Oracle® Enterprise Manager

Concepts

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Preface

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

Note that later versions of this and other Enterprise Manager books may be available on the Oracle Technology Network:

http://www.oracle.com/technology/documentation/oem.html

Audience

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

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Structure

The following preface and chapters discuss in greater detail Enterprise Manager functionality and applications:

What's New in Enterprise Manager 10.2

Presents an overview of the new features in Oracle Enterprise Manager 10*g* Release 2 (10.2).

Part I, "General Grid Control Features"

Contains the chapters that describe general features of Grid Control that may apply to any target type.

Chapter 1, "Introduction" Introduces, at a high-level, and puts into business-use context the features and benefits of using Enterprise Manager Grid Control.

Chapter 2, "Setting Up Enterprise Manager" Explains the options within the Grid Control Setup and Preferences pages, such as roles, privileges, connection settings, and so on.

Chapter 3, "Licensable Management Options" Describes the different management packs, plug-ins, and connectors that you can license for Enterprise Manager.

Chapter 4, "System Monitoring" Describes how Enterprise Manager monitors the performance and availability of the targets within your Oracle environment.

Chapter 5, "Group Management" Describes Enterprise Manager group management functionality.

Chapter 6, "Managing Deployments" Describes how you can use Grid Control to manage all the deployments in your enterprise, including hardware/software configurations, patching, cloning, provisioning, and policy management.

Chapter 7, "Information Publisher" Explains report definitions, customizing reports, the elements of a report, and out-of-box reports.

Chapter 8, "Job System" Explains how the Enterprise Manager Job System provides the capacity to automate administrative tasks and synchronize systems.

Chapter 9, "Extending Enterprise Manager" Introduces Enterprise Manager framework extensions such as adding new target types or directly accessing information stored in the Management Repository.

Chapter 10, "Managing from Anywhere Using EM2GO" Introduces the mobile management application designed for the Oracle Environment.

Part II, "Managed Targets"

Contains the chapters that describe the Grid Control features for specific target types, such as services, databases, application servers, and more.

Chapter 11, "Service Management" Explains how Enterprise Manager monitors and manages services and Web applications to determine the availability, performance, usage, and overall effectiveness of business implementations.

Chapter 12, "Database Management" Specifies the features Enterprise Manager includes to monitor, manage, administer, and maintain Oracle Databases.

Chapter 13, "Application Server Management" Describes how Enterprise Manager provides an easy way to centrally manage your middle-tier Oracle Application Server environment.

Chapter 14, "Oracle Collaboration Suite Management" Describes the new capabilities for Collaboration Suite management, including service and system monitoring, service topology, monitoring dashboards, and client data collection.

Chapter 15, "Host and Third-Party Target Management" Describes Grid Control's built-in features for managing host targets, as well as out-of-box third-party targets from non-Oracle vendors such as BEA and IBM.

Chapter 16, "E-Business Suite Management" Introduces the Grid Control Plug-in for Oracle Applications, which helps you monitor E-Business Suite components using Grid Control.

Glossary
Provides definitions of terms specific to Enterprise Manager.

Related Documents

For more information, see the following manuals in the Oracle Enterprise Manager 10*g* Release 2 documentation set:

- *Oracle Enterprise Manager Grid Control Quick Installation Guide*
- *Oracle Enterprise Manager Grid Control Installation and Basic Configuration*
- *Oracle Enterprise Manager Advanced Configuration*
- *Oracle Enterprise Manager Configuration for Oracle Collaboration Suite*
- *Oracle Enterprise Manager Policy Reference Manual*
- *Oracle Enterprise Manager Metric Reference Manual*
- *Extending Oracle Enterprise Manager*
- *Oracle Enterprise Manager Command Line Interface*
- *SNMP Support Reference Guide*

The latest versions of this and other Enterprise Manager books can be found at:

`http://www.oracle.com/technology/documentation/oem.html`

Oracle Enterprise Manager also provides extensive online help. Click **Help** on any Oracle Enterprise Manager page to display the online help system.

Updated Terminology

In previous versions of Oracle Enterprise Manager, Service Level Management was known as either Application Service Level Management or Application Performance Management.

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

What's New in Enterprise Manager 10.2

Enterprise Manager Grid Control 10*g* Release 2 (10.2) includes many new features that add to your ability to monitor and manage your enterprise:

Grid Management Features

- *System Monitoring:* Lights-out, comprehensive monitoring of all components of the Oracle ecosystem. New features include administrator control of metric collection schedules, Corrective Actions that enable automated responses to alerts, enhancements to SQL-based User-Defined Metrics, Monitoring Templates that enable administrators to apply standardized monitoring settings across their enterprise, and a rich set of out-of-box monitoring reports.
- *Bare-Metal Provisioning:* Automatically deploy new fully configured systems, including operating systems and software images. Clone existing installations and software images (such as Oracle Cluster Ready Services (CRS), Real Application Clusters (RAC), and Oracle Application Server).
- *Real Application Clusters Provisioning and Conversion:* Automatically configure RAC database instances to dynamically increase database capacity to meet your needs; convert non-RAC databases to RAC databases.
- *Cloning:* Simplify deployment of Oracle solutions by cloning fully patched and tested Oracle homes to multiple hosts; clone database instances to create backups of important databases; create new single-node RAC by cloning an existing RAC Oracle home.
- *Lights-Out Patching:* Quickly identify available patches for the components in your enterprise. Find out which have not been applied and which are critical. Bring those components up to the latest patch level with just a few clicks.
- *Policy-Based Monitoring:* Apply consistent, proactive management practices across your enterprise using policies and management templates.
- *Security Assessment:* Automatically assess the security vulnerabilities in your enterprise using the Critical Patch Facility, which provides notifications and a direct link to Oracle Support. Enhanced security rules harden the infrastructure database and host. Violation score reporting helps administrators prioritize security operations.
- *Job System:* More powerful, feature-rich job system allows you to schedule and run multi-task jobs across multiple targets, as well as receive notifications.
- *Group Management:* Enhanced group management features enable administrators to manage many components as one. Group pages roll up critical management information, such as overall status and group status history, open alerts and alert history, open policy violations and policy trend overview charts, and out-of-box

group performance charts. Simplifies common administrative tasks, such as running jobs, executing custom SQL or host commands, and scheduling maintenance windows. A group "dashboard" enables proactive monitoring of status and alerts across all group members as they occur.

Service Management Features

- *Services:* Define services to represent the business functions or applications that run in your enterprise. Measure the performance and availability of these services, receive alerts when there is a problem, identify common issues, and diagnose causes of failures.
- *Service and System Topologies:* Easily define, visualize, and manage key business functions and the assets that they rely upon.
- *Service Level Management:* Allows you to define service-level goals for availability and performance and more quickly resolve problems through rules, reports, and historical monitoring.
- *Dashboards:* Offer "at-a-glance" monitoring of all critical indicators for your services and systems.
- *Root Cause Analysis:* Diagnose service problems quickly using the Root Cause Analysis engine.

Enterprise Reporting Features

- *Out-of-Box Reports:* Easy-access out-of-box reports for all Oracle components; reports on configuration, performance, service level, and audit.
- *Graphical Report Creation:* Easy-to-use tool to create custom reports.
- *Complete Repository Access:* Create reports using any data collected and stored in the Management Repository.
- *Report Publishing:* Proactively deliver specialized management information to users, managers, and executives using out-of-box reports, custom reports, and secure publishing features, with views accessible by any reporting product.

Database Management Features

- *Real Application Clusters Management:* Enhanced monitoring of RAC databases and clusters to include Interconnect monitoring, cluster cache coherency diagnostics, CRS monitoring, a graphical topology view; provision RAC deployments, convert single instances, and add nodes to existing clusters.
- *Transportable Tablespaces:* Allows an administrator to move tablespaces between databases.
- *Fast-Start Failover:* Allows Data Guard to rapidly and automatically fail over to the standby database without requiring manual intervention, significantly improving the degree of availability as well as the disaster resilience for the system infrastructure.
- *Restore Points:* Guaranteed recovery of the database to a particular point in time when used with Flashback Database or Flashback Table.
- *Enhanced Backup Management:* Provides a single view of all backups run against the databases in a domain.
- *Access Advisor Enhancements:* Enhanced to expose more powerful features of the Access Advisor, including template support, tuning of a single statement,

journaling, recommendation implementation status, and action implementation status.

- *Automatic Segment Advisor:* Proactively identifies segments that have significant wasted space due to data fragmentation, which are good candidates for Online Segment Shrink. You no longer need to run Segment Advisor to determine what segments have data fragmentation.
- *Online Segment Shrink Enhancements:* Extends Online Segment Shrink capability to large object (LOB) segments and index-organized table (IOT) overflow segments. Online Segments Shrink capability is now extended to all types of segments, further reducing the need to perform other more advanced reorganization methods such as Online Redefinition.
- *Oracle Streams:* Share message information within a database or from one database to another. Control what information is put into a stream, how the stream flows from database to database, what happens to messages in the stream, and how the stream terminates.
- *Adaptive Alert Thresholds:* Computes statistical alert thresholds using either static (user-defined) or dynamic (self-adjusting) baselines. Dynamic statistical baselines can significantly improve the accuracy of performance alerting, while reducing exposure to the "false positives" commonly incurred under fixed threshold schemes.

Application Server Management Features

- *Extended Middle Tier Management:* Allows administrators to discover OracleAS Farms, OracleAS Clusters, Oracle HTTP Server High Availability Groups and OC4J High Availability Groups as composite targets and perform management and administration operations on them.
- *Topology Views:* Provides graphical topology view of AS Farms, Clusters, and ASs, with current status, alerts and policy violations, and performance metrics. View by host, by request routing overview, or request routing details.
- *Custom Aggregate Monitoring:* Define monitoring criteria for OracleAS Farms and Clusters using customizable aggregate metrics based on the statistical aggregation of individual metrics of cluster members. View aggregate metrics as an overlay of “top best,” “top worst,” or “peak threshold” values for individual metrics.
- *J2EE Application Monitoring:* Hierarchical J2EE application view at the OracleAS cluster level shows performance across the OC4J instances on which it is deployed. Ability to plug customer application JMX MBeans into Grid Control.
- *Backup and Restore:* Supports full and incremental online backup of middle tier installations. Automatically recover instances to the last full backup, then apply incremental backups.
- *OPMN Jobs:* Supports immediate or scheduled full process control (start, stop, restart) of OPMN managed components from Grid Control.
- *Configuration Management:* Extended configuration management support for OracleAS deployments. Collect, search, track, compare, and report on all OracleAS hardware and software installation configurations. Maintain a central inventory of software configuration data of core components for all OracleAS instances.
- *Provisioning "Gold" Images:* Save standard reference images of application server targets to the central Software Library and deploy to target locations. Standardize the deployments of the application server targets in your enterprise. Create and

extend OracleAS Cluster environments by creating new clusters or adding nodes to existing clusters.

- *Cloning:* Extended cloning support for different types of middle-tier installations, including WebCache, J2EE and WebCache, Portal and Wireless, Business Intelligence, Forms and Reports Services, and Business Intelligence and Forms.

Collaboration Suite Management Features

- *Centralized Management:* Single target subtab for Collaboration Suite from which you can view your Collaboration Suite deployment(s) and navigate to specific components.
- *Automatic Discovery:* Collaboration Suite server targets, such as SMTP servers and Calendar servers, are automatically discovered and monitored in Grid Control.
- *Service Monitoring:* In addition to monitoring server components, Grid Control also monitors Collaboration Suite services from the end-user perspective.
- *Custom Service Modeling:* Fast setup of services using a simple customization user interface.
- *Topology Viewer:* Service topology view of your Collaboration Suite deployment showing relationships between different services in Collaboration Suite.
- *Root Cause Analysis:* Detects the potential root causes of any service outage.
- *Dashboards:* Services Dashboard for monitoring service availability, performance, usage, and service-level compliance. System Dashboard for monitoring exceptions in your Collaboration Suite system.
- *Client System Analyzer:* Collects Windows client data and checks for minimum Collaboration Suite requirements.

Broader System Coverage

- *Host Management:* Out-of-box operating system, hardware, and software monitoring of the hosts on which your applications and services reside. Increased coverage for hardware monitoring, process and file-level monitoring, remote command shells, and remote file editing.
- *Enterprise Storage Reports:* Reports on allocation, utilization, roll-ups by location, line of business, application, and vendor.
- *Support for Network Devices and Storage:* Monitor network and storage devices, such as F5 Server Load Balancers and NetApp Filer network storage.
- *Support for Non-Oracle Middleware:* Support for discovery, performance monitoring, reporting, alerts, process control, and synthetic transactions for third-party application servers and application server clusters, such as IBM WebSphere and BEA WebLogic.
- *External Product Integration:* Integrate external products using command line interface, notifications, and bi-directional messages.
- *E-Business Suite Management:* Plug-in available to enable Grid Control to manage the Oracle Applications Manager, part of the E-Business Suite.

New Management Packs and Plug-ins

In addition to the six management packs available in the previous release, Enterprise Manager 10.2 offers eight new management options: three new standalone management packs and five system monitoring plug-ins.

- *New Management Packs:*
  - Oracle Service Level Management Pack
  - Oracle Configuration Pack for Non-Oracle Systems
  - Oracle Provisioning Pack
- *New Management Plug-ins:*
  - System Monitoring Plug-in for Hosts
  - System Monitoring Plug-in for Non-Oracle Databases
  - System Monitoring Plug-in for Non-Oracle Middleware
  - System Monitoring Plug-in for Network Devices
  - System Monitoring Plug-in for Storage

Part I

General Grid Control Features

This part contains chapters that describe general Grid Control features. These functions and tools are not necessarily specific to any particular target type, and may be used to manage most target types—databases, application servers, a services, hosts, or other managed targets.

Part I contains the following chapters:

1

Introduction

The Oracle Grid offers a proven solution that allows businesses to heighten application performance and deliver unparalleled IT infrastructure reliability. Businesses of all sizes attain measurable IT cost savings by extending the availability of computing resources, cultivating more productive and effective administrators, and achieving higher quality of service—all direct benefits of the Oracle Grid. A critical ingredient to achieving the full benefits of the Oracle Grid is employing the right solution for managing the grid systems and, most importantly, the applications that run on those systems.

Oracle Enterprise Manager 10*g* Grid Control is Oracle's single, integrated solution for managing all aspects of the Oracle Grid and the applications running on it. Grid Control couples a potent, top-down monitoring approach to delivering the highest quality of service for applications with a cost-effective automated configuration management, provisioning, and administration solution. This powerful combination provides unequaled management for any size Oracle data center.

This chapter provides an overview of Enterprise Manager 10*g* Grid Control Release 2 (10.2), its rich functionality, and the unique benefits it offers to Oracle customers.

Quality of Service: Bridging the Business with IT Infrastructure

Until recently, business success measurements and IT infrastructure performance were rarely mentioned in the same conversation. Corporations treated the two distinctly—in part because of traditional organization structures—but mostly because existing management tools offered point solutions that only addressed a portion of the larger need. IT management priorities focused primarily on maintaining individual IT systems performance, largely disconnected from real business objectives and needs. Now companies realize that in order to manage bottom line profits and differentiate the quality of service they offer, they must gain insight into how businesses are affected by IT performance. This requirement has mandated innovation in management solutions, where tools must go beyond discrete systems management to focus on delivering application availability and performance levels that align with business priorities. Few management solutions—because of their limited view of the application and its life cycle—are up to the task.

