

# **Oracle® Enterprise Manager Ops Center**

Sizing and Performance Guide

12c Release 2 (12.2.2.0.0)

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# Contents

<b>Preface</b> .....	v
Audience .....	v
Documentation Accessibility .....	v
Related Documents .....	v
Conventions .....	v
<b>1 Introduction to Sizing and Performance</b>	
<b>About Oracle Enterprise Manager Ops Center</b> .....	1-1
<b>Product Design and Resource Utilization</b> .....	1-1
<b>Architecture</b> .....	1-2
Knowledge Base and Package Repository .....	1-3
Enterprise Controller .....	1-3
Proxy Controller .....	1-4
Agent Controllers .....	1-4
<b>Product Design</b> .....	1-5
Enterprise Manager Ops Center’s State Machine .....	1-5
Ops Center’s Job Management System .....	1-6
<b>High Availability</b> .....	1-6
<b>Related Resources for Product Architecture</b> .....	1-6
<b>2 Resource Utilization</b>	
<b>Use Patterns</b> .....	2-1
<b>Use Pattern Categories</b> .....	2-1
Hardware Management .....	2-2
Hardware and OS Provisioning .....	2-2
Hardware, OS, and Update Management .....	2-2
Hardware and OS Virtualization .....	2-2
All Management Features .....	2-2
<b>Related Resources for Resource Utilization</b> .....	2-3
<b>3 Scaling and Performance Guidelines</b>	
<b>Introduction to Scaling and Performance</b> .....	3-1
<b>Enterprise Controller Considerations and Requirements</b> .....	3-2
<b>Proxy Controller Considerations</b> .....	3-3
<b>Virtualization Controller Considerations</b> .....	3-4

<b>Management Repository Considerations</b> .....	3-4
Embedded Database .....	3-5
Customer-Managed Database .....	3-6
<b>Network Considerations</b> .....	3-6
<b>Disk Considerations</b> .....	3-6
<b>Determine the Number of Asset Access Points</b> .....	3-7
Viewing the Access Point Count for Your Environment .....	3-8
Viewing the Access Point List for Each Proxy Controller.....	3-8
Viewing the Access Point Types for Each Proxy Controller.....	3-9
Viewing All Access Point Data .....	3-9
<b>Related Resources for Scaling</b> .....	3-10

## 4 Reference Systems

Enterprise Controller .....	4-1
Proxy Controller.....	4-2
Virtual Resources Provided to the Virtual Domain .....	4-2

## A Report Service Configuration Properties

Default Retention Periods .....	A-1
Edit Report Service Properties .....	A-1
Disable the Report Service .....	A-3

## Index

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# Preface

The *Oracle Enterprise Manager Ops Center Sizing and Performance Guide* provides sizing and deployment considerations to optimize Oracle Enterprise Manager Ops Center performance.

## Audience

This document is intended for all administration users of Oracle Enterprise Manager Ops Center 12c Release 2 (12.2.2.0.0) software.

## Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

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## Related Documents

For more information, see the Oracle Enterprise Manager Ops Center Documentation Library at [http://docs.oracle.com/cd/E40871\\_01/index.htm](http://docs.oracle.com/cd/E40871_01/index.htm).

Oracle Enterprise Manager Ops Center provides online Help. Click Help at the top-right corner of any page in the user interface to display the online help window.

For the latest releases of these and other Oracle documentation, check the Oracle Technology Network at:

<http://www.oracle.com/technetwork/documentation/index.html#em>

## Conventions

The following text conventions are used in this document:

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Convention	Meaning
<i>italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.

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<b>Convention</b>	<b>Meaning</b>
monospace	Monospace type indicates commands within a paragraph, code in examples, text that appears on the screen, or text that you enter.

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# Introduction to Sizing and Performance

This document provides an overview of the Oracle Enterprise Manager Ops Center software product design and includes what to consider when planning to deploy the software. It provides guidelines on how to effectively size an Oracle Enterprise Manager Ops Center environment, how to configure a scalable deployment for your datacenter and optimize performance.

The following topics are covered in this document:

- [Resource Utilization](#)
- [Scaling and Performance Guidelines](#)
- [Reference Systems](#)

## About Oracle Enterprise Manager Ops Center

Oracle Enterprise Manager Ops Center provides a converged management solution for Oracle servers, storage, Oracle Solaris and Linux operating systems, zones, and Oracle VM Server for SPARC virtualization.

The software provides system administrators with a comprehensive solution including change and configuration management, firmware and OS patching, bare metal and VM provisioning, hardware telemetry (“phone home”), performance management, integrated diagnostics, and automatic tuning.

This chapter contains the following topics:

- [Product Design and Resource Utilization](#)
- [Architecture](#)
- [Product Design](#)
- [High Availability](#)
- [Related Resources for Product Architecture](#)

## Product Design and Resource Utilization

Oracle Enterprise Manager Ops Center is designed to scale from small installations up through large installations. To scale, you must deploy key components of the product architecture appropriately to meet the requirements. You should be familiar with the following key components:

- **Browser user interface.** Ops Center provides a rich interface inside a browser. The user interface heavily leverages JavaScript and AJAX technology to provide a highly dynamic and asynchronously updating user view.

- **Enterprise Controller.** The Enterprise Controller is the core component of Ops Center, it provides a centralized place where management information is stored and from which operations are initiated. The browser user interface connects into a standard API that the Enterprise Controller provides.
- **A Management Repository.** The management repository is based on an Oracle Enterprise Edition Database and provides a permanent storage location for all management data used by the Enterprise Controller. In this release the management repository can either be co-located in the same operating system instance as the Enterprise Controller or deployed onto an external database server.
- **Proxy Controller.** The Proxy Controller is designed to be distributed throughout the networks. It provides proxy capabilities for operations that must be logically located close to the targets due to network considerations, such as OS provisioning activities. It also provides a fan out for minimizing network load, proxy load balancing, and failover. Using this technology, you can configure proxies to see the same assets and can load balance traffic and provide a failover model between proxies.
- **Agent Controllers.** Agent Controllers provide monitoring and update capabilities for the host operating system. Specialized agents support basic and virtualization control virtualization technology. When an asset is agent-managed, the agent gathers information for the Enterprise Controller. The VC Agent Controller is for virtualization technology, such as zones and logical domains. This agent manages the logical domains that run on the Control Domain and the zones that run on the logical domains.

