util/lsr_register -f /var/tmp/lsr1_config
```

**10 Enable the WebSphere MQ component resources.**

```
# clresource enable websphere-mq-resource
```

**Next Steps** See [“Verifying the Solaris Cluster HA for WebSphere MQ Installation and Configuration”](#) on page 37

## ▼ How to Register and Configure Solaris Cluster HA for WebSphere MQ in an HA Container

This procedure assumes that you installed the data service packages during your initial Oracle Solaris Cluster installation.

If you did not install the Solaris Cluster HA for WebSphere MQ packages as part of your initial Oracle Solaris Cluster installation, go to [“How to Install the HA for WebSphere MQ Packages”](#) on page 28.

---

**Note** – Perform this procedure on one node of the cluster only.

---

**1 Create a failover resource group for WebSphere MQ.**

Follow steps 1, 2, 3, 4, 5 and 6 in [“How to Register and Configure Solaris Cluster HA for WebSphere MQ in a Failover Resource Group”](#) on page 31.

**2 Register the HA container in the failover resource group for WebSphere MQ.**

Refer to *Oracle Solaris Cluster Data Service for Solaris Containers Guide* for complete information about HA containers.

Edit the `sczbt_config` file and follow the comments within that file. Ensure that you specify the `websphere-mq-resource-group` for the `RG=` parameter within `sczbt_config`.

After you have edited `sczbt_config`, you must register the resource.

```
# cd /opt/SUNWsczone/sczbt/util
# vi sczbt_config
# ./sczbt_register
```

The following deployment example has been taken from [Step 7 in Appendix B, “Deployment Example: Installing a WebSphere MQ Queue Manager in an HA Container,”](#) and shows `/opt/SUNWsczone/sczbt/util/sczbt_config` that has been edited to configure a HA container resource.

```
Vigor5# cat > /var/tmp/sczbt_config <<-EOF
RS=wmq3-FOZ
RG=wmq3-rg
PARAMETERDIR=/FOZones
SC_NETWORK=true
```

```

SC_LH=wmq3-lh
FAILOVER=true
HAS_RS=wmq3-SVMhas,wmq3-ZFShas

Zonename=z3
Zonebootopt=
Milestone=multi-user-server
Mounts="/ZFSwmq3/log /ZFSwmq3/qmgrs"
EOF
Vigor5#
Vigor5# /opt/SUNWsczone/sczbt/util/sczbt_register -f /var/tmp/sczbt_config

```

### 3 Enable the HA container resource

```
# clresource enable websphere-mq-failover-zone-resource
```

### 4 Create a resource for the WebSphere MQ queue manager resource

Edit `/opt/SUNWscmq/mgr/util/mgr_config` and follow the comments within that file. Ensure that the `RS_ZONE` variable specifies the cluster resource for the HA container. After you have edited `mgr_config`, you must register the resource.

```

# cd /opt/SUNWscmq/mgr/util
# vi mgr_config
# ./mgr_register

```

The following deployment example has been taken from [Step 1 in Appendix B, “Deployment Example: Installing a WebSphere MQ Queue Manager in an HA Container,”](#) and shows `/opt/SUNWscmq/mgr/util/mgr_config` that has been edited to configure a queue manager resource within a HA container resource.

```

Vigor5# cat > /var/tmp/mgr3_config <<-EOF
# +++ Required parameters +++
RS=wmq3-qmgr
RG=wmq3-rg
QMGR=qmgr3
LH=wmq3-lh
HAS_RS=wmq3-ZFShas
LSR_RS=
CLEANUP=YES
SERVICES=NO
USERID=mqm

# +++ Optional parameters +++
DB2INSTANCE=
ORACLE_HOME=
ORACLE_SID=
START_CMD=
STOP_CMD=

# +++ HA container parameters +++
# These parameters are only required when WebSphere MQ should run
# within a HA container managed by the Solaris Cluster Data Service
# for Solaris Containers.
RS_ZONE=wmq3-FOZ
PROJECT=default
TIMEOUT=300

```

```
EOF
Vigor5#
Vigor5# /opt/SUNWscmq3/mgr/util/mgr_register -f /var/tmp/mgr1_config
```

## 5 Enable the WebSphere MQ resource.

```
# clresource enable websphere-mq-resource
```

## 6 Create and register a resource for any other WebSphere MQ components.

Repeat this step for each WebSphere MQ component that is required.

Edit `/opt/SUNWscmq3/xxx/util/xxx_config` and follow the comments within that file. Where `xxx` represents one of the following WebSphere MQ components:

```
chi      Channel Initiator
csv      Command Server
lsr      Listener
trm      Trigger Monitor
```

Ensure that the `RS_ZONE` variable specifies the cluster resource for the HA container. After you have edited `xxx_config`, you must register the resource.

```
# cd /opt/SUNWscmq3/xxx/util
# vi xxx_config
# ./xxx_register
```

The following deployment example has been taken from [Step 4 in Appendix A, “Deployment Example: Installing a WebSphere MQ Queue Manager in Non-Global Zones,”](#) and shows a *modified* `/opt/SUNWscmq3/lsr/util/lsr_config` that has been edited to configure a listener resource in a HA container resource.

```
Vigor5# cat > /var/tmp/lsr3_config <<-EOF
# +++ Required parameters +++
RS=wmq3-lsr
RG=wmq3-rg
QMGR=qmgr3
PORT=1420
IPADDR=
BACKLOG=100
LH=wmq3-lh
QMGR_RS=wmq3-qmgr3
USERID=mqm

# +++ HA container parameters +++
# These parameters are only required when WebSphere MQ should run
# within a HA container managed by the Solaris Cluster Data Service
# for Solaris Containers.
RS_ZONE=wmq3-F0Z
PROJECT=default
EOF

Vigor5# /opt/SUNWscmq3/lsr/util/lsr_register -f /var/tmp/lsr3_config
```

## 7 Enable the WebSphere MQ component resources.