Extended Application Server Management

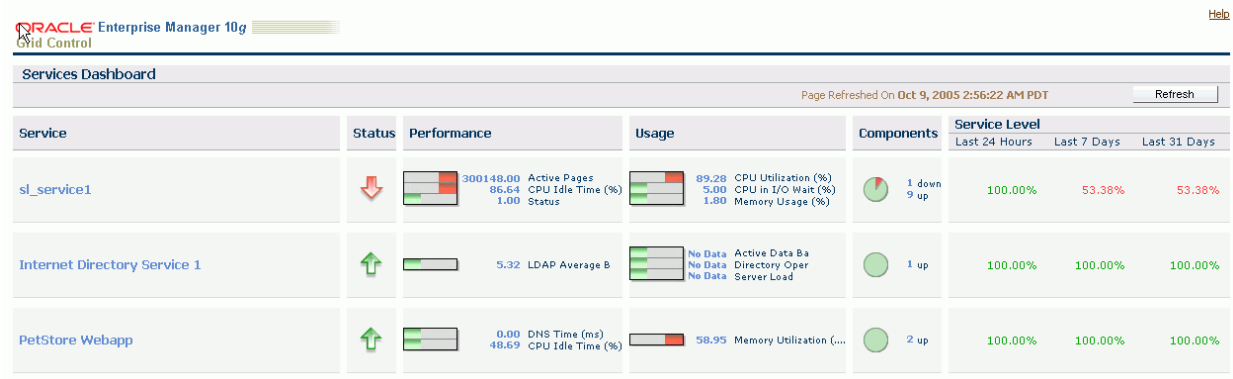
Oracle Enterprise Manager 10*g* Grid Control, a critical element of the Oracle Grid platform, manages service level performance from a business perspective. By leveraging its "best-of-breed" system monitoring solution—including out-of-box support for databases, application servers, hosts, firewalls, load balancers, and storage—it provides a top-down approach to managing applications. This solution is

unique because of its deep system-specific coverage and the range of applications supported. No other solution offers the same level of depth, integration, and precision for Oracle customers.New functionality in Grid Control Release 2 extends the Release 1 application service level management solution with rich graphical modeling and monitoring, crisp and workflow-driven dashboards, and root-cause diagnostics, which take administrators from an end-user application availability issue through the entire application stack to pinpoint the offending IT infrastructure component. Additionally, complementary functionality allows administrators to quickly identify and triage impacted applications when low-level system issues surface.

Using the new features available in Grid Control Release 2, administrators can model and relate system components within the IT infrastructure that provide the backbone for service offerings. Leveraging these system components, they can define applications, or services, that depend upon those systems, and select business transactions that are measured to determine availability and performance of those services. Grid Control supports over 20 different transaction protocols, including custom scripts, dramatically extending the breadth of coverage to meet the application monitoring needs of nearly every environment.

Using Grid Control's graphical monitoring dashboards, administrators, managers, and business owners gain real-time understanding of the status of the business's most important services in a single view. Monitoring dashboards provide top-level views of individual or groups of services, as well as system-level views describing the relationships and status of IT system components. Brought together with newly introduced root-cause availability management capabilities, dashboards dramatically reduce the time it takes to resolve issues that directly impact performance. Service and system "dashboards" are available out-of-box for Oracle packaged applications, such as the Oracle Collaboration Suite—and for the upcoming releases of Oracle Applications and Fusion.

Figure 1–1 Consolidated Dashboard View of Multiple Services



Lowering Management Costs Through the Grid

The number of systems and diversity of services in the Grid can be small or quite large. Historically, the cost of managing large sets of systems has increased linearly, or more, with each new system added to the enterprise. It's simply not possible to maintain management costs in the Grid environment with traditional management solutions that do not scale. The fundamental value proposition of Grid Control is to maintain management costs at a flat or near flat rate as the number of managed systems increases. There are a number of things that make this possible.

Knowing What You Have and What You Are Running

For years, IT departments have relied upon the knowledge of key individuals who manually installed, configured, and maintained the systems running throughout an enterprise. Keeping systems up and running was often a fine-tuned recipe book of details written in a language only those closely involved could understand. Yet, as distributed systems evolved and service architectures became more complex and heterogeneous, manual solutions were no longer viable from a cost-effective standpoint—and more pressingly, from a quality of service standpoint. Administrators are now responsible for far more systems, and the relationships between those systems are much too complicated to track manually. Firewalls, switches, load-balancers, application servers, databases, and clusters are all distributed and connected through complex rules that demand reliable, automated configuration management.

Grid Control's configuration management solution is designed to eliminate the costs and errors that plague traditional manual configuration management solutions. Grid Control centrally tracks hardware, software installation (including patch levels), and software configuration data for every service and system that it manages. This detailed information is regularly and automatically collected and updated as changes occur. Central storage of enterprise configuration information lays the foundation for defining, deploying, auditing, enforcing, and maintaining the systems throughout the Grid.

Certified Configurations: Bringing Harmony to an Ever-Changing Data Center

IT professionals will agree—the fewer variations in the types of systems deployed and the configurations used to deploy them, the easier systems are to manage and the more reliable they will be. That said, it is impossible to expect, even with the most mature business practices, that all systems can follow the same standards of deployment. Using a robust configuration management solution, administrators can rely upon automated tools to ensure that all systems deployed follow specified practices and rules. This way, only pre-tested, pre-certified configurations can enter the production "food chain" of a busy data center.

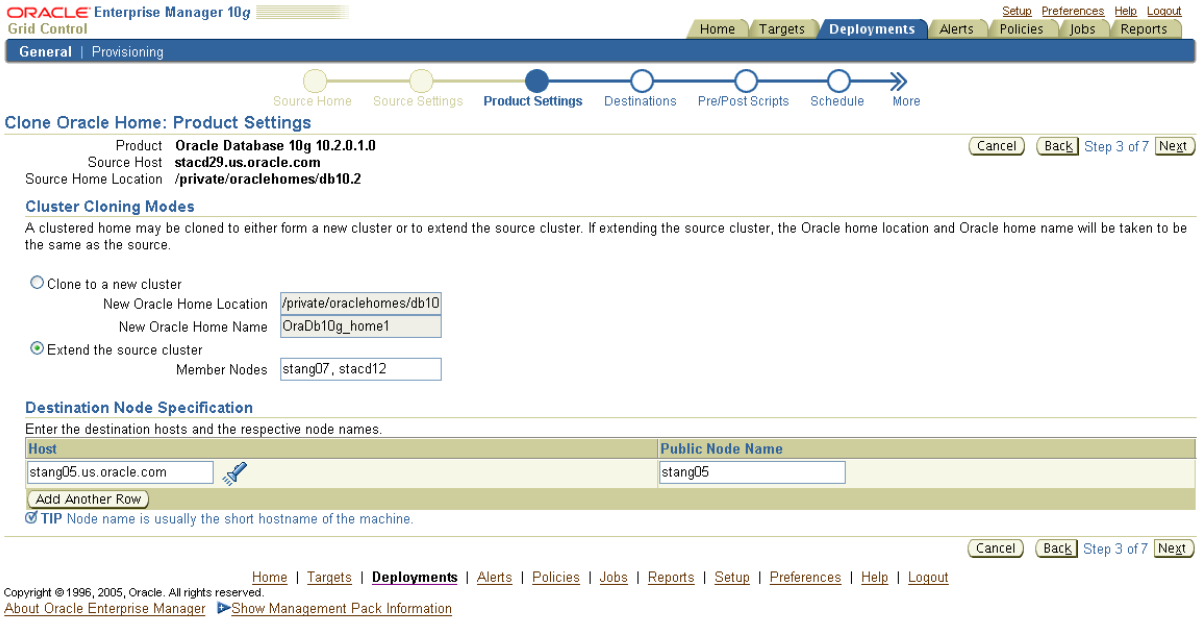
Grid Control allows administrators to define rules (or policies)—most of which are available out-of-box—that are responsible for governing the configuration of all the systems and software running across the enterprise. And because the natural configuration life cycle of any system means it will be changed—through installation of patches, adding files and directories, changing ports, editing its dependencies, and so on—once a system is rolled out, Grid Control continually audits it against its predefined policies. All changes are tracked so that administrators know when they are happening, who is making them, what changes are acceptable, and what changes must be corrected. This level of security and compliance through proactive auditing and enforcement is necessary to keep harmony in the continual flux that defines most data centers. It is also critical to maintaining order and meeting compliance standards as new systems are brought on line, existing systems are upgraded, or patches are applied.

Error-Free Automated Provisioning: Linux, RAC, Certified Images, Patches, Upgrades

Systems administrators can spend up to 25% of their time installing and configuring new software. Using Grid Control's automated provisioning tools, businesses can reduce the time spent deploying new software by up to 90%. Grid Control allows administrators to store base images in a central library—pre-configured and certified—from which new deployments can be based. Newly available with Release 2, administrators are able to deploy fully configured Linux systems from bare metal.

These systems can be deployed with any desired software configuration, certified to the appropriate version and patch level—all with a few simple clicks. This capability is extraordinarily powerful for Real Application Clusters (RAC) and application cluster environments where adding capacity can be done quickly and without errors. Specific capabilities designed for RAC and cluster systems, minimizing the number of steps and complexities involved, are available with Release 2.

Figure 1–2 Automated RAC Deployments and Extensions

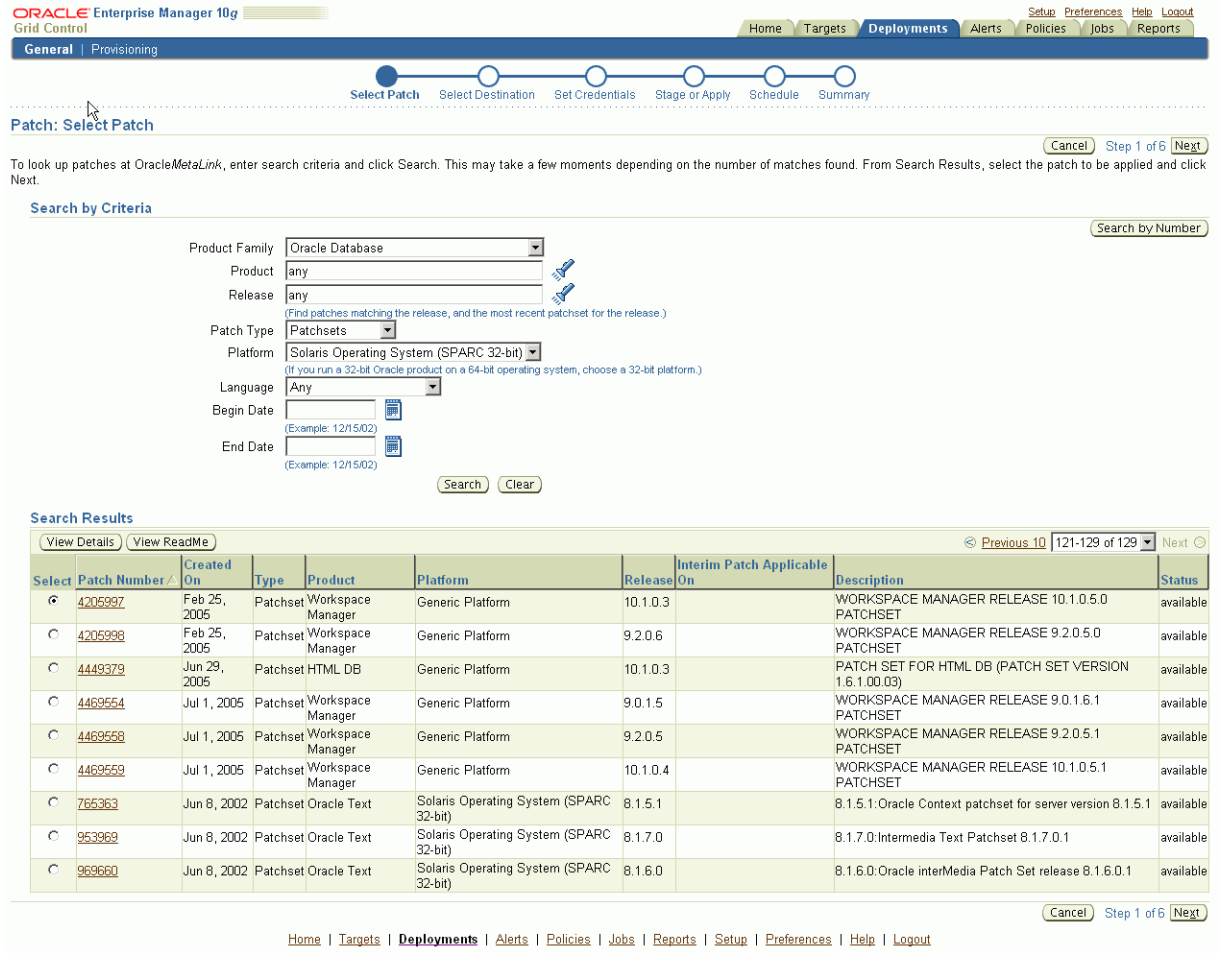


Patch Management

Historically, managing the patches for any IT environment has been extremely tedious and difficult to control. In a Grid environment, where the number of systems and changes to those systems is widespread, manual patch management can become a full-time, often unproductive, job.

Using a direct link to Oracle, Grid Control proactively and regularly queries Oracle*MetaLink* for critical patches that have been released and notifies administrators through advisories of patches that should be applied. By correlating the available patches with the specific systems and software running on a particular site, administrators are notified of only applicable patches. When querying MetaLink directly, patches can be found either in the context of a specific target or, if desired, the administrator can query for a specific patch. Once the necessary patch is located, Grid Control can download and deploy it. Optionally, Grid Control can execute an end-user provided script to install the patch to all systems that require it. Each of these steps allows for quicker application of patches across the customer's enterprise. Grid Control extends this valuable patch management functionality to include support for OS patches—a critical component of systems maintenance and the biggest impediment preventing the installation of important software for system repair.

Figure 1–3 Searching for Patches in the Context of a Specific Target



Using Grid Control to find, download, and deploy patches increases an administrator's efficiency by automating mundane, repetitive, day-to-day maintenance tasks as much as possible, allowing them more time for proactive systems work.

Management for the Complete Oracle Grid Environment

While Enterprise Manager 10*g* Grid Control provides the richest, most comprehensive management for Oracle products, it is also clear that there is no such thing as an Oracle-only environment. Customers have a wide variety of platforms, hardware, network, storage, and software components delivering critical functionality to the Oracle Grid, and they look for a single tool to monitor and manage this environment. With the latest release of Grid Control, there are two complementary initiatives that target extending the solution so customers can better leverage existing investments:

- Extending Grid Control's scope through native management extensions, and partner and custom plug-ins.
- Developing valuable integration solutions with existing management solutions to allow customers to leverage these investments without losing the unique value they gain from Grid Control.

Extensions and Management Plug-ins

With Release 2, Grid Control dramatically broadens the reach of its management solution. New extensions and plug-ins enable customers to leverage their investment in Grid Control to manage all the pieces of the application solution in a vendor-neutral way—components such as firewalls, server load balancers, and non-Oracle databases and application servers. For instance, with Release 2, customers running BEA WebLogic or IBM WebSphere will be able to seamlessly monitor and manage these system components with the similar, rich management functionality available for Oracle products. Grid Control also includes extensions of the core Grid Control product for F5 server load balancers and NetApp Filers. Over the coming months, many more extensions will be generally released and available as easy-to-implement plug-ins to Release 2. These plug-ins will be both Oracle-developed (e.g., Checkpoint firewall, SQL Server, and others) and developed in partnership by third-party vendors, with support and validation by Oracle to provide a single console for primary monitoring and management of the Oracle Grid. In addition to the management plug-ins available out-of-box, Grid Control offers an open Command Line Interface and illustrative examples for easily adding new targets and customizing management solutions for customer-specific environments. This extended breadth of coverage gives customers the ability to use Grid Control for central management of their complete environment.

Figure 1–4 Monitoring BEA WebLogic Application Server Cluster

Oracle Integrated Management Partnerships

In addition to extending the direct reach of Grid Control, bi-directional integration support for other leading management solutions is a key priority. Customers who have invested in non-Oracle management solutions derive increased value from Oracle's integration efforts. Direct integration between Grid Control Release 2 and products by HP, Micromuse, and EMC SMARTS are currently supported. As an example, the integration between HP OpenView Operations and Grid Control

provides both depth and breadth of management capabilities based on a common view of management data. This new level of integration allows customers to seamlessly leverage Oracle's strength in database, application server, and applications management and HP OpenView's strength in host and network management.