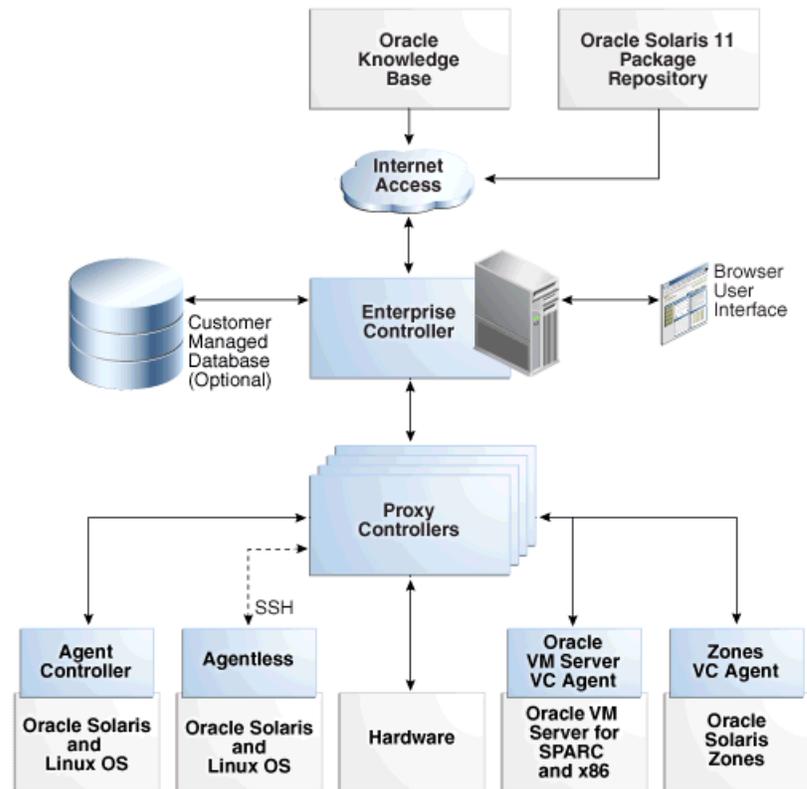
You have the option to not install an agent on a host, referred to as agentlessly managed. The management functionality is limited without the agent.

## Architecture

Oracle Enterprise Manager Ops Center is designed to provide increased scalability, high availability and optimized performance in large, distributed data centers. The architecture is scaled as your organization grows. The Enterprise Controller, Proxy Controllers, Agent Controllers, and user interface are the major architectural components. They are supported by the Knowledge Base, which is hosted by Oracle and accessed through the Internet. This architecture lets you customize your deployment for the size and network topology of your organization by varying the placement of the Proxy Controllers and use of Agent Controllers.

Oracle Enterprise Manager Ops Center, downloads information from the [Knowledge Base and Package Repository](#) to the [Enterprise Controller](#), which stores the information along with basic management tools, such as the profiles and plans. At least one [Proxy Controller](#) distributes the Enterprise Controller's work. Secure network connections between all components transfer control commands and data. For operating systems, [Agent Controllers](#) provide update capabilities, management and monitoring, and control of virtualization environments. Agent Controllers are required for Oracle Solaris 9 and 10 and Linux catalogs. Oracle Solaris 9 and Oracle Solaris 10 boot environment management also requires an agent-managed operating system.

[Figure 1–1](#) shows the relationship between the browser console, Enterprise Controller, Proxy Controller, and multiple Agent Controllers. The *Oracle Enterprise Manager Ops Center Ports and Protocols Guide* provides details on the communication direction, protocol and port, and the purpose for each level of communication.

**Figure 1–1 Oracle Enterprise Manager Ops Center Architecture**

## Knowledge Base and Package Repository

The Knowledge Base and Oracle Solaris 11 Package Repository store metadata about Oracle Solaris and Oracle Linux operating system components. The metadata includes patch dependencies, standard patch compatibilities, withdrawn patches, and rules for download and deployment.

Oracle Enterprise Manager Ops Center is configured to connect to Oracle Corporation sites for updated metadata for operating systems. However, you can configure the product software without a direct connection to these sites.

## Enterprise Controller

The Enterprise Controller is the central server for Oracle Enterprise Manager Ops Center. All operations, or jobs, are initiated from the Enterprise Controller. The Enterprise Controller manages firmware and operating system images, plans, profiles, and policies. The Enterprise Controller relies on a database of asset data and site customizations. The database is a local embedded database or a remote customer-managed Oracle Enterprise Edition database that is accessible on the network to the Enterprise Controller. Include the Enterprise Controller in an active-standby High Availability configuration to increase the availability of the Oracle Enterprise Manager Ops Center software.

The Enterprise Controller connects to the Internet to get access to contract information, to create service requests, and to download updates, Oracle Solaris images, and updates to the product software itself. When an update is requested, the Enterprise Controller retrieves the software from the Knowledge Base, package repository, or vendor. This default mode of operation is called Connected mode.

If your site policy does not permit an Internet connection, you can operate the software in Disconnected mode. In this mode, you must load and maintain the Knowledge Base and package repository data and updates in the Enterprise Controller. For Oracle Solaris and Oracle Linux operating systems, Oracle Enterprise Manager Ops Center provides a script that you run on a system that is connected to the Internet to retrieve the contents of Oracle's Knowledge Base or Oracle Solaris 11 Package Repository and then you upload the baselines and updates to the Enterprise Controller.

## Proxy Controller

Proxy Controllers distribute the operation load and provide fan-out capabilities to minimize network load. The Proxy Controller can also be used to provide a network presence behind a firewall or to provide access to a private network. A Proxy Controller links the managed assets to the Enterprise Controller and performs operations that must be located close to the managed assets, such as operating system provisioning. Proxy Controller performs management operations on assets and reports the results to the Enterprise Controller. The actions required to manage, provision, and update assets are handled as a queue of jobs.

You must have at least one Proxy Controller. When you install the Enterprise Controller, a Proxy Controller is automatically installed on the same system. To enhance performance and scalability, the preferred method is to install the Proxy Controllers on separate machines.

Most sites benefit from using multiple Proxy Controllers. The following are some reasons for using multiple Proxy Controllers:

- Some assets are in remote locations and you want to maintain performance.
- You anticipate creating multiple jobs to run concurrently.
- Some assets are behind a firewall and need their own Proxy Controller.
- To provision Oracle Solaris 10 or Linux with ISO boot, you will need a local Proxy Controller. To provision Oracle Solaris 11 SPARC or Oracle Solaris 10 SPARC with Solaris Flash archive, you can use WAN boot to provision the operating system on a wide area network.
- You can designate a Proxy Controller for the Management Network and another Proxy Controller for the Data Network.

