



CHAPTER 1

System Requirements

This chapter describes what is required to install CTM. It contains the following sections:

- [1.1 CTM Server Requirements, page 1-1](#)
- [1.2 CTM Client Requirements, page 1-11](#)
- [1.3 Oracle Licensing for CTM, page 1-16](#)
- [1.4 Overview of Sudo Commands, page 1-20](#)



Note

- CiscoView is an optional package and is not provided with CTM R9.2. Contact your Cisco account representative for information on how to license and install CiscoView.
 - Although Cisco makes every attempt to ensure the availability of third-party hardware and software platforms specified for CTM, Cisco reserves the right to change or modify system requirements due to third-party vendor product availability or changes that are beyond Cisco's control.
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1.1 CTM Server Requirements

The CTM server runs on any of the following:

- Sun Solaris 10, release 10/09, on a Sun UltraSPARC-based server
- Sun Solaris 10, release 10/09, on a Sun UltraSPARC T2
- Sun Solaris 10, release 10/09, on a Sun UltraSPARC T2 Plus

Cisco tests certain simulated network configurations, which are listed in [Table 1-4](#) and [Table 1-5](#). Your setup and performance might vary depending on the size of your network and the usage pattern of management tasks.



Note

- The CTM server must run on a dedicated workstation. Any application that is not explicitly listed in this chapter as being required or supported by CTM cannot be installed on the dedicated CTM server workstation.
- CTM is not validated against required file systems (/oracle, /db01, /db02, /db03, /db04, /db05) of the Network File System (NFS) type.
- CTM R9.2 does not support local Solaris zones.

- When Solaris 10 is installed, the International Input Method Server (IIMS), which uses CTM internal port 9010, is also installed. Port 9010 is used by an MGX process called eventd. If the eventd process cannot start, internal CTM alarms appear continuously in the Alarm Browser, indicating that CTM is restarting the eventd process automatically. The IIMS is required only for non-English input methods; it is not required in CTM. Enter the Solaris command `ps -eaf | grep 9010` to show the process that is using port 9010. If the IIMS process is using port 9010, run the script `/etc/init.d/Iim stop` to free up that port. Alternately, stop the IIMS process and make port 9010 available for the MGX eventd process.
- When Solaris 10 is installed, its Windows manager, Java Desktop System (JDS), is also installed. The first time you start Solaris 10, you are prompted with a message to choose Common Desktop Environment (the legacy desktop system) or JDS.

Table 1-1 lists the items required to install the CTM server.

Table 1-1 Items Required to Install the CTM Server

Requirement	Notes
CTM installation CDs	The CTM server CDs are the “S” CDs. If you are installing the CTM client on Windows or Solaris, you need the client “C” CD.
Solaris Operating System 10 10/09 Media Kit	<ul style="list-style-type: none"> • Product is available on CD or DVD. • Solaris 10 can be installed only on a 64-bit workstation. • During the Solaris 10 installation, you are prompted to select software to install. (The default is End User System Support—769 MB.) Choose Entire Distribution plus OEM support—5641 MB. • Make sure that your file systems are configured to allow large files. If this configuration is not applied, no single file can be larger than 2 GB, which can be problematic for large database installations of the CTM server. Choose Include Solaris 64-bit support.
CTM R9.2 is compliant with the Solaris patch cluster released on January 8, 2010	<ul style="list-style-type: none"> • Install the most recent Solaris patch cluster available. Visit Sun’s website for the most up-to-date patch information. • While installing Solaris patches, you might receive a message saying, “This patch is obsoleted by patch <i>number</i>, which has already been applied to this system.” This message indicates that an updated version of the patch is already installed, and no action is required. • Enter the <code>showrev -p grep patch-number</code> command to verify that the Solaris patches are installed. • Always install Solaris patches in single-user mode.
Sun Microsystems Java Development Kit (JDK) Standard Edition version 1.6.0_20	JDK is installed automatically for the CTM server and CTM GateWay/CORBA, and bundled with the CTM client.

Table 1-1 *Items Required to Install the CTM Server (continued)*

Requirement	Notes
<p>Oracle 10g software plus the following patches:</p> <ul style="list-style-type: none"> • p6810189_10204_Solaris-64.zip • p6880880_112000_SOLARIS64.zip • p8833280_10204_Solaris-64.zip <p>If you need your CTM server to comply with the New Zealand Daylight Saving Time (DST) settings update, the following additional patches are required:</p> <ul style="list-style-type: none"> • p7695070_10204_Solaris-64.zip • p9146268_Solaris-64.zip 	<ul style="list-style-type: none"> • The Oracle 10g product is available on CD or in .cpio file format. • Oracle patches are available in .zip file format.
Oracle 10g licenses for Sun Solaris	Oracle licenses can be purchased either for the server processor or for named users. For more information on Oracle 10g named users, see 1.3 Oracle Licensing for CTM, page 1-16 .
GNU tar	CTM uses GNU tar to extract files from archives. GNU must be installed on the CTM server workstation. The CTM server supports the latest version of GNU tar.
CD-ROM drive	—

1.1.1 Additional Prerequisites

Before installing the CTM server and the Oracle 10g database on your Sun Solaris 10 server, verify the following:

- The **ping** command is included in your path environment variable.
- Your /ctm_backup directory (the disk directory for the backed-up database and configuration files) is at least as big as the total size of your database data files.
- Solaris Secure File Transfer Protocol (SFTP) packages have been installed (if your managed network contains MGX NEs). See [1.1.2 Solaris SFTP Packages for MGX NEs, page 1-4](#).
- You have identified nonroot users and related UNIX groups to run CTM UNIX commands. See [1.4 Overview of Sudo Commands, page 1-20](#).

1.1.2 Solaris SFTP Packages for MGX NEs

If your managed network contains MGX NEs, you must download and install Solaris packages to enable SFTP support with those MGX NEs. You can install the SFTP packages in any order. Complete the following steps, which apply to both SPARC-based and T2 servers:

- Step 1** Go to <http://ftp.sunfreeware.com/ftp/pub/freeware/sparc/5.10/> and download the latest version of the libraries shown in the following table.

