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ENTERPRISE MANAGER 12c

Enterprise Manager 12c Cloud Control Sizing Guidelines

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Executive Overview

Oracle Enterprise Manager is Oracle's integrated enterprise IT management product line and provides the industry's first complete cloud lifecycle management solution. Oracle Enterprise Manager's Business-Driven IT Management capabilities allow you to quickly set up, manage and support enterprise clouds and traditional Oracle IT environments from applications to disk. Enterprise Manager allows customers to achieve:

- *Best service levels for traditional and cloud applications* through management from a business perspective including Oracle Fusion Applications

- *Maximum return on IT management* investment through the best solutions for intelligent management of the Oracle stack and engineered systems

- *Unmatched customer support experience* through real-time integration of Oracle's knowledgebase with each customer environment

Introduction

Oracle Enterprise Manager provides a highly available and scalable deployment topology. This document will lay out the basic minimum sizing and tuning recommendations for initial capacity planning for your Oracle Enterprise Manager deployment. This document assumes a basic understanding of Oracle Enterprise Manager components and systems. A complete description of these components can be found in the Oracle Enterprise Manager Cloud Control Introduction. This document is a starting point for site sizing. Every site has its own characteristics and should be monitored and tuned as needed. This document is intended to complement the Oracle Enterprise Manager installation documentation and covers basic Oracle Enterprise Manager sizing. The document does not cover JVM Diagnostics (JVMD), BI Publisher (BIP) or Application Dependency and Performance (ADP) sizing.

Overview of Sizing Guidelines

Hardware Information

The sizing guidelines outlined in this document were obtained by running a virtual environment on the following hardware and operating system combination.

>
> Hardware - Oracle's Sun Fire X4170 M2
> Hypervisor – 64-bit Linux Oracle Virtual Server
> Operating System of Virtual Machines - 64-bit Oracle Linux

The virtual environment setup had a one-to-one mapping of CPUs between the Oracle VM Server (OVS) host and the virtual machines running on it. The OVS servers had enough RAM to support all virtual machines without requiring memory swapping.

As noted, this document is based on a 64-bit Oracle Linux environment. If you are running on another platform, you will need to convert the sizing information based on similar hardware performance. This conversion should be based on single-thread performance.

Note that running on a host with 24 slow cores is not equivalent to running on a machine with 12 fast cores even though the total machine performance might be the same on a throughput benchmark. Single thread performance is critical for ensuring good Enterprise Manager user interface response times.

Sizing Specifications

The sizing guidelines for Oracle Enterprise Manager are divided into four sizes: Eval, Small, Medium and Large. The definitions of each size are shown in Table 1.

TABLE 1. ORACLE ENTERPRISE MANAGER CONFIGURATION SIZES

SIZE	AGENT COUNT	TARGET COUNT	CONCURRENT USER SESSIONS
Eval	< 10	< 100	< 3
SMALL	< 100	< 1000	<10
MEDIUM	>= 100, < 1000	>= 1000, < 10000	>= 10, < 25
LARGE	>=1000	>= 10000	>= 25, <=50*

for larger user loads see the section titled Large Concurrent UI Load

The Eval configuration is not meant for production environments. It is only to be used for trial and testing environments.

Sizing for Upgraded Installs

If upgrading from a previous release of Enterprise Manager to Enterprise Manager 12*c*, the following queries can be run as the sysman user to obtain the Management Agent and target counts for use in Table 1.

- Agent count - select count(*) from mgmt_targets where target_type = 'oracle_emd'

- Target count – select count(*) from mgmt_targets where target_type != 'oracle_emd'

Minimum Hardware Requirements

Table 2 and 3 lists the minimum hardware requirements for each of the four configurations.

