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Concepts

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Oracle welcomes your comments and suggestions on the quality and usefulness of this publication. Your input is an important part of the information used for revision.

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Preface

This manual introduces Oracle Enterprise Manager and describes the architecture and concepts required to use the product effectively to manage your Oracle environment.

Intended Audience

This manual is intended for all users of Oracle Enterprise Manager.

Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible, with good usability, to the disabled community. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Standards will continue to evolve over time, and Oracle is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For additional information, visit the Oracle Accessibility Program Web site at

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Structure

The architecture of the Enterprise Manager framework provides a high level of flexibility and functionality. You can easily customize Enterprise Manager to suit the monitoring and administrative needs of your environment. The following chapters discuss in greater detail Enterprise Manager functionality and applications:

Chapter 1, "Introduction"

Presents an overview of the Enterprise Manager framework: targets, services, and Grid Control. It also provides information about Enterprise Manager framework security.

Chapter 2, "Monitoring the Oracle Environment"

Describes how Enterprise Manager monitors system performance and availability of your Oracle environment.

Chapter 3, "Application Performance Management"

Explains how Enterprise Manager monitors and manages e-business application infrastructures to determine the level of performance and overall effectiveness of e-business implementations. Monitoring capabilities include: user response times,

performance and availability of servers, ability to isolate outages and performance bottlenecks, and rapid problem resolution.

Chapter 4, "Database Management"

Specifies how Enterprise Manager provides a comprehensive suite of applications to manage and administer Oracle databases.

Chapter 5, "Application Server Management"

Describes how Enterprise Manager provides an easy way to centrally manage your middle-tier Oracle Application Server environment.

Chapter 6, "Managing Deployments"

Explains how Enterprise Manager allows you to track and manage your host, database, and enterprise hardware/software configurations.

Chapter 7, "Setting Up Enterprise Manager for Your Environment"

Covers those aspects of Enterprise Manager setup and configuration that pertain to administrative effectiveness. Topics include defining roles and creating administrator accounts, organizing targets in groups, and granting appropriate privileges.

Chapter 8, "Extending Enterprise Manager"

Introduces Enterprise Manager framework extensions such as adding new target types or directly accessing information stored in the Management Repository.

Chapter 9, "Managing From Anywhere - EM2Go"

Introduces the mobile management application designed for the Oracle Environment.

Chapter 10, "Job System"

Explains how the Enterprise Manager Job System provides the capacity to automate administrative tasks and synchronize systems.

Glossary

Provides definitions of terms specific to Enterprise Manager.

Related Documents

For more information, see the following manuals in the Oracle Enterprise Manager documentation set:

- *Oracle Enterprise Manager Grid Control Installation and Basic Configuration*
- *Oracle Enterprise Manager Advanced Configuration*
- *Extending Oracle Enterprise Manager*

Oracle Enterprise Manager also provides extensive online help. Click **Help** at the top of any Oracle Enterprise Manager page to display the online help window.

Conventions

The following conventions are also used in this manual:

Convention	Meaning
boldface text	Boldface type in text indicates an element in the user interface.
< >	Angle brackets enclose user-supplied names.
[]	Brackets enclose optional clauses from which you can choose one or none.

Introduction

Oracle Enterprise Manager (hereafter referred to as Enterprise Manager) is the Oracle integrated management solution for managing the complete Oracle environment. All services within your enterprise, including hosts, databases, listeners, application servers, HTTP Servers, and Web applications, are easily managed as one cohesive unit.

This chapter acknowledges the challenges you face as a database administrator and states how Enterprise Manager can help you meet these challenges.

This chapter describes:

- [Challenges of Managing the Enterprise](#)
- [How Enterprise Manager Meets These Challenges](#)

Challenges of Managing the Enterprise

The IT systems of today are growing more complex with each iteration of new technology. It is not unheard of to have 2,600 instances to manage. These instances can be as close as next door or on the other side of the world. By using Enterprise Manager, you can:

- Extract the information needed for critical and timely decisions.
- Manage the extraordinary number of systems in an efficient manner.
- In conjunction with virus protection software, prevent viruses and worms from attacking your system.
- Manage your ecosystem, that is, your Oracle platform and all your third-party software, including your storage systems, hosts, routers, and so on.
- Reduce your hardware and labor costs, that is, manage thousands of systems as if they were one.

Availability of Information

Mission-critical decisions are dependent on accessible and up-to-date information. The reporting mechanisms within Enterprise Manager can answer the following:

- Why is it taking so long for banking transactions to process from the branch in London to the branch in New York? The answer is available using the Application Performance Management functionality.
- We are forecasting our budget for next year. Do we foresee needing additional storage devices? If so, what machine needs these devices? Set up the Automatic Storage Management option to help analyze your needs.

- Host XYZ is always going down. Why? Look at the home page for the host and analyze the information. Maybe the host needs to be reconfigured?

These are just a few of the questions Enterprise Manager can help you answer. The up-to-the-minute information on the Grid Control provides clear and concise information.

Not only is this information available from any supported Web browser on any desktop, it is also available using any personal digital assistant (PDA) that supports Microsoft Pocket PC IE. The EM2Go mobile component of Enterprise Manager makes this instant availability of information possible without any additional work on your part.

See Also: [Chapter 9, "Managing From Anywhere - EM2Go"](#)

Managing Innumerable Components

With system components numbering into the thousands, it is unrealistic to think that you can manage these components individually. The solution is to combine components together and have them follow one set of rules. You can combine these components in a number of ways:

- Create heterogeneous groups, database groups, and host groups.

In Enterprise Manager, a group is a collection of targets. (Targets are components that you monitor or configure using Enterprise Manager.) You can define a database-specific group, a host-specific group, or define a heterogeneous group for a specific purpose.

A group can include any of the following: Oracle Management Agents, Application Servers, Beacons, Databases, database groups, HTTP servers, hosts, OIC LDAP Servers, Oracle Management Service and Oracle Management Repository, Web Applications, as well as other components.

For example, you can define a group to:

- Reflect a particular function within your company, for example, manufacturing
- Represent a geographic location, for example, European countries
- Serve as a division of labor, for example, all the targets assigned to a particular administrator
- Organize targets by type, for example, Management Agents
- Combine targets that are on the same maintenance schedule, for example, for blackouts and backups

See Also: ["Organizing Targets as Groups"](#) on page 7-4 and ["About Groups"](#) in the Enterprise Manager online help

- Create Oracle Application Server farms.

Oracle Application Server instances can be grouped and managed together by adding standalone instances to a single Oracle Application Server Metadata Repository. The collection of instances within a single metadata repository is known as an Oracle Application Server farm.

Having an Oracle Application Server farm is helpful because it is the first step in creating an Oracle Application Server cluster. Another benefit of a farm is having

access to a single page with which to view and access all instances that use a common metadata repository.

- Create Oracle Application Server clusters.

A cluster is a collection of Application Server instances with identical configuration and application deployment. Clusters enforce homogeneity among member instances so that a cluster of Application Server instances can appear and function as a single instance. Changes you make to one instance of a cluster are propagated to all members of the cluster. Clusters work only with J2EE and Web Cache middle tiers.

See Also: [Chapter 5, "Application Server Management"](#)

Preventing the Unthinkable

Unfortunately, we hear of computer systems being attacked by worms, viruses, and hackers. These attacks can cost millions of dollars in damage to files and systems, lost productivity, and if the attacks are to a Web site, millions of dollars in lost revenue.

How to Safeguard Your Systems Against Viruses

Enterprise Manager, together with virus protection software, provides the security you need to prevent these hideous invasions by:

- Notifying you of critical patch advisories

When a patch needs to be applied to prevent security problems, you are notified of such patches on the Grid Control home page. Enterprise Manager examines your enterprise configuration to determine whether the appropriate patches have been applied.

- Providing notice of policy violations

You can use Enterprise Manager to see whether Oracle databases and hosts in your enterprise configuration are following database and host policies. On the host and the database home pages, you are notified of such policy violations. The policies identify security vulnerabilities, such as missing patches, open ports, access vulnerabilities, and so on.

Notifying you of critical patch advisories and policy violations is only a small part of how Enterprise Manager protects you and your systems from undesirable behavior.

Enterprise Manager Framework Security

In most production environments, you install and distribute the components of Enterprise Manager on multiple computers throughout your enterprise. For example, you might install your Management Repository on one system, install the Management Service on another system, and install Management Agents on each of the host computers you want to manage.

See Also: ["Providing a Flexible Architecture"](#) on page 1-7 for information about the components of the Enterprise Manager Framework

The security features of Enterprise Manager are packaged as a set of capabilities called Enterprise Manager Framework Security. Enterprise Manager Framework Security provides safe and secure communication channels between the components of Enterprise Manager. For example, it provides secure connections between your Management Service and its Management Agents.

Enterprise Manager Framework Security is designed to secure your Enterprise Manager installation and prevent:

- Tampering or unauthorized review of credentials and sensitive management data while the data is in transit
- Accidental or malicious installations of Management Agents that can upload data to your Management Service and Management Repository
- Malicious calls to the Management Service or Management Agents from an external source
- Unauthorized processes masquerading as a Management Service in order to collect data from Management Agent uploads

Enterprise Manager Framework Security implements these security features with industry-standard security tools and procedures that have been implemented and proven effective for other Oracle software products.

In particular, Enterprise Manager Framework Security takes advantage of:

- HTTPS and Public Key Infrastructure (PKI) components, including signed digital certificates and public keys, for communications between the Management Service and the Management Agents

See Also: "The Public Key Infrastructure Approach to Security" in *Oracle Security Overview* for an overview of Public Key Infrastructure (PKI) features

- Oracle Advanced Security for communications between the Management Service and the Management Repository

See Also: *Oracle Advanced Security Administrator's Guide*

Detailed instructions for enabling Enterprise Manager Framework Security are available in *Oracle Enterprise Manager Advanced Configuration*.

Reducing the Cost of Ownership

Today's corporations are looking at every possible way to save money. They need to do more with less and need to be competitive and conscious of costs. The bottom line is to save money!

By using Enterprise Manager, you can add targets and administrative accounts without scalability concerns. The underlying framework of Enterprise Manager can easily adapt to these additions. When you add a new target to Enterprise manager, all you need to do is to add a Management Agent to the target's host.

When you need to grow the enterprise even more, for example to other countries, add Oracle Management Services as needed.

Consolidation is driven by reducing management costs. The more you can run your individual systems as a cohesive unit, the less you will need to spend for labor.

How Enterprise Manager Meets These Challenges

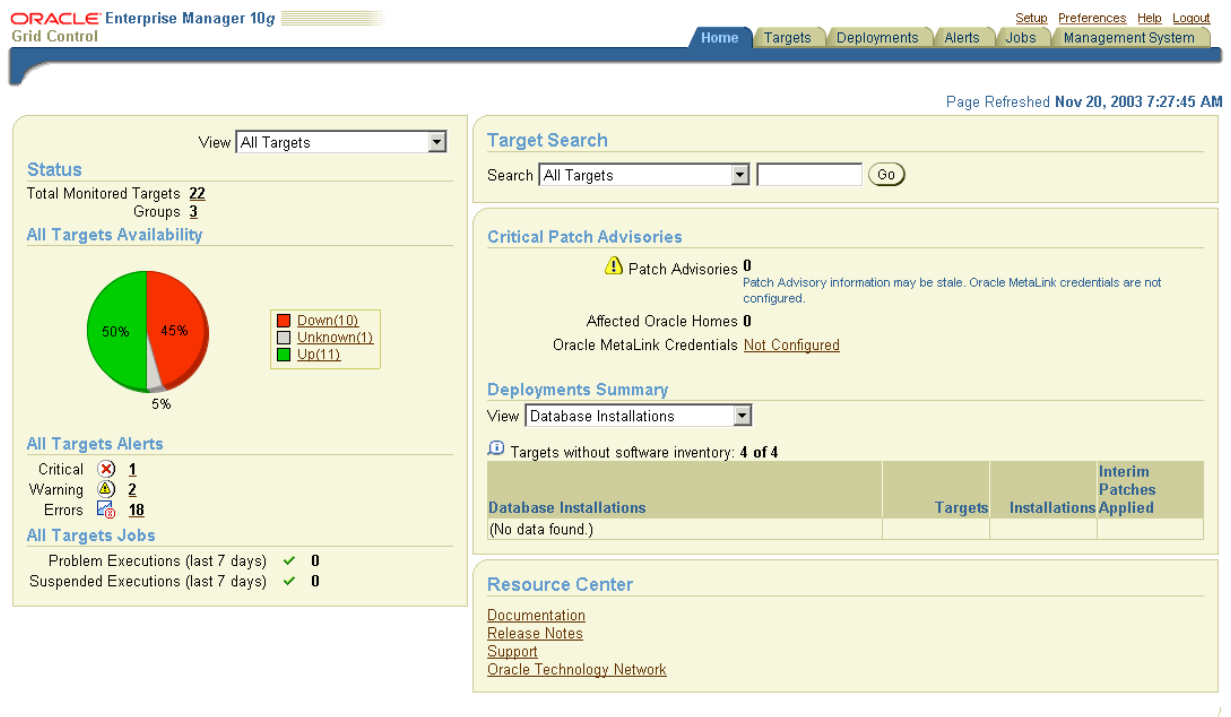
Enterprise Manager provides the tools and framework needed for you to manage all the pieces that comprise your system and hardware environment. This section provides information about the following:

- [Managing Your Ecosystem](#)
- [Managing Grid Computing](#)
- [Providing a Flexible Architecture](#)

Managing Your Ecosystem

In Enterprise Manager, the Oracle Ecosystem is the organization of software and hardware and its environment functioning as a unit. The Grid Control Home page provides a unified view of your ecosystem. It gives one view of everything and the interdependencies of related targets.

Figure 1–1 Oracle Enterprise Manager Grid Control Home Page



The Oracle Ecosystem manages, but is not limited to managing, the following components:

- Database
- Oracle Application Server
- Oracle Collaboration Suite
- Hosts (for example, Solaris, Linux, Windows)
- Groups (applications and grids)

The following are examples of using Enterprise Manager to manage your ecosystem.

- Using Oracle Database Management, you can:
 - Study top performance problems by analyzing the Top SQL pages. These pages assess the problem SQL statements and provide recommendations for correcting the problems.

- Check the health of a target of a database group by analyzing the Database Group Maintenance page. For example, in the **Configuration Advice** sections of this page, you may see the rule that the control file for your database is not adequate. The message states:

Use at least two control files, multiplex them on different disks.
- By connecting to MetaLink, determine whether there are any patches that need to be applied to your database. This information is available in the **Hardware and Software Configuration** section of the Database Group Maintenance page.
- Monitor cluster databases on the Database Home page. In addition to the typical database information, this page also lists the cluster to which this database belongs.
- Using Oracle Application Server, you can:
 - Identify the components of the Application Server and their current status, and drill down to obtain more details on the performance of the components.
 - Monitor real-time performance of the Application Server from the Performance property page.
 - View the top applications performance problems and drill-downs by accessing the Application Server's J2EE applications page.
 - By connecting to MetaLink, determine whether there are any patches that need to be applied to your Application Server. This information is available by clicking **Patch** in the **Related Links** section of the Application Server Home page. From the Patch: Select Patch page, you can then search for missing patches.
- Using Host and Host Configuration, you can:
 - Analyze the top processes by CPU and memory on the Host Performance page.
 - Keep track of your hardware and software inventory using the Host Configuration page. By clicking **Operating System Details**, you can view the operating system properties. By clicking **Hardware Details**, you can analyze the hardware associated with this host.
 - Study the top performance problems by analyzing the Performance page related to a host.

Managing Grid Computing

Grid computing encompasses the pooling and provisioning of resources, and workload management. There are many components and systems tied together that make grid computing possible.

The Web-based Grid Control (Figure 1–1) exposes information and management functionality using HTTP, so you can perform your management tasks using a standard browser such as Netscape or Internet Explorer. The framework provides a standard Grid Control login URL through which an administrator gains access to Enterprise Manager. The management content of the Grid Control is organized to allow different classes of users to see customized views of management information that are appropriate for their needs.

Enterprise Manager Features to Support Grid Computing

The key to grid computing is managing separate entities as a whole. Enterprise Manager provides this manageability through the definition and use of groups, database clusters, hosts, and application server clusters. This greatly simplifies the complexity of your grid and reduces the time needed to manage these entities.

Groups: Use to Compare Metrics You can define groups with the purpose of comparing metrics of similar targets. This enables you to define the thresholds for the metrics of a particular group only once and then copy these thresholds to other groups. This comparison is particularly useful when dealing with host and database groups.

Database Clusters Database clusters are optional structures for storing table data. Clusters are groups of one or more tables physically stored together because they share common columns and are often used together. Because related rows are physically stored together, disk access time improves. When you define database clusters, you can then manage these structures as a single unit.

Application Server Clusters An Application Server cluster is a collection of application server instances with identical configuration and application deployment. Clusters enforce homogeneity between member instances so that a cluster of Application Server instances can appear and function as a single instance. With appropriate front-end load balancing, any instance in an Application Server cluster can serve client requests. This simplifies configuration and deployment across multiple instances and enables fault tolerance among clustered instances.

Implementing Grid Computing with Enterprise Manager

Defining a grid can be an ongoing process. You can start small and add as you go. For example, by defining groups, database clusters, and Application Server clusters, you have the beginnings of a grid. You can then manage these entities as single units.

Though grouping information is important, it is only a small portion of Grid Computing. The efficiency of resource utilization sharing and dedicating resources are crucial to the success of Grid Computing:

- When you share resources, you take advantage of underutilized resources within or across your organization.
- When you use Real Application clusters, you have the ability to use high availability configurations where redundant hardware and software maintain operations despite failures.

Providing a Flexible Architecture

The architecture of the Enterprise Manager framework provides a high level of flexibility and functionality. You can easily customize Enterprise Manager to suit the monitoring and administrative needs of your environment.

Enterprise Manager is a lightweight multi-tiered framework that enables you to centrally manage your applications over the Intranet and Internet using a Web-based Grid Control. Access to Enterprise Manager management services and applications use standard Internet technology. Hence, you can easily adapt Enterprise Manager to work seamlessly through corporate firewalls for remote management.

You can also extend the framework, by using the Software Developer's Kit, to include new target types that are unique to your environment. For example, you can quickly define new target types to allow users to collect monitoring information from

managed targets specific to their enterprise environment. The typical Enterprise Manager framework configuration consists of these functional areas (Figure 1-2):

- **Oracle Management Agent**

Responsible for monitoring all targets on the host, for communicating that information to the middle-tier Management Service, and for managing and maintaining the host and its targets.

- **Managed Targets**

Oracle Management Agents monitor and perform administrative functions on managed targets in your enterprise. Targets include but are not limited to Databases, Application Servers, Listeners, and Third-party Applications.

- **Oracle Management Service**

A J2EE Web application that renders the user interface for the Grid Control, works with all Management Agents in processing monitoring and job information, and uses the Management Repository as its data store.

- **Oracle Management Repository**

Two tablespaces in an Oracle database that contain information about administrators, targets, and applications that are managed within Enterprise Manager.

The Management Service uploads to the Management Repository the monitoring data it receives from the Management Agents. The Management Repository then organizes the data so that the data can be retrieved by the Management Service and displayed on the Grid Control.

- **Oracle Enterprise Manager 10g Grid Control**

Enterprise Manager Web-based user interface for centrally managing your entire computing environment. The Grid Control is installed from a separate CD-ROM that is part of the Oracle Database 10g Release 1 (10.1) CD-ROM Pack.

From the Grid Control, you can monitor and administer your entire computing environment from one location on the network. All the services within your enterprise, including hosts, databases, listeners, application servers, HTTP Servers, and Web applications, are easily managed as one cohesive unit.

- **Oracle Enterprise Manager 10g Grid Control Framework**

The Grid Control relies on various underlying technologies to discover, monitor, and administer your computing environment.

The Grid Control Framework consists of the Grid Control and these underlying technologies:

- One or more Oracle Management Services
- The Oracle Management Repository
- Remote Oracle Management Agents, installed on each monitored host.

- **Oracle Enterprise Manager 10g Database Control**

The Enterprise Manager Web-based application for managing Oracle Database 10g Release 1 (10.1). The Database Control is installed and available with every Oracle Database 10g installation.

From the Database Control, you can monitor and administer a single Oracle Database instance or a clustered database.

See Also: [Chapter 4, "Database Management"](#)

- **Oracle Enterprise Manager 10g Database Control Framework**

The Database Control relies on various underlying technologies to discover, monitor, and administer the Oracle Database environment.

The Database Control Framework consists of the Database Control and its underlying technologies:

- A local version of the Oracle Management Service designed to work with the local database or clustered database
- A local Oracle Management Repository installed in the local database and designed to store management data for the Database Control
- A local version of the Oracle Management Agent designed to provide monitoring data to the local Management Service

- **Oracle Enterprise Manager 10g Application Server Control**

The Enterprise Manager Web-based application for managing Oracle Application Server 10g (9.0.4). The Application Server Control is installed and available with every Application Server 10g installation.

From the Application Server Control, you can monitor and administer a single Oracle Application Server instance, a farm of Oracle Application Server instances, or Oracle Application Server Clusters.