Other complementary partnerships designed to deliver unique capabilities to Oracle customers (including storage management and the ability to dynamically flex data center capacity) are underway and will be announced shortly.

Conclusion

Grid computing is poised to revolutionize the economics of delivering applications and services across the enterprise. Enterprise Manager 10*g* Grid Control Release 2 allows customers to deliver heightened application performance and realize dramatic savings in IT administration and maintenance costs. Enterprise Manager's robust service level management functionality brings together business priorities with IT application performance requirements in ways it never has before. Rich configuration management and provisioning functionality eliminate the error-prone, manual tactics that plague most data centers and drive up the overall cost of management. In a time when administration resources are at a premium, and businesses are forced to tightly control IT spending budgets, Enterprise Manager 10*g* is a must-have tool for small and large enterprises that want to make the Grid a reality for their IT department.

2

Setting Up Enterprise Manager

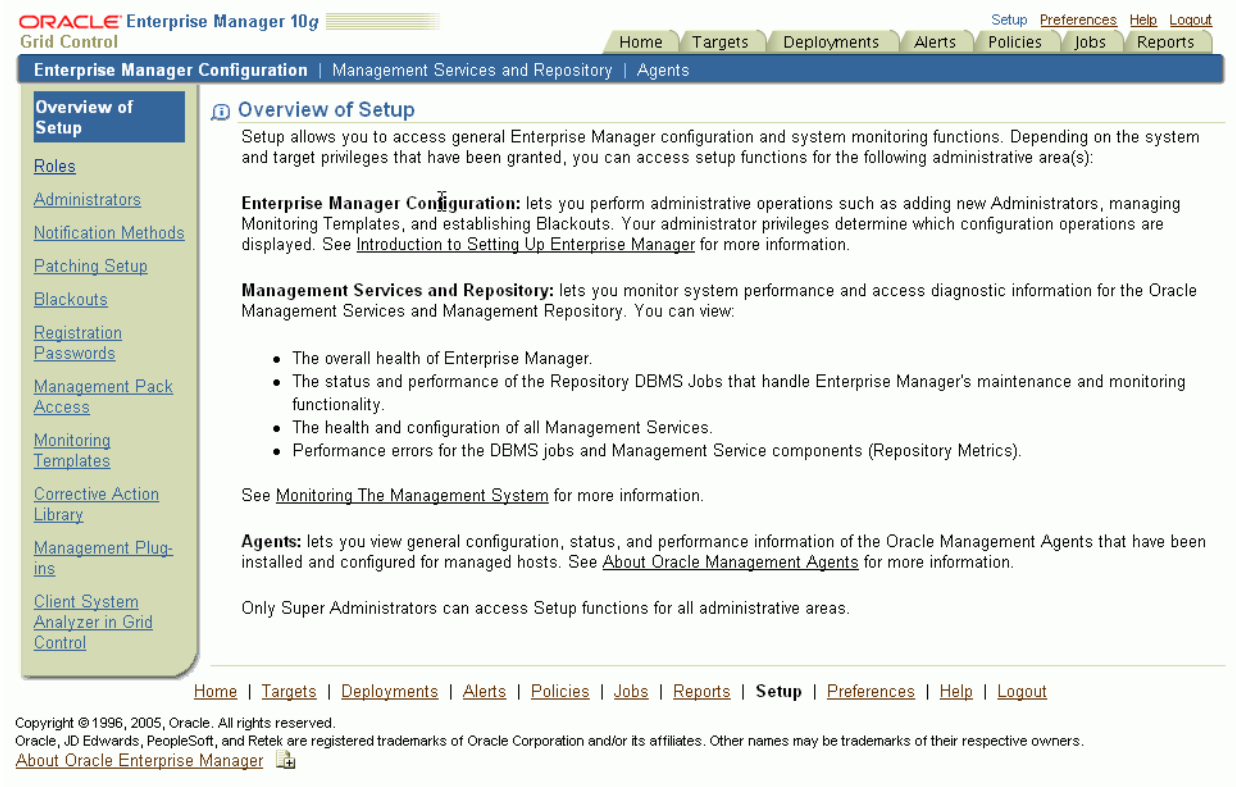
Before you begin using Enterprise Manager, establish standard administrative settings in the Setup and Privileges pages, such as roles, notifications, passwords, templates, plug-ins, and more. These settings will help you manage user administration, communication, notification, standard actions and access, and security.

This chapter contains the following sections:

Grid Control Setup

The Grid Control Setup area allows you to configure the following:

Figure 2–1 Grid Control's Overview of Setup Page



Roles

Roles allow you to group Enterprise Manager system and target privileges, and grant these to administrators or to other roles. Privileges give the administrator rights to perform management actions within Enterprise Manager. Using roles and privileges allows you to manage security across all functional areas of Enterprise Manager.

Creating roles is an easy way to grant a predefined set of privileges to a group of administrators. If you change a role, the changes are automatically propagated to all administrators who are assigned that role.

Roles can be based on:

- Geographic location. For example, you can define a role for UK administrators to manage UK systems.
- Line of business. For example, you can define a role for administrators of the human resource systems.
- Any other IT model.

Administrators

Administrators are database users defined in the Management Repository who can log in to Enterprise Manager to perform management tasks. The breadth of management tasks available in Enterprise Manager depends on the privileges and roles assigned to the administrators.

There are two types of accounts:

- Super Administrator Account

- Administrator Account

Super Administrator Account

Enterprise Manager is installed with a default super administrator account named SYSMAN. During the installation, you are prompted provide a password for SYSMAN. You use the SYSMAN account for the initial login to Enterprise Manager. The super administrator account cannot be deleted or renamed.

The super administrator account can manage all other administrator accounts and set up all administrator credentials. The super administrator can:

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

Oracle recommends that you create an administrator account for each individual user. The super administrator account should not be used to conduct daily administration tasks.

Administrator Account

Administrator accounts provide 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
- Privileges
- Role, or set of privileges

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

Notification Methods

Notification Methods allow you to define different mechanisms for sending notifications. These include e-mail, SNMP traps, or running custom scripts—or all three. Once defined, these methods can then be used with Notification Rules for sending notifications to administrators as a result of alert occurrences.

> **See Also:** "Notifications" in Chapter 4, "System Monitoring"

Patching Setup

On the Patching Setup page, specify parameters that allow you to configure and use Grid Control's patching features. These features simplify the staging and application of Oracle patches and patch sets to any host on which the Oracle Management Agent is running. They also allow you to collect information about Oracle critical patch advisories that are relevant to your enterprise.

You can use this page to set your *MetaLink* credentials, set patch cache size, turn on patch set validation, configure proxy and connection details, as well as offline patching settings.

See Also: "Patching" in Chapter 6, "Managing Deployments"

Blackouts

Blackouts allow Enterprise Manager administrators to suspend any data collection activity on one or more monitored targets, thus allowing Enterprise Manager administrators to perform scheduled maintenance on targets. For example, you can stop data collections during periods where a managed target is undergoing routine maintenance, such as a database backup or hardware upgrade. If you continue monitoring during these periods, the collected data will show trends and other monitoring information that are not the result of normal day-to-day operations. To get a more accurate, long-term picture of a target's performance, you can use blackouts to exclude these special-case situations from data analysis.

A blackout can be defined for individual target(s), a group of multiple targets that reside on different hosts, or for all targets on a host. The blackout can be scheduled to run immediately or in the future, and to run indefinitely or stop after a specific duration. Blackouts can be created on an as-needed basis, or scheduled to run at regular intervals. If, during the maintenance period, the administrator discovers that he needs more (or less) time to complete his maintenance tasks, he can easily extend (or stop) the blackout that is currently in effect.

See Also: "Blackouts" in Chapter 4, "System Monitoring"

Registration Passwords

Set registration passwords to secure Management Agents against any Management Service that uses the central Management Repository.

When defining registration passwords, you may specify an expire date after which the password will be invalid, or you may specify that the password can only be used one time, after which it is deleted automatically from the repository.

Management Pack Access

Oracle offers a number of management options, or "Management Packs," that bring together a set of technologies related to a specific area of Enterprise Manager.

Each pack has several premium features bundled as part of that pack. Having a pack licensed or unlicensed on a target has a very significant impact on the user experience because the corresponding links, which need the pack, are enabled or disabled accordingly.

See Also: Chapter 3, "Licensable Management Options"

Monitoring Templates

Monitoring templates simplify the task of setting up monitoring for large numbers of targets by allowing administrators to specify the monitoring settings once, then apply them as often as needed. You can create, edit, and save a monitoring template that contains your enterprise's standards for monitoring—metrics, thresholds, corrective actions and/or policy rules. Once defined, you can propagate these standards by applying the template to managed targets.

See Also: "Monitoring Templates" in Chapter 4, "System Monitoring"

Corrective Action Library

Corrective Actions allow administrators to specify automated responses to alerts or policy violations. Corrective Actions ensure that routine responses to alerts or policy violations are automatically executed, thereby saving administrator time and ensuring problems are dealt with before they noticeably impact end users.

Corrective actions share many features in common with the Job System. By default, the corrective action will run on the target on which the alert or policy violation has triggered. Alternatively, a corrective action can be specified to contain multiple tasks, with each task running on a different target. Administrators can also receive notifications for the success or failure of corrective actions.

Use this page to display and manage corrective actions. The library allows administrators to re-use library corrective actions that have been created.

> **See Also:** "Defining Corrective Actions" in Chapter 6, "Managing Deployments"

Management Plug-ins

A Management Plug-in is a target type provided by the user or a third party to extend Enterprise Manager's set of predefined target types. This page is used to define new Management Plug-ins, import Management Plug-ins from, or export Management Plug-ins to a Management Plug-in Archive, or to deploy a Management Plug-in into your system.

The Tool Center is the central access point for all of the functionality available to you to operate on your Management Plug-ins. Any Management Plug-ins that have been imported into the Management Repository are listed on this page. Certain operations allow you to operate on multiple Management Plug-ins simultaneously (delete and export); some operations only allow you to operate on a single Management Plug-in at a time (deploy and undeploy); and import allows you to add Management Plug-ins to the table on this page. You also can search through the Management Plug-ins using the search criteria at the top of the page.

> **See Also:** "Developing Management Plug-ins" in Chapter 9, "Extending Enterprise Manager"

Client System Analyzer in Grid Control

The Client System Analyzer (CSA) allows Web server administrators to collect and analyze end-user client data. End-users can directly access CSA or may be redirected to it from other applications.

An instance of the Client System Analyzer application is pre-installed with Grid Control. The application is run by the Oracle Management Services' web servers. It can be used to collect client information for any system that can reach the Oracle Management Services URLs. This option allows administrators to collect client data without setting up a separate web application.

> **See Also:** "Client Configurations" in Chapter 6, "Managing Deployments"

Grid Control Preferences

The Grid Control Preferences area allows you to set options for the following:

- General

- Preferred Credentials
- Notification
- Target Subtabs

General

You can specify one or more e-mail addresses and associated message formats for your Enterprise Manager account.

Specify the e-mail addresses and message formats you want associated with your Enterprise Manager account. All e-mail notifications you receive from Enterprise Manager will be sent to the e-mail addresses you specify.

Preferred Credentials

Preferred credentials simplify access to managed targets by storing target login credentials in the Management Repository. With preferred credentials set, users can access an Enterprise Manager target that recognizes those credentials without being prompted to log into the target. Preferred credentials are set on a per user basis, thus ensuring the security of the managed enterprise environment.

The Preferred Credentials page provides a top-level view of all preferred credentials set for your Enterprise Manager environment. From this page, you can set preferred credentials for any managed target listed in the Preferred Credentials table. Each row of the table provides a credential summary for each target. Targets are organized according to target type.

Notification

From Preferences, you can set up notification rules and the schedule.

Notification Rules

If you want to define a target or set of targets, the target availability states for which you would like to receive notifications, the metrics you want to monitor for thresholds, the policies you want to monitor for thresholds, the job status changes you want to monitor, and the notification action you want to take when a threshold is exceeded or a job's status changes, click the **Create** button.

Use the Notification Rules page to create, view, or edit notification rules. You can choose the targets and conditions for which you want to receive notifications from Enterprise Manager. The methods for sending notifications include e-mail, SNMP traps, running custom scripts, PL/SQL procedures, or all four.

See Also: "Notifications" in Chapter 4, "System Monitoring"

Notification Schedule

Use the notification schedule page to select a user for which a notification schedule needs to be set. An e-mail address must be defined for the administrator prior to defining a notification schedule. For each administrator for which a notification schedule has been specified, all specifics pertaining to their schedule are displayed.

See Also: "Notifications" in Chapter 4, "System Monitoring"

Target Subtabs

Use the Target Subtabs page to select and order the categories subtabs that appear within the Targets tab. The categories you create appear as subtabs under the Targets page.

3

Licensable Management Options

In addition to the six management packs available in the previous release, Enterprise Manager 10.2 offers eight new management options: three new standalone management packs and five system monitoring plug-ins. This chapter describes these management options in the following sections:

- Oracle Management Packs
- Oracle Management Plug-ins

Oracle Management Packs

Oracle offers a number of "Management Packs" that bring together a set of technologies related to a specific area of Enterprise Manager. Each pack has several premium features bundled as part of that pack.

You can grant and revoke access to packs for various databases and application servers in your Enterprise Manager repository by using the Management Pack Access option available from Grid Control's Setup page. When you enable/disable access to a pack, the corresponding features and functions are enabled/disabled. The ability to modify this Management Pack Access functionality is available only to Super Administrators.

When one or more packs on a target monitored by Enterprise Manager are not licensed, access to premium functionality for that target is disabled. For example, the **Black Out** button located on a target's home page, which you can use to move the target to the blackout state, is enabled when the Oracle Database Diagnostics Pack or the Oracle Application Server Diagnostics Pack is licensed for that target.

To determine the packs used by the current page and to know what packs need to be licensed for any link on that page to be enabled, click the show/hide icon located in the footer of any Enterprise Manager Grid Control page. Enterprise Manager displays this information for all pages the user navigates to during that session.

This section includes descriptions for the following types of management packs:

- Oracle Database Management Packs
- Oracle Application Server Management Packs
- Oracle Standalone Management Packs

Oracle Database Management Packs

Enterprise Manager offers four database management packs.

Oracle Database Diagnostics Pack

Oracle Diagnostics Pack 10*g* for database offers a complete, cost-effective, and easy to use solution for managing the performance of Oracle Database environments by providing unique functionality such as automatic identification of performance bottlenecks, guided problem resolution, and comprehensive system monitoring.

Table 3–1 Feature Highlights of Database Diagnostics Pack

Feature	Description
Automatic Workload Repository (AWR)	Oracle Database 10*g* built-in, automatic capture of statistics data to be used for real-time and historical performance analysis. Snapshot data, active session history data, and workload reports are part of AWR.
Performance Monitoring and Diagnostics	Measures performance and diagnose poor performance with the Performance page associated drill-downs. This includes historical analysis and alert threshold integration.
Automatic Database Diagnostic Monitor (ADDM)	Oracle Database 10*g* built-in functionality that provides out-of-the-box automatic performance analysis based on AWR data.
Operating System Monitoring	Monitors the operating system and hardware in the drill-downs from Grid Control host monitoring pages.
Memory-Based Monitoring	"Memory-Based" performance monitoring to diagnose extremely slow moving databases, including ORADEBUG Hang Analysis, a utility for diagnosing "hung" systems that provides a graphical view of hung sessions along with appropriate details.
Dynamic Metric Baselines	Capture "baselines" of workload performance metrics during "normal" performance and compare against the same metrics during poor performance to diagnose the causes. Set adaptive thresholds using a pre-defined baseline to accurately detect alert conditions when a system has predictably varying workloads.
Monitoring Templates	Facilitates the monitoring of large number of targets of the same type. Greatly simplifies the task of managing many targets in an enterprise system by providing rich functionality to specify policy settings, metrics, alert thresholds, schedules, and corrective actions that can be taken to remedy alert situations.
Advanced Alert Management	This features includes notification methods, rules, and schedules, metric history and associated drill-downs, ability to set blackouts, associate corrective actions with an alert, user-defined metrics, monitoring templates, adaptive metric thresholds, setting metric baselines, and Memory Access Mode.