Package Name	Package Name in Solaris
libiconv-1.11	SMCliconv
libgcc-3.4.6	SMClgcc346
libgcrypt-1.2.4	SMCgcrypt
libgpgerror-1.5	SMClgpgger
zlib-1.2.3	SUNWzlib

- Step 2** Unzip the library packages that you downloaded in [Step 1](#).
- Step 3** Verify that the `/usr/local` directory exists on your CTM server.
- Step 4** Enter the following command to install the library packages:
- ```
pkgadd -d absolute-path-of-the-unzipped-library
```
- For example, enter:
- ```
pkgadd -d /tmp/libgcc-3.4.6-sol10-sparc-local
```
- Step 5** As the installation option, choose **All**.
- Step 6** In the console window, verify the progress of the installation.

1.1.3 Server Specifications

The following tables show recommended optical and MGX hardware specifications for installing the CTM server, and the resulting maximum number of NEs the server manages for each configuration. The tables also show samples of configurations in which the CTM server and Oracle 10g database are installed on the same workstation. The CTM server can run on any platform that supports Sun Solaris 10.

If the CTM server and Oracle database are installed on separate workstations, both workstations must meet the hardware requirements shown in the following tables.

CTM R9.2 is supported on servers equipped with the following processors:

- UltraSPARC
- UltraSPARC T2
- UltraSPARC T2 Plus

**Note**

- The processor requirements for UltraSPARC IV apply also to UltraSPARC IV+. CTM R9.2 requires the same number of processors regardless of whether you use UltraSPARC IV or UltraSPARC IV+.
- It is possible to use and configure disk arrays for database storage with any type of RAID layout. You can do so only if the disk throughput is equal to or higher than the throughput calculated for internal disks.

Table 1-2 Minimum Processor Requirements

Network Size	UltraSPARC T2	UltraSPARC T2 Plus
Small	1 x 4 cores	1 x 4 cores per socket
Medium	1 x 4 cores	1 x 4 cores per socket
Large	1 x 4 cores	1 x 4 cores per socket
High end	1 x 8 cores	1 x 8 cores per socket

Table 1-3 Legacy Processor Requirements

Network Size	UltraSPARC
Small	2 x UltraSPARC III or 2 x UltraSPARC IIIi
Medium	4 x UltraSPARC III or 2 x UltraSPARC IV
Large	8 x UltraSPARC III or 4 x UltraSPARC IV
High end	8 x UltraSPARC IV with fiber-channel disk array

Table 1-4 Recommended Specifications for the CTM Server Installation—Optical

Network Size	Oracle Database Type	RAM	Number of Network Partitions ¹	Maximum Number of Optical NEs ²
Small	Standard Edition	8 GB	1	200
Medium	Enterprise Edition	16 GB	1	500
Large	Enterprise Edition	32 GB	4	2000
High end	Enterprise Edition	64 GB	8	4000

1. In CTM R9.2, a single NE service (or a single network partition) can support up to 750 nodes.

A high-end network supports any combination of up to 4000 nodes, 8 network partitions, and 750 nodes per network partition. For example, 8 NE services with 500 nodes (8 x 500), 5 NE services with 750 nodes + 1 NE service with 250 nodes (5 x 750 + 1 x 250).

A large network supports any combination of up to 2000 nodes, 4 network partitions, and 750 nodes per network partition. For example, 4 NE services with 500 nodes (4 x 500), 2 NE services with 750 nodes + 1 NE service with 500 nodes (2 x 750 + 1 x 500).

2. These numbers assume you are using fully equipped ONS 15454 MSPP nodes (for example, 12 OC-48, 2 TCC, and 1 XC10G with up to 2 links and 48 SONET cross-connections per node). Note that these numbers should be used as a guideline, and vary depending on the software and hardware configuration of your NEs.

Table 1-5 Recommended Specifications for the CTM Server Installation—MGX

Network Size	Oracle Database Type	Max. No. of MGX NEs	Processor	CPU Speed	RAM ¹	No. of Network Partitions	Total Disk Space Without PM Collection ²	Total Disk Space with PM Collection
Small	Standard Edition	6	UltraSPARC T2 with 1 x 4 cores	1.2 GHz	8 GB	1	62 GB	123 GB
			2 x UltraSPARC III or 2 x IIIi CPU					
Medium	Enterprise Edition	20	UltraSPARC T2 with 1 x 4 cores	1.2 GHz	16 GB	1	94 GB	240 GB
			4 x UltraSPARC III or 2 x UltraSPARC IV CPU					
Large	Enterprise Edition	50	UltraSPARC T2 with 1 x 4 cores	1.2 GHz	32 GB	1	144 GB	448 GB
			8 x UltraSPARC III or 4 x UltraSPARC IV CPU					
High end	Enterprise Edition	100	UltraSPARC T2 with 1 x 8 cores	1.4 GHz	64 GB	1	306 GB	952 GB
			8 x UltraSPARC IV CPU with fiber-channel disk array	1.2 GHz				

1. The memory required for the maximum number of NEs is for a single NE type. A network with multiple NE types might require additional memory.
2. The disk space values assume you are not using the optional partitions /db01_rd and /db02_rd. If you are using /db01_rd and /db02_rd, add 2 GB for a small network, 4 GB for a medium network, 6 GB for a large network, and 8 GB for a high-end network.

The following list describes the server configuration parameters and the effect of changes in each parameter on the maximum number of NEs the server can manage:

- **Network Size**—If the network size increases, more resources are reserved for the higher number of NEs to be managed.
- **Oracle Database Type**—Standard Edition is allowed only in small configurations. In a small configuration, performance is identical whether Standard Edition or Enterprise Edition is used. In medium or larger networks, Oracle Enterprise Edition is required.
- **RAM**—The server can manage more NEs as the RAM increases. The server can manage fewer NEs as the RAM decreases.
- **Number of Network Partitions**—For each network partition, the server reserves resources for the higher number of NEs to be managed. The server can manage more NEs as the number of network partitions increases. The server can manage fewer NEs as the number of network partitions decreases.

