

Oracle® Enterprise Manager

Concepts Guide

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Oracle Enterprise Manager Concepts Guide, Release 9.2.0

Part No. A96674-01

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Preface

The *Oracle Enterprise Manager Concepts Guide* presents a general overview of Oracle Enterprise Manager Release 9.2.0.

Oracle Enterprise Manager Console is a system management tool which provides an integrated solution for managing your heterogeneous environment. The product combines a graphical console, agents, common services, and tools to provide an integrated, comprehensive systems management platform for managing Oracle products.

Refer to the Oracle Enterprise Manager online help or the *Oracle Enterprise Manager Administrator's Guide* for information on how to use the Oracle Enterprise Manager Console.

Intended Audience

This guide explains the general concepts of Oracle Enterprise Manager. You should already be familiar with Oracle and the administrative tasks you wish to perform.

Documentation Accessibility

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Organization

This guide is divided into the following chapters:

Chapter 1, "Overview of Oracle Enterprise Manager"

describes the overall architecture and features of Oracle Enterprise Manager: the Console, Oracle Management Server, and the common services.

Chapter 2, "The Console"

Describes the layout and use of the Oracle Enterprise Manager Console.

Chapter 3, "Job and Event Systems"

Describes the Job Scheduling and Event Systems, which execute jobs and monitor for occurrences on sites throughout the network.

Chapter 4, "Database Administration"

Describes the database administrative functionality in Oracle Enterprise Manager.

Chapter 5, "Oracle Management Packs and Integrated Applications"

Describes the optional management packs. Combined with Oracle Enterprise Manager's Console and framework, these specialized application packs offer

integrated solutions for monitoring system bottlenecks, optimizing and tuning system performance, managing system changes, and planning for increases in resource utilization of your entire information system environment.

Related Documents

For more information, see these Oracle resources:

- *Oracle9i Database New Features*
- *Oracle9i Database Concepts*
- *Oracle9i Database Administrator's Guide*
- *SQL*Plus User's Guide and Reference*
- *Oracle9i Database Error Messages*
- *Oracle9i Globalization Support Guide*
- *Oracle9i Database Reference*
- *Oracle9i SQL Reference*

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<http://otn.oracle.com/admin/account/membership.html>

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Conventions

The following conventions are used in this manual:

Convention	Meaning
. . .	Vertical ellipsis points in an example mean that information not directly related to the example has been omitted.
...	Horizontal ellipsis points in statements or commands mean that parts of the statement or command not directly related to the example have been omitted
boldface text	Boldface type in text indicates a term defined in the text, the glossary, or in both locations.
< >	Angle brackets enclose user-supplied names.
[]	Brackets enclose optional clauses from which you can choose one or none.

Overview of Oracle Enterprise Manager

Oracle Enterprise Manager combines Oracle's system management Console, common services, and integrated platform graphical tools. It provides an integrated set of standard database administration applications to help automate and simplify the common daily tasks of administrators. These supplemental applications focus on specific areas of database administration, helping administrators with their daily and routine tasks of managing databases and other services and keeping them operational.

This chapter presents an overview of Oracle Enterprise Manager's benefits, architecture, and major components.

The chapter is divided into the following sections:

- Managing Your Entire Oracle Environment
- Three-Tier Framework
- Benefits of Oracle Enterprise Manager
- Common Services

Managing Your Entire Oracle Environment

The primary interface to managing your Oracle environment is the Oracle Enterprise Manager Console, the client interface. The Console is part of the Oracle Enterprise Manager three-tier architecture, which is discussed in more detail later in this chapter.

From the Console, you can perform the following tasks:

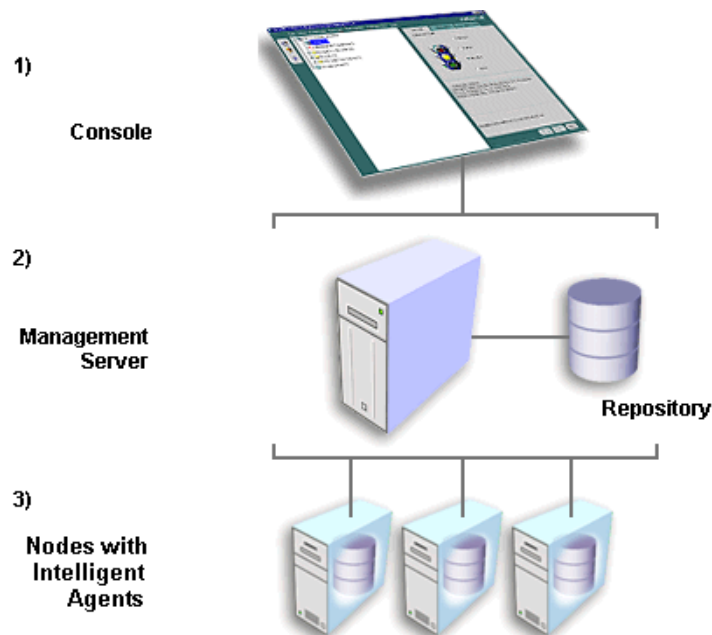
- Administer, diagnose, and tune multiple databases.
- Manage a wide range of targets in addition to Oracle databases, including: Web servers, application servers, applications, and services.
- Administer Oracle Real Application Groups Clusters if the option is installed.
- Schedule tasks on multiple systems at varying time intervals.
- Monitor database conditions throughout the network.
- Share tasks with other administrators.
- Group related targets together to facilitate administration tasks.
- Create, schedule, and publish HTML reports to quickly view and analyze information about your managed systems.
- Administer targets from any location via a Web browser.
- Launch integrated Oracle and third-party tools.
- Customize the display of an Enterprise Manager administrator.

Three-Tier Framework

Oracle Enterprise Manager architecture consists of a three-tier framework. Unlike a two-tier client-server structure, where a client tier responsible for the presentation of information accesses data from a server, Oracle Enterprise Manager utilizes a three-tier architecture which includes:

- Console clients and integrated tools provide a graphical interface for administrators—first tier
- Management Servers and a database repository provide a scalable middle tier for processing system management tasks—second tier
- Intelligent Agents installed on each node monitor its services and execute tasks from the Management Server—third tier

Figure 1-1 Three-Tier Architecture



With Oracle Enterprise Manager's three-tier framework, data-intensive business logic is moved off the client and is recast as shared services on one or more

middle-tier Oracle Management Servers, providing reliability, scalability, and fault tolerance for enterprise environments.

Because not all enterprises need to implement Enterprise Manager as a three tier system, Enterprise Manager is also available in standalone mode, a two-tier framework which connects directly to the databases. The Console launched standalone allows a single person to use one or more applications without requiring an Oracle Management Server or Intelligent Agent.

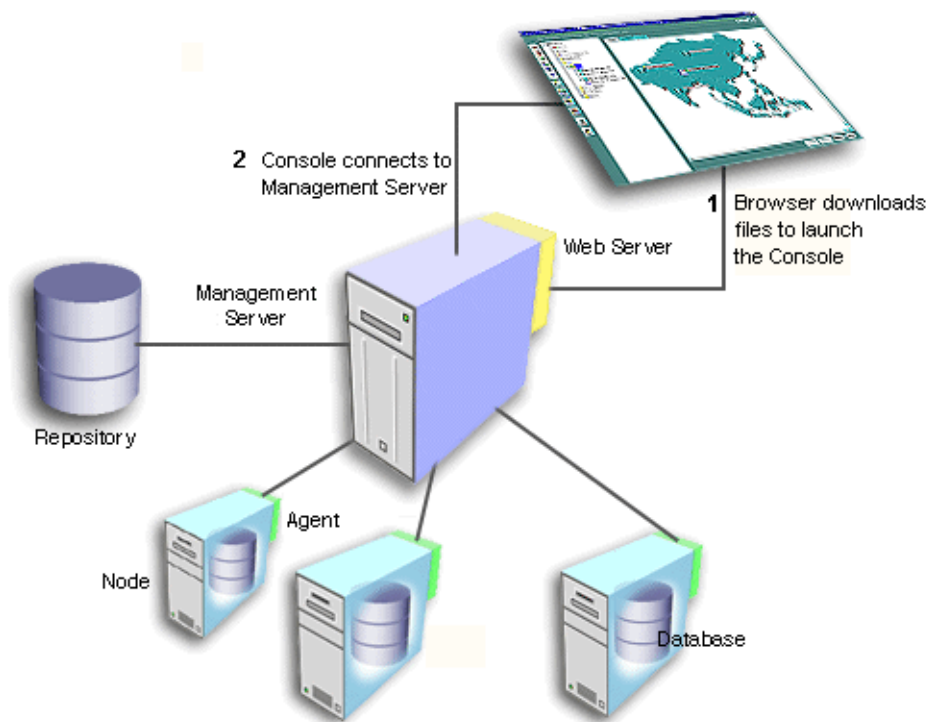
Use the standalone Console if you want to perform basic administrative tasks that do not require the job, event, or group system.

If you want to use events, jobs, sharing of administrative data, blackouts, groups, enhanced notifications, historical collections, and have the ability to run applications in a web browser, use Enterprise Manager connected to the Management Server. For more information about the standalone Console, see the *Oracle Enterprise Manager Configuration Guide*.

Clients

The first tier of Oracle Enterprise Manager is comprised of clients such as consoles and management applications, which present a graphical user interface to administrators for all management tasks. These client components can be installed locally or brought up with a web browser.

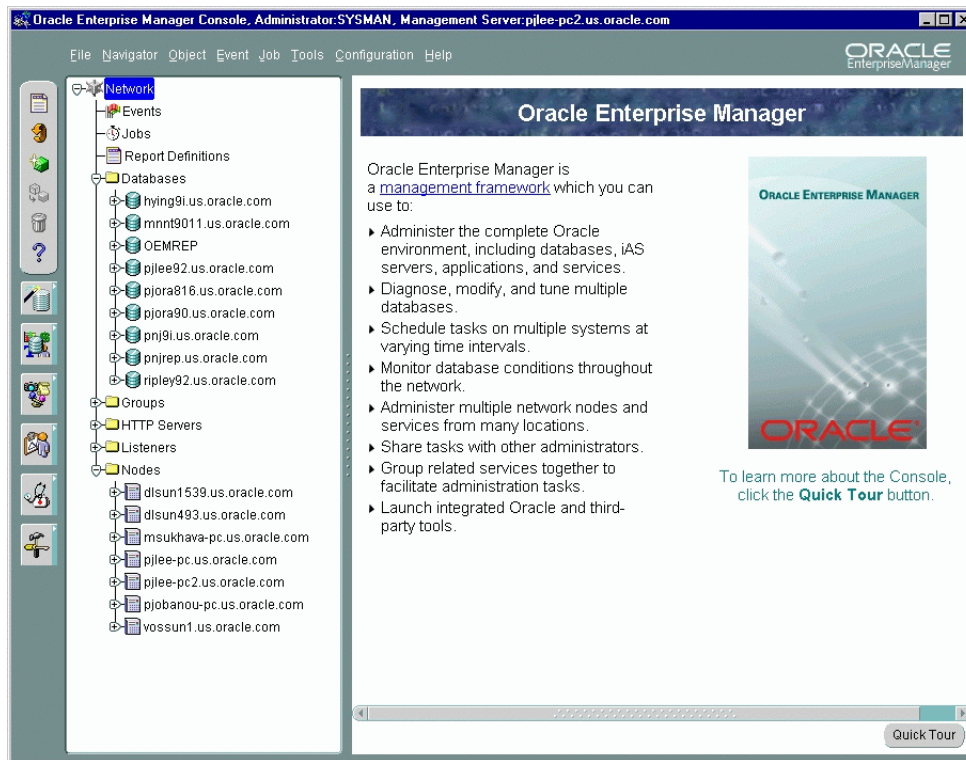
The first-tier clients depend on second-tier Oracle Management Servers for the bulk of their application logic.

Figure 1-2 First Tier

The Oracle Enterprise Manager Console provides menus, toolbars, and drawers allowing access to Oracle tools.

The Console uses a master/detail configuration to provide an integrated, consistent, and efficient way of managing your enterprise environment. When an object in the Navigator (master) is selected, the appropriate interface is displayed on the right-hand side of the Console (the detail pane). Information displayed on the right-hand side of the Console can be a multi-column list, property sheet, or overview page.

In addition, Events, Jobs, Groups, and Report definitions have been integrated into the Navigator as well.

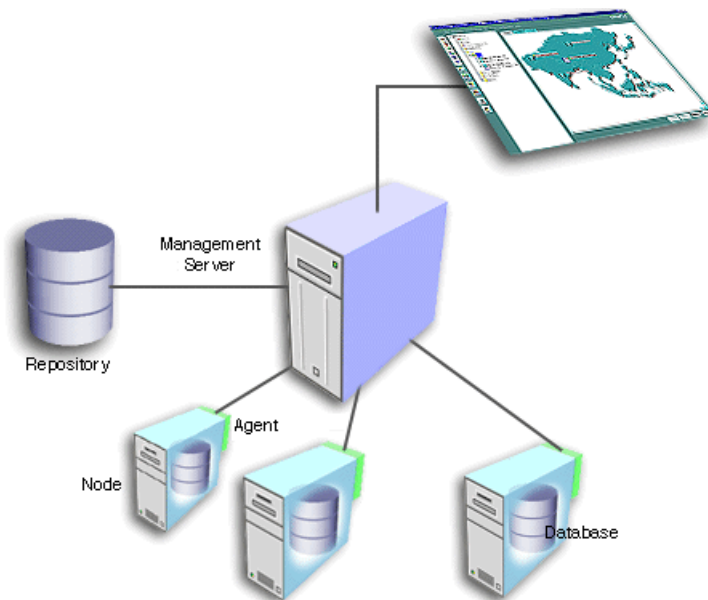
Figure 1–3 Oracle Enterprise Manager Console

Note: See Chapter 2, "The Console" for descriptions of the basic components of the Console and how they are organized. For information about the Console menus, see the *Oracle Enterprise Manager Administrator's Guide*.

Oracle Management Server

The second tier of the Oracle Enterprise Manager framework is comprised of one or more Oracle Management Servers. The Management Server is the core of the Enterprise Manager framework. It provides administrative user accounts, processes management functions such as jobs and events, and manages the flow of information between the Console (first tier) and the nodes with Intelligent Agents (third tier).

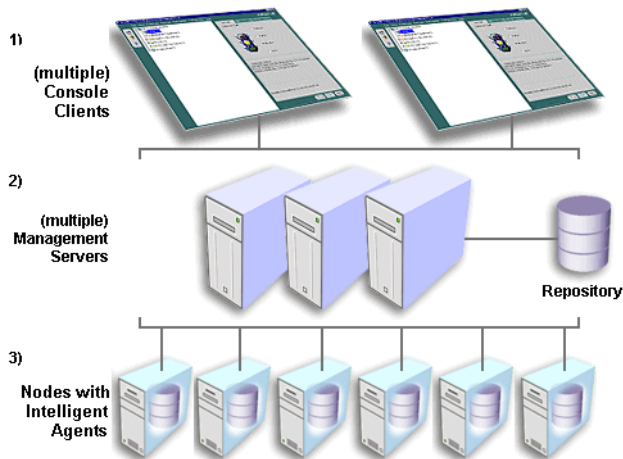
Figure 1–4 Management Server



The Oracle Management Server uses a repository to store all system data, application data, information about the state of managed nodes, and information about any system management packs. A repository is a set of database tables that must be located in a supported Oracle database accessible to the Oracle Management Server.

If necessary, a large enterprise can use more than one Oracle Management Server in the middle tier. When multiple Oracle Management Servers are used, they share and balance the workload, ensuring high performance and scalability.

Figure 1–5 Second Tier

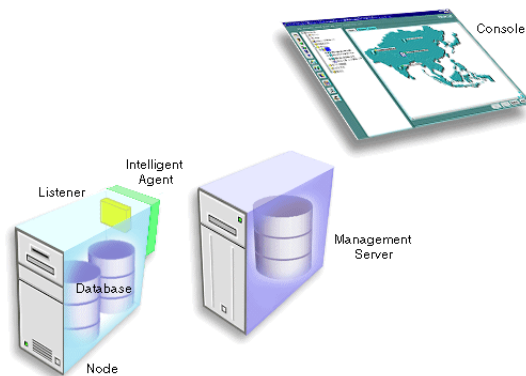


One of the most important responsibilities of the Oracle Management Server is distributing tasks to the Oracle Intelligent Agents, which run on managed nodes in the third tier. The Intelligent Agents are responsible for the localized execution of tasks and the on-going monitoring of databases and other targets on the managed nodes.

Also, the Administrator can reconnect to a Management Server from within the Console should the Management Server to which the Console was originally connected become unavailable whether due to scheduled maintenance on the node or a power outage in the area where the Management Server resides.

Managed Nodes

The third tier of the Oracle Enterprise Manager framework is comprised of managed nodes which contain databases and other managed targets. Residing on each node is an Oracle Intelligent Agent, which communicates with the Oracle Management Server(s) and performs tasks sent by consoles and client applications.

Figure 1–6 Third Tier

The Oracle Intelligent Agent monitors databases and other targets in the node for registered events (potential problem occurrences) and scheduled jobs (activities), both sent by the client via the middle-tier Oracle Management Server(s).

Intelligent Agents function independently of the databases and other targets they support, and also function independently of the Console, management applications, and Oracle Management Servers. By running independently from other components, Intelligent Agents can perform such tasks as starting up and shutting down a database and staying operational if another part of the system is down.

Beginning with Intelligent Agent version 9.0.1, the Intelligent Agent process will be automatically restarted in cases where the Intelligent Agent process exits due to an abnormal condition within the environment in which the Intelligent Agent is running.

Intelligent Agents support Simple Network Management Protocol (SNMP), enabling third-party applications to communicate with the Intelligent Agent and be managed along with Oracle targets.

The Intelligent Agent handles the collection of system performance data (for example, file I/O or CPU usage data) for Capacity Planner and Performance Manager, which are data-analysis applications in the optional Oracle Diagnostics Pack, Oracle Management Pack for Oracle Applications, and Oracle Management Pack for SAP R/3. You do not have to configure a separate data collection service for this purpose.

Note: For more information about the Intelligent Agent, see the *Oracle Intelligent Agent User's Guide*.

Benefits of Oracle Enterprise Manager

Oracle Enterprise Manager enables administrators to maintain the highest level of performance and availability while controlling system management costs. This section describes the major benefits of Oracle Enterprise Manager and its scalability, power, and reliability.

Topic	See Page
Single Point of Management	1-10
Multi-Administrator System	1-11
Scalability for Growing, Distributed Environments	1-11
Extensible Architecture	1-12
Automated Lights-out Administration	1-12
Autonomous Intelligent Agent	1-12
Database Administration Functionality	1-13
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Single Point of Management

From the Oracle Enterprise Manager Console, you can manage and administer all your distributed systems, databases, tools, and users from a central location. An intuitive graphical user interface that provides powerful and robust system management, the Console gives you a central point of control for the Oracle environment. The easy-to-use interface can simplify tasks for the system administrator.

With Oracle Enterprise Manager, a distributed enterprise can be managed as easily and effectively as a local workgroup, lowering the cost of system ownership. The Oracle Enterprise Manager framework allows the automation and delegation of routine, time-consuming tasks on multiple targets. Jobs can be scheduled on multiple nodes simultaneously and groups of targets can be monitored together.

Multi-Administrator System

In many enterprises, teams of database administrators must cooperate to manage numerous systems, often remotely. With Oracle Enterprise Manager, database management tasks can be organized and distributed in multi-administrator enterprises, and system data can be safely shared among administrators.

With Oracle Enterprise Manager, system data, application data, and the state of managed targets is contained in the repository, which stores administrative data. If you are using more than one Oracle Management Server, they can share a repository. Administrative data is stored in a repository.

Administrative data stored in the repository is filtered based on administrator permissions. The Oracle Management Server handles security and distributes notifications and management information to administrators based on the access levels that are set up for them. Each administrator has an account with preferred credentials set which provides access to the Oracle Management Server and the central data stored in the repository. When an administrator connects through the Navigator, the preferred credentials used are those defined explicitly for that administrator. The Oracle Management Server filters information as it flows between different consoles and the targets on the managed nodes.

Typically, all administrators share a single Enterprise Manager repository, which allows administrators to share information. The distribution of information reduces redundancy, which saves time and keeps administrative costs down. Although you can set up multiple repositories, administrators using different repositories will not have access to each other's information; there is no sharing of data between repositories.

Scalability for Growing, Distributed Environments

With its three-tier architecture, Oracle Enterprise Manager has the ability to maintain performance and automate routine tasks in rapidly growing, distributed environments. As the number of nodes and managed targets in your network increases, or if the current Oracle Management Server is overloaded, you can add more Oracle Management Servers to the middle tier to share and balance the workload. Balancing the workload in the middle tier rather than investing in additional systems management overhead, controls the cost of systems management.

Because multiple Oracle Management Servers can share a repository as their back-end store, they provide fault tolerance for each other. If one Oracle Management Server fails, the clients registered with it can immediately log in again and register with any of the other Oracle Management Servers running with that

repository, and work continues seamlessly. Any clients registered with an Oracle Management Server other than the failed one are unaffected.