Note: Generation of alerts (via Enterprise Manager or directly by the server in Oracle 10*g*) is not part of this pack; it comes free with the database.

Oracle Database Tuning Pack

Oracle Tuning Pack 10*g* offers a set of groundbreaking technologies that automate the application tuning process, thereby significantly lowering database management costs while enhancing performance and reliability, significantly improving resource utilization, and ensuring best application performance without manual intervention.

Table 3–2 Feature Highlights of Database Tuning Pack

Feature	Description
SQL Tuning Advisor	Includes the ability to analyze SQL statements and make recommendations for better execution, such as applying SQL Profiles or recommending rewriting of the SQL.
SQL Access Advisor	Can recommend schema changes needed to improve database performance; for example, creation of new indexes and materialized views.
Reorganize Objects	Use the Schema Object Reorganization wizard to reorganize database objects.

Note: Oracle Tuning Pack 10*g* requires an Oracle Diagnostics Pack 10*g* license. Therefore, customers interested in using any of the Oracle Tuning Pack 10*g* functionality must license both of these packs.

Oracle Database Configuration Management Pack

This pack automates the time-consuming, costly, and often error-prone process of software configuration, software and hardware inventory tracking, patching, and policy management, ensuring consistency across deployments.

Table 3–3 Feature Highlights of Database Configuration Management Pack

Feature	Description
Configuration Management	Hardware and software configuration data collection, search, comparison, and analytical reporting.
Patching	Includes Critical Patch Advisories, which alert you to critical patches that need to be applied.
Policy and Security Management	■ Ensures consistency of deployments, system security, and adherence to operation standards. ■ Includes policy violation notifications and Enterprise Security Advisor

Oracle Database Change Management Pack

This pack gives database administrators the ability to evaluate, plan for, and implement database schema changes to support new application requirements without error and data loss while minimizing downtime. Enables rapid response to new requirements, significantly improves the implementation of complex changes, and ensures that application code is synchronized with detailed baselines.

Table 3–4 Feature Highlights of Database Change Management Pack

Feature	Description
Baselines	Captures database and schema definitions.
Comparisons	Compares baseline with database, or database with database, schema with schema.
Synchronization	Propagates database objects with or without data, update database object definitions.

Oracle Application Server Management Packs

Enterprise Manager offers two application server management packs.

Oracle Application Server Diagnostics Pack

This pack ensures high availability of mission-critical applications by reducing the complex tasks of diagnosing and correcting application performance problems, lowering the costs of managing web-based applications spanning multiple systems.

Table 3–5 Feature Highlights of Application Server Diagnostics Pack

Feature	Description
Transaction Tracing Diagnostics	■ Interactively traces transactions through all three tiers: client, mid-tier, and database. ■ Detailed traces of network, JSP, EJB, and JDBC/SQL calls.
Historical Performance Analysis	■ Transaction performance. ■ End-user page performance.
Page Performance Diagnostics	■ Complete URL call processing stack. ■ Drill-downs to JSP, servlet, EJB method to SQL code. ■ Correlation of middle-tier performance to application component metrics.
Complete Application Server Monitoring	■ Historical monitoring and availability for all Application Server components. ■ "Top" views (for example, "Top JSPs," "Top EJBs," etc.).
Advanced Alert Management	Includes notification methods, rules, and schedules, metric history and associated drill-downs, ability to set blackouts, associate corrective actions with an alert, user-defined metrics, and monitoring templates are also part of this feature.

Oracle Application Server Configuration Management Pack

This pack automates the time-consuming, costly, and often error-prone process of software configuration, software and hardware inventory tracking, patching, and policy management, ensuring consistency across deployments.

Table 3–6 Feature Highlights of Application Server Configuration Management Pack

Feature	Description
Configuration Management	Hardware and software configuration data collection, search, comparison, and analytical reporting.
Patching	Includes Critical Patch Advisories, which alert you to critical patches that need to be applied.
Policy and Security Management	■ Ensures consistency of deployments, system security, and adherence to operation standards. ■ Includes policy violation notifications and Enterprise Security Advisor

Oracle Standalone Management Packs

Enterprise Manager offers three standalone management packs.

Oracle Configuration Management for Non-Oracle Systems Pack

This pack offers a complete, cost-effective, and easy-to-use solution for managing the configurations of non-Oracle targets.

Table 3–7 Feature Highlights of Non-Oracle Configuration Management Pack

Feature	Description
Configuration Management	Hardware and software configuration data collection, search, comparison, and analytical reporting.
Policy Management	Ensures consistency of deployments and adherence to operation standards. Includes policy violation notifications.

Oracle Provisioning Pack

This pack automates deployment of software, applications, and patches. This pack provides functionality for "bare-metal" provisioning of operating systems and software images, cloning of existing installations and software images (such as Oracle Clusterware, Real Application Clusters, and Oracle Application Servers), and patching. It makes critical data center operations easy and scalable, resulting in lower operational risk and cost of ownership.

Table 3–8 Feature Highlights of Provisioning Pack

Feature	Description
Patching	■ End-to-end patching of Oracle products across a wide-range of product patches and customer environments. ■ Automated Linux host patching. ■ Critical Patch Advisories, which alert you to critical patches that need to be applied, and Critical Patch Facility, which helps you automate the downloading and deployment of patches.
Provisioning	■ Creates and maintains a library of reference software images. ■ Deploys operating systems and software to bare metal servers. ■ Provisions standard, or "gold," images of Oracle Database, Oracle Real Application Clusters (RAC), and Oracle Application Server. ■ Extends RAC clusters or Oracle Application Server middleware. ■ Out-of-box and custom reporting on provisioning and deployments.
Cloning	■ Clones databases and Oracle homes. ■ Converts single-instance databases to RAC.
Policy and Security Management	■ Ensures consistency of deployments, system security, and adherence to operation standards. ■ Includes policy violation notifications and Enterprise Security Advisor.

Oracle Service Level Management Pack

This pack offers a comprehensive monitoring solution that helps IT organizations achieve high availability and performance, and optimized service levels for their business services. Actively monitors and reports on the availability and performance of services, including end-user business functions, Web applications, and infrastructure components. Using service tests or synthetic transactions executed from remote user locations, businesses can monitor services from the end users' perspective and its correlation to the underlying IT infrastructure. In addition, Service Level

Management Pack assesses the business impact of any service problem or failure, and indicates whether service-level goals have been met.

Table 3–9 Feature Highlights of Service Level Management Pack

Feature	Description
Service Modeling	Model critical business functions based on a wide range of supported protocols.
Complete Service Monitoring	Monitors service availability, performance, usage, and service level compliance.
Beacons	Measures availability and performance from representative key user locations.
Root Cause Analysis	Enhances performance and failure diagnostics by determining root causes and services impacted by failure.

Note: Integrate with Oracle Enterprise Manager 10*g* Application Server Diagnostics Pack for complete end-to-end Service Level Management.

Oracle Management Plug-ins

Enterprise Manager offers five management plug-ins that expand your system monitoring coverage to include additional target types, including hosts, non-Oracle databases, non-Oracle middleware, network devices, and storage:

- System Monitoring Plug-in for Hosts
- System Monitoring Plug-in for Non-Oracle Databases
- System Monitoring Plug-in for Non-Oracle Middleware
- System Monitoring Plug-in for Network Devices
- System Monitoring Plug-in for Storage

Each plug-in provides the key monitoring features for its respective target type, as described in Table 3–10.

Table 3–10 Key Features of System Monitoring Plug-ins

Feature	Benefit
Performance Monitoring	Real-time and historical performance monitoring. Reduce the complex tasks of diagnosing and correcting performance problems for your targets.
Advanced Alert Management	Includes notification methods, rules, and schedules, metric history and associated drill-downs, ability to set blackouts, associate corrective actions with an alert, user-defined metrics, and monitoring templates are also part of this feature.

4

System Monitoring

Because of the size, complexity, and criticality of today's enterprise IT operations, the challenge for IT professionals is to be able to maintain high levels of component availability and performance for both applications and all components that make up the application's technology stack. Monitoring the performance of these components and quickly correcting problems before they can impact business operations is crucial. Enterprise Manager provides comprehensive, flexible, easy-to-use monitoring functionality that supports the timely detection and notification of impending IT problems across your enterprise.

This chapter covers the following topics:

Systems Monitoring: Breadth and Depth

Enterprise Manager system monitoring features provide increased out-of-box value, automation, and grid monitoring support to enable IT organizations to maximize operational efficiencies and provide high quality services. For applications that are built on Oracle, Enterprise Manager offers the most comprehensive monitoring of the Oracle Grid environment—from Oracle Database instances to Oracle Real Application Clusters to Oracle Application Server Farms and Clusters. To support the myriad and variety of applications built on Oracle, Enterprise Manager expands its monitoring scope to non-Oracle components, such as third-party application servers, hosts, firewalls, server load balancers, and storage.

Enterprise Manager provides the most comprehensive management features for all Oracle products. For example, Enterprise Manager's monitoring functionality is tightly integrated with Oracle Database 10*g* manageability features such as server-generated alerts. These alerts are generated by the database itself about problems it has self-detected. Server-generated alerts can be managed from the Enterprise Manager console and include recommendations on how problems can be resolved. Performance problems such as poorly performing SQL and corresponding recommendations that are generated by the database's self-diagnostic engine, called Automatic Database Diagnostic Monitor (ADDM), are also captured and exposed through the Enterprise Manager console. This allows Enterprise Manager administrators to implement ADDM recommendations with ease and convenience.

Enterprise Manager also makes it easy to expand the scope of system monitoring beyond individual components. Using Enterprise Manager's group management functionality, you can easily organize monitorable targets into groups, allowing you to monitor and manage many components as one.

Monitoring Basics

System monitoring functionality permits unattended monitoring of your IT environment. Enterprise Manager comes with a comprehensive set of performance and health metrics that allows monitoring of key components in your environment, such as applications, application servers, databases, as well as the back-end components on which they rely (hosts, operating systems, storage, and so on).

The Management Agent on each monitored host monitors the status, health, and performance of all managed components (also referred to as targets) on that host. If a target goes down, or if a performance metric crosses a warning or critical threshold, an alert is generated and sent to Enterprise Manager and to Enterprise Manager administrators who have registered interest in receiving such notifications. Systems monitoring functionality and the mechanisms that support this functionality are discussed in the following sections.

When it is not practical to have a Management Agent present to monitor specific components of your IT infrastructure, as might be the case with an IP traffic controller or remote Web application, Enterprise Manager provides Extended Network and Critical URL Monitoring functionality. This feature allows the Beacon functionality of the Agent to monitor remote network devices and URLs for availability and responsiveness without requiring an Agent to be physically present on that device. You simply select a specific Beacon, and add key network components and URLs to the Network and URL Watch Lists. More information about using this feature is available in the Enterprise Manager online help.

Out-of-Box Monitoring

Enterprise Manager's Management Agents automatically start monitoring their host's systems (including hardware and software configuration data on these hosts) as soon as they are deployed and started. Enterprise Manager provides auto-discovery scripts that enable these Agents to automatically discover all Oracle components and start monitoring them using a comprehensive set of metrics at Oracle-recommended thresholds. This monitoring functionality includes other components of the Oracle ecosystem such as NetApp Filer, BIG-IP load balancers, Checkpoint Firewall, and IBM WebSphere and BEA WebLogic application servers. Metrics from all monitored components are stored and aggregated in the Management Repository, providing administrators with a rich source of diagnostic information and trend analysis data. When critical alerts are detected, notifications are sent to administrators for rapid resolution.

Out-of-box, Enterprise Manager monitoring functionality provides:

- In-depth monitoring with Oracle-recommended metrics and thresholds.
- Access to real-time performance charts.
- Collection, storage, and aggregation of metric data in the Management Repository. This allows you to perform strategic tasks such as trend analysis and reporting.
- E-mail notification for detected critical alerts.

Enterprise Manager can monitor a wide variety of components (such as databases, hosts, and routers) within your IT infrastructure.

Some examples of monitored metrics are:

- Archive Area Used (Database)
- Component Memory Usage (Application Server)
- Segments Approaching Maximum Extents Count (Database)
- Network Interface Total I/O Rate (Host)

Some metrics have associated predefined limiting parameters called thresholds that cause alerts to be triggered when collected metric values exceed these limits. Enterprise Manager allows you to set metric threshold values for two levels of alert severity:

- **Warning** - Attention is required in a particular area, but the area is still functional.
- **Critical** - Immediate action is required in a particular area. The area is either not functional or indicative of imminent problems.

Hence, thresholds are boundary values against which monitored metric values are compared. For example, for each disk device associated with the Disk Utilization (%) metric, you might define a warning threshold at 80% disk space used and critical threshold at 95%.

Note: Enterprise Manager also allows you to define your own target types. See Chapter 9, "Extending Enterprise Manager" for information on creating new monitorable target types for your environment.

Metric Thresholds

As mentioned earlier, some metric thresholds come predefined out-of-box. While these values are acceptable for most monitoring conditions, your environment may require that you customize threshold values to more accurately reflect the operational norms of your environment. Setting accurate threshold values, however, may be more challenging for certain categories of metrics such as performance metrics.

For example, what are appropriate warning and critical thresholds for the Response Time Per Transaction database metric? For such metrics, it might make more sense to be alerted when the monitored values for the performance metric deviates from normal behavior. Enterprise Manager provides features to enable you to capture normal performance behavior for a target and determine thresholds that are deviations from that performance norm.

Note: Enterprise Manager administrators must be granted OPERATOR or greater privilege on a target in order to perform any metric threshold changes.

Metric Snapshots A metric snapshot is a named collection of a target's performance metrics that have been collected at a specific point in time. A metric snapshot can be used as an aid in calculating metric threshold values based on the target's past performance.

The key in defining a metric snapshot for a target is to select a date during which target performance was acceptable under typical workloads. Given this date, actual values of the performance metrics for the target are retrieved and these represent what is normal or expected performance behavior for the target. Using these values, you can then use Enterprise Manager to calculate warning and critical thresholds for the

metrics that are a specified percentage 'worse' than the actual metric snapshot values. These represent values which, when crossed, could indicate performance problems. After thresholds are calculated, you can still edit the calculated values if needed.

You can define a metric snapshot for a target based on a date and (optionally) time. If you only specify a date, the metric snapshot is the set of average daily values of the target's performance metrics for that date. If you also specify an hour within the date, then the metric snapshot is the set of Low and High metric values for the preceding hour.

Metric snapshots apply to all monitored targets except 10.2 or higher databases, Services, and Web applications. For these targets, the Metric Baseline feature is supported.

Metric Baselines Metric baselines are statistical characterizations of system performance over well-defined time periods. Metric baselines can be used to implement adaptive alert thresholds for certain performance metrics as well as provide normalized views of system performance. Adaptive alert thresholds are used to detect unusual performance events. Baseline normalized views of metric behavior help administrators explain and understand such events.

Metric baselines are well defined time intervals (baseline periods) over which Enterprise Manager has captured system performance metrics. The underlying assumption of metric baselines is that systems with relatively stable performance should exhibit similar metric observations (that is, values) over times of comparable workload. Two types of baseline periods are supported: moving window baseline periods and static baseline periods. Moving window baseline periods are defined as some number of days prior to the current date (example: Last 7 days). This allows comparison of current metric values with recently observed history. Moving window baselines are useful for operational systems with predictable workload cycles (example: OLTP days and batch nights).

Static baselines are periods of time that you define that are of particular interest to you (example: end of the fiscal year). These baselines can be used to characterize workload periods for comparison against future occurrences of that workload (example: compare end of the fiscal year from one calendar year to the next).