1.1.4 Disk Space and Partition Specifications


Note

To calculate the disk space required for multiple NE types (optical and MGX), double the space required for each /db partition and increase the /ctm_backup size accordingly.

The following tables show disk space and partition requirements for optical and MGX NEs based on network size and performance monitoring (PM) data collection status.

- The minimum disk space is the total space required for /, swap, /cisco, /oracle, /db01, /db02, /db03, /db04, and /db05. (The minimum disk space does not include /ctm_backup or the optional partitions /db01_rd and /db02_rd.)
- The maximum disk space is the total space required for /, swap, /cisco, /oracle, /db01, /db02, /db03, /db04, /db05, /db01_rd, /db02_rd, and /ctm_backup.


Note

- It is recommended that you use the partition sizes described in this section. CTM performance degrades if you do not use the recommended partition sizes.
- To improve database performance and maximize data input/output, configure a dedicated disk array with the following setup:
 - Dynamic multipathing (DMP) to parallelize the file system access.
 - Raid 0 (striping) to optimize the disk input data.
- CTM is a high-transaction application, which causes high I/O throughput for Oracle redo logs. It is recommended that you reserve dedicated system controllers for file systems—including the optional /db01_rd and /db02_rd file systems—that manage redo logs.


Caution

For large and high-end networks, if you do not follow the preceding disk striping recommendations, the I/O might create a critical bottleneck and cause an unexpected CTM shutdown.

Table 1-6 Disk Space and Partition Requirements for Installing the CTM Server and Oracle 10g on the Same Workstation—PM Collection Enabled

Network Size	Disk Space	/	swap ¹	/cisco	/oracle	/db01	/db02	/db03	/db04	/db05	/db01_rd (optional)	/db02_rd (optional)	/ctm_backup
Small	128 GB (min)	12 GB	12 GB	10 GB	5 GB	5 GB	6 GB	40 GB	30 GB	8 GB	1 GB	1 GB	96 GB
	226 GB (max)												
Medium	245 GB (min)	12 GB	24 GB	10 GB	5 GB	8 GB	16 GB	90 GB	70 GB	10 GB	2 GB	2 GB	203 GB
	452 GB (max)												

1.1.4 Disk Space and Partition Specifications

Table 1-6 Disk Space and Partition Requirements for Installing the CTM Server and Oracle 10g on the Same Workstation—PM Collection Enabled (continued)

Network Size	Disk Space	/	swap ¹	/cisco	/oracle	/db01	/db02	/db03	/db04	/db05	/db01_rd (optional)	/db02_rd (optional)	/ctm_backup
Large	453 GB (min)	12 GB	48 GB	10 GB	5 GB	10 GB	26 GB	190 GB	140 GB	12 GB	3 GB	3 GB	389 GB
	848 GB (max)												
High end	863 GB (min)	12 GB	96 GB	10 GB	5 GB	12 GB	50 GB	360 GB	300 GB	18 GB	4 GB	4 GB	753 GB
	1624 GB (max)												

1. Use swap when creating the partition. Do not use /swap.

Table 1-7 Disk Space and Partition Requirements for Installing the CTM Server and Oracle 10g on the Same Workstation—PM Collection Disabled

Network Size	Disk Space	/	swap ¹	/cisco	/oracle	/db01	/db02	/db03	/db04	/db05	/db01_rd (optional)	/db02_rd (optional)	/ctm_backup
Small	67 GB (min)	12 GB	12 GB	10 GB	5 GB	5 GB	6 GB	5 GB	4 GB	8 GB	1 GB	1 GB	35 GB
	104 GB (max)												
Medium	99 GB (min)	12 GB	24 GB	10 GB	5 GB	8 GB	16 GB	8 GB	6 GB	10 GB	2 GB	2 GB	57 GB
	160 GB (max)												
Large	149 GB (min)	12 GB	48 GB	10 GB	5 GB	10 GB	26 GB	14 GB	12 GB	12 GB	3 GB	3 GB	85 GB
	240 GB (max)												
High end	241 GB (min)	12 GB	96 GB	10 GB	5 GB	12 GB	50 GB	20 GB	18 GB	18 GB	4 GB	4 GB	131 GB
	380 GB (max)												

1. Use swap when creating the partition. Do not use /swap.

Table 1-8 Disk Space and Partition Requirements for the CTM Server when Installing the CTM Server and Oracle 10g on Separate Workstations

Network Size	Total Disk Space	/	swap ¹	/cisco	/oracle
Small	39 GB	12 GB	12 GB	10 GB	5 GB
Medium	51 GB	12 GB	24 GB	10 GB	5 GB

Table 1-8 Disk Space and Partition Requirements for the CTM Server when Installing the CTM Server and Oracle 10g on Separate Workstations (continued)

Network Size	Total Disk Space	/	swap ¹	/cisco	/oracle
Large	75 GB	12 GB	48 GB	10 GB	5 GB
High end	123 GB	12 GB	96 GB	10 GB	5 GB

1. Use swap when creating the partition. Do not use /swap.

Table 1-9 Disk Space and Partition Requirements for the Oracle 10g Database Server when Installing the CTM Server and Oracle 10g on Separate Workstations—PM Collection Enabled

Network Size	Disk Space	/	swap ¹	/cisco	/oracle	/db01	/db02	/db03	/db04	/db05	/db01_rd (optional)	/db02_rd (optional)	/ctm_backup
Small	120 GB (min)	12 GB	12 GB	10 GB	5 GB	5 GB	6 GB	40 GB	30 GB	8 GB	1 GB	1 GB	96 GB
	226 GB (max)												
Medium	235 GB (min)	12 GB	24 GB	10 GB	5 GB	8 GB	16 GB	90 GB	70 GB	10 GB	2 GB	2 GB	203 GB
	452 GB (max)												
Large	441 GB (min)	12 GB	48 GB	10 GB	5 GB	10 GB	26 GB	190 GB	140 GB	12 GB	3 GB	3 GB	389 GB
	848 GB (max)												
High end	845 GB (min)	12 GB	96 GB	10 GB	5 GB	12 GB	50 GB	360 GB	300 GB	18 GB	4 GB	4 GB	753 GB
	1624 GB (max)												

