CHAPTER 1

System Requirements

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

Note

- At the time of the CTM R8.0 release, CiscoView is supported on Solaris 8 but not on Solaris 10. Therefore, CiscoView is not provided with CTM R8.0. Contact your Cisco account representative to obtain CiscoView for Solaris 10 once it becomes available.
- CTM R8.0 packaging includes four installation CDs.
- 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.

1.1 CTM Server Requirements

The CTM server runs on Sun Solaris 10, hardware release 06/06, on a Sun SPARC-based server. Earlier releases of Solaris 10 can be updated by applying the latest recommended patch cluster available from Sun at http://sunsolve.sun.com/pub-cgi/show.pl?target=patches/patch-access.

Cisco tests certain simulated network configurations, which are listed in Table 1-1 to Table 1-4. 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 capable of using a nonlocal database, meaning the database is installed on a separate server. For information about this configuration, contact your Cisco account representative.

- CTM is not validated against Network File System (NFS)-mounted drives. Their use might require more CPU, memory, and disk space than is specified in the following tables.

Caution During the Solaris 10 installation, you are prompted to select software to install. (The default is End User System Support—769 MB.) Select **Entire Distribution plus OEM support—1491 MB**. If you do not select this, the CTM installation will fail.

Note When Solaris 10 is installed, it also installs the International Input Method Server (IIMS), which uses the CTM internal port 9010. 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. This indicates that CTM is automatically restarting the eventd process. The IIMS is required only for non-English input methods; it is not required in CTM. To avoid internal CTM alarms and to make port 9010 available, make sure that the IIMS is not running.

Caution Configure your file systems to allow large files. By default, no single file can be larger than 2 GB. This can be problematic for large database installations of the CTM server. Select **Include Solaris 64-bit support**.

To install the CTM server, it is required that you have:

- Sun Solaris patches 118371-07,118560-02, 118562-09, 118712-10, 118712-11, 118815-04, 118822-30, 118833-24, 118870-01, 118872-04, 118918-19, 118918-21, 118959-03, 119059-18, 119130-26, 119254-27, 119254-28, 119254-06, 119317-01, 119574-02, 119578-29, 119578-30, 119593-01, 119757-04, 119764-05, 119850-21, 119903-02, 119981-09, 119985-02, 120061-02, 120292-01, 120329-02, 120467-05, 120469-05, 120664-01, 120719-01, 120824-05, 120824-06, 120849-04, 120085-01, 120900-04, 121002-03, 121004-02, 121012-02, 121118-08, 121133-02, 121229-01, 121236-02, 121265-02, 121296-01, 121308-07, 121453-02 122032-02, 122856-02, 122856-03, 122911-02, 123186-01, 123304-02, 119254-27, 119578-29, 119689-07, and 122032-01 or later, available on SunSolve Online at http://sunsolve.sun.com.

  Note Patches 119689-07 and 122032-01 are required to comply with the Daylight Saving Time changes that are planned in the United States for March 2007, as described in the Energy Policy Act of 2005. These patches are not necessary outside of U.S. time zones.

  Note These Solaris patches might be superseded by more recent patches. Visit Sun's website for the most up-to-date patch information.

  Note While installing Solaris patches, you might receive a message saying "This patch is obsoleted by patch <*number*>, 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.

Note Enter the **showrev -p | grep** <*patch_number*> command to verify that the required Solaris patches are installed.

Note Always install Solaris patches in single-user mode.

- Sun Microsystems Java Runtime Environment (JRE) Standard Edition version 1.5.0_06 (installed automatically for the CTM server and CTM GateWay/CORBA, and bundled with the CTM client).
- Oracle9i Release 2 software plus the 9.2.0.7 or 9.2.0.8 patch.

Note Both the 9.2.0.7 and 9.2.0.8 patches for Oracle9i are supported with CTM R8.0.

- Oracle9i licenses for Sun Solaris.

Note Oracle licenses can be purchased either for the server processor or for named users. For more information on Oracle9i named users, see 1.3 Oracle Licensing for CTM, page 1-15.

- Available swap space (see Table 1-9 and Table 1-10, Part 2 for swap space requirements).
- CD-ROM drive.