```
# clresource enable websphere-mq-resource
```

**Next Steps** See “Verifying the Solaris Cluster HA for WebSphere MQ Installation and Configuration” on page 37

## Verifying the Solaris Cluster HA for WebSphere MQ Installation and Configuration

This section contains the procedure you need to verify that you installed and configured your data service correctly.

### ▼ How to Verify the Solaris Cluster HA for WebSphere MQ Installation and Configuration

1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify` RBAC authorization.

2 Ensure all the WebSphere MQ resources are online.

```
# cluster status
```

Enable any WebSphere MQ resources that are not online.

```
# clresource enable websphere-mq-resource
```

3 Switch the WebSphere MQ resource group to another cluster node or node:zone.

```
# clresourcegroup switch -n node[:zone] websphere-mq-resource-group
```

## Upgrading HA for WebSphere MQ

Upgrade the HA for WebSphere MQ data service if the following conditions apply:

- You are upgrading from an earlier version of the HA for WebSphere MQ data service.
- You need to use the new features of this data service.

### ▼ How to Migrate Existing Resources to a New Version of HA for WebSphere MQ

Perform steps 1, 2, 3 and 6 if you have an existing HA for WebSphere MQ deployment and wish to upgrade to the new version. Complete all steps if you need to use the new features of this data service.

- 1 On a cluster member, become superuser or assume a role that provides `solaris.cluster.modify` RBAC authorization.**
- 2 Disable the WebSphere MQ resources.**  
`# clresource disable websphere-mq-resource`
- 3 Install the new version of HA for WebSphere MQ to each cluster**  
Refer to “[How to Install the HA for WebSphere MQ Packages](#)” on page 28 for more information.
- 4 Delete the WebSphere MQ resources, if you want to use new features that have been introduced in the new version of HA for WebSphere MQ.**  
`# clresource delete websphere-mq-resource`
- 5 Reregister the WebSphere MQ resources, if you want to use new features that have been introduced in the new version of HA for WebSphere MQ.**  
Refer to “[How to Register and Configure Solaris Cluster HA for WebSphere MQ](#)” on page 30 for more information.
- 6 Enable the WebSphere MQ resources**  
If you have only performed steps 1, 2 and 3 you will need to re-enable the WebSphere MQ resources.  
`# clresource enable websphere-mq-resource`

## Understanding the Solaris Cluster HA for WebSphere MQ Fault Monitor

This section describes the Solaris Cluster HA for WebSphere MQ fault monitor probing algorithm or functionality, states the conditions, and recovery actions associated with unsuccessful probing.

For conceptual information on fault monitors, see the *Oracle Solaris Cluster Concepts Guide*.

### Resource Properties

The Solaris Cluster HA for WebSphere MQ fault monitor uses the same resource properties as resource type `SUNW.gds`. Refer to the `SUNW.gds(5)` man page for a complete list of resource properties used.

## Probing Algorithm and Functionality

The HA for WebSphere MQ fault monitor is controlled by the extension properties that control the probing frequency. The default values of these properties determine the preset behavior of the fault monitor. The preset behavior should be suitable for most Oracle Solaris Cluster installations. Therefore, you should tune the HA for WebSphere MQ fault monitor *only* if you need to modify this preset behavior.

- Setting the interval between fault monitor probes (`Thorough_probe_interval`)
- Setting the time-out for fault monitor probes (`Probe_timeout`)
- Setting the number of times the fault monitor attempts to restart the resource (`Retry_count`)

The HA for WebSphere MQ fault monitor checks the queue manager and other components within an infinite loop. During each cycle the fault monitor will check the relevant component and report either a failure or success.

If the fault monitor is successful it returns to its infinite loop and continues the next cycle of probing and sleeping.

If the fault monitor reports a failure a request is made to the cluster to restart the resource. If the fault monitor reports another failure another request is made to the cluster to restart the resource. This behavior will continue whenever the fault monitor reports a failure.

If successive restarts exceed the `Retry_count` within the `Thorough_probe_interval` a request to failover the resource group onto a different node or zone is made.

### Operations of the queue manager probe

The WebSphere MQ queue manager probe checks the queue manager by using a program named `create_tdq` which is included in the Solaris Cluster HA for WebSphere MQ data service.

The `create_tdq` program connects to the queue manager, creates a temporary dynamic queue, puts a message to the queue and then disconnects from the queue manager.

### Operations of the channel initiator, command server, listener and trigger monitor probes

The WebSphere MQ probe for the channel initiator, command server, listener and trigger monitor all operate in a similar manner and will simply restart any component that has failed.

The process monitor facility will request a restart of the resource as soon as any component has failed.

The channel initiator, command server and trigger monitor are all dependent on the queue manager being available. The listener has an optional dependency on the queue manager that is set when the listener resource is configured and registered. Therefore if the queue manager fails the channel initiator, command server, trigger monitor and optional dependent listener will be restarted when the queue manager is available again.

## Debug Solaris Cluster HA for WebSphere MQ

### ▼ How to turn on debug for Solaris Cluster HA for WebSphere MQ

Solaris Cluster HA for WebSphere MQ can be used by multiple WebSphere MQ instances. It is possible to turn debug on for all WebSphere MQ instances or a particular WebSphere MQ instance.

A config file exists under `/opt/SUNWscmq5/xxx/etc`, where `xxx` can be `mqr` (Queue Manager), `chi` (Channel Initiator), `csv` (Command Server), `lsr` (Listener) and `trm` (Trigger Monitor).

These files allow you to turn on debug for all WebSphere MQ instances or for a specific WebSphere MQ instance on a particular node or zone within the cluster. If you require debug to be turned on for Solaris Cluster HA for WebSphere MQ across the whole cluster, repeat this step on all nodes within the cluster.

#### 1 Edit `/etc/syslog.conf` and change `daemon.notice` to `daemon.debug`.