Adaptive Thresholds

Once metric baselines are defined, they can be used to establish alert thresholds that are statistically significant and adapt to expected variations across time. For example, you can define alert thresholds to be generated based on significance level, such as the HIGH significance level thresholds are values that occur 5 in 100 times. Alternatively, you can generate thresholds based on a percentage of the maximum value observed within the baseline period. These can be used to generate alerts when performance metric values are observed to exceed normal peaks within that period.

Baseline Normalized Views

Enterprise Manager provides charts which graphically display the values of observed performance and workload metrics normalized against the baseline. Using these charts, statistically significant values are easily seen as 'blips' in the charts. These allow administrators to easily perform time-correlation of events. For example, performance events can be related to significantly increased demand or significantly unusual workload.

Metric baselines are supported for databases (version 10.2 or higher) and for Services and Web Application target types.

Alerts

When a metric threshold value is reached, an alert is generated. An alert indicates a potential problem; either a warning or critical threshold for a monitored metric has been crossed. An alert can also be generated for various target availability states, such as:

- Target is down.
- Oracle Management Agent monitoring the target is unreachable.

When an alert is generated, you can access details about the alert from the Enterprise Manager console. See "Accessing Monitoring Information" on page 4-8 for more information on viewing alert information.

Enterprise Manager provides various options to respond to alerts. Administrators can be automatically notified when an alert triggers and/or corrective actions can be set up to automatically resolve an alert condition.

Notifications

When a target becomes unavailable or if thresholds for performance are crossed, alerts are generated in the Enterprise Manager console and notifications are sent to the appropriate administrators. Enterprise Manager supports notifications via e-mail (including e-mail-to-page systems), SNMP traps, and/or by running custom scripts.

Enterprise Manager supports these various notification mechanisms via notification methods. A notification method is used to specify the particulars associated with a specific notification mechanism, for example, which SMTP gateway(s) to use for e-mail, which OS script to run to log trouble-tickets, and so on. Super Administrators perform a one-time setup of the various types of notification methods available for use. Once defined, other administrators can create notification rules that specify the set of criteria that determines when a notification should be sent and how it should be sent. The criteria defined in notification rules include the targets, metrics and severity states (clear, warning or critical) and the notification method that should be used when an alert occurs that matches the criteria. For example, you can define a notification rule that specifies e-mail should be sent to you when CPU Utilization on any host target is at critical severity, or another notification rule that creates a trouble-ticket when any database is down. Once a notification rule is defined, it can be made public for sharing across administrators. For example, administrators can subscribe to the same rule if they are interested in receiving alerts for the same criteria defined in the rule. Alternatively, an Enterprise Manager Super Administrator can assign notification rules to other administrators such that they receive notifications for alerts as defined in the rule.

Notifications are not limited to alerting administrators. Notification methods can be extended to execute any custom OS script or PL/SQL procedure, and thus can be used to automate any type of alert handling. For example, administrators can define notification methods that call into a trouble ticketing system, invoke third-party APIs to share alert information with other monitoring systems, or log a bug against a product.

Customizing Notifications

Notifications that are sent to Administrators can be customized based on message type and on-call schedule. Message customization is useful for administrators who rely on both e-mail and paging systems as a means for receiving notifications. The message formats for these systems typically vary—messages sent to e-mail can be lengthy and can contain URLs, and messages sent to a pager are brief and limited to a finite

number of characters. To support these types of mechanisms, Enterprise Manager allows administrators to associate a long or short message format with each e-mail address. E-mail addresses that are used to send 'regular' e-mails can be associated with the 'long' format; e-mail addresses that are used to send pages can be associated with the 'short' format. The 'long' format contains full details about the alert; the 'short' format contains the most critical pieces of information.

Notifications can also be customized based on an administrator's on-call schedule. An administrator who is on-call might want to be contacted by both his pager and work e-mail address during business hours and only by his pager address during off hours. Enterprise Manager offers a flexible notification schedule to support the wide variety of on-call schedules. Using this schedule, an administrator defines his on-call schedule by specifying the e-mail addresses by which they should be contacted when they are on-call. For periods where they are not on-call, or do not wish to receive notifications for alerts, they simply leave that part of the schedule blank. All alerts that are sent to an administrator automatically adhere to his specified schedule.

Corrective Actions

Corrective actions allow you to specify automated responses to alerts. Corrective actions ensure that routine responses to alerts are automatically executed, thereby saving administrator time and ensuring problems are dealt with before they noticeably impact users. For example, if Enterprise Manager detects that a component, such as the SQL*Net listener is down, a corrective action can be specified to automatically start it back up. A corrective action is thus any task that you specify that will be executed when a metric triggers a warning or critical alert severity. By default, the corrective action runs on the target on which the alert has triggered. Administrators can also receive notifications for the success or failure of corrective actions.

A corrective action can also consist of multiple tasks, with each task running on a different target. For example, if an Oracle Application Server's J2EE container (called an OC4J container) triggers a warning alert indicating it is approaching its limit on the number of requests it can handle, a corrective action can be defined to automatically start up another OC4J container on another host, thereby sharing application load among different containers. As shown by this example, corrective actions can be used to dynamically allocate resources as demand increases, thereby preventing performance bottlenecks before they impact overall application availability.

Corrective actions for a target can be defined by all Enterprise Manager administrators who have been granted OPERATOR or greater privilege on the target. For any metric, you can define different corrective actions when the metric triggers at warning severity or at critical severity.

Corrective actions must run using the credentials of a specific Enterprise Manager administrator. For this reason, whenever a corrective action is created or modified, the credentials that the modified action will run with must be specified.

Blackouts

Blackouts allow you to support planned outage periods to perform emergency or scheduled maintenance. When a target is put under blackout, monitoring is suspended, thus preventing unnecessary alerts from being sent when you bring down a target for scheduled maintenance operations such as database backup or hardware upgrade. Blackout periods are automatically excluded when calculating a target's overall availability.

A blackout period can be defined for individual targets, a group of targets or for all targets on a host. The blackout can be scheduled to run immediately or in the future,

and to run indefinitely or stop after a specific duration. Blackouts can be created on an as-needed basis, or scheduled to run at regular intervals. If, during the maintenance period, you discover that you need more (or less) time to complete maintenance tasks, you can easily extend (or stop) the blackout that is currently in effect. Blackout functionality is available from both the Enterprise Manager console as well as via the Enterprise Manager command-line interface (EMCLI). The EMCLI is often useful for administrators who would like to incorporate the blacking out of a target within their maintenance scripts. When a blackout ends, the Management Agent automatically re-evaluates all metrics for the target to provide current status of the target post-blackout.

Monitoring Templates

Monitoring templates simplify the task of standardizing monitoring settings across your enterprise by allowing you to specify the monitoring settings once and apply them to your monitored targets. This makes it easy for you to apply specific monitoring settings to specific classes of targets throughout your enterprise. For example, you can define one monitoring template for test databases and another monitoring template for production databases.

A monitoring template defines all Enterprise Manager parameters you would normally set to monitor a target, such as:

- Target type to which the template applies.
- Metrics (including user-defined metrics), thresholds, metric collection schedules, and corrective actions.

When a change is made to a template, you can reapply the template across affected targets in order to propagate the new changes. You can reapply the monitoring templates as often as needed. For any target, you can preserve custom monitoring settings by specifying metric settings that can never be overwritten by a template.

User-Defined Metrics

User-defined metrics allow you to extend the reach of Enterprise Manager's monitoring to conditions specific to particular environments via custom scripts or SQL queries and function calls. Once a user-defined metric is defined, it will be monitored, aggregated in the repository, and can trigger alerts like any other metric in Enterprise Manager. There are two types of user-defined metrics: Operating System and SQL.

- *Operating System (OS) User-Defined Metrics:* Accessed from Host target home pages, these user-defined metrics allow you to implement custom monitoring functions via OS scripts.
- *SQL User-Defined Metrics:* Accessed from the Database target home pages, these user-defined metrics allow you to implement custom database monitoring using SQL queries or function calls.

Creating a User-Defined Metric

To monitor a particular condition (example: check successful completion of monthly system maintenance routines), you can write a custom OS script to monitor that condition, then register it as a user-defined metric in Enterprise Manager. Each time the metric is evaluated by Enterprise Manager, it uses this script to evaluate the condition. SQL user-defined metrics do not use external scripts: you enter SQL directly into the Enterprise Manager console at the time of metric creation. Once a user-defined

metric is defined, all other monitoring features, such as alerts, notifications, historical collections, and corrective actions are automatically available to it.

If you already have your own library of custom monitoring scripts, you can leverage Enterprise Manager's monitoring features by integrating these scripts with Enterprise Manager as OS user-defined metrics. Likewise, existing SQL queries or function calls currently used to monitor database conditions can be easily integrated into Enterprise Manager's monitoring framework as SQL user-defined metrics. For more information about user-defined metrics, see *Oracle Enterprise Manager Advanced Configuration*.

Accessing Monitoring Information

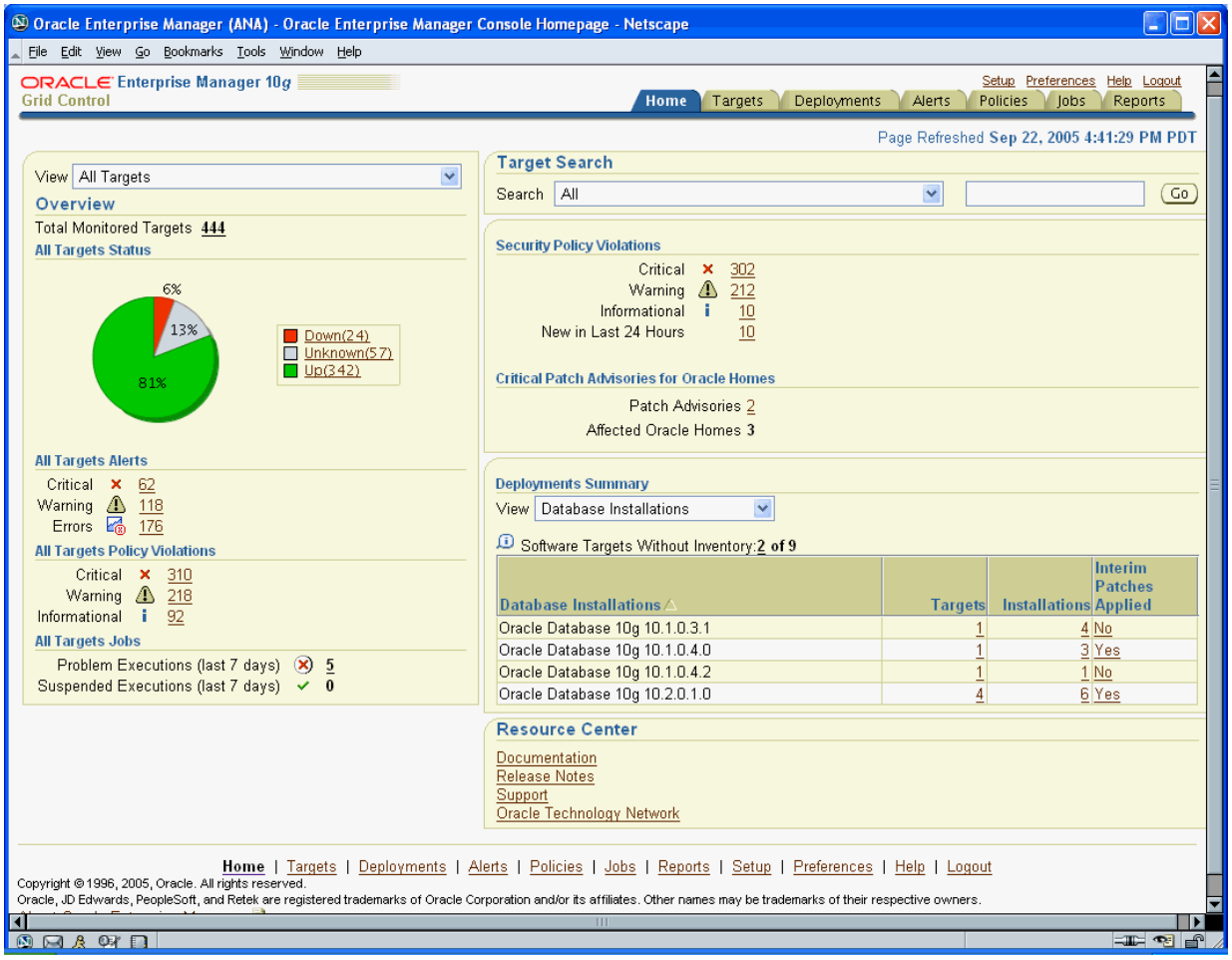
All monitoring information is accessed via the Enterprise Manager console, providing quick views into the health of your monitored environment.

Enterprise Manager Console Home Page

The Enterprise Manager console home page shown in Figure 4–1 gives you an at-a-glance view of the overall status of your monitored environment. As shown in the following figure, the home page summarizes key monitoring areas such as availability across all managed targets, open alerts, policy violations, and recent problems with job executions. Links on this page allow you to drill down to detailed performance information.

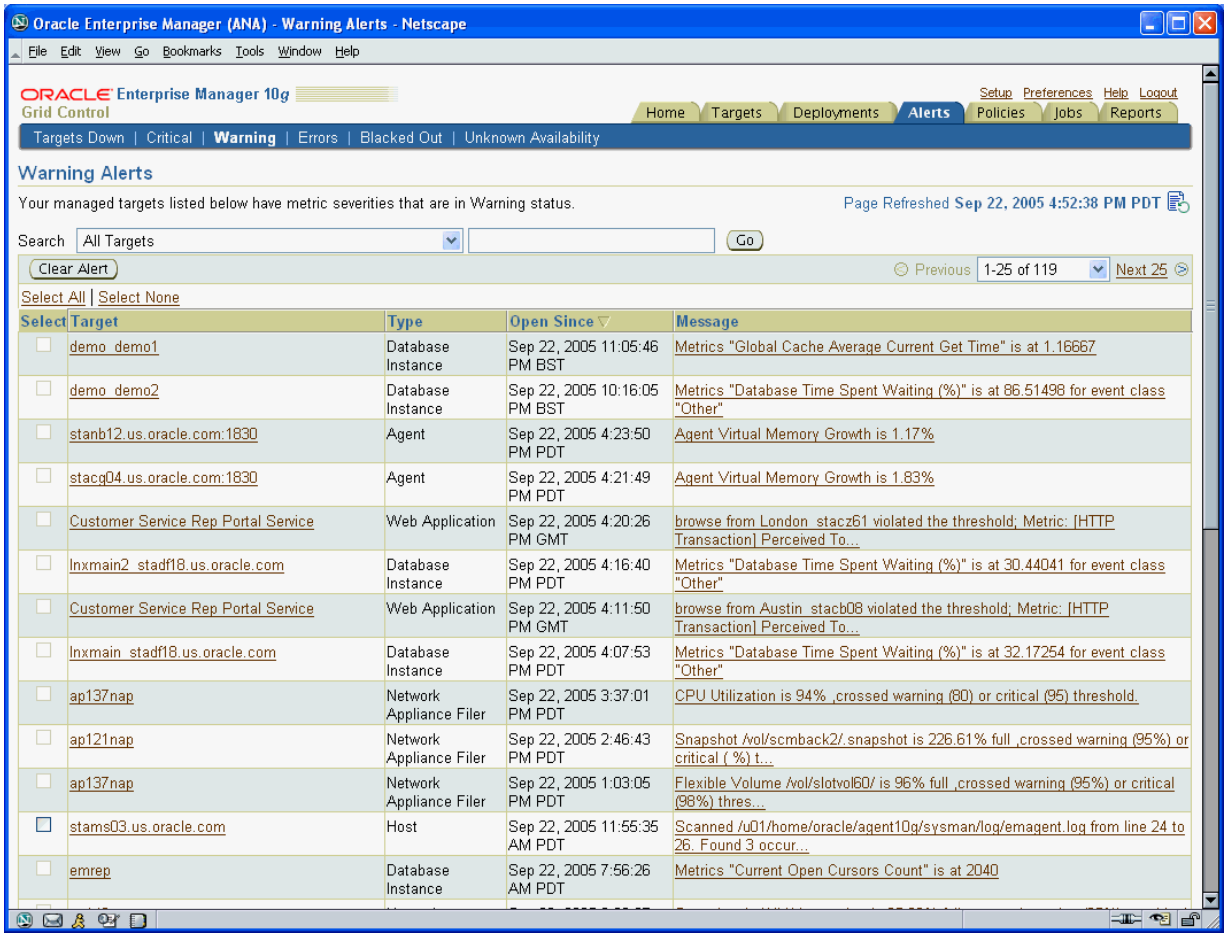
The Resource Center is your central access point to Enterprise Manager documentation as well as the comprehensive technical resources of the Oracle Technology Network (OTN).