1.1.1 Server Specifications

Table 1-1 to Table 1-4 show recommended optical, CRS-1, XR 12000, Cisco 7600, 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 sample configurations when the CTM server and Oracle9i database are installed on the same workstation. The CTM server can run on any platform that supports Sun Solaris 10.

Note To calculate the memory required for multiple NE types, add the specified RAM required for each NE type. For instance, in a small network, if you are adding optical NEs (which requires 4 GB of RAM according to Table 1-1) and CRS-1 NEs (which requires 4 GB of RAM according to Table 1-2), you will require 8 GB RAM total.

Note The processor requirements for UltraSPARC IV apply also to UltraSPARC IV+. CTM R8.0 requires the same number of processors regardless of whether you use UltraSPARC IV or UltraSPARC IV+.

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

Network Size	Oracle Database Type	Processor	CPU Speed	RAM	No. of Network Partitions	Max. No. of Optical NEs[1]
Small	Standard Edition	2 x UltraSPARC III or 2 x IIIi CPU	1.2 GHz	4 GB	1	200
Medium	Enterprise Edition	4 x UltraSPARC III or 2 x UltraSPARC IV CPU	1.2 GHz	16 GB	1	500
Large	Enterprise Edition	8 x UltraSPARC III or 4 x UltraSPARC IV CPU	1.2 GHz	32 GB	4	2000
High end	Enterprise Edition	8 x UltraSPARC IV CPU with fiber-channel disk array	1.2 GHz	64 GB	6	3000

1. 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 SDCC links and 96 SONET cross-connections per node). Note that these numbers should be used as a guideline, and will vary depending on the software and hardware configuration of your NEs.

Values in Table 1-2 assume that performance monitoring (PM) data collection is not enabled. It is recommended that you:

- Enable PM data collection only on the NEs where PM collection is required.
- Add to the PM data collection while monitoring system performance.
- Collect only the required PM data types.

Also, the values in Table 1-2 are based on 5000 Access Control Lists (ACLs) and 2000 IP Explicit Paths (IEPs).

Table 1-2 Recommended Specifications for the CTM Server Installation—CRS-1 and XR 12000

Network Size	Oracle Database Type	Processor	CPU Speed	RAM	No. of Network Partitions[1]	Max. No. of CRS-1 or XR 12000 NEs[2]
Small	Standard Edition	2 x UltraSPARC III or 2 x IIIi CPU	1.2 GHz	4 GB	1	20
Medium	Enterprise Edition	4 x UltraSPARC III or 2 x UltraSPARC IV CPU	1.2 GHz	16 GB	2	80
Large	Enterprise Edition	8 x UltraSPARC III or 4 x UltraSPARC IV CPU	1.2 GHz	32 GB	3	100
High end	Enterprise Edition	8 x UltraSPARC IV CPU with fiber-channel disk array	1.2 GHz	64 GB	4	130

1. In a standard configuration, the recommended maximum number of NEs per partition is 40.
2. Note that these numbers should be used as a guideline, and will vary depending on the software and hardware configuration of your NEs.

Table 1-3 Recommended Specifications for the CTM Server Installation—Cisco 7600

Network Size	Oracle Database Type	Processor	CPU Speed	RAM	No. of Network Partitions	Max. No. of Cisco 7600 NEs[1]
Small	Standard Edition	2 x UltraSPARC III or 2 x IIIi CPU	1.2 GHz	4 GB	1	20
Medium	Enterprise Edition	4 x UltraSPARC III or 2 x UltraSPARC IV CPU	1.2 GHz	16 GB	1	40
Large	Enterprise Edition	8 x UltraSPARC III or 4 x UltraSPARC IV CPU	1.2 GHz	32 GB	1	40
High end	Enterprise Edition	8 x UltraSPARC IV CPU with fiber-channel disk array	1.2 GHz	64 GB	1	40

1. These numbers assume you are using all Cisco 7600 NEs with 9-slot chassis. Note that these numbers should be used as a guideline, and will vary depending on the software and hardware configuration of your NEs.

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

Network Size	Oracle Database Type	Processor	CPU Speed	RAM[1]	No. of Network Partitions	Max. No. of Clients	Max. No. of MGX NEs
Small	Standard Edition	2 x UltraSPARC III or 2 x IIIi CPU	1.2 GHz	4 GB	1	30	6
Medium	Enterprise Edition	4 x UltraSPARC III or 2 x UltraSPARC IV CPU	1.2 GHz	16 GB	1	50	20
Large	Enterprise Edition	8 x UltraSPARC III or 4 x UltraSPARC IV CPU	1.2 GHz	32 GB	1	50	50
High end	Enterprise Edition	8 x UltraSPARC IV CPU with fiber-channel disk array	1.2 GHz	64 GB	1	100	100

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.