For failover and scalability of the repository database, Oracle has database solutions such as Oracle9i Real Application Clusters, Oracle Failsafe, Replication Management, and others.

Extensible Architecture

Oracle Enterprise Manager's flexible architecture allows new products and additional modules to be written and added to the suite. Oracle Enterprise Manager's use of open standards (CORBA, IIOP, etc.) makes it possible to integrate third-party tools into the Console.

Automated Lights-out Administration

In a large, distributed database environment, the proportion of managed nodes per administrator increases rapidly, requiring tools that can automate tasks. Oracle Enterprise Manager offers automated, "lights-out" task management and proactive target monitoring for events, which enables control of the enterprise without necessarily needing additional staff to meet increasing system responsibilities.

Using the Job System, you can automate routine tasks such as database backups or running reports on a regular basis. Using the Event System, you can have remote databases and other targets monitored for important occurrences (events) and set up "fixit" jobs that automatically execute in response to events. Monitoring of targets for occurrences and automatic problem correction ensures that problems are dealt with before they noticeably impact end users.

Autonomous Intelligent Agent

Because jobs are executed locally at the managed nodes, they can be completed even when a crucial part of the network is down. Localized tasks are dependable because all jobs are processed by the Intelligent Agents on the individual managed nodes.

For example, if you schedule a job to run on a node, the job will be executed locally at the node at the specified time, and will run even if a network outage occurs between the node, the Oracle Management Server, and the Console. If a target on the node is down, the Intelligent Agent stores any jobs to be performed on the target until the target is back up. If the Console is down, the Intelligent Agent stores any information about the status of the job until the Console is back in service and can receive information.

Database Administration Functionality

Oracle Database Administrators (DBAs) are commonly required to perform tasks such as creating users, performing backups, adding tablespaces or datafiles, managing database objects, and changing instance parameters.

The Oracle Enterprise Manager Console offers database administration functionality that help automate and simplify the daily tasks of a DBA:

Note: For an overview of the database administration functionality, see Chapter 4, "Database Administration" or the Oracle Enterprise Manager online help.

Ease of Use

Oracle Enterprise Manager provides a complete user-friendly system management solution that allows administrators to manage distributed environments with a minimum of effort. With the ability to access and manage remote targets, an administrator can more easily make changes and execute commands. The Oracle Enterprise Manager framework is designed to offer high scalability without increasing complexity, allowing an administrator to manage more and more targets, confident that the environment is under control.

In addition, all Oracle Enterprise Manager applications have a similar graphical user interface allowing the administrator to manage the Oracle enterprise using the same familiar front end with each application. This interface can be used by both beginning and advanced users, and also can serve as a training tool when used with the Oracle Enterprise Manager wizards and quick tours.

Common Services

Oracle Enterprise Manager is made up of common services that help you manage the Oracle environment.

These common services include:

- Target Discovery
- Job System
- Event System
- Notification System and Filtering
- Paging/E-mail Blackouts
- Security
- Comprehensive Reporting
- Font Control

Target Discovery

When you launch the Console with a Management Server connection, you can perform service discovery through a Discovery Wizard. This wizard is used to identify nodes in your environment that you want to manage with Enterprise Manager. When you activate the wizard, the Discovery Wizard searches the network for the targets you specify. If that target has an Oracle Intelligent Agent running, it will be added to the Enterprise Manager Console Navigator for management along with any services running on that target. You will be able use these services as targets in jobs, events, and groups.

Job System

The Job System enables the automation of standard and repetitive administrative tasks, such as executing a SQL script or executing an operating system command. With the Job system, you can create and manage jobs, share jobs with other administrators, schedule execution of jobs, and view information about the jobs. Jobs can be scheduled on a single node or multiple nodes in the network, provided that the node has an Intelligent Agent running on it.

In-place modification also allows administrators to add and/or remove targets for submitted jobs, regardless of the version of the Intelligent Agent.

Upon job completion or failure, the system can be configured to automatically notify you and/or other administrators through e-mail or page, depending on the access levels and preferred credentials.

Because a job is an administrative entity (object) within the Oracle Enterprise Manager framework, an owner is always specified for the job as well as basic security parameters, which prevent or allow viewing and modifications by other administrators.

Note: For more information about the Job System, see Chapter 3, "Job and Event Systems".

Event System

The Event System allows the Oracle environment to be monitored for operational occurrences and borderline conditions such as loss of service, lack of storage, and resource problems such as high CPU usage.

Note: Only up/down events are shipped with base Oracle Enterprise Manager; all other more advanced events are bundled with the separately licensable packs.

These critical occurrences, called "events", are each made up of one or more "tests". When you register an event through the Console, you define the event condition by selecting one or more tests to run on the managed targets (databases, nodes, listeners, or other services), then set the threshold parameters for which you want to be notified.

You can also dynamically change parameters of a registered event by selecting a registered event, adding and/or removing targets, changing some attributes, and then applying the changes to all the targets of that event. For Oracle9*i*, you can perform a full modification. For pre-9*i*, you can perform limited modification. For information on Intelligent Agent restrictions, refer to the *Oracle Enterprise Manager Administrator's Guide*.

In Oracle9*i*, you can also specify custom operating system scripts as new event tests that will be included as part of the Enterprise Manager events system. User-Defined Events expands the breadth and flexibility of the events system by allowing you to write and incorporate custom scripts that are particular to your environment. Also, you can tie in your existing monitoring scripts into the events system, and thus take advantage of the services provided by the Enterprise Manager framework:

paging/e-mail notifications for events that go in alarm, and collaborative administration of targets.

In the Event system, you have the flexibility to schedule the evaluation of an event at specified intervals, on specified day of the week, or on a specified day of the month. It is a useful feature since you can schedule resource intensive jobs during off-peak periods.

When an event occurs and is detected by an Intelligent Agent, specified administrators are notified by Console alert, e-mail, or page, depending on their access levels and preferred credentials. You can also set up a “fixit” job to run automatically in response to an event.

As in the Job System, you can share event information with other administrators connected to the repository. Events are also objects within the Oracle Enterprise Manager framework and are assigned owners and security parameters.

Note: For more information about the Event System, see Chapter 3, "Job and Event Systems".

Notification System and Filtering

Administrators can be notified of the status of jobs and events by Console alert, e-mail, or page. When scheduling a job or registering an event, you set up notification procedures and choose which administrators to have notified of job completion or failure or event occurrence. Notification filters allow each administrator to specify when to send an email notification as opposed to a page notification as a result of a job or event status change.

Paging/E-mail Blackouts

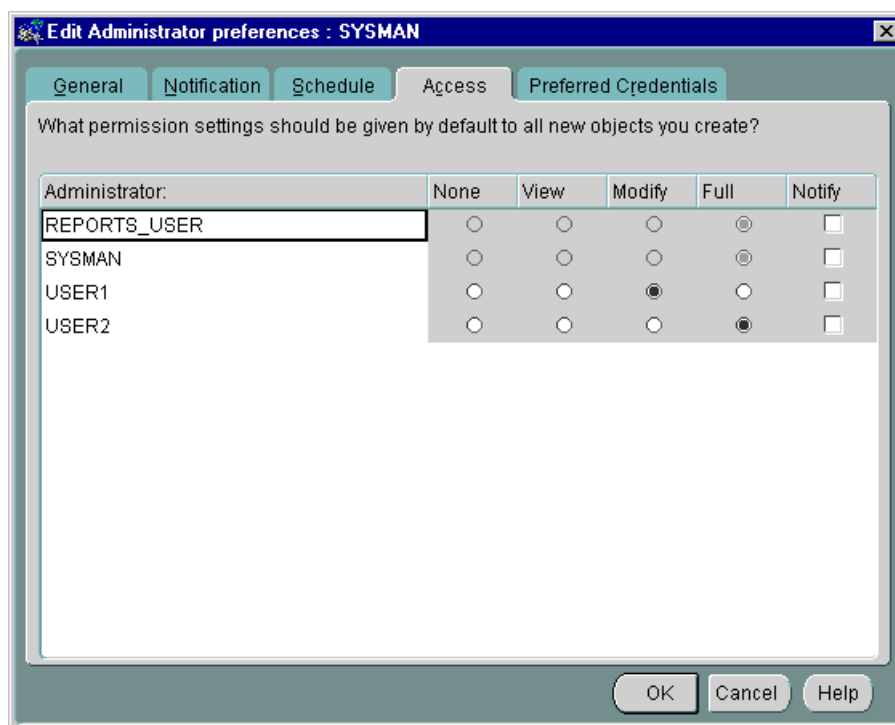
Paging/Email Blackout allows an administrator with super administrator privileges to suspend paging and email notifications for specified targets and/or services that have been previously discovered in the Navigator. Paging/email blackouts deactivate enhanced notification (email/paging), thus preventing Enterprise Manager administrators from being flooded with emails and pages if a managed target/service is brought down. For example, if a target is brought down on a regular basis for scheduled maintenance, a super administrator can schedule a paging/email blackout for that target to prevent enhanced notification during the maintenance period.

In addition to paging/email blackouts, the Enterprise Manager administrative framework also allows you to specify target-level blackouts to suspend all management and data collection activity for specific targets in your enterprise.

Security

Security parameters in Oracle Enterprise Manager are defined for targets, objects, and administrators. All administrator accounts are defined by a Super Administrator who creates and defines the access levels of all Enterprise Manager administrators. A Super Administrator can access any object and control its security parameters, including objects owned by other administrators. Security parameters are set up in the Preferences dialog box, shown in Figure 1-7, "Preferences Dialog Box".

Figure 1-7 Preferences Dialog Box



Oracle Enterprise Manager's restricted access to target discovery provides better security of managed systems by allowing only Super Administrators to discover,

refresh, and remove targets from the Enterprise Manager Console. This functionality prevents novice or new administrators of a team from adding or deleting targets for which they are not responsible.

The Console improves the security of managed environments by allowing Administrators who are actually responsible for specific targets to view and manipulate only those targets. This feature allows Super Administrators to control and customize the list of managed targets displayed in the Consoles of other, regular Administrators using Enterprise Manager. In addition, restricting certain targets from Administrators' views improves Administrators' ability to manage the targets to which they do have access. For example, rather than viewing all 300 discovered databases in his Console Navigator tree, Administrator Fred's Super Administrator can customize Fred's view such that only the 20 databases he is responsible for appear.

Comprehensive Reporting

The Enterprise Manager reporting system provides flexible reporting functionality to administrators, permitting quick and easy access to information about the status, configuration, and performance of all monitored systems in their enterprise.

Administrators can create, schedule, and publish a wide variety of enterprise system reports. When published to a website, these reports can be accessed by a wider audience, enabling anyone from administrators to managers to executives to quickly access information regarding their monitored environment. The reporting functionality is fully integrated with the Enterprise Manager Job scheduling system, allowing reports to be generated automatically at specific times or at regular intervals. Reports can also be generated on-demand, such as when an administrator requests to view a specific report by clicking on a link within the reporting website.

Note: The reporting system is only available for Enterprise Manager Consoles connected to a Management Server. Consoles running standalone only have access to the minimal reporting functionality that is available through the standard database management tools.

A rich set of predefined report definitions are supplied with Enterprise Manager out of the box, allowing you to generate reports without having to create new report definitions. If none of the predefined definitions meets your reporting requirements, you can modify definition parameters from an existing report definition and save it

as a new report definition. If your reporting needs go beyond the scope of the predefined report definitions, you can create completely new report definitions.

For more information, see the *Oracle Enterprise Manager Administrator's Guide* and the online help.

Font Control

You can control font size and style of the Console and applications. If the default fonts are too large or small for your display, you can change them from the Console. Any application which is then launched from the Console will display the updated font size.

The Console

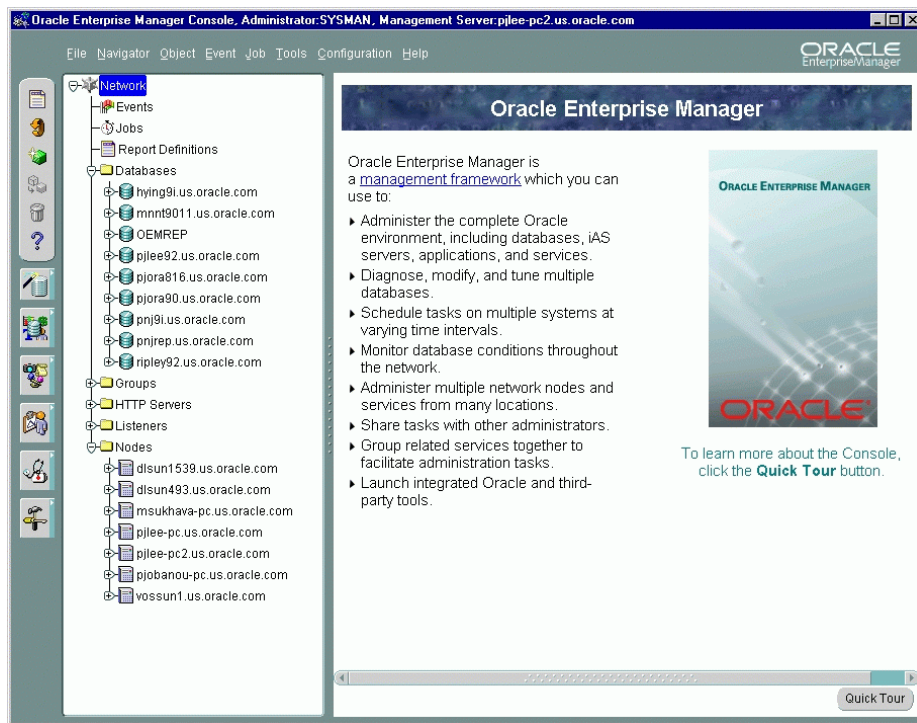
The Console is a client interface in the first tier of the Oracle Enterprise Manager framework and is used to centrally manage and administer multiple databases and other targets and your entire Oracle environment. This chapter describes the basic components of the Console and how they are organized. It is divided into the following sections:

- Console Graphical User Interface
- Console Views

Console Graphical User Interface

The Oracle Enterprise Manager Console uses a master/detail configuration to provide an integrated, consistent, and efficient way of managing your enterprise environment. When an object in the Navigator (master) is selected, the appropriate interface is displayed on the right-hand side of the Console (the detail pane). Information displayed on the right-hand side of the Console can be a multi-column list, property sheet, or overview page.

Figure 2–1 Oracle Enterprise Manager Console



The Console toolbar, located along the upper-left side of the Console, allows you to access basic functions for objects in the Navigator and the Console in general.

The Console tool drawers, located below the toolbar, provides quick and easy access to a wide variety of integrated applications.

Console Views

This section describes each of the views which you can access through the Console.

Topic	See Page
Navigator	2-3
Groups	2-3
Jobs	2-5
Events	2-8

Navigator

The Navigator provides:

- Identification of the targets on nodes in the managed environment.
- Relationships among the objects; by expanding an object, you can display any objects it contains.
- Methods for accessing and launching administration tools on objects.
- A source of targets and nodes with which to populate groups.
- A source of database objects upon which to access database administration functionality and integrated applications.
- A source of objects for copying with a simple drag and drop action.

Because the Enterprise Manager Console uses a master/detail-type user interface, objects selected in the "master" Navigator tree control what is displayed in the "detail" pane to the right. This simple, yet effective interaction paradigm is consistent for all Enterprise Manager applications.

Note: For more information on the Navigator, see the *Oracle Enterprise Manager Administrator's Guide*.

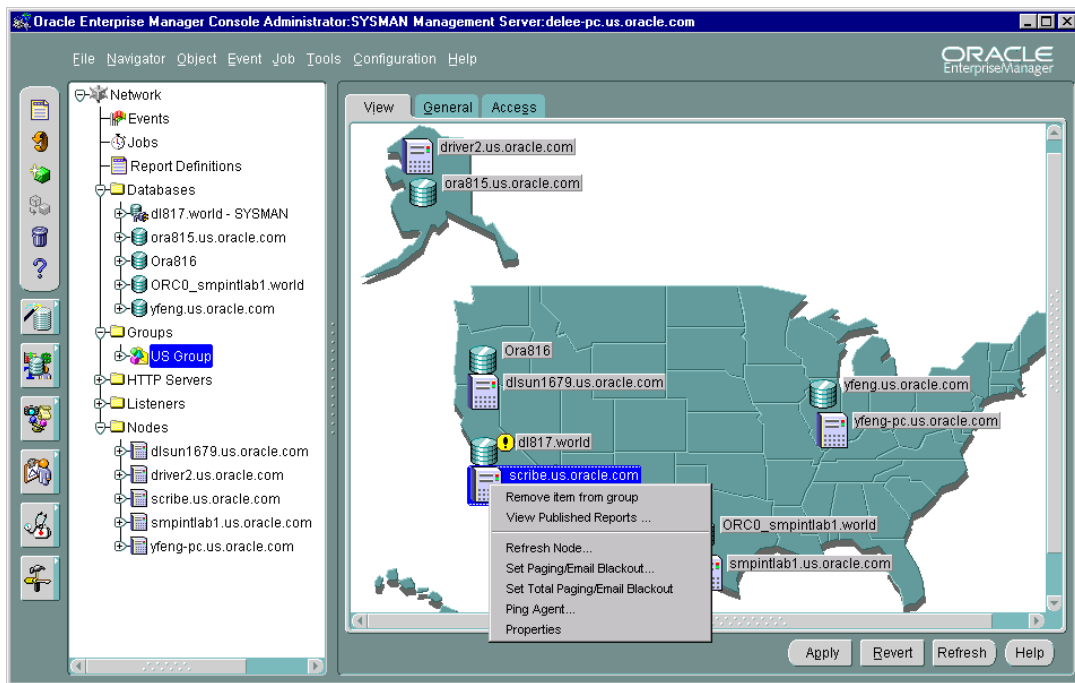
Groups

The Group system lets you organize the objects you manage into logical categories for more efficient management and administration. A group is a collection of targets, such as databases, listeners, nodes or HTTP servers, that share a common

location or function. You can organize groups based on any criteria you determine, such as function, department, geographical location, or number of administrators. You can then place the groups on a map or graphical view of the network making it easy to locate, diagnose, and act on encountered conditions. The system also lets you assign jobs to groups and monitor their status. The Groups system is especially useful for managing environments with many databases and targets.

Probably the most important aspect of the Enterprise Manager Group system is that it provides an efficient way to monitor the alerts reported by the event system. If the object or group has events registered against it, a flag showing the state of the event condition is displayed. If an object in a group has more than one event registered against it, the flag will represent the most severe alert condition.

Figure 2–2 Groups



You can create, modify, and remove groups to further organize your network view. There are three tabbed pages in a selected Group's right-side detail view. The View page displays the targets in the group on an optional background image. The General page

allows you to add targets to the group, to specify a background image, and to select large or small group icons. The Access page lets you determine whether other administrators have permissions for the group. It also contains default settings defined with administrator Preferences. For more information on the tabbed pages, refer to the *Oracle Enterprise Manager Administrator's Guide*.

A group is represented in the Navigator by an icon and a name. You can double-click the group's icon to expand the group, and view and update the group's members and sub-groups. Groups can be populated by dragging and dropping databases, groups, nodes, listeners or any other discovered targets in the Navigator into the appropriate group in the Navigator Groups folder.

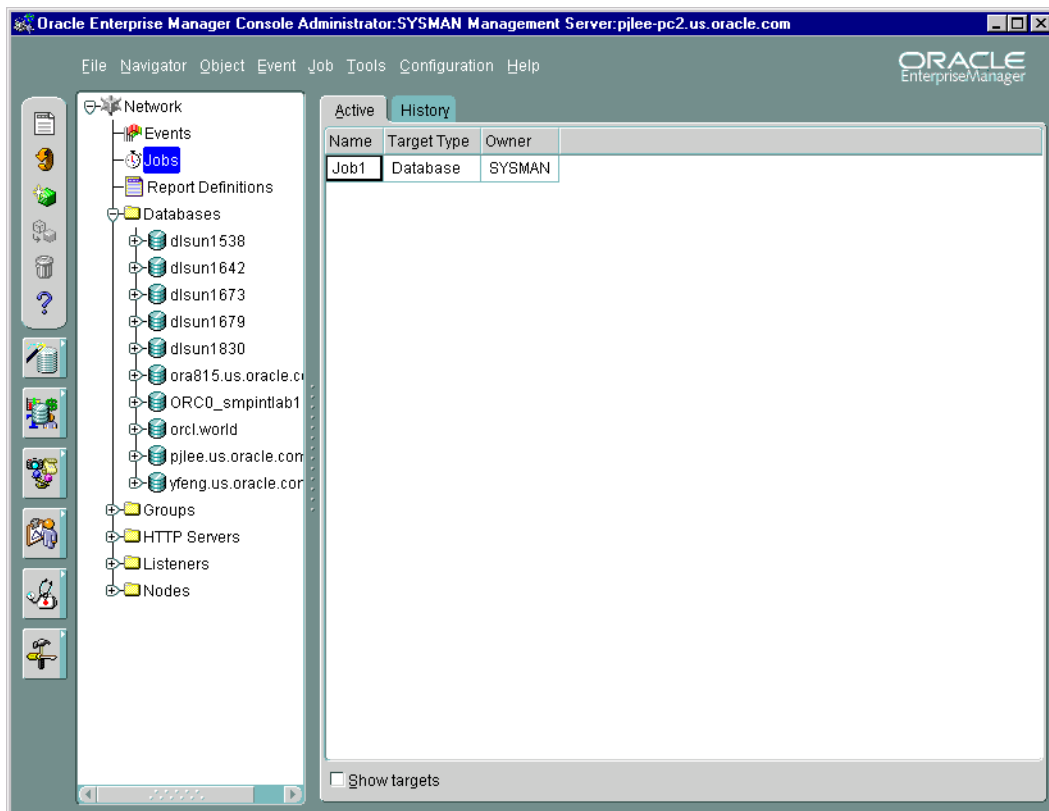
The Group View gives you a graphical view of the objects in the group and their individual status. You can also add background maps to Group to better visualize locations of particular objects. For example, if you are responsible for several systems in Europe, you could use a background map of Europe and place each system icon in the country where the system resides. If an event occurs on any of the systems, a flag appears on the system's icon in Group.