1. Use swap when creating the partition. Do not use /swap.

Table 1-10 Disk Space and Partition Requirements for the Oracle 10g Database Server when Installing the CTM Server and Oracle 10g on Separate Workstations—PM Collection Disabled

Network Size	Disk Space	/	swap ¹	/cisco	/oracle	/db01	/db02	/db03	/db04	/db05	/db01_rd (optional)	/db02_rd (optional)	/ctm_backup
Small	59 GB (min)	12 GB	12 GB	10 GB	5 GB	5 GB	6 GB	5 GB	4 GB	8 GB	1 GB	1 GB	35 GB
	104 GB (max)												
Medium	89 GB (min)	12 GB	24 GB	10 GB	5 GB	8 GB	16 GB	8 GB	6 GB	10 GB	2 GB	2 GB	57 GB
	160 GB (max)												

Table 1-10 *Disk Space and Partition Requirements for the Oracle 10g Database Server when Installing the CTM Server and Oracle 10g on Separate Workstations—PM Collection Disabled (continued)*

Network Size	Disk Space	/	swap ¹	/cisco	/oracle	/db01	/db02	/db03	/db04	/db05	/db01_rd (optional)	/db02_rd (optional)	/ctm_backup
Large	137 GB (min)	12 GB	48 GB	10 GB	5 GB	10 GB	26 GB	14 GB	12 GB	12 GB	3 GB	3 GB	85 GB
	240 GB (max)												
High end	223 GB (min)	12 GB	96 GB	10 GB	5 GB	12 GB	50 GB	20 GB	18 GB	18 GB	4 GB	4 GB	131 GB
	380 GB (max)												

1. Use swap when creating the partition. Do not use /swap.

Note the following PM assumptions for optical NEs:

- In a small network, PM data collection assumes 30 days of storage for PM data collected across 200 optical NEs, assuming an average of 200 interfaces per NE, up to a maximum of 40,000 interfaces (includes logical and physical interfaces).
- In a medium network, PM data collection assumes 30 days of storage for PM data collected across 400 optical NEs, assuming an average of 100 interfaces per NE, up to a maximum of 40,000 interfaces (includes logical and physical interfaces).
- In a large network, PM data collection assumes 30 days of storage for PM data collected across 2000 optical NEs, assuming an average of 100 interfaces per NE, up to a maximum of 200,000 interfaces (includes logical and physical interfaces).
- In a high-end network, PM data collection assumes 30 days of storage for PM data collected across 4000 optical NEs, assuming an average of 100 interfaces per NE, up to a maximum of 400,000 interfaces (includes logical and physical interfaces).

1.1.4.1 Understanding the ctm_backup Directory

The ctm_backup directory is a repository used by the oracle user to back up the following main categories of information:

- CTM database backup and export dump
- Configuration files
- Database ARCHIVELOG files

The oracle user must have read/write permissions or the database backup will fail. The database should be blocked if the ARCHIVELOG files cannot be moved to the /ctm_backup directory.

It is recommended that the /ctm_backup size be equivalent to the sum of the single database partitions (that is, the sum of /oracle, /db01, /db02, /db03, /db04, /db05, and—if configured—/db01_rd and /db02_rd).

**Note**

- The final /ctm_backup size is also related to the ARCHIVELOG files.
- The /ctm_backup directory can be a symbolic link to a user-defined directory and must have read/write permissions.

1.1.5 Important Note About MGX Debug Levels and Log Files

By default, the MGX debug levels and the number of log files to retain are kept low to save disk space. During the first few installations or upgrades, it is recommended (but not mandatory) that you increase the debug level of some MGX processes to assist in debugging any issues that might arise.

It is recommended that you increase the debug level for the following processes:

- topod (debug level 5)
- ILMITopoc (debug level 5)
- ooemc (debug level 7; retain up to 50 log files)
- nts (debug level 5; retain up to 20 log files)
- snmpcomm (debug level 5)
- NMServer (debug level 5; retain up to 20 log files)

For information about changing the debug level for these processes, see the [Cisco Transport Manager Release 9.2 User Guide](#), Chapter 9, section “Setting Debug Options.”

After running the system for several weeks without any problems, you can reduce the debug levels to save disk space.

1.2 CTM Client Requirements

To install the CTM client, it is recommended that you have a Sun Solaris workstation or Microsoft Windows PC configured as shown in [Table 1-11](#).

Table 1-11 Minimum Requirements for the CTM Client

Platform	Network Size	RAM ^{1,2,3}	CPUs	CPU Speed	Disk Space Without CEC ⁴	Disk Space with CEC	Other
Sun workstation	Small	512 MB	1	333 MHz	640 MB	710 MB	<ul style="list-style-type: none"> • Sun Solaris 10 release 10/09 with CDE, with graphics support for 16-bit color or higher, or Java Desktop System (JDS) • Mozilla 1.7 (the version integrated in Solaris 10 release 10/09)
	Medium	512 MB					
	Large	1 GB					
	High end	2 GB					

Table 1-11 Minimum Requirements for the CTM Client (continued)

Platform	Network Size	RAM ^{1,2,3}	CPUs	CPU Speed	Disk Space Without CEC ⁴	Disk Space with CEC	Other
Pentium 4 class PC	Small	512 MB	1	450 MHz	630 MB	700 MB	<ul style="list-style-type: none"> Microsoft Windows 7 (32- and 64-bit), Windows Vista, Windows 2000 Professional with Service Pack 4, Windows XP Professional with Service Pack 2, or Windows Server 2003 Enterprise Edition with Terminal Services, each with graphics support for 16-bit color or higher Microsoft Internet Explorer 6.0 (or higher) or Mozilla 1.7.13, with JavaScript enabled Microsoft Windows XP and Windows 2003 patch number KB928388 is available for the revised Daylight Saving Time in 2007
	Medium	512 MB					
	Large	512 MB					
	High end	512 MB					

1. If you are running multiple CTM client sessions on a single client workstation, add 256 MB of RAM for each additional CTM client.
2. If you are running more than two simultaneous Cisco Transport Controller (CTC) sessions on a single client workstation, add 64 MB of RAM for each CTC client.
3. It is recommended that you set the client virtual memory to two times the size of the physical memory (two times the amount of RAM).
4. Disk space requirements are for CTM and Cisco Edge Craft (CEC) client software only.