Note The installation procedure assumes that you are performing the installation directly from the workstation. X-terminal sessions are not supported for the CTM server installation.

The following list details 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 is increased from the size shown in Table 1-1, Table 1-2, Table 1-3, and Table 1-4, 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.
- Processor—The server can manage more NEs as the number of processors increases above what is shown in Table 1-1, Table 1-2, Table 1-3, and Table 1-4. The server can manage fewer NEs as the number of processors decreases.

- CPU Speed—The server can manage more NEs if the CPU speed is faster than what is shown in Table 1-1, Table 1-2, Table 1-3, and Table 1-4. The server can manage fewer NEs as the CPU speed decreases.
- RAM—The server can manage more NEs if the RAM increases above what is shown in Table 1-1, Table 1-2, Table 1-3, and Table 1-4. 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.

1.1.2 Disk Space Specifications

Note To calculate the disk space required for multiple NE types, add together the specified disk space required for each NE type. For instance, in a small network without PM collection, if you are adding optical NEs (which requires 49 GB of disk space according to Table 1-5) and CRS-1 NEs (which requires 46 GB of disk space according to Table 1-6), you will require 95 GB disk space total.

Table 1-5 to Table 1-8 show disk space requirements for optical, CRS-1, XR 12000, Cisco 7600, and MGX NEs based on network size and PM collection status when you are installing the CTM server and Oracle9i database on the same workstation. The disk space shown does not include the /ctm_backup directory.

Table 1-5 Disk Space Requirements for Installing the CTM Server and Oracle9i on the Same Workstation—Optical

Network Size	Maximum No. of NEs	Total Disk Space Without PM Collection	Total Disk Space with PM Collection
Small	200	50 GB	111 GB
Medium	500	80 GB	226 GB
Large	2000	142 GB	446 GB
High end	3000	234 GB	856 GB

Table 1-6 Disk Space Requirements for Installing the CTM Server and Oracle9i on the Same Workstation—CRS-1 and XR 12000

Network Size	Maximum No. of NEs	Total Disk Space Without PM Collection	Total Disk Space with PM Collection
Small	20	46 GB	47 GB
Medium	80	72 GB	88 GB
Large	100	100 GB	120 GB
High end	130	130 GB	156 GB

Table 1-7 Disk Space Requirements for Installing the CTM Server and Oracle9i on the Same Workstation—Cisco 7600

Network Size	Maximum No. of NEs	Total Disk Space Without PM Collection	Total Disk Space with PM Collection
Small	20	47 GB	—
Medium	40	77 GB	—
Large	40	105 GB	—
High end	40	135 GB	—

Table 1-8 Disk Space Requirements for Installing the CTM Server and Oracle9i on the Same Workstation—MGX

Network Size	Maximum No. of NEs	Total Disk Space Without PM Collection	Total Disk Space with PM Collection
Small	6	46 GB	103 GB
Medium	20	72 GB	215 GB
Large	50	133 GB	435 GB
High end	100	306 GB	952 GB

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 200 interfaces per NE, up to a maximum of 80,000 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 200 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 3000 optical NEs, assuming an average of 200 interfaces per NE, up to a maximum of 500,000 interfaces (includes logical and physical interfaces).

1.1.3 Partition Specifications

Table 1-9 shows partition specifications for installing the CTM server and Oracle9i on the same workstation.

Table 1-9 Partition Sizing for Installing the CTM Server and Oracle9i on the Same Workstation

Network Size	root	swap	oraclesw9i	db01	db02	db03[1]	db04[2]	db05[3]
Small	11 GB	6 GB	5 GB	5 GB	6 GB	40 GB	30 GB	8 GB
Medium	15 GB	12 GB	5 GB	8 GB	16 GB	90 GB	70 GB	10 GB
Large	15 GB	48 GB	5 GB	10 GB	26 GB	190 GB	140 GB	12 GB
High end	15 GB	96 GB	5 GB	12 GB	50 GB	360 GB	300 GB	18 GB

1. If PM collection is not enabled, the /db03 directory requires 5 GB for a small network, 8 GB for a medium network, 14 GB for a large network, and 20 GB for a high-end network.
2. If PM collection is not enabled, the /db04 directory requires 4 GB for a small network, 6 GB for a medium network, 12 GB for a large network, and 18 GB for a high-end network.
3. The /db05 directory is required only if you want to install the CTM database in ARCHIVELOG mode.