Note: For more information about Groups, see the *Oracle Enterprise Manager Administrator's Guide*.

Jobs

Jobs is the user interface to the Job System, which enables you to automate standard and repetitive administrative tasks, providing the kind of "lights out" management which is vital in a large, distributed environment.

Figure 2–3 Jobs



Jobs contains two tabbed pages, described in the following table:

Page	Function
Active	The Active page contains a summary of active jobs on the network. These are jobs that have been submitted to the job system and have not yet been completed. A job listed in the Active Jobs page is scheduled or running.
History	The History page contains a list of previous job activities, such as multiple runs of a job. These are jobs that have been submitted to an Intelligent Agent and have run successfully or unsuccessfully.

The Active and History pages automatically refresh when toggling between tabs.

A job is made up of one or more tasks. You select these tasks when you schedule a job to be run on the databases or other targets that you are administering. Jobs can be executed immediately, set for future execution, or scheduled to be performed at regular intervals.

Administrators can use any of the pre-defined job tasks offered with the base system, or define their own tasks using SQL or OS commands. Any tasks can be grouped together to create a single job.

Tasks within a job can be set to be executed based on the success or failure of previous tasks in the job. For example, if an administrator wants users to be notified before a system shuts down, but the notification fails, the system-shutdown task in the job can be halted to avoid unnecessary negative impact on the uninformed users. Depending on the success or failure of a previous task in a job, an administrator can choose to have certain tasks in the job performed or have the entire job halt midway.

Because jobs are executed by the nodes' Intelligent Agents, jobs can be scheduled on multiple targets and groups of targets at once. Intelligent Agents function independently of the Console, management applications, Oracle Management Server, and the targets residing on the nodes.

Once a job has been successfully performed, or if a job failure occurs, designated administrators can be notified by Console alert, page, or e-mail, depending on the access level and preferences. Jobs that have been scheduled and have not yet been completed can be viewed. When selecting a job from the Active pane, the only job attribute you can modify is the job permission. Jobs that have been successfully or unsuccessfully completed are stored in the Job History page, which keeps a historical record of jobs scheduled in your network. Jobs can also be saved in the Job Library to be scheduled at a future time.

An administrator sets access levels on jobs so that others administrators can view the job or alter it. He can also decide who is to be notified if certain conditions occur.

Note: For more information on the Job System, see Chapter 3, "Job and Event Systems". For detailed information on Jobs, see the *Oracle Enterprise Manager Administrator's Guide*.

Events

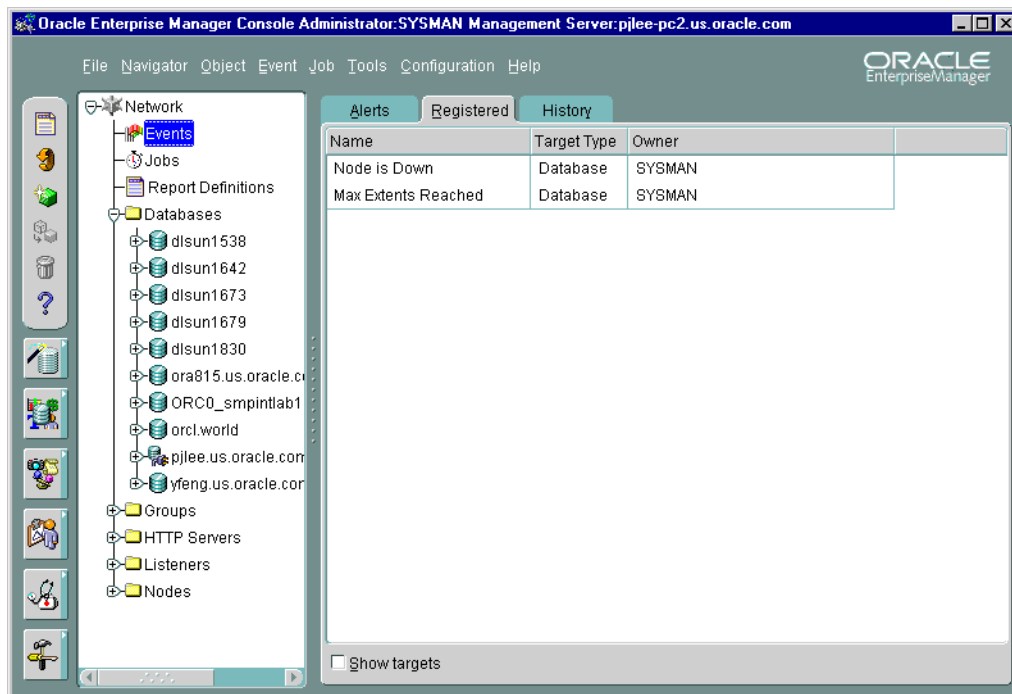
Events is the interface to the Event System and enables you to monitor your network for problem occurrences. To register an event, an administrator specifies one or more tests in Events and then registers the event against one or more managed targets or groups of targets. When the Intelligent Agent(s) detects an event occurrence by performing tests on the target(s), it notifies the Oracle Management Server, which then notifies the appropriate administrator Console based on the access levels that are set for the event.

Like Jobs, Events have assigned access levels such as which administrators can view or modify the event and who is to be notified when the event occurs. After registering an event, Events can be used to modify, cancel, or check the status of the event and see information about past events.

Events contains the following tabbed pages:

Page	Function
Alerts	This page displays events that have occurred and have not yet been cleared by an administrator or have not yet been manually moved to the History page.
Registered	This page displays events that have been registered and for which Intelligent Agents are currently testing targets.
History	This page displays events that have cleared or have been manually moved from the Alerts page.

Figure 2–4 Events



The Alerts, Register, and History pages automatically refresh when toggling between tabs.

When you select an event listed in the History or Alerts page, you can select Edit Event Occurrence item from the Event menu to access the Event Viewer window. It appears containing the following pages:

Page	Function
General	This page displays properties of events and the tests that comprise them.
Log	This page is for viewing and adding comments about events. Any administrator with Modify or Full permissions can add a comment to this page.
Notification Details	This page contains information about all the notifications that were sent when an event occurred.

Note: For more information on the Event System, see Chapter 3, "Job and Event Systems".

Job and Event Systems

This chapter describes the Oracle Enterprise Manager Job System and Event System.

The Job system allows you to automate standard and repetitive tasks, such as executing a SQL script or executing an operating system command. With the Job system, you can create and manage jobs, share jobs with other administrators, schedule execution of jobs, and view information about the jobs. Jobs can be scheduled on a single node or multiple nodes in the network, provided that the node has an Intelligent Agent running on it. If the node or its Intelligent Agent is down, the job request is queued, and once the node can be contacted, the queued job is submitted to the Intelligent Agent.

The Event system allows you to monitor your network for specific conditions, such as loss of service or lack of storage, that may occur in your managed environment. You select tests to run on managed targets (databases, nodes, listeners, or other services), then set the threshold parameters for which you want to be notified. You can share events with other administrators, in addition to being able to notify specific administrators when an event condition occurs. For some event tests, you can also choose to execute a *fixit* job that automatically corrects the problem.

This chapter describes the Job System and the Event System:

Topic	See Page
Job System	3-2
Event System	3-7

Job System

The Job System allows you to schedule and manage job tasks throughout the network, even remotely. Any job that an administrator can perform from the operating system command or with SQL can be sent from the Job System and can be performed on any remote system.

With the Job System, you can perform asynchronous tasks on multiple databases and other targets without having to maintain connections to all those targets. In addition, jobs can run simultaneously on different nodes in the system.

The three tiers of Oracle Enterprise Manager, which are the Console, the Oracle Management Server, and Intelligent Agents residing on managed nodes, work in unison to schedule and execute the job.

From job scheduling to job completion, the following steps occur:

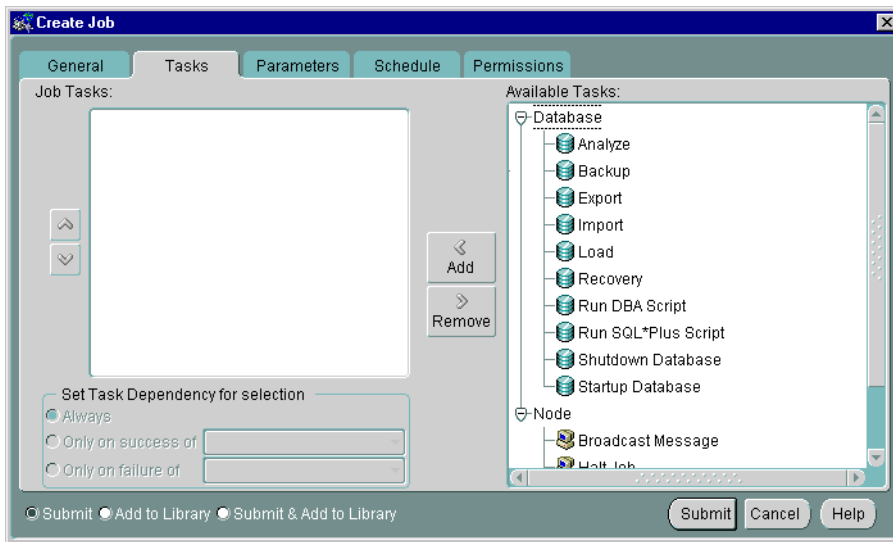
1. From the Console Jobs pane, a job is scheduled against one or more targets of the same type that is made up of one or more tasks.
2. The Oracle Management Server stores the information and checks if the target node is up or down. If the node or its Intelligent Agent is down, the Oracle Management Server queues the job.
3. Once the node can be contacted, the Oracle Management Server sends the job information to the Intelligent Agent residing on the managed node. Jobs can be sent to multiple nodes concurrently.
4. The Intelligent Agent executes the job on schedule.
5. The Intelligent Agent returns any related job messages back to the Oracle Management Server for display in the appropriate consoles based on administrator access levels. If the Intelligent Agent cannot get in touch with the Oracle Management Server, it queues the messages.

This section discusses the benefits of the Job System.

- Pre-defined System Tasks
- Job Scheduling
- Lights-out Management
- Cross-Platform Job Scripts
- Job Progress
- Job Notification and Filtering
- Communication with the Intelligent Agent
- Composite Jobs
- Scalability
- Security and Jobs

Pre-defined System Tasks

When scheduling a job, you construct it with one or more tasks. The Job System includes a variety of pre-defined tasks from which to select, such as starting up and shutting down Oracle databases and Listeners; running SQL and DBA commands; and running operating system commands or shell scripts.

Figure 3–1 Selecting Tasks When Creating a Job

Job Scheduling

The Job System is simple to use because the task of scheduling and managing jobs is centralized in the Enterprise Manager Console. The administrator only needs to submit a job once, regardless of the number of targets on which the job will run.

When you submit a job, the Management Server sends the job information to the appropriate Intelligent Agents on the targets you selected. The Intelligent Agents are responsible for executing the job on the specified schedule and returning job status messages to the Console through the Management Server. Once submitted, jobs will run regardless of whether you are logged in or not.

When a job is submitted to one or more remote sites, it is possible that any one of those sites may be down. If a site or its Intelligent Agent is down, the Management Server queues any job requests that could not be delivered to the site. Once the site can be contacted, the Management Server submits the queued job to the Intelligent Agent, which in turn executes the job on the node.

If a job has been scheduled with an Intelligent Agent, and the connection between the Intelligent Agent and the Oracle Management Server goes down, the Intelligent Agent still executes the job on schedule. When the job is completed, and if the Oracle Management Server is back up, the Intelligent Agent notifies the Oracle

Management Server, which then displays the status of the job on the Console. If the Oracle Management Server cannot be contacted, the Intelligent Agent queues the status message until the server is available.

To schedule a job, you do not have to connect directly to the node on which the job will be run. You only need to submit the job from the Console and specify the targets on which it should run. The targets can include databases, nodes, listeners, web servers, and groups of such targets.

Lights-out Management

The Job System allows you to automate repetitive and periodic tasks and problem correction. If a job needs to be run periodically, the Intelligent Agents reschedule the job without the need for additional intervention. Messages about a job's status are reported back to the Console.

The Job System can be used with the Event System to automate problem correction. When you register an event, you have the option of specifying a fixit job, which will automatically be run in response to an event to correct the problem.

Cross-Platform Job Scripts

Jobs are implemented as Tool Command Language (Tcl) scripts. Tcl is a platform-independent scripting language used to write both job and event scripts. For example, a job can be run against a UNIX and an NT machine at the same time, without changing a single byte of information in the job definition.

Job Progress

You can monitor the progress of a job by double-clicking on the job in the Active Jobs page of the Jobs pane. When you click on a job in the list, the Job Properties dialog box appears providing information about the job's activities and progress.

After a job is run, a list of tasks comprising the job and the time that each task completed or failed appears in the Progress tab of the Job Properties dialog box.

Job Notification and Filtering

Administrators can be notified in various ways of the status of jobs, such as by electronic mail or page, depending on the administrator's preferences. With the Job System, you can set up notification procedures and choose which administrators to have notified of job completion or failure. You can also filter e-mail and pages sent to administrators according to a job's status.

Communication with the Intelligent Agent

Although a job is submitted from the Console, the job scripts themselves reside on the Intelligent Agents residing on the managed nodes. Because the manner in which a job is implemented may depend on the platform, each Intelligent Agent keeps its own set of job scripts.

Composite Jobs

A composite job combines two or more tasks into one job. Composite jobs consist of separate tasks that are constructed such that some tasks may or may not execute upon completion of another task. For example, if a composite job consists of two tasks, starting up a database and then running a SQL script, you can specify that the script be run only if the database was successfully started. Here, you specify a dependency between the two tasks that determine whether the next task is executed. The Job system allows you to specify one of three dependencies for any task: Always (default), Only on Success, or Only on Failure.

Scalability

The Job System allows you to run jobs efficiently on multiple remote nodes. When you submit a job to run on a remote node, all the information needed to run the job is transferred to the Intelligent Agent servicing the node.

When the job is run, it is run by the Intelligent Agent on that node, minimizing network traffic between the remote node, the Oracle Management Server, and the Console. The only communication between the Intelligent Agent and the Oracle Management Server is the initial transmission of the job and any subsequent messages about job status.

Because jobs are run independently by Intelligent Agents, you can submit any number of jobs on multiple nodes without affecting the Console. For example, you can submit several jobs and then immediately administer something else without waiting for the Intelligent Agents to schedule the jobs.

Additionally, because there is an Intelligent Agent residing on each managed node, jobs can run on multiple nodes simultaneously. For example, you can submit a job, such as running a report, on multiple databases worldwide. The job is then run independently by each Intelligent Agent servicing each database. In this way, all jobs are performed by their respective Intelligent Agents at the same time.

Security and Jobs

Jobs are normally run with the preferences of the administrator who submitted the job. This ensures that jobs cannot be used to perform functions the administrator could not perform if logged into the machine directly. Because jobs are categorized by the type of target they act on, the job system knows what credentials to pass to the Intelligent Agent. The Job system uses preferred credentials to determine what preference information needs to be passed. When a job runs on a node, the job system passes the administrator preferences for the managed node.

Event System

The Event system allows you to efficiently monitor a large system. Using the Event system and Intelligent Agents, you can effectively monitor any number of databases, nodes, or other targets 24 hours a day, and be alerted when a problem or specific condition is detected. You can also pinpoint only the targets you wish to monitor. The Event system can be extended to include other third-party applications that detect events independent of the Intelligent Agents.

Events are simply a group of event tests that you want to run on your managed systems. Oracle Enterprise Manager includes a variety of predefined event tests that you can use when creating events. The event tests are grouped by target type, for instance:

- Database
- Listener
- HTTP Servers
- Concurrent Manager
- Node

You can create events using the predefined event tests that have been installed with Oracle Enterprise Manager. The events are created with information entered in the Event property sheet. You determine parameters such as the target that is monitored, the specific tests to perform, the frequency that the event test is executed, and whether other administrators can share the events and which administrators should be notified if the event condition is met. Some event tests have parameters with threshold values that you can customize for your system.

In the Event system, event settings are stored based on the administrator registering the event. This allows administrators of large systems to customize their event

systems to their preferences and tasks. Administrators receive messages for events for which they have been selected to receive notifications by other administrators.

The Event system includes the following processes:

1. Creating an event by completing the Event property sheet pages. This involves:
 - a. Determining the monitored targets.
 - b. Selecting the event tests that you want to run.
 - c. Determining the threshold parameters for the event tests.
 - d. Determining how often the event condition is to be checked.
 - e. Specifying a fixit job to be run when an event triggers. (Optional)
 - f. Assigning permissions to allow other administrators to share the event or be notified if the event condition is met.
2. Saving and modifying an event.
3. Registering or submitting an event to the Intelligent Agents on the monitored targets.
4. Interpreting and correcting an event occurrence.
 - a. Logging information pertinent to your interpretation of the event to the Event log.
 - b. Assigning the Event to a different administrator if appropriate.

The Event System contains the following features:

Topic	See Page
Proactive Event Management	3-8
Scalability	3-9
Event Notification and Filtering	3-9
Event Log	3-11

Proactive Event Management

When registering an event, in some cases you can create a *fixit* job that responds to specific event conditions. Refer to the *Oracle Enterprise Manager Administrator's Guide* for more information about associating *fixit* jobs with events. These situations are noted in the online help for Oracle events.

Events and fixit jobs used together automate problem detection and correction. The proactive management of an event ensures that a problem is corrected before it noticeably impacts end-users.

Scalability

The Event System allows administrators to monitor multiple databases and systems. For example, it would be difficult for one person to connect to 100 databases individually every day to check on each database's performance. However, using the Event System, one person can effectively have the databases monitored 24 hours a day with minimal performance impact on the Console, and he can be alerted if a problem is detected. Because the monitoring is performed by Intelligent Agents independently of the Console, multiple targets can be monitored without slowing down other tasks.

The Event System also gives you the option of focusing on select systems and events. Rather than monitoring all targets or a large number of targets at once, you can choose to focus on select targets.

Event Notification and Filtering

Events can consist of multiple event tests.

Event Notification

If any one of these tests identify a specified condition, the event is triggered and a notification is sent to the Console. If enhanced notification is configured for your system, paging and/or e-mail notifications are sent.

Event notification occurs as follows:

- A notification is sent when the threshold of an event test exceeds the level specified by parameter values. If the event does not have parameters, a notification is sent when the event occurs.
- If the event test condition remains above the threshold specified, a new notification is not sent. If the condition does not exist when the next test is run, the event clears. Notifications can also be sent (e-mail/paging) when an event clears based on filtering.
- If an event test condition changes from warning to critical or critical to warning, a new notification is sent to the Event pane or via e-mail or page.
- If you acknowledge and move an alert to history, a new notification is not sent to the Alerts page unless a moved warning changes to a critical alert.

Extended Event Status

An event is composed of one or more event tests. While an individual event test may result in a different status (For example, some clear, some are in alert), there is a general status for the Event. To determine the general severity for the event, the following rules apply in succession:

1. If the event includes an UpDown event test, and this test triggers, then the general status of the Event is "Unknown" (gray flag).
2. Otherwise, if the event includes a test that reaches an alert state, then the general status of the Event is "Critical" (red flag).
3. Otherwise, if the event includes a test that reaches a warning state, then the general status of the Event is "Warning" (yellow flag).
4. Otherwise, if the event includes a test that is in error, then the general status of the Event is "Error" (yellow hexagon).
5. Otherwise, all tests should be clear, so the general status of the event is "Clear".

You can still see the individual status of each event test in the Event Viewer.

Event Colors and Icons

All events return values and some events produce output messages. The events return different icons depending on the severity of the event. These severity levels are determined by parameter thresholds you set for the event tests during event creation. The colors are displayed on the event severity icon that is located:

- Next to the event name listed in the Alerts page of the Events detail view.
- On the object in the Group detail view if the target is part of a group.