See Also: [Chapter 5, "Application Server Management"](#)

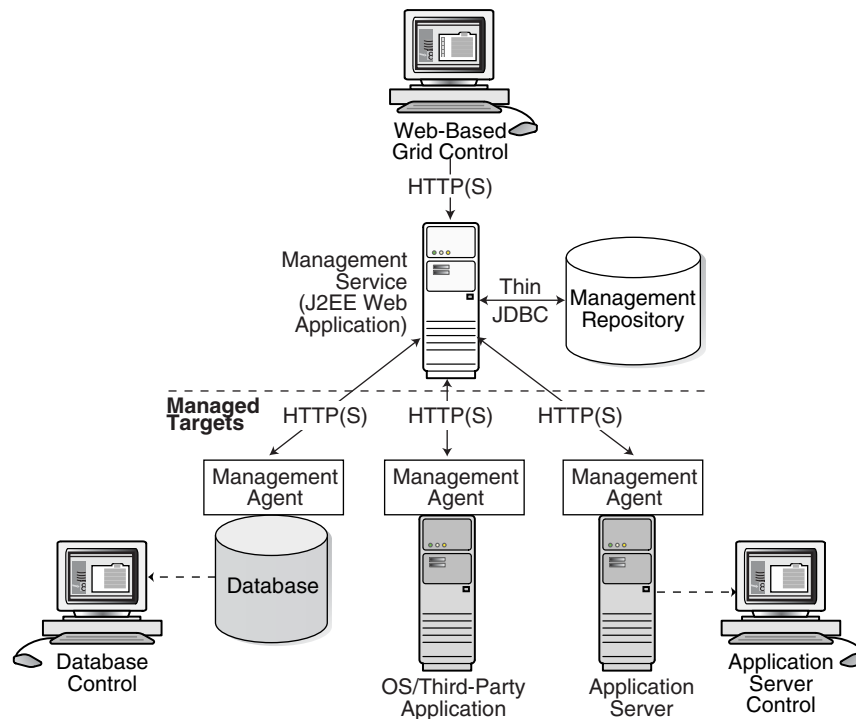
- **Oracle Enterprise Manager 10g Application Server Control Framework**

The Application Server Control relies on various underlying technologies to discover, monitor, and administer the Oracle Application Server environment.

The Application Server Control Framework consists of the Application Server Control and its underlying technologies:

- Oracle Dynamic Monitoring Service (DMS)
- Oracle Process Management Notification (OPMN)
- Distributed Configuration Management (DCM)
- A local version of the Oracle Management Agent specifically designed to gather monitoring data for the Application Server Control.

See Also: *The Application Server Documentation Library* for more information about the Application Server technologies

Figure 1–2 Oracle Enterprise Manager Framework

More About Managed Targets

Targets are the entities that Enterprise Manager manages. Examples of targets include but are not limited to: hosts, databases, application servers, and listeners. As your environment changes, you can add and remove targets from Enterprise Manager as needed. Many of the commonly used managed targets have been defined as part of the base Enterprise Manager product. They are automatically pre-configured for management when a management-ready product is installed. Oracle applications, Oracle databases and applications servers, and many of the operating systems that run Oracle products, are management-ready. Even though a target is predefined for instance monitoring levels, thresholds, and notification rules, you can still customize Enterprise Manager to your liking. That is, you can still perform value-added instrumentation to access more of the rich management functionality of Enterprise Manager than is provided with the standard target configuration.

The Oracle Management Agent identifies your targets, collects the data about those targets, and detects problems in your environment, for example, high CPU usage. A typical management framework deployment has one Management Agent on each host that is part of the enterprise. The Management Agent is responsible for the managed targets that are running on that host.

To store and process the information collected by the Management Agent, and to instruct the Management Agent to perform administrative tasks, the Management Agent relies on that part of Enterprise Manager that provides the core functionality of the framework – the Oracle Management Service.

More About Oracle Management Service

The Management Service tier (J2EE Web applications) can be divided into several major components. These include:

- Management servlets that perform management and administrative functions

- Management Repository where information collected by the Management Agents from managed targets is consolidated
- Management administration and maintenance services
- User interface technology to organize and present management information content to any Web browser

The management service tier can be further distributed in high-end environments for performance. For example, you can install the Management Repository on a separate host from the one running the Management Service. The framework can also be collapsed into the managed target tier to support a standalone deployment configuration (Management Repository, Management Service, and Management Agent reside on a single host).

Management information is stored in a Management Repository. The Management Repository consists of schema definitions, RDBMS jobs, and stored procedures running inside an Oracle database. The information in the Management Repository includes:

- Configuration details about the managed targets
- Historical metric data and alert information
- Client and Web server response time information
- Managed target availability information
- Product and patch inventory information

The richness of information stored in the Management Repository is useful for tasks such as end-to-end reporting, problem diagnosis, as well as service-level agreement and availability reporting. Information stored in the repository, can be shared between any number of administrators accessing Central Consoles that point to the central Management Repository.

Monitoring the Oracle Environment

The Enterprise Manager framework provides in-depth system monitoring that supports the timely detection and notification of impending problems across the entire Oracle environment

This chapter includes information about the following:

- [The Basics](#)
- [Getting Started Monitoring](#)
- [Customizing Monitoring](#)
- [Self-Monitoring Architecture](#)

The Basics

Metrics and alerts when used together provide a powerful mechanism by which to notify you of impending problems with your environment.

Metrics and Alerts - Heart of Enterprise Manager

Metrics are units of measurement used to assess the health of your system. Each target comes with a predefined set of metrics. These metrics in turn have thresholds associated with them.

Thresholds are boundary values against which monitored metric values are compared. For example, for each disk device associated with the Disk Utilization (%) metric, you can define a different warning and critical threshold. Some of the thresholds are predefined by Oracle, others are not.

Once a threshold is reached, an alert is generated. An alert is an indicator signifying that a particular condition has been encountered and is triggered when one of the following conditions is true:

- A threshold is reached.
- An alert has been cleared.
- The availability of a monitored service changes. For example, the availability of an application server changes from up to down.
- A specific condition occurs. For example, an alert is triggered whenever an error message is written to a database alert log file.

These alerts can be associated with a notification, the automatic execution of a job, and so on.

Alerts are detected through a polling-based mechanism by checking for the monitored condition from a separate process at regular, predefined intervals. The majority of the Enterprise Manager metric-based alerts are polling based. Polling means that the Management Agent checks at intervals to see if the condition has been reached.

See Also: "About Alerts" in the Enterprise Manager online help

Aggregating Information

The Enterprise Manager Grid Control Home page is the pinnacle of aggregated information. At a glance, you can determine the state of the enterprise, the overall availability of the targets, the severity of reported alerts, and the status of job executions.

In addition, if a target consists of other components, its home page will provide the rolled-up view of the status and performance of the target as a whole, and include aggregate performance of each component.

For example, the home page for an Oracle Application Server instance provides a rolled-up view of the performance of the Oracle Application Server instance, including the aggregate CPU and memory performance of each component in the instance. You can identify components that may require diagnostic investigation and drill down into those components for more detailed performance information, such as deployed applications.

Identifying Trends

Enterprise Manager automatically collects and aggregates performance and availability data for each target over time. When alert details are shown, they are displayed in context of the metric's historical values over time. You can examine this historical data to watch for performance trends where problems have occurred.

You can also correlate a target's metric data with its past historical averages or compare its values with other targets. Measurement against past performance or against other targets provides a tool for diagnosing whether or not a problem is isolated in time or space. For example, if the CPU Utilization on host PROD1 seems unusually high, you might want to compare it against its average to see if what you are observing is a spike or a more serious problem. You might further want to compare it against the CPU utilization of other hosts that support the same application, to determine if some load balancing of work is needed across multiple hosts.

Comparing Metrics and Targets

You can compare metrics to determine trends in metric performance across various subsets of data of the same type.

The Compare Objects page allows you to contrast values for a particular metric within a target. As an example, you can compare the disk usage across various file systems. If the Filesystem Space Available (%) metric on host1 has three values /, /private, /private1, and you are currently viewing the details of the values of /private1, then you can compare the /private1 value details with the details for the values / and /private. The comparisons are plotted on the Metric Value History chart.

You can compare targets of the same type and determine how a target is performing with relation to others. Using the Compare Targets page, you can select targets from the **Available Targets** list. For your convenience, the results display in the **Metric Value History** chart on the Metric Detail page.

Notifying the Appropriate People Instantly

When a target becomes unavailable or if performance thresholds are reached, Enterprise Manager generates alerts in the Grid Control and notifies you and other appropriate administrators. Enterprise Manager supports notifications through e-mail (including e-mail to paging systems), SNMP (Simple Network Management Protocol) traps, and the running of custom scripts.

Enterprise Manager supports these various notification mechanisms through the use of notification methods.

Notifications are not limited to alerting administrators. You can define notification methods to run any custom operating system script or PL/SQL procedure, and thus automate any type of response to an alert. For example, you can define methods that call into a trouble-ticket system, invoke third party API's to share alert information with other monitoring systems, or even log a bug against a product.

See Also: "About Notifications" in the Enterprise Manager online help

Notification Methods

A notification method is used to specify the details associated with a particular notification mechanism, such as, which SMTP gateway(s) to use for e-mail, which operating system script to run to log trouble tickets, and so on. You, as a super administrator, perform a one-time setup of the various types of notification methods available for use. Only an administrator with super user privileges can manage (create, edit, or both) a notification method.

See Also: "Managing Notification Methods" in the Enterprise Manager online help

Notification Rules

Once you define the notification methods, you can then define notification rules. A notification rule is a set of conditions that determine when Enterprise Manager sends a notification. You specify these conditions as the set of targets, monitored metrics, and metric severities for which notifications should be sent. For example, you can define a rule such that notifications should be sent when any database goes down or tablespace usage becomes critical. During notification rule creation, you can associate the rule with multiple notification methods.

See Also: "Defining Notification Rules" in the Enterprise Manager online help

Default Notification Rules for Supported Targets

When you install the option that creates the Management Repository, notification rules are created for the critical conditions that could occur for all supported target types. For example, for the database target type, a rule is created such that e-mail notifications are sent when any database becomes unavailable, or if any of its key health metrics (Datafile Usage(%), Archiver Hung Error Stack, Tablespace Space Used(%), and so on) becomes critical. Enterprise Manager sends the e-mail notifications to the e-mail address associated with the SYSMAN account. The SYSMAN account is the default super administrator account provided when you install Enterprise Manager.

See Also: "About Default Notification Rules for Supported Targets" in the Enterprise Manager online help

Getting Started Monitoring

Enterprise Manager provides a number of ways to help you get started monitoring your Oracle Environment.

Out-of-Box Value for Monitoring

Out-of-the-box monitoring simplifies a critical but potentially time-consuming task of setting up monitoring for managed targets, that is, services that you want to monitor. As you add targets to Enterprise Manager, options are automatically provided to monitor the target at a recommended or at a minimum level. Each level of monitoring consists of a set of metrics and predefined thresholds that are based on Oracle recommendations for those levels.

The recommended level covers full monitoring of the target. The minimum level covers monitoring of the target's key availability and performance indicators. These options allow you to quickly set up monitoring based on your high-level requirements.

Although you can rely on these Oracle recommendations, you still have the flexibility of later fine-tuning these thresholds to suit your particular environment.

Proactive Monitoring of the Entire Oracle Ecosystem

Enterprise Manager provides proactive, unattended monitoring of the complete Oracle platform. A thorough set of performance and health metrics provide monitoring of each component (and subcomponent) of the Oracle environment:

- Business Applications
- Application Servers
- Databases
- Hosts
- Operating Systems

The Oracle Management Agent on each monitored host monitors the status, health, and performance of all targets on that host. If the target goes down, or if a performance metric crosses a warning or critical threshold, Enterprise Manager generates an alert. This alert appears in the Grid Control and also triggers notification to the administrators specified in the notification schedule.

This allows you to be notified if the target:

- Goes down
- Is blacked out for scheduled maintenance
- Current status cannot be determined due to network outages
- Has other issues that trigger alerts, such as low disk space, high CPU usage, and so on

In addition to these proactive notifications, are availability status reports that you can access using the Grid Control. For each monitored target, Enterprise Manager provides a consolidated availability summary that shows its current and past availability status within the last 24 hours, 7 days, or month (31 days). This report provides you with critical information about day-to-day target availability. This report also provides information for upper management to determine if Service Level Availability (SLA) goals are being met.

See Also: "About Availability" in the Enterprise Manager online help

Advice-Driven Responses to Alerts

When an alert is generated to notify you of availability or performance problems, you can check the Grid Control for more information about the metric that triggered the alert. This includes information on the metric's historical values that might show trends over the past week or month, and online help that provides advice on what you can do to fix or further diagnose the problem.

For example, if an alert is sent reporting '3 segments in the USERS tablespace are unable to extend', then you can consult the online help. The help would suggest that you look into increasing the value of the segment's MAXEXTENTS storage parameter or rebuild the segment with a larger extent size.

Quick Views and Drill-Downs

In addition to providing quick views to the health of your system, the Grid Control provides drill-downs to help you analyze the root of any problem. For example, click **Critical Alerts** to view the message associated with the alert and study the metrics causing the problem.

You can also view a particular type of target, for example, Management Agents. Select the Management Agent in which you are interested and drill down to the associated page.

If memory usage is high, one of the targets you could analyze is the OC4J target. The OC4J home page presents a roll-up of status and performance metrics for the container and its applications, including:

- How long the container has been running and what applications are active.
- Container resource usage such as the percentage of CPU and memory resources being consumed.
- Volume and average processing time of application requests and transactions.

The composite data presented in the roll-up is broken down for each deployed application. You can easily determine which application is incurring the highest volume of requests or longest response time. An application can be further examined by drilling into the application to view the performance of individual objects such as servlets and Enterprise JavaBeans (EJBs). In this way, you and the application developer can isolate the source of the problem more easily.

Customizing Monitoring

One of the noteworthy features of Enterprise Manager is that you can customize monitoring for your specific needs in various ways. You can:

- Edit thresholds to change the out-of-box settings to fit your environment.
- Copy monitoring settings from one target to another.
- Use metric baselines as an aid to creating thresholds.
- Create user-defined metrics.

Editing Thresholds

Out of the box, Enterprise Manager comes with thresholds for critical metrics. Warning and critical thresholds are used to generate an alert, letting you know of impending problems so that you can address them in a timely manner.

To better suit the monitoring needs of your organization, you can edit the thresholds provided by Enterprise Manager and define new thresholds. When defining thresholds, the key is to choose acceptable values to avoid unnecessary alerts, while still being notified of issues in a timely manner.

You can establish thresholds that will provide pertinent information in a timely manner by defining metric baselines that reflect how your system runs for a normal period of time.

The metrics listed on the Edit Thresholds page are either default metrics provided by Oracle or metrics whose thresholds you can change.

Creating Thresholds Using Metric Baselines

You may want thresholds for performance metrics to be based on deviations from real target performance instead of absolute numbers. For example, if for a given day, performance for a database was acceptable, and that database was running under normal workload, then you might want to define thresholds such that you are notified only when database performance becomes 10% worse than that given day. Such thresholds can be defined using metric baselines.

A metric baseline is a snapshot of a target's performance at a given point in time. When used for thresholds, you should define a metric baseline that will be used as the performance norm – preferably a day in the past when performance was good for the target and it was running under normal to high workload. A metric baseline thus consists of a target's performance metrics for a good day.

In the Grid Control, you define a metric baseline by first specifying a date in the past that will be used as the performance norm. Next you specify percentage values from the metric baseline that represent the points at which performance becomes a problem at a warning, then more critical level. These percentages are then calculated into specific warning and critical threshold values for the performance metrics.

For example, if the database supporting the financial system had good performance on October 1, 2003, you could use that date to set up the metric baseline for the financial database. Next you specify 10% and 20% as warning and critical percentages respectively. Enterprise Manager then calculates values that are 10% and 20% worse than the metric baseline data, and provides these calculated values as the warning and critical thresholds for the database's performance metrics. You can review or edit the calculated values, then apply them as thresholds for the target. When any performance metric reaches its threshold, Enterprise Manager generates an alert.

Metric baselines thus provide a two-fold benefit – you can now define thresholds based on high level performance goals and thresholds can be more fine-tuned to reflect actual performance numbers.

See Also: "About Thresholds" in the Enterprise Manager online help

Copying Metric Settings

Enterprise Manager also provides the opportunity for you to copy thresholds from one target to another target as long as they are the same target type. Copying thresholds

allows you to easily standardize monitoring across different targets, and provides consistency between targets.

Creating User-Defined Metrics

User-defined metrics allow you to extend the reach of Enterprise Manager's monitoring to conditions specific to your particular environment. Specifically, if you want to monitor a particular condition, for example, to check successful completion of monthly system maintenance routines, you can:

- Write a custom script that will monitor that condition
- Create a user-defined metric that will use your custom script

Each time the metric is evaluated by Enterprise Manager, it will use the script you specified, relying on that script to return the value of the condition. Once a user-defined metric is defined, all other monitoring features – threshold-based alerting, proactive notifications, historical collections, seamless integration with the Grid Control – are automatically available to the metric. If you already have your own library of custom monitoring scripts, you can leverage these monitoring features by integrating your scripts as user-defined metrics in Enterprise Manager.

For help on defining user-defined metrics, click **Help** at the top of the Create User Defined Metric page.

See Also: *Extending Oracle Enterprise Manager* manual

Taking Advantage of Jobs

A job is a unit of work that you define and schedule to perform commonly-run tasks. A job is defined by its name, description, parameters, targets, and schedule.

Use the Job General page to set or modify the parameters of the job. After you specify a name for the job, you can set the various attributes of the job.

On the target home page, the **Job Activity** section displays the number of suspended executions and problem executions. From these links, you can drill down to investigate which jobs are problematic and why.

See Also: "About Jobs" in the Enterprise Manager online help

Blacking Out Targets

Blackouts allow you to suspend target monitoring so you can schedule maintenance periods for these targets. When you black out a target, you prevent unnecessary alerts from being sent when you bring down a target for maintenance. While aiming to meet Service Level Availability goals, you can use blackouts to guarantee that scheduled down periods are not calculated as true down time when you calculate overall target availability.

You can define a blackout for individual targets, a group of multiple targets that reside on different hosts, or for all targets on a host. You can schedule the blackout to run immediately or in the future. You can also schedule the blackout to run indefinitely or to stop after a specific amount of time. If, during the maintenance period, you discover that you need more or less time to finish the maintenance tasks, you can extend or stop the blackout that is in effect.

Blackout functionality is available from the Grid Control, as well as through the Management Agent command-line interface (CLI). The CLI is useful to you if you like to incorporate the blacking out of a target within your maintenance scripts.

See Also: "About Blackouts" and "Creating Blackouts" in the Enterprise Manager online help

Self-Monitoring Architecture

The Enterprise Manager framework itself must be operating efficiently in order to effectively perform system monitoring of targets. Enterprise Manager has self-monitoring features which monitor the availability and performance of key critical components of the framework. You can access information about Enterprise Manager configuration and its overall health through the **Management System** tab in the Grid Control.

The Overview page (Figure 2–1) provides an overview of the entire Enterprise Manager framework: repository host and database information, number of Management Services, number of Management Agents, number of Administrators, and any open alerts on the repository host or database.

Figure 2–1 Overview Page of the Management System

Overview

Page Refreshed Jan 28, 2003 12:07:24 PM

Repository Host smpemdw-sun1.us.oracle.com Repository Database omsdb8 Management Services 2 Agents 19	Repository Size 195 Mb Targets 125 Administrators 6 Metric Errors 6
--	---

Alerts

Target Name	Target Type	Metric Name	Severity	Alert Triggered	Value	Last Checked
omsdb8	Database	log file sync (%)	!	Jan 28, 2003 10:29:04 AM	26.38	Jan 28, 2003 11:59:04 AM

Oracle Management Repository Operations

You can view the repository operations by viewing the Repository Operations page. This page provides you with an overview of the status and performance of the Repository DBMS Jobs that handle part of the Enterprise Manager functionality.

The following DBMS jobs are examples of the jobs that run within the Management Repository and require no user input:

- Agent Ping

Checks if the Management Agents are gathering information about the host computer and information about the targets installed on the host computer.
- Maintenance (Analysis)

Runs an analysis on the Enterprise Manager schema to ensure that the execution of queries is optimal. The database accesses the information in the schema to determine the best way to execute a query.
- SQL Evaluation

Evaluates the performance of the SQL code being run in the Management Repository for Enterprise Manager.
- Roll Up

Checks the availability of the targets and summarizes this information in the Grid Control.

To determine how well the Management Repository jobs are functioning, view the Throughput per second and Processing Time Percent (Last Hour) columns. If the

Processing Time Percent (Last Hour) is running large and the Throughput is low, there may be problems in that area of management.

If there are delays in notifications, examine the following metrics to determine the cause of the delay:

- Average Notification Backlog

The average number of notifications which could not to be processed within the time allotted for notification delivery. This number may fluctuate at times. An upward trend over time may indicate an increased workload and the reason for the delays.

- Average Notification Delivery Time

The average time it took to process a notification from the time the notification job receives the notification until the notification is sent. This number may fluctuate. An upward trend over time will reflect a delay in notifications sent.