TABLE 2. ORACLE ENTERPRISE MANAGER MINIMUM HARDWARE REQUIREMENTS

SIZE	OMS MACHINE COUNT*	CORES PER OMS	MEMORY PER OMS (GB)	STORAGE PER OMS (GB)	DATABASE MACHINE COUNT*	CORES PER DATABASE MACHINE	MEMORY PER DATABASE MACHINE (GB)
Eval	1	2	4	15	-	-	-
SMALL	1	2	6	15	1	2	6
MEDIUM	2	4	8	15	2 (RAC)	4	8
LARGE	2	8	16	15	2 (RAC)	8	16
	4	4	8	15	2 (RAC)	8	16

* The OMS and database instances are not co-located except for the Eval size

TABLE 3. ORACLE ENTERPRISE MANAGER MINIMUM DATABASE STORAGE REQUIREMENTS

SIZE	MGMT_TABLESPACE (GB)	MGMT_ECM_DEPOT_TS (GB)	TEMP (GB)	ARCHIVE LOG AREA (GB)
Eval	15	1	3	Archive log off
SMALL	50	1	10	25
MEDIUM	200	4	20	100
LARGE	300	8	40	150

Network Topology Considerations

A critical consideration when deploying Enterprise Manager is network performance between tiers. Enterprise Manager ensures tolerance of network glitches, failures, and outages between application tiers through error tolerance and recovery. The Management Agent in particular is

able to handle a less performant or reliable network link to the Management Service without severe impact to the performance of Enterprise Manager as a whole. The scope of the impact, as far as a single Management Agent's data being delayed due to network issues, is not likely to be noticed at the Enterprise Manager system wide level.

The impact of slightly higher network latencies between the Management Service and Management Repository will be substantial, however. Implementations of Enterprise Manager have experienced significant performance issues when the network link between the Management Service and Management Repository is not of sufficient quality.

The Management Service host and Repository host should be located in close proximity to each other. Ideally, the round trip network latency between the two should be less than 1 millisecond.

Software Configurations

Eval Configuration

The Eval configuration has to be installed by selecting the Simple installation option. The installation then has to be reconfigured with the appropriate values.

Minimum OMS Settings

The Oracle Management Service (OMS) heap size should be set to 800 MB.

Minimum Repository Database Settings

Table 5 lists the minimum repository database settings that are recommended for a Eval configuration.

TABLE 5. EVAL CONFIGURATION MINIMUM DATABASE SETTINGS

PARAMETER	MINIMUM VALUE
Processes	300
memory_target	700 MB
redo log file size	50 MB
shared_pool_size	450 MB
session_cached_cursors	remove

Small Configuration

The Small configuration is based on the minimum requirements that are required by the Oracle Enterprise Manager installer.

Minimum OMS Settings

No additional settings are required.

Minimum Repository Database Settings

Table 6 lists the minimum repository database settings that are recommended.

TABLE 6. SMALL CONFIGURATION MINIMUM DATABASE SETTINGS

PARAMETER	MINIMUM VALUE
Processes	300
pga_aggregate_target*	1024 MB
sga_target*	2 GB
redo log file size	300 MB
shared_pool_size	600 MB

* memory_target of 3GB can be used in place of sga_target and pga_aggregate_target

Medium Configuration

The Medium configuration modifies several out-of-the-box Enterprise Manager settings.

Minimum OMS Settings

The Oracle Management Service (OMS) heap size should be set to 4096 MB.

Minimum Repository Database Settings

Table 7 lists the minimum repository database settings that are recommended for a Medium configuration.

TABLE 7. MEDIUM CONFIGURATION MINIMUM DATABASE SETTINGS

PARAMETER	MINIMUM VALUE
Processes	600
pga_aggregate_target*	1280 MB
sga_target*	4 GB
redo log file size	600 MB
shared_pool_size	600 MB

*memory_target of 5.25GB can be used in place of sga_target and pga_aggregate_target

Large Configuration

The Large configuration modifies several out-of-the-box Enterprise Manager settings.

Minimum OMS Settings

Table 8 lists the minimum OMS settings that are recommended for a Large configuration.

TABLE 8. LARGE CONFIGURATION MINIMUM OMS SETTINGS

OMS COUNT	HEAP SIZE MINIMUM VALUE
2	8192 MB
4	4096 MB

Minimum Repository Database Settings

Table 9 lists the minimum repository database settings that are recommended for a Large configuration.