The colors of the event severity icons are:

- Error State (yellow hexagon with an exclamation point). An error state indicates there is a problem with the evaluation of the event condition, as opposed to a threshold being met.
- Event cleared (green flag)
- Warning (yellow flag)
- Critical (red flag)
- Unknown (gray flag). A gray flag represents an "unknown" state where it is not possible for Enterprise Manager to ascertain the event status because the node is unreachable or the Intelligent Agent is not working. The gray flag will appear

on the group pane and as the flag for the event in the Alert tab if your event includes at least one up/down event test (any target: node/database/listener). When the gray flag occurs, it will be set for the Event. For more information about the gray flag and up/down event tests, refer to the *Oracle Enterprise Manager Administrator's Guide*.

Event Log

With the Event Log page, located in the Event Viewer page, administrators can share information with other administrators about events and how they are being managed. The Event Log page allows comments to be entered on a selected event by administrators with modify access levels for the event.

The information displayed in the Event Log page includes any comments that have been entered for the event, the names of the administrators that entered the comments, and the time and date each comment was entered. The Event System itself also enters data in the Event Log page.

Unsolicited Error Detection

Unsolicited event tests are event tests that have been initiated outside the Enterprise Manager Event system. An event is considered unsolicited if it is raised by a process other than the Oracle Intelligent Agent, but is running on the same node as the Intelligent Agent. These events are usually provided by third-party software. Creating an unsolicited event allows you to integrate and monitor third-party events.

Note: *Fixit* jobs can be specified for unsolicited events only if you are using an Oracle9i Intelligent Agent

Event Handler

Specific enterprise IT demands may require that responses to certain event occurrences be performed and/or tracked automatically by Enterprise Manager. For example, if the database updown event triggers, administrators may want Enterprise Manager to automatically open an in-house trouble-ticket so that the appropriate IT staff can respond to this event occurrence. The ability to provide customized automatic responses to event occurrences can be achieved by using the Event Handler.

The Event Handler is an integral part of the Oracle Management Server. It listens for event notifications and responds to these events in ways specified by the administrator.

For detailed information about the Event Handler, refer to the *Oracle Enterprise Manager Administrator's Guide*.

Database Administration

The database administration features and wizards are integrated into Oracle Enterprise Manager. You can access the database administration features through the Console. The Console can either be launched with a connection to an Oracle Management Server, which utilizes Oracle Enterprise Manager's three-tier framework, or launched standalone, which connects directly to a database.

The Console's Databases folder allows you to administer database instances, schemas, security, and storage, and other database features from a unified tree view. The unified access to administration functions offered by the Databases folder makes it easy to switch between tasks and to gain an accurate overall view of the database configuration status. When you expand a database in the tree, a list of database features appears below.

- Instance, including startup, shutdown, and initialization.
- Schema, including tables, indexes, and all other schema objects.
- Security, including user accounts, roles, and privileges.
- Storage, including tablespaces, datafiles, rollback segments, redo log groups, and archive logs.
- Distributed, including in-doubt transactions, database links, Streams, Advanced Queues, and Advanced Replication
- Warehouse, including summary management and OLAP management. Summary Management includes tools for improving the performance of a data warehouse. OLAP management includes tools for creating and editing OLAP metadata based on a star or snowflake schema.
- Workspace, including a virtual environment that one or more users can share to make versioned changes to data.

-
- XML Database, including tools for storing and retrieving XML objects and optimizing access and updates to XML objects.
 - Other database features, depending on the products installed with your database.

You can use the Database folder features with or without connecting to an Oracle Management Server.

The Backup and Recovery wizards are also available to help you back up or restore and recover various objects such as the tablespaces, datafiles, or archive logs. With the Backup wizard you can also make an image copy of the datafiles and the current controlfile. Beginning with Oracle Enterprise Manager 9.2, the Backup Wizard allows the setting of additional options, such as backup retention policy, deleting obsolete backups and specifying the archive log deletion policy. With Oracle 9.2, recovery includes Block Media Recovery which improves the speed of recovery significantly in the case of block corruptions.

Oracle Enterprise Manager now features the SQL Scratchpad, which provides a user interface for you to enter, edit, and execute SQL quickly and easily.

Common Features of Database Management Features

This section discusses the common features shared by the database administration features in Enterprise Manager.

Tree Views

The Console displays a tree view of connected databases, which can be expanded to show subordinate objects.

General Information about Databases

When you select a database node in the tree, a non-editable General page appears on the right where you can view information about the host, port, SID, TNS descriptors, setup information (Oracle_Home and Listeners), and Operating System information.

Comprehensive Overview Pages

When you select any of these database features, a brief description of the feature appears in the comprehensive overview page on the right side of the Console. Depending on the feature, the page may contain a link to obtain more information, or to start a process, or a button to launch the related Quick Tour or Help screen.

Property Sheets

When relevant, if you select an object in the tree, a property sheet appears on the right where you can view or edit database properties. Wizards also display tree views and property sheets as necessary.

Multi-Column Lists

In most cases when you select any of the database features such as Schema (with the exception of Advanced Queues), Instance, and so on, a multi-column list of all the folder's objects appears on the right side of the Console, providing a quick summary of information about each object in the selected folder.

Database Version Awareness

All database features and wizards are aware of the features that are available in each database version. When you select a database in a tree view, the tool only displays objects and properties that are enabled in that database version.

Database Reports

You can extract information from the database such as object definitions, object dependencies, database configuration, or reports, including custom SQL queries.

Logging of Database Changes

You can now log all Data Definition Language (DDL) and Data Manipulation Language (DML) changes made by an application when connected to a database.

Showing Object DDL

Data Definition Language (DDL) commands set up the data such as creating and altering databases and tables. You can display the Data Definition DDL for objects.

Show SQL

Though one of the benefits of Enterprise Manager is that DBA tasks can be performed without manually entering SQL, you do have the option of viewing the SQL code generated for you. By selecting Show SQL button, you can review this code before implementing any changes, as well as copy and paste it into your own SQL scripts if you wish.

Show Dependencies

Database object dependencies and dependents can be viewed by right-mouse clicking an object in the tree view and choosing Show Dependencies. Dependencies show what the selected object depends on, such as the tablespace location and the owner of the selected object. Dependents rely on the selected object, such as which indexes will be dropped and which synonyms will be affected if you drop the selected object.

Right-Mouse Commands

With the database features, you can right-mouse click any folder or object in a tree list to perform administrative tasks. Right-mouse clicking an object shows all the tasks that can be performed on the object, such as connecting to or disconnecting from the database, creating users, adding or removing profiles, assigning privileges, showing dependencies, and bringing up wizards.

DB Search Capabilities

Database Search allows you to search for any object in a database given a flexible set of criteria:

- Names of the objects that you want to find. You can enter wild card characters for the object name.
- Database that you want to search.
- Object types that you want to include in the search.
- Schemas that you want to include in the search.

Database Management Features and Wizards

This section describes Database Management features and wizards.

DBA Management Features	Task	See Page
Instance Management	Manages instances and sessions	4-7
Schema Management	Manages schema objects	4-14
Security Management	Manages security parameters	4-19
Storage Management	Manages database storage	4-21
Distributed Management	Manages in-doubt transactions, database links, streams, advanced queues, and advanced replication	4-24
Warehouse Management	Manages the performance of a data warehouse (Summary Management) and OLAP metadata using the CWMLite Release 1 APIs (OLAP management manages).	4-25
Workspace Management	Allows you to version-enable tables and create, modify, refresh, and merge workspaces	4-27
XML Database	Manages the storing and retrieving of XML objects and optimizing access and updates to XML objects.	4-28
SQL*Plus Worksheet	Executes SQL and PL/SQL commands	4-29
SQL Scratchpad	Provides a user interface for you to enter, edit, and execute SQL quickly and easily	4-30
Wizards	Assist with importing, exporting, loading, backing up, and recovering data, as well as analyzing and creating tables and views	4-32

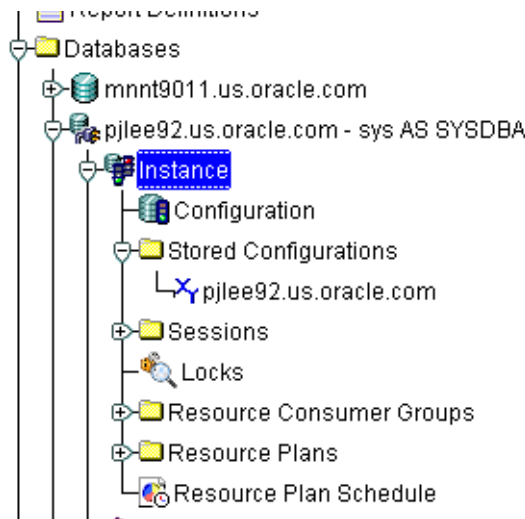
Instance Management

The Instance Management feature helps you manage database instances and sessions in your Oracle environment. With the Instance Management feature you can:

- Start up and shut down a database.
- View and edit the values of instance parameters.
- Tune your database resources for optimal use with the help of Memory and Mean-Time-To-Recover (MTTR) Advisors.
- Manage users' sessions, and view currently running SQL and its explain plan.
- Administer locks and sessions consuming the highest amounts of resources (if the Diagnostics Pack is installed).
- Monitor long-running operations.
- Control processing resources via Resource Plans.
- Perform backup, recovery and maintenance operations on the database files.

When you expand the Instance node under the database in the tree view, the following list of objects and folders appears:

- Configuration
- Stored Configurations (only when connected to Oracle Management Server)
- Sessions
- Locks
- Resource Consumer Groups
- Resource Plans
- Resource Plan Schedule

Figure 4–1 Instance Management

Configuration Operations

When you select the Configuration node under Instance, a property sheet of tabbed pages appears on the right for viewing information about the database instance and editing database properties.

General Page The General Page shows the following information which can be viewed and/or edited:

- Status of the instance, including the database version and any installed options, and allows you to start up and shut down a database.

For information on cluster databases, refer to *Oracle9i Real Application Clusters Administration*.

- Location of the spfile if the database had been started with an spfile
- Persistent parameters which allow you to modify, apply changes, and re-initialize the database.

Note: The Configured mode for a cluster database displays an additional "Instance Name" column, which helps distinguish the parameters as either database-wide or instance-specific. If this column is blank for a parameter; then, it implies that the parameter's value is available database wide (i.e. for all

instances). A string in this column specifies the SID of a specific cluster database instance to which the parameter's value is applicable.

Memory Page The Memory Page allows you to perform the following tasks:

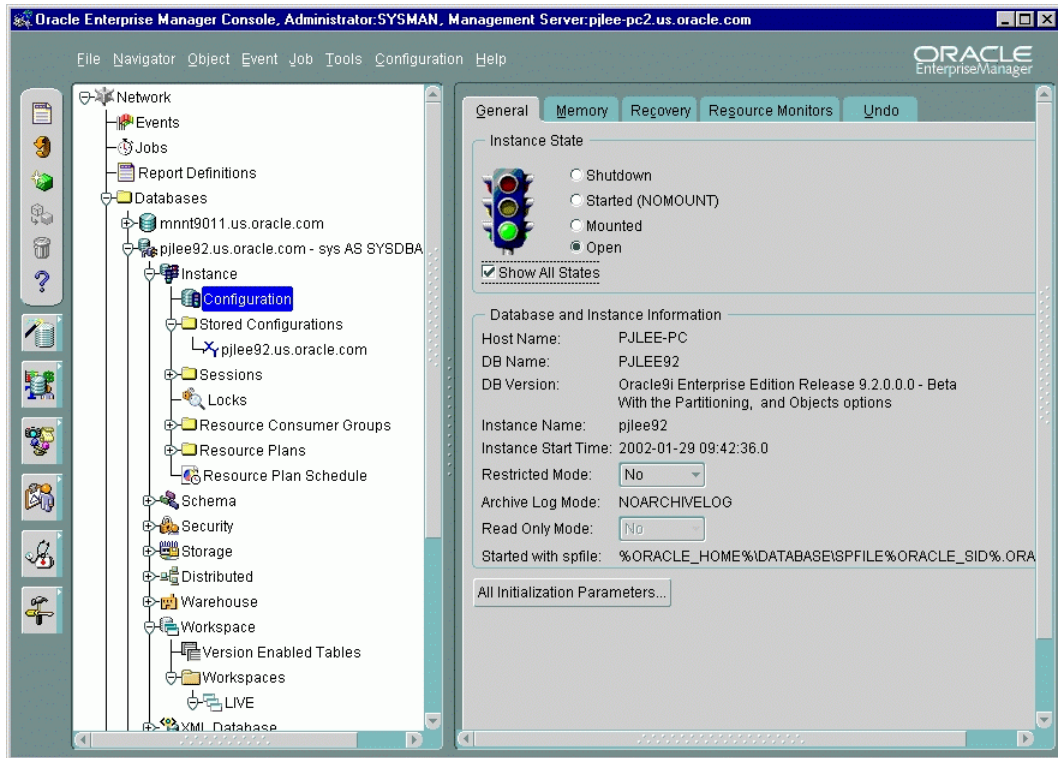
- View information about the memory usage of the current database.
- Use the Shared Pool Size Advisor to determine optimal Shared Pool size by tracking its use by the Library Cache. This advisor is available starting with Oracle 9.2.
- Use the Buffer Cache Size Advisor to determine the optimal size of the buffer cache.
- Use the Program Global Area (PGA) Advisor to tune PGA memory allocated to individual server processes. This advisor is available starting with Oracle 9.2.

Recovery Page The Recovery page allows you to perform the following tasks:

- Use the Mean-Time-To-Recover (MTTR) Advisor to determine the optimal value for the maximum time needed to recover the database. This advisor is available starting with Oracle 9.2.
- View the current state of the redo log archival and take the database in archivelog or noarchivelog mode.

Resource Monitors Page The Resource Monitors page allows you to view the performance statistics of an active plan and of each consumer group associated with the active resource plan.

Undo Page The Undo Page contains information about the undo tablespace including the name of the active undo tablespace and the current undo retention time. Through this page, you can modify the retention time based on your largest transaction time and immediately view the space required for the undo tablespace. Undo generation rates are calculated based on statistics available for undo space consumption for the current instance. From this page, you can decide on an optimal size for your undo tablespace and ensure that even your longest transactions always complete.

Figure 4–2 Instance Management Window

Stored Configurations

When the database is connected to the Oracle Management Server, the Stored Configurations folder appears in the tree view with which you can create multiple database start-up configurations without the need to track initialization parameter files (INIT<SID>.ORA). Stored configurations exist in the Oracle Enterprise Manager repository (they are not external files) and can be created, edited, and deleted. You can also add and delete parameters and export a configuration to a file.

Note: If you are connected to an Oracle9.x database, you can also start up the database by using the SPFILE on the server side. The database knows the location of the SPFILE and will look for it when it starts up to find the startup parameters. An SPFILE is similar to an init.ora file but located on the server-side and maintained by the server.

Sessions List

The Sessions List page displays the top number of sessions that you specify using database instance resources in real time. Sessions are displayed in descending order based upon the delta value of the statistic chosen as the sort statistic. You can use the information in the chart to isolate executing SQL or to kill a problem session. Also, Oracle 9i introduces a resumable sessions feature where the sessions are marked and you can view details. Refer to the online help for more information on "resumable space allocation."

Sessions Folder

The Sessions folder lists all users connected to the discovered database. When you select a user in the list, the Sessions property sheet appears with which you can edit user properties, view information about the status of each user, view current SQL or the last run SQL for the database session, and view the database session explain plan.

Long Running Operations

A small clock appears on the session icon in the tree view for sessions with currently running in-progress operations. Select the Long Operations tab on the top of a Session detail view to view the status of long-running operations on Oracle8i or Oracle9i databases. You can monitor the type of operation it is, how long it has been running, and the estimated time of completion.

Locks

The Locks list contains information about the locks currently held by the Oracle server and outstanding requests for a lock or latch. Locks are mechanisms that prevent destructive interaction between transactions accessing the same resource--either user objects such as tables and rows or system objects not visible to users, such as shared data structures in memory and data dictionary rows. In all cases, Oracle automatically obtains necessary locks when executing SQL statements, so users need not be concerned with such details. Oracle automatically uses the lowest applicable level of restrictiveness to provide the highest degree of data concurrency yet also provide fail-safe data integrity. Oracle also allows you to lock data manually.

Note: Background sessions holding locks are not problematic and should not be killed.

In-Doubt Transactions

The In-Doubt Transactions folder contains information about distributed transactions that failed in the PREPARED state. You can sort the Transactions list on each of the columns by clicking on the column heading.

The In-Doubt Transactions property sheet displays information about distributed transactions in which a commit was interrupted by a system, network, or any failure resulting from external factors.

Resource Consumer Groups

The Resource Consumer Groups folder lists sets of users who have similar resource usage requirements. When you select a resource consumer group object in the folder, a property sheet appears in which you can view or specify properties and assign or remove users from the resource consumer group.

Resource Plans

The Resource Plans folder lists objects that represent resource plans, which are ways of allocating resources among consumer groups. Resource plans contain directives that specify the resources to be given to each group and can be specified in hierarchical fashion using subplans.

Note: The activated resource plans are highlighted in the navigator.

The Resource Plans property sheet, which appears when you select an object representing a Resource Plan, allows you to choose available groups/subplans to include in the resource plan, select the percentage of CPU resources allocated to a group, specify the maximum number of parallel execution servers associated with a single operation for each resource consumer group, specify the maximum number of concurrently active sessions allowed within a consumer group, specify a maximum in kilobytes on the total amount of undo generated by a consumer group, specify a maximum execution time in seconds allowed for an operation if there were no other work on the system, specifying criteria that causes the automatic switching of sessions to another consumer group, and then activate the plan.

Resource Plan Schedule

The Resource Plan Schedule property sheet allows you to automate when to activate a resource plan.

Note: The scheduling job is implemented using DBMS_JOB.

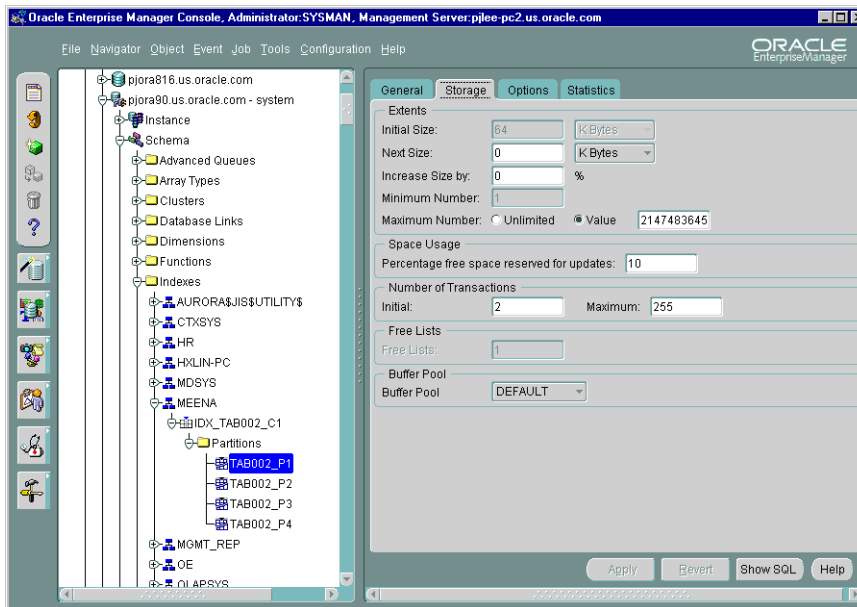
Schema Management

With the Schema Management feature, you can create, alter, or drop database schema objects such as clusters, indexes, materialized views, tables, and views, as well as view dependencies of schema objects. Storage layout information is also available for a table or an index if they are on EMC devices.

The Schema Management feature also supports index organized tables, partitioned tables and indexes, advanced queues, Java classes and sources, and unicode. Advanced queuing offers message transformation which can be used to transform and validate message communication amongst different business processes. The unicode feature allows you to select a column of "character" type and specify the length in bytes or characters.

You can also compile multiple objects such as functions, packages, package bodies, and triggers from their Summary View panel, and you can edit the storage and options information for clusters, indexes, and tables if the values apply to multiple objects.

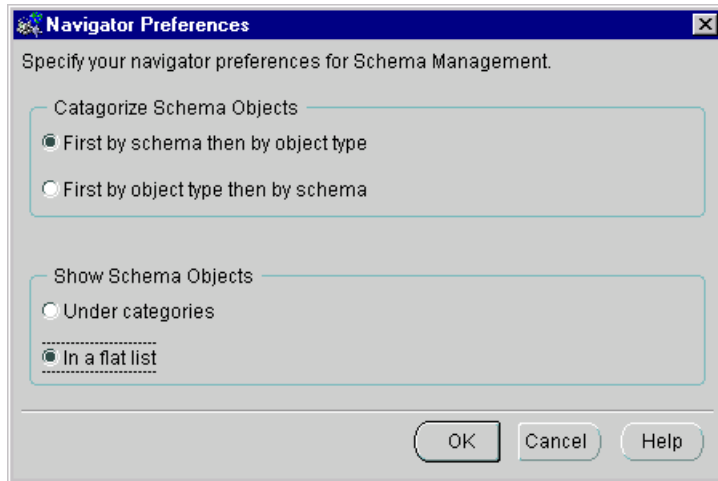
Figure 4–3 Schema Management Window



Tree List by Schema or Object

Beginning with 9.2, you can specify your navigator preferences for Schema Management.