It is strongly recommended that you install the CTM client on a workstation separate from the CTM server. Installing the CTM client and server on the same workstation consumes server resources and degrades performance.

Table 1-12 shows the maximum number of simultaneous CTM client sessions supported in a network of optical devices versus a network of MGX devices.

Table 1-12 Maximum Number of Simultaneous CTM Client Sessions

Network Size	Max. No. of CTM Client Sessions in an Optical Network	Max. No. of CTM Client Sessions in an MGX Network
Small	30	30
Medium	60	50
Large	100	50
High end	100	100

1.2.1 Using Remote Application Software with the CTM R9.2 Client

Client launch and operation are supported by the following remote application software:

- Windows Server 2003 Enterprise Edition with Terminal Services
- Citrix Presentation Server 4.0

- Secure Global Desktop Enterprise Edition 4.0 (previously known as Tarantella Enterprise)

**Note**

If you are using Secure Global Desktop, enable full-duplex autodetection on the GUI server interface to prevent performance slowdown.

The hardware requirements for the remote application depend on the number of clients that the system must export, calculated with the following formula:

Target RAM = base RAM + (delta RAM x number of clients)

Target CPU = base CPU + (delta CPU x number of clients)

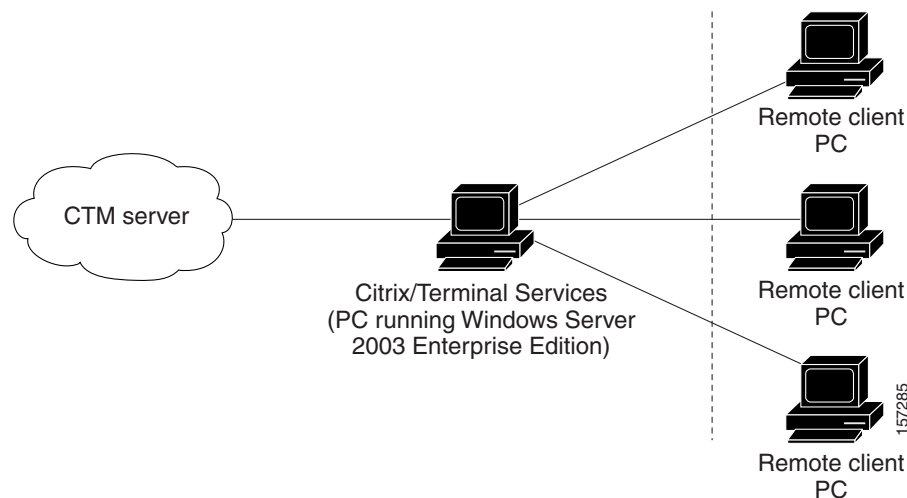
where:

- base RAM—Amount of RAM required by the remote application software.
- base CPU—Amount of CPU required by the remote application software.
- delta RAM—Amount of RAM required for each additional client.
- delta CPU—Amount of CPU required for each additional client.

1.2.1.1 Citrix and Windows Server 2003 Terminal Services

The following figure shows the environment for a remote Citrix Presentation Server or Windows Server 2003 Terminal Server. In this example, the GUI application server and the presentation server reside on the same workstation.

Figure 1-1 Remote Citrix or Windows Server 2003 Terminal Server Environment



The following table shows requirements for a remote Citrix or Windows Server 2003 Enterprise Edition Terminal Server.

Table 1-13 Requirements for Citrix and Windows Server 2003 Enterprise Edition with Terminal Services

Remote Application Software	Base RAM	Delta RAM	Base CPU	Delta CPU
Windows Server 2003 Enterprise Edition with Terminal Services	512 MB	300 MB	450 MHz	240 MHz
Citrix Presentation Server 4.0	512 MB	300 MB	450 MHz	240 MHz

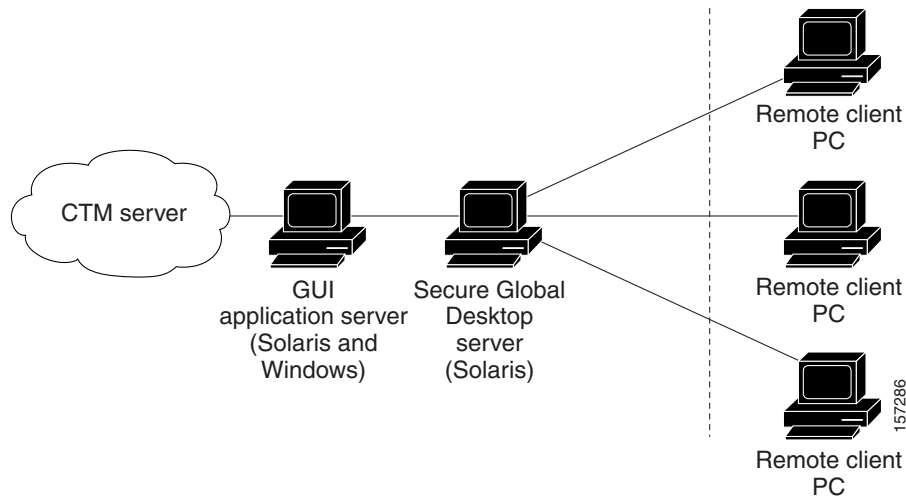
In this example, the hardware requirements for 10 clients are:

- CPU = 450 MHz + (240 MHz x 10) = 2850 MHz
- RAM = 512 MB + (300 MB x 10) = 3512 MB

1.2.1.2 Secure Global Desktop Enterprise Edition 4.0

The following figure shows the environment for a remote client via the Secure Global Desktop server. In this example, the GUI application server and the Secure Global Desktop server reside on different workstations. The application server can be a Windows Server 2003 Enterprise Edition with Terminal Services or a Solaris workstation.