If your average notification backlog and delivery time are high, you may consider:

- Checking the number of notification rules defined and verify that they are all necessary, removing those that are not.
- Verifying that the addresses being used for the notifications are correct.
- Adjusting the notification rules so that you can be notified in a timely matter.

Figure 2–2 provides an example of statistics relating to a Management Repository jobs.

Figure 2–2 Status of the Oracle Management Repository Jobs

Repository Operations

This page displays the status and performance of Repository DBMS Jobs. Page Refreshed Jan 28, 2003 12:59:31 PM

Average Notification Backlog 0.00
Averaged over the last 10 minutes

Average Notification Delivery Time 0.00 seconds
Averaged over the last 10 minutes

DBMS Job Name	Status	Last Error	Throughput per second	Processing Time Percent (Last Hour)	Next Scheduled Run
Agent Ping	↑	No errors	0.00	0.06	12:57:27 PM Jan 28 2003
Beacon Availability Computation	↑	No errors	0.00	0.00	12:57:05 PM Jan 28 2003
Chronos Rollup	↑	No errors	539.00	0.03	01:21:12 PM Jan 28 2003
Job Purge	↑	No errors	0.00	0.00	12:14:16 PM Jan 29 2003
Maintenance (Analysis)	↑	12:14:13 PM Jan 21 2003	0.00	0.00	03:10:00 AM Jan 29 2003
Notification Check	↑	12:20:18 PM Jan 24 2003	2.50	0.06	12:57:05 PM Jan 28 2003
Notification Delivery	↑	No errors	0.00	0.00	12:57:05 PM Jan 28 2003
Repository Metrics	↑	No errors	1.00	0.03	12:57:05 PM Jan 28 2003
Rollup	↑	No errors	478.71	2.75	01:21:12 PM Jan 28 2003
SQL Evaluation	↑	No errors	0.00	0.00	06:15:28 PM Jan 28 2003

Oracle Management Services

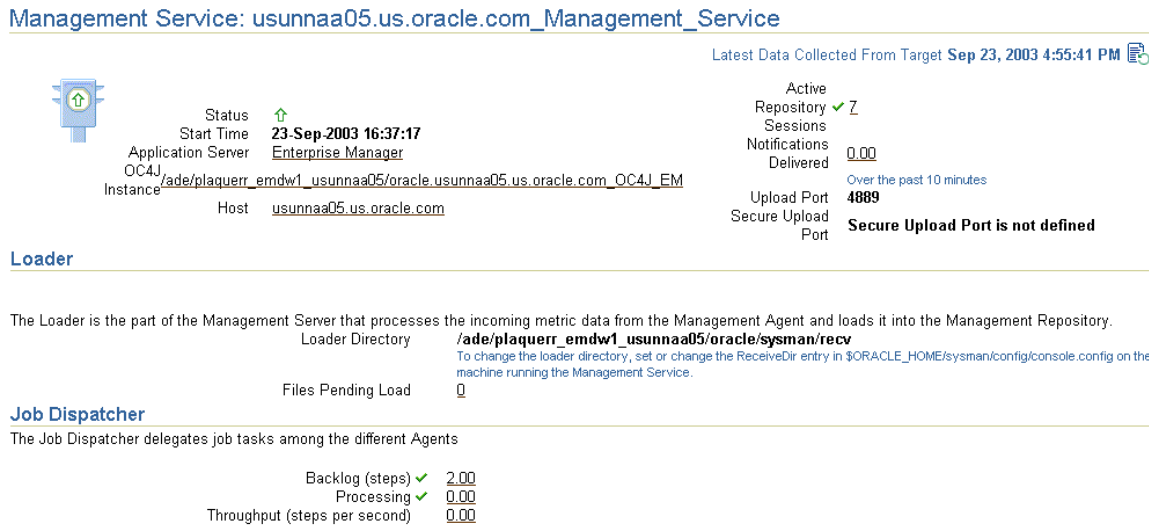
The Management Services page provides you with an overview of the health and configuration of all Management Services, including their status, any errors encountered, the performance (load processing) of the Management Services when loading metric data to the Management Repository, and information on files waiting to be loaded into the Management Repository.

After you click the name of one of the Management Services, the Management Service page for that particular Management Service appears. From the Management Service page, you can view the status (up or down) and performance (load processing) of the particular Management Service. You can easily view how well the Management Service is performing by looking at the Loader and Job Dispatcher sections. You can also look at the performance over time; for example, for the same amount of data processed, a decreasing trend in loader throughput might indicate that resources on

the machine are being maximized and an additional Management Service might need to be added for load balancing.

Figure 2–3 provides an example of statistics relating to Management Services.

Figure 2–3 Status of an Oracle Management Service



Oracle Management Agent

The Oracle Management Agent page provides you with an overview of all Management Agents, including their status, versions, information about data they are loading to the Management Service, resource consumption, and so on. You can easily determine if a Management Agent is up or down or if there are any metric collection errors seen by any Management Agent.

On the Management Agent Home page, verify:

- If a Management Agent is up or down
- If a Management Agent is uploading data to the Management Service
- When was the last successful upload to the Management Service

Figure 2–4 shows statistics for the Management Agents being monitored.

Figure 2–4 Status of Installed Oracle Management Agents**Agents**

These are the Agents that have been installed and configured for the hosts in your enterprise. If you need to add a target or modify its properties, select the host on which the target resides.

Targets Configured 117

Targets Unconfigured 0

Name	Version	Status	Last Successful Load	CPU Usage (%)	Memory Usage (KB)	Management Service	Secure Upload	Targets Configured
dlsun1285.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 1:00:29 PM	7.3	59232	smoemdw-sun1.us.oracle.com:4888	Yes	5
dlsun1302.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 12:35:49 PM	0.2	24536	smoemdw-sun1.us.oracle.com:4888	Yes	4
dlsun131.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 1:00:06 PM	0.4	26120	smoemdw-sun1.us.oracle.com:4888	Yes	4
dlsun1434.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 12:36:30 PM	0.2	59768	smoemdw-sun1.us.oracle.com:4888	Yes	3
dlsun1443:1813	4.0.0.0.0	↑	Jan 28, 2003 1:03:08 PM	0.2	26584	smoemdw-sun1.us.oracle.com:4888	Yes	4
dlsun1574.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 1:01:37 PM	3.3	60192	smoemdw-sun1.us.oracle.com:4888	Yes	10
dlsun1599.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 12:46:42 PM	1.5	50392	smoemdw-sun1.us.oracle.com:4888	Yes	5
dlsun1605.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 12:40:14 PM	0.3	52880	smoemdw-sun1.us.oracle.com:4888	Yes	8
dlsun1700.us.oracle.com:1814	4.0.0.0.0	↑	Jan 28, 2003 12:19:42 PM	0.0	23176	smoemdw-sun1:4888	No	2
dlsun1728.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 12:46:04 PM	0.2	50264	smoemdw-sun1.us.oracle.com:4888	Yes	5
dlsun1746.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 1:00:07 PM	3.6	60536	smoemdw-sun1.us.oracle.com:4888	Yes	12
dlsun1827.us.oracle.com:1813	4.0.0.0.0	↑	Jan 28, 2003 12:59:21 PM	5.8	105344	smoemdw-sun1.us.oracle.com:4888	Yes	6

Application Performance Management

This chapter introduces the concept of application performance management and contains the following sections.

- [Introduction to Application Performance Management](#)
- [Web Application Availability Monitoring](#)
- [Business Transaction Monitoring](#)
- [Page Performance Monitoring](#)
- [Extended Network and Critical URL Monitoring](#)

Introduction to Application Performance Management

Today's e-businesses depend heavily upon their Web applications to allow critical business processes to be performed online. As more emphasis is placed on accessing information quickly, remotely, and accurately, how can you ensure your online customers can successfully complete a transaction? Are you certain that your sales force is able to access the information they need to be effective in the field?

Enterprise Manager Application Performance Management tools are a major shift in system diagnostics and monitoring. With Application Performance Management tools, you can proactively monitor your e-business systems from the top down and trace the experience of your end users as they enter and navigate the Web site. Additionally, with the knowledge of real end-user response times, you are able to effectively manage your e-business systems and understand the impact of application performance problems. Application Performance Management tools also provide detailed diagnostics that allow you to quickly and easily identify the root cause of the application performance problems.

Application Performance Management functionality complements the traditional systems monitoring capabilities of Enterprise Manager. Full integration with the Enterprise Manager systems monitoring capabilities allow you to monitor the performance and availability of system components that make up the applications' technology environment, including the back-end database and the middle-tier application servers.

The key Application Performance Management monitoring capabilities are described in the following sections:

Web Application Availability Monitoring

This section contains the following topics:

- [What is Web Application Availability Monitoring?](#)
- [Web Application Availability Monitoring in Action](#)

What is Web Application Availability Monitoring?

The availability of your Web applications is critical to the success of your business. However, the rules for what constitutes availability can vary widely from one application to another.

For example, for one Web application, you might measure availability in terms of how well the login page performs for your users. For another application, such as an online store, you might measure availability in terms of a successful sales transaction.

In fact, a Web application can sometimes be available to some users and not to others. A customer in Tokyo might have problems accessing your Web site while a user in New York might have no trouble at all. Using Enterprise Manager, you have the flexibility to define application availability for your unique environment.

Enterprise Manager continuously monitors the availability criteria you specify and generates alert notifications when predefined performance thresholds are exceeded. When Enterprise Manager generates an alert, you can drill down to locate the availability problem quickly.

In addition to automatic notification of performance issues, Enterprise Manager also provides real-time information for each Web application. At any time, you can review the status of your Web applications with real-time charts and availability icons that show you the status of the application and individual pages or sets of pages on your Web site.

Web Application Availability Monitoring in Action

Setting up your Web application so it can be monitored by Enterprise Manager is as easy as creating a Web application target. To create a Web application target, use the Grid Control and perform the following steps:

1. Click **Targets**.
2. Click **Web Applications**.
3. On the Web Applications page, click **Add**.
4. Provide the needed information in the Create Web Application wizard.

See Also: "Creating Web Application Targets" in the Enterprise Manager online help

To review existing Web Application targets:

1. Click **Targets** in the Enterprise Manager Grid Control
2. Click **Web Applications**.
3. Click the Web Application of your choice.

See [Figure 3-1](#) for an example of a Web Application home page.

4. On the Availability Transaction Response page, click **Manage Transactions**.
5. On the Manage Transactions page, choose the transaction to investigate and click **Collection Settings**.

See Also: "Setting Transaction Intervals and Thresholds" in the Enterprise Manager online help

By default, the Homepage URL is checked for availability by the local host where the Management Service has been installed. To obtain more information about the performance and availability of the Homepage URL from multiple locations on the Intranet or across the Internet, you can assign special targets called Oracle Beacons to access the Homepage URL.

See Also: "About Beacons" in the Enterprise Manager online help

Business Transaction Monitoring

This section contains the following topics:

- [What Is Business Transaction Monitoring?](#)
- [Business Transaction Monitoring in Action](#)

What Is Business Transaction Monitoring?

Besides monitoring the availability of an entire Web application, you can also monitor the performance of specific pages or features of your application.

With Application Performance Management, you can create a recording of your Web browser actions as you access these pages. You can then save this recording—which Application Performance Management refers to as a business transaction—so you can play the transaction automatically from strategic locations throughout your infrastructure. After a period of time, you can view and compare data about the performance of the transaction from a variety of locations on the network. A breakdown of the transaction path from start to finish provides detailed information about each URL in the transaction, including response metrics for server and network components.

Enterprise Manager pinpoints the location of any performance problem, whether internal or external to the data center, and lets you know if slow response times are due to problems in your system or externally on the Internet. Issues within the data center are further broken down to reveal if they are at the network, server, content, or application level.

Business Transaction Monitoring in Action

To become familiar with the concept of business transactions, consider the Homepage URL, which is defined when you create a Web Application target.

The Homepage URL used to monitor the availability of the Web Application is a simple business transaction that displays the Homepage URL of the Web Application. The performance of this simple transaction determines the availability of the Web Application.

[Figure 3–2](#) shows the Homepage URL transaction as it appears in the All Transactions table on the Transaction Performance page of the Web Application target home page.

Figure 3–2 Homepage URL Transaction as Shown in the All Transactions Table

All Transactions

Group By: Transaction

Expand All | Collapse All

Beacon	Beacon	Total Transaction Time (ms)	Average Page Response (ms)	Slowest Page (ms)	Transaction Status	Collection Time
▼ Transactions						
▶ homepage	Local	3132.0	3132.0	3132.0	↑	Sep 29, 2003 7:36:43 AM

You can use the Administration page of the Web Application home page to add additional and more complex transactions. You create each transaction by recording a series of actions you take in the Web browser. Enterprise Manager provides a recording control panel and a browser window so you can record a series of actions in the browser (Figure 3–3). You then save these actions as a single business transaction that you can monitor from the Web Application Transaction Performance page.

Figure 3–3 Recording an Application Performance Monitoring Business Transaction

Create Transaction: Recording

Step 1. Start recording

Step 2. Stop recording

Step 3. Verify the recording

Recording a Transaction

Steps to record a transaction:

Step 1. Press the Start button to start recording. This opens the recording browser window which is using this browser window are captured and added to the transaction.

Welcome to Java Pet Store Demo - Microsoft Internet Explorer

Address: http://demostage01.us.oracle.com:7777/estore/control?language?language=English

File Edit View Favorites Tools Help

Java Pet Store demo What are you looking for? Search

Fish
Saltwater, Freshwater

Dogs
Various Breeds

Reptiles
Lizards, Turtles, Snakes

Cats
Various Breeds, Exotic Varieties

Birds
Exotic Varieties

A Web application transaction can be monitored from different geographical user communities using Beacons. Beacons are client robots which have the functionality of playing transactions from various representative user communities and collecting response time data.

Figure 3–4 shows the All Transactions table after additional transactions were created for this Web Application. The table provides details about the average response time of the pages within each transaction that was played from various representative user communities.

Figure 3–4 Multiple Transactions as Shown in the All Transactions Table

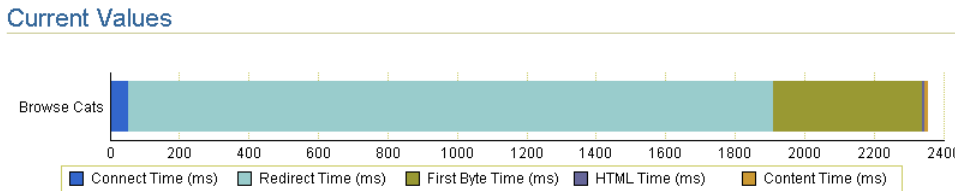
Expand All | Collapse All

Group By Transaction

Beacon	Beacon	Total Transaction Time (ms)	Average Page Response (ms)	Slowest Page (ms)	Transaction Status	Collection Time
▼ Transactions						
▼ Browse_Cats	Local	1714.0	342.0	1249.0	↑	Oct 9, 2003 11:55:59 AM
	New York	3274.0	654.0	2193.0	↑	Oct 9, 2003 11:58:09 AM
	San Francisco	2763.0	552.0	1780.0	↑	Oct 9, 2003 11:52:01 AM
▼ Browse_Dogs	Local	1520.0	380.0	1258.0	↑	Oct 9, 2003 11:55:58 AM
	New York	1611.0	402.0	1302.0	↑	Oct 9, 2003 11:56:15 AM
	San Francisco	4121.0	1030.0	3794.0	↑	Oct 9, 2003 11:58:15 AM
▼ Browse_Reptiles	Local	603.0	301.0	500.0	↑	Oct 9, 2003 11:59:22 AM
	New York	267.0	133.0	182.0	↑	Oct 9, 2003 11:58:27 AM
	San Francisco	123.0	61.0	69.0	↑	Oct 9, 2003 11:59:28 AM
▼ Online_Purchase	Local	2242.0	203.0	1250.0	↑	Oct 9, 2003 11:55:53 AM
	New York	2281.0	207.0	1380.0	↑	Oct 9, 2003 11:56:16 AM
	San Francisco	2980.0	270.0	1990.0	↑	Oct 9, 2003 11:58:23 AM
▼ Shopping_Cart	Local	4416.0	220.0	1641.0	↑	Oct 9, 2003 11:55:49 AM
	New York	3410.0	170.0	1304.0	↑	Oct 9, 2003 11:56:19 AM
	San Francisco	3905.0	195.0	1253.0	↑	Oct 9, 2003 11:58:19 AM
▼ Store_Login	Local	2052.0	410.0	1588.0	↑	Oct 9, 2003 11:55:55 AM
	New York	2400.0	480.0	1877.0	↑	Oct 9, 2003 11:56:12 AM
	San Francisco	3589.0	717.0	3018.0	↑	Oct 9, 2003 11:58:30 AM
▼ homepage	Local	20.0	20.0	20.0	↑	Oct 9, 2003 11:59:22 AM
	New York	60.0	60.0	60.0	↑	Oct 9, 2003 11:58:27 AM
	San Francisco	19.0	19.0	19.0	↑	Oct 9, 2003 11:56:21 AM

If you drill down and click the transaction name in the All Transactions table, Enterprise Manager provides details about the transaction performance, as well as a graphical breakdown of each phase of the transaction (Figure 3–5).

Figure 3–5 Drilling Down to Transaction Details



From the **Manage Transactions** link, you can play a transaction using the interactive trace facility. By selecting a recorded transaction and clicking **Play**, this trace feature allows you to execute a transaction and obtain response times for each URL within the transaction. If the transaction is a J2EE transaction that invokes components of the J2EE stack, click **Play with Trace** to see a breakdown of the server times. The server time breakdown includes the servlet/JSP, EJB, and JDBC/SQL times and allows you to determine where transaction bottlenecks exist so that you can further diagnose performance problems (Figure 3–6).

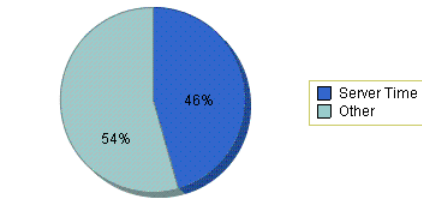
See Also: "Extended Network and Critical URL Monitoring in Action" on page 3-10 to learn more about Oracle Beacons

Figure 3–6 Interactive Cross-Tier Tracing for Business Transactions

Trace Results - Overview: Online Purchase

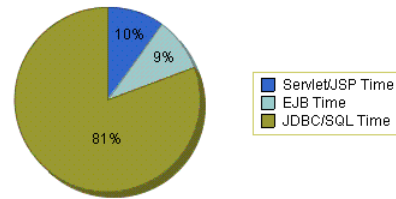
Summary

Transaction Time Overview



Total Transaction Time (ms) **6436**
 Server Time (ms) **2933**
 Average Page Response Time (ms) **459**
 Maximum Page Response Time (ms) **2156**

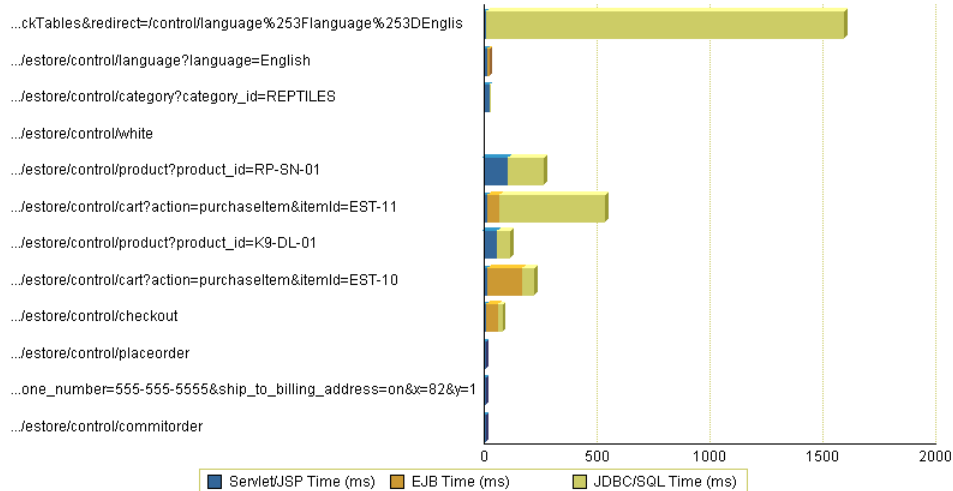
Server Time Overview



Servlet/JSP Time (ms) **293**
 EJB Time (ms) **269**
 JDBC/SQL Time (ms) **2349**

Details

Server Time



For more information about creating Web Application transactions, see the Enterprise Manager online help.

See Also: "Creating Transactions" in the Enterprise Manager online help

Page Performance Monitoring

This section includes the following topics:

- [What Is Page Performance Monitoring?](#)
- [Page Performance Monitoring in Action](#)

What Is Page Performance Monitoring?

Page Performance Monitoring can help you develop a clear understanding of how your Web applications are performing from the end-user perspective. This new Enterprise Manager feature collects the actual response time experienced by end users and stores this comprehensive performance data in the Management Repository. As

this data is gathered over time, you can generate detailed reports that reveal exactly how well your pages are responding to user requests.