TABLE 9. LARGE SITE MINIMUM DATABASE SETTINGS

PARAMETER	MINIMUM VALUE
Processes	1000
pga_aggregate_target*	1536 MB
sga_target*	6 GB
redo log file size	1000 MB
shared_pool_size	600 MB

* memory_target of 7.5GB can be used in place of sga_target and pga_aggregate_target

Additional Configurations

Some Enterprise Manager installations may need additional tuning settings based on larger individual system loads. These additional settings are listed below.

Large Concurrent UI Load

If more than 50 concurrent users are expected per OMS, the following settings should be altered as follows:

TABLE 10. LARGE CONCURRENT UI LOAD ADDITIONAL SETTINGS

PROCESS	PARAMETER	VALUE	WHERE TO SET
OMS	-Djbo.recyclethreshold	Number of concurrent users / number of OMS's	Per OMS
OMS	-Djbo.ampool.maxavailablesize	Number of concurrent users / number of OMS's	Per OMS
OMS	Heap Size	Additional 4 GB for every increment of 50 users	Per OMS
Database	sga_target	Additional 1 GB for every increment of 50 users	Per Instance

Higher user loads will require more hardware capacity. An additional 2 cores are required for both the database and OMS hosts for every 50 concurrent users.

Example: A site with 1500 agents and 15000 targets with 150 concurrent users would require at a minimum the setting modifications listed in Table 11 (based on a LARGE 2 OMS configuration).

TABLE 11. LARGE CONCURRENT UI LOAD ADDITIONAL SETTINGS EXAMPLE FOR 2 OMS CONFIGURATION

PROCESS	PARAMETER	VALUE	CALCULATION
OMS	-Djbo.recyclethreshold	75 (set on each OMS)	150 users / 2 OMS's
OMS	-Djbo.ampool.maxavailablesize	75 (set on each OMS)	150 users / 2 OMS's
OMS	Heap Size	12 GB (set on each OMS)	8 GB (standard large setting) + ((150 users – 50 default large user load) / 2 oms's)* (4 GB / 50 users)
Database	sga_target	8 GB	6 GB (standard large setting) + (150 users - 50 default large user load) * (1 GB / 50 users)

Minimum Additional Hardware required is listed in Table 12

TABLE 12. LARGE CONCURRENT UI LOAD MINIMUM ADDITIONAL HARDWARE EXAMPLE FOR 2 OMS CONFIGURATION

TIER	PARAMETER	VALUE	CALCULATION
OMS	CPU cores	24 (total between all OMS hosts)	8 cores * 2 OMS's (default large core count) + (150 users – 50 default large user load) *(2 cores * 2 OMS's)/ 50 users)
Database	CPU cores	24 (total between all Database hosts)	8 cores * 2 OMS's (default large core count) + (150 users – 50 default large user load) *(2 cores * 2 OMS's / 50 users)

The physical memory of each machine would have to be increased to support running this configuration as well.

Large Job System Load

If the jobs system has a backlog for long periods of time or if you would like the backlog processed faster, set the following parameters with the emctl set property command.

TABLE 13. LARGE JOB SYSTEM BACKLOG SETTINGS

PARAMETER	VALUE
oracle.sysman.core.jobs.shortPoolSize	50
oracle.sysman.core.jobs.longPoolSize	24
oracle.sysman.core.jobs.longSystemPoolSize	20
oracle.sysman.core.jobs.systemPoolSize	50
oracle.sysman.core.conn.maxConnForJobWorkers	144 *

*this setting may require an increase of the processes setting in the database of 144 * number of OMS servers*

These settings assume that there are sufficient database resources available to support more load. These parameters are likely to be needed in a Large configuration with 2 OMS nodes.

Large Repository Side Availability Load (12.1.0.3)

Many targets have repository side availability in Enterprise Manager: Services, Clusters etc. By default Enterprise Manger computes these availabilities with 2 processes. This should be adequate for most installs. If the availability calculation is taking more than 2 minutes on average, more processes can be added. To track the performance of this calculation the following sql should be run:

```
select status, actual_start_date, run_duration
  from dba_scheduler_job_run_details
 where owner='SYSMAN'
   and job_name='EM_REPOS_SEV_EVAL'
   and job_subname IS NULL
   and actual_start_date > sysdate-1/24
 order by actual_start_date;
```

This will track the run time of the job for the last hour. If your database has adequate free resources and the calculation is consistently taking more that 2 minutes you can add more processes by running the following as SYSMAN:

```
begin
 em_severity_repos.set_parallel_parametrization(1, <total number of processes>); commit;
end;
/
```

The change is dynamic and the next iteration of the job will use the new process count.