Table 1-10, Part 1 and Table 1-10, Part 2 show partition specifications for installing the CTM server and Oracle9i on separate workstations.

Table 1-10, Part 1 Partition Sizing for the CTM Server When Installing the CTM Server and Oracle9i on Separate Workstations

CTM Server								
Network Size	**root**	**swap**	**oraclesw9i**	**db01**	**db02**	**db03**	**db04**	**db05**
Small	11 GB	6 GB	5 GB	—	—	—	—	—
Medium	15 GB	12 GB	5 GB	—	—	—	—	—
Large	15 GB	48 GB	5 GB	—	—	—	—	—
High end	15 GB	96 GB	5 GB	—	—	—	—	—

Table 1-10, Part 2 Partition Sizing for the Oracle9i Database Server When Installing the CTM Server and Oracle9i on Separate Workstations

Oracle9i Database Server								
Network Size	**root**	**swap**	**oraclesw9i**	**db01**	**db02**	**db03[1]**	**db04[2]**	**db05[3]**
Small	10 GB	4 GB	5 GB	5 GB	6 GB	40 GB	30 GB	8 GB
Medium	10 GB	6 GB	5 GB	8 GB	16 GB	90 GB	70 GB	10 GB
Large	10 GB	12 GB	5 GB	10 GB	26 GB	190 GB	140 GB	12 GB
High end	10 GB	12 GB	5 GB	12 GB	50 GB	360 GB	300 GB	18 GB

1. If PM collection is not enabled, the /db03 directory requires 5 GB for a small network, 8 GB for a medium network, 14 GB for a large network, and 20 GB for a high-end network.
2. If PM collection is not enabled, the /db04 directory requires 4 GB for a small network, 6 GB for a medium network, 12 GB for a large network, and 18 GB for a high-end network.
3. The /db05 directory is required only if you want to install the CTM database in ARCHIVELOG mode.

1.1.4 Important Note About Installing the Cisco 7600 Module

The Config Engine component of the Cisco 7600 module, which is automatically installed when the Cisco 7600 module is installed, requires and comprises the following application packages:

- Tomcat version 4.1.18
- Tibco version 7.2
- Apache version 1.3.26
- SMCtcl version 8.3.1
- SMCossl version 0.9.6g
- Expect version 5.31
- CSCOTools version 1.4

If you are installing the Cisco 7600 module, you must ensure either that the server does not have these applications installed or that any installed applications on the server are the same versions as those required for the Config Engine. You can also use the **pkgrm** command to remove these packages from the server before installing CTM on the server.

To verify the application versions running on the server, enter the following commands on the command line:

- For Tomcat, enter:

  ```
  pkginfo -l  tomcat
  ```

- For Tibco, enter:

  ```
  pkginfo -l  Tibco
  ```

- For Apache, enter:

  ```
  pkginfo -l  apache
  ```

- For SMCtcl, enter:

  ```
  pkginfo -l  SMCtcl
  ```

- For SMCossl, enter:

  ```
  pkginfo -l  SMCossl
  ```

- For Expect, enter:

  ```
  pkginfo -l SMCexpect
  ```

- For CSCOTools, enter:

  ```
  pkginfo -l CSCOTools
  ```

To remove the applications from the server, enter the following commands on the command line:

- For Tomcat, enter:

  ```
  pkgrm tomcat
  ```

- For Tibco, enter:

  ```
  pkgrm Tibco
  ```

- For Apache, enter:

  ```
  pkgrm apache
  ```

- For SMCtcl, enter:

  ```
  pkgrm SMCtcl
  ```

- For SMCossl, enter:

  ```
  pkgrm SMCossl
  ```

- For Expect, enter:

  ```
  pkgrm SMCexpect
  ```

- For CSCOTools, enter:

  ```
  pkgrm CSCOTools
  ```

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 8.0 User Guide*, Chapter 9, section “Setting Debug Options.”