```
# grep daemon /etc/syslog.conf
*.err;kern.debug;daemon.notice;mail.crit      /var/adm/messages
*.alert;kern.err;daemon.err                    operator
#
```

Change the `daemon.notice` to `daemon.debug` and restart `syslogd`. Note that the output below, from `grep daemon /etc/syslog.conf`, shows that `daemon.debug` has been set.

```
# grep daemon /etc/syslog.conf
*.err;kern.debug;daemon.debug;mail.crit      /var/adm/messages
*.alert;kern.err;daemon.err                    operator
```

Restart the `syslogd` daemon.

#### a. If running Solaris 9

```
# pkill -1 syslogd
```

#### b. If running Solaris 10

```
# svcadm disable system-log
# svcadm enable system-log
```

**2 Edit /opt/SUNWscmq/xxx/etc/config.**

Perform this step for each component that requires debug output, on each node of Oracle Solaris Cluster as required.

Edit /opt/SUNWscmq/xxx/etc/config and change DEBUG= to DEBUG=ALL or DEBUG=*resource*.

```
# cat /opt/SUNWscmq/mgr/etc/config
#
# Copyright 2006 Sun Microsystems, Inc. All rights reserved.
# Use is subject to license terms.
#
##ident "@(#)config 1.2 06/03/08 SMI"
#
# Usage:
#     DEBUG=<RESOURCE_NAME> or ALL
#
DEBUG=ALL
```

---

**Note** – To turn off debug, reverse the steps above.

---



# Deployment Example: Installing a WebSphere MQ Queue Manager in Non-Global Zones

---

This appendix presents a complete example of how to install and configure multiple WebSphere MQ queue managers in non-global zones. It presents a simple node cluster configuration. If you need to install the application in any other configuration, refer to the general-purpose procedures presented elsewhere in this manual.

## Target Cluster Configuration

This example uses a single-node cluster with the following node and zone names:

vigor5	The physical node, which owns the file system.
vigor5:z1	A whole root non-global zone named z1.
vigor5:z2	A whole root non-global zone named z2.

## Software Configuration

This deployment example uses the following software products and versions:

- Solaris 10 06/06 software for SPARC or x86 platforms
- Oracle Solaris Cluster 3.3 core software
- HA for WebSphere MQ data service
- WebSphere MQ v6 Solaris x86-64

This example assumes that you have already installed and established your cluster. It illustrates installation and configuration of the data service application only.

## Assumptions

The instructions in this example were developed with the following assumptions:

- **Shell environment:** All commands and the environment setup in this example are for the Korn shell environment. If you use a different shell, replace any Korn shell-specific information or instructions with the appropriate information for your preferred shell environment.
- **User login:** Unless otherwise specified, perform all procedures as superuser or assume a role that provides `solaris.cluster.admin`, `solaris.cluster.modify`, and `solaris.cluster.read` RBAC authorization.

## Installing and Configuring WebSphere MQ

---

**Note** – This deployment example is designed for a single-node cluster. It is provided simply as a concise guide to help you if you need to refer to an installation and configuration of WebSphere MQ.

This deployment example is *not* meant to be a precise guide to install and configure WebSphere MQ.

If you need to install WebSphere MQ in any other configuration, refer to the general purpose procedures elsewhere in this manual.

---

The instructions with this deployment example assumes that you are using the WebSphere MQ v6 Solaris x86-64 platform and will configure WebSphere MQ on a ZFS highly available local file system.

The cluster resource group will be configured to failover between two non-global zones on a single node cluster.

The tasks you must perform to install and configure WebSphere MQ in the non-global zones are as follows:

- [“Example: Prepare the Cluster for WebSphere MQ” on page 45](#)
- [“Example: Configure two Non-Global Zones” on page 45](#)
- [“Example: Install WebSphere MQ in the Non-Global Zones” on page 47](#)
- [“Example: Verify WebSphere MQ” on page 48](#)
- [“Example: Configure Cluster Resources for WebSphere MQ” on page 49](#)
- [“Example: Enable the WebSphere MQ Software to Run in the Cluster” on page 50](#)
- [“Example: Verify the HA for WebSphere MQ Resource Group” on page 51](#)
- [“Example: Creating Multiple Instances” on page 51](#)

## ▼ Example: Prepare the Cluster for WebSphere MQ

Perform all steps within this example in the global zone.

- 1 **Install and configure the cluster as instructed in [Oracle Solaris Cluster Software Installation Guide](#).**

Install the following cluster software components on node Vigor5.

- Oracle Solaris Cluster core software
- Oracle Solaris Cluster data service for WebSphere MQ

- 2 **Add the logical host name to `/etc/hosts` and `/etc/inet/ipnodes` in the global zone.**

The following output shows logical host name entries for qmgr1.