You can select individual pages (URLs) to monitor, or you can display reports that reveal Web application performance information sorted in multiple ways. For example, you can view reports that show the slowest pages on your site over the past 24 hours, the average response time experienced by particular Web site visitors, or the average response time experienced by users from specific network domains.

Knowledge of the actual performance of your application as experienced by your end users enables you to understand the impact of performance problems. This enables you to prioritize your resolution efforts on the issues that impact your business the most.

Page Performance Monitoring in Action

To view the page performance data for a Web application, click the **Page Performance** tab on the Enterprise Manager Web Application home page. By default, this page shows the slowest pages in this Web Application over the past 24 hours ([Figure 3–7](#)).

Note: To view end-user performance data for your own Web applications, you must not only create a Web Application target, but you must also configure the Web Caches for your Web application.

See Also: "Configuring Application Performance Monitoring" in *Oracle Enterprise Manager Advanced Configuration*.

Figure 3–7 End-User Response Time for the a Typical Web Application

End-User Response Time

End-user response time is a measure of page performance from the end-user's perspective, including all page load time from the client browser through the web server.

Slowest Pages

URL	Samples	Average Response Time (sec)	Average Server Time (sec)	Response Time Details
/estore/control/verifysignin	46	13.0	11.8	
/estore/control/productdetails	36	10.4	10.0	
/estore/control/search	142	8.6	7.5	
/estore/control/updateaccount	129	8.1	6.2	
/estore/control/cart	15	7.3	6.8	

Average Server Time (sec)
 Average Response Time (sec)

Detail Views

- [Slowest Pages \(All\)](#)
- [Slowest Domains](#)
- [Slowest Regions](#)
- [Slowest Visitors \(IP\)](#)
- [Slowest Webservers](#)

For more specific information, use the **Administration** tab of the Web Application home page to add the URLs that most interest you to the URL Watchlist. The watchlist provides you with a summary of the number of times the page has been accessed and the average response time of the page ([Figure 3–8](#)).

Figure 3–8 Selected Pages Shown in the Web Application URL Watchlist

Watch List

The Watch List measures the end-user response time of critical pages as identified by the Web Application administrator. Click the "Manage Watch List" button to add or remove pages to this list.

[Manage Watch List](#)

URL	Samples	Average Response Time (sec)	Average Server Time (sec)	Response Time Details ▲
reptiles	236	0.2	0.1	
Store Login	35	0.1	0.0	
Fish Main Page	208	0.2	0.1	
Cats Main Page	186	0.2	0.1	
Create New Account	15	0.2	0.0	
Order Commit	79	0.4	0.2	

In addition to End-User Response Time, the Page Performance page displays Middle Tier Performance (Figure 3–9) data.

Figure 3–9 Middle Tier Performance for a Web Application

Middle Tier Performance

Middle Tier performance is a measure of the time taken to prepare web application content in the middle tier, including all time spent in the application server and back-end data sources.

Slowest URLs by Average Time in OC4J

View By:

URL	Hits	Processing Time Per Hit (ms)	Processing Time Breakdown
/estore/populate	206	1,542.5	
/estore/control/verifysignin	8	362.5	
/estore/control/productdetails	2	296.2	
/estore/control/cart	9	171.3	
/estore/control/product	689	124.2	
/estore/control/checkout	5	93.4	
/estore/control/category	10	80.5	
/dmsoc4/Spv	6	46.7	
/estore/control/language	1,396	28.4	
/estore/control/main	1	14.3	

Legend: ■ Servlet Time ■ JSP Time ■ EJB Method Time ■ JDBC Time

OC4J-Related Links

[Servlet Performance](#)
[JSP Performance](#)
[OC4J Performance](#)

Enterprise Manager collects detailed J2EE activity data each time a user accesses a page (or URL) of your Web Application. The processing times reflect the time needed to prepare Web application content in the middle tier, as well as the time spent in the application server and back-end data sources. You can use this data to identify the slowest URL and plan your corrective action.

In addition, for each URL you can drill down and examine the processing time and additional performance details for each servlet, JSP, JDBC, and EJB component, down to the root cause of the problem at the SQL statement level. You can also correlate the processing time and load with other factors such as the CPU, Memory, I/O, and response times and load. This correlation also includes other metrics of the components that make up your Web application. Details of the full call processing stack of every URL accessed is also provided for rapid root cause diagnosis.

For example, Figure 3–10 shows a report that reveals which users are experiencing the slowest performance on your site.

Figure 3–10 End-User Response Time Data Sorted by Visitor

Slowest Average Response Time : Visitor Metrics

Sort by

Visitor	Average Response Time (sec)	Samples	Average Server Time (sec)	Total Time (min)	Standard Deviation (sec)
dhcp-amer-vpn-gw2-west-141-144-88-96.vpn.oracle.com	20.52	10	17.07	3.42	14.02
rzkrishtn-pc.us.oracle.com	13.88	13	13.05	3.01	15.68
dhcp-5op3-5op4-west-130-35-70-149.us.oracle.com	8.51	31	6.1	4.4	6.81
jgwang-pc1.us.oracle.com	7.19	33	6.37	3.96	8.46
dhcp-5op3-5op4-west-130-35-70-230.us.oracle.com	6.82	118	4.79	13.41	5.99
dhcp-5op5-west-144-25-119-168.us.oracle.com	6.74	74	6.24	8.31	11.06
pdo-pc.us.oracle.com	6.58	297	5.28	32.55	9.4
dhcp-nashua1-2nd-3rd-fl-east-138-2-233-191.us.oracle.com	6.29	25	5.67	2.62	13.18
dhcp-5op3-5op4-west-130-35-70-204.us.oracle.com	5.88	96	5.38	9.41	8.09
jpyang-pc.us.oracle.com	5.69	33	5.27	3.13	6.22
dhcp-5op3-5op4-west-130-35-70-42.us.oracle.com	4.99	86	1.98	7.15	5.67
DHCP-EDC-TVP-31-72.uk.oracle.com	4.87	10	2.55	.81	6.12
pdo-pc1.us.oracle.com	4.31	31	3.81	2.23	5.91
dhcp-5op5-west-144-25-119-158.us.oracle.com	4.16	44	3.33	3.05	8.08
dhcp-nashua1-2nd-3rd-fl-east-138-2-233-154.us.oracle.com	4.01	40	3.62	2.67	6.07

[All Visitors](#) [Apply Filter](#)

You can learn more about the end-user response time drill-down reports in the Enterprise Manager online help.

See Also: "About Monitoring Page Performance" in the Enterprise Manager online help

Extended Network and Critical URL Monitoring

This section includes the following topics:

- [What Is Extended Network and Critical URL Monitoring?](#)
- [Extended Network and Critical URL Monitoring in Action](#)

What Is Extended Network and Critical URL Monitoring?

The responsiveness of your network components is as critical to your Web application as the performance of your URLs. Enterprise Manager provides you with tools to monitor both continuously and on-demand.

You can define watch lists of network components and URLs that you wish to continuously monitor for availability and responsiveness. Since it is not always practical to have the management infrastructure permeate the entire application infrastructure, on-demand monitoring also allows network components that might otherwise go unmonitored to be checked periodically for responsiveness and availability.

Extended Network and Critical URL Monitoring in Action

To manage targets on each of your network hosts, you install an Oracle Management Agent. The Management Agent discovers the targets on each host and gathers management data about the hardware and software on each host.

The Management Agent also serves as an Oracle Beacon. Each Oracle Beacon can be configured to monitor the availability and performance of any:

- Device on your network, such as a host computer or an IP traffic controller
- Web page or Web application that is accessible from the selected Beacon

If the network device, Web page, or Web application is inaccessible, or if it does not respond within a predefined time interval, you can configure the Beacon so it generates an alert.

You can add one Beacon target for each host where the Management Agent has been installed. You add the Beacon target like any other managed target by selecting the Beacon target type and clicking **Add** on the Management Agent home page.

Like other managed targets, each Beacon has an Enterprise Manager home page. From the Beacon home page, you can check the HTTP response time of a remote URL or the network response or route used to contact any device that can be located with a TCP/IP network address.

For example, to check the performance of a remote URL:

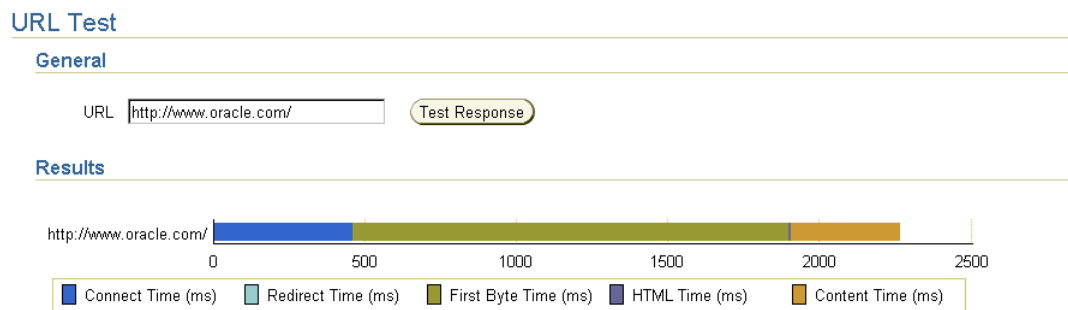
1. From the Beacon home page, click **Performance**.
2. Scroll to the bottom of the page and enter the complete HTTP address (URL) of a Web page you want to test.

You can test Web pages on your Intranet, or configure the Beacon to use your proxy server so you can test pages outside your company firewall.

3. Select **HTTP Response** from the menu and click **Go**.

Enterprise Manager displays the URL Test page, which provides details about the response time of the URL, including a graphical breakdown of the entire transaction, as shown in [Figure 3-11](#).

Figure 3-11 Testing the Performance of a Remote URL



You can get more information about the test result data by clicking **Help** on the URL Test page.

To make sure the performance of a network component or URL is acceptable from multiple locations on your network, you can configure multiple Beacons to monitor the component or URL. You do this by installing Management Agents on strategically-located hosts. For each Beacon on each host, you can then add key network components and Web pages to the **Network Watchlist** and the **URL Watchlist** on the Beacon Performance page. After an item is added to the Network or URL Watchlist, you can scan the entries in the list to see:

- Which components are currently available from this Beacon
- If any warning or critical alerts have been triggered
- A key set of metrics that can help you determine the relative performance of the connection to the component

More information about using Beacons to measure network component and critical URL availability is available in the Enterprise Manager online help.

See Also: "About Beacons" in the Enterprise Manager online help

Database Management

This chapter introduces the concept of database management and contains the following sections.

- [Introduction to Database Management](#)
- [Monitoring Databases](#)
- [Administering Databases](#)
- [Database Maintenance](#)
- [Database Group Management](#)

Introduction to Database Management

Database management involves the monitoring, administration, and maintenance of the databases and database groups in your enterprise. Enterprise Manager is the premier tool for managing your database environment.

With Enterprise Manager, you get:

- A complete set of integrated features for managing Oracle databases
- Unparalleled scalability that lets you manage a single database or thousands of instances
- An intuitive management product that leads the industry in ease of deployment and use

Database Control Versus Grid Control

Enterprise Manager provides two configurations with which to monitor your database: Database Control and Grid Control. Database Control is the Enterprise Manager Web-based application for managing Oracle Database 10g Release 1 (10.1). The Database Control is installed and available with every Oracle Database 10g installation.

From the Database Control, you can monitor and administer a single Oracle Database instance or a clustered database.

The Grid Control is the Enterprise Manager console used for centrally managing your entire Oracle environment. Within Grid Control, you access the database targets using the **Targets** tab and clicking **Databases**.

See Also: ["Providing a Flexible Architecture"](#) on page 1-7 for additional information about Database Control and Grid Control

Database Home Page as the Management Hub

The Enterprise Manager Database Home page (Figure 4–1) allows you to view important performance and status information about your database instance from a single source, including:

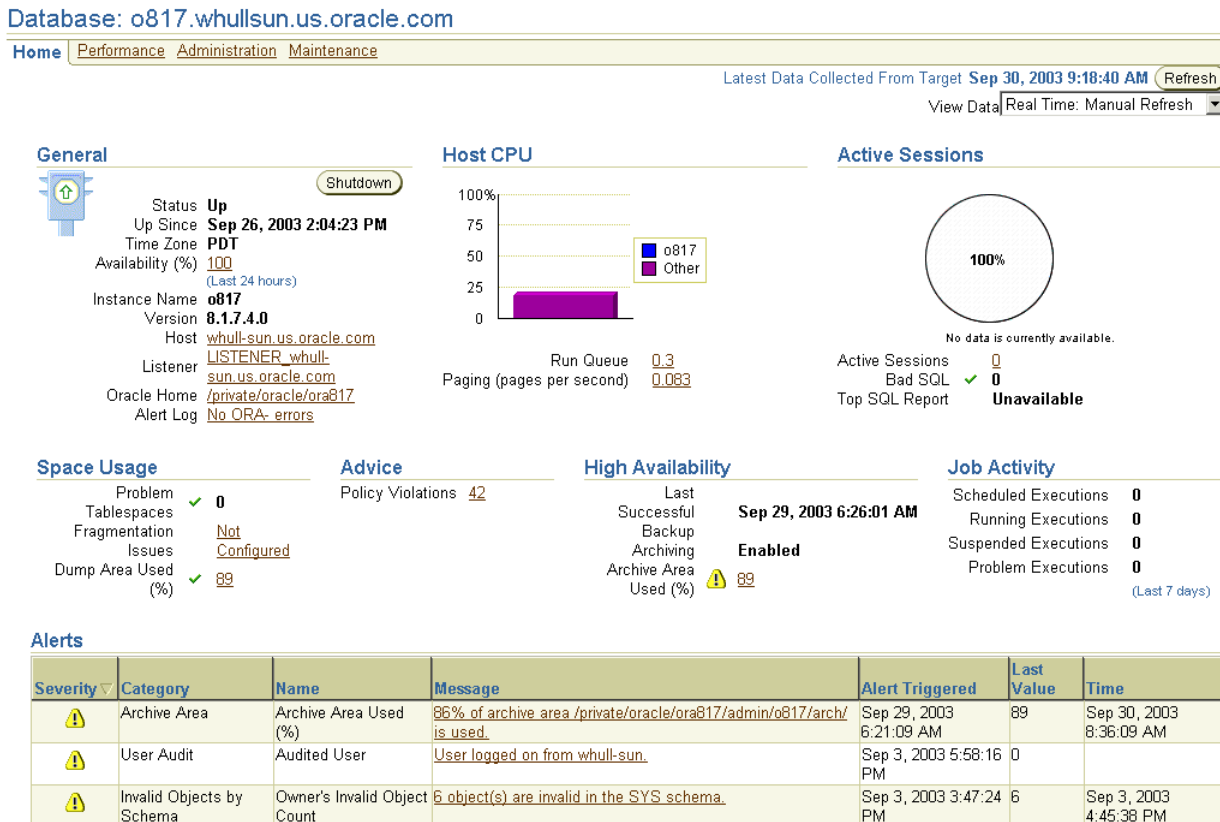
- Instance name, database version, Oracle home location, media recovery options, and other pertinent instance data
- Current instance availability
- Host CPU metrics and aggregate session activity data
- High availability statistics
- Outstanding alerts
- Session and SQL-related performance information
- Key space usage metrics

Starting from the Database Home page, you can access additional details and management functions by drilling down through the user interface.

In addition, the Database Home page provides a list of Related Links. From these links you can perform such activities as add and edit metric thresholds, analyze job activity and metric collection errors, and access a number of advisors to help you improve the performance of your database.

See Also: "Oracle Database Home Page" in the Enterprise Manager online help

Figure 4–1 Enterprise Manager Database Home Page



Monitoring Databases

Comprehensive database monitoring allows you to identify the problem areas in your database environment that are affecting performance. Once you have identified the areas to improve, you can tune your databases' performance using the Enterprise Manager administration capabilities.

Note: For more detailed information about the features on any page, click **Help** to access Enterprise Manager online help.

Database Performance Page

On the Database Performance page (Figure 4-2), accessible from the Database Home page, you can quickly view performance data for the instance and its underlying host. Several charts display current and recent metric information on a common time axis that enables visual correlation of metrics:

- Host charts show paging and run queue information to assess overall memory and CPU issues.
- Sessions: Waiting and Working chart quantifies session database work, as well as where waiting is negatively impacting performance.
- Throughput charts allow correlation of user workload with performance indicators in the other charts.

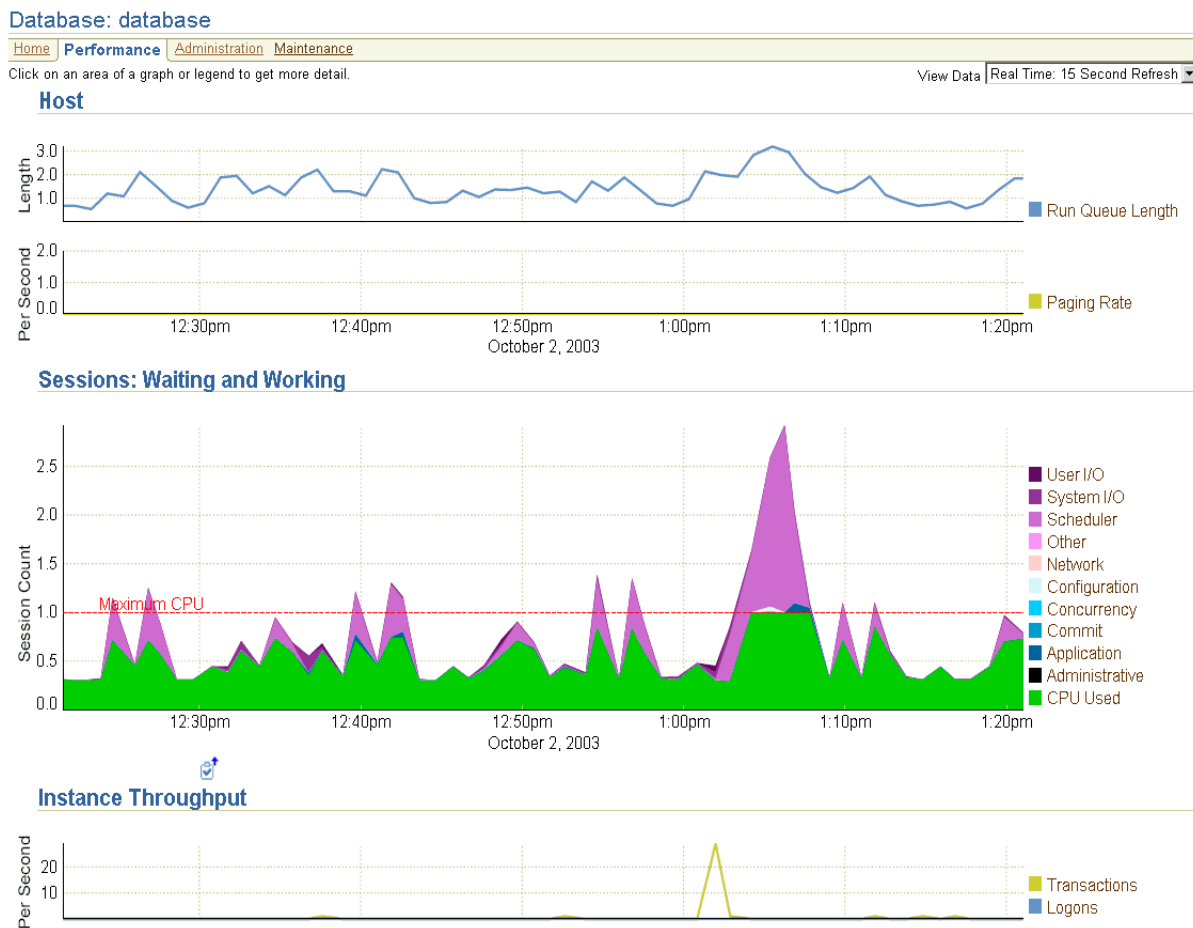
Each of these charts has context-sensitive drill-down to additional details for rapid problem diagnosis.

Additional links to powerful real-time diagnostic capabilities allow you to identify top resource consumers (by session, SQL, or service/module/action) and locking issues.

The Sessions: Waiting and Working chart is the centerpiece of Oracle performance monitoring. It displays a profile of the amount of time sessions are either working or waiting to work in the database instance. Session time is categorized as either CPU (working) or one of the wait classes. The Maximum CPU line on the chart helps determine how much of the CPU resource is being utilized. Session wait time accumulates above the CPU line and the ratio of wait time to CPU time indicates how efficiently the system is working. Specific wait classes accumulating time help indicate where tuning efforts should be focused.

On Oracle 10g databases, the Sessions: Waiting and Working chart also shows a small icon for every Automatic Database Diagnostic Monitoring (ADDM) task within the time period, which can be clicked to get ADDM recommendations.

Figure 4–2 Top of the Database Performance Page



Database tuning becomes a lot easier and more effective when all the information for an in-depth performance diagnosis is made available on a single screen. Additionally, all critical performance metrics can be graphed for trend analysis as well as compared to those of other database instances.

Top Consumers

In the **Additional Monitoring Links** section of the Database Performance page, click the **Top Consumers** link for an overview of the top consumers of system resources (Figure 4-3). The top consumers include sessions, services, modules, and clients.

