Veritas™ Cluster Server Application Note: Sun Enterprise 10000 Dynamic Reconfiguration

Solaris

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VCS Application Note: Sun Enterprise 10000 Dynamic Reconfiguration

Introduction

This application note describes how to perform Dynamic Reconfiguration (DR) operations on VCS clustered system domains of the Sun™ Enterprise™ 10000 server.

The Solaris DR utility enables you to reconfigure the resources of system boards so that the boards can be replaced without system downtime. Before you can physically remove a board, you must "detach" it, or reconfigure it such that its resources can be disabled and removed from the domain configuration. Likewise, after you have physically replaced a board in a domain, you must "attach" it, or reconfigure it into the domain.

Note: Currently, VCS does not support using DR in clusters where I/O controllers and storage use Sun's Alternate Pathing (AP).

In a VCS cluster of domains, it's possible that the DR operations in a domain might cause VCS to detect that resources are not available and to initiate failover to the other domain. Therefore, it is advisable to freeze the service groups running in the domain before running DR.

Do not use the following procedures to DR a system board containing a VCS private heartbeat link. If you need to do so, you must stop VCS before proceeding.

Supported hardware

- Sun Enterprise 10000 (E10K)

Supported software

- Solaris 8, 9, and 10
- VERITAS Cluster Server, version 2.0, 3.5, 4.0, and 4.1
- VERITAS Volume Manager (VxVM), as supported by the VCS version
- VERITAS File System, as supported by the VCS version

Dynamic reconfiguration in VCS environment

The system board in a domain may contain I/O controllers, CPUs, or memory. Typically, within a domain, system boards have their functions duplicated on other system boards. For example, a board with CPU or memory can be removed dynamically because another board has the equivalent functions.

Boards with I/O controllers can be dynamically reconfigured as long as you use VxVM with the Dynamic Multipathing (DMP) feature to manage the shared storage.

Setting environment variable to enable DR

Before performing DR operations on a domain, you must first set the appropriate environment variable.

Enable the kernel cage variable for DR

Using the Solaris 8 operating environment, you must set the `system`(4) variable, `kernel_cage_enable`, to 1 (enabled). By default, this variable is set to zero (kernel cage disabled), preventing DR Detach operations.

Edit the file `/etc/system` so that `kernel_cage_enable` equals 1.

```
.
set kernel_cage_enable=1
.
```

Reboot the domain. To verify the kernel cage is enabled, check the file `/var/adm/messages`. Look for the message:

```
NOTICE: DR Kernel Cage is ENABLED
```

Detaching and attaching I/O system boards

In the configuration shown below, VCS runs on Domains A and B with service groups online on Domain A. Shared storage consists of a VxVM disk group with

Dynamic Multipathing (DMP) enabled. Dynamic Reconfiguration of I/O boards depends on DMP being configured for the storage.
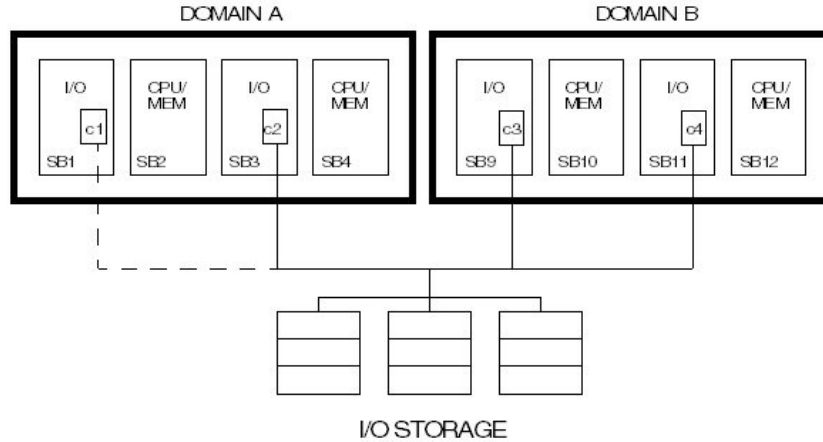
In the example, the system board SB3, which has a disk controller, is to be removed, repaired, and replaced. The administrator disables the controller, and the disk controller on SB1 automatically takes over because of the DMP functionality. Using DR commands, the administrator can detach, or remove the board from the Domain A's configuration. When this is complete, the board can be physically removed.

Replacing the board—a controller board in this case—involves physically installing it and reconnecting it to the shared storage. Reconfiguring the board requires using DR commands to "attach" it to the domain, after which the controller can be re-enabled.

Detaching I/O system boards with DMP enabled

Make sure the `kernel_cage_enable` variable is set.

1   Freeze the VCS service groups running on the domain where you intend to perform DR operations. Freezing the service groups prevents them from being taken offline or failed over. Repeat the following command for each service group:

   # **hagrp -freeze** *ser_grp_name*

2   Connect to the SSP server and log in to the domain whose system board requires Dynamic Reconfiguration (DR).

   ssp:D1% **echo $SUNW_HOSTNAME**

3   Enter the `dr`(1M) shell:

   ssp:D1% **dr**

4   To verify the board is an I/O board, enter:

    dr> **drshow** *sb#* **IO**

If the display lists the disks connected to the controller, the system board is an I/O board.