To determine the current setting run the following sql:

select parameter_value from em_sysavail_parameters where parameter_name = 'NUM_CHUNKS'

The total number of process should be incremented by 1 until the calculation takes on average less than 2 minutes. After each increase, repository resource consumption should be reevaluated before increasing further.

Large Number of Agents (12.1.0.3)

The default out of box settings for Enterprise manager will have 2 ping recorder threads per OMS. This will handle 2000 agents per OMS. If your site needs to handle more agents than the number of OMS's * 2000, or your database per thread cpu performance is slow then you can increase the number of ping recorder threads per OMS. The following parameter can be used:

oracle.sysman.core.omsAgentComm.ping.heartbeatPingRecorderThreads

This value defaults to 2 per OMS. Internal testing has shown that 1 ping thread per 1000 agent is sufficient under well tuned situations. Each OMS requires a restart to use the new value.

Conclusion

Sizing is a critical factor in Enterprise Manager performance. Inadequately-sized Enterprise Manager deployments will result in frustrated users and the overall benefits of Enterprise Manager may be-compromised. The resources required for the Enterprise Manager Oracle Management (OMS) Service and Management Repository tiers will vary significantly based on the number of monitored targets. While there are many additional aspects to be considered when sizing Enterprise Manager infrastructure, the above guidelines provide a simple methodology that can be followed to determine the minimum required hardware resources and initial configuration settings for the OMS and Management Repository tiers.

Appendix

Modifying OMS Settings

The following provides examples of changing the OMS settings recommended in this document. The values in the examples should be substituted with the appropriate value for your configuration.

Heap Size (JAVA_EM_MEM_ARGS)

To modify the OMS Heap Size, first open the following file:
```
$INSTANCE_HOME/<DOMAIN_NAME>/servers/EMGC_OMS1/logs/EMGC_OMS1.out
```

search for text "`JAVA Memory arguments: `". the text will look like this:

```
JAVA Memory arguments: -Xms256m -Xmx1024m -XX:MaxPermSize=768M -XX:+UseConcMarkSweepGC
-XX:+UseParNewGC -XX:+CMSClassUnloadingEnabled -XX:CompileThreshold=8000 -
XX:PermSize=128m
```

Modify the heap size value (-Xmx) as per the recommended value and set the complete text using JAVA_EM_MEM_ARGS property (Note we have changed the Heap size i.e. Xmx value to 4096m in the example below).

```
$ emctl set property -name JAVA_EM_MEM_ARGS -value "-Xms256m -Xmx4096m -
XX:MaxPermSize=768M -XX:+UseConcMarkSweepGC -XX:+UseParNewGC -
XX:+CMSClassUnloadingEnabled -XX:CompileThreshold=8000 -XX:PermSize=128m"
```

To get the property (after changing from the default):
```
$ emctl get property -name "JAVA_EM_MEM_ARGS"
```

To delete the property (revert to original setting):
```
$ emctl delete property -name "JAVA_EM_MEM_ARGS"
```

OMS restart using 'emctl stop oms -all; emctl start oms' is required on each OMS after changing the property value.

oracle.sysman.core.jobs.shortPoolSize

Default value = 25

To set the property:
```
$ emctl set property -name oracle.sysman.core.jobs.shortPoolSize -value 50
```

To get the property (after changing from the default):
```
$ emctl get property -name "oracle.sysman.core.jobs.shortPoolSize"
```

To delete the property (revert to original setting):
```
$ emctl delete property -name "oracle.sysman.core.jobs.shortPoolSize"
```

OMS and Node Manager restart using 'emctl stop oms -all; emctl start oms' is required on each OMS after changing the property value.

oracle.sysman.core.jobs.longPoolSize

Default value = 12

To set the property:
```
$ emctl set property -name oracle.sysman.core.jobs.longPoolSize -value 24
```