Use the Top Consumers page to help you pinpoint the most problematic areas on which to focus your database tuning efforts. From this page, click the property page associated with the resource you want to investigate in more detail, for example, Top Sessions.

Figure 4-3 Top Consumers Overview Page

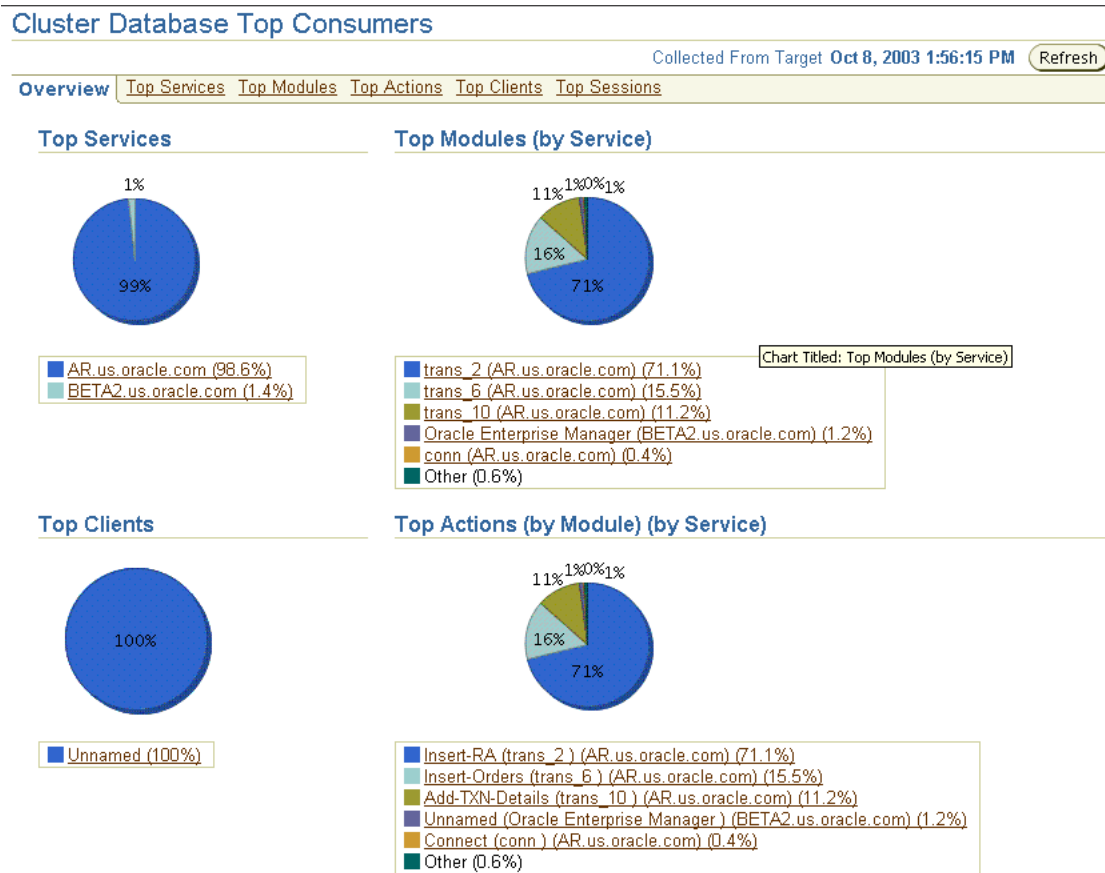


Figure 4-4 shows the Top Sessions property page associated with Top Consumers. This page lists the most resource-consuming sessions for the database.

Figure 4-4 Top Sessions

Top Consumers

Collected From Oct 2, 2003 2:28:55 PM To Oct 2, 2003 2:29:10 PM

Overview Top Services Top Modules Top Actions Top Clients Top Sessions Show Active SQL Customize Kill Session View

Select	SID	DB User	CPU (1/100 sec)	PGA Memory (bytes)	Physical Reads	Logical Reads	Hard Parses	Total Parses	Disk Sorts	Status	Program	OS PID	Machine	OS User	Timeout (seconds)
37	SYSMAN		2200	401424	0	5131	0	23	0	ACTIVE	JDBC Thin Client	25243	usunnab08.us.oracle.com		
22	SYSMAN		5	796756	0	60	0	0	0	ACTIVE	JDBC Thin Client	9075	usunnab08.us.oracle.com		
19	SYSMAN		4	860780	0	123	0	1	0	ACTIVE	JDBC Thin Client	9066	usunnab08.us.oracle.com		
18	q000		0	413844	0	0	0	0	0	ACTIVE	oracle@usunnab08.us.oracle.com (q000)	8710	usunnab08.us.oracle.com	plaquerr	
20	J000		0	2449616	0	0	0	0	0	ACTIVE		8718			
13	QMNC		0	306332	0	0	0	0	0	ACTIVE	oracle@usunnab08.us.oracle.com (QMNC)	8704	usunnab08.us.oracle.com	plaquerr	

SQL Monitoring

Enterprise Manager analyzes all SQL statements for performance and resource consumption. Suspect SQL statements are evaluated, and areas for possible tuning are identified in a plain-language SQL Assessment. You can view the SQL statement together with its execution statistics and execution plan.

To view the Top SQL statements, click the **Top SQL** link available in the **Additional Monitoring Links** section of the Database Performance page. There, you can also choose to view **Blocking Sessions**, **Database Locks**, and **Instance Activity**.

Administering Databases

As the Enterprise Manager comprehensive monitoring identifies problem areas in your database and database groups, you can administer your database using the Enterprise Manager administration tools.

Enterprise Manager allows you to manage the following:

- Initialization parameters
- Schema objects such as tables, indexes, and views
- Storage entities such as tablespaces, datafiles, control files, rollback segments, redo log groups, and archive logs
- Users, roles, and profiles
- Resource consumer groups and resource plans
- Source types such as packages, procedures, functions, and Java classes

Table 4–1 describes the administration categories in more detail. For additional information about any of the administration tools, click **Help** to access Enterprise Manager online help.

Table 4–1 Database Administration Categories

Administration Category	Description
Configuration Management	Helps you to compare the configuration of multiple databases. This allows you to duplicate the same configuration of a good performing database to databases that are not performing as well. From this category, you can also view the statistics of the last collected configuration, for example, tablespace information.
Enterprise Manager Administration	Supports tasks specific to the administration of Enterprise Manager. For example, you can define administrator accounts to perform management tasks. You can also define blackouts to suspend monitoring of one or more targets. Additionally, you can define notification schedules and monitor job activity.
High Availability	Provides access to Data Guard and the Add Standby Database wizard. By using Data Guard in conjunction with standby databases, you can protect your data from unforeseen circumstances, such as power outages and hardware malfunctions. Data Guard automates the creation, management, and monitoring of database standby environments.
Instance	Helps you manage the database instances and sessions in your Oracle environment. Using these tools, you can administer memory, recovery, and initialization parameters, start up and shut down a database, manage users' sessions, view currently running SQL, track space usage, and view instance alerts.
Resource Manager	Allows you to allocate resources among user groups. This makes it possible to give certain groups first access to system resources. For example, you can allocate to users running resource-intensive quarterly reports the resources that remain after all other groups have submitted their tasks. This ensures that the reports do not run at the expense of other functions that may be more time critical. Enterprise Manager provides resource administration tools that allow administrators to manage and optimize resource usage. Using these tools, you can monitor and analyze the status of the currently active resource plan; change the active resource plan; view user/group resource requirements; allocate or reallocate resources according to an established hierarchy.

Table 4–1 (Cont.) Database Administration Categories

Administration Category	Description
Scheduler	Simplifies the scheduling and management of all jobs. The Scheduler ensures that jobs are processed at a predefined time in an efficient manner while maximizing the use of system resources. It lets you manage and monitor the jobs. Detailed information on all Scheduler activities is available, thus providing key information on resource usage that you can use to plan for future capacity requirements.
Schema	<p>Provides several tools that allow you to manage and administer schemas. Using these tools, you can create indexes to improve the speed with which SQL statements execute against a table, create views to better reflect the needs of particular users, and create, alter, clone, or drop various database schema objects, including indexes, tables, views, synonyms, sequences, and database links.</p> <p>Schema administration also supports packages, procedures, functions, triggers, as well as Java sources and classes. You can also launch the Labor Statistics wizard for generating cost-based optimizer statistics.</p>
Security	<p>Provides easy, intuitive tools for managing security, including creating, cloning, and removing user accounts and permissions; creating and modifying roles; and setting profile parameters.</p> <p>Security administration also supports Oracle password management, which increases system security. Supported features include: account locking, password lifetime and expiration, password history, password complexity, verifications, and export/import of passwords.</p>
Storage	Provides database storage administration tools that make it easier for administrators to optimize database performance. Using these tools, you can administer operations on control files, tablespaces, datafiles, rollback segments, redo log groups, and archive logs.
Warehouse	<p>Helps you to configure an Oracle database to support business intelligence applications that perform complex multidimensional calculations, forecasting, and what-if analysis.</p> <p>Using Enterprise Manager, you can create Online Analytical Processing (OLAP) metadata for a star/snowflake schema. To fully configure your database for OLAP applications, you will also need to use OLAP tools such as Analytic Workspace Manager and packages such as DBMS_ODM.</p>
Workload	Helps you to use the Automatic Workload Repository to store database statistics that are used for performance tuning. Use the SQL Tuning Set page to define a collection of SQL Statements that can be used for tuning purposes.

Database Maintenance

In addition to monitoring and administering your databases, Enterprise Manager allows you to perform maintenance operations on your databases to keep them up-to-date with the latest patches, upgrades, and data. You can access the following utilities and software management tools through the **Maintenance** tab on the Database Home page:

Table 4–2 Utility Options

Utility	Description
Clone Database	Duplicates the current database by first backing up and then transferring the current database to a destination Oracle home. Use this utility to copy a database that is in a known and acceptable state. For example, the database has been configured, tuned, and tested.
Export to Files	Moves existing data in Oracle format to and from Oracle databases. For example, you can back up logical database objects while the database is open and available for use. Allows users to export the contents of databases, objects, and tables.
Gather Statistics	Generates and modifies optimizer statistics. Up-to-date statistics can greatly improve the performance of SQL queries against your objects.
Import from File(s)	Imports data that was exported using the Export to File tool. You can use this feature to import the contents of databases, tables, and objects.
Import from Database	Imports the contents of a database.
Load Data from File	Loads data from non-Oracle databases into an Oracle database.
Make Tablespace Locally Managed	Converts dictionary managed tablespaces to locally managed tablespaces.
Reorganize Objects	Rebuilds fragmented indexes or tables, moves objects to a different tablespace, or optimizes the storage attributes of specified objects.

Table 4–3 Backup and Recovery Options

Option	Description
Configure Backup Settings	Protects your database against data loss and to reconstruct the data should loss occur. A backup is a copy of data that can be used to reconstruct parts of your database in the case of data loss. This backup can include important parts of the database such as the control file and datafiles.
Configure Recovery Catalog Settings	Configures the current database with a recovery catalog. A recovery catalog is a supplemental logical schema, created in a database other than the one that you are backing up, that contains RMAN metadata. The recovery catalog is stored in the default tablespace of the schema.
Configure Recovery Settings	Establishes the parameters for crash recovery of instances and media. Recovery refers to the various strategies and procedures involved in protecting your database against data loss and reconstructing the data should that loss occur.
Manage Current Backups	Searches for and displays a list of backup sets or backup copies and performs management operations on selected copies, sets, or files.
Perform Recovery	Restores or recovers a database, tablespaces, datafiles, archived logs, or flashbacks tables or undrops objects.
Schedule Backup	Backs up the contents of your database to disk, tape or both. Online backups are available only when the database is in ARCHIVELOG mode. A backup copies important parts of the database such as the control file and datafiles. A backup is a safeguard against unexpected data loss and application errors. If you lose the original data, then you can reconstruct it by using a backup.

Table 4–4 *Deployment Options*

Option	Description
Patch	Keeps your databases up-to-date by searching for recent patches at <i>OracleMetaLink</i> , which you can then download and apply.
Search Configuration	Performs different types of searches that involve one or more targets in your enterprise configuration. Most of the search queries are pre-defined, but you can modify the search criteria to customize the different search queries.

Database Group Management

Today's enterprises usually consist of a great number of databases. Managing each database individually can be very time consuming for administrators. By combining databases that have certain common characteristics into a single group, administrators can easily and efficiently monitor the performance and availability of multiple databases at once.

With the Enterprise Manager group management capabilities, you can easily manage multiple databases by assigning them to groups. Oracle also provides a set of configuration recommendations against which your databases are automatically compared.

This section contains the following topics:

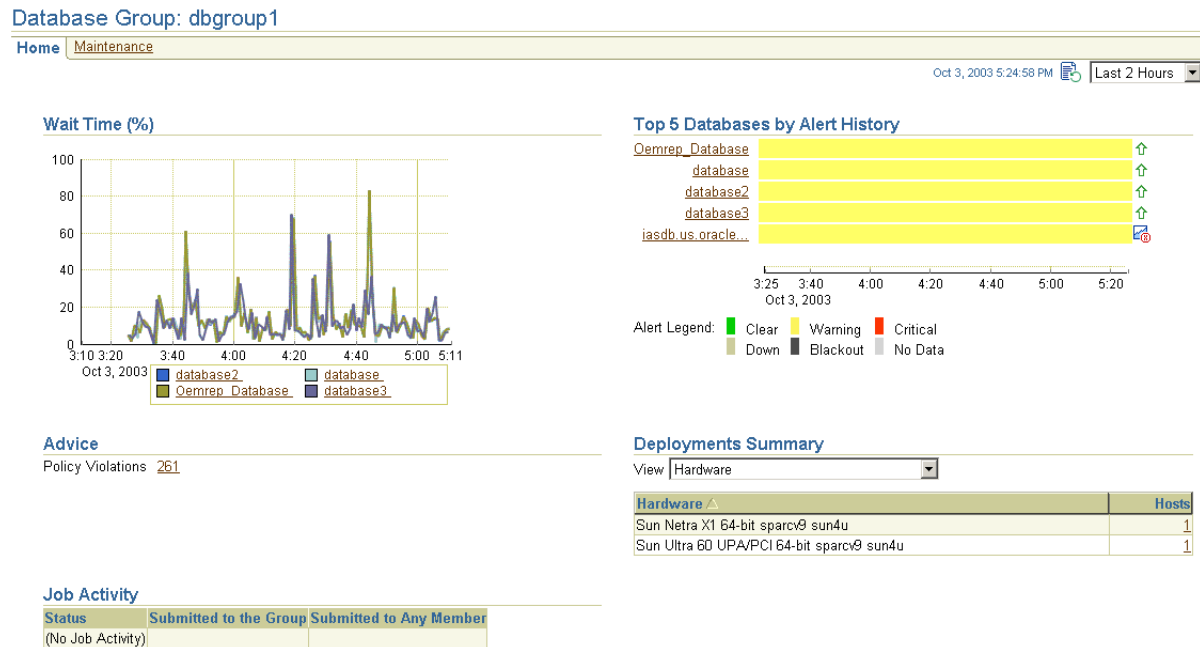
- [Managing Multiple Databases](#)
- [Best Practice Configuration Recommendations](#)

Managing Multiple Databases

The use of database groups makes monitoring and administration easier for administrators who manage multiple databases. For example, an administrator can place all production databases into a single group, allowing for quick and easy monitoring of those databases from a single screen. The Database Group page displays information about the databases that have the highest wait times (indicating potential bottlenecks), those with the most severe alert status, or those that are down.

The Database Group page ([Figure 4–5](#)) also provides direct links to the home pages of the databases that make up the group, allowing the administrator quick access to key availability and performance data about individual databases as well. The Enterprise Manager group management capability alleviates the need for cumbersome navigation between multiple instances and prevents performance degradation trends from going unnoticed.

Figure 4-5 Database Group Home Page



You can view a database’s violations of the Oracle recommended settings from either tab of the Database Group page. The **Databases** table lists noncompliant databases in the **Policy Violations** column. Click the number in that column for more information about the violations for that database.

Best Practice Configuration Recommendations

Enterprise Manager automatically compares the configuration settings of all managed database instances against settings recommended by Oracle. For example, instances with an insufficient number of control file copies are flagged for further review. This automatic configuration check cuts down on manual audits and improves system availability and uniformity.

To view the Oracle configuration recommendations:

1. In the **Targets** tab, click **Groups**.
2. Select a database group by clicking the group name.
3. Once on the Database Group page, click **Maintenance**.

On the Configuration Advice page (Figure 4-6), study the recommendations provided in the **Message** column. If a database group does not comply with a recommended setting, apply the configuration advice.

Figure 4–6 Database Group Maintenance Page - Configuration Recommendations

Database Group: dbgroup1

Home Maintenance Page Refreshed Oct 3, 2003 5:42:56 PM Refresh

Configuration Advice

Expand All | Collapse All

Rule	Message	Databases	Value
▼ Rule			
▶ Control file autobackup	Control file autobackup is not enabled. Backing up the control file is a crucial aspect of backup and recovery. Enable this feature from Backup Settings so that you always have an accessible control file to mount or open the database.	5	
▼ Control files	Use at least two control files, multiplex them on different disks	4	
Oemrep_Database			/ade/plaquerr_emdw2_usunnaa05/oracle/dbs/t_cf1.f
database			/ade/plaquerr_emdw2_usunnaa05/oracle/dbs/t_cf1.f
database2			/ade/plaquerr_emdw2_usunnaa05/oracle/dbs/t_cf1.f
database3			/ade/plaquerr_emdw2_usunnaa05/oracle/dbs/t_cf1.f
▶ Dictionary tablespace	Use uniform extent size for DICTIONARY tablespaces or use locally managed tablespaces	0	
▶ Flash recovery area location	The flash recovery area location is not set. Oracle recommends that the flash recovery area location be set to provide a unified storage location for all recovery components. Specify the flash recovery area location from Recovery Settings.	0	

Application Server Management

This chapter describes how you can use Enterprise Manager to manage the crucial components of your middle-tier application servers, which provide you with a platform for deploying your e-business Web applications.

Specifically, this chapter describes how Enterprise Manager can help you manage all aspects of your Application Server installations.

The Oracle Application Server management capabilities of Enterprise Manager can be broken down into the following topics:

- [Out-of-Box Management of Oracle Application Server Instances](#)
- [Centralized Management of Oracle Application Server Instances](#)
- [Complete Oracle Application Server Administration](#)
- [Automated Oracle Application Server Monitoring and Alerts](#)
- [Oracle Application Server Diagnostics and Historical Analysis](#)

Out-of-Box Management of Oracle Application Server Instances

When you install an Oracle Application Server instance, you automatically get the Oracle Application Server Control to manage that instance. Each installed Application Server has its own Application Server Control.

The Application Server Control is the Enterprise Manager Web-based application for managing Oracle Application Server 10g (9.0.4). The Application Server Control provides Web-based management tools designed specifically for Application Server.

From the Application Server Control, you can monitor and administer a single Oracle Application Server instance, a farm of Oracle Application Server instances, or Oracle Application Server Clusters. You can also deploy applications, monitor real-time performance, manage security, and configure the components of your Application Server.

The Application Server Control relies on various underlying technologies to discover, monitor, and administer the Oracle Application Server environment.

The Application Server Control Framework consists of the Application Server Control and its underlying technologies:

- Oracle Dynamic Monitoring Service (DMS)
- Oracle Process Management Notification (OPMN)
- Distributed Configuration Management (DCM)

- A local version of the Oracle Management Agent specifically designed to gather monitoring data for the Application Server Control.

For additional management functionality, for example, Application Performance Management, deployments, historical data collections for performance trending alerts, and so on, you can deploy Grid Control to get additional Application Server management.

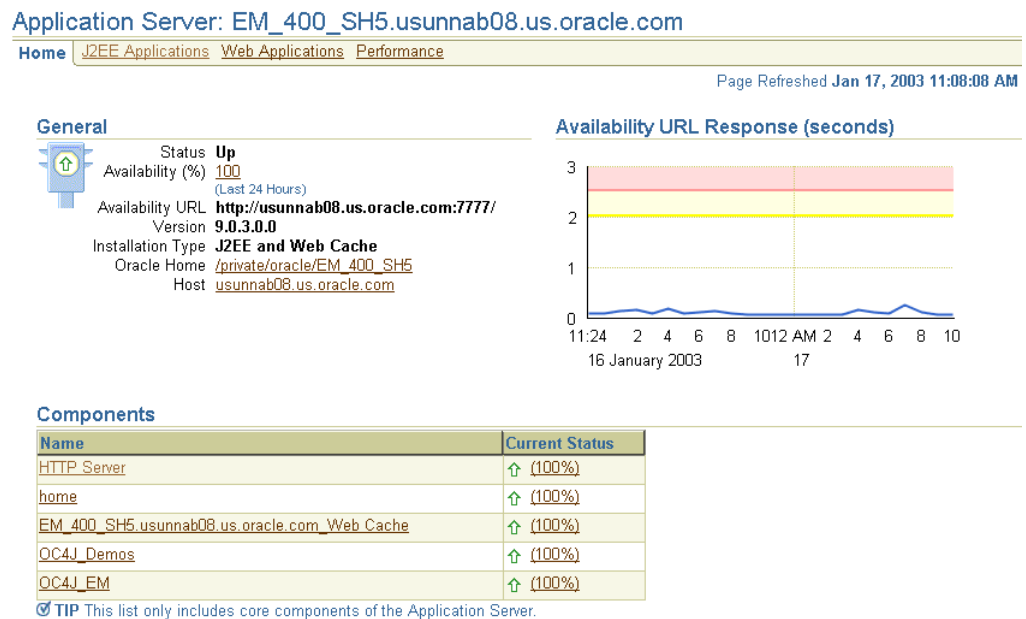
See Also: *Oracle Application Server 10g Administrator's Guide*

Centralized Management of Oracle Application Server Instances

While Application Server Control provides standalone management for an Application Server and its components, you can centrally manage all your Application Servers through one tool rather than through several Application Server Controls by using the Grid Control (Figure 1–2). For example, say you have 10 Application Servers deployed on five hosts. By deploying a Management Agent on each host, Enterprise Manager automatically discovers the Application Server on those hosts and automatically begins monitoring them using default monitoring levels, notification rules, and so on.