## Agent Controllers

Physical and virtual Oracle Solaris and Oracle Linux operating systems require agent software to perform many functions, such as creating update reports, creating and using system catalogs, and managing Oracle Solaris 9, 10 and 11 boot environments. Some monitoring and Analytics data also require an agent-managed operating system. However, you can use many of the monitoring and management features without installing an Agent Controller on the operating system.

The Agent Controller is a lightweight Java software that identifies the asset and responds to Proxy Controller. When an operating system is agent-managed, the agent receives the command from its Proxy Controller, performs the required action, and notifies the Proxy Controller of the results. When an operating system is agentlessly managed, the Proxy Controller uses SSH (Secure Shell protocol) to perform tasks and to monitor the operating system. You can change the method of managing an operating system asset.

Hardware management does not require the Agent Controller. Instead, a Proxy Controller runs commands on the hardware system and reports the results to the Enterprise Controller.

## Product Design

To fully understand the best approach to a deployment, it is important to understand how the product uses resources and under what use conditions.

Ops Center provides such a wide range of potential use cases that it is difficult to provide an accurate and simple answer about how far a particular product deployment can scale.

Ops Center is designed around two key design models:

1. A distributed state machine. Maintains the information about all of the managed assets and what can be done to the assets under Enterprise Manager Ops Center's control. This state machine is incremented by discovering new assets, adding new services or metrics to the machine or creating new logical groups of assets. The state machine size is decreased by deleting assets. Each modification of a variable, for example a CPU utilization measure, causes a change in the state machine.
2. An asynchronous job dispatch system. All actions that are requested through the Ops Center console are dispatched asynchronously through the system. The job system has a throttle that prevents the overloading of the system and manages queues of pending jobs.

## Enterprise Manager Ops Center's State Machine

Enterprise Manager Ops Center's state machine is maintained in a combination of memory and database. As the managed environment of assets increase, so will the resource utilization (mostly in terms of memory required) of the system.

The diagram above shows a simple deployment of Enterprise Manager Ops Center. Each component of Enterprise Manager Ops Center manages part of the state machine. A basic Agent will add the asset information for the operating system being managed and insert all of the relevant metrics, data, and operations that are supported as part of a discovery action. This part of the state machine is then pushed up to the Proxy Controller, which manages the part of the state machine for all of the assets it is managing and ultimately up to the Enterprise Controller, which can see the entire state machine.

The state machine imparts the highest load on the managed systems during discovery actions. Every part of the system is involved, beginning with the initial location of the asset by way of network requests to the addition of the asset into the state machine, through to the propagation and automated correlation of the new asset in the Enterprise Controller.

Steady state operation of the state machine involves the changing of metrics on the assets themselves. For example, an operating system's asset will have metrics showing network I/O utilization; these are sampled periodically by the Agent from the operating system and updated into the state machine on the Agent. The Agent caches to the state machine, per policy updates, and then sends the updates up to the Proxy Controller. The Proxy Controller follows a similar process up to the Enterprise Controller. The network load in steady state is very low because only changes to metrics are sent and connection management caching is in place to reduce the SSL handshake overhead between the tiers.

The browser user interface reflects a view of the state machine. Assets and their relationships as they exist in the state machine are displayed in the navigation panels, details of the assets are displayed in the center panels and actions associated with the assets are displayed in the Action panel. The Enterprise Controller manages the translation of data from the state machine into a form the browser can display. Viewing different assets or asset groups can place a processing load on the Enterprise Controller. Each user performing these actions in parallel will increase the processing load on the Enterprise Controller. In addition, a small amount of memory is dedicated to each user session.

## Ops Center's Job Management System

The job management system performs actions that are requested by the user. The job management system is completely asynchronous and active jobs are capped and queued to manage resource utilization by the entire Ops Center system. Depending on the particular action, job actions can run on the agent, the Proxy Controller, or the Enterprise Controller, or a combination of all three. For example, an OS provisioning job is managed from the Proxy Controller that is managing the system that is the target of the action. The Proxy Controller will run the majority of the processes during such an action and will impart the majority of the CPU load that is used during such an action.

The Agent Controller on the hosting operating system executes the software patch install on the operating system. The agent performs all of the requests required to fulfill the required action and imparts a minor CPU load on the host through job completion.

## High Availability

The design for a High Availability (HA) architecture must consider all single points of failure, such as power, storage, and network connectivity in addition to the software. See the *Oracle Enterprise Manager Ops Center Administration Guide* for configuration options for high availability.

## Related Resources for Product Architecture

For more information about managing an Enterprise Controller HA configuration, see the *Oracle Enterprise Manager Ops Center Administration Guide*.

For more information about the ports, see the *Oracle Enterprise Manager Ops Center Ports and Protocols Guide*.

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## Resource Utilization

This chapter describes how different use patterns affect resource utilization.

- [Use Patterns](#)
- [Use Pattern Categories](#)
- [Related Resources for Resource Utilization](#)

### Use Patterns

Enterprise Manager Ops Center is designed to support an increasing number of administration and management actions. Each type of action and management analysis impacts resource utilization on the underlying systems that support the Enterprise Manager Ops Center deployment. The management features that are used throughout a deployment will greatly affect the resource utilization and the demands of Enterprise Manager Ops Center on its host systems. It is therefore critical to understand the types of management activities to be conducted by Enterprise Manager Ops Center, as this will greatly affect the number of assets a deployment can manage.

Which services are enabled is often related to the Enterprise Manager Ops Center deployment model. For example, deploying an Agent to an Oracle Solaris 10 OS system will automatically enable virtualization management for Oracle Solaris Zones, which in turn increases the size of the state machine for that particular managed asset.

### Use Pattern Categories

To simplify deployment, the following five use patterns are identified and compared:

- [Hardware Management](#): Management of server and chassis hardware through Enterprise Manager Ops Center.
- [Hardware and OS Provisioning](#): Management of server and chassis hardware and the ability to provision operating systems to the managed hardware.
- [Hardware, OS, and Update Management](#): Management of hardware, operating systems and deploying software updates to the operating systems.
- [Hardware and OS Virtualization](#): Management of hardware, operating systems, and virtualization features of Oracle Solaris 10 and 11.
- [All Management Features](#)

## Hardware Management

Hardware management is performed from the Proxy Controller through the systems management Ethernet port on the servers or chassis. In this mode the majority of the utilization occurs at the proxy, which is responsible for performing initial discovery of the hardware and subsequent polling of the hardware for status and configuration changes.