Figure 4–1 Enterprise Manager Console



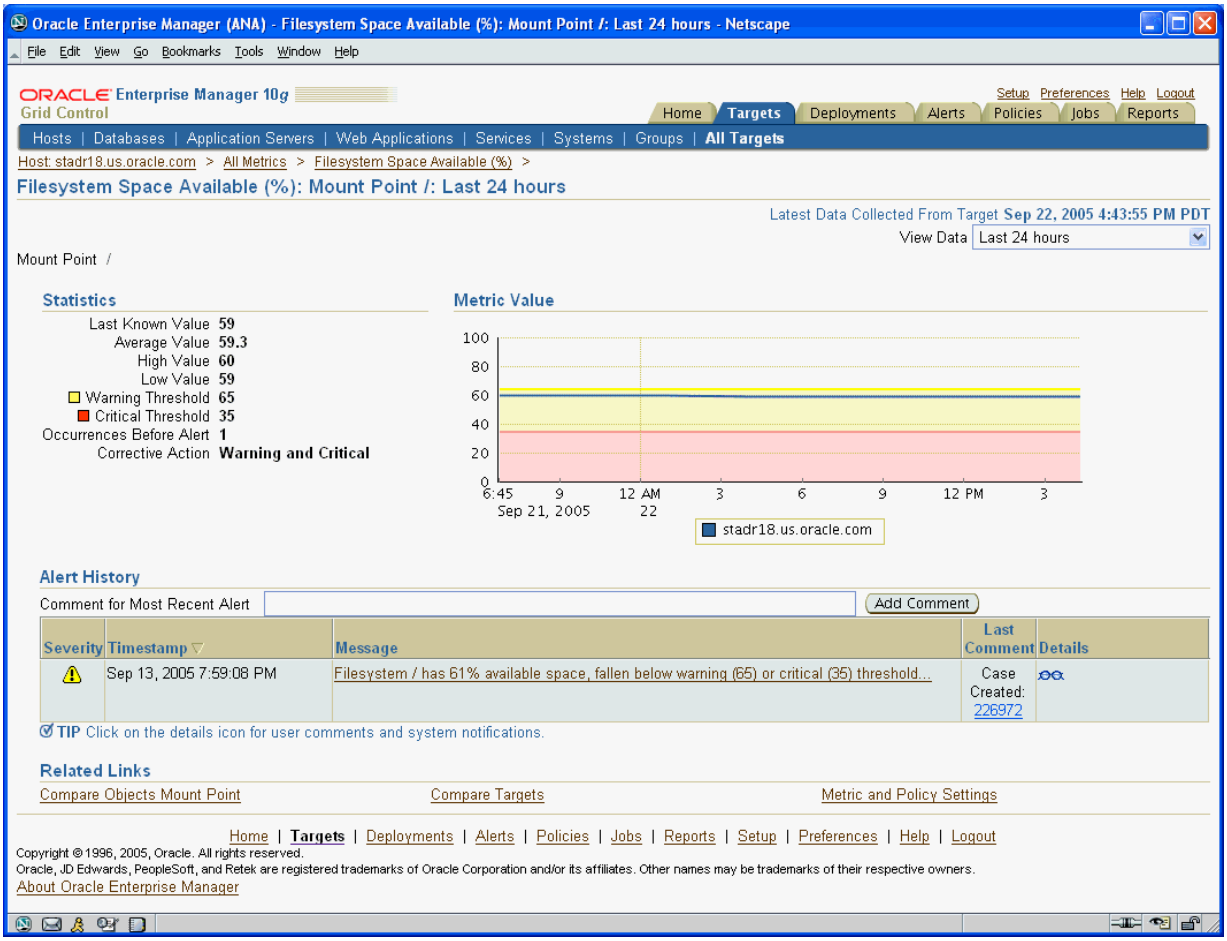
From the home page, you can easily access alert information. For example, you can click on the Down link in the All Targets Status legend to determine which targets are currently down. Under All Target Alerts, you can click on the Warning alerts value to access a list of warning alerts for all monitored targets (Figure 4–2).

Figure 4–2 Warning Alerts Page



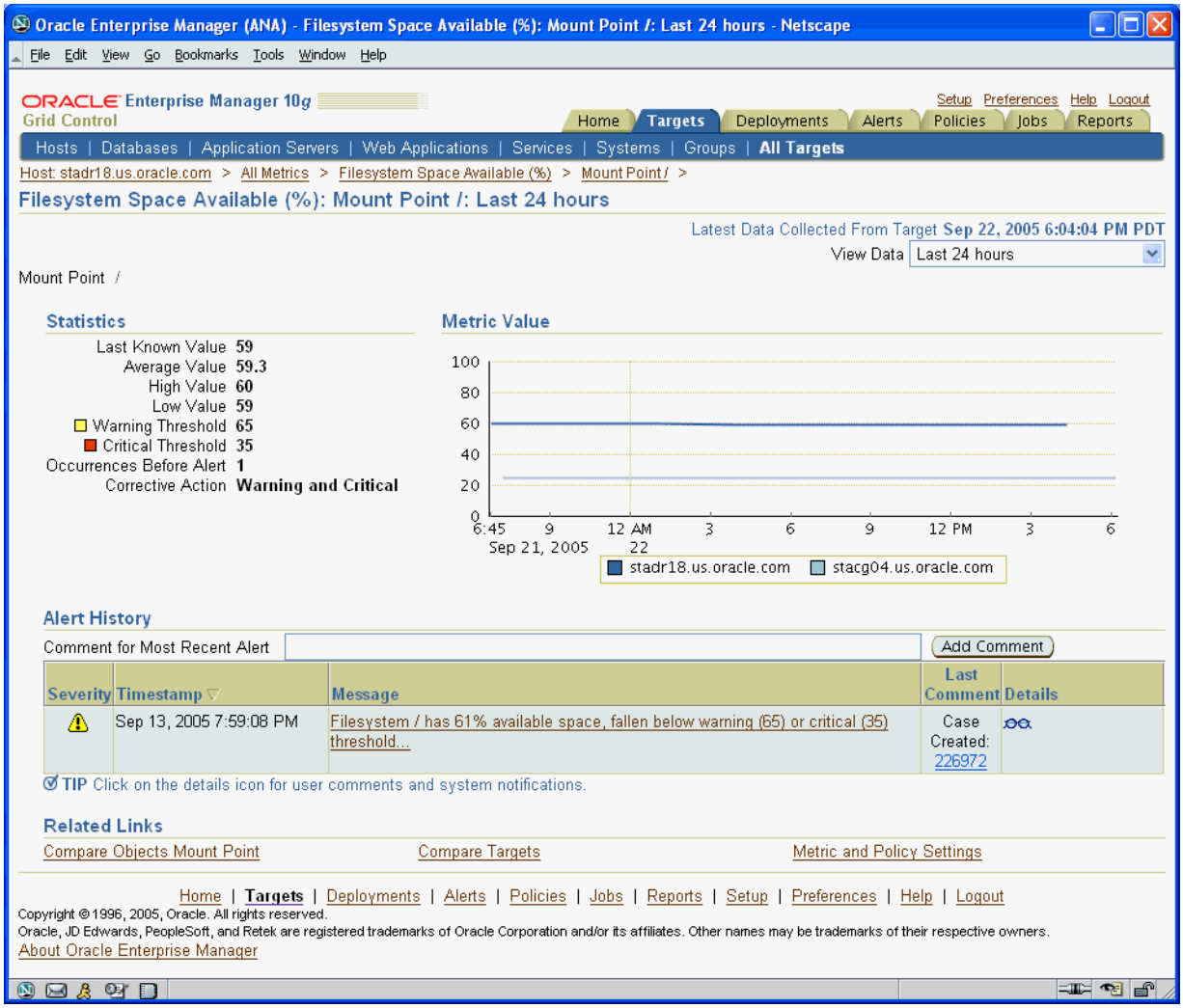
The most recent alerts are listed first. You can change the sorting methodology by clicking on the appropriate column header. By clicking on a specific alert message, you can drill down to explicit details about the metric in alert (Figure 4–3).

Figure 4–3 Warning Alert: Metric Details



By default, metric values shown on this page reflect the last 24 hours of collected data. You can also select another time period or specify a custom time period with which to view metric data and easily assess if the problem occurred recently or across a long time period. Because Enterprise Manager collects and aggregates metric data in the Management Repository, you can click on the Compare Targets related link to display metric data for more than one target simultaneously, thus allowing you to compare performance across multiple targets (Figure 4–4).

Figure 4–4 Compare Targets



The Alert History table shows alerts generated over the selected time period. You can view explicit details about a specific alert in this table by clicking on the eyeglasses icon in the Details column. Figure 4–5 shows the Alert Details page.

Figure 4–5 Alert Details

The Alert Details page shows all notifications for an alert, any corrective actions that have been executed, and any custom notifications, for example, the opening of a case ticket for an alert. On this page, you also have the option of adding annotations or comments for other administrators to see.

5

Group Management

This chapter introduces the concept of group management and contains the following sections:

Introduction to Groups

Today's IT operations can be responsible for managing a great number of components, such as databases, application servers, hosts, or other components, which can be time consuming and impossible to manage individually. The Enterprise Manager Grid Control group management system lets you combine components (called targets in Enterprise Manager) into logical sets, called groups. This enables you to organize, manage, and effectively monitor the potentially large number of targets in your enterprise.

Enterprise Manager Groups can include:

- Targets of the same type, such as:
  - All hosts in your data center
  - All of your production databases
- Targets of different types, such as:
  - The database, application server, listener, and host that are used in your application environment
  - Targets operating within a particular data center region

> **Note:** An Enterprise Manager "System," used specifically to group the components on which a service runs, is a special kind of Enterprise Manager group. Many of the functions and capabilities for groups and systems are similar. See Chapter 11, "Service Management" for a detailed explanation of systems and how they are used.

Managing Groups

By combining targets in a group, Enterprise Manager offers a wealth of management features that enable you to efficiently manage these targets as one group. Using the Group pages, you can:

- View a summary status of the targets within the group.
- Monitor outstanding alerts and policy violations for the group collectively, rather than individually.
- Monitor the overall performance of the group through performance charts.
- Perform administrative tasks, such as scheduling jobs for the entire group, or blacking out the group for maintenance periods.

You can also customize the console to provide direct access to group management pages.

Group Home Page

The Group Home page, shown in Figure 5–1, is the central location for monitoring information. The Group Home page provides the following features:

- Availability pie chart that provides at-a-glance information on the current status across all members so you can easily assess the percentage of members that are up, and the percentage of members that are unavailable. You can quickly drill down for information if any member target is down.
- Roll-up of open alerts and policy violations, categorized by severity, so you can quickly focus on the most critical problems first. Alerts and violations that have occurred within the last 24 hours highlight problems that recently occurred.
- Access to the Policy Trend Overview page, which provides a comprehensive view of the group for compliance with policy rules over a period of time. Using policy charts, you can assess trends such as increased or decreased number of policy violations, changes in the overall group compliance score, and the percentage of members in compliance with your enterprise's policy rules.
- Access to the Security at a Glance page, which provides an overview of the security health of the group. This shows statistics about security policy violations and critical security patches that have not been applied.
- Summary of recent configuration changes across all members in the group, so you can easily determine if a new problem is related to any recent changes.
- Summary of Critical Patch Advisories for Oracle homes within the group.

Figure 5–1 Group Home Page

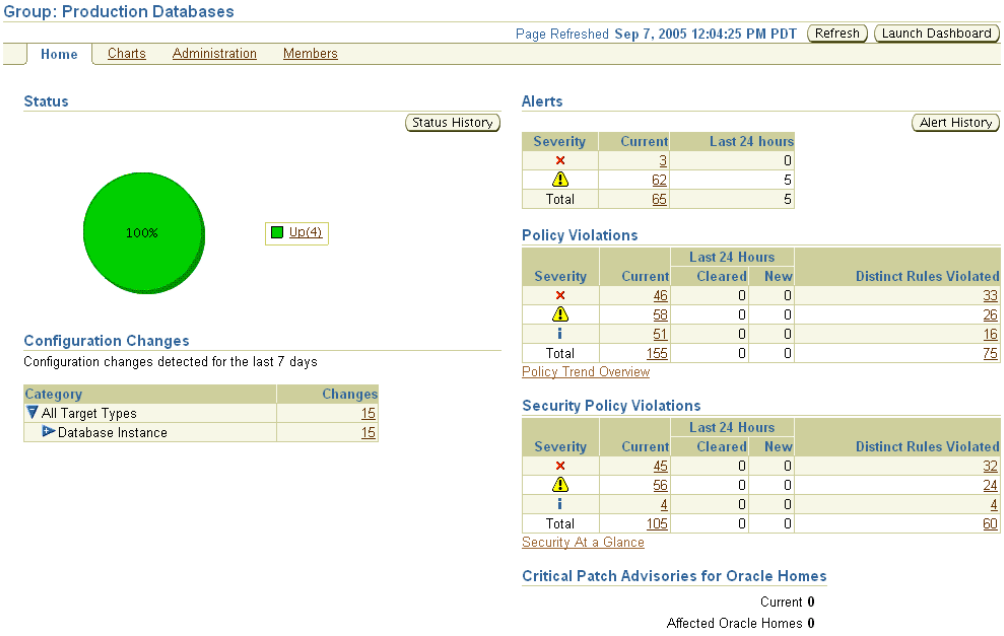
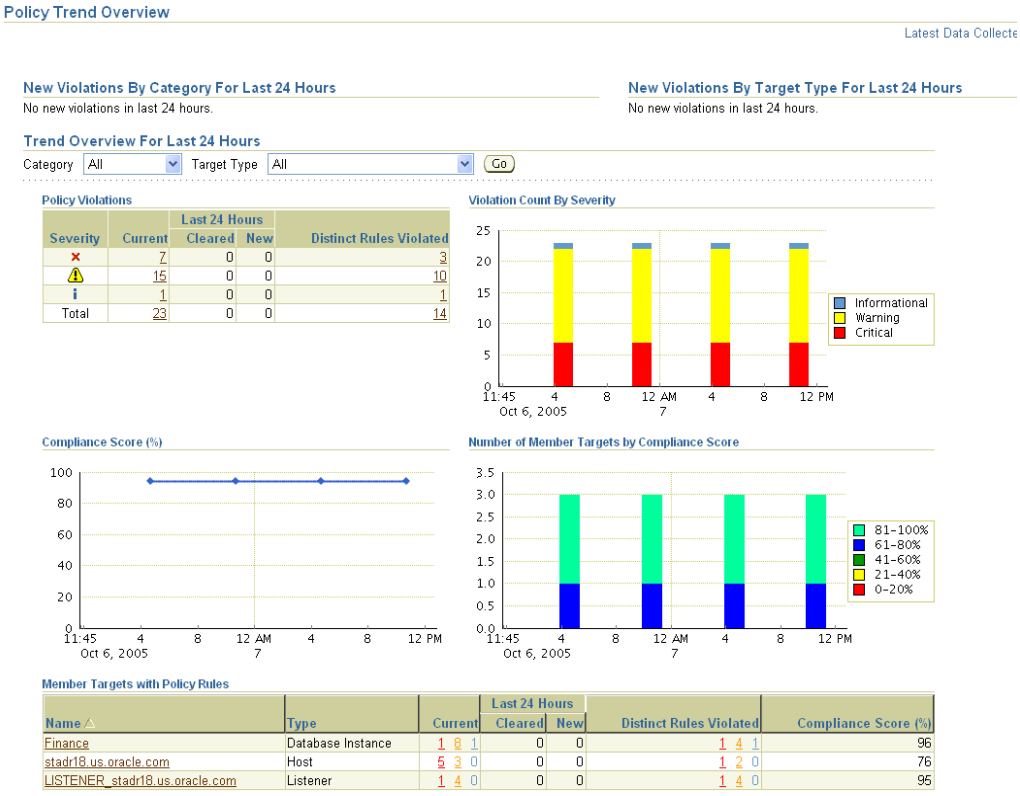


Figure 5–2 shows the Policy Trend Overview page that you can access from the Group Home page.