```
Vigor5# grep qmgr1 /etc/hosts /etc/inet/ipnodes
/etc/hosts:192.168.1.150    qmgr1
/etc/inet/ipnodes:192.168.1.150    qmgr1
```

- 3 **Install and configure a Zettabyte file system.**

Create two ZFS pools.

---

**Note** – The following zpool definitions represent a very basic configuration for deployment on a single-node cluster.

You should *not* consider this example for use within a productive deployment, instead it is a very basic configuration for testing or development purposes only.

---

```
Vigor5# zpool create -m /ZFSwmq1/log HAZpool1 c1t1d0
Vigor5# zpool create -m /ZFSwmq1/qmgrs HAZpool2 c1t4d0
```

## ▼ Example: Configure two Non-Global Zones

Perform all steps within this example in the global zone.

- 1 **On local storage create a directory for the non-global zones root path.**

```
Vigor5# mkdir /zones
```

- 2 **Create a temporary file for the whole root zones, for example `/tmp/z1` and `/tmp/z2`, and include the following entries:**

```
Vigor5# cat > /tmp/z1 <<-EOF
create -b
set zonepath=/zones/z1
EOF
Vigor5# cat > /tmp/z2 <<-EOF
```

```
create -b
set zonepath=/zones/z2
EOF
```

### 3 Configure the non-global zones, using the files you created.

```
Vigor5# zonecfg -z z1 -f /tmp/z1
Vigor5# zonecfg -z z2 -f /tmp/z2
```

### 4 Install the zones.

Open two windows and issue the following command in each window.

```
Vigor5# zoneadm -z z1 install
Vigor5# zoneadm -z z2 install
```

### 5 Boot the zones.

Perform this step after the installation of the zones are complete.

```
Vigor5# zoneadm -z z1 boot
Vigor5# zoneadm -z z2 boot
```

### 6 Log in to the zones and complete the zone system identification.

```
Vigor5# zlogin -C z1
Vigor5# zlogin -C z2
```

### 7 Close the terminal window and disconnect from the zone consoles.

After you have completed the zone system identification, disconnect from the window your previously opened.

```
Vigo5# ~.
```

### 8 Create the appropriate mount points and symlinks for the queue manager in the zone.

```
Vigor5# zlogin z1 mkdir -p /var/mqm/log /var/mqm/qmgrs
Vigor5# zlogin z1 ln -s /ZFSwmq1/log /var/mqm/log/qmgr1
Vigor5# zlogin z1 ln -s /ZFSwmq1/qmgrs /var/mqm/qmgrs/qmgr1
Vigor5#
Vigor5# zlogin z2 mkdir -p /var/mqm/log /var/mqm/qmgrs
Vigor5# zlogin z2 ln -s /ZFSwmq1/log /var/mqm/log/qmgr1
Vigor5# zlogin z2 ln -s /ZFSwmq1/qmgrs /var/mqm/qmgrs/qmgr1
```

### 9 Create the WebSphere MQ userid in the zones.

```
Vigor5# zlogin z1 groupadd -g 1000 mqm
Vigor5# zlogin z1 useradd -u 1000 -g 1000 -d /var/mqm mqm
Vigor5#
Vigor5# zlogin z2 groupadd -g 1000 mqm
Vigor5# zlogin z2 useradd -u 1000 -g 1000 -d /var/mqm mqm
```

### 10 Add the logical host name to /etc/hosts and /etc/inet/ipnodes in the zones.

The following output shows the logical host name entry for qmgr1 in zones z1 and z2.

```
Vigor5# zlogin z1 grep qmgr1 /etc/hosts /etc/inet/ipnodes
192.168.1.150      qmgr1
```

```
Vigor5# zlogin z2 grep qmgr1 /etc/hosts /etc/inet/ipnodes
/etc/hosts:192.168.1.150    qmgr1
/etc/inet/ipnodes:192.168.1.150    qmgr1
```

## ▼ Example: Install WebSphere MQ in the Non-Global Zones

### 1 Mount the WebSphere MQ software in the zones.

Perform this step in the global zone.

In this example, the WebSphere MQ software has been copied to node Vigor5 in directory /export/software/ibm/wmqsv6 on .

```
Vigor5# zlogin z1 mkdir -p /var/tmp/software
Vigor5# zlogin z2 mkdir -p /var/tmp/software
Vigor5#
Vigor5# mount -F lofs /export/software /zones/z1/root/var/tmp/software
Vigor5# mount -F lofs /export/software /zones/z2/root/var/tmp/software
```

### 2 Mount the ZFS pools in the non-global zone.

Perform this step in the global zone.

```
Vigor5# zpool export -f HAZpool1
Vigor5# zpool export -f HAZpool2
Vigor5# zpool import -R /zones/z1/root HAZpool1
Vigor5# zpool import -R /zones/z1/root HAZpool2
```

### 3 Setup the ZFS file systems for user and group mqm

```
Vigor5# zlogin z1 chown -R mqm:mqm /ZFSwmq1
```

### 4 Login to each zone in two separate windows.

Perform this step from the global zone.

```
Vigor5# zlogin z1
Vigor5# zlogin z2
```

### 5 Install the WebSphere MQ software in each zone.

Perform this step within each new window you used to login to the zone.

```
# cd /var/tmp/software/ibm/wmqsv6
# ./mqlicense.sh
# pkgadd -d .
# exit
```

## ▼ Example: Verify WebSphere MQ

### 1 Create and start the queue manager.

Perform this step from the global zone.

```
Vigor5# zlogin z1
# su - mqm
$ crtmqm qmgr1
$ strmqm qmgr1
```

### 2 Create a persistent queue in each queue manager and put a message to the queue .

Perform this step in zone z1.