Network sessions are initiated directly from the Proxy Controller to the hardware using specific server and chassis-type protocols that include, IPMI, SSH and SNMP.

Hardware management has a relatively low resource impact on the Enterprise Manager Ops Center host OS. The largest impact is on the network traffic emanating from the Proxy Controller to the target servers and the Proxy Controllers should be scaled appropriately.

## Hardware and OS Provisioning

Agents are not deployed for OS provisioning or pure hardware management, as no operating systems are being managed. OS provisioning is an action taken on managed servers and is executed primarily from the Enterprise Manager Ops Center Proxy Controller. The number of OS provisioning jobs that can occur in parallel is metered by the job management system, but OS provisioning does impart a greater load on the infrastructure.

## Hardware, OS, and Update Management

This mode applies to Oracle Solaris 8, Oracle Solaris 9, and Linux-managed operating systems. Oracle Solaris 10 and 11 operating systems implicitly enable virtualization management. In this use pattern, Agents are deployed to the managed operating systems and update / software provisioning jobs can be completed. This increases the size of the state machine, as operating systems and their configuration are modeled and made available to the update and monitoring capabilities of Enterprise Manager Ops Center.

## Hardware and OS Virtualization

Oracle Solaris 10 and 11 Management adds in sophisticated virtualization management for Oracle Solaris Zones and Oracle VM Server for SPARC. Managing these virtualization features involves exposing significantly greater operating system configuration and metrics to the state machine. This will increase the memory utilization at the Enterprise and Proxy Controller tiers. Oracle VM Manager for x86 requires the deployment of an Oracle VM Server x86 management environment. This does not add as much load as the Oracle Solaris technologies as the Oracle VM management infrastructure is managing much of the scale load.

## All Management Features

Using all management features of Enterprise Manager Ops Center will place the largest resource utilization burden on Enterprise Manager Ops Center's host infrastructure. It is recommended that you only configure and use the co-located Proxy Controller for small installations or test environments. For any moderate sized or larger production environment, deploy one or more remote Proxy Controllers.

## Related Resources for Resource Utilization

Our documentation library includes installation guides, an administration guide, reference materials, and examples to guide you through Oracle Enterprise Manager Ops Center. The documentation library is located at [http://docs.oracle.com/cd/E40871\\_01/index.htm](http://docs.oracle.com/cd/E40871_01/index.htm)

For additional details about features, see the *Oracle Enterprise Manager Ops Center Feature Reference Guide*. For workflows and end-to-end examples about how to use the software to perform an operation, see the [Deploy How Tos](#) tab and the [Operate How Tos](#) tab in the library. The *Oracle Enterprise Manager Ops Center Command Line Interface Guide* contains information about the command-line interface.



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## Scaling and Performance Guidelines

Many factors can affect the resources used by Oracle Enterprise Manager Ops Center, and ultimately its ability to scale to manage large deployments.

The following topics are covered:

- [Introduction to Scaling and Performance](#)
- [Enterprise Controller Considerations and Requirements](#)
- [Proxy Controller Considerations](#)
- [Management Repository Considerations](#)
- [Network Considerations](#)
- [Determine the Number of Asset Access Points](#)

### Introduction to Scaling and Performance

You can scale Oracle Enterprise Manager Ops Center to accommodate a variety of environments. However, the size and layout of your environment can effect the number of Enterprise Controllers and Proxy Controllers that you require. The scaling guidelines provided here are based on the use of an external repository and are minimum required parameters.

For sizing purposes, the following are defined as assets:

- Servers, including the service processor and operating system
- Switches
- Storage devices
- Non-global zones
- Logical domains
- Chassis
- Oracle SPARC Enterprise M-Series chassis
- Oracle SPARC Enterprise M-Series domains
- Oracle Exadata Storage Server X2-2 cells

See [Determine the Number of Asset Access Points](#) for how to run a script on the Enterprise Controller to determine the number and type of assets on each Proxy Controller and the total number of assets on the Enterprise Controller.

## Enterprise Controller Considerations and Requirements

Consider the following factors when selecting a platform for the Enterprise Controller:

- **System:** The Enterprise Controller has many parallel executing processes and a multi-core system will significantly improve performance. There are some processes that are by their nature single threaded and benefit from higher clock speed. It is recommended to choose a process that is both multi-core and has a high single thread CPU speed.

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**Note:** Do not install the Enterprise Controller on a hardened system. The installation will complete successfully, but you will encounter several issues when you use the software.

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- **Memory:** The core JVM machine consumes memory and its resource utilization will increase with the number of assets being managed. If the Java virtual machine is forced into virtual memory, then Enterprise Manager Ops Center performance will reduce significantly.
- **Database:** A database is present in Ops Center and a high performing disk I/O is important in the implementation. Generally, disk striping or the use of a well configured high performing file system with such features built in, such as ZFS, is highly recommended. See [Management Repository Considerations](#) for information on database sizing.
- **Operating system:** While not a scaling issue, the system must be running on a version of Oracle Solaris 11 if you plan on using Oracle Enterprise Manager Ops Center to manage Oracle Solaris 11 Operating Systems or virtualized environments, or if you plan on discovering and managing Oracle SuperCluster and other Oracle engineered systems. Because Oracle SuperCluster uses Oracle Solaris 11, you must install your Enterprise Controller on Oracle Solaris 11 if you plan to manage Oracle SuperCluster.

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**Note:** It is recommended that you use Oracle Solaris 11.2.

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- **Network:** Start-up times of the Enterprise Controller can be minimized by ensuring that the network link to the repository is as low latency as possible. The start-up process involves a large number of queries as the state machine is being built. It is recommended that a 10 GigE connection be available between the Enterprise Controller and Management Repository.

For a remote customer-managed database, set up the network according to the Oracle database networking setup defined in the Oracle Server Installation Guide. See the Oracle Database Enterprise Edition documentation at <http://www.oracle.com/technetwork/database/enterprise-edition/documentation/index.html> for detailed database requirements. See [Management Repository Considerations](#) for more information on database considerations.

