ORACLE VM

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Hard Partitioning With Oracle VM Server for SPARC

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Introduction

This document describes hard partitioning with the Oracle VM Server for SPARC software, and how to use it to conform to the Oracle licensing policies for partitioned environments.

CPU Cores and CPU Threads

The Oracle VM Server for SPARC software runs on Oracle's SPARC T-Series servers, which use SPARC T-Series processors. The SPARC T-Series processors have multiple CPU cores, and each CPU core has multiple CPU threads. By default, domains that are created with the Oracle VM Server for SPARC software are configured with CPU threads.

Hard Partitioning and CPU Whole Cores

Beginning with the Oracle VM Server for SPARC 2.0 release, hard partitioning is enforced by using CPU whole-core configurations. In such a case, domains are configured with CPU whole cores, instead of the default of individual CPU threads (virtual CPUs). When binding such a domain, the system provisions the specified number of CPU cores and all its CPU threads to the domain. Using a CPU whole-core configuration also limits the number of CPU cores that can be dynamically assigned to a bound or active domain.

For more information about CPU whole-core configurations, see the Administration Guide of Oracle VM Server for SPARC Documentation.

Oracle Hard Partition Licensing

To conform to the Oracle hard partition licensing requirement, you must use Oracle VM Server for SPARC 2.0 or later releases and must use CPU whole cores as follows:

- If a domain runs applications using Oracle hard partition licensing, that domain must be configured with CPU whole cores.

- If a domain does not run applications using Oracle hard partition licensing, that domain need not be configured with CPU whole cores. For example, if you do not run any Oracle applications in the control domain, that domain need not be configured with CPU whole cores.

Checking the Configuration of a Domain

To Determine Whether a Domain is Configured With CPU Whole Cores

1. Determine whether the domain is configured with CPU whole cores.

   # **ldm list -o resmgmt** *domain*

   Verify that the `whole-core` constraint appears in the output and that the `max-cores` keyword specifies the maximum number of CPU cores configured for the domain.

For more information, see the ldm(1M) man page of the Reference Manual in the Oracle VM Server for SPARC Documentation.

EXAMPLE – Checking Whether a Domain is Configured With CPU Whole Cores

The following command shows that domain `ldg1` is configured with CPU whole cores and a maximum of five cores:

```
# ldm list -o resmgmt ldg1
NAME
ldg1

CONSTRAINT
   whole-core
   max-cores=5
```

To List the CPU Cores That Are Assigned to a Domain

CPU cores are effectively assigned to a domain when a domain is bound.

1. Obtain the list of CPU cores that are assigned to a domain.

   # **ldm list -o core** ***domain***

EXAMPLE – Listing the CPU Cores That Are Assigned to a Domain

The following command shows the cores that are assigned to domain `ldg1`:

```
# ldm list -o core ldg1
NAME
ldg1

CORE
CID   PCPUSET
1     (8, 9, 10, 11, 12, 13, 14, 15)
2     (16, 17, 18, 19, 20, 21, 22, 23)
```

Configuring a Domain With CPU Whole Cores

Use the following command to configure a domain to use CPU whole cores:

```
ldm set-vcpu -c number-of-cpu-cores domain
```

This command also specifies the maximum number of CPU cores for the domain.

For more information, see the ldm(1M) man page of the Reference Manual in the Oracle VM Server for SPARC Documentation.

To Create a New Domain With CPU Whole Cores

When creating a new domain, you can configure it to use CPU whole cores.

1. Create the domain.

   ```
   # ldm create domain
   ```

2. Set the number of CPU whole cores for the domain.

   ```
   # ldm set-vcpu -c number-of-cpu-cores domain
   ```

   This command also sets the maximum number of CPU cores for *domain* to *number-of-cpu-cores*.

3. Configure the domain.

   During this configuration, do not use the `ldm add-vcpu`, `ldm set-vcpu` or `ldm rm-vcpu` commands without the `-c` option. If you do so, the domain is reconfigured with individual CPU threads instead of CPU whole cores.

4. Bind and start the domain.

   ```
   # ldm bind domain
   # ldm start domain
   ```

EXAMPLE – Creating a New Domain With 2 CPU Whole Cores

This example creates a domain, `ldg1`, with two CPU whole cores. The first command creates the `ldg1` domain. The second command configures the `ldg1` domain with two CPU whole cores. This command also specifies the maximum number of CPU cores for `ldg1` to two. At this point, you can perform further configuration on the domain, subject to the restrictions described in Step 3 of Section Before you use the `ldg1` domain, you must bind and start it, which is done by the third and fourth commands.

```
# ldm create ldg1
```

```
# ldm set-vcpu -c 2 ldg1
...
# ldm bind ldg1
# ldm start ldg1
```

To Configure an Existing Domain With CPU Whole Cores

If a domain already exists and is configured to use CPU threads, you can change its configuration to use CPU whole cores.

1. Stop and unbind the domain.

   # **ldm stop** *domain*
   # **ldm unbind** *domain*

2. Set the number of CPU whole cores for the domain.

   # **ldm set-vcpu -c** *number-of-cpu-cores domain*

   This command also sets the maximum number of CPU cores for *domain* to *number-of-cpu-cores*.

3. Rebind and restart the domain.

   # **ldm bind** *domain*
   # **ldm start** *domain*

EXAMPLE – Configuring an Existing Domain With 4 CPU Whole Cores

This example updates the configuration of an existing domain, `ldg1`. The first and second commands stop and unbind the `ldg1` domain. The third command configures the `ldg1` domain with four CPU whole cores. This command also sets the maximum number of CPU cores for `ldg1` to four. The fourth and fifth commands bind and restart the `ldg1` command.

```
# ldm stop ldg1
# ldm unbind ldg1
# ldm set-vcpu -c 4 ldg1
# ldm bind ldg1
# ldm start ldg1
```

To Configure the Primary Domain With CPU Whole Cores

If the `primary` domain is configured to use CPU threads, you can change its configuration to use CPU whole cores.