Both the Application Server Control and the Grid Control have their own Application Server Home page which provides easy access to key information required by your application server administrators. The Application Server Home page on the Grid Control (Figure 5–1) provides:

- Application server status, responsiveness, and performance data
- Resource usage for the application server and its components
- A single view of all Java 2 Platform Enterprise Edition (J2EE) applications and web services
- Alerts and diagnostic drill-downs so you can identify and resolve problems quickly
- Links to Oracle Application Server component home pages
- Links to the Oracle Application Server Control for administration operations such as starting and stopping components, modifying configurations, and deploying applications

Figure 5–1 Application Server Home Page of Grid Control

Complete Oracle Application Server Administration

The Oracle Application Server Control provides a full set of features for performing Oracle Application Server administration, with Web-based interfaces for performing operations such as:

- Starting and stopping services
- Modifying server configuration parameters
- Creating new OC4J containers and adding JVMs
- Configuring J2EE resources such as Java Database Connectivity (JDBC) data sources and Java Authentication and Authorization Service (JAAS) providers for J2EE application security
- Deploying J2EE and Web Services applications
- Managing additional application server components such as Oracle Application Server Portal and Oracle Application Server Reports Services
- Creating clusters, that are also managed with Oracle Application Server Control, that speed up the configuration and deployment of your Web applications

Many of these management operations can also be performed across Oracle Application Server clusters, which are also managed with Enterprise Manager.

See Also: *Oracle Application Server 10g Administrator's Guide*

Automated Oracle Application Server Monitoring and Alerts

Enterprise Manager automatically gathers and evaluates diagnostic information from Oracle Application Server systems distributed across the enterprise. As with all services managed by Enterprise Manager, an extensive array of Oracle Application Server performance metrics are automatically monitored against predefined thresholds. Alerts are generated when metrics exceed these thresholds.

For example, Enterprise Manager can automatically monitor:

- The CPU or memory consumption of the application server, including detailed monitoring of individual Java Virtual Machines (JVMs) being run by the server's Oracle Application Server Containers for J2EE (OC4J) instances
- J2EE application responsiveness from the application down through individual servlets and Enterprise JavaBeans (EJBs)
- HyperText Transfer Protocol (HTTP) Server session volumes, connection duration, and error rates
- Oracle Application Server Web Cache hit rates and volumes

When you receive an Oracle Application Server alert notification, Enterprise Manager makes it easy to investigate the problem. For example, notification of excessive CPU consumption by OC4J may lead to investigation of the applications running in that container. Using the J2EE Applications tab of the Application Server Home page (Figure 5–2), you can quickly identify the highest volume or least responsive application. You can then drill down and diagnose application's servlets, Java Server Pages (JSPs), or EJBs so you can pinpoint the bottleneck.

See Also: "Comparing the Performance of Deployed Applications" in the Enterprise Manager online help

Figure 5–2 Monitoring the Performance of Your Deployed J2EE Applications

View Top J2EE Applications by Total Processing Time

Name	OC4J Instance	Total Processing Time (seconds)	Average Servlet/JSP Processing Time (seconds)	Servlet/JSP Requests Processed	Total Servlet/JSP Processing Time (seconds)	Average EJB Method Execution Time (seconds)
Petstore	Prod_OC4J	5,548.34	0.21	19,282	4,131.72	0.03
default	Prod_OC4J	703.87	0.04	17,094	703.87	0.00
default	home	190.09	0.01	17,094	190.09	0.00
BC4J	home	74.42	0.35	213	74.42	0.00
BC4JManager	home	0.00	0.00	0	0.00	0.00

Oracle Application Server Diagnostics and Historical Analysis

This section describes important management tasks, such as:


- [Diagnosing Oracle Application Server Performance Issues with "Top" Reports](#)
- [Analyzing Historical Oracle Application Server Performance](#)


Diagnosing Oracle Application Server Performance Issues with "Top" Reports

In addition to automated monitoring, Enterprise Manager provides you with easy access to flexible diagnostic data in the form of "top" reports, such as the top servlets or EJBs. These diagnostic reports can be generated based on a variety of criteria. For example, you can identify the top servlets by response time or session activity (Figure 5–3).

Figure 5–3 Displaying the Top JSPs for a J2EE Application

Top JSPs

Data Retrieved October 22, 2003 4:39:56 PM PDT 

View Top JSPs by Requests Processed 

Name	OC4J Instance	Application	Web Module	Average Processing Time (seconds)	Requests Processed	Total Processing Time (seconds)
footer.jsp	Prod_OC4J	Petstore	petstore	0.0002	428,331	74.38
template.jsp	Prod_OC4J	Petstore	petstore	0.14	428,331	59,408.91
banner.jsp	Prod_OC4J	Petstore	petstore	0.0006	428,331	257.57
topindex.jsp	Prod_OC4J	Petstore	petstore	0.0002	357,052	82.50
productcategory.jsp	Prod_OC4J	Petstore	petstore	0.17	111,947	19,553.65
product.jsp	Prod_OC4J	Petstore	petstore	0.24	91,620	22,093.29
petfooter.jsp	Prod_OC4J	Petstore	petstore	0.005	81,595	404.86
index.jsp	Prod_OC4J	Petstore	petstore	0.0003	71,279	17.91
productdetails.jsp	Prod_OC4J	Petstore	petstore	0.28	40,653	11,409.50
signin.jsp	Prod_OC4J	Petstore	petstore	0.0002	30,630	5.74
signinsuccess.jsp	Prod_OC4J	Petstore	petstore	0.0001	20,316	2.70
cart.jsp	Prod_OC4J	Petstore	petstore	0.06	10,316	621.29
confirmshippingdata.jsp	Prod_OC4J	Petstore	petstore	0.0003	10,314	3.22
shiporder.jsp	Prod_OC4J	Petstore	petstore	0.19	10,314	2,007.24
signoff.jsp	Prod_OC4J	Petstore	petstore	0.0001	10,314	1.39
enteruserdata.jsp	Prod_OC4J	Petstore	petstore	0.0005	10,314	5.42
checkout.jsp	Prod_OC4J	Petstore	petstore	0.06	10,314	618.12
populate.jsp	Prod_OC4J	Petstore	petstore	0.004	1	0.004

Analyzing Historical Oracle Application Server Performance

As with all Enterprise Manager diagnostics, the Oracle Application Server diagnostic reports can be based on current or historical data. Oracle Application Server metrics are collected and stored in the Management Repository, so you analyze the data well after the situation has changed. For example, you can use historical data and diagnostic reports to research an application performance problem that occurred days or even weeks ago.

The historical data maintained by Enterprise Manager allows you to track performance trends and compare data across other Oracle Application Server systems. For example, you can investigate the following sequence:

1. What's the average request processing time for OC4J server #1 at this moment?
2. How did OC4J server #1 do over the past twenty-four hours?
3. How does that performance trend compare to OC4J server #2?

Logical diagnostic processes such as this are easily performed using Enterprise Manager.

See Also: "Introduction to Managing Oracle Application Server Containers for J2EE" in the Enterprise Manager online help

Managing Deployments

In a large enterprise, it can be difficult to:

- Determine the current configuration of the enterprise (the hardware and installed software that comprises the enterprise)
- Determine changes that need to be made to the enterprise
- Make those changes in a controlled and streamlined manner

This chapter explains how Enterprise Manager simplifies the monitoring and management of the deployments in your enterprise in the following sections:

- [Collecting Hardware and Software Configuration Information](#)
- [Monitoring and Managing Your Deployments](#)

Collecting Hardware and Software Configuration Information

When the Oracle Management Agent is running on a host, you can use Enterprise Manager to monitor and manage the host and other targets (such as Oracle databases and application servers) that are running on the host. At periodic intervals, the Management Agent communicates information about the managed targets over HTTPS¹ to the host, which uploads that information to the Oracle Management Repository.

Understanding Host Configuration Information

Part of the information that is collected for a host and uploaded to the Management Repository is host configuration information. The host configuration information collected includes information about the hardware and software configurations for the host. Specifically, host configuration information is comprised of the following categories:

- Hardware (including memory, CPU, I/O device, and network interface information) for the host
- Operating system (including installed patches) for the host
- Other installed software registered with the operating system on the host. For example, this could include information about Veritas data storage management software installed on the host.

¹ HTTP requires advanced configuration.

- Installed Oracle software on the host, including (but not limited to) installed products and their components, patch sets, and interim patches applied using OPatch.

By default, the Management Agent on a host automatically collects and uploads configuration information for the host every 24 hours.

Understanding Database Configuration Information

The Management Agent on a host also automatically collects database configuration information for the Oracle databases installed on the host. By default, database configuration information is collected every 12 hours. Database configuration information is comprised of the following categories:

- Database and instance properties
- Initialization parameters
- System Global Area parameters
- Tablespace information
- Datafiles information
- Control files information
- Redo logs information
- Rollback segments information
- High availability information
- License information

Understanding Enterprise Configuration Information

In this chapter, the term "enterprise" is used to refer to the complete set of hosts and targets for which configuration information is stored in the Management Repository. The term "enterprise configuration" is used to refer to the configuration information stored in the Management Repository for the set of hosts and targets that comprise your enterprise.

Because the Management Agent collects the latest configuration information for hosts and managed targets daily, the enterprise configuration stored in the Management Repository provides you with a very current view of your enterprise.

Monitoring and Managing Your Deployments

You can use Enterprise Manager to:

- View the hardware and software configurations of individual hosts and databases.
- Track changes to host configurations.
- See a summary view of your enterprise configuration.
- Compare the configurations for two hosts or two databases.
- Search the enterprise configuration to find configurations that meet a set of search criteria that you specify.
- Clone Oracle homes and database instances.
- View host and database policy violations.

- Simplify the process of patching Oracle products.
- Manage Oracle critical patch advisories

Viewing the Hardware and Software Configurations of a Host or Database

Enterprise Manager enables you to view the configuration information stored in the Management Repository for an individual host or Oracle database.

Viewing the Configuration Information for a Host

To view the configuration information for a host, go to the Host Configuration page for that host.

See Also: "Viewing a Host Configuration" in the Enterprise Manager online help

You can also save a host configuration to a file for viewing at a later time or including in a comparison. (See "[Comparing Host Configurations](#)" on page 6-4 for more information about comparisons.) The file that stores the host configuration information is known as a configuration file.

See Also: "Saving a Host Configuration to a File" in the Enterprise Manager online help

Viewing the Configuration Information for a Database

To view the configuration information for a database, go to the Last Collected Configuration page for that database.

See Also: "Viewing a Database Configuration" in the Enterprise Manager online help

Tracking Changes to Host Configurations

Enterprise Manager records changes made to host configuration information over time. This history information records:

- Details of the operation that was performed. For example, if a file system mount is deleted, this is recorded in the history for the host configuration.
- The time of the Management Repository refresh operation that detected the change to the configuration.

When you are viewing a host configuration, you can display the history for all the categories of the host configuration, or you can drill down to the history for a specific host configuration category.

Viewing a Summary View of Your Enterprise Configuration

Enterprise Manager enables you to view a summary view of your enterprise configuration. The following enterprise configuration summary views are available:

- Hardware

This summary view shows the different types of host hardware in your enterprise configuration and the number of hosts using each hardware type.

From the summary view, you can drill down to a list of hosts using each hardware type and the operating system running on each of those hosts.

- Operating systems

This summary view shows the different types of operating systems in your enterprise configuration, the number of hosts running each type of operating system, and whether any operating system patches were applied to that operating system.

From the summary view, you can drill down to a list of the hosts running each type of operating system. You can also drill down to a list of the operating system patches applied or not applied to the hosts running each operating system type.

- Oracle databases

This summary view shows the different versions of Oracle databases and application servers in your enterprise configuration, the number of targets and installations for each version, and whether or not any interim patches were applied using OPatch to any of the installations for each version.

From the summary view, you can drill down to a list of the instances for each Oracle database. You can also drill down to a list of the installations (and Oracle home directories) for each Oracle database. Finally, you can drill down to more information about the unique interim patches applied using OPatch for each Oracle database.

- Oracle application servers

This summary view shows the different versions of Oracle application servers in your enterprise configuration, the number of targets and installations for each version, and whether or not any interim patches were applied using OPatch to any of the installations for each version.

From the summary view, you can drill down to a list of the instances for each Oracle application server version. You can also drill down to a list of the installations (and Oracle home directories) for each Oracle application server version. Finally, you can drill down to more information about the unique interim patches applied using OPatch for each Oracle application server version.

See Also: "Viewing the Enterprise Configuration" in the Enterprise Manager online help

Comparing Configurations

You can use Enterprise Manager to perform comparisons of host configurations or database configurations:

- Two host configurations, two configuration files, or a host configuration and a configuration file
- Multiple host configurations (compare one host to multiple hosts)
- Two database configurations

These configuration comparisons are useful for quickly finding similarities and differences between two host configurations or two database configurations.

Comparing Host Configurations

Enterprise Manager supports these types of host configuration comparisons:

- Two host configurations, two configuration files, or a host configuration and a configuration file
- Multiple host configurations (compare one host to multiple hosts)

When host configurations are compared, all the categories of host configuration information for each host (the categories mentioned in "[Understanding Host Configuration Information](#)" on page 6-1) are included in the comparison. The summary results of the comparison are presented in a tabular format. From the summary results, you can drill down to more details about the items compared.

Comparisons of two configurations, two configuration files, or a host configuration and a configuration file are performed interactively.

Comparisons of multiple host configurations (comparisons that include one to two or more host configurations) must be performed using the Enterprise Manager job system.

See Also: "About Comparisons" in the Enterprise Manager online help

Comparing Database Configurations

When two database configurations are compared, all the categories of database configuration information for each database (the categories mentioned in "[Understanding Database Configuration Information](#)" on page 6-2) are included in the comparison. As with host configuration comparisons, the summary results of the comparison are presented in a tabular format and you can drill down from those summary results to more details about the items compared.

From the summary results for a database comparison, you can start a comparison of the host configurations for the hosts on which the databases are running.

Comparisons of two database configurations are performed interactively.

See Also: "Comparing Database Configurations" in the Enterprise Manager online help

Searching the Enterprise Configuration

In some cases, you may want to search your enterprise configuration to get answers to specific questions about your enterprise. For example, you might want to get answers to enterprise configuration questions such as these:

- Which hosts have not had operating system patch 105181-05 installed?
- Which hosts have an Oracle version 9.0.1.0.0 database installed and in what Oracle home directories are those databases installed?

Enterprise configuration searches query the enterprise configuration views in the Management Repository to find configuration information that satisfies the specified search criteria.

Enterprise Manager provides two types of enterprise configuration searches:

- Predefined searches

Although these searches are predefined, you can modify the search criteria for each search. Because you can modify the search criteria, the predefined searches offer you the flexibility to create very specific search queries.

After you enter the search criteria for a predefined search, Enterprise Manager creates the SQL query that searches the enterprise configuration views in the Management Repository.

Enterprise Manager provides the following predefined enterprise configuration searches:

- Search Oracle products installed in Oracle homes
- Search operating system-registered software installed on hosts
- Search patch sets installed in Oracle homes
- Search interim patches installed using OPatch in Oracle homes
- Search initialization parameter settings
- Search initialization parameter setting changes
- Search tablespaces
- Search datafiles
- Search recommended settings for databases
- Search database feature usage
- Search operating system components installed on hosts
- Search operating system patches installed on hosts
- Search operating system property settings on hosts
- Search operating system property changes on hosts
- Search host operating system and hardware summaries
- Search network interface card configurations on hosts
- Search file systems on hosts
- Search policy library
- User-defined searches

With a user-defined search, you specify the SQL query that will search the enterprise configuration views in the Management Repository. If you do not want to create the entire SQL query yourself, you can choose one of the predefined searches, make changes to the search criteria, then click **Search Using SQL** to display the SQL query that will be executed based on the current search criteria. You can execute the query, view the results, then modify it and execute it again until it returns the desired results.

See Also: "Searching the Enterprise Configuration" in the Enterprise Manager online help

Cloning Oracle Homes and Database Instances

You can use the Enterprise Manager job system to clone Oracle home directories. For example, after you have an Oracle home in a known state (you have chosen particular install options for it, applied required patches to it, and tested it), you may want to clone that Oracle home to one or more hosts. Enterprise Manager provides a Clone Oracle Home tool that steps you through the Oracle home clone operation.

There are many advantages to cloning an Oracle home.

- Saves time. You no longer need to install, then apply, all the same patches to get an Oracle home that looks like the source Oracle home. Also, you can clone to multiple hosts and Oracle homes with a single Oracle home cloning job, instead of connecting to each host and running Oracle Universal Installer to install the Oracle home.

- Reduces risk of errors. It is more likely that the cloned home matches the source home, then if you installed then patched a new Oracle home. You would have to remember the settings and patches you used on the original source Oracle home.
- You can do the cloning from a Web browser.

Note: Enterprise Manager can clone any Oracle home that the Oracle Universal Installer recognizes as a clonable home.

You can also use Enterprise Manager to clone Oracle database instances. For example, after you have configured an instance, tuned it, and tested it, you may want to clone that database instance. Enterprise Manager provides a Clone Database tool that steps you through the Oracle database clone operation.

The Clone Database tool clones a database instance to an existing Oracle home. If you want to create a new Oracle home to clone the instance to, use the Clone Oracle Home tool to create a new Oracle home, then use the Clone Database tool to clone the instance to that home.

There are many advantages to cloning an Oracle database instance.

- Provides infrastructure for Data Guard management. Data Guard embeds Database Cloning to create a standby database (a clone of the primary database) as part of the Data Guard management process.
- Provides a testing environment for database application developers. The cloned database can be used for testing and debugging purposes while the original database is kept available.
- Provides high availability for the source database while it is cloned. The source database instance is kept up and running during the cloning operations.
- Saves time. You do not need to install a new database instance then import the data to create an identical database. Also, you can clone the same instance to multiple Oracle homes using the saved working directory without connecting to the source database instance again.
- Backs up the whole database and restores it at any time. The saved working directory contains everything needed to restore the target database. You can save the backup on disk and create a new database from it at any time. No existing target database instance is required.

See Also: "About Cloning" in the Enterprise Manager online help for an overview of cloning and a pointer to more information about the types of Oracle homes and databases that can be cloned

Viewing Host and Database Policy Violations

You can use Enterprise Manager to determine the hosts and Oracle databases in your enterprise configuration that are not following host and database policy rules. There are different categories of policy rules, such as the configuration, security, and storage categories. The policy rules are given different priorities, including High, Medium, and Informational. Enterprise Manager compares each host and database in your enterprise with the policy rules and identifies the policy violations for each host and database.

You can view the policy violations for one or more hosts and databases. Then, for each violation, you can choose to fix the problem that caused the violation or set the

violation to Ignore (specify that Enterprise Manager not report the violation in the future).

You can also remove some policy rules from the evaluation process so that your hosts or databases are not checked for compliance with that rule.

By default, policy rule evaluation takes place every 24 hours.

See Also: "About Policies" in the Enterprise Manager online help for an overview of policies and pointers to more information about viewing and managing policies

Simplifying the Patching of Oracle Products

Enterprise Manager simplifies the patching of Oracle software products.

You can use Enterprise Manager to:

- Search the *OracleMetaLink* Web site for Oracle patches and patch sets.
After providing your *OracleMetaLink* Web site user name and password credentials to Enterprise Manager, you can use Enterprise Manager to search the *OracleMetaLink* Web site for Oracle patches and patch sets of interest.
- Stage a patch to the host or hosts on which it will be installed.
When Enterprise Manager stages a patch, it automatically downloads it from *OracleMetaLink* to the patch cache in the Management Repository. Once a patch is in the patch cache, you can use Enterprise Manager to stage or apply it to any accessible host in your enterprise (any host on which the Management Agent is running). The Enterprise Manager job system is used to stage the patch to the host.
- Install a patch on the host or hosts using the Enterprise Manager job system.
The job system provides status of the patch application at each host, through Enterprise Manager job status information. With the Enterprise Manager job system, you can schedule the patch job to begin immediately or at a specified time. The Enterprise Manager job system with its scheduling features helps you apply Oracle patches in a controlled manner.