An Enterprise Controller can manage up to 3,000 mixed assets including hardware, operating systems, virtualization technologies, and other assets. Deployments above 1,000 assets might require you to tune your Java Virtual Machine (JVM) heap size.

An Enterprise Controller system must meet the following minimum requirements:

- Oracle SPARC or x86 platform that is running a supported Oracle Solaris or Linux OS, such as Oracle Solaris 11

- 87 GB of disk space
- Swap space
  - Embedded (Ops Center local) database: determined by the amount of RAM (maximum 16 GB of swap space is required)
    - If RAM is between 8 GB and 16 GB, then match RAM
    - 16 GB for RAM greater than 16 GB, then use .75 times RAM
  - Customer-managed (remote) database: 6 GB Swap Space
- 8 GB of Java Heap Size, as indicated by the java flag -Xmx

## Proxy Controller Considerations

Consider the following factors when selecting a platform and environment for the Proxy Controller:

- **Operating system:** To provision and update Oracle Solaris 11 operating systems, the Enterprise Controller and Proxy Controller must be installed on at least Oracle Solaris 11.1 operating system.
- **Global or non-global zone:** If the assets being managed are Oracle Solaris 11, you can configure the Proxy Controllers in a global or non-global zone. Otherwise, install the Proxy Controllers in global zones. A Proxy Controller includes the capability to perform OS provisioning, which is not supported by Oracle Solaris 10 non-global zones.
- **Network I/O:** If the Proxy Controller is supporting Operating System provisioning then it is recommended that the Proxy Controller should be utilizing GigE network cards or higher.

Consider installing additional Proxy Controllers, beyond the minimum requirements, in environments with the following characteristics:

- **Remote datacenters:** If some of your assets are in a remote location, installing a Proxy Controller in that location can reduce network latency and cache Oracle Enterprise Manager Ops Center content closer to the assets.
- **Deployment through firewalls:** If you have firewalls between your Enterprise Controller and some managed assets, having a Proxy Controller near the assets can simplify deployment and management.
- **High Availability:** Installing additional Proxy Controllers gives you the ability to migrate assets between Proxy Controllers for maintenance or if a Proxy Controller fails.
- **Virtualization:** If you intend to manage virtualization technologies like Oracle VM Servers for SPARC, additional Proxy Controllers help handle the added asset and job load.

The software is supported on a wide variety of hardware, operating systems, and virtualization technologies. See the *Oracle Enterprise Manager Ops Center Certified Systems Matrix* for a list of certified systems.

Each Proxy Controller can manage up to 450 assets for a basic environment and up to 350 assets for a more complex environment. Installing additional Proxy Controllers beyond the requirements is beneficial in some environments.

A Proxy Controller system must meet the following minimum requirements:

- Oracle SPARC or x86 platform that is running a supported Oracle Solaris or Linux OS, such as Oracle Solaris 11
- 1.5 GB of disk space
- 6 GB Swap space
- 2 GB Java Heap size, defined by -Xmx in the java-flags

It is generally recommended that you use proxy fan out as it makes sense in the network to be deployed. For example, OS provisioning capabilities are often restricted to a network subnet.

Changing the resource configuration of the system will affect the numbers, as will more complex mixing of the services across the deployment.

## Virtualization Controller Considerations

An agent on an Oracle Solaris Zone Virtualization Controller installed on a system with one (1) processor and 128 GB of memory can manage with a good level of performance:

- 50 non-global zones with one (1) filesystem configured on each non-global zone.
- 15 non-global zones with 20 filesystems configured on each non-global zone.

An agent on an Oracle VM Server for SPARC Virtualization Controller installed on a system with one (1) processor and 128 GB of memory can manage, with a good level of performance, 20 logical domains with 25 disks (LUNs) configured on each domain.

For both configurations described above, the agent deployment time will take less than one hour and the restart time will be about 15 minutes. The CPU consumption of the agent should not exceed 5 percent.

## Management Repository Considerations

Oracle Enterprise Manager Ops Center stores product data in an Oracle Database Enterprise Edition database. This database can be an embedded database installed on the same system as the Enterprise Controller, or a customer-managed database that is accessible to the Enterprise Controller system. Run the OCDoctor to check for basic database requirements.

A backup feature enables you to back up your environment. The backup feature supports an embedded or customer-managed database. If you are using a customer-managed database, you can also back up the database schema using the existing backup and recovery processes implemented by your database administrator.

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**Note:** If you plan to implement high availability for the Enterprise Controller, you must use a customer-managed database.

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Use the following sizing guidelines to estimate the maximum size of the database based upon the number of assets managed:

- Operational Data: 74 megabytes (MB) per asset.
- Reporting Data: 166 MB per asset. Steady state is reached at 180 days when using the default rollup schedule. USERS tablespace (Reporting) is required when report attributes are enabled. Use one of the following methods to change the size of the reporting data:

- Customize the amount of attributes shown in the Enterprise Controller.
  - Stop the report service, which will stop generating report data in the database.
- See [Appendix A](#) for more information about the report service.
- UCE Data: 4 gigabytes (GB) needed for 10 channels. 12 GB additional for disconnected mode. You will generally need 400 megabits (Mb) for each additional channel. In some cases, you might need up to 600 Mb for a channel.
- Oracle Solaris and Linux operating system updates and provisioning use UCE data. A **channel**, or **UCE channel**, is a supported Oracle Solaris or Linux operating system distribution, such as an Oracle Solaris 10 on a SPARC platform.
- Schema Backups: Each backup dump requires 40% of Enterprise Manager Ops Center Schema Size on the database server in the OC\_DUMP\_DIR directory location.
    - Embedded, or Ops Center Local, database: A maximum of seven (7) copies of the backup are kept online.
    - Customer managed database: The database administrator must manage the Oracle Enterprise Manager Ops Center dump directory backup content.
  - Archival: An embedded database does not run in archive mode. For a remote database running in archive mode, the size of the archive is set according to the redo logs size.

[Table 3–1](#) shows the estimated database size for when 1000 assets and 100 assets are managed and 10 UCE channels are configured in connected mode.

**Table 3–1** *Estimated Database Size*

Use Pattern	Size for 1000 Assets (MB)	Size for 100 Assets (MB)
SYSTEM tablespace	1000	1000
UNDO tablespace	2750	275
SYSAUX	1200	1200
USERS tablespace (Operational)	100000 (100 GB)	10000 (10 GB)
USERS tablespace (Reporting)	230000 (230 GB)	23000 (23 GB)
USERS tablespace (UCE)	4000	4000
TEMP	2000	200
TOTAL DB Size	340950	39675
Spaced Reserved for Backups	954660	103600

The database size also depends on your retention policy of gathered data. The default retention is 180 days for a 24 hour sample.