To get the property (after changing from the default):
```
$ emctl get property -name "oracle.sysman.core.jobs.longPoolSize"
```

To delete the property (revert to original setting):
```
$ emctl delete property -name "oracle.sysman.core.jobs.longPoolSize"
```

OMS restart using 'emctl stop oms; emctl start oms' is required on each OMS after changing the property value.

oracle.sysman.core.jobs.longSystemPoolSize

Default value = 10

To set the property:
```
$ emctl set property -name oracle.sysman.core.jobs.longSystemPoolSize -value 20
```

To get the property (after changing from the default):
```
$ emctl get property -name "oracle.sysman.core.jobs.longSystemPoolSize"
```

To delete the property (revert to original setting):
```
$ emctl delete property -name "oracle.sysman.core.jobs.longSystemPoolSize"
```

OMS restart using 'emctl stop oms; emctl start oms' is required on each OMS after changing the property value.

oracle.sysman.core.jobs.systemPoolSize

Default value = 25

To set the property:
```
$ emctl set property -name oracle.sysman.core.jobs.systemPoolSize -value 50
```

To get the property (after changing from the default):
```
$ emctl get property -name "oracle.sysman.core.jobs.systemPoolSize"
```

To delete the property (revert to original setting):
```
$ emctl delete property -name "oracle.sysman.core.jobs.systemPoolSize"
```

OMS restart using 'emctl stop oms; emctl start oms' is required on each OMS after changing the property value.

oracle.sysman.core.conn.maxConnForJobWorkers

Default value = 25

To set the property:
```
$ emctl set property -name oracle.sysman.core.conn.maxConnForJobWorkers -value 200
```

To get the property (after changing from the default):
```
$ emctl get property -name "oracle.sysman.core.conn.maxConnForJobWorkers"
```

To delete the property (revert to original setting):
```
$ emctl delete property -name "oracle.sysman.core.conn.maxConnForJobWorkers"
```

OMS restart using 'emctl stop oms; emctl start oms' is required on each OMS after changing the property value.

Djbo.ampool.maxavailablesize and Djbo.recyclethreshold (JAVA_EM_ARGS)

To set the properties:
```
$ emctl set property -name JAVA_EM_ARGS -value "-Djbo.ampool.maxavailablesize=500 -
Djbo.recyclethreshold=500"
```

To get the properties (after changing from the default):
```
$ emctl get property -name "JAVA_EM_ARGS"
```

To delete the properties (revert to original setting):
```
$ emctl delete property -name "JAVA_EM_ARGS"
```

OMS restart using 'emctl stop oms -all; emctl start oms' is required on each OMS after changing the property value.

oracle.sysman.core.omsAgentComm.ping.heartbeatPingRecorderThreads

To set the property:
```
emctl set property -name
oracle.sysman.core.omsAgentComm.ping.heartbeatPingRecorderThreads -value 5
```

To get the property (after changing from the default):
```
emctl get property -name
oracle.sysman.core.omsAgentComm.ping.heartbeatPingRecorderThreads
```

To delete the properties (revert to original setting):
```
emctl delete property -name
oracle.sysman.core.omsAgentComm.ping.heartbeatPingRecorderThreads
```

OMS restart using 'emctl stop oms; emctl start oms' is required on each OMS after changing the property value.

Modifying Database Settings

If you have downloaded the Database Templates for a Preconfigured Repository you can run the appropriate SQL script to adjust the database parameters to the recommended settings. The scripts that you should run are as follows:

SIZE	SCRIPT
SMALL	set_repo_param_11.2.0.3_Database_SQL_for_EM12_1_0_3_Small_deployment.sql
MEDIUM	set_repo_param_11.2.0.3_Database_SQL_for_EM12_1_0_3_Medium_deployment.sql
LARGE	set_repo_param_11.2.0.3_Database_SQL_for_EM12_1_0_3_Large_deployment.sql

Note that the above scripts do not adjust MEMORY_TARGET / SGA_TARGET / PGA_AGGREGATE_TARGET so these parameters must be modified manually.

See the Cloud Control Basic Installation Guide for further details or the Database Templates for a Preconfigured Repository.

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