See Also: "About Patching" in the Enterprise Manager online help

Managing Oracle Critical Patch Advisories

You can use Enterprise Manager to manage Oracle critical patch advisories.

Some Oracle software patches have been identified as critical. To help ensure a secure and reliable configuration, all relevant and current critical patches should be applied to the appropriate Oracle homes in your enterprise.

To promote critical patch application, Enterprise Manager performs an assessment of vulnerabilities by examining your enterprise configuration to determine which Oracle homes have not applied one or more of these critical patches. Enterprise Manager provides a list of critical patch advisories and the Oracle homes to which the critical patches should be applied.

From the summary of patch advisories, you can navigate to more information about a particular patch and get a list of the Oracle homes to which the patch has not been applied. Then you can launch the Enterprise Manager Patch tool to simplify the application of the critical patch to those homes.

See Also: "Managing Critical Patch Advisories" in the Enterprise Manager online help for more information on setting up and managing critical patch advisories

Setting Up Enterprise Manager for Your Environment

The bigger your enterprise, the bigger the task to manage all the targets in that environment. You can set up Enterprise Manager to work within that environment so that multiple administrators can share the responsibilities of managing multiple targets. This set up includes defining the appropriate levels of access and privileges so administrators can perform their jobs in the most optimum way.

This chapter explains these concepts:

- [Creating Administrators](#)
- [Using Privileges](#)
- [Defining Roles](#)
- [Organizing Targets as Groups](#)

Creating Administrators

The breadth of management tasks available in Enterprise Manager depends on the privileges and roles assigned to the administrators. Administrator accounts are user accounts that allow administrators to log in to Enterprise Manager and perform management tasks. The privileges and roles assigned to the administrator account determine what the administrator can do within Enterprise Manager.

Superadministrator Account

Enterprise Manager is installed with a default superadministrator account called SYSMAN. During the installation, you provide a password for SYSMAN. You use the SYSMAN account for the initial log in to Enterprise Manager. The superadministrator account cannot be deleted nor renamed.

The superadministrator account can create, as well as delete other administrator accounts and set up all administrator credentials. Among other tasks, the superadministrator can:

- Create Enterprise Manager privileges and roles
- Perform the initial set up of Enterprise Manager, for example, defining e-mail configurations and defining global notifications rules
- Add additional targets to Enterprise Manager
- Perform any action on any target in the system

Oracle recommends that after installation, the first time you log in to Enterprise Manager as SYMAN, you create a new administrator account for yourself. Oracle does not recommend logging in as superadministrator to conduct daily administration tasks.

Each administrator should have his or her own account that is not a superadministrator account. For example, you could create a new administrator account that would have access to a subset of targets (databases, application servers, hosts) in the environment for which the administrator is primarily responsible.

Administrator Account

An Enterprise Manager administrator account (also known as an administrator) is an account that provides users permission to perform administrative tasks and access administrative information. You can set up each administrator account to have its own:

- E-mail address
- Notification rules
- Set of privileges that determine what it can do in Enterprise Manager, for example, which targets it can access

Oracle recommends that you create an administrator account using the superadministrator account for each administrator on your administrative team. The superadministrator account has a lot of capabilities and it is not a good idea for everyone on the administration team to be logging in and doing work as SYSMAN.

See Also: "About Administrators and Roles" in the Enterprise Manager online help

Using Privileges

System security is a major concern of any corporation. Security conscious IT departments plan privileges such that each person only has the minimum privileges needed to do his or her job. Also you do not want to perform the tedious task of individually granting access to tens, hundreds, or even thousands of targets to every new member of your organization.

With the Enterprise Manager administrator privileges and roles feature, you can perform this task within seconds, instead of hours.

A privilege is a right to perform management actions within Enterprise Manager such as:

- View any target and add any target in the enterprise
- Perform operations on a target such as configure credentials for maintenance operations of a target

The following types of privileges are defined by Oracle.

- System Privileges allow a user to perform systemwide operations. The systemwide operations include:
 - Viewing any target, including all the Management Agents and the Management System pages.
 - Adding any target to Enterprise Manager for management.

- Using any Beacon on any monitored host to monitor transactions, URLs, and network components. (See [Chapter 3, "Application Performance Management"](#) for additional information about Beacons.)
- Monitoring Enterprise Manager performance.
- Target Privileges allow a user to perform operations on a target. The target privileges include:
 - Viewing properties and monitoring information about a target.
 - Starting up and shutting down a target through the Operator privilege.
 - Maintaining the target by patching the software and data.
 - Granting all target privileges including deleting a target and configuring credentials for maintenance operations of a target.
 - Managing a target group by creating a target in a target group, deleting a target from a target group, and granting privileges to a group. See ["Organizing Targets as Groups"](#) on page 7-4 for information about target groups.

Note: Certain privileges automatically include other privileges. For additional information, see the Enterprise Manager online help.

Defining Roles

Roles are named groups of related privileges that you grant to users and other roles. Creating roles is an easy way to grant a set of privileges to a group of administrators rather than granting the privileges to each administrator, a privilege at a time. So in time if administrator responsibilities change, you need only change the Role definition once and the changes are automatically propagated to the administrators who have these roles.

Enterprise Manager has one predefined role, the PUBLIC role. By default, the PUBLIC role contains no privileges and is granted to every new Enterprise Manager administrator account created. The PUBLIC role is an easy way to grant privileges to all administrators. By granting a privilege to the PUBLIC role, all administrators get that privilege.

Roles can be based on:

- Geographic location

For example, you can define a role for UK administrators to manage UK systems or define a role for Canadian administrators to manage Canadian systems.
- Line of business

For example, you can define a role for administrators of the human resource systems or define a role for the sales systems.
- Any other IT model

Granting of such roles and privileges guarantees security across all functional areas of Enterprise Manager. That is, if an administrator is restricted to only accessing development databases, then throughout the product, only those development databases on which he or she has been granted privileges will be available.

See Also: "Creating, Editing, and Viewing Roles" in the Enterprise Manager online help

Organizing Targets as Groups

Because of the ever-growing number of systems and services that administrators are responsible for, Enterprise Manager provides a view that includes only those targets you need to monitor. This view is called a group.

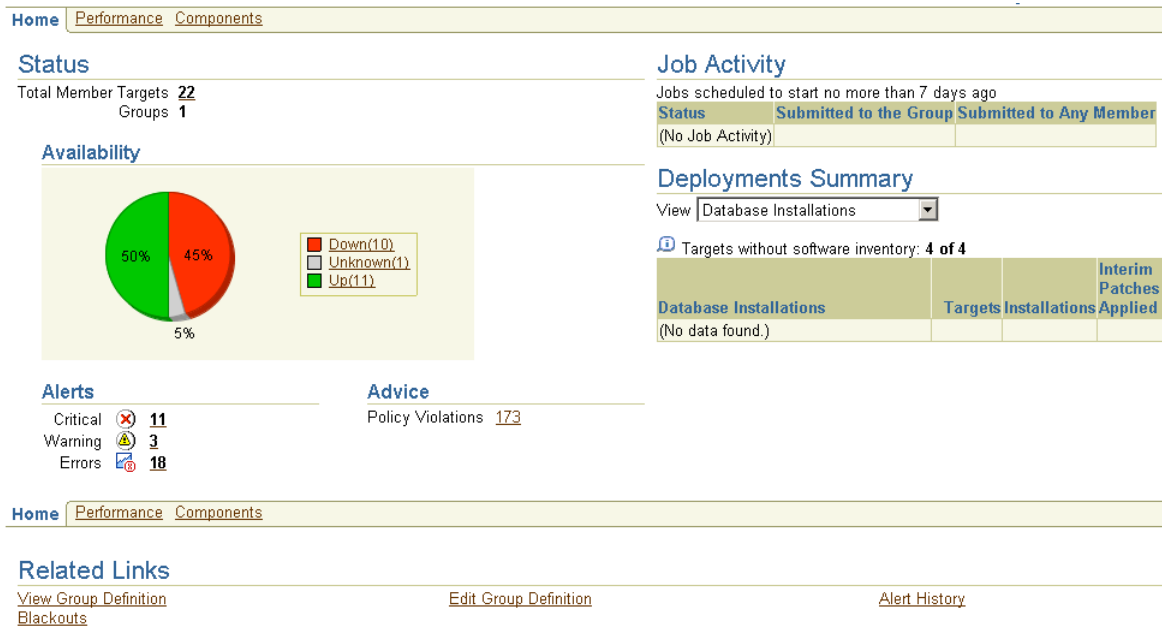
Groups are user-defined sets of targets logically combined to be managed as one. You can use groups in Enterprise Manager to monitor and manage different targets collectively, easily perform administrative operations against the targets, and consolidate and monitor your distributed targets as one logical entity.

For example, you can define a group called TEST that contains all hosts and database targets within your test environment. From the group's home page, you can easily see the overall status and availability of all the targets in your test group, instead of having to check the status of each individual member. You can easily perform maintenance operations against the group, for example, run a weekly job that backs up all test scripts. Even if group membership changes, any jobs submitted to the group automatically keep up with group membership.

From a Group's Home page (see [Figure 7-1](#)), whether the group is based on a homogenous set of targets or a heterogeneous set of targets (for example, a business's application), you can:

- Easily determine the overall availability of all the members in the group and outstanding alerts.
- Drill down and analyze the specifics of a particular target.
- Select quick links to targets that are down, links to blackout schedules, and so.
- Easily determine the status of members of the groups through the rollup of alerts, with quick drill-down into alert details.

Figure 7-1 Home Page for a Group



There are three types of groups:

- Group

A Group can include targets of the same type (for example, all your production databases) or include targets of different types (for example, all targets comprising your business's application).

A benefit of the Group target type is the Summary Metric, which is only available for this type of group. You define a Summary Metric to obtain overall performance information for one target type within the Group including: minimum, maximum, and averages of key performance metrics of all group members. These group averages reflect the overall performance of the group. Using these group averages, you can then compare the relative performance of any target within the group against the group average. This helps you to decide where you should apply your tuning efforts.

For example, if you define a group to monitor your database and OC4J targets, you can choose the:

- Database:Session Activity:Active Sessions metric to be monitored for all the databases in the group
- OC4J:Resource Usage:CPU Usage (%) metric to be monitored for all the OC4J targets in the group

- Database group

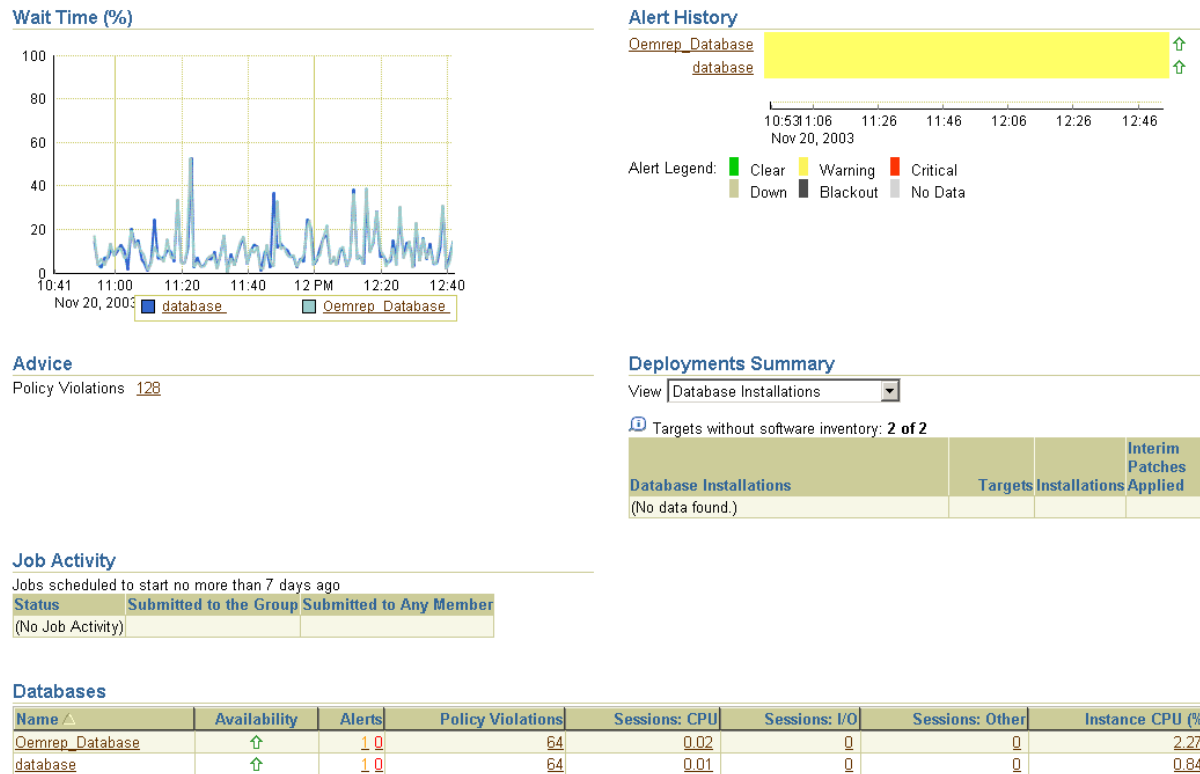
If your group consists only of database targets, then you can choose to create a Database group. The Database Group Home page focuses on information pertinent to databases.

With creating a Database group, multiple instances – for example, all production databases – can be collected into a group and efficiently monitored on a single screen. You can quickly identify those databases that are down, have the most bottle necks, or have the most severe alert status.

Notice the Wait Time graph. This graph is prominent because it indicates the databases in the group that are having the most performance issues as measured by their wait time.

In addition, you get key availability and performance data on all members of the group with hyperlinks for further drill down. Database groups alleviate the need for cumbersome navigation between multiple instances and prevents performance degradation trends from going unnoticed. See [Figure 7–2](#).

Figure 7-2 Home Page for a Database Group



- Host group (Figure 7-3)

If your group consists only of host targets, then you can choose to create a Host group. The Host Group Home page focuses on information pertinent to hosts.

By creating a Host group, overview information of the state of the hosts that make up the group is available. The overview information includes status and number of hosts, and information about the memory of the hosts in the group. You can also get the configuration information regarding the hardware and operating system. Charts are available, for example, Most Active Hosts by CPU Usage.

See Also: "Creating Groups" in the Enterprise Manager online help

Figure 7-3 Home Page for a Host Group



Extending Enterprise Manager

Enterprise Manager is the Oracle central management solution for managing, monitoring, and tuning the complete Oracle environment. Most enterprise environments include, in addition to the Oracle environment, custom software and hardware modules that require the same level of management provided by Enterprise Manager.

By extending Enterprise Manager, you can leverage the same valuable management infrastructure such as alert monitoring, real-time diagnostics, and service level reporting provided by Enterprise Manager. You can increase the flexibility of the framework to better monitor and manage your enterprise applications. From software applications to specific infrastructure elements that support enterprise systems, you can consolidate the monitoring and management of your complete application environment using a single consistent interface.

The following sections explain extension areas for typical framework integration activities:

- [Enhancing Enterprise Manager](#)
- [Accessing Management Information Using Management Repository Views](#)
- [Using Fetchlets](#)
- [Using User-Defined SQL Metrics](#)

Enhancing Enterprise Manager

The Enterprise Manager framework is extensible (that is, can be extended) at many levels. This extensibility provides you with complete flexibility in tailoring Enterprise Manager to meet your management needs. Enterprise Manager provides the following extension capabilities and attributes:

- Easy to add new managed target types

When you add a custom target, all the rich features of Enterprise Manager are automatically extended to that target type. You do not need to make any code changes at the repository or Grid Control level. The target becomes an important element of Enterprise Manager and you can take advantage of:

- Historical collections
- Real-time notifications
- Metric baselines
- Blackouts
- Notification rules

- Accessible system data
Management information collected in the Oracle Management Repository is easily accessible through predefined Management Repository views.
- Easy third-party integration
The Enterprise Manager framework is extensible and flexible enough to allow integration with cooperative management vendors, trouble ticket generation systems, or other proprietary systems that are part of your management process.

Accessing Management Information Using Management Repository Views

The Management Repository views provide access to target, metric, and monitoring information stored in the Management Repository. Accessing the Management Repository allows you to:

- Obtain pertinent application-specific information at the correct level of granularity and density for a wider variety of users, for example, IT staff, executives, and developers.
- Perform historical analysis or additional computation on stored data.
- Streamline your operations by sending Enterprise Manager Notifications to trouble-ticketing systems such as Oracle iSupport and Remedy.

Management Repository as Comprehensive Source

The Management Repository is the comprehensive source for all the management information in the managed environment. The key to extensibility is the Management Repository's open schema. This open architecture allows you to customize how the information in the Management Repository is used if the Enterprise Manager standard configuration does not meet your requirements.

To facilitate easy access to information stored in the Management Repository, Enterprise Manager supplies a comprehensive set of views. Views protect custom applications from any underlying changes to the Management Repository schema and ensures upstream applications will not break when the Management Repository schema changes as a result of patching or upgrades to the underlying Management Repository tables.

Base Views

The views have been designed to present the management information that is stored in the physical database tables in a form that is both intuitive and directly usable for client interfaces, reports, and other consumers of management information. The three primary view categories provide access to the majority of the management information in the Management Repository:

- Central Policy Views
These views provide information on central policies, such as blackout schedules and histories, or metric collection, that have been set for managed targets.
- Monitoring Views
The monitoring views provide information about the metric data in the Management Repository that has been collected for each of the managed targets.
- Inventory Views

The inventory views provide information about entities within the management environment and their attributes.

In addition to base views, Enterprise Manager provides views for:

- Application Performance Management
- Enterprise Configuration Management
- Database Configuration

See Also: For detailed information about views, see *Extending Oracle Enterprise Manager*

Imbedded Queries In Code

Because the views are simple queries to a database, you can imbed these queries within any application code used to return information for further processing and display in the Oracle Enterprise Manager Grid Control or third-party user interfaces.

Using Fetchlets

Data retrieval is handled through predefined fetchlets. A fetchlet is a parameterized data access mechanism that takes arguments (such as a script, a SQL statement, a target instance's properties) as input and returns formatted data. Each fetchlet handles a specific type of data access.

The fetchlets supplied with Enterprise Manager provide data retrieval capability for the most common data access methods, such as SQL, Simple Network Management Protocol (SNMP), HTTP, and Dynamic Monitoring Service (DMS). To handle more complex data access requirements, Enterprise Manager also provides an OS command fetchlet, allowing developers to implement custom metric collection methods.

The fetchlets and data access methods are comprehensive, that is, you need not write or extend a fetchlet. You need only decide which fetchlet or method meets your needs.

The following list is an example of the fetchlets supplied with Enterprise Manager:

- OS command fetchlets
- SQL fetchlet
- User-defined metrics fetchlet
- URL timing fetchlet
- Simple Network Management Protocol (SNMP) fetchlet
- Web Based Enterprise Management (WBEM) fetchlet

Allows you to collect management content from a Common Information Model Object Manager (CIMOM).

Using User-Defined SQL Metrics

User-defined SQL metrics are very similar to user-defined metrics (see [Creating User-Defined Metrics](#) on page 2-7). The difference is that user-defined SQL metrics are written specifically for conditions related to databases.

See Also: *Extending Oracle Enterprise Manager* manual

Managing From Anywhere - EM2Go

Businesses today place increasing demands on their IT systems and staff. Part of this demand is on administrators to be available at any time to meet unforeseen crises. Enterprise Manager helps to meet this demand by providing EM2Go, an internet-enabled architecture that allows you to manage from anywhere and at any time.

This chapter contains the following sections:

- [Introduction to EM2Go](#)
- [Highlights of EM2Go](#)

Introduction to EM2Go

EM2Go is the mobile management application designed for the Oracle Environment. Not only can you monitor Enterprise Manager from your desktop, you can monitor while you are on the go. Because EM2Go is installed as part of Enterprise Manager, no additional configuration is necessary. You simply direct your personal digital assistant (PDA) that supports Microsoft Pocket PC IE to the Enterprise Manager UI and you access the EM2Go interface.

Mobile Security

EM2Go offers a highly secure solution as it leverages the Enterprise Manager security features. EM2Go utilizes HTTPS communications and the security model of administrator privileges and roles. When you connect your browser to the EM2Go URL, a login prompt is issued for you to enter your Enterprise Manager preferred credentials ([Figure 9-1](#)). You will then only see the targets to which you have been granted privileges.

A lost or stolen device is no longer a security risk because no enterprise data is stored on the device itself.

Figure 9–1 EM2Go Logon Page

Intuitive Interface

EM2Go provides an intuitive interface, similar to the Grid Control. Because the layout is easy to use, you can quickly assess the availability and health of the Oracle Environment. [Figure 9–2](#) displays a consolidated and personal Grid Control home page.

Figure 9–2 EM2Go Home Page

The EM2Go Home page provides high-level data to isolate, and repair availability and performance problems.

On the EM2Go home page:

- From the **Alert and Availability** section, you can drill down to investigate the problem that generated the alert.
- From the **Targets** section, you can click the type of target in which you are interested. The associated target home page, displays only the most important metrics thus helping you to quickly isolate and diagnose the root cause of the problem.

Highlights of EM2Go

The EM2Go subset of Enterprise Manager functionality is specific to the needs of the mobile administrator. EM2Go enables the following services available in Enterprise Manager.