1. Put the `primary` domain in delayed reconfiguration mode.

   ```
   # ldm start-reconf primary
   ```

2. Set the number of CPU whole cores for the `primary` domain.

   ```
   # ldm set-vcpu -c number-of-cpu-cores primary
   ```

   This command also sets the maximum number of CPU cores for `primary` to *number-of-cpu-cores*.

3. Reboot the `primary` domain.

Use the appropriate procedure to reboot the `primary` domain, which depends on the system configuration. See the Administration Guide of the Oracle VM Server for SPARC Documentation.

EXAMPLE – Configuring the Primary Domain With 2 CPU Whole Cores

This example configures CPU whole cores on the `primary` domain. The first command initiates delayed reconfiguration mode on the `primary` domain. The second command configures the `primary` domain with two CPU whole cores. This command also sets the maximum number of CPU cores for `primary` to two. The third command reboots the `primary` domain.

```
# ldm start-reconf primary
# ldm set-vcpu -c 2 primary
# shutdown -i 5
```

Interaction With Other Features

CPU Dynamic Reconfiguration

You can use CPU dynamic reconfiguration with domains that are configured with CPU whole cores. However, you can only add or remove entire CPU cores, not individual CPU threads. Using CPU dynamic reconfiguration thus maintains the hard partitioning of the system. In addition, when you dynamically add CPU cores to a domain, the command fails if it exceeds the maximum number of CPU cores for the domain.

Use the following commands to dynamically add, set, or remove CPU whole cores to a bound or active domain:

```
ldm add-vcpu -c number-of-cpu-cores domain
ldm set-vcpu -c number-of-cpu-cores domain
ldm rm-vcpu -c number-of-cpu-cores domain
```

Note – If the domain is not active, these commands also adjust the maximum number of CPU cores for the domain. If the domain is bound or active, these commands do not affect the maximum number of CPU cores for the domain.

EXAMPLE – Dynamically Adding Two CPU Whole Cores to a Domain

This example dynamically adds two CPU whole cores to domain `ldg1`, which is an active domain configured with CPU whole cores. The first command shows that the `ldg1` domain is active. The second command shows that the `ldg1` domain is configured with CPU whole cores, and a maximum of four CPU cores. The third and fifth commands show CPU cores assigned to the domain before and after adding two CPU whole cores. The fourth command dynamically adds two CPU whole cores to the `ldg1` domain.

```
# ldm list ldg1
NAME    STATE   FLAGS   CONS  VCPU  MEMORY UTIL  UPTIME
ldg1    active  -n----  5000  16    2G     0.4%  5d 17h 49m

# ldm list -o resmgmt ldg1
NAME
ldg1

CONSTRAINT
   whole-core
   max-cores=4

# ldm list -o core ldg1
NAME
ldg1

CORE
CID   PCPUSET
1     (8, 9, 10, 11, 12, 13, 14, 15)
2     (16, 17, 18, 19, 20, 21, 22, 23)

# ldm add-vcpu -c 2 ldg1

# ldm list -o core ldg1
NAME
ldg1

CORE
CID   PCPUSET
1     (8, 9, 10, 11, 12, 13, 14, 15)
2     (16, 17, 18, 19, 20, 21, 22, 23)
3     (24, 25, 26, 27, 28, 29, 30, 31)
4     (32, 33, 34, 35, 36, 37, 38, 39)
```

CPU Dynamic Resource Management

If Dynamic Resource Management (DRM) is used to automatically manage CPU resources on some domains, DRM policies will not apply to those domains that are configured with CPU whole cores.

A DRM policy can include a domain that is configured with CPU whole cores. However, when such a policy is activated, it is automatically disabled for that domain, which remains configured with CPU whole cores. If the domain is later reconfigured with CPU threads instead of CPU whole cores, the DRM policy is automatically re-enabled for that domain.

CPU Power Management

You can use CPU power management in performance and elastic modes for domains that are configured with CPU whole cores. Using CPU power management maintains the hard partitioning of the system.

Domain Reboot or Rebind

A domain that is configured with CPU whole cores remains configured with CPU whole cores when it is restarted, or if the entire platform is restarted. A domain uses the same physical CPU cores for the entire time it remains bound. For example, if a domain is rebooted, it uses the exact same physical CPU cores both before and after the reboot. Or, if the entire platform is powered off while a domain is bound, that domain will be configured with the exact same physical CPU cores when the platform is powered on again. If you unbind a domain and then rebind it, or if the entire platform is restarted with a new configuration, the domain might use different physical CPU cores.

Domain Migration

CPU whole-core configuration is incompatible with domain migration. However, you can still migrate a domain that is configured with CPU whole cores. After such a migration, hard partitioning is not enforced on the target system. Also, the whole-core configuration and the maximum number of CPU cores are not preserved by the migration on the target system.

If you migrate a domain that is configured with whole cores, you must reconfigure the target domain to use hard partitioning after the migration completes. Also, you must ensure that your license agreement permits you to use the domain on both the source and the target systems.

Conclusion

With the Oracle VM Server for SPARC software, you must use whole-core configurations to conform to the Oracle hard partition licensing requirement. In such a case, domains are configured with CPU whole cores, instead of the default of individual CPU threads. Using a CPU whole-core configuration also adds some restrictions to features, such as CPU dynamic reconfiguration, CPU dynamic resource management, and domain migration.

For more information about Oracle's virtualization solutions, visit oracle.com/virtualization.

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