```
$ runmqsc qmgr1
def ql(sc3test) defpsist(yes)
end
$ /opt/mqm/samp/bin/amqsput SC3TEST qmgr1
test test test test test
^C
```

### 3 Stop the queue manager.

Perform this step in zone z1.

```
$ endmqm -i qmgr1
$ exit
# exit
```

### 4 Copy the mq.s.ini file between the two zones.

Perform this step in the global zone.

```
Vigor5# cp /zones/z1/root/var/mqm/mqs.ini /zones/z2/root/var/mqm/mqs.ini
```

### 5 Unmount and mount the ZFS file systems in the other zone.

Perform this step in the global zone.

```
Vigor5# zpool export -f HAZpool1
Vigor5# zpool export -f HAZpool2
Vigor5# zpool import -R /zones/z2/root HAZpool1
Vigor5# zpool import -R /zones/z2/root HAZpool2
```

### 6 Start the queue manager.

Perform this step from the global zone.

```
Vigor5# zlogin z2
# su - mqm
$ strmqm qmgr1
```

### 7 Get the messages from the persistent queue and delete the queue.

Perform this step in zone z2.

```
$ /opt/mqm/samp/bin/amqsget SC3TEST qmgr1
^C
```

```
$ runmqsc qmgr1
delete ql(sc3test)
end
```

## 8 Stop the queue manager.

Perform this step in zone z2.

```
$ endmqm -i qmgr1
$ exit
# exit
```

## 9 Unmount the ZFS file systems from the zone.

Perform this step in the global zone.

```
Vigor5# zpool export -f HAZpool1
Vigor5# zpool export -f HAZpool2
```

# ▼ Example: Configure Cluster Resources for WebSphere MQ

Perform all steps within this example in the global zone.

## 1 Register the required resource types.

```
Vigor5# clresourcetype register SUNW.HAStoragePlus
Vigor5# clresourcetype register SUNW.gds
```

## 2 Create the resource group.

```
Vigor5# clresourcegroup create -n Vigor5:z1,Vigor5:z2 wmq1-rg
```

## 3 Create the logical hosts.

```
Vigor5# clreslogicalhostname create -g wmq1-rg -h qmgr1 wmq1-lh
```

## 4 Create the HAStoragePlus resource in the wmq1-rg resource group.

```
Vigor5# clresource create -g wmq1-rg -t SUNW.HAStoragePlus \
> -p Zpools=HAZpool1,HAZpool2 wmq1-ZFShas
```

## 5 Enable the resource group.

```
Vigor5# clresourcegroup online -M wmq1-rg
```

## ▼ Example: Enable the WebSphere MQ Software to Run in the Cluster

Perform all steps within this example in the global zone.

### 1 Create the HA for WebSphere MQ queue manager configuration file.

Either cat the following into `/var/tmp/mgr1_config` or edit `/opt/SUNWscmq/mgr/util/mgr_config` and execute `/opt/SUNWscmq/mgr/util/mgr_register`.

```
Vigor5# cat > /var/tmp/mgr1_config <<-EOF
# +++ Required parameters +++
RS=wmq1-qmgr
RG=wmq1-rg
QMGR=qmgr1
LH=wmq1-lh
HAS_RS=wmq1-haZFS
LSR_RS=
CLEANUP=YES
SERVICES=NO
USERID=mqm

# +++ Optional parameters +++
DB2INSTANCE=
ORACLE_HOME=
ORACLE_SID=
START_CMD=
STOP_CMD=

# +++ HA container parameters +++
# These parameters are only required when WebSphere MQ should run
# within a HA container managed by the Solaris Cluster Data Service
# for Solaris Containers.
RS_ZONE=
PROJECT=default
TIMEOUT=300
EOF
```

### 2 Register the HA for WebSphere MQ queue manager resource.

```
Vigor5# /opt/SUNWscmq/mgr/util/mgr_register -f /var/tmp/mgr1_config
```

### 3 Enable the HA for WebSphere MQ queue manager resource.

```
Vigor5# clresource enable wmq1-qmgr
```

### 4 Create the HA for WebSphere MQ listener configuration file.

Either cat the following into `/var/tmp/lsr1_config` or edit `/opt/SUNWscmq/lsr/util/lsr_config` and execute `/opt/SUNWscmq/lsr/util/lsr_register`.

```
Vigor5# cat > /var/tmp/lsr1_config <<-EOF
# +++ Required parameters +++
```

```

RS=wmq1-lsr
RG=wmq1-rg
QMGR=qmgr1
PORT=1414
IPADDR=
BACKLOG=100
LH=wmq1-lh
QMGR_RS=wmq1-qmgr
USERID=mqm

# +++ HA container parameters +++
# These parameters are only required when WebSphere MQ should run
# within a HA container managed by the Solaris Cluster Data Service
# for Solaris Containers.
RS_ZONE=
PROJECT=default
EOF

```

- 5 Register the HA for WebSphere MQ listener resource.

```
Vigor5# /opt/SUNWscmqs/lsr/util/lsr_register -f /var/tmp/lsr1_config
```

- 6 Enable the HA for WebSphere MQ listener resource.

```
Vigor5# clresource enable wmq1-lsr
```

## ▼ Example: Verify the HA for WebSphere MQ Resource Group

Perform this step in the global zone.

- Switch the WebSphere MQ resource group between the two non-global zones.