Figure 4–4 Navigator Preferences



Databases contain at least one named schema for each database user. Regardless of object type, each schema object belongs to one of these named schemas.

If you need to edit several objects belonging to the same schema, select to view objects "First by schema and then by object type". Refer to Figure 4–5, "Schema Objects and Flat List" and Figure 4–6, "Schema Objects and Categories".

If you manage the same type of objects from different schemas, select to view them "First by object type and then by schema". Refer to Figure 4–7, "Objects and Flat List" and Figure 4–8, "Objects and Categories".

Depending on a second selection, the tree view will reorder all objects accordingly, presenting object folders in a categorized list or a flat list.

Figure 4–5 Schema Objects and Flat List

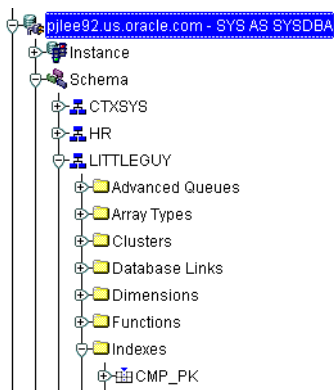


Figure 4–6 Schema Objects and Categories

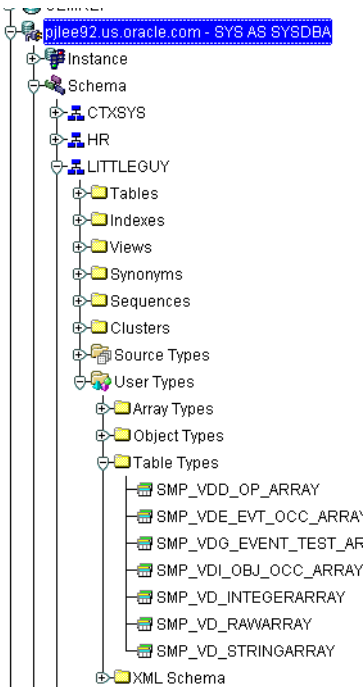


Figure 4–7 Objects and Flat List

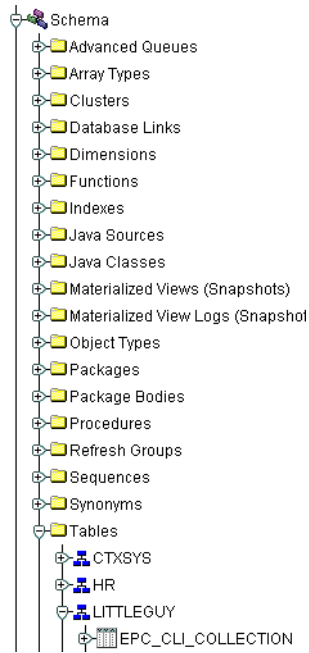
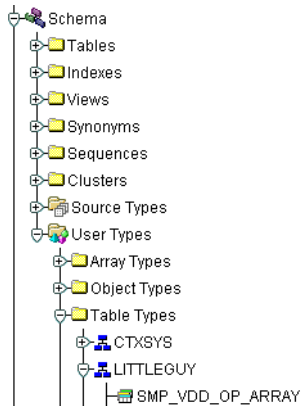


Figure 4–8 Objects and Categories

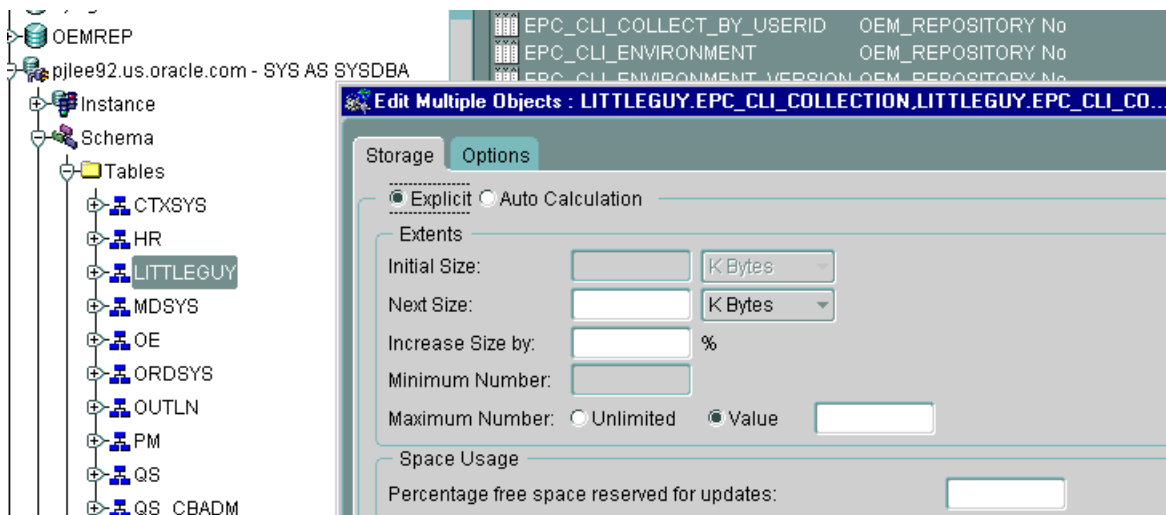


Editing an Object

To view/edit an object, you use the object's property sheet, which appears when you select the object in the tree view. You can then modify the object's parameters.

For clusters, indexes, and tables, you can use the Edit Multiple Objects feature to edit the storage and options information that apply to multiple objects at the same time.

Figure 4–9 *Editing Multiple Objects*



The Schema Management feature also includes the Table Data Editor content viewer, which allows you to view, update, and delete the contents of a table and display the contents of a view or synonym by selecting a right-mouse command on a table in the tree view.

Creating Objects

Schema Management allows you to create an object or a clone of an object by selecting Create or Create Like from the Object menu. When creating a clone of an object, all attributes are identical except for the name. Parameters for new objects and cloned objects are specified in property sheets which appear when you select Create and the object from the Create dialog or Create Like from the Object menu.

Security Management

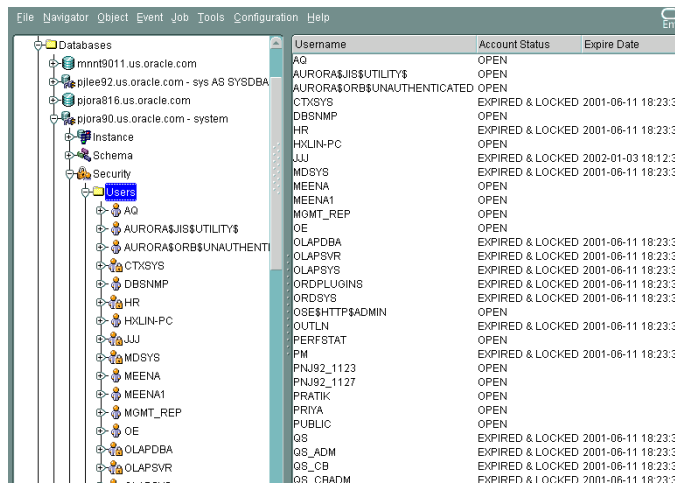
In a large network environment, security parameters for objects, administrators, and users are in constant change. With the Security Management feature, an administrator can make these necessary changes quickly and efficiently.

When you expand the Security node under the database in the tree view, folders for users, roles, and profiles appear.

Figure 4–10 *Managing Users, Roles, and Profiles*



Figure 4–11 *Security Management Window*



User Operations

The Security Management feature helps you manage the database users in your network by helping you create users and clones of users, add and remove user

permissions and roles, grant or revoke the switch privilege of resource consumer groups for a user or role, alter user properties, including account status and default profiles, and set up database users to act as proxy for a user. Security Management capabilities also allow you to easily see users' dependents and dependencies.

Role Operations

With the Security Management role operations feature, you can modify role properties as easily as user properties. You can also create roles and clones of roles, add and remove permissions from roles, and see grantees of roles, including consumer groups.

Profile Operations

A profile is a set of limits on a user's database resources. As with users and roles, you can create a profile or a clone of a profile, alter a profile's properties, and assign and remove profiles from users. You also have the ability to see profile dependents and dependencies, as well as grantees of profiles.

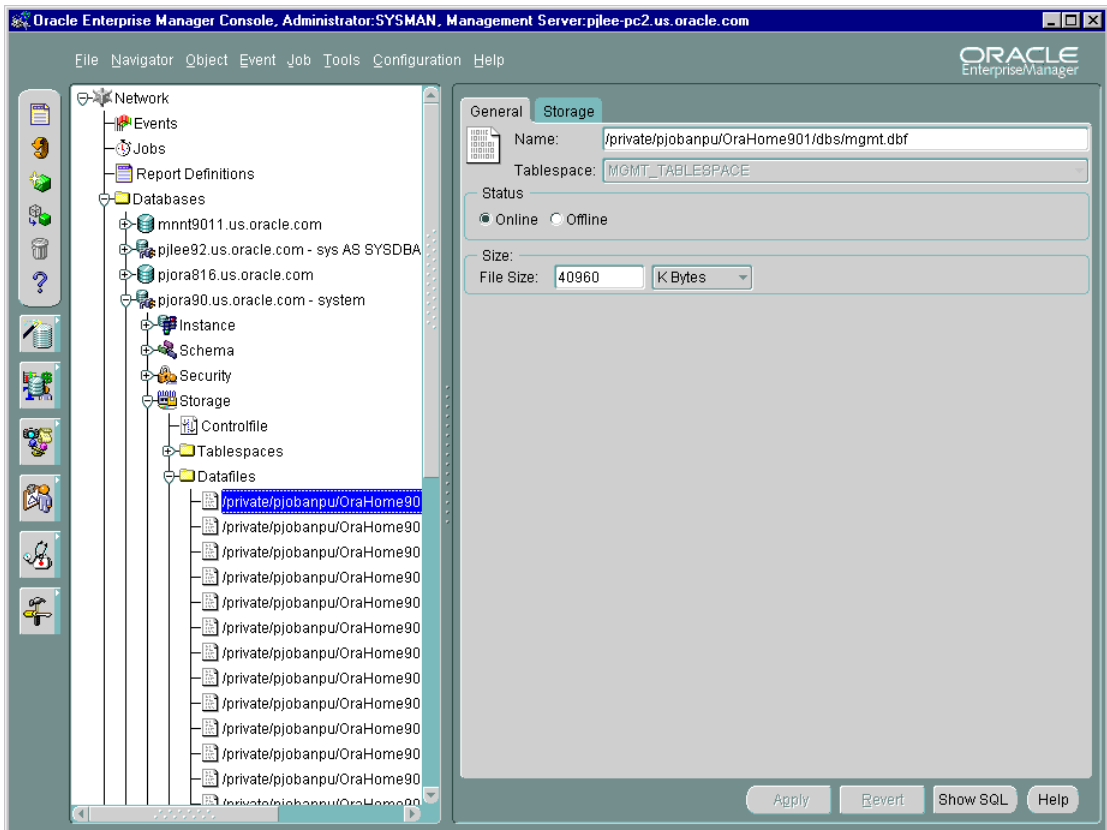
Profiles, roles, and the users to which they are assigned can easily be seen in security lists provided by Security Management. Administrators can then use property sheets to determine security parameters, simplifying the process of making changes.

The Security Management feature also supports Oracle password management, which increases system security. Supported features includes: account locking, password lifetime and expiration, password history, password complexity, verifications, and export/import of passwords.

Storage Management

The Storage Management feature helps you administer tablespaces (permanent, temporary, and undo), datafiles, redo logs, archive logs, and rollback segments for optimum database storage.

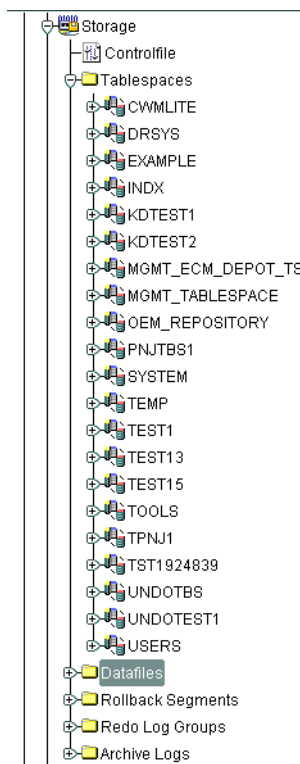
Figure 4–12 Storage Management Window



When you connect to a database, the Storage Management branch of the tree view lists an icon for the Controlfile and five folders which contain all the storage objects in the selected database. The five folders include:

- Tablespaces
- Datafiles
- Rollback Segments
- Redo Log Groups
- Archive Logs

Figure 4–13 Managing Database Storage Parameters



The following sections describe the Storage Management operations that can be performed with the objects in each of these folders:

Controlfile Operations

When you select the Controlfile icon, a property sheet appears where you can see the number of controlfiles created for the database and other statistics.

Tablespace Operations

Using the contents of the Tablespaces folder, you can create, edit, or drop a tablespace, switch to a new default temporary tablespace, add a datafile or rollback segment, take a tablespace off- or on-line, make a tablespace read-only or writable, and set tablespace storage parameters, including multiple block sizes which is key in facilitating the transportability of tablespaces from one database type to another.

Beginning with Enterprise Manager 9.2, you can choose to use bitmaps to manage the free space within segments. Bitmaps allow Oracle to manage free space more automatically, and offers high performance for free space management.

In addition, you can click the tablespace to see the used and free space of the tablespace or datafile.

Beginning with Oracle9i, you can also allocate your undo space in a single undo tablespace, instead of distributing them into a set of statically allocated rollback segments. For each Oracle instance, you will only have to allocate enough disk space for the workload in that instance in an undo tablespace. In addition, using Enterprise Manager, you can create or alter an undo tablespace.

Datafile Operations

With the contents of the Datafiles folder, you can create a datafile or a clone of a datafile, edit a datafile, and take a datafile off- or on-line. You can also click the datafile to see the used and available space. In 9.2, you can delete datafiles when dropping a tablespace. Also, the storage layout feature, which includes a page to display the storage layout information for a datafile and a page to display the overview of the file map, is available for datafiles on EMC devices.

Rollback Segment Operations

Using the Rollback Segments folder, you can create, alter, drop, or shrink a rollback segment as well as take one off- or on-line.

Redo Log Group Operations

Using the Redo Log Groups folder, you can switch the current redo log group, trigger a checkpoint in a redo log group, create a new redo log group, and rename, remove, or add new redo log group members.

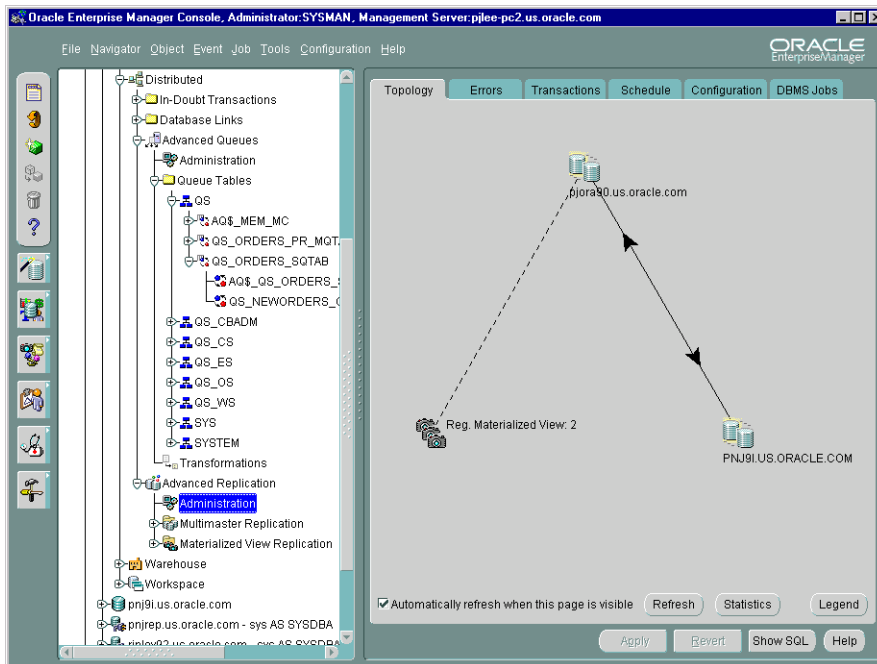
Archive Log Operations

The archive log folder allows you to view the current archive logs in the database.

Distributed Management

Oracle supports data replication and messaging technologies to support distributed applications and distributed database systems.

Figure 4–14 Distributed Database Management

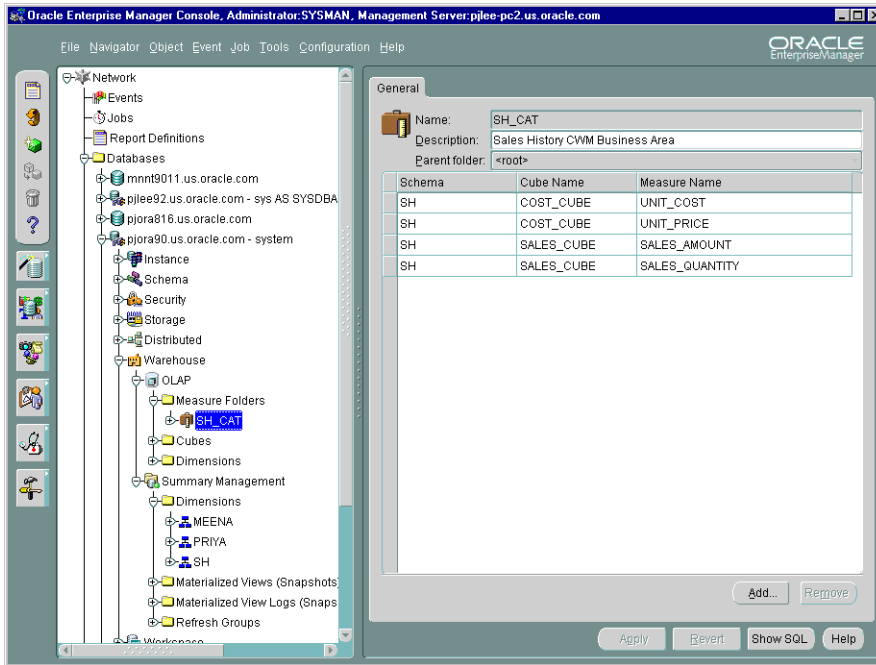


With Distributed Database Management, you can:

- use the In-Doubt Transactions folder to view failed two-phase commit transactions.
- use Database Links to create, edit and delete links between databases.
- use the Streams folder to replicate data over a network of databases. You can monitor and administer your Streams environment. This folder is available for Oracle version 9.2 and above.
- use the Advanced Queues folder to integrate applications by using messaging technology. You can monitor and administer your Advanced Queues environment.
- use the Advanced Replication folder to replicate data amongst a group of databases (Multi Master Replication) or to replicate a snapshot of data between databases (Snapshot Replication). You can to monitor and administer your Advanced Replication environment.

Warehouse Management

A data warehouse is a relational database that is designed for query and analysis rather than for transaction processing. Oracle supports complex analysis of warehouse data by on-line analytical processing (OLAP) applications. Oracle also provides mechanism to improve performance of your warehouse by using summaries.

Figure 4–15 Warehouse Management

OLAP Management

OLAP Management enables an administrator to create and edit OLAP catalog metadata for an existing star or snowflake schema. OLAP catalog metadata is required by business intelligence applications that use Oracle's Java-based OLAP API.

Within the OLAP catalog repository, owned by OLAPSYS, there are two sets of metadata tables, each with its own write APIs (PL/SQL packages): CWMLite Release 1 and CWMLite Release 2.

The OLAP Management interface within Enterprise Manager uses CWMLite Release 1 only. CWMLite Release 2 metadata must be created programmatically using the CWM2_OLAP supplied PL/SQL packages.

Both CWMLite 1 and CWMLite 2 are supported by the OLAP API.

For more information, see *Oracle9i OLAP User's Guide*.