After running the system for several weeks without any issues, 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 Ultra 5 workstation[5]	Small	256 MB	1	333 MHz	640 MB	710 MB	• Sun Solaris 10 hardware release 06/06 with Common Desktop Environment (CDE), with graphics support for 16-bit color or higher • Mozilla 1.7 (the version integrated in Solaris 10 hardware release 06/06)
	Medium	512 MB					
	Large	512 MB					
	High end	1 GB					
Pentium 4 class PC	Small	512 MB	1	450 MHz	630 MB	700 MB	• Microsoft Windows 2000 Professional with Service Pack 3, 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 Mozilla 1.7.12, 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.
5. It is not mandatory that the CTM client run on a Sun Ultra 5 workstation. You can run the CTM client on other comparable Sun workstations.

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 causes performance degradation.

CTM supports a maximum of:

- 30 simultaneous CTM client sessions for a small network
- 60 simultaneous sessions for a medium network
- 100 simultaneous sessions for a large network
- 100 simultaneous sessions for a high-end network

Note If your network contains MGX nodes, the maximum number of supported clients is lower. See Table 1-4.

1.2.1 Verifying the Mozilla Version for the Solaris Client

To verify the application version running on the Solaris client, enter the following commands on the command line:

- To create a link in /usr/bin that points to Mozilla version 1.7, enter:

  ```
  ln -s /mozilla_installation_dir/mozilla mozilla
  ```

- To verify the environmental variables for Mozilla, enter:

  ```
  echo $PATH
  ```

  Note "/usr/bin/" should be found inside the path string.

  ```
  echo $LD_LIBRARY_PATH
  ```

  Note "/usr/local/lib" should be found inside the path string.

- To correct the environmental variables for Mozilla, enter:

  ```
  setenv PATH /usr/bin:$PATH
  setenv LD_LIBRARY_PATH /usr/local/lib
  ```

1.2.2 Using Remote Application Software with the CTM R8.0 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:

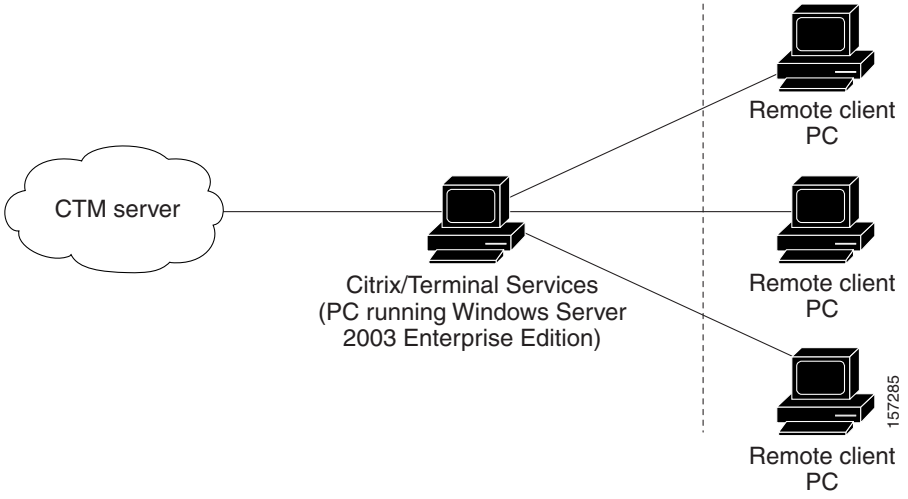
- base RAM—Amount of RAM required by the remote application software.
- base CPU—Amount of CPU required by the remote application software.

- delta RAM—Amount of RAM required for each additional client.
- delta CPU—Amount of CPU required for each additional client.