Notifications

You can schedule notifications to be sent by way of e-mail to your PDA.

If a target becomes unavailable or experiences performance problems, an alert is generated to both the Grid Control and EM2Go.

For example, you receive an e-mail notification that the Tablespace Full metric has triggered. You log into EM2Go to view the alert details. To help solve the problem, you can use the host information to check the file system space available. You can then use EM2Go to increase the size of the tablespace by enabling automatic extension of one of the tablespace data files, manually resizing one of the data files, or adding another data file.

Ad Hoc SQL and OS Queries

EM2Go provides a tool that allows you to enter and execute SQL/OS commands dynamically.

For example, you receive an alert from the CPU Utilization for Top Processes % metric through mobile e-mail. Use the Execute OS Commands tool to check the load on the system using the following UNIX commands: `uptime`, `top`, or `ps -ef`.

Performance Monitoring

Using EM2Go, you can monitor the performance of your environment by:

- Displaying all metric warnings and alerts together with a metric history graph
- Accessing the database home page which provides information about the status of the database and the administration and configuration of the database environment
- Studying key performance metrics to allow you to quickly assess the health of the host
- Viewing storage information about tablespaces and data files
- Observing transaction alerts, beacons, and availability of your Web applications
- Studying availability and performance metrics of your Application Server

Because the IT systems of today are composed of many sets of systems, you need to minimize the time needed to support these systems and eliminate the human error associated with system maintenance. The Enterprise Manager Job System provides the capacity to automate routine administrative tasks and synchronize systems so you can manage them more efficiently.

This chapter describes the Job System in the following sections:

- [What Is A Job?](#)
- [Using and Defining Jobs](#)
- [Analyzing Job Activity](#)
- [Jobs and Groups](#)
- [Sharing Job Responsibilities](#)
- [Job Library](#)

What Is A Job?

The Enterprise Manager Job System serves a dual purpose. It:

- Provides for the automation of many administrative tasks, for example, backup, cloning, and patching
- Allows end users to create their own jobs using their own custom OS and SQL scripts

A job is a unit of work that you define to automate commonly-run tasks. One of the advantages of jobs is that you can schedule a job to start immediately or start at a later date and time. You also have the option to have the job run once or at a specific interval, for example, three times every month.

The Job Activity page ([Figure 10-1](#)) is the hub of the Job System. From this page you can:

- Search for existing job runs and job executions
You can restrict the search by name, owner, status, scheduled start, job type, target type, and target name.
- Create a job
- View, edit, create like, suspend, resume, stop, and delete a run
- View, edit, create like, suspend, resume, retry, stop, and delete an execution

Figure 10–1 Job Activity Page

Job Activity Page Refreshed Oct 30, 2003 11:16:45 AM

Search

Name: Job Type:
 Owner: Target Type:
 Status: Target Name:
 Scheduled Start: Show jobs to which I have not been granted view access
Show jobs scheduled to start at the above time or afterwards. The jobs will be listed, but their results cannot be viewed.

Results

TIP Only the first 500 items are displayed. You may want to use different search criteria to refine the results.

View: Create Job:

Select	Name	Status	Scheduled	Targets	Target Type	Owner	Job Type	Repeating
<input checked="" type="radio"/>	REPEAT GROUP RDA	Failed	Oct 30, 2003 12:10:00 PM GMT-07:00	notify	oracle_database	SYSMAN	SQL Script	Hourly
<input type="radio"/>	REPEAT GROUP RDA	Failed	Oct 30, 2003 12:10:00 PM GMT-07:00	popish	oracle_database	SYSMAN	SQL Script	Hourly
<input type="radio"/>	REPEAT GROUP RDA	Failed	Oct 30, 2003 12:10:00 PM GMT-07:00	otiose	oracle_database	SYSMAN	SQL Script	Hourly
<input type="radio"/>	REPEAT GROUP RDA	Failed	Oct 30, 2003 12:10:00 PM GMT-07:00	ornery	oracle_database	SYSMAN	SQL Script	Hourly

The results of Jobs display on the target’s home page.

Job functionality is not restricted to only the Jobs tab. You can access Job functionality while you are working on deployments and databases. On the Deployments page you can create a job to clone a database and another job to clone an Oracle home. While you are working with your databases, you can clone a database by clicking **Deployments** in the **Related Links** section.

What Are Job Executions and Job Runs?

Job executions are usually associated with one target, for example, a backup job on a particular database. When a job is run against multiple targets, each execution may execute on one target.

Job executions are not always a one-to-one mapping to a target. Some executions have multiple targets, for example, comparing hosts. Other executions have no targets, for example, the RefreshFromMetalink job.

When you submit a job to many targets, it would be tedious to examine the status of each execution of the job against each target. For example, say that you run a backup job against 100 databases. Typical questions would be: Were all the backups successful? If not, which backups failed? If this backup job runs every week, you would want to know each week which backups were successful and those that failed.

With the Job System, you can easily get these answers viewing the Job Run. A Job Run is the sum of all job executions of a job that ran on a particular scheduled date. Using the backup example, if you have a backup job against 100 databases on November 5th, then you will have a November 5 job run. The job table that shows the job run will provide a rollup of the status of those executions.

Differences Between Job Executions and Job Runs

In addition to supporting the standard job operations of create, edit, create like, and delete, the Job System allows you to suspend and resume jobs, as well as retry failed executions. For example, you may need to suspend a job if a needed resource was not available or the job needs to be postponed. Once you suspend a job, any scheduled executions will not occur until you decide to resume the job.

When analyzing a failed execution, it is useful to be able to retry a failed execution once the cause of the problem has been determined. This alleviates the need of creating a new job for that failed execution. When you use the Retry operation in the Job System, Enterprise Manager provides links from the failed execution to the retried execution and vice versa, should it become useful to retroactively examine the causes of the failed executions.

Refining the Job Search

In addition to restricting the job search by name, owner, status, scheduled start, job type, and target name, you can query against a target using the target type and access.

Target Types

You can form a query against a target using the following target types:

- All Targets

For basic targets, for example hosts and databases, you can query to see what jobs ran on those targets.

- All Groups

You can query to see what jobs were submitted to these targets.

- All Member Targets of the Target Named Below

You can query to see what jobs ran on the members of the named composite target (group, Real Application Cluster, or cluster). This differs from the All Groups query because it shows both jobs which were submitted to the Group, as well as those submitted directly to any member of the group.

- System

This is a special job category for jobs that do not run against any target, for example, RefreshFromMetalink.

Access Check Box

Using the **Show jobs to which I have not been granted view access** check box, you can view the jobs to which you do *not* have access. Using this option you can avoid surprises to members of your group. For example, if you are about to bounce a database or place a database into blackout, you may want to check on what jobs may be currently executing or about to execute on that target.

Using and Defining Jobs

Enterprise Manager provides predefined job tasks for database targets and deployments. A job task is used to contain predefined, unchangeable logic, for example, patch an application, backup a database, and so on.

The predefined database jobs include backup, export, and import. The predefined jobs associated with deployments include patching, cloning Oracle homes, and cloning databases.

In addition to predefined job tasks, you can define your own job tasks by writing code to be included in OS and SQL scripts. The advantages of using these scripts include:

- When defining these jobs, you can use target properties.
- You can submit the jobs against many targets or a group. The job automatically keeps up with the group membership.
- For host command jobs, you can submit to a cluster.
- For SQL jobs you can submit to a Real Application Cluster.

Using the Job System, you can create jobs using the following:

- CloneHome
Copies the known state of an Oracle home. For example, after you have an Oracle home in a known state (you have chosen particular install options for it, applied required patches to it, and tested it), you may want to clone that Oracle home to one or more hosts.
- Host Command
Use to execute a user-defined OS script.
- Patch
Use to find a patch and then apply that patch.
- Refresh from MetaLink
Use to be notified of critical patch advisories.
- SQL script
Use to execute a user-defined SQL script.

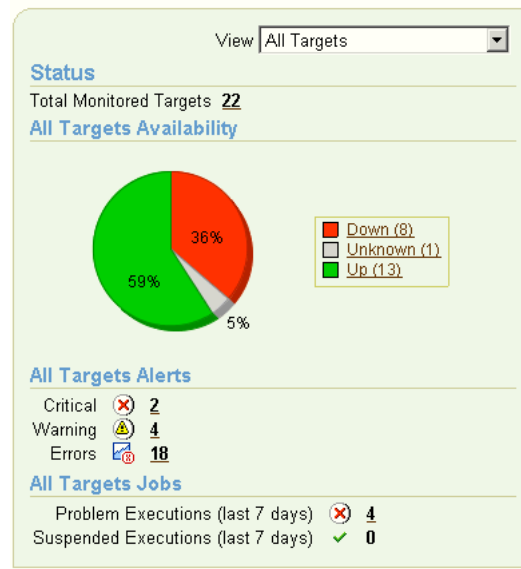
See Also: [Chapter 6, "Managing Deployments"](#) for information about deployment jobs

[Chapter 4, "Database Management"](#) for information about the Database Scheduler

"About Jobs", "About Scheduler", "About Cloning", and "About Patching" in the Enterprise Manager online help

Analyzing Job Activity

After you submit jobs, the status of all job executions across all targets is automatically rolled up and available for review on the Grid Control Home page. [Figure 10–2](#) shows the All Targets Jobs information on the Grid Control Home page.

Figure 10–2 Summary of Target Jobs on the Grid Control Page

This information is particularly important when you are examining jobs that execute against hundreds, if not thousands of systems. You can determine the job executions that have failed. By clicking the number associated with a particular execution, you can drill down to study the details of the failed job.

Jobs and Groups

In addition to submitting jobs to individual targets, you can submit jobs against a group of targets. Any job that you submit to a group is automatically extended to all its member targets and takes into account the membership of the group as it changes.

For example, if a Human Resources job is submitted to the Payroll group, then if a new host is added to this group, the host will automatically be part of the Human Resources job. In addition, if the Payroll group is composed of diverse targets, for example, databases, hosts, and application servers, then the job will only run against applicable targets in the group.

By accessing the Groups home page, you can analyze the job activity for that group.

Sharing Job Responsibilities

To allow you to share job responsibilities, the Job System provides job privileges. These job privileges allow you to share the job with other administrators. Using privileges, you can:

- View access to the administrators who need to see the results of the job
- Give full access to the administrators who may need to edit the job definition

These privileges can be granted on an as-needed basis.

Job Library

Once you have defined jobs, you can save these jobs to the Job Library. Use the Library as a repository for frequently used jobs. Analogous to active jobs, you can grant View or Full access to specific administrators.

In addition, you can use the Job Library to store:

- Basic definitions of jobs then add targets and other custom settings before submitting the job
- Jobs for your own reuse or to share with others. You can share jobs using views or giving full access to the jobs.

Glossary

administrator

An Oracle Enterprise Manager administrator account can be created for daily administration work.

Advanced Security Option (ASO)

Optional software used to secure the communication line between the Oracle Management Service and the Oracle Management Repository. When Enterprise Manager is installed "out-of-box," the communications between the Oracle Management Service and Oracle Management Repository are not secure.

Agent

See [Oracle Management Agent](#).

AIJSERVER

An optional network-object server invoked by the network software. The AIJSERVER receives after-image journal records from the master database and forwards them across the network to the LRS process on the standby database.

alert

Indicator signifying a particular metric condition has been encountered. An alert is triggered when one of the following conditions is true:

- A metric threshold is reached.
- The availability of a monitored service changes. For example, the availability of the host changes from up to down.
- A metric-specific condition occurs. For example, an alert is triggered whenever an error message is written to a database alert log file.

availability

The percentage or amount of scheduled time that a computing system provides application service.

Beacon

Software installed when you install an Oracle Management Agent. The Beacon software can be enabled to monitor the availability and performance of network components (a host computer or an IP traffic controller) from more than one location, or Web pages and Web applications from multiple network locations.

blackouts

Allow Enterprise Manager administrators to suspend any data collection activity on one or more monitored targets. This allows administrators to perform scheduled maintenance on targets and excluding these special-case situations from the data analysis in order to get a more accurate, long-term picture of a target's performance.

control

See [Oracle Enterprise Manager 10g Grid Control](#), [Oracle Enterprise Manager 10g Application Server Control](#), and [Oracle Enterprise Manager 10g Database Control](#).

database configuration

Includes these categories of configuration information:

- Database and instance properties
- Initialization parameters
- System Global Area parameters
- Tablespace information
- Datafiles information
- Control files information
- Redo logs information
- Rollback segments information
- License information
- Database options information

database group

A group consisting only of database targets where multiple instances – for example, all production databases – can be collected into a group and efficiently monitored on a single screen. Database groups enable you to quickly identify databases that are down, most bottle necked or have the most severe alert status.

enterprise configuration

Configuration information stored in the Management Repository for the set of hosts and targets that comprise your enterprise.

failover

Ability to reconfigure a computing system to utilize an alternate active component when a similar component fails.

fault tolerance

Ability of a computing system to withstand faults and errors while continuing to provide the required services.

Grid Control

See [Oracle Enterprise Manager 10g Grid Control](#).

group

Can include targets of the same type (for example, all your production databases) or include targets of different types (for example, all targets comprising your business's application). A benefit of the Group target type is the Summary Metric, which is only available for this type of group.

home page

See [target home page](#).

host configuration

Includes these categories of configuration information:

- Hardware (including memory, CPU, I/O device, and network interface information) for the host.
- Operating system (including installed patches) for the host.
- Other installed software registered with the operating system on the host. For example, this could include information about Veritas data storage management software installed on the host.
- Installed Oracle software on the host, including (but not limited to) installed products and their components, patch sets, and interim patches applied using OPatch.

host group

A group consisting only of host targets where you can view the general overview of the state of the hosts that make up the group.

hot standby

A second running computing system that is ready to pick up application processing in the event that the primary computing system fails. That is, the secondary system takes over the processing at the point where the original computing system stopped and the secondary system continues the processing.

J2EE

An abbreviation for Java 2 Platform Enterprise Edition. J2EE is an environment for developing and deploying enterprise applications.

log catch-up server (LCS)

The LCS process is a database server that synchronizes the master and standby databases. The LCS process synchronizes the database by automatically sending any after-image journal records (received since the last checkpoint interval) to the LRS process on the standby database. As soon as the databases are in sync, the ALS process on the master database is converted to a log ship server (LSS) process, and the LCS process terminates.

Management Agent

See [Oracle Management Agent](#).

Management Repository

See [Oracle Management Repository](#).

Management Services

See [Oracle Management Service](#).

metric

Unit of measurement used to report the health of the system.

mission critical

See [fault tolerance](#).

Oracle Enterprise Manager 10g

Oracle Enterprise Manager is the Oracle integrated management solution for managing your computing environment.

Oracle Enterprise Manager 10g Application Server Control

The Enterprise Manager Web-based application for managing Oracle Application Server 10g (9.0.4). The Application Server Control is installed and available with every Application Server 10g installation.

From the Application Server Control, you can monitor and administer a single Oracle Application Server instance, a farm of Oracle Application Server instances, or Oracle Application Server Clusters.

Oracle Enterprise Manager 10g Application Server Control Framework

The Application Server Control relies on various underlying technologies to discover, monitor, and administer the Oracle Application Server environment.

The Application Server Control Framework consists of the Application Server Control and its underlying technologies:

- Oracle Dynamic Monitoring Service (DMS)
- Oracle Process Management Notification (OPMN)
- Distributed Configuration Management (DCM)
- A local version of the Oracle Management Agent specifically designed to gather monitoring data for the Application Server Control.

Oracle Enterprise Manager 10g Database Control

The Enterprise Manager Web-based application for managing Oracle Database 10g Release 1 (10.1). The Database Control is installed and available with every Oracle Database 10g installation.

From the Database Control, you can monitor and administer a single Oracle Database instance or a clustered database.

Oracle Enterprise Manager 10g Database Control Framework

The Database Control relies on various underlying technologies to discover, monitor, and administer the Oracle Database environment.

The Database Control Framework consists of the Database Control and its underlying technologies:

- A local version of the Oracle Management Service designed to work with the local database or clustered database
- A local Oracle Management Repository installed in the local database and designed to store management data for the Database Control
- A local version of the Oracle Management Agent designed to provide monitoring data to the local Management Service

Oracle Enterprise Manager 10g Grid Control

Enterprise Manager Web-based user interface for centrally managing your entire computing environment. The Grid Control is installed from a separate CD-ROM that is part of the Oracle Database 10g Release 1 (10.1) CD-ROM Pack.

From the Grid Control, you can monitor and administer your entire computing environment from one location on the network. All the services within your enterprise,

including hosts, databases, listeners, application servers, HTTP Servers, and Web applications, are easily managed as one cohesive unit.

Oracle Enterprise Manager 10g Grid Control Framework

The Grid Control relies on various underlying technologies to discover, monitor, and administer your computing environment.

The Grid Control Framework consists of the Grid Control and these underlying technologies:

- One or more Oracle Management Services
- The Oracle Management Repository
- Remove Oracle Management Agents, installed on each monitored host.

Oracle Management Agent

The Oracle Management Agent is responsible for monitoring all targets on the host, for communicating that information to the middle-tier Management Service, and for managing and maintaining the host and the products installed on the host.

Oracle Management Repository

Two tablespaces in an Oracle database that contain information about administrators, targets, and applications that are managed within Enterprise Manager.

The Management Service uploads to the Management Repository the monitoring data it received from the Management Agent. The Management Repository then organizes the data so that the data can be retrieved by the Management Service and displayed on the Grid Control.

Oracle Management Service

A J2EE Web application that renders the user interface for the Grid Control, works with all Management Agents in processing monitoring and job information, and uses the Management Repository as its data store.

out-of-box installation

An installation of Oracle Enterprise Manager which provides immediate value. The required components are embedded with the installation, a default SYSMAN account is created and configured to receive e-mail notifications, targets are automatically discovered, default monitoring levels and data collections automatically enabled, and for all supported targets, e-mail notifications are set up with default rules defining the targets and conditions for which SYSMAN will receive notifications.

privileges

A right to perform management actions within Enterprise Manager such as view any target and add any target in the enterprise or a right to perform operations on a target such as maintaining and cloning the target. Types of privileges are defined by Oracle.

redundant

Duplicate or extra computing components that protect a computing system.

reliability

Ability of a computing system to operate without failing. Reliability is measured by mean-time-between-failures (MTBF).

replicated database

See [standby database](#).

Repository

See [Oracle Management Repository](#).

roles

Collection of predefined Enterprise Manager target or system privileges created by super administrators as a means of facilitating the granting of multiple privileges or roles to users. Roles limit target access and access to specific management features.

scalability

Measure of how well the software or hardware product is able to adapt to future business needs.

Secure Socket Layer (SSL)

Optional software used to secure the communications between the Management Service and the Management Agent. When Enterprise Manager is installed "out-of-box," the communications between the Management Service and Management Agent are not secure. Encrypted communications between the Management Agent and Management Service over HTTPS ensures the privacy of data sent from one computer to another.

standby database

Read-only database on the standby node. The standby database, also referred to as the replicated database, is physically identical to the master database. In the event of catastrophic failures, data modification activities "fail over" to the standby database such that it becomes the new master database.

super administrator

Enterprise Manager administrator account that has the ability to create, modify and delete any Enterprise Manager administrator; create any role in the system; perform any action on any target in the system, and see all areas of the Management System tab.

Summary Metric

Defined in a Group to obtain overall performance information for one target type within the Group; though, you can have multiple summary metrics. For example, one for host, one for databases, and so on.

SYSMAN

By default during the installation of Oracle Enterprise Manager, one super administrator account is created with the user name of SYSMAN. The SYSMAN account should be used to perform infrequent systemwide, global configuration tasks such as setting up the environment. Other administrator accounts can be created for daily administration work. The SYSMAN account is:

- Owner of the Management Repository schema
- Default Enterprise Manager super administrator
- User name used to login to Enterprise Manager the first time

system privilege

Allows a user to perform systemwide operations. For example, the VIEW ANY TARGET system privilege allows the administrator to view any target on the system, including Oracle Management Agents and Oracle Management Services.

target

A single component that you can monitor or configure with Enterprise Manager. Examples of a target include:

- Single Oracle 10g database
- Group of databases that provide your worldwide customers with product information
- Oracle Application Server or an instance of Oracle HTTP Server
- Web application that your customers visit to investigate or buy your products
- Sun Solaris host computer, including its memory, disks, and CPU
- Server load balancer switch that controls the Internet traffic for a set of Web servers

Enterprise Manager can manage all these targets. A complete list of the target types you can manage is included in *Oracle Enterprise Manager Grid Control Installation and Basic Configuration*.

Target Discovery (Automatic)

When the Oracle Management Agent starts up after installation, automatic target discovery occurs. During discovery, the targets located on the Oracle Management Agent machine are discovered and added to Enterprise Manager to be monitored and administered. Which targets are added automatically is dependent on how the Oracle Management Agent is installed.

target home page

Contains general information about the selected target. From a target home page, you can drill down to more detailed performance information.

target privilege

Allows an administrator to perform operations on a target. For example, the View target privilege allows the administrator to view properties, inventory, and monitor information about a target.

threshold

Boundary values against which monitored metric values are compared. The comparison determines whether an alert should be generated.

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