Figure 5–2 Policy Trend Overview Page

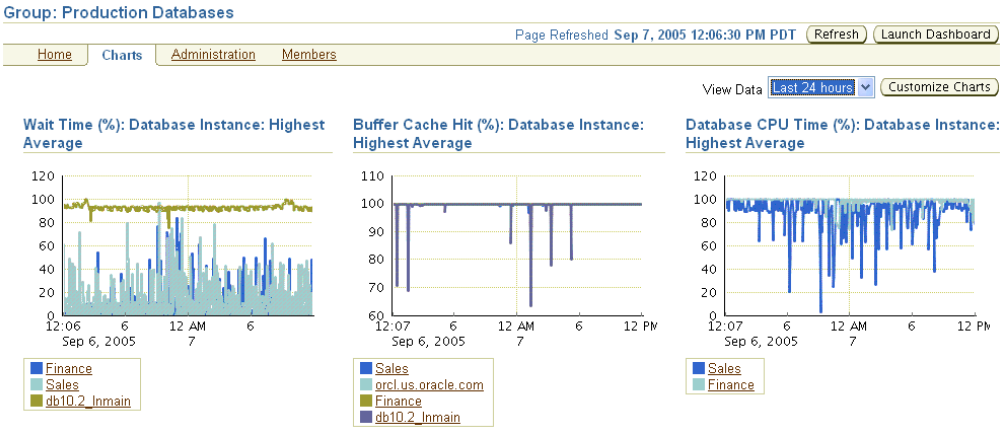


See Also: "Group Home Page" in the Enterprise Manager online help

Group Charts Page

The Group Charts page, shown in Figure 5–3, enables you to monitor the collective performance of the group. Out-of-box performance charts are provided based on the type of members in the group. For example, when databases are part of the group, a Wait Time (%) chart is provided that shows the top databases with the highest wait time percentage values. You can view this performance information over the last 24 hours, last 7 days, or last 31 days. You can also add your own custom charts to the page.

Figure 5–3 Group Charts Page



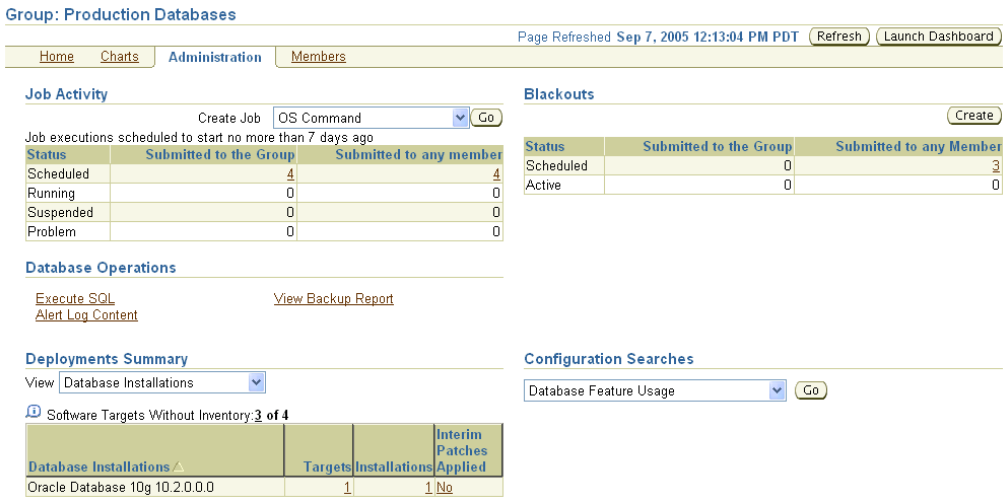
See Also: "Group Charts Page" in the Enterprise Manager online help

Group Administration Page

The Group Administration page, shown in Figure 5–4, provides a central point for performing common administrative tasks for the group. For example, you can:

- Run jobs or find out the status of currently running jobs against the group.
- Define planned outage windows, called blackouts, on the members of the group to perform maintenance tasks.
- Run SQL commands collectively against the database member targets of the group.
- View the most recent backup for each database in the group.
- View the last 100,000 bytes of the alert log for all databases in the group.
- Use a deployment summary to easily obtain hardware and software inventory information across all member targets.

Figure 5–4 Group Administration Page



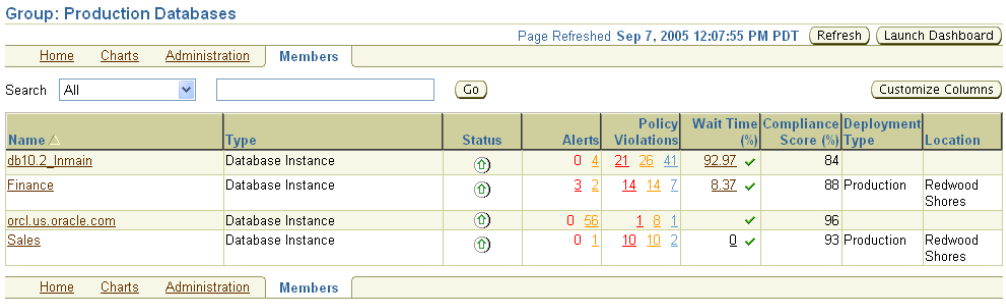
See Also: "Group Administration Page" in the Enterprise Manager online help

Group Members Page

The Group Members page, shown in Figure 5–5, summarizes information about the member targets in the group. It includes information on their current availability status, roll-up of open alerts and policy violations, and key performance metrics based on the type of targets in the group.

You can visually assess availability and relative performance across all member targets. You can sort on any of the columns to rank members by a certain criterion (for example, database targets in order of decreasing wait time percentage). Default key performance metrics are displayed based on the targets you select, but you can customize these to include additional metrics that are important for managing your group.

Figure 5–5 Group Members Page



See Also: "Group Members Page" in the Enterprise Manager online help

System Dashboard

The System Dashboard, shown in Figure 5–6, enables you to proactively monitor the status and alerts in the group as they occur. The color-coded interface is designed to

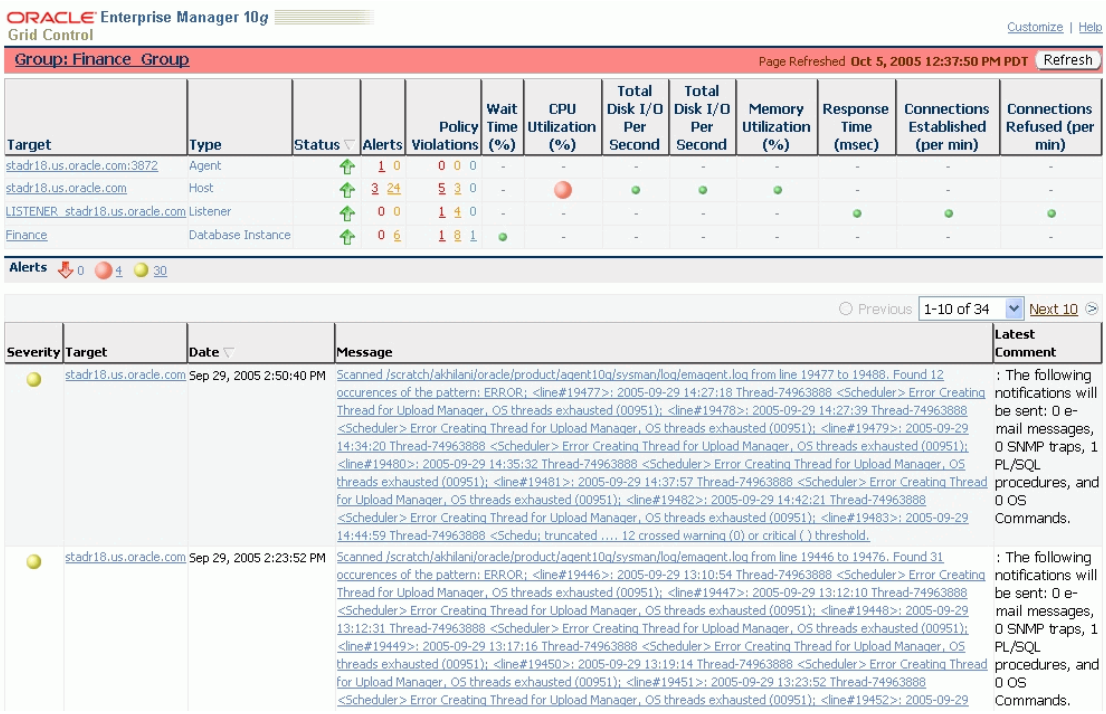
highlight problem areas using the universal colors of alarm—targets that are down are highlighted in red, metrics in critical severity are shown as red dots, metrics in warning severity are shown as yellow dots, and metrics operating within normal boundary conditions are shown as green dots.

Using these colors, you can easily spot the problem areas for any target and drill down for details as needed. An alert table is also included to provide a summary for all open alerts in the group. The alerts in the table are presented in reverse chronological order to show the most recent alerts first, but you can also click on any column in the table to change the sort order.

You can customize the dashboard according to your needs. You can specify which key metrics should be included in the dashboard and the display names to be used for these metrics. You can also customize the refresh interval to ensure that you always receive timely information about alerts as they are detected.

You can launch the System Dashboard in context from any Group Home page. However, using reporting framework features, you can also make the System Dashboard publicly available for any user that has access to a web browser and the Enterprise Manager Reports Web site.

Figure 5–6 System Dashboard

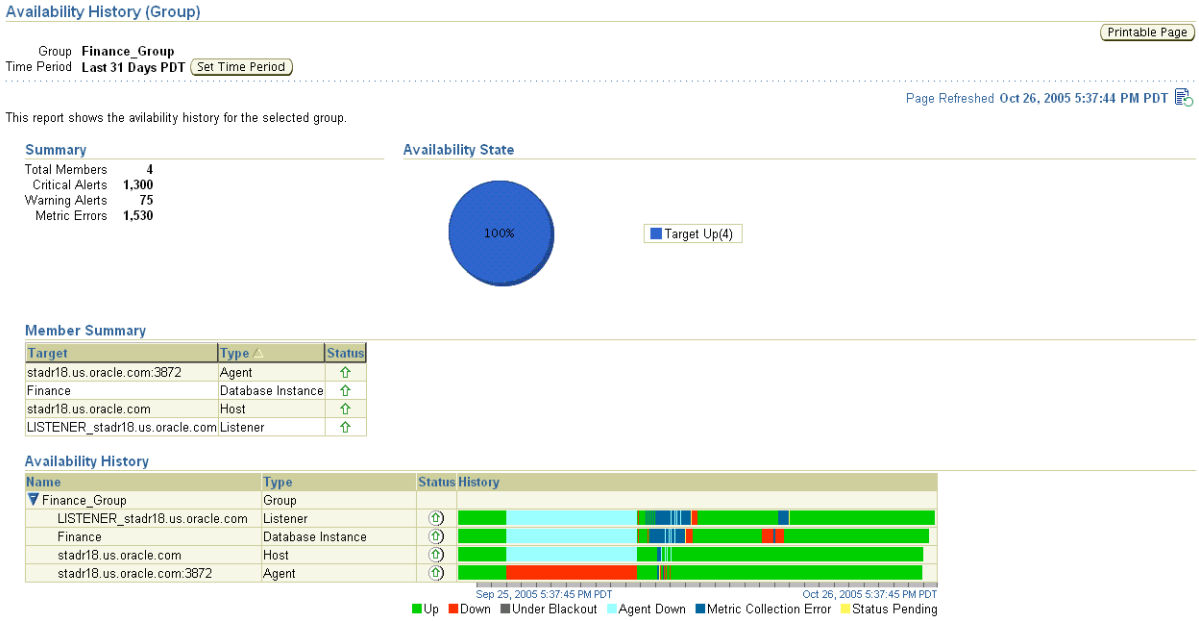


Out-of-Box Reports

Enterprise Manager provides several out-of-box reports for groups as part of the reporting framework, called Information Publisher. These reports display important administrative information, such as hardware and operating system summaries across all hosts within a group, and monitoring information, such as outstanding alerts and policy violations for a group.

You can access these reports from the **Reports** link in the Related Links section of all Group pages. Figure 5–7 shows the Availability History report for a specified group over the last 31 days.

Figure 5–7 Availability History Report



See Also: Chapter 7, "Information Publisher"

Redundancy Groups

A redundancy group is a group that contains members of the same type that function collectively as a unit. A type of redundancy group functions like a single logical target that supports a status (availability) metric. A redundancy group is considered up (available) if at least one of the member targets is up.

You can create and administer a redundancy group from the All Targets page. Redundancy groups support all group management features previously discussed.

Do not use redundancy groups if the group you want to model is a Real Application Clusters database, host cluster, HTTP server high availability group, or OC4J high availability group. Instead, you can use the following specialized target types for this purpose:

- Cluster
- Cluster Database
- HTTP HA Group
- OC4J HA Group

6

Managing Deployments

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

Deployments Overview

With today's complex IT infrastructures, most of an administrator's time may be spent trying to keep the underlying software up to date. Operating systems, applications, and other software must be installed, propagated, patched to the latest level, and duplicated. Without automation and central management, deployment management could present a huge obstacle to the growth and maintenance of your enterprise.

With Enterprise Manager Grid Control, monitoring, managing, and maintaining your IT infrastructure is simplified through its powerful tools for configuration management, cloning, patching, bare metal provisioning, and policy management.

The following sections describe how your enterprise (and administrators) can benefit from Grid Control's deployment management features.

Note: To view a summary of deployments:

1. Navigate to the Grid Control Home page.
2. In the Deployments Summary section, set the **View** menu to Hardware, Operating System, Database Installations, or Application Server Installations.

Hardware and Software Configurations

Use Grid Control to view, save, track, compare, and search the configuration information stored in the Management Repository for individual hosts, databases, application servers, clients, and the entire enterprise.

This section contains the following subsections:

Collected Configurations

Enterprise Manager Grid Control collects configuration information for all hosts and the managed targets on those hosts that have a running Management Agent. The agent periodically sends the configuration information to the Management Repository over HTTP or HTTPS, allowing you to view up-to-date configuration information for your entire enterprise through Grid Control.

Table 6–1 Collected Configurations for Various Targets

Target Type	Collected Configuration Information
Host[1]	▪ Hardware (includes memory, CPU, I/O device, and network information) ▪ Operating system (includes installed patches and patch sets) ▪ Oracle software (includes installed products and their components, patch sets, and interim patches applied using OPatch) ▪ Other software (includes all software registered with the operating system)
Database[2]	▪ Database and instance properties ▪ Initialization and System Global Area parameters ▪ Tablespace, datafile, and control file information ▪ Redo logs, rollback segments, and high availability information ▪ Licensing information
Application Server	▪ Installation type and version ▪ Repository information ▪ URLs (for Management Agent and Application Server Control) ▪ Component information (includes HTTP Server, OC4J, and Web Cache) ▪ OPMN information (includes ports, SSL information, and log levels)

Table 6–1 (Cont.) Collected Configurations for Various Targets

Target Type	Collected Configuration Information
Client[3]	■ Hardware ■ Operating system (includes properties, file systems, patches) ■ Software registered with the operating system ■ Network data (includes latency and bandwidth to the Web server) ■ Client-specific data that describes configuration for the browser used to access the client configuration collection applet ■ Other client-oriented data items
Enterprise[4]	Summary views for hardware, operating systems, Oracle Databases, Oracle Application Servers, and Oracle Collaboration Suite. Table 6–3 contains details on these summary views.