5   If the system board is an I/O board, open another window and log in as root to the domain you are currently reconfiguring.

6   Disable the controller on the I/O system board:

    # **vxdmpadm disable ctlr=***ctlr#*

7   In the window where you are running DR, start detaching the I/O board by entering:

    dr> **drain** *sb#*

8   Monitor the progress of the drain operation by entering:

    dr> **drshow** *sb#* **drain**

9   When you see the message:

    Percent Complete= 100% (0 KBytes remaining)

complete the detach operation:

    dr> **complete_detach** *sb#*

10   To verify that the board is no longer configured, type the following command:

    dr> **drshow** *sb#*

The detached board should not appear in the detailed listing.

11   Exit the dr shell:

    dr> **exit**

12   If the board is not to be immediately replaced, unfreeze any frozen service groups:

    # **hagrp -unfreeze** *ser_grp_name*

Repeat for each service group.

Attaching I/O system boards with DMP enabled

1   Freeze the VCS service groups running on the domain where you intend to attach a system board. Repeat the following command for each service group:

    # **hagrp -freeze** *ser_grp_name*

2   After physically replacing a previously removed I/O board, make sure it is connected to the shared storage.

3   From the SSP server, enter the dr(1M) shell:

    ssp:D1% **dr**

4   Follow the Sun procedure to attach the system board, described here briefly:

      dr> **init_attach** *sb#*

    Complete the attach operation:

      dr> **complete_attach** *sb#*

5   Verify that the DR attach operation has succeeded. Type:

      dr> **drshow** *#sb*

    The new system board should show in the list of configured boards.

6   Exit the dr shell.

      dr> **exit**

7   Log in as root to the domain where you are adding the system board. Enable the controller by entering:

      # **vxdmpadm enable ctlr=***ctlr#*

8   When you have successfully attached and enabled the system I/O board, unfreeze any frozen service groups:

      # **hagrp -unfreeze** *ser_grp_name*

    Repeat for each service group.

9   Verify that VCS is still up and running.

Detaching CPU/memory boards

Note: Use the following procedure if no I/O devices on the system board are used.

Make sure the kernel_cage_enable variable is set.

1   Freeze the VCS service groups running on the domain where you intend to detach a CPU/Memory board. Freezing the service groups prevents them from being taken offline or failed over. Repeat the following command for each service group:

      # **hagrp -freeze** *ser_grp_name*

2   Connect to the SSP server and log in to the domain whose system board requires Dynamic Reconfiguration (DR).

      ssp:D1% **echo $SUNW_HOSTNAME**

3   Enter the dr(1M) shell:

      ssp:D1% **dr**

4   In the window where you are running DR, start detaching the I/O board by entering:

      dr> **drain** *sb#*

5   Monitor the progress of the drain operation by entering:

      dr> **drshow** *sb#* **drain**

6   When you see the message

```
Percent Complete= 100% (0 KBytes remaining)
```

complete the detach operation:

```
dr> complete_detach sb#
```

7   To verify that the board is no longer configured, type the following
command:

```
dr> drshow sb#
```

The detached board should not appear in the detailed listing.

8   Exit the `dr` shell:

```
dr > exit
```

9   If the board is not to be immediately replaced, unfreeze any frozen service
groups:

```
# hagrp -unfreeze ser_grp_name
```

10   Repeat for each service group.

Attaching CPU/Memory boards

Note: Use the following procedure if none of the I/O devices on the system board
are used.

1   Freeze the VCS service groups running on the domain where you intend to
attach a system board. Repeat the following command for each service
group:

```
# hagrp -freeze ser_grp_name
```

2   Physically replace the CPU/Memory board.

3   From the SSP server, enter the `dr`(1M) shell:

```
ssp:D1% dr
```

4   Follow the Sun procedure to attach the system board, described here briefly:

```
dr> init_attach sb#
```

Complete the attach operation:

```
dr> complete_attach sb#
```

5   Verify that the DR attach operation has succeeded. Type:

```
dr> drshow #sb
```

The new system board should show in the list of configured boards.

6   Exit the `dr` shell.

```
dr> exit
```

7   When you have successfully attached the CPU/Memory board, unfreeze any
frozen service groups:

```
# hagrp -unfreeze ser_grp_name
```
Repeat for each service group.

8 Verify that VCS is still up and running.

Using VM without DMP enabled

If you have the Volume Manager DMP feature disabled for some or all of the disks in the shared storage, and you must perform DR operations within the cluster, we recommend using the VCS DiskReservation agent to guard against data corruption. In the event of a "split-brain" condition, that is, when two processors in a cluster can simultaneously write to the shared storage, the DiskReservation agent ensures that only one processor has access to the storage at one time. See the *VCS Bundled Agents Reference Guide* for information on configuring the DiskReservation agent.