```

Vigor5# for node in Vigor5:z2 Vigor5:z1
do
    clrg switch -n $node wmq1-rg
    clrs status wmq1-qmgr
    clrs status wmq1-lsr
    clrg status wmq1-rg
done

```

## ▼ Example: Creating Multiple Instances

If another queue manager is required you can repeat the following tasks. However you must change the entries within that task to reflect your new queue manager.

- 1 Repeat the following steps from [“Example: Prepare the Cluster for WebSphere MQ”](#) on page 45. [Step 2](#) and [Step 3](#).

- 2 Repeat the following steps from **“Example: Configure two Non-Global Zones”** on page 45.  
Step 8 and Step 10.
- 3 Repeat the following steps from **“Example: Install WebSphere MQ in the Non-Global Zones”** on page 47.  
Step 2.
- 4 Repeat the following steps from **“Example: Verify WebSphere MQ”** on page 48.  
Step 1, Step 3, Step 4 and Step 9.
- 5 Repeat the following steps from **“Example: Configure Cluster Resources for WebSphere MQ”** on page 49.  
Step 2, Step 3, Step 4 and Step 5.
- 6 Repeat the following steps from **“Example: Enable the WebSphere MQ Software to Run in the Cluster”** on page 50.  
Step 1, Step 2 and Step 3.  
  
Repeat as required for any WebSphere MQ component.

## Deployment Example: Installing a WebSphere MQ Queue Manager in an HA Container

---

This appendix presents a complete example of how to install and configure a WebSphere MQ queue manager in a HA container. It presents a simple node cluster configuration. If you need to install the application in any other configuration, refer to the general-purpose procedures presented elsewhere in this manual.

### Target Cluster Configuration

This example uses a single-node cluster with the following node and zone names:

- `Vigor5`      The physical node, which owns the file system.
- `Vigor5:z3`    A whole root non-global zone named z3.

### Software Configuration

This deployment example uses the following software products and versions:

- Solaris 10 06/06 software for SPARC or x86 platforms
- Oracle Solaris Cluster 3.3 core software
- HA for WebSphere MQ data service
- Solaris Cluster HA for Solaris Containers data service
- WebSphere MQ v6 Solaris x86-64

This example assumes that you have already installed and established your cluster. It illustrates installation and configuration of the data service application only.

## Assumptions

The instructions in this example were developed with the following assumptions:

- **Shell environment:** All commands and the environment setup in this example are for the Korn shell environment. If you use a different shell, replace any Korn shell-specific information or instructions with the appropriate information for your preferred shell environment.
- **User login:** Unless otherwise specified, perform all procedures as superuser or assume a role that provides `solaris.cluster.admin`, `solaris.cluster.modify`, and `solaris.cluster.read` RBAC authorization.

## Installing and Configuring WebSphere MQ in an HA Container

---

**Note** – This deployment example is designed for a single-node cluster. It is provided simply as a concise guide to help you if you need to refer to an installation and configuration of WebSphere MQ.

This deployment example is *not* meant to be a precise guide to install and configure WebSphere MQ.

If you need to install WebSphere MQ in any other configuration, refer to the general purpose procedures elsewhere in this manual.

---

The instructions with this deployment example assumes that you are using the WebSphere MQ V6 Solaris x86-64 and will configure WebSphere MQ on a ZFS highly available local file system

The HA containerpath cannot use a ZFS highly available local file system, instead the zonepath will use a SVM highly available local system.

The cluster resource group is simply brought online and is *not* failed over to another node as this deployment example is on a single node cluster.

The tasks you must perform to install and configure WebSphere MQ in the HA container are as follows:

- [“Example: Prepare the Cluster for WebSphere MQ” on page 55](#)
- [“Example: Configure the HA Container” on page 56](#)
- [“Example: Install WebSphere MQ in the HA Container” on page 57](#)
- [“Example: Verify WebSphere MQ” on page 58](#)
- [“Example: Configure Cluster Resources for WebSphere MQ” on page 60](#)

- “Example: Enable the WebSphere MQ Software to Run in the Cluster” on page 61
- “Example: Verify the HA for WebSphere MQ resource group” on page 61
- “Example: Creating Multiple Instances” on page 62

## ▼ Example: Prepare the Cluster for WebSphere MQ

- 1 **Install and configure the cluster as instructed in *Oracle Solaris Cluster Software Installation Guide*.**

Install the following cluster software components on node Vigor5.

- Oracle Solaris Cluster core software
- Oracle Solaris Cluster data service for WebSphere MQ
- Oracle Solaris Cluster data service for Solaris Containers

- 2 **Add the logical host name to `/etc/hosts` and `/etc/inet/ipnodes` in the global zone and HA container.**

The following output shows the logical host name entry for qmgr3 in the global zone.

```
Vigor5# grep qmgr1 /etc/hosts /etc/inet/ipnodes
/etc/hosts:192.168.1.150    qmgr1
/etc/inet/ipnodes:192.168.1.150    qmgr1
```

- 3 **Install and configure a Zettabyte File System**

---

**Note** – The following zpool definition represents a very basic configuration for deployment on a single-node cluster.

You should *not* consider this example for use within a productive deployment, instead it is a very basic configuration for testing or development purposes only.

---

Create a ZFS pool

```
Vigor5# zpool create -m /ZFSwmq3/log HAZpool1 c1t1d0
Vigor5# zpool create -m /ZFSwmq3/qmgr HAZpool2 c1t4d0
```

- 4 **Install and Configure a Solaris Volume Manager File System**

---

**Note** – The following metaset definitions represent a very basic configuration for deployment on a single-node cluster.

You should *not* consider this example for use within a productive deployment, instead it is a very basic configuration for testing or development purposes only.

---

**a. Create a SVM Disk Set.**