Figure 1-2 Remote Secure Global Desktop Environment



The following table shows requirements for a remote Secure Global Desktop server on a Solaris workstation and a GUI application server on a Windows PC.

Table 1-14 *Requirements for Secure Global Desktop Server and GUI Application Server on Separate Solaris and Windows Workstations*

Server and Platform	Base RAM	Delta RAM	Base CPU	Delta CPU
Secure Global Desktop server on Solaris	256 MB	7 MB	100 MHz	7 MHz
GUI application server on Windows Server 2003 Enterprise Edition with Terminal Services	512 MB	300 MB	450 MHz	240 MHz

In this example, the hardware requirements for 10 clients are:

- Secure Global Desktop server CPU = 100 MHz + (7 MHz x 10) = 170 MHz
- Secure Global Desktop server RAM = 256 MB + (7 MB x 10) = 326 MB
- Application server CPU = 450 MHz + (240 MHz x 10) = 2850 MHz
- Application server RAM = 512 MB + (300 MB x 10) = 3512 MB

The following table shows requirements for a remote Secure Global Desktop server on a Solaris workstation and a GUI application server on another Solaris workstation.

Table 1-15 *Requirements for Secure Global Desktop Server and GUI Application Server on Separate Solaris Workstations*

Server and Platform	Base RAM	Delta RAM	Base CPU	Delta CPU
Secure Global Desktop server on Solaris	256 MB	40 MB	100 MHz	30 MHz
GUI application server on Solaris	512 MB	200 MB	333 MHz	110 MHz

In this example, the hardware requirements for 10 clients are:

- Secure Global Desktop server CPU = 100 MHz + (30 MHz x 10) = 400 MHz
- Secure Global Desktop server RAM = 256 MB + (40 MB x 10) = 656 MB
- Application server CPU = 333 MHz + (110 MHz x 10) = 1433 MHz
- Application server RAM = 512 MB + (200 MB x 10) = 2512 MB

Using the CTM R9.2 Client in a Sun Ray Environment

The CTM R9.2 client is supported in an Oracle Sun Ray 2 environment. The setup uses thin terminal devices and Oracle Sun Ray 2 virtual display clients that are network-connected to a server running Sun Ray server software.

A virtual desktop runs on the Sun Ray server, while the related display is exported remotely to the associated Sun Ray 2 virtual display client.

- For CTM client requirements, see [Table 1-11 on page 1-11](#).
- For Oracle Sun Ray 2 virtual display client requirements and network and software configurations, see:
 - <http://www.oracle.com/us/products/servers-storage/desktop-workstations/030726.htm>

- <http://www.oracle.com/us/products/servers-storage/desktop-workstations/036088.pdf>

1.2.2 Java Heap Sizes

The CTM client startup script provides small and high-end memory allocation and identifies the maximum heap allocation for the client Java Virtual Machine (JVM) process. The CTM client launches with the appropriate minimum and maximum Java heap sizes based on the server configuration (small, medium, large, or high end). The following table shows the Java heap memory values.

Table 1-16 Java Heap Sizes

Network Size	Initial Heap Size	Maximum Heap Size
Small	100 MB	192 MB
Medium	128 MB	256 MB
Large	192 MB	512 MB
High end	256 MB	1024 MB



Caution

The client memory type should match (or exceed) the server memory type. If a client configured for a small network logs into a medium, large, or high-end server, the small client could crash due to memory limitations. Therefore, a warning dialog box appears if a client configured for a small network logs into a medium, large, or high-end server.

1.3 Oracle Licensing for CTM

This section explains how to calculate the total number of Oracle Named User Plus licenses required for your CTM R9.2 server and client installations. This section describes with examples the following Oracle database editions:

- [1.3.1 Oracle Enterprise Edition, page 1-19](#)
- [1.3.2 Oracle Standard Edition, page 1-19](#)



Note

See the Oracle website for detailed information about Oracle licensing definitions and requirements.

Oracle's technology products, including the Oracle database required for use with CTM, are licensed using one of two possible metrics. Which metric to use normally depends on which will result in a lower price for the database. If for some reason the number of database users cannot be counted, the Processor metric must be used. However, in a CTM environment, database users normally can be counted:

- *Processor*—This metric is defined as the number of processors on the server on which the Oracle database is installed or running. This option must be used in environments in which software users cannot easily be identified or counted (not normally the case in a CTM environment).

**Note**

For the purpose of counting the number of processors, a multicore chip with n cores is determined by multiplying n cores by a core processor licensing factor of 0.75. All cores on all multicore chips for each licensed program for each core processor licensing factor listed above are aggregated, before multiplying by the appropriate core processor licensing factor. All fractions of a number are rounded up to the next whole number. When licensing Standard Edition programs on servers with a maximum of one processor with one or two cores, only one processor is counted.

- *Named User Plus*—This metric is used in environments in which users can be identified and counted. Named User Plus includes both human-operated and automated devices. All human-operated and automated devices that access the program must be licensed. A Named User Plus license may access the program on any instances on which it is deployed, provided that the minimum license requirement on each server is met.