## Embedded Database

When using an embedded (Ops Center local) database, the Enterprise Controller system must meet the requirements for an Oracle Database Enterprise Edition installation. You can improve the embedded database performance by using the following configuration:

- Use the ZFS filesystem as your underlying database
- Set the redo log files to a block size of 8K

- Set the `logbias=throughput`

Separating the redo logs onto a separate zpool (a different underlying disk) will further improve the embedded database performance.

Dynamic Intimate Shared Memory (DISM) allows a database to dynamically extend or reduce the size of the shared data segment. The embedded database is configured to use a maximum of 8 GB RAM using DISM (TOTALMEMORY in the response file.)

See the *Oracle Enterprise Manager Ops Center Installation Guide for Oracle Solaris Operating System Guide* or the *Oracle Enterprise Manager Ops Center Installation Guide for Linux Operating Systems Guide* for information about local database requirements.

## Customer-Managed Database

A customer-managed (remote) database system must use a supported Oracle Database version. See the *Oracle Enterprise Manager Ops Center Certified Systems Matrix* for a list of supported database versions. For a reference supported DB versions are documented in Certified Systems.

The network connection to the remote database should have a low latency.

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**Note:** If you are implementing high availability, the remote database system must be accessible for all of the Enterprise Controller nodes.

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The recommended database memory size is 8 GB.

The following are the minimum initialization parameters to use when you create the database:

- `open_cursors=1000`
- `pga_aggregate_target=0`
- `processes=500`
- `recyclebin=OFF`
- `sga_target=0`

See the Oracle Database Enterprise Edition documentation at <http://www.oracle.com/technetwork/database/enterprise-edition/documentation/index.html> for detailed database requirements.

## Network Considerations

When using a remote database, the network connection to the remote database should have a low latency.

For Ethernet connectivity, it is recommended that the network you are planning to use to conduct OS provisioning across be 1/10GB capable.

If your site uses VLAN, a best practice is to create a separate VLAN for management networks.

## Disk Considerations

In a mirror setup, you need two (2) disks with following minimum disk space:

- In the active and running boot environment:

- /var: 85GB for the Enterprise Controller and Proxy Controller run time
- /: 30GB for the Enterprise Controller and Proxy Controller install and data
- Enterprise Controller Libraries
  - 15 GB for the EC library
  - 45 GB for the Oracle Solaris 11 Software Update Library
  - 5 GB per channel for the Linux, Solaris 8-10 Software Update Library

- Database

See [Table 3–1](#) for database sizing. The following is an example estimated database size for 400 assets: 160 GB for the database plus 400 GB reserved for backups

Sufficient storage disk space is critical in optimizing performance.

The following configurations are applicable for a SPARC platform:

- The OS disk configuration is on a Fibre Channel hardware RAID.
- The Oracle Enterprise Manager Ops Center data is on a Fibre Channel hardware RAID.

The following are recommended disk configurations:

- Place the /var/opt/sun/xvm directory on a different set of disk spindles from the operating system. Do not co-mingle with the OS.
- Use at least 4 spindles in the hardware RAID cache configuration.
- Place the OS on multiple spindles with hardware RAID cache. If the hardware does not allow this with internal drives, then boot from SAN

The Proxy Controller software is considered relatively lightweight and, in all but the extreme scale cases, does not require a dedicated system.

The following configurations are applicable for SPARC platforms:

- The OS disk configuration is on a Fibre Channel hardware RAID.
- The Oracle Enterprise Manager Ops Center data is on a Fibre Channel hardware RAID.

## Determine the Number of Asset Access Points

An access point is a connection between a managed asset and the Enterprise Controller through a Proxy Controller. The number of access points for the Enterprise Controller and for each Proxy Controller provides more accurate scaling information than the number of assets.

A single managed asset can have one or more access points, depending on how many Proxy Controllers are managing it. For example, if an Oracle VM Server for SPARC control domain's operating system is managed by one Proxy Controller while a hosted logical domain's operating system is managed by another Proxy Controller, the Enterprise Controller has two access points for that asset.

The OCDoctor utility includes a script, `AssetCount.sh`, that you can run on the Enterprise Controller to get the current access point count for the Enterprise Controller and each Proxy Controller, including a breakdown of the type of assets on each Proxy Controller.

When the OCDoctor utility is run with the `--troubleshoot` option, it performs an access point count. If the results of this count indicate that the Enterprise Controller or

Proxy Controllers are approaching or beyond the maximum recommended number of assets, the output will include a warning.

When you run the `./OCDoctor.sh --collectlogs` command on the Enterprise Controller, the current access point count is included in the output. The current access point count can be useful when troubleshooting an issue.

The following methods can be used to view the access point count:

- [Viewing the Access Point Count for Your Environment](#)
- [Viewing the Access Point List for Each Proxy Controller](#)
- [Viewing the Access Point Types for Each Proxy Controller](#)
- [Viewing All Access Point Data](#)

## Viewing the Access Point Count for Your Environment

You can view the total number of access points managed by the Enterprise Controller, as well as a categorized count of the access points managed by each Proxy Controller. Run the following command on the Enterprise Controller:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh standard
```

For example:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh standard
EC 72
Proxy Assets Zones Ldoms OVMGuests Servers Storages Switches ExadataCells MSeriesChassis MSeriesD
-----
pc4 32 5 25 0 2 0 0 0 0 0
pc1 28 0 26 0 2 0 0 0 0 0
pc0 12 2 4 0 6 0 0 0 0 0
Use option '-v' to see additional notes on the counting algorithm.
```

## Viewing the Access Point List for Each Proxy Controller

You can view a list of the access points of each type that are managed by each Proxy Controller. The output first provides the total number of access points on the Enterprise Controller, then for each Proxy Controller provides the total number of access points, the number of access points of each type, and the user-friendly name for each asset.

The output for this command can be very long in a large environment.