```
Vigor5# metaset -s dg_d1 -a -h Vigor5
```

**b. Add a Disk to the SVM Disk Set**

```
Vigor5# metaset -s dg_d1 -a /dev/did/rdisk/d2
```

**c. Add the Disk Information to the metainit utility input file**

```
Vigor5# cat >> /etc/lvm/md.tab <<-EOF
dg_d1/d100      -m      dg_d1/d110
dg_d1/d110     1 1    /dev/did/rdisk/d2s0
EOF
```

**d. Configure the metadevices**

```
Vigor5# metainit -s dg_d1 -a
```

**e. Create a Mount Point for the SVM Highly Available Local File System**

```
Vigor5# mkdir /FOZones
```

**f. Add the SVM highly available local file system to /etc/vfstab**

```
Vigor5# cat >> /etc/vfstab <<-EOF
/dev/md/dg_d1/dsk/d100 /dev/md/dg_d1/rdisk/d100 /FOZones ufs 3 no logging
EOF
```

**g. Create the File System**

```
Vigor5# newfs /dev/md/dg_d1/rdisk/d100
```

**h. Mount the File System**

```
Vigor5# mount /FOZones
```

## ▼ Example: Configure the HA Container

In this task you will create a whole root failover non-global zone on node Vigor5.

**1 Create a non-global zone to be used as the HA container**

```
Vigor5# cat > /tmp/z3 <<-EOF
create -b
set zonepath=/FOZones/z3
set autoboot=false
add inherit-pkg-dir
set dir=/opt/SUNWscmqs
end
EOF
```

**2 Configure the non-global HA container, using the file you created.**

```
Vigor5# zonecfg -z z3 -f /tmp/z3
```

**3 Install the zones.**

```
Vigor5# zoneadm -z z3 install
```

**4 Boot the zone.**

Perform this step after the installation of the zones are complete.

```
Vigor5# zoneadm -z z3 boot
```

**5 Log in to the zone and complete the zone system identification.**

Open another window and issue the following command.

```
Vigor5# zlogin -C z3
```

**6 Disconnect from the zone console and close the terminal window.**

After you have completed the zone system identification, disconnect from the zone and close the window you previously opened.

```
Vigo5# ~.  
Vigo5# exit
```

**7 Create the appropriate mount points and symlinks for WebSphere MQ in the zone.**

```
Vigor5# zlogin z3 mkdir -p /var/mqm/log /var/mqm/qmgrs  
Vigor5# zlogin z3 ln -s /ZFSwmq3/log /var/mqm/log/qmgr3  
Vigor5# zlogin z3 ln -s /ZFSwmq3/qmgrs /var/mqm/qmgrs/qmgr3
```

**8 Create the WebSphere MQ userid in the zone.**

```
Vigor5# zlogin z3 groupadd -g 1000 mqm  
Vigor5# zlogin z3 useradd -u 1000 -g 1000 -d /var/mqm mqm
```

**9 Add the logical host name to /etc/hosts and /etc/inet/ipnodes in the zone**

The following output shows logical host name entry for qmgr3 in zone z3 .

```
Vigor5# zlogin z3 grep qmgr3 /etc/hosts /etc/inet/ipnodes  
/etc/hosts:192.168.1.152    qmgr3  
/etc/inet/ipnodes:192.168.1.152    qmgr3
```

**▼ Example: Install WebSphere MQ in the HA Container****1 Mount the WebSphere MQ software in the zones.**

In this example, the WebSphere MQ software has been copied to node Vigor5 in directory /export/software/ibm/wmqsv6.

```
Vigor5# zlogin z3 mkdir -p /var/tmp/software  
Vigor5#  
Vigor5# mount -F lofs /export/software /FOZzones/z3/root/var/tmp/software
```

**2 Mount the ZFS pools in the zone.**

```
Vigor5# zpool export -f HAZpool1
Vigor5# zpool export -f HAZpool2
Vigor5# zpool import -R /FOZones/z3/root HAZpool1
Vigor5# zpool import -R /FOZones/z3/root HAZpool2
```

**3 Setup the ZFS file systems for user and group mqm**

```
Vigor5# zlogin z3 chown -R mqm:mqm /ZFSwmq3
```

**4 Login to the HA container in a separate window.**

```
Vigor5# zlogin z3
```

**5 Install the WebSphere MQ software in the HA container.**

Perform this step within each new window you used to login to the zone.

```
# cd /var/tmp/softwareibm/wmqsv6
# ./mqlicense.sh
# pkgadd -d .
# exit
```

**▼ Example: Verify WebSphere MQ****1 Create and start a queue manager.**

Perform this step from the global zone.

```
Vigor5# zlogin z3
# su - mqm
$ crtmqm qmgr3
$ strmqm qmgr3
```

**2 Create a persistent queue in the queue manager and put a message to the queue.**

Perform this step in zone z3.

```
$ runmqsc qmgr3
def ql(sc3test) defpsist(yes)
end
$ /opt/mqm/samp/bin/amqsput SC3TEST qmgr3
test test test test test
^C
```

**3 Stop the queue manager.**

Perform this step in zone z3.

```
$ endmqm -i qmgr3
$ exit
# exit
```

**4 Unmount and mount the ZFS file systems in the zone.**

Perform this step in the global zone.

```
Vigor5# zpool export -f HAZpool1
Vigor5# zpool export -f HAZpool2
Vigor5# zpool import -R /FOZones/z3/root HAZpool1
Vigor5# zpool import -R /FOZones/z3/root HAZpool2
```

**5 Start the queue manager.**

Perform this step from the global zone.