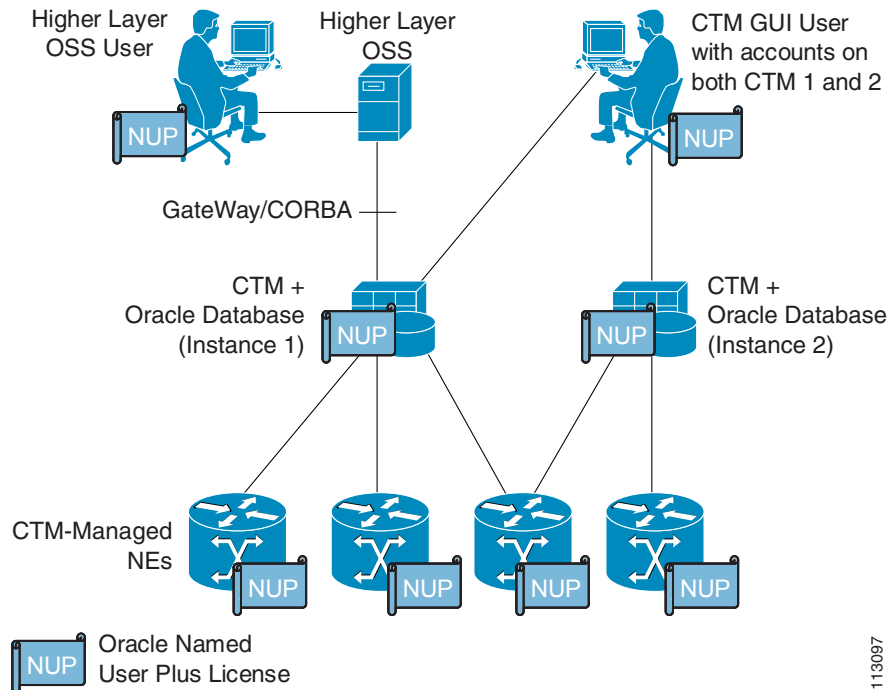
In the context of a CTM environment, *human-operated device* means any device operated by a user who has direct or indirect access to CTM. Direct access is gained through a user account on CTM that allows access through the CTM client GUI. Indirect access is possible through a user account on a higher-layer OSS, which in turn communicates with CTM through CTM GateWay/CORBA. Automated users include the NEs managed by CTM and the CTM server itself.

Oracle database editions have the following differences:

- Oracle Standard Edition—Requires a minimum of five Named User Plus licenses or the total number of actual users, whichever number is higher. Oracle Standard Edition can be licensed only on servers that have a maximum capacity of four sockets. A blade server that meets these criteria is also eligible for licensing this program. Effective with the release of Oracle 10g, the Oracle Standard Edition product includes the Real Application Clusters database option. The Real Application Clusters option is not included with any Standard Edition versions prior to Oracle 10g. Customers who participate in Oracle's Update Subscription Service for the Standard Edition database can upgrade to the 10g version of the product for the supported licenses. Also, customers must use Oracle Cluster Ready Services as the clusterware; third-party clusterware is not supported. Customers must use Oracle Automatic Storage Management to manage all data.
- Oracle Enterprise Edition—Requires a minimum of 25 Named User Plus licenses per processor or the total number of actual users, whichever number is higher.

The following figure shows an example CTM environment to illustrate identifying the human and automated database users that must be counted.

Figure 1-3 Example CTM Environment



In the example shown in [Figure 1-3](#) there are two independent CTM servers and Oracle database instances. There are four NEs, one of which is managed by both CTM servers. There is one direct CTM user and one indirect user. So in this example the total number of Oracle named users is as follows:

CTM servers: 2*

NEs: 4**

CTM users: 1**

Higher-layer OSS users: 1

Total Named User Plus: $8 = 2 + 4 + 1 + 1$

*Because of the *self-monitor* feature of CTM, a CTM server itself is considered an automated user of the database and is therefore counted.

**A Named User Plus license entitles the user to access Oracle on any instances where it is deployed. So if a user has access to multiple CTM servers, only a single license is needed per user. Also, if an NE is managed by multiple CTM servers, only a single license is needed per NE.

This example explains how to count the named users, but the number of named users required is the larger of either 1) the actual count or 2) the required minimum. The required minimum will vary depending on the edition of the Oracle database (for example, standard, enterprise, and so on).

1.3.1 Oracle Enterprise Edition

Oracle Database Enterprise Edition (EE) provides improved scalability performance. The two major features in this release are:

- The Oracle partitioning option (not available in the Oracle SE)
- An increased number of maximum supported CPUs (Oracle SE supports a maximum of only four CPUs)



Note

Oracle EE requires a separate license.

1.3.1.1 CTM with Oracle EE (Example A)

A service provider has 800 NEs and a data center with 10 CTM client workstations. 100 employees in the data center are authorized to use the CTM client. Some of the employees in the data center share the same CTM account (username/password). CTM is running on a Sun V880 with 8 processors, with only one core and 32 GB of RAM.

- Named User Plus: 1) Minimum = 8 processors x 25 users/processor = 200 or 2) Count = 800 licenses for NEs + 100 licenses for data center personnel + 1 CTM server = 901

Result: 901 Named User Plus licenses are required

- Processor: 8 processor licenses

If the processors are UltraSPARC IV and IV+ (dual core), the calculation for processor licensing is:

- Processor: $(8 \times 2) \times 0.75 = 12$ processor licenses

1.3.1.2 CTM with Oracle EE (Example B)

The same service provider as in the preceding example decides to enable CTM GateWay/CORBA and connect to a higher-layer OSS that handles inventory management. There are 20 employees in the data center authorized to access the inventory system; 5 of them are also CTM users (that is, they are a subset of the 100 CTM users identified in the preceding example). In this case, the total number of human users is:

95 CTM-only users + 15 inventory system-only users + 5 CTM/inventory system users, or 115 human named users.

As a result of adding the OSS and related users, the total number of named users required has increased from 901 to 916.

1.3.2 Oracle Standard Edition

For small CTM installations, Oracle Database Standard Edition (SE) offers a low-cost alternative. Oracle Database SE can be licensed only on servers that have a maximum capacity of four sockets.

1.3.2.1 CTM with Oracle SE (Example)

A large enterprise customer has 78 NEs and 5 CTM client workstations. 15 employees in the data center are authorized to use the CTM client. Some of the employees in the data center share the same CTM account (username/password). CTM is running on a Sun V240 with 2 processors and 8 GB RAM.