[1] The default collection period for host configuration information is 24 hours.
[2] The default collection period for database configuration information is 12 hours.
[3] Refer to "Client Configurations" in this chapter for more information.
[4] Refer to "The Enterprise Configuration" in this chapter for more information.

Viewing Configurations

Using Grid Control, you can perform the following actions for targets such as hosts, databases, application servers, and clients:

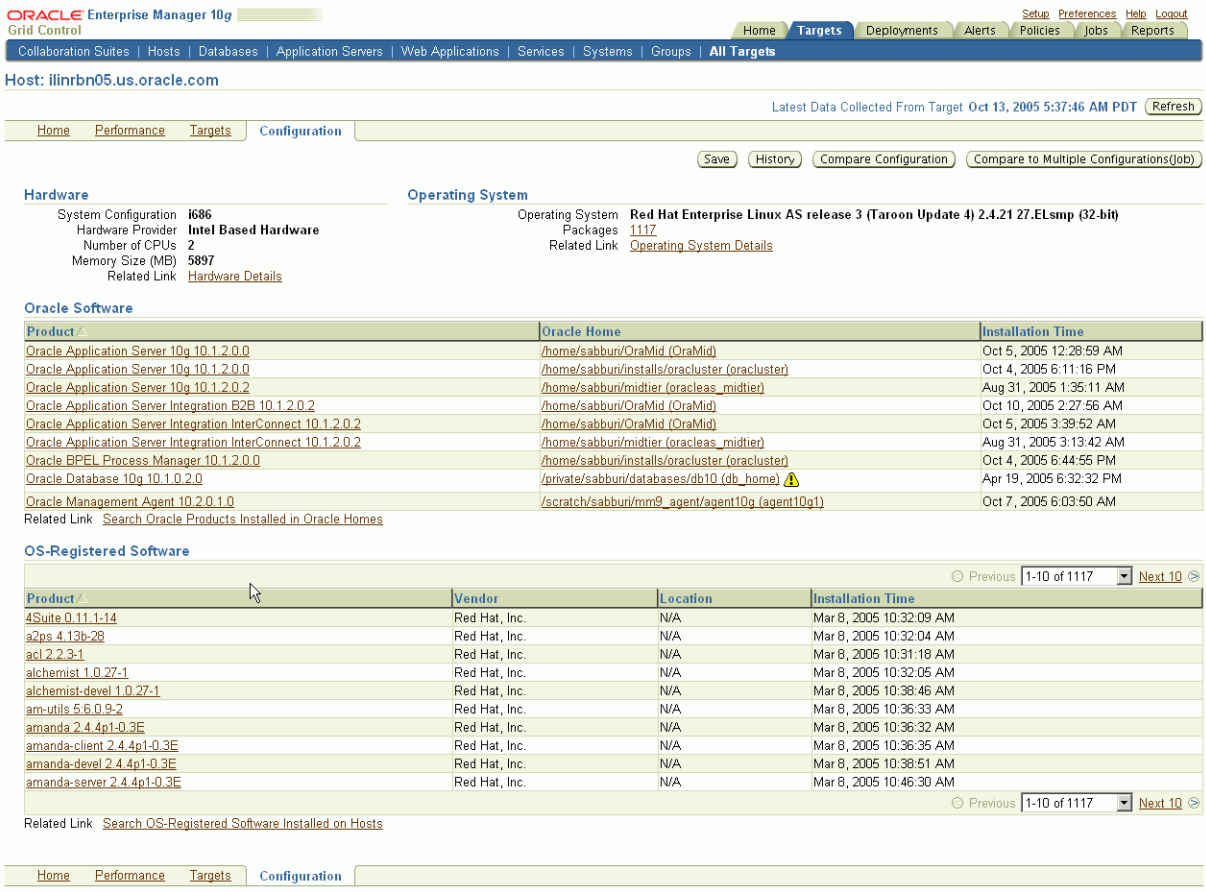
- View the last collected and saved configuration
- Save configurations to a configuration file or to the Management Repository
- Search collected configuration data
- View the history of configuration changes
- Compare configurations (refer to "Comparing Configurations" in this chapter for more detailed information)

See Also: Grid Control online help for the pages described in Table 6–2

Table 6–2 Viewing Configurations for Various Targets

Target Type	Instructions for Viewing Configuration
Host	From the Home page for that host, click the **Configuration** subtab.
Database	From the Database Home page, click the **Maintenance** subtab, then click the **Last Collected Configuration** link under Software Deployments, Configuration.
Application Server	From the Application Server Home page, click the **Administration** subtab, then click the **Last Collected Configuration** link under Configuration.
Client	From the Deployments tab, click the **Client Configurations** link.
Enterprise	From the Deployments tab, select a summary view from the **View** list under Deployment Summary. Summary views are provided in Table 6–3.

Figure 6–1 Host Configuration Page



Comparing Configurations

Grid Control gives you the tools to perform comparisons between configurations of the same target type. These comparisons are useful for quickly finding similarities and differences between two or more configurations.

You can compare:

- Two configurations in the Management Repository
- Two saved configuration files
- One configuration to multiple configurations
- A configuration in the Management Repository to a saved configuration file

When two target configurations are compared, all categories of collected configuration information are included. Grid Control presents the summary results of the comparison in a tabular format. More detailed information is available by drilling down from those summary results.

Comparisons between multiple configurations must be performed using the Enterprise Manager Job System.

See Also: "About Comparisons" in the Grid Control online help

The Enterprise Configuration

Grid Control offers several summary views of your enterprise that you can use to monitor the state of your host and target configurations. "Enterprise" refers to the complete set of hosts and targets for which configuration information is stored in the Management Repository.You can also search enterprise configuration information using predefined or custom searches.

Viewing the Enterprise Configuration

Table 6–3 lists the available enterprise configuration summary views.

Table 6–3 Enterprise Configuration Summary Views

Summary View	Description
Hardware	Shows the different types of host hardware 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 ■ The operating system running on each host
Operating Systems	Shows the different types of operating systems, the number of hosts running each type, and whether any operating system patches were applied. From the summary view, you can drill down to: ■ A list of hosts running each operating system ■ A list of the operating system patches, and whether or not they have been applied
Database and Application Server Installations	Shows the different versions of Oracle Databases or Application servers, respectively, the number of targets and installations for each version, and whether or not any interim patches were applied using OPatch. From the summary view for each database or application server version, you can drill down to: ■ A list of the instances ■ A list of the installations and Oracle home directories ■ More information about the unique interim patches applied using OPatch
Collaboration Suite Installations	Shows the different versions of Oracle Collaboration Suite components, the number of targets and installations for each version, and whether or not any interim patches were applied using OPatch. From the summary view, you can drill down to more information about Oracle Collaboration Suite components.

See Also: "Viewing the Enterprise Configuration" in the Grid Control 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, such as:

- 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, allowing you the flexibility to create specific search queries. Based on your search criteria, Grid Control 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, patch sets, and interim patches installed in Oracle homes
  - Search software registered with the host operating system
  - Search initialization parameter settings and setting changes
  - Search tablespaces, datafiles, and recommended database settings
  - Search database feature usage
  - Search host operating system components, patches, property settings, and property changes
  - Search host operating system and hardware summaries
  - Search host file systems and network interface card configurations
  - Search policy library

- **User-Defined Searches**

  With a user-defined search, you specify the SQL query that searches 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 is executed. 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 Grid Control online help

Client Configurations

A "client" represents an end-user or customer system—a system that is not part of your own IT infrastructure. A "client configuration" represents the configuration data collected about the end-user's system. These configurations differ from the internal deployments that you manage using Grid Control.

The Client System Analyzer (CSA) application allows Web server administrators to collect and analyze data from end-user systems. The client data is collected by an applet, diagnosed, and sent back to the CSA application. You can either use the CSA application that comes pre-installed with Grid Control, or you can deploy CSA independently to your Web server.

Client System Analyzer in Grid Control

Using the pre-installed application allows you to collect client data without having to set up a separate Web server. The Management Agents collect, analyze, and upload the client data to the Management Repository. End users do not need login credentials to access Grid Control. Example usage scenarios include:

- End-users who call the Help Desk may be asked to navigate to the Out-Of-Box CSA page so that their system information is uploaded. The Technical Support Representative can then review the system information and offer solutions.
- The client's application can be changed to provide an "Upload my system information" link to the Client System Analyzer in the Grid Control application. The link can specify certain configuration parameters, such as the URL to return to after the Client System Analyzer runs.
- The client's application can be modified to redirect its users to the Client System Analyzer in the Grid Control page during login or at other points in the application. Collected information can then be used from within Grid Control to obtain various bits of information about the client systems. Examples include most popular browser versions, or systems that do not have a necessary Operating System patch applied or do not have enough RAM.

Client System Analyzer Deployed Independently

CSA can be deployed independently to any J2EE-capable Web server. This deployment strategy is appropriate when:

- Clients accessing CSA cannot reach or have limited access to a Grid Control deployment; for example, due to a firewall.
- Further customization to the CSA application is required, such as:
  - Custom rules can be supplied to the CSA application so that the end users have immediate feedback as to whether their systems satisfy certain constraints.
  - The behavior of the applet can be changed to collect additional information or to present end users with additional or different user interfaces.
  - The load on the Management Service Web servers needs to be reduced.

Both pre-installed and standalone types of deployments assign a configurable identifier called a Client Configuration Collection Tag to every client configuration collection. After the client configuration data has been collected by the client configuration collection applet and written to the Web server directory specified by the CSA application, you must configure Grid Control to collect the client configuration data and upload it to the Management Repository.

> **See Also:** "Viewing a Client Configuration" in the Grid Control online help
>
> "Configuring Enterprise Manager to Collect Client Configurations" in the Grid Control online help

Accessing Configuration Pages in Grid Control

To access the configuration pages in Grid Control, click the **Deployments** tab, then click the links found under the Configuration section:

- Search
- Compare Configurations

- Compare to Multiple Configurations (Job)
- View Saved Configurations
- Import Configuration
- Host Configuration Collection Problems
- Refresh Host Configuration
- Configuration History

These links take you to pages where you can search, view, and compare configurations for your various targets.

Patching

Manually applying software patches to maintain the latest and most secure IT environment can become a full-time job. With Enterprise Manager Grid Control's deployment management tools, you can quickly see the patches available for the components in your enterprise, find out which have not been applied and which are critical, then bring those components up to the latest patch level with just a few clicks.

The enriched patching application offers an "end-to-end" patching solution that works seamlessly across a wide range of product patches and customer environments. The patching application automates the deployment of patches for the Oracle Database, including Clusterware and RAC, as well as Oracle Application Server and Oracle Collaboration Suite.

Using a direct link to Oracle's *MetaLink* patch repository, the Critical Patch Facility identifies the critical patches that have been released for the Oracle software running in your specific systems, and notifies administrators of only those patches that are applicable to their environment. Once a patch is identified, Grid Control can download and deploy it to multiple targets automatically.

Enterprise Manager Grid Control provides the following patching features:

- Accessing Patching Pages in Grid Control
- Patching Oracle Software
- Linux Host Patching
- Managing Critical Patch Advisories

Accessing Patching Pages in Grid Control

To access the patching pages in Grid Control:

- Click the **Deployments** tab, then click the links found under the Patching section:
  - Patch Oracle Software
  - View Patch Cache
  - Patch Linux Hosts
- Click **Setup,** then click **Patching Setup** from the navigation pane. From this page, you can configure your settings for *MetaLink* and patching, proxy connection, and offline patching.

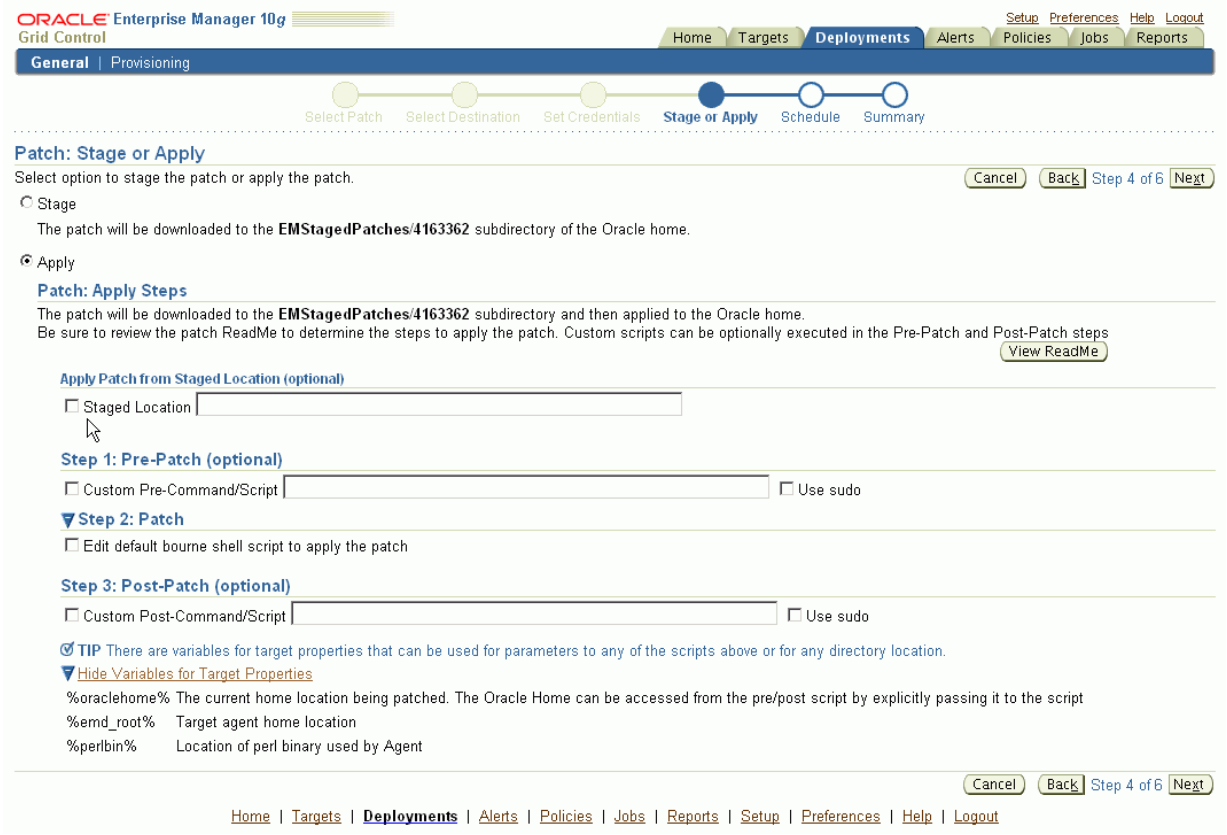
Patching Oracle Software

Grid Control's patching tools simplify the patching of Oracle software products. Some key features are listed in Table 6–4.

Table 6–4 Features for Patching Oracle Software

Feature	Description
Critical Patch Advisories	Lists all critical advisories with their corresponding areas of impact. Critical Patch Advisories also provides support for "remedies," in that you can select an advisory and view the calculated remediation paths from the context of that advisory, as well as the affected Oracle homes.
Online Patching	Allows you to connect to Oracle*MetaLink* through Grid Control, search and download the required patches, and apply.
Offline Patching	Allows you to perform all the patching activities from the Patch Cache. Even when you are not connected to Oracle*MetaLink*, you can search, download, and apply patches.
Oracle*MetaLink*	Searches the Oracle*MetaLink* Web site for Oracle patches and patch sets. Or use Grid Control to search after you provide your Oracle*MetaLink* Web site user name and password.
Patching Setup	Helps you configure MetaLink, patching, proxy connection, and offline patching settings. Note that if you are accessing a proxy server to get to Oracle*MetaLink*, you will need to