Run the following command on the Enterprise Controller:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh machine
```

For example:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh machine
EC 72
Proxy 32 pc4
Zones 5 S11zone101 S11zone102 S11zone100 S11zone103 S11zone104
Ldoms 25 stdldom21 stdldom34 stdldom36 stdldom22 stdldom45 stdldom47 ...
OVMGuests 0
Servers 2 10.187.70.169 pc4
...
Proxy 28 pc1
Zones 0
Ldoms 26 stdldom21 stdldom34 stdldom36 stdldom22 stdldom45 stdldom47 ...
OVMGuests 0
```

```
Servers 2 10.187.70.171 pc1
```

## Viewing the Access Point Types for Each Proxy Controller

You can view a count of the access points for each Proxy Controller in three categories: Agent Controllers, Agentless assets, and service processors.

Run the following command on the Enterprise Controller:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh agent
```

For example:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh agent
EC 72
Proxy Agents Agentless SPs
-----
pc4  25    2    0
pc1  1     1    0
pc0  5     5    5
Use option '-v' to see additional notes on the counting algorithm.
```

## Viewing All Access Point Data

You can view all access point data, including the results of the standard, machine, and agent options.

Run the following command on the Enterprise Controller:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh all
```

For example:

```
# /var/opt/sun/xvm/OCDoctor/toolbox/AssetCount.sh all
EC 72
Proxy Assets Zones Ldoms OVMGuests Servers Storages Switches ExadataCells MSeriesChassis MSeriesD
-----
pc4  32    5    25    0        2        0        0        0            0            0
pc1  28    0    26    0        2        0        0        0            0            0
pc0  12    2     4     0        6        0        0        0            0            0
```