- Named User Plus: 1) Minimum = 2 processors x 5 users/processor = 10 or 2) Count = 78 licenses for NEs + 15 licenses for data center personnel + 1 CTM server = 94
Result: 94 Named User Plus licenses are required
- Processor: 2 processor licenses

If the processors are UltraSPARC IV and IV+ (dual core), the calculation for processor licensing is:

- Processor: 2 processor licenses

1.4 Overview of Sudo Commands

Sudo software (freeware) version 1.6.6 is bundled with the CTM R9.2 software. The sudo software enables nonroot UNIX users to run the following UNIX commands:

- **ctms-start**
- **ctms-abort**
- **ctms-stop**
- **ctms-stop-service**
- **showctm**
- **getinfo.sh**
- **prune_auditlog.sh**
- **prune_errlog.sh**
- **prune_audittrail.sh**
- **prune_fm.sh**
- **prune_pm.sh**
- **prune_ne.sh**
- **prune_server_monitor.sh**
- **prune_admin_job_table.sh**
- **prune_ne_ipaddress.sh**

During the CTM server installation, the setup program prompts you to specify the name of the UNIX group to which you want to assign administrator privileges. By default, this group is set to the root group. If you specify a group other than root, the setup program verifies that the UNIX group exists on the system and adds entries to the `/etc/sudoers` file. Entries in this file reflect the commands that the specified UNIX group can run by using the **sudo** command.

The following entries in the `/etc/sudoers` file reflect the commands that can be run as nonroot:

```
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_admin_job_table.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_admin_job_table.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_server_monitor.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_server_monitor.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_ne.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/prune_ne.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_pm.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/prune_pm.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_fm.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/prune_fm.sh
```

```

%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_audittrail.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_audittrail.
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_errlog.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_errlog.
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/prune_auditlog.sh
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/prune_auditlog.
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/getinfo.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/getinfo.sh
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/showctm
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/showctm
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/ctms-stop-service
%CTM_UNIX_group hostname=(root) NOPASSWD:
/opt/CiscoTransportManagerServer/bin/ctms-stop-service
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/ctms-stop
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/ctms-stop
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/ctms-abort
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/ctms-abort
%CTM_UNIX_group hostname=(root) NOPASSWD: /usr/bin/ctms-start
%CTM_UNIX_group hostname=(root) NOPASSWD: /opt/CiscoTransportManagerServer/bin/ctms-start

```

1.4.1 Explanation of the ctms-start Command

A complete set of administrative command scripts is added to the application during installation. One command automatically starts the CTM server processes every time the server is started. The server processes can also be started or stopped manually as necessary; the scripts are located in the `/opt/CiscoTransportManagerServer/bin` directory.

The **ctms-start** command sets the appropriate environment variables and starts the CTM server. The amount of time it takes for the CTM server to start varies based on the number of NEs in the configuration and the size of the database. Use **ctms-start** only when the CTM server has stopped.

Step 1 Log into the CTM server workstation as the root user.

Step 2 On the command line, enter the following command:

```
ctms-start
```



Note It can take from 0 to 5 minutes for the server processes to start after the **ctms-start** command has finished execution. This is because NE services and gateway services (if enabled) are still initializing for all of the NEs that are deployed. Wait 5 minutes after entering the **ctms-start** command; then, enter the **showctm** command. The NE service corresponding to all the deployed NEs should have started.

1.4.2 Explanation of the ctms-stop Command

The **ctms-stop** command stops the CTM server gracefully. The stop procedure shuts down the server and cleans all memory and connections. The overall process takes approximately 5 minutes.

1.4.3 Explanation of the `ctms-abort` Command

Step 1 Log into the CTM server workstation as the root user.

Step 2 On the command line, enter the following command:

```
ctms-stop
```

1.4.3 Explanation of the `ctms-abort` Command

The `ctms-abort` command kills all of the running processes immediately and stops the CTM server. The overall process takes no longer than 2 to 3 minutes.

Step 1 Log into the CTM server workstation as the root user.

Step 2 On the command line, enter the following command:

```
ctms-abort
```

1.4.4 Explanation of the `showctm` Command

The `showctm` command provides CTM version and process information.

Step 1 Log into the CTM server workstation as the root user.

Step 2 On the command line, enter the following command:

```
showctm
```

The following is an example of the output of the `showctm` command, where all of the attributes (except for the process names) are variable:

```
CTM Processes for Cisco Transport Manager Server Version: 9.2 Build: build-number
```

USER	PID	%CPU	%MEM	START	TIME	PROCESS
root	1545	0.0	0.111104033672	Sep_09	28:32	CTM Server
root	1522	0.0	0.098984	Sep_09	0:00	CTM Server
root	1794	0.2	0.5634096300984	Sep_09	228:04	SnmpTrapService
root	1620	0.0	0.4529248236944	Sep_09	60:44	SMSservice
root	2469	0.1	2.020528321316328	Sep_09	238:49	CTC-based SONET NetworkService-2
root	2589	0.0	1.720510481097776	Sep_09	264:03	CTC-based SDH NetworkService-4
root	4516	0.0	0.5498352279272	Sep_11	50:25	ONS15454/ONS15327/ONS15310CL/ONS15310MA PMSservice-1
root	8842	0.0	0.7882680444368	Sep_10	26:02	CORBAGWService
root	2211	0.1	2.9324592118760	Sep_10	1:47	OrchestrationService
root	8825	0.1	4.1324040166824	Sep_09	4:47	MGX VG NESservice-1
root	1536	0.0	0.0	Sep_09	0:34	Apache Web Server

1.4.5 Explanation of the `ctms-stop-service` Command

The `ctms-stop-service` command kills the service and starts a new instance of the service automatically.

**Caution**

Use the `ctms-stop-service` command with extreme caution, because it terminates the service ungracefully. Before using this command, try to stop the service from the Control Panel window.

Step 1

Log into the CTM server workstation as the root user.

Step 2

On the command line, enter one of the following commands to stop the CTM process and automatically start a new service:

- SM service:

```
ctms-stop-service SMSERVICE
```

- NE/PM services:

```
ctms-stop-service service-ID-number
```

- CTM GateWay/CORBA service:

```
ctms-stop-service -1
```

- SNMP trap service:

```
ctms-stop-service -2
```

■ 1.4.5 Explanation of the ctms-stop-service Command