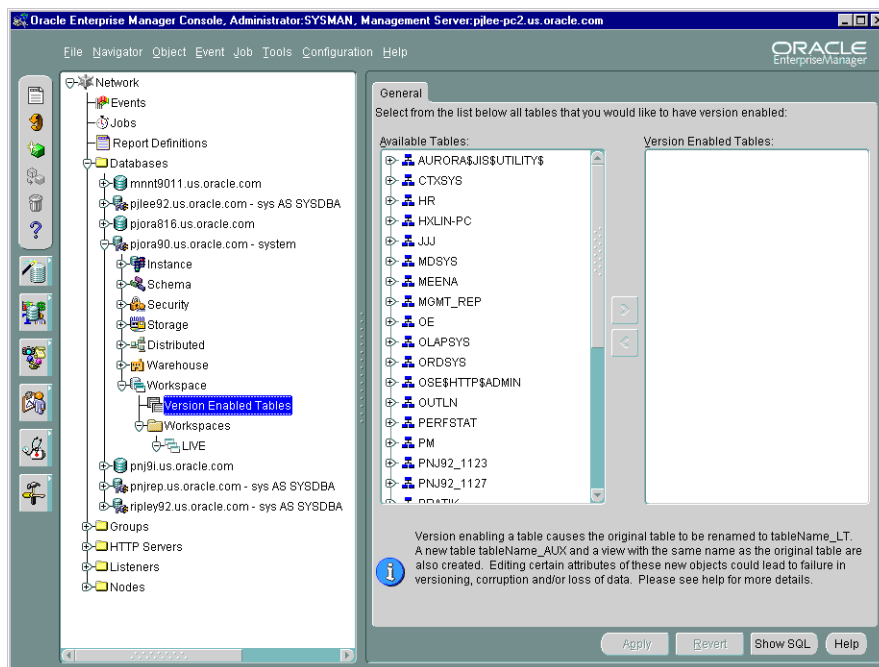
Summary Management

Oracle supports Materialized Views, also known as Summaries, to improve the performance of a data warehouse. Summaries pre-calculate expensive joins and aggregation operations and store them in a table. Oracle speeds-up query execution by transparently re-writing queries to use summaries. Dimensions aid query re-write operation. MV Logs track changes to master table for incremental refresh of Materialized Views.

Workspace Management

Workspace Management allows you to version-enable tables and create, modify, refresh, and merge workspaces.

Figure 4–16 *Workspace Management*



Oracle Workspace Manager provides a long transaction framework, in which multiple data versions are stored in the database as different workspaces. You can create new versions of data to update, while maintaining a copy of the old data.

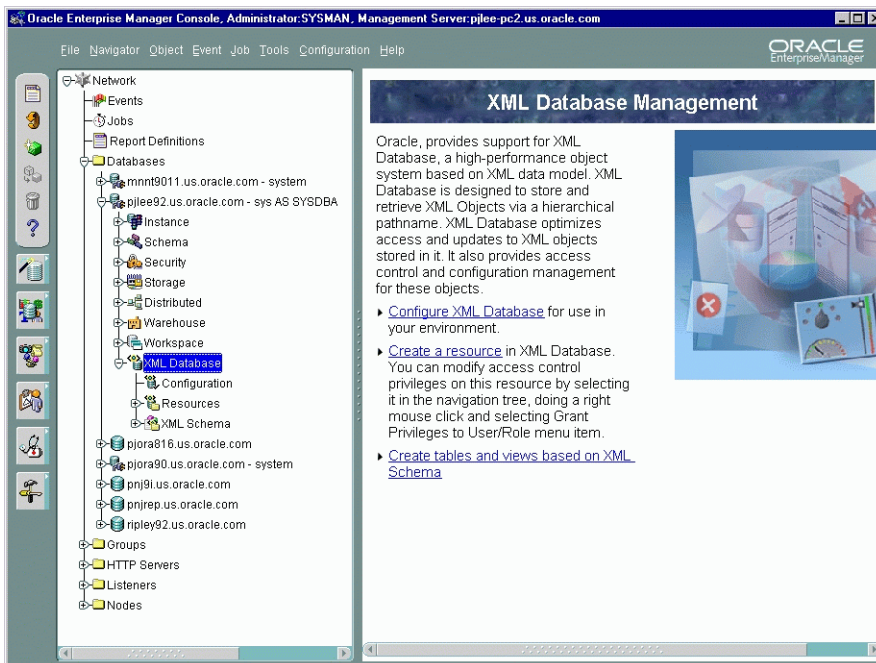
Versioning improves concurrent access of data in the database and allows multiple what-if analyses to be run against the data simultaneously.

For detailed information about Workspace Manager concepts and the application programming interface (API), see *Oracle9i Application Developer's Guide - Workspace Manager*.

XML Database

Oracle provides support for an XML Database, a high-performance object system based on the XML data model. An XML Database is designed to store and retrieve XML Objects via a hierarchical pathname. It also optimizes access and updates to XML objects stored in it and provides access control and configuration management for these objects.

Figure 4–17 XML Database Management



From the XML Database container, you can perform the following tasks:

- Configure XML Database for use in your environment.
- Create a resource in XML Database. You can modify access control privileges on this resource by selecting it in the navigation tree, doing a right mouse click and selecting Grant Privileges to User/Role menu item.
- Create tables and views based on XML Schema

SQL*Plus Worksheet

When you need to administer your database environment with SQL, PL/SQL, or SQL*Plus commands, use Oracle SQL*Plus Worksheet. With Oracle SQL*Plus Worksheet, you can enter SQL and PL/SQL code and DBA commands dynamically and run scripts which are stored as files.

The SQL*Plus Worksheet window consists of an Input pane (top) where commands are entered, and an Output pane (bottom) where the results of your commands appear after you click the Execute button.

SQL*Plus Worksheet maintains a history of the commands you have entered, allowing you to edit and re-execute an earlier command without having to retype it. The last 50 command executions can be displayed by clicking the Command History button. Selections from the Command History dialog box can then be copied and inserted into the Input pane.

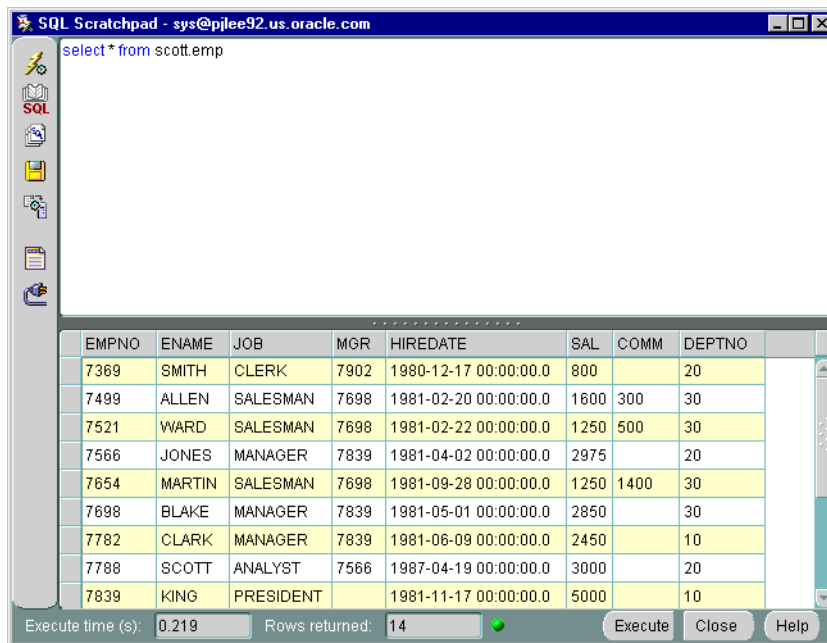
With SQL*Plus Worksheet, you can have multiple copies of the worksheet open at a time, each of which is separate from the others; so work can be committed or rolled back in each worksheet independently.

Note: Additional information on the database administration features and wizards in the Oracle Enterprise Manager can be found in the Oracle Enterprise Manager Online Help.

SQL Scratchpad

Oracle Enterprise Manager now features the SQL Scratchpad, which provides a user interface for you to enter, edit, and execute SQL quickly and easily.

Figure 4–18 SQL Scratchpad

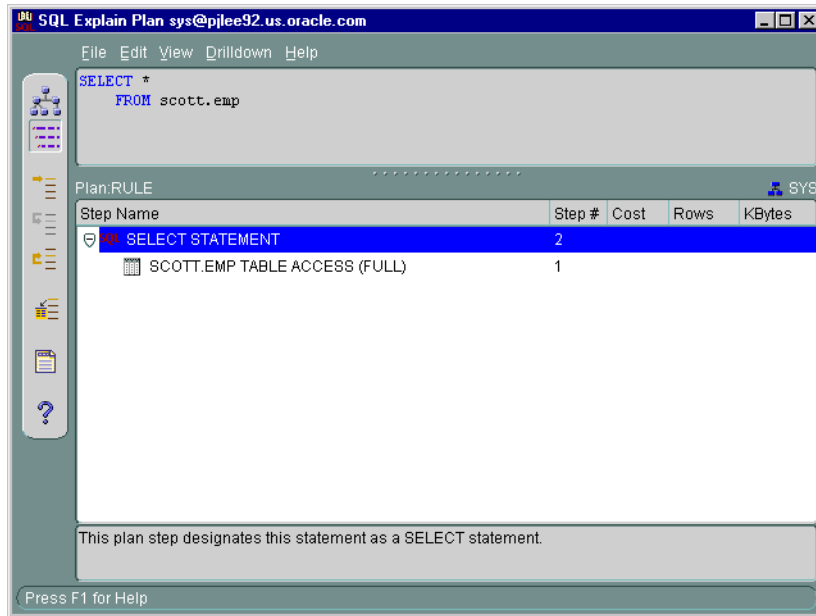


Features of SQL Scratchpad are listed below:

- Low overhead
- Standard editor features: cut, copy, paste
- Full color syntax highlighting
- Load and save SQL

- Graphical Explain Plan which describes the steps chosen by the optimizer for executing the SQL statement.

Figure 4–19 Explain Plan



- View and sort results of executed SQL command as data in a read-only spread table
- Displays the time taken to execute the queries
- Displays the number of rows for select statement
- Cancel SQL execution, which is especially useful for long running queries
- Connect to the database as a different user, including connection with SYSDBA role

Wizards

For help with database administration tasks, Oracle Enterprise Manager offers a variety of wizards:

- **Analyze Wizard:** The Analyze wizard allows you to collect statistics about the objects and store them in the data dictionary, delete statistics about the objects from the data dictionary, validate the structure of the objects, and identify migrated and continued rows of tables or clusters.
- **Backup and Recovery Management Wizards:** The Backup and Recovery wizards are also available to help you back up or restore and recover various objects such as the tablespaces, datafiles, or archive logs. With the Backup wizard you can also make an image copy of the datafiles and the current controlfile. Beginning with Oracle Enterprise Manager 9.2, the Backup Wizard allows the setting of additional options, such as backup retention policy, deleting obsolete backups and specifying the archive log deletion policy. With Oracle 9.2, recovery includes Block Media Recovery which improves the speed of recovery significantly in the case of block corruptions.
- **Create Table Wizard:** The Create Table Wizard facilitates the creation of a table.
- **Cube Wizard:** The Create Cube Wizard helps you build a cube object. Cubes represent multidimensional data stored in your data warehouse fact tables.
- **Data Management Wizards (Import/Export/Load):** Oracle Data management wizards automate the transfer of data to and from an Oracle database.
- **Dimension Creation Wizard:** The Create Dimension Wizard will help you build a dimension object. Dimensions represent columns in your data warehouse dimension tables as levels and attributes. Dimensions typically define hierarchical relationships between their levels.
- **Resource Plan Wizard:** The Resource Plan Wizard helps you group user sessions that have similar processing and resource usage requirements and allocate resources among the consumer groups.
- **Summary Advisor Wizard:** The Summary Advisor Wizard provides advice as to which materialized views should be created, dropped, or retained.
- **View Wizard:** The View Wizard facilitates the creation of a view, a tailored presentation of the data contained in one or more tables (or other views).

For more information on wizards, see the Oracle Enterprise Manager Quick Tour or the Oracle Enterprise Manager Online Help.

Oracle Management Packs and Integrated Applications

Oracle Enterprise Manager's functionality can be extended further by adding one or more optional management packs. Combined with Oracle Enterprise Manager's Console and framework, these specialized application packs offer integrated solutions for monitoring system bottlenecks, optimizing and tuning system performance, managing system changes, and planning for increases in resource utilization of your entire information system environment.

The following optional system management packs are available for use with Oracle Enterprise Manager:

- Oracle Diagnostics Pack
- Oracle Tuning Pack
- Oracle Change Management Pack
- Oracle Standard Management Pack
- Oracle Management Pack for Oracle Applications
- Oracle Management Pack for SAP R/3

Integrated into the Oracle Enterprise Manager Console are the following applications for added value in enterprise management:

- Oracle Enterprise Security Manager
- Oracle9i Text
- Oracle Spatial Index Advisor
- Oracle Data Guard Manager
- Oracle LogMiner Viewer

Oracle Diagnostics Pack

The Oracle Diagnostics Pack is a useful set of sophisticated, yet easy-to-use tools for managing the health of your system, including automatically detecting problems, diagnosing problems, and planning for the future. By using the tools in Oracle Diagnostics Pack, you can make significant gains in productivity, manageability, and database performance.

The Oracle Diagnostics Pack contains the following applications:

- Oracle Advanced Events
- Oracle Performance Manager
- Oracle Capacity Planner
- Oracle TopSessions
- Oracle Trace

Oracle Advanced Events

In addition to the basic UpDown event tests provided for all targets administered in the Enterprise Manager Console, the Diagnostics Pack provides a library of advanced event tests to automatically detect excessive resource use, performance degradation, and other problem situations.

The key to a smooth running system is to resolve problems before they turn into crises. These advanced event tests allow you to focus on the causes of a problem before the symptoms become serious. In addition, with the paging and e-mail support provided by Enterprise Manager, you can be notified of any problems with the system wherever you happen to be.

The Event System within Oracle Enterprise Manager assists the DBA with automatic problem detection and correction. Using the Event System, the DBA can establish boundary thresholds for warnings and critical conditions within the network environment for problem monitoring.

The Enterprise Manager base product comes with a set of event tests called base event tests. These event tests consist of UpDown event tests that check whether a database, listener, or node is available. More comprehensive monitoring is available through Advanced Event Tests. These event tests are packaged with the Oracle Diagnostics Pack and are classified under the following categories:

- Database Event Tests
- Listener Event Test

- Microsoft® SQL Server Event Test
- Node Event Tests

Database Event Tests

The Oracle Advanced Event Tests for the database target type are grouped into the following categories:

- Database Audit Management Event Test: allows you to monitor specific database user connections.
- Database Fault Management Event Tests: monitors for server problems that require immediate action.
- Database Performance Management Event Tests: monitors the system for performance problems.
- Database Resource Management Event Tests: tracks possible resource problems.
- Database Space Management Event Tests: tracks possible space problems within the database.
- User Defined SQL Event Test: allows you to define your own SQL script that evaluates an event condition.

Listener Event Test

The UpDown Listener Event Test checks whether the listener on the node being monitored is available. The Startup Listener job task can be set up as a fixit job for automatically correcting the problem.

Microsoft® SQL Server Event Test

This test checks whether the Microsoft SQL Server being monitored is running.

Node Event Tests

The node event tests include the following categories with several different event tests in each area:

- Common Node Event Tests
- Compaq Tru64 Event Tests
- HP-UX Event Tests
- IBM AIX Event Tests

- Solaris Event Tests
- Windows NT Event Tests

HTTP Server Event Tests

The Oracle e-Business Management Tools Advanced Event tests are provided for lights-out event monitoring and problem detection of the HTTP Server.

Oracle Performance Manager

Oracle Performance Manager is an Oracle Enterprise Manager application that allows you to monitor the performance of the database and its related applications and operating systems in real time. It allows system and database administrators to monitor performance statistics for Oracle database servers, web servers, Oracle concurrent managers, operating systems, and other managed targets. Performance Manager also allows you to record statistics and play them back at a later time.

You can display these statistics in a number of formats including horizontal and vertical tables, strip charts, horizontal and vertical bar charts, and pie charts. You can also drill down for more detail on some predefined charts.

Since Performance Manager is integrated with Oracle Capacity Planner, you can also drill down to an historical view of the displayed data. The drilldown to historical data allows you to quickly compare the current real time value with the historical average to provide you with a better understanding of the meaning of the current value.

Performance Manager integrates Event system thresholds with charts so that events and charts share common performance thresholds you can set from either monitoring point. This provides consistent monitoring of thresholds across Enterprise Manager and allows access to graphical and historical diagnostics information from the Event system. You can investigate event notifications by launching charts, historical data and diagnostic advice directly from the Event Viewer. Performance Manager charts incorporate event notification through chart threshold state indicators.

You can use activity diagnostic charts such as TopSessions for finding and troubleshooting high impact sessions. These charts provide graphical performance data to help you diagnose a problem session or SQL statement.

Oracle Capacity Planner

The same data collection mechanism used by Performance Manager to sample real-time data is also used to collect historical performance and resource consumption data. The Diagnostics Pack uses Capacity Planner to analyze performance data to help you diagnose problems using historical information and project your future capacity needs.

In Performance Manager, historical data can be gathered for the targets you monitor. The collection can be customized, allowing you to select any subset of statistics to collect and the interval at which these statistics should be sampled. The data collection mechanism provides roll up capabilities, where data is automatically aggregated at the end of each hour, day, week, or month. This data collection mechanism also allows you to set up data expiration policies so you can fully control the amount of storage needed for the historical data.

Once the data is gathered, you can use Capacity Planner to chart the historical data for the purposes of identifying trends and predicting future hardware requirements for the system. You can also extrapolate to a particular point in time or work back from a particular target value and find when a specific level of usage is expected to occur. These charts can be customized, allowing you to get the data you need and to view data from multiple sources (for example, CPU and disk) on a single, unified chart.

You can also publish historical data to a website where administrators and system administrators can view data that is periodically updated.

Oracle TopSessions

You can use Performance Manager to assist you in identifying performance bottlenecks within your system and database environment. The TopSessions chart displays database sessions that are contributing most heavily to database activity. You can display various details for these sessions, including the SQL statements, and resource usage.

You can obtain an overview of session activity by displaying the top sessions sorted by a statistic of your choosing. For any given session you can then drill down for more detail, or if you choose, you can terminate the session using the Kill Session option.

The TopSessions chart provides a methodology for identifying and correcting certain database performance problems. For example, when sudden file I/O load is detected, you can first identify the sessions contributing most to the problem and then isolate the executing SQL statements in user applications for those sessions.

You can then analyze the SQL explain plans for those SQL statements to determine how best to resolve the problem.

Once populated with data, the TopSessions chart includes a multi-column list of summary information for each session connected to the database instance or for each of the top n sessions as measured by the selected sort statistic.

You can also access the TopSessions chart from the Enterprise Manager console by selecting TopSessions from the Diagnostics Pack tool drawer. You can access information about individual sessions via drill downs from this chart.

Oracle Trace

Trace is a general-purpose tracing mechanism that collects data for any software product enabled with Trace Application Programming Interface (API) calls, such as the Oracle server. You can use Trace to collect a wide variety of data, such as performance statistics, diagnostic data, system resource usage, and business transaction details.

Data Viewer allows you to view formatted data collected by Trace. Data Viewer handles the complex task of extracting data and aggregating key server performance metrics on a large Trace collection. Once you select a Trace collection, you can have Data Viewer compute SQL or Wait statistics or both.

Oracle Tuning Pack

The Oracle Tuning Pack contains seven applications to help users tune all aspects of their database environment; from identifying and correcting problem SQL statements to adjusting the instance parameters for the database.

The Oracle Tuning Pack enables users to proactively tune their database environment. The applications within the Oracle Tuning Pack can be used to:

- Identify and resolve performance problems
- Identify the cause of a problem that has been reported and get advice on the best way to correct it
- Maintain existing performance
- Avoid performance problems by practicing proper maintenance operations
- Identify potential tuning problems before they occur
- Provide tools and methodologies to establish and maintain database performance

Oracle Tuning Pack includes the following applications that cover the complete spectrum of Oracle tuning:

- Oracle Expert
- Oracle Index Tuning Wizard
- Oracle SQL Analyze
- Oracle Tablespace Map
- Reorg Wizard
- Outline Editor (New in Oracle9i)
- Outline Management (New in Oracle9i)

Oracle Expert

Oracle Expert is a software tool for optimizing the performance of your database environment. Oracle Expert assists with the initial configuration of a database and with the collection and evaluation of performance characteristics of existing databases.

Oracle Expert automates the process of collecting and analyzing performance tuning data and provides expert database tuning recommendations. Additionally,

Oracle Expert generates scripts that assist with the implementation of tuning recommendations.

Oracle Expert provides many advantages. Oracle Expert:

- helps to ensure continued performance as the database environment changes over time
- provides consistent and complete recommendations
- performs interdependency checking during analysis
- detects and reports symptoms of poor performance
- sifts through vast quantities of data quickly to identify performance problems
- identifies situations where advanced performance features of the database may be applied

Oracle Expert also serves as:

- an educational tool that explains its tuning recommendations through detailed reports
- a methodology tool that guides the DBA, analyst, and designer through the process of improving the performance of an Oracle database
- a maintenance tool that uses historical trends to inform the DBA of degrading performance and impending bottlenecks
- an information tool that collects tuning data from numerous sources. This data not only feeds the tuning process, but can be displayed, edited, and reported.
- an automation tool that assists the DBA by automating routine database maintenance and tuning tasks

Oracle Index Tuning Wizard

The Oracle Index Tuning wizard is a software application that identifies tables with inefficient indexes and makes recommendations which will improve access to those tables.