```
Vigor5# zlogin z3
# su - mqm
$ strmqm qmgr3
```

**6 Get the messages from the persistent queues in the queue manager and delete the queue.**

Perform this step in zone z3.

```
$ /opt/mqm/samp/bin/amqsget SC3TEST qmgr3
^C
$ runmqsc qmgr3
delete ql(sc3test)
end
```

**7 Stop the queue manager.**

Perform this step in zone z3.

```
$ endmqm -i qmgr3
$ exit
# exit
```

**8 Unmount the ZFS file systems from the other zone.**

Perform this step in the global zone.

```
Vigor5# zpool export -f HAZpool1
Vigor5# zpool export -f HAZpool2
```

**9 Halt the HA container.**

Perform this step in the global zone.

```
Vigor5# zoneadm -z z3 halt
```

**10 Unmount the SVM zonepath.**

Perform this step in the global zone.

```
Vigor5# umount -f /FOZones
```

## ▼ Example: Configure Cluster Resources for WebSphere MQ

### 1 Register the necessary data types on the single node cluster

```
Vigor5# clresourcetype register SUNW.HASStoragePlus
Vigor5# clresourcetype register SUNW.gds
```

### 2 Create the resource group.

```
Vigor5# clresourcegroup create -n Vigor5 wmq3-rg
```

### 3 Create the logical host.

```
Vigor5# clreslogicalhostname create -g wmq3-rg -h qmgr3 wmq3-lh
```

### 4 Create the SVM HASStoragePlus resource in the wmq3-rg resource group.

```
Vigor5# clresource create -g wmq3-rg -t SUNW.HASStoragePlus \
> -p FilesystemMountPoints=/FOZones wmq3-SVMhas
```

### 5 Create the ZFS HASStoragePlus resource in the wmq3-rg resource group.

```
Vigor5# clresource create -g wmq3-rg -t SUNW.HASStoragePlus \
> -p Zpools=HAZpool1,HAZpool2 wmq3-ZFSHas
```

### 6 Enable the resource group.

```
Vigor5# clresourcegroup online -M wmq3-rg
```

### 7 Create the Solaris Cluster HA for Solaris Container Configuration file.

```
Vigor5# cat > /var/tmp/sczbt_config <<-EOF
RS=wmq3-FOZ
RG=wmq3-rg
PARAMETERDIR=/FOZones
SC_NETWORK=true
SC_LH=wmq3-lh
FAILOVER=true
HAS_RS=wmq3-SVMhas,wmq3-ZFSHas

Zonename=z3
Zonebootopt=
Milestone=multi-user-server
Mounts="/ZFSwmq3/log /ZFSwmq3/qmgrs"
EOF
```

### 8 Register the Solaris Cluster HA for Solaris Container data service.

```
Vigor5# /opt/SUNWsczone/sczbt/util/sczbt_register -f /var/tmp/sczbt_config
```

### 9 Enable the HA container resource

```
Vigor5# clresource enable wmq3-FOZ
```

## ▼ Example: Enable the WebSphere MQ Software to Run in the Cluster

- 1 Create the HA for WebSphere MQ queue manager configuration file.

```
Vigor5# cat > /var/tmp/mgr3_config <<-EOF
# +++ Required parameters +++
RS=wmq3-qmgr
RG=wmq3-rg
QMGR=qmgr3
LH=wmq3-lh
HAS_RS=wmq3-ZFShas
LSR_RS=
CLEANUP=YES
SERVICES=NO
USERID=mqm

# +++ Optional parameters +++
DB2INSTANCE=
ORACLE_HOME=
ORACLE_SID=
START_CMD=
STOP_CMD=

# +++ HA container parameters +++
# These parameters are only required when WebSphere MQ should run
# within a HA container managed by the Solaris Cluster Data Service
# for Solaris Containers.
RS_ZONE=wmq3-FOZ
PROJECT=default
TIMEOUT=300
EOF
```

- 2 Register the HA for WebSphere MQ data service.

```
Vigor5# /opt/SUNWscmqs/mgr/util/mgr_register -f /var/tmp/mgr3_config
```

- 3 Enable the resource.

```
Vigor5# clresource enable wmq3-qmgr
```

## ▼ Example: Verify the HA for WebSphere MQ resource group

- Check the status of the WebSphere MQ resources.

```
Vigor5# clrs status wmq3-FOZ
Vigor5# clrs status wmq3-qmgr
Vigor5# clrg status wmq3-rg
```

## ▼ Example: Creating Multiple Instances

If another queue manager is required you can repeat the following tasks. However you must change the entries within that task to reflect your new queue manager.

- 1 Repeat the following steps from “Example: Prepare the Cluster for WebSphere MQ” on page 55.**  
Step 2 and Step 3.
- 2 Repeat the following steps from “Example: Configure the HA Container” on page 56.**  
Step 7 and Step 9.
- 3 Repeat the following steps from “Example: Install WebSphere MQ in the HA Container” on page 57.**  
Step 2.
- 4 Repeat the following steps from “Example: Verify WebSphere MQ” on page 58.**  
Step 1, Step 3 and Step 8.
- 5 Repeat the following steps from “Example: Configure Cluster Resources for WebSphere MQ” on page 60.**  
Step 3 and Step 5.

After creating these resources you must enable them using `clresource enable resource` before continuing with the next step.

- 6 Repeat the following steps from “Example: Enable the WebSphere MQ Software to Run in the Cluster” on page 61.**  
Step 1, Step 2 and Step 3.

Also repeat as required for any WebSphere MQ component.

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