```
Proxy Agents Agentless SPs
-----
```

```
pc4  25    2    0
pc1  1     1    0
pc0  5     5    5
```

```
Proxy 32 pc4
Zones 5 S11zone101 S11zone102 S11zone100 S11zone103 S11zone104
Ldoms 25 stdldom21 stdldom34 stdldom36 stdldom22 stdldom45 stdldom47 ...
OVMGuests 0
Servers 2 10.187.70.169 pc4
...
Proxy 28 pc1
Zones 0
Ldoms 26 stdldom21 stdldom34 stdldom36 stdldom22 stdldom45 stdldom47 ...
OVMGuests 0
Servers 2 10.187.70.171 pc1
```

Use option '-v' to see additional notes on the counting algorithm.

## Related Resources for Scaling

See the Oracle Enterprise Manager Ops Center Installation Guides in the documentation library, which is located at [http://docs.oracle.com/cd/E40871\\_01/index.htm](http://docs.oracle.com/cd/E40871_01/index.htm).

See the *Oracle Enterprise Manager Ops Center Administration Guide* for more information about the OCDoctor, including tuning and troubleshooting options.

OCDoctor will print a WARNING if the Asset Count of an EC or Proxy is reaching the maximum recommended value, or is even beyond it

See the *Oracle Enterprise Manager Ops Center Certified Systems Matrix* for a list of supported Oracle Database versions.

See the Oracle Database Enterprise Edition documentation at <http://www.oracle.com/technetwork/database/enterprise-edition/documentation/index.html> for detailed database requirements.

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## Reference Systems

Scalability figures are based on systems that run an Oracle Solaris 11.2 operating system. Memory access is affected by DIMM count and placement, therefore these configurations include the maximum number of DIMMs of lowest density available to achieve the best possible memory access times.

Any departure from the stated specifications might have a measurable effect on the overall performance and scalability of the reference configurations.

The following reference information is included:

- [Enterprise Controller](#)
- [Proxy Controller](#)
- [Virtual Resources Provided to the Virtual Domain](#)

### Enterprise Controller

The following are the reference system specifications for the Enterprise Controller to support up to 3,000 assets:

- CPU count: 8 virtual processors (as seen by `psrinfo -pv`)
- CPU speed: 2.6Ghz (or above)
- Disk: 87 GB
- Swap: 8 GB
- Memory: 8 GB

The following is the 8 drive configuration reference storage for Internal or FC/SAN Storage:

- Volume 1: OS root, swap, and dump:
  - Hardware RAID 10 (1+0) for redundancy and performance
  - 4 x 300 GB Disks @ 10,000 RPM
  - 600 GB Volume, 600 GB LUN (whole Volume)
- Volume 2: Enterprise Manager Ops Center Shared Data and Local Libraries:
  - Hardware RAID 10 (1+0) for redundancy and performance
  - 4 x 300 GB @ 10,000 RPM
  - 600 GB Volume, 600 GB LUN (whole Volume)

## Proxy Controller

The following are the reference system specifications for the Proxy Controller to support from 350 to 450 assets, as defined in [Proxy Controller Considerations](#):

- CPU count: 4 virtual processors (as seen by `psrinfo -pv`)
- CPU speed: 2.6 Ghz (or above)

The following is the reference (6 drive configuration) storage Internal or FC/SAN Storage:

- Volume 1: OS root, swap, and dump:
  - ZFS mirror for redundancy
  - 2 x 300 GB Disks @ 10,000 RPM
  - 300 GB Volume, 300 GB LUN (whole Volume)
- Volume 2: Enterprise Manager Ops Center Shared Data and Local Libraries:
  - Hardware RAID 10 (1+0) for redundancy and performance
  - 4 x 300 GB @ 10,000 RPM
  - 600 GB Volume, 600 GB LUN (whole Volume)

## Virtual Resources Provided to the Virtual Domain

The following is the reference storage Internal or FC/SAN Storage:

- 64 GB memory
- 4 cores
- Direct I/O configuration to network

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**Note:** The Direct I/O configuration is not required with Oracle VM Server for SPARC, beginning with version 3.1.1.

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## Report Service Configuration Properties

You can tune the report service retention periods or disable the report service to improve performance.

The following information is covered:

- [Default Retention Periods](#)
- [Edit Report Service Properties](#)
- [Disable the Report Service](#)

### Default Retention Periods

The report service writes to the database every 1000 samples and retains the information for a defined amount of time.

The following are the default retention periods:

- Daily samples (collected every 5 minutes): 5 days  
(repsvc.daily-samples-retention-days)
- 1 hour samples (weighted average of daily samples for one hour): 21 days  
(repsvc.1hour-samples-retention-days)
- 12 hour samples (weighted average of daily samples for 12 hours): 42 days  
(repsvc.12hours-samples-retention-days)
- 24 hour samples (weighted average of daily samples for 24 hours): 180 days  
(repsvc.24hours-samples-retention-days)

You can tune the report service to write to the database of samples. By default a write is made every 1000 samples. For larger deployments, you might want to increase the number from 1000 samples to a larger sample size.

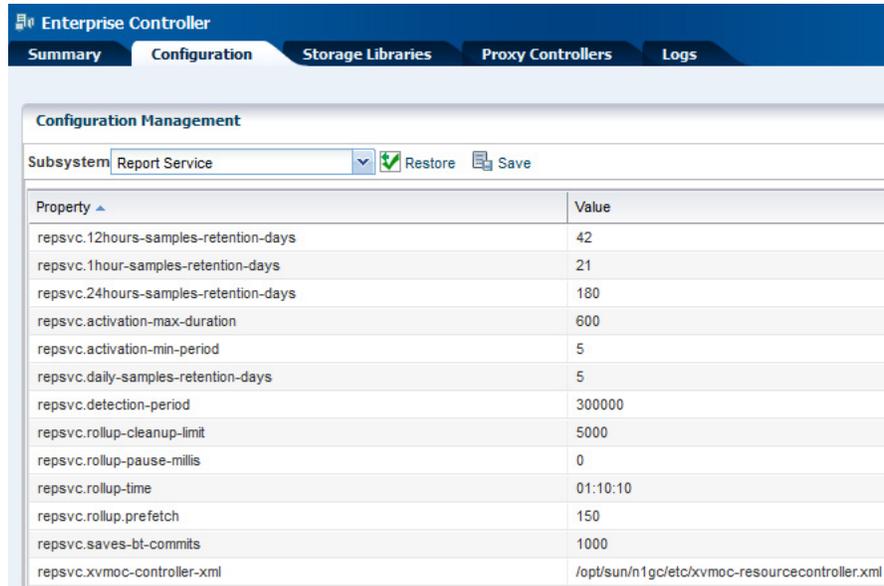
### Edit Report Service Properties

You can configure the retention periods to change the number of days that data is retained, or you can disable the roll up of data.

Perform the following steps to disable the report service:

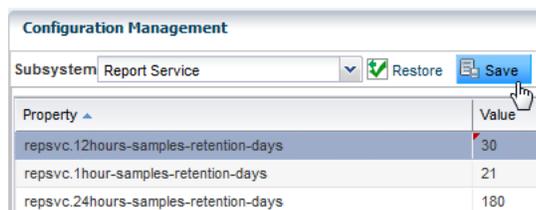
1. Expand **Administration** in the Navigation pane.
2. Select the Enterprise Controller.
3. Click the **Configuration** tab.
4. Select Report Service from the Subsystem menu.

**Figure A-1 Report Service Configuration Properties**



5. You can edit the following property values:
  - To edit the number of days that data is retained, edit the number in the Value field for the sample-retention-days properties.
  - To increase the sample size, edit the number in the epsvc.saves-bt-commits field. Larger deployments might want to increase the sample size from the default size of 1000.
  - To disable the roll up of data, set the 1 hour samples, 12 hour samples, and 24 hour samples retention times to 0.
6. Click **Save** to save your changes.

**Figure A-2 Save Configuration Property Values**



7. Stop and restart the Enterprise Controller.
  - a. As root, log in to the Enterprise Controller system.
  - b. Use the `ecadm` command with the `stop` subcommand to stop the Enterprise Controller.
  - c. Use the `ecadm` command with the `start` subcommand to start the Enterprise Controller.

See the *Oracle Enterprise Manager Ops Center Administration Guide* for more information about viewing and changing the Enterprise Controller status and command options.

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## Disable the Report Service

You can disable the report service, which will stop adding report data in the database.

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**Note:** Before disabling the report service, contact your support representative to discuss the ramifications of disabling the service.

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Perform the following steps to disable the report service:

1. Go to the `/opt/sun/n1gc/lib` directory.
2. Edit the `XVM_SATELLITE.properties` file.
3. Remove the comment from the following line: `report.service.disable=true`.
4. Stop and restart the Enterprise Controller.
  - a. As root, log in to the Enterprise Controller system.
  - b. Use the `ecadm` command with the `stop` subcommand to stop the Enterprise Controller.
  - c. Use the `ecadm` command with the `start` subcommand to start the Enterprise Controller.

See the *Oracle Enterprise Manager Ops Center Administration Guide* for more information about viewing and changing the Enterprise Controller status and command options.



## A

---

Agent Controllers, 1-2  
Architecture, 1-2  
Assets  
    definition, 3-1  
    determining the number of, 3-7  
    maximum supported, 3-2

## D

---

Database  
    considerations, 3-4  
    customer-managed, 3-6  
    embedded, 3-5  
    local, 3-5  
    remote, 3-6  
    sizing, 3-4  
Database configuration  
    local, 3-5  
    remote, 3-6  
Disk considerations, 3-6

## E

---

Enterprise Controller, 1-2  
    database, 3-2  
    disk space, 3-3  
    Java Heap size, 3-3  
    memory, 3-2  
    minimum requirements, 3-2  
    network, 3-2  
    operating system, 3-2  
    platform considerations, 3-2  
    requirements, 3-2  
    sizing, 4-1  
    swap space, 3-3  
    system, 3-2

## H

---

Heap size, 3-2

## K

---

Knowledge Base and Package Base Repository, 1-2

## M

---

Management repository  
    considerations, 3-4

## N

---

Network, 4-2  
Network considerations, 3-6

## O

---

OCDocor, 3-7  
Oracle VM Server for SPARC, 3-4

## P

---

Proxy Controller, 1-2  
    disk space, 3-4  
    Java Heap size, 3-4  
    multiple, 3-3  
    network I/O, 3-3  
    operating system, 3-3  
    platform, 3-4  
    platform considerations, 3-3  
    requirements, 3-3  
    sizing, 4-2  
    swap space, 3-4  
    zones, 3-3

## R

---

Related Resources  
    Resource utilization, 2-3  
    scaling, 3-10  
Remote database  
    sizing, 3-6

## S

---

Sizing  
    Enterprise Controller, 4-1  
    local database, 3-5  
    Proxy Controller, 4-2  
    remote database, 3-6  
    Storage, 4-2  
SSH (Secure Shell protocol), 1-4

Storage  
sizing, 4-2

## **U**

---

Use pattern  
Hardware and OS provisioning, 2-2  
Hardware and OS virtualization, 2-2  
Hardware management, 2-2  
Hardware, OS, and update management, 2-2  
Manage all, 2-2  
Use Patterns, 2-1

## **V**

---

Virtualization considerations, 3-4

## **Z**

---

Zones, 3-4