1.2.2.1 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 1-12 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	150 MB	450 MHz	240 MHz
Citrix Presentation Server 4.0	512 MB	150 MB	450 MHz	240 MHz

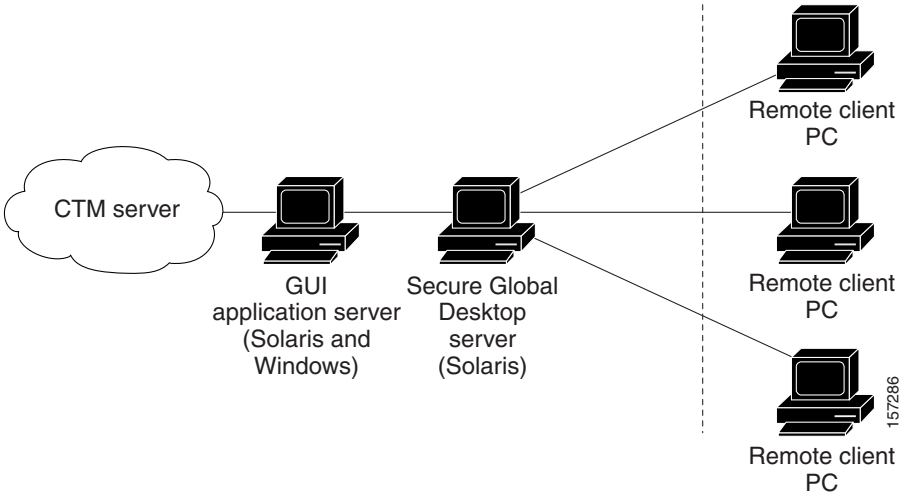
In this example, the hardware requirements for 10 clients are:

- CPU = 450 MHz + (240 MHz *x* 10) = 2850 MHz
- RAM = 512 MB + (150 MB *x* 10) = 2012 MB

1.2.2.2 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 1-13 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	150 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 + (150 MB *x* 10) = 2012 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 1-14 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

1.2.3 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 1-15 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 R8.0 server and client installations. This section describes with examples the following Oracle database editions:

- 1.3.1 Oracle Enterprise Edition, page 1-17
- 1.3.2 Oracle Standard Edition, page 1-17

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

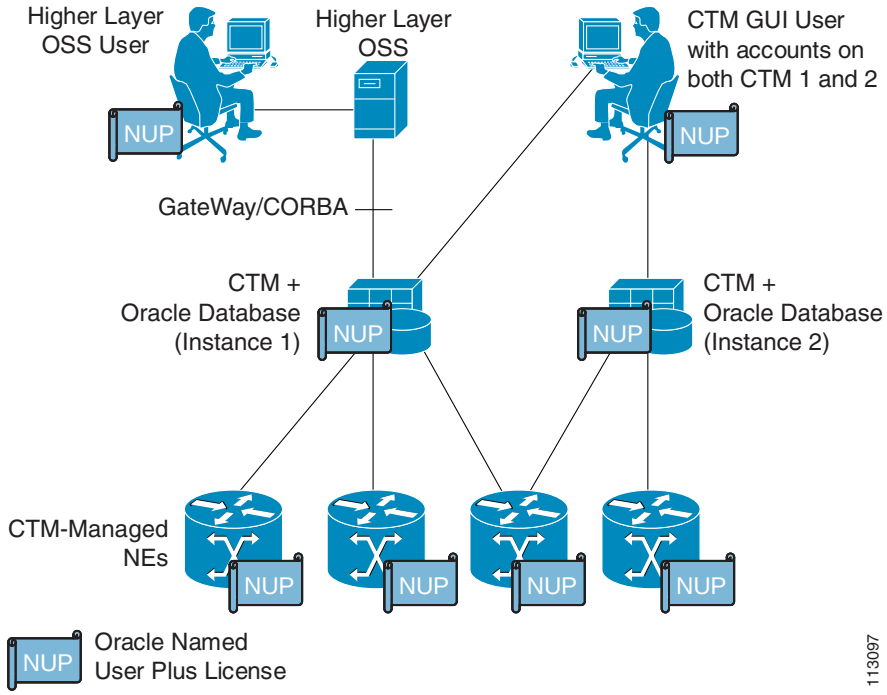
Oracle's technology products, including the Oracle database required for use with CTM, are licensed using one of two possible metrics. Which metric to use normally depends on which will result in a lower price for the database. If for some reason the number of database users cannot be counted, the Processor 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).
- *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 either CTM GateWay/CORBA or CTM GateWay/TL1. Automated users include the NEs managed by CTM and the CTM server itself.

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 forth).

1.3.1 Oracle Enterprise Edition

Due to the scalability features included, Oracle Database Enterprise Edition (EE) is required for CTM servers managing medium to high-end CTM installations.

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 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

1.3.1.2 CTM with Oracle EE (Example B)

The same service provider customer as in 1.3.1.1 CTM with Oracle EE (Example A) 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 previous 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 cannot be licensed on workstations with a capacity of greater than 4 processors.

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 4 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

1.4 Installation Prerequisites

Before installing the CTM server and the Oracle9i database on your Sun Solaris 10 server, verify the following:

- You have the correct Solaris patches installed. (See 1.1 CTM Server Requirements, page 1-1.)

  Note Solaris 10 can be installed only on a 64-bit workstation.

- You have the correct version of Oracle9i—Standard or Enterprise Edition, for Sun Solaris.

  Note Enter the following command to determine what type of applications you can run on your operating system (OS):

  ```
  isainfo -kv
  ```

  If the output reads “64-bit sparcv9 kernel modules,” you can run both 64-bit and 32-bit applications. If the output reads “32-bit sparcv9 kernel modules,” you can run only 32-bit applications. It is recommended that you be able to run 64-bit applications.

- You meet all of the system requirements described in this chapter.
- The **ping** command is included in your path environment variable.
- Decide whether or not you want to install the CTM database in ARCHIVELOG mode. If you plan to perform hot database backups, ARCHIVELOG mode is required.
- Verify that your /ctm_backup directory (the disk directory for the backed-up database and configuration files) is at least as big as the total sum of your database data files. If the /ctm_backup directory is not equal to the total size of your database data files, you are prompted with a warning message that you might not have enough disk space.
- Decide which nonroot users you want to be able to run CTM UNIX commands. (See 1.4.1 Overview of Sudo Commands, page 1-19.)

1.4.1 Overview of Sudo Commands

Sudo software (freeware) version 1.6.6 is bundled with the CTM R8.0 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_ip_address.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: \
/opt/CiscoTransportManagerServer/bin/ctms-start, \
/opt/CiscoTransportManagerServer/bin/ctms-abort, \
/opt/CiscoTransportManagerServer/bin/ctms-stop, \
/opt/CiscoTransportManagerServer/bin/ctms-stop-service, \
/opt/CiscoTransportManagerServer/bin/showctm,\
/opt/CiscoTransportManagerServer/bin/getinfo.sh, \
/opt/CiscoTransportManagerServer/bin/prune_auditlog.sh, \
/opt/CiscoTransportManagerServer/bin/prune_errlog.sh, \
/opt/CiscoTransportManagerServer/bin/prune_audittrail.sh, \
/opt/CiscoTransportManagerServer/bin/prune_fm.sh, \
/opt/CiscoTransportManagerServer/bin/prune_pm.sh, \
/opt/CiscoTransportManagerServer/bin/prune_ne.sh, \
/opt/CiscoTransportManagerServer/bin/prune_server_monitor.sh, \
/opt/CiscoTransportManagerServer/bin/prune_admin_job_table.sh, \
/opt/CiscoTransportManagerServer/bin/prune_ne_ip_address.sh
```

1.4.2 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.

The **ctms-start** command also starts the Config Engine if the Cisco 7600 is installed.

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.

1.4.3 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 **ctms-stops** command also shuts down the Config Engine if the Cisco 7600 is installed. The overall process takes approximately 5 minutes.

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

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

```
ctms-stop
```

1.4.4 Explanation of the ctms-abort Command

The **ctms-abort** command kills all of the running processes immediately and stops the CTM server. The **ctms-aborts** command also stops the Config Engine if the Cisco 7600 is installed. 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
```

1.4.5 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 flexible:

```
CTM Processes for Cisco Transport Manager Server Version: 8.0 Build: <build_number>
-------------------------------------------------------------------------------------
USER   PID   %CPU       %MEM          START         TIME  PROCESS
-------------------------------------------------------------------------------------
root  2509   0.2   0.425528           16:21:08      0:13  CTM Server
root  2463   0.0   0.018032           16:21:03      0:00  CTM Server
root  2695   0.4   4.438779289056     16:21:51      0:58  SnmpTrapService
root  2538   0.1   4.638281692280     16:21:10      0:40  SMService
root  2491   0.0   0.0                16:21:07      0:00  Apache Web Server
-------------------------------------------------------------------------------------
```

1.4.6 Explanation of the ctms-stop-service Command

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

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