The Index Tuning wizard:

- Identifies tables in need of index changes
- Presents its findings in reports
- Implements the recommendations for you

The Index Tuning wizard is intended for use with the Oracle cost-based optimizer. The recommendations made by the Index Tuning wizard will optimize index usage for the Oracle cost-based optimizer. Therefore, you should not use the Index Tuning wizard for those schemas where rule-based optimization is used.

You can use the Index Tuning wizard to proactively maintain optimal indexes for your database. You should run the Index Tuning wizard regularly to evaluate whether index changes should be made to improve SQL query performance. The Index Tuning wizard may recommend adding new indexes, changing existing indexes, or changing the type of an index.

You should also use the Index Tuning wizard when one of the following situations occurs:

- A user has reported unacceptable response times for a query
- New applications have been added to the database environment
- Existing application SQL has been modified
- The database server has been upgraded to a new version
- Table sizes within the database have increased substantially

Any of these factors may impact the indexing decisions for the database.

Oracle SQL Analyze

One of the primary benefits of the SQL language is its flexibility; you can achieve the same result by taking any of a number of different approaches. Although each approach might return the same result, performance varies dramatically depending on the database environment, structure of indexes and the access paths chosen by the Oracle optimizer.

While efficient SQL statements can help maintain peak database performance, inefficient statements can cause slow performance. In many cases, tuning your SQL statements can increase overall performance by 100% or more.

Tuning SQL, however, has not been easy in the past. It involves collecting and analyzing information, and requires expert knowledge and experience. Tuning a SQL statement requires:

- awareness of the current environment and data
- knowledge of all schema objects
- an understanding of the Oracle Optimizer

- an in-depth knowledge of SQL

Oracle SQL Analyze provides you with the tools to collect information about the database environment and schema objects, analyze SQL performance, identify and compare different optimizer approaches, and edit SQL statements for optimal performance—in some cases, automatically.

Benefits of Oracle SQL Analyze are listed below:

- Provides TopSQL functionality to identify the SQL statements that consume the most resources.
- Provides access to SQL history or SQL statements that have already been run against the database.
- Executes SQL under various optimizer modes and presents explain plans and execution statistics for easy comparison.
- Walks you through the explain plan, providing the order of execution and an explanation of the operations.
- Steps you through an analysis of a SQL statement's potential join orders and methods, and provides alternative SQL for improved performance.
- Automatically checks SQL statements for basic SQL design “rules-of-thumb” violations and generates alternative SQL that corrects them.
- Presents relevant object properties to help identify and correct problems that will impact SQL performance.
- Provides easy access to initialization parameter settings that have a direct impact on SQL performance.
- Helps you add hints to your statement with the Hints Wizard.
- Saves SQL statements, execution plans, and performance statistics in a repository for future use.
- Provides index recommendations to improve SQL performance

Oracle SQL Analyze in Oracle9i introduces two new features that enhance the information you can use to tune your databases, and help automate the tuning process:

- **Charting Capability for Performance Profile Comparison:** The Compare Execution Statistics feature (introduced in SQL Analyze version 2.2) now allows you to select multiple explain plans and view the execution statistics for each statement in a color-coded chart. These charts show a visual representation of

the overall cost of each explain plan in direct comparison to the other explain plans you have selected.

- **Virtual Index Creation:** This wizard allows you to test and understand how a new index will affect SQL performance. You can define an index and then, without actually creating the index, understand how this index would affect the execution plan for an individual SQL statement.

Oracle Tablespace Map

Getting the best performance from a database's application SQL requires more than tuning individual SQL statements; it also requires identifying database storage problems. To meet these needs, the Oracle Tuning Pack includes Oracle Tablespace Map, a tool for monitoring tablespace usage.

The Tablespace Map provides a complete picture of the characteristics of all tablespaces associated with a particular Oracle database. These characteristics include analysis status, segment type, segment name, number of extents, and the total size of the extent in blocks. You can display all segments for a tablespace or all segments for a datafile.

The Tablespace Map also provides an allocation map which illustrates the organization of a tablespace's segments. This map displays an overview of the sequential allocation of space for segment extents within a selected tablespace or datafile. Within the tablespace map, it is possible to select an individual extent and see the segment name, the ID of the block in the extent, the ID of the extent, the size (in blocks) of the extent, and the full name and path of the datafile which is the physical location of the extent.

Another key feature of the Tablespace Map is the Tablespace Analysis tool. A Tablespace Analysis can detect potential space management problems. Once a Tablespace Analysis has been performed, a Tablespace Analysis report is created and provides a detailed listing of any detected problems and marks the problematic segments with a warning or alert flag.

Reorg Wizard

To correct database storage problems, Oracle Tuning Pack provides the Reorg Wizard, which can help you maintain a well performing database by correcting space usage problems. Over time, database performance can be affected by problems such as row chaining and/or migration and index stagnation. The Reorg Wizard can eliminate space problems by reorganizing database space usage and allowing you to change an object's storage settings and location.

The Reorg Wizard gives you three reorganization options:

- Reorganize specific schema objects
- Reorganize an entire tablespace
- Repair migrated rows

The wizard performs reorganizations within the Oracle database and does not use external data handling operations. Reorganizations can be performed within the target tablespace or by temporarily using space in another tablespace.

The Reorg Wizard evaluates the reorganization operations and generates an Impact Report and reorganization script, which can be reviewed prior to execution.

Reorganizations can be performed immediately or can be scheduled at a later time, perhaps during off-peak hours. In either case, the reorganization will be run by an Enterprise Manager job using the Oracle Intelligent Agent.

Note: The Enterprise Manager Console, Oracle Management Server and Agent are required to perform reorganizations with the Reorg Wizard. The Agent must be running on the same node as the database being reorganized.

Certain database reorganization operations can be time-consuming and will impact the availability of objects being reorganized. Use database object reorganization selectively. For example, tablespace reorganizations can often be avoided by reorganizing only selected tables and indexes.

Outline Management

The Outline Management is an advanced Oracle9i application that allows you to manage stored outlines directly using a GUI-based tool. Specifically you can browse, sort, delete, and edit outlines with this tool. The tool uses the editing and management features of Oracle's plan stability functionality. Plan stability prevents certain database environment changes from affecting the performance characteristics of applications. Such changes include changes in optimizer statistics, changes to the optimizer mode settings, and changes to parameters affecting the sizes of memory structures, such as SORT_AREA_SIZE and BITMAP_MERGE_AREA_SIZE. Plan stability is most useful when you cannot risk any performance changes in an application.

Plan stability preserves execution plans in stored outlines. Oracle can create a public or private stored outline for one or all SQL statements. The optimizer then generates equivalent execution plans from the outlines when you enable the use of stored outlines. You can group outlines into categories and control which category of outlines Oracle uses to simplify outline administration and deployment.

The plans Oracle maintains in stored outlines remain consistent despite changes to your system's configuration or statistics. Using stored outlines also stabilizes the generated execution plan if the optimizer changes in subsequent Oracle releases.

Plan stability also facilitates migration from the rule-based optimizer to the cost-based optimizer when you upgrade to a new Oracle release.

Outline Editor

Outline Editor is an advanced Oracle9i application that allows the user to control the optimizer behavior by modifying the optimizer mode, join order, or index usage without having to change the statement in the application code.

When you create an outline, hints are added to the database which are used by the optimizer when executing the SQL statement. The outline affects the execution plan of the SQL text because the optimizer uses the hints stored in the outline to execute the SQL. The Outline Editor application window shows the SQL text of the outline and the graphical layout of the outline's execution plan. The execution plan is the set of steps Oracle uses to execute a statement and includes the access method for each table that the statement accesses, the join methods used, and an ordering of the tables (the join order.)

With the Outline Editor, you can change the outline's join order (simply select an outline step from the graphical display and drag it to another location), access methods, and other outline properties to optimize its performance. Note that changes to an outline may result in invalid hints to the optimizer. The optimizer may revert your changes if the changes are unacceptable. It is important to note that these changes will not be applied to the outline until the changes have been validated. It is also important to note that these changes will not be available to other users until the outline has been saved. You will not see the updated outline in Outline Management until the outline has been saved with a unique name and Outline Management has been refreshed.

In addition to editing outlines with the Outline Editor, you can also create new outlines. The Outline Editor allows you to create an outline or create an outline that is like another outline.

Oracle Change Management Pack

The Oracle Change Management Pack is a group of integrated applications used to track and make changes to database object definitions. The Oracle Change Management Pack is a component of Oracle Enterprise Manager.

An important task of database administrators is preparing for and reacting to change. Because business needs and requirements can change quickly, adjustments and enhancements are often required for business applications and their supporting databases. DBAs need the ability to respond to these changes quickly and effectively.

Oracle Change Management Pack is a set of easy-to-use tools for managing complex changes in the Oracle Server and database objects. While tracking and implementing changes has typically been a very expensive and difficult process, Oracle Change Management Pack greatly reduces the time and costs associated with managing the implications of changing business needs and requirements.

Managing change in an Oracle environment can mean managing the evolution of schema objects and the database environment. Changes to applications can require changes in the definitions of particular objects like tables or triggers. Over the lifetime of a database, changes may need to be made to the characteristics of a tablespace or a set of users. Oracle Change Management Pack can manage all of these types of changes.

With Oracle Change Management Pack, you can track changes by capturing the definitions of a set of database objects and comparing the object definitions in one schema or database to another. You can also compare object definitions in a schema or database to a previously-captured state (baseline) of the same schema or database or compare two baselines.

Change Management Pack also keeps track of versions of baselines, comparisons, and changes. For example, you could capture repeated versions of a baseline for keeping track of an evolving schema like a meta-data backup.

In addition to tracking changes, Oracle Change Management Pack allows you to implement changes. After comparing two sets of object definitions, you can implement changes by synchronizing database definitions with those of a baseline or another database; or you can create one or more object definitions on multiple databases that are copies of the definitions in another database. You can also change object definitions by simply specifying the changes to make.

To make changes, Oracle Change Management Pack generates scripts that are run against database object definitions. When a script is generated, you have the ability to view and edit the script, execute it whenever you like or schedule a time for the

script to be executed, and optionally to roll back the changes. Oracle Change Management Pack also provides an impact report which the administrator can evaluate before making the changes.

In the following section, some of the major capabilities of Oracle Change Management Pack are described.

Change Manager

Change Manager is a central application for managing your work in Oracle Change Management Pack. The tree view on the left of the application's interface displays baselines, comparisons, and plans. With the detail view on the right, you can launch other wizards and tools.

The following functionality can be accessed from Change Manager:

Create Baseline

The Create Baseline application guides you through the process of capturing a database (or a subset of a database) in a form that is readable by other Oracle Change Management Pack applications. Create Baseline lets you specify the set of database object definitions to capture, captures those definitions in their current state at the time of the capture operation, and displays the baseline in the Baseline Viewer.

Create Baseline can capture object definitions in both of the following forms:

- A baseline. The baseline stores definitions in a form that other Oracle Change Management Pack applications can use. A baseline is created during every capture operation.
- A SQL DDL script. The script contains the SQL statements that correspond to the captured definitions. You can use the script to save a textual version of the definitions or as input to CASE tools that accept SQL DDL input. You can also use individual SQL statements from the script to create definitions in a new database. You have the option of whether or not to create a SQL DDL script. To save time during a capture operation, you can defer the creation of the SQLDDL script.

The Baseline Viewer displays baselines created with Create Baseline. You can also use Baseline Viewer to generate a SQL DDL script for the baseline if you did not generate one when the baseline was captured.

Compare Database Objects

The Compare Database Objects application guides you through the steps of selecting two sets of object definitions for a comparison. The object definitions can be selected from current database definitions or they can be selected from baselines created earlier with Create Baseline. Differences that are found between the two sets of object definitions are displayed in the Comparison Viewer.

The result of comparing two sets of object definitions using Compare Database Objects is called a comparison. You can view a comparison, name it, and save it in the Comparison Viewer. You can also generate a report in HTML format about the results of a comparison.

After two sets of object definitions have been compared, you can use the Synchronization Wizard to modify one set of definitions (with the exception of baselines, which are read-only and cannot be modified) to match the other set of definitions.

Synchronization Wizard

After two sets of object definitions have been compared and the comparison results are displayed in the Comparison Viewer, you can use the Synchronization Wizard to modify one set of definitions (with the exception of baselines, which are read-only and cannot be modified) to match the other set of definitions. For each selected object definition in the source, if an object definition of the same name and type already exists at the target database, the target object will be modified to match the source definition. If a selected object definition in the source does not exist at the target database, it will be created. The Synchronization Wizard does all the work of determining and ordering the individual steps that must be carried out to perform this requested synchronization, taking object definition dependencies into account.

DB Quick Change

The DB Quick Change application guides you through the process of making one or more changes to a single database object definition. You indicate changes to object definitions by directly manipulating their representation on property sheets similar to those in the Oracle Enterprise Manager Console. The DB Quick Change versions of these property sheets allow you to make some changes that cannot be made using the Console (for example, changing the name of a column in a table).

DB Quick Change does all the work of determining and ordering the individual steps that must be carried out to perform your requested operations, taking object definition dependencies into account.

DB Alter

The DB Alter application guides you through the process of making changes to one or more object definitions in one or more databases. You indicate changes to object definitions by directly manipulating their representation on property sheets similar to those in the Oracle Enterprise Manager Console. The DB Alter versions of these property sheets allow you to make some changes that cannot be made using the Console (for example, changing the name of a column in a table).

When you specify a group of changes to several database object definitions, DB Alter does all the work of determining and ordering the individual steps that must be carried out to perform your requested operations, taking object definition dependencies into account.

The specified changes can be applied at the source database and at other databases.

DB Propagate

The DB Propagate application guides you through the steps of selecting one or more object definitions from a database, then reproducing those definitions in a target schema within the source database or in one or more target databases. For each selected object definition in the source database, if an object definition of the same name and type already exists at the target database, the target definition will be modified to match the source definition. If a selected object definition in the source database does not exist at the target database, it will be created.

DB Propagate does all the work of determining and ordering the individual steps that must be carried out to perform your requested operations, taking object definition dependencies into account.

Plan Editor

The Plan Editor application allows you to create, modify, and deploy a single change plan. The change plan can modify or reproduce database object definitions in one or more databases.

You can also create change plans with Synchronization Wizard, DB Alter, DB Quick Change, and DB Propagate. However, these applications differ from Plan Editor because each of them is designed to create a change plan with specific types of change requests that make specific types of changes.

Plan Editor is a more flexible change plan tool. You can use Plan Editor to create and modify a change plan that includes any type of change request and which can make a wider variety of changes.

The other applications use components from the Plan Editor interface in a framework that guides you through the application's task. As you use the other Oracle Change Management Pack applications, you become familiar with the components that Plan Editor uses to accomplish different tasks.

Oracle Standard Management Pack

Oracle Standard Management Pack is a management pack designed for smaller enterprises that use the Oracle Workgroup Server or Oracle9i. This pack combines many of the diagnostic, tuning, and change management functionality of Oracle Diagnostics Pack, Oracle Tuning Pack, and Oracle Change Management Pack into one easy-to-use application suitable for the smaller business enterprise. Oracle Standard Management Pack monitors and diagnoses problems, tunes high impact indexes, and tracks and compares changes in the Oracle environment.

Oracle Standard Management Pack is comprised of the following applications for managing the Oracle Environment:

- **Oracle Performance Manager:** Applies real-time, graphical Oracle and host monitoring through an extensive array of customized performance charts.
- **Oracle Index Tuning Wizard:** Proactively optimizes the indexes in your database environment.
- **Oracle Create Baseline:** Captures definitions of schema objects, allowing users to easily "reverse engineer" a schema.
- **Oracle Compare Database Objects:** Allows users to easily compare schemas or databases and object definitions.
- **Oracle Advanced Database and Node Events:** This set of additional tests is an extension to the Oracle Enterprise Manager Event System, providing more advanced event monitoring functionality.

Oracle Management Pack for Oracle Applications

The Oracle Management Pack for Oracle Applications is a set of advanced tools for monitoring and diagnosing your Oracle Applications environment and planning for future resource needs. The pack extends the existing database management capabilities of Oracle Enterprise Manager to the middle-tier application subsystem of Oracle Applications, namely the Concurrent Processing Servers. The pack builds on the Oracle Enterprise Manager host and database management framework and incorporates Oracle Applications within its managed targets.

The Management Pack for Oracle Applications includes the following diagnostic applications for optimum Oracle Applications management:

- **Oracle Performance Manager:** With the pack's performance management capabilities, it can recognize multiple instances of Oracle Applications and display real-time data of Concurrent Processing Servers and Forms Servers in easy-to-interpret, consolidated graphical views.
- **Oracle Capacity Planner:** The pack's capacity planning feature collects historical performance data from Concurrent Processing Servers, Forms Servers, and their underlying hosts, allowing correlation and trending of this information for determining future resource requirements.
- **Concurrent Processing Tuning Assistant:** This feature analyzes historical batch job execution records and identifies scheduling bottlenecks as well as programs that would benefit the most from tuning.
- **Oracle Applications Advanced Events:** This extension to the Oracle Enterprise Manager Event System allows lights-out event monitoring and problem detection of the entire applications system.

The Management Pack for Oracle Applications displays Concurrent Processing Servers on the Oracle Enterprise Manager Console. The Console provides central administration of a distributed application system, allowing administrators to notify each other if any of the servers go down, and schedule jobs and monitor events on the application subsystems.

Oracle Management Pack for SAP R/3

Oracle Management Pack for SAP R/3 is a set of applications for monitoring, diagnosing, and planning in the SAP R/3 environment. This pack extends the advanced tools in Oracle Enterprise Manager for monitoring the SAP R/3 environment, diagnosing problems, and planning for future needs.

The Management Pack for SAP R/3 builds on the Oracle Enterprise Manager host and database management framework, and manages the SAP R/3 system as one of its managed targets. The pack displays R/3 application servers in the navigator and map views. Jobs and events, including Management Pack for SAP R/3 Advanced Events, are similarly integrated.

Oracle Management Pack for SAP R/3 contains the following applications:

Oracle Performance Manager: This tool recognizes multiple instances of R/3 and displays real-time data of R/3 application servers, buffers, and work processes in an easy-to-interpret, consolidated graphical view.

Oracle Capacity Planner: This tool collects R/3 metrics and diagnoses problems through correlation and trending of the collected information to determine future resource requirements.

Oracle Advanced Events: This extension to the Oracle Enterprise Manager Event System allows lights-out event monitoring and problem detection of the entire R/3 applications system.

Integrated Applications

The applications listed below are integrated with Oracle Enterprise Manager for added value in managing your Oracle environment, and can be installed with Oracle Enterprise Manager if your environment requires them. The applications can be accessed from the Oracle Enterprise Manager Navigator pane and/or the Console application drawers, or from your operating system.

Oracle Enterprise Security Manager

Oracle Enterprise Security Manager is a component of the Oracle Advanced Security Option and manages Oracle9i Enterprise User Security. The application allows administrators to manage enterprise-level role authorization among multiple databases simultaneously.

Enterprise Users are created and centrally managed in an LDAP Directory Server. They use digital certificates and Secure Sockets Layer (SSL) to achieve Single Sign-On to multiple Oracle9i Database Servers. Upon authenticating an Enterprise User, Oracle9i will search for its role authorizations in the Directory. Such role authorizations are known as "Enterprise Roles".

Enterprise Security Manager allows multiple administrators to define "Enterprise Domains" of servers that share a common set of Enterprise Roles. The tool also allows administrators to create Enterprise Users and then manage their Enterprise Roles within these domains. All information on Enterprise Domains, Databases, Enterprise Roles, and Enterprise Users is stored securely in a Directory, for example Oracle Internet Directory.

Oracle9i Text

The Oracle9i Text is a text-search system for managing and searching for text in the Oracle database. This application helps you manage and search for text in the database as quickly and easily as any other type of data. Oracle9i Text's search techniques make text a standard datatype in the Oracle server which you can create, modify, and delete. Additionally, with Oracle9i text, new text-based developments or extensions to existing applications are easy and cost-effective to build with standard SQL tools.

With Oracle9i Text, you can search for data in any Oracle database application that uses text from search-enabling a comments field in an existing application to implementing large-scale document management systems dealing with multiple document formats and complex search criteria. Oracle9i Text also supports basic full-text searches in most languages supported by the Oracle database.

Oracle9i Text allows the database administrator to create and manage Oracle9i Text indexes used for text querying. Text servers, which poll for new documents not yet indexed can also be started when connecting to a database through the Oracle Management Server.

Oracle Spatial Index Advisor

Oracle Spatial Index Advisor helps you analyze and tune spatial indexes on data. Using this application, you can analyze the effectiveness of spatial indexes defined on spatial data. The Advisor lets you see if indexes are properly defined for optimum query performance. The application also provides an understanding of the distribution of data through visual inspection.

A spatial index is a set of database tiles. With Oracle Spatial Index Advisor, the database administrator specifies the size and number of tiles in a database. The geometric coverage of the tiles has a direct impact on query performance. The Advisor allows the user to see the interaction of the tiles with the geometric coverage and to issue queries against the data to see how typical queries will perform.

Oracle Directory Manager

Oracle Directory Manager is a Java-based tool for administering most functional areas of Oracle Internet Directory and its related processes. Using Oracle Directory Manager, you can connect to directory servers; manage configuration parameters; add, modify, and delete entries, attributes, and object classes; set up access control policies; configure security; and view and modify replication agreements.

Oracle Forms Server Manager

Oracle Forms Server Manager allows you to control and monitor Forms Listener, Forms Server, Load Balancer Server, and Load Balancer Client. The tool provides the following functionality:

- Automatic node discovery, which helps find the Forms listener, Metrics Server, and Metrics client running on the node you want to discover.
- Forms Server listener control, which allows you to remotely create, start, stop, and refresh Forms listener, as well as modify the configuration and list the runtime processes
- Forms Server runtime control, which displays information about the users currently connected

- Load Balancer Control, which helps you remotely create, start, stop, and load the balancer
- Activity monitoring, which allows you to schedule a job while particular events are occurring, such as listener down, CPU usage consumption, and excessive memory usage
- Fixit jobs, which can be used to restart the forms listener automatically if it stops for abnormal reasons
- Notification capability, which allows administrators to be notified by email or pager when a particular event occurs

Oracle Policy Manager

You can use Oracle Policy Manager to administer Oracle Label Security. The navigator tree lists policies, along with their labels, authorizations, and protected objects. The detail view shows a property sheet in which labels are specified.

See the online help for instructions on how to use this graphical user interface.

Oracle Net Manager

Oracle Net Manager is a graphical user interface tool that combines configuration abilities with Oracle Names component control to provide an integrated environment for configuring and managing Oracle Net. It can be used on either the client or server.

You can use Oracle Net Manager to configure the following network components:

- Naming--Define simple names, connect identifiers, and map them to connect descriptors to identify the network location and identification of a service. Oracle Net Manager supports configuration of connect descriptors in local `tnsnames.ora` files, a centralized LDAP-compliant directory service, or an Oracle Names server.
- Naming Methods--Configure the different ways in which connect identifiers are resolved into connect descriptors.
- Profiles--Configure preferences for enabling and configuring Oracle Net features on the client or server.
- Listeners--Create and configure listeners to receive client connections.

If an Oracle Names server is configured, you can start, stop, tune, or gather statistics for it with Oracle Net Manager.

Oracle Data Guard Manager

Oracle Data Guard Manager is an easy-to-use Oracle Enterprise Manager application. It provides users with fast recovery from disaster situations by automating failover to standby databases. Use the Data Guard Manager to create Data Guard physical and logical standby configurations, receive e-mail or pager notifications, failover to a standby after a disaster, switchover between standby databases, and monitor the performance of a Data Guard configuration.

When you use Data Guard Manager to control and monitor configurations, you dramatically reduce the time and complexity required to implement standby database solutions.

Oracle LogMiner Viewer

Oracle9i LogMiner is a relational utility that helps you analyze online or archived log files to evaluate all updates to a database. The ability to easily and accurately determine and control what activity is taking place on computer systems is essential to the effective management of these systems. Resolving what caused key data to change is vital to the security and management of enterprise applications and systems. Now administrators can easily audit the use of the database and the mission critical data it manages.

With Oracle9i LogMiner Viewer, part of Oracle Enterprise Manager, you can easily specify the query criteria to choose the data to retrieve from the redo log files, view the data retrieved from the redo log files, including SQL redo and undo statements, specify other redo log files to be queried or specify the columns to be displayed and their order. The query criteria and the results can be saved for later use.

Glossary

3-Tier Architecture

Enterprise Manager is based upon a lightweight, three-tier architecture that offers flexible deployment options, round-the-clock reliability and unparalleled scalability. Console clients and integrated tools provide a graphical interface for administrators. Management Servers and a database repository provide a scalable middle tier for processing system management tasks. Intelligent Agents installed on each node monitor its services and execute tasks from the Management Server.

Administrative User

An Oracle Enterprise Manager administrative user is an account that provides users permission to perform administrative tasks and access administrative information. An administrative account is usually created for each person on an administrative team by the super administrator. Oracle Enterprise Manager is installed with a default user/password super administrator account which can be used for the initial login. The super administrator account is similar to root on UNIX or Administrator on Windows NT and is a user which cannot be deleted or renamed.

When you launch the Console with a Management Server connection, you login as an Enterprise Manager administrator. This administrator account should not be confused with your user account on any of the databases or systems that you manage.

When you launch the Console standalone, you connect directly to databases as a database user (such as SYS). Standalone connections do not use Enterprise Manager's middle tier, so do not require an Enterprise Manager administrator account.

Advanced Events

A set of additional pre-defined events that are included in Oracle Diagnostics Pack, Oracle Management Pack for Oracle Applications, and Oracle Management Pack for SAP R/3. These events provide advanced options for use with the Event System.

Automatic Undo Management

Oracle9i introduces a new approach for undo space management called Automatic Undo Management, which eliminates the need to manage rollback segments, by using a new UNDO tablespace.

Blackout

A feature which can be set up to prevent administrators from being flooded with e-mails and pages if a managed target is brought down for scheduled maintenance; deactivates enhanced notification (page/e-mail) while the target is down.

Capacity Planner

A tool in Oracle Diagnostics Pack used for collecting, storing, and analyzing historical performance data collected from managed databases.

Console

The client user interface of Oracle Enterprise Manager; the first tier in the three-tier framework from which network tasks are administered; The Oracle Enterprise Manager Console uses a master/detail view to provide an integrated, consistent, and efficient way of managing your enterprise. When an object in the Navigator (master) is selected, the appropriate details are displayed on the right-hand side of the Console (the detail pane).

Console Launched Standalone

Enterprise Manager is also available in standalone mode, a two-tier framework which connects directly to the databases. The Console launched standalone allows a single person to use one or more applications without requiring an Oracle Management Server or Intelligent Agent. Use the standalone Console if you want to perform basic administrative tasks that do not require the job, event, or group system.

Change Management Pack

An optional system management pack that is used with Oracle Enterprise Manager to help simplify the managing of complex changes to the Oracle Server and database objects.

Clients

The first tier of Oracle Enterprise Manager is comprised of clients such as consoles and management applications, which present a graphical user interface to administrators for all management tasks. These client components can be installed locally or brought up with a web browser.

Compare Database Objects

A tool in Change Management Pack used for selecting two sets of database object definitions and comparing them.

Create Baseline

A tool in Change Management Pack used for capturing database definitions in the form of a baseline to be used by other Change Management Pack tools.

Data Guard Manager

Oracle Data Guard Manager provides the monitoring, control, and automation necessary to manage a Data Guard configuration, including the primary and standby databases, and the log transport and log apply services.

Database Search

A tool in the Console that helps administrators locate database objects based on naming characteristics.

Database User

A user of a database managed by Oracle Enterprise Manager; not an Oracle Enterprise Manager user.

DB Alter

A tool in Oracle Change Management Pack used for making changes to one or more object definitions in one or more databases.

DB Propagate

A tool in Change Management Pack that helps administrators select one or more object definitions from a database and reproduce them in a destination schema within the source or destination database.

DB Quick Change

A tool in Change Management Pack that helps administrators make one or more changes to a single definition of a database object.

Diagnostics Pack

An optional system management pack that is used with Oracle Enterprise Manager to help manage the health of a system, including detecting and diagnosing problems and planning for the future.

Discovery

There are two types of discovery

- Automatic discovery performed by the Intelligent Agent to record the list of all services that it can manage
- Target discovery performed by the Console to obtain the list of targets from the Intelligent Agent so that the Console Navigator can display the targets

Without the Intelligent Agent discovery, there is no Console discovery. Both discoveries must be successful and must happen in the correct order for the services to appear in the Console Navigator.

When you use the Discovery Wizard in the Console, the Management Server contacts the Intelligent Agent installed on that node to discover the Oracle services installed on the node.

When the Intelligent Agent starts, it performs its service discovery by scanning the system for Oracle targets to manage. The Intelligent Agent records the target discovery. When the Console requests a discovery of the node, the Intelligent Agent transmits the service discovery information it has detected to the Management Server.

The Management Server then places the new information in the repository, and updates the Console Navigator, displaying a view of all nodes and their respective targets.

Target discovery allows administrators to run jobs and monitor for events on those nodes and allows the information to be centrally managed by the Consoles.

Directory Manager

An application integrated with Oracle Enterprise Manager used for administering most functional areas of Oracle Internet Directory and its related processes; can be used to connect to directory servers; manage configuration parameters; add, modify, and delete entries, attributes, and object classes; set up access control policies; configure security; and view and modify replication agreements.

e-Business Management Tools

The Oracle e-Business Management Tools are a set of applications that enable centralized management of the complete e-Business infrastructure including the client, middle-tier HTTP servers, and database.

Enterprise Security Manager

An application integrated with Oracle Enterprise Manager used for administering the Oracle environment for user security using an LDAP-compliant directory server; allows an administrator to manage enterprise-level role authorization among multiple databases simultaneously.

Event

A potential problem occurrence registered with the Event System in the form of one or more tests on a managed database or other service; triggers an alert to the Console, as well as a possible corrective action, if an event occurs; can also trigger e-mail or page alerts.

Event Handler

The Event Handler allows you to customize responses to event occurrences, either by logging event information to a file and/or by executing any operating system command. For example, the Event Handler can log an in-house trouble-ticket when the database goes down. This allows much more flexibility in defining responses specific to your business needs.

Event System

The system through which events are registered from the Events detail view in the Oracle Enterprise Manager Console; provides proactive alert notification.

Expert

See Oracle Expert.

Extensibility

The Enterprise Manager architecture can be easily extended on each tier to handle any number of clients and managed targets. As the number of managed systems increases, you can add more Oracle Management Servers to share and balance the workload. In this case, both the original and new Management Servers can share a single repository as their back-end store.

Export Wizard

A data management wizard that aids in transferring data from an Oracle database to an Oracle binary operating system file.

Fat Client

You can perform client operations with Enterprise Manager directly through an installed Console as a fat client. A fat client can be launched either with a Management Server connection or standalone.

Filtering (see Notification Filtering)**Fixit Job**

A job that can be scheduled to run when a particular event occurs to automatically correct the problem.

Forms Server Manager

An application integrated with Oracle Enterprise Manager that allows administrators to control and monitor Forms Listener, Forms Server, Load Balancer Server, and Load Balancer Client.

Group

A logical administrative collection of objects which are grouped together in the Group detail view of the Oracle Enterprise Manager Console for more efficient management and administration.

Import Wizard

A data management wizard that aids in transferring data from an exported binary file to an Oracle database.

Index Tuning Wizard

A tool in Oracle Tuning Pack that helps administrators quickly identify and correct index problems by recommending optimal indexing strategies and implementing the tuning recommendations.

Intelligent Agent

An independent object that resides on a managed node in the third tier and executes commands sent by the Oracle Management Server; monitors for critical occurrences (events) and executes jobs on the databases and other managed services on the node; is responsible for reporting back to the Console via the Oracle Management Server the status of jobs and events on the node; functions

independently of the databases and other services it supports, and is also independent of the Oracle Management Server and Console clients.

Instance Management

Functionality in the Console that helps administrators manage database instances and sessions.

Job

A set of one or more administrative tasks scheduled with the Oracle Enterprise Manager Job System; runs on managed databases or other services.

Job System

The system through which jobs are scheduled from the Jobs detail view of the Oracle Enterprise Manager Console.

Load Wizard

A data management wizard that aids in transferring data from operating system files, such as text files, to an Oracle database.

LogMiner Viewer

Oracle9i LogMiner is a relational utility that helps you analyze online or archived log files to evaluate all updates to a database.

Managed Node

A managed node is any machine that is being monitored by an Intelligent Agent that has been discovered by the Console.

Managed Service/Managed Target

Every service running on a managed node is a managed service or target. Multiple services (targets) can exist on a single machine (node).

Management Pack for Oracle Applications

An optional system management pack that is used with Oracle Enterprise Manager; a set of applications for monitoring and diagnosing the Oracle Applications environment and planning for future resource needs.

Management Pack for SAP R/3

An optional system management pack that is used with Oracle Enterprise Manager; a set of applications for monitoring, diagnosing, and planning for future needs in the SAP R/3 environment.

Navigator

The view in the Oracle Enterprise Manager Console where a tree list of discovered databases and their objects appears when connected to an Oracle Management Server; provides access to managed databases and other services which can be viewed and managed from this pane.

Net Manager

Oracle Net Manager is a graphical user interface tool that combines configuration abilities with Oracle Names component control to provide an integrated environment for configuring and managing Oracle Net. It can be used on either the client or server. Oracle Net Manager is also integrated with Oracle Enterprise Manager.

Node

A machine in the third tier of the Oracle Enterprise Manager framework where the managed databases and other services reside; also hosts an Intelligent Agent which monitors performance and performs tasks on the node's databases and services.

Notification

The ability of Enterprise Manager administrators to be notified of the status of jobs and the occurrence of events by Console alert, e-mail, or page; allows you to choose which administrators to have notified, and whether to use notification filtering.

Notification Filtering

Notification filters allow each administrator to specify when to send an email notification as opposed to a page notification as a result of a job or event status change.

OLAP Management

A tool in the Console that enables administrators to create and edit OLAP metadata using the CWMLite Release 1 APIs.

Oracle9i Text

An application integrated with Oracle Enterprise Manager; a text-search system for managing and searching for text in the Oracle database.

Oracle Enterprise Manager Console

The Oracle Enterprise Manager Console and its three-tier architecture provide a wide view of your entire Oracle environment. Use the Console to automatically

discover and manage Oracle databases, application servers, and Oracle applications across your entire network.

Oracle Management Server

The middle tier and the core of the Oracle Enterprise Manager framework. The Management Server provides administrative user accounts, processes management functions such as jobs and events, and manages the flow of information between the tiers.

As the number of nodes and managed services in your network increases or if the current Management Server is overloaded, you can add more Oracle Management Servers to the middle tier to share and balance the workload. These additional Management Servers provide fault-tolerance in the case where one Management Server becomes unavailable. All Management Servers administering the same set of managed nodes share a single Repository, which stores all system data, application data, and the state of managed nodes throughout the environment.

Oracle Expert

A tool in Oracle Tuning Pack that helps administrators with database initialization parameter tuning, application tuning, and structure tuning.

Oracle Real Application Clusters

Oracle9i Real Application Clusters provide transparent application scalability by sharing cluster-wide caches for coordinated data access. Along with standard DBA features, the Console supports startup and shutdown of an entire cluster database or a select set of instances. Individual cluster database instances can be managed in the same way as a single instance database. In addition to common database jobs and events, Cluster Database Instances support specialized event tests. Version 9.2 also includes diagnostics overview and drilldown charts.

Oracle Trace

A tool in Oracle Diagnostics Pack that is used for collecting precise database-occurrence statistics from Oracle products as well as end-user and third-party applications.

Outline Editor

Outline Editor is an advanced Oracle9i application that allows the user to control the optimizer behavior by modifying the optimizer mode, join order, or index usage without having to change the statement in the application code.

Outline Management

The Outline Management is an advanced Oracle9i application that allows you to manage stored outlines directly using a GUI-based tool. Specifically you can browse, sort, delete, and edit outlines with this tool.

Performance Manager

A tool in Oracle Diagnostics Pack that helps administrators monitor the factors that most affect database performance; provides real-time graphical views of performance data collected from Oracle databases, other services, and the host operating system.

Policy Manager

You can use Oracle Policy Manager to administer Oracle Label Security. The navigator tree lists policies, along with their labels, authorizations, and protected objects. The detail view shows a property sheet in which labels are specified.

Privilege

The right to execute a particular Oracle Enterprise Manager command or SQL statement; a right granted to a database administrator by a Super Administrator, or to a database user by a database administrator.

Profile

An individualized summary of data specifying system privileges as well as limitations on system resources; assigned to each database administrator and database user.

Property Sheet

A summary of information about a database or object that appears when you select a database or object in a tree view; can be used to view and change object properties; often contains multiple tabbed pages.

Reorg Wizard

Oracle Tuning Pack provides the Reorg Wizard to help you maintain a well performing database by correcting space usage problems. The Reorg Wizard eliminates space problems by reorganizing database space usage and allows you to change an object's storage settings and location.

Reporting

Enterprise Manager provides comprehensive reporting so that administrators can quickly access information about the status of all monitored systems in their

enterprise. The reporting functionality allows reports to be generated automatically at specific times or at regular intervals.

Repository

A set of database tables used as a back-end store for the middle-tier Oracle Management Server(s), and that can be located in any Oracle database; is shared by administrators and stores the state and history of registered events and scheduled jobs; also contains accounts of all administrators, including information such as administrator passwords and privileges; contains the current view of the network including all system data, application data, and information about the state of managed nodes.

Repository User

An Enterprise Manager repository is owned by a database user. During repository creation a repository's user name is entered that will be used to create this database user. The name of the repository user will also be the name of this repository, and this name will be used throughout the network to identify all the objects in this repository. The name of the repository must be a unique schema name across the entire managed network.

If the repository user name and encrypted password are saved during repository creation, the Management Server uses them to login to the repository; if they are not saved, the Management Server prompts the user for a user name and password before it starts up.

Resumable Statements

Oracle9i introduces a new feature called "resumable space allocation" which allows the system to suspend operations that encounter an "out of space condition," "MAX Extents Reached," or "User space quote exceeded failure." The system then fixes the problem and then automatically resumes execution from the point of interruption.

Enterprise Manager marks the sessions that have been suspended in Instance Management's Session List. For each suspended session you can view more details on the resumable state, such as start time, suspended time, Time Out, the last statement run, and the error encountered.

Role

A set of database privileges granted to a database administrator or database user.

Schema Management

Functionality in the Console that helps administrators manage database schema objects; helps administrators to create, alter, or drop database clusters, indexes, snapshots, tables, and views.

Security Management

Functionality in the Console that helps administrators make changes to security parameters for database objects, users, and other administrators quickly and efficiently.

Spatial Index Advisor

An application integrated with Oracle Enterprise Manager that enables administrators to analyze and tune spatial indexes on database data.

SQL Analyze

A tool in Oracle Tuning pack that analyzes and tunes problematic SQL statements that are causing the greatest impact on database performance.

SQL*Plus Worksheet

A tool with which administrators can execute SQL and PL/SQL commands and store them as files to reuse at a later time.

SQL Scratchpad

SQL Scratchpad is a low-overhead tool that simplifies SQL and PL/SQL development and general database querying. Along with the Console Navigator, SQL Scratchpad offers a complete SQL development environment.

Standard Management Pack

An optional system management pack that is used with Oracle Enterprise Manager by administrators of smaller database enterprises who use the Oracle Workgroup Server or Oracle9i; combines several of the diagnostic, tuning, and change management features of Diagnostics Pack, Tuning Pack, and Change Management Pack into one application suitable for smaller enterprises.

Storage Management

Functionality in the Console that helps administrators manage database storage for optimum database performance, such as managing tablespaces, datafiles, redo logs, and rollback segments.

Super Administrator

Default user/password. The first administrator to set up an administrator account in the repository; the head administrator to one or more middle-tier Oracle Management Servers; can create as well as disable other administrator accounts and set up all administrator credentials.

Tablespace Map

A tool in the Oracle Tuning Pack for monitoring tablespace usage. The Tablespace Map provides a complete picture of the characteristics of all tablespaces associated with a particular Oracle database. These characteristics include analysis status, segment type, segment name, number of extents, and the total size of the extent in blocks. You can display all segments for a tablespace or all segments for a datafile.

Task

What a job is comprised of when scheduled to run on a managed database or other service; what an administrator selects to create a job when scheduling a job with the Job Scheduling System; is selected from a list of pre-defined tasks.

Test

What an event is comprised of when registered against a managed database or other service; what an administrator selects to create an event when registering an event with the Event System; is selected from a list of pre-defined tests.

Thin Client

You can perform client operations with Enterprise Manager through a browser as a thin client. You use the browser when you do not have the Console software installed locally. A thin client requires the middle tier Management Server.

TopSessions

A tool in Oracle Diagnostics Pack that gives administrators the ability to pinpoint database sessions that are causing the greatest impact on performance.

Tuning Pack

An optional system management pack that is used with Oracle Enterprise Manager to help optimize performance in the database environment, including identifying and tuning major database and application bottlenecks such as inefficient SQL, poor database structures, and improper use of resources.

Trace

See Oracle Trace

Trace Manager

A tool in Oracle Trace for administering Oracle Trace data collected from API-instrumented products.

Tree List

A list of discovered and managed databases and other services and their objects that appears in a Console client when connected to the Oracle Management Server or single database; can appear in the Oracle Enterprise Manager Console, a system management pack, or, in certain circumstances, wizards.

Workspace Management

Workspace Management allows you to version-enable tables and create, modify, refresh, and merge workspaces. Oracle Workspace Manager provides a long transaction framework, in which multiple data versions are stored in the database as different workspaces. Users can create new versions of data to update, while maintaining a copy of the old data.

XML Database

Oracle9i introduced the Oracle XML Database, a high-performance system designed to store and retrieve XML documents both via relational and hierarchical access APIs. Oracle Enterprise Manager simplifies the configuration and on-going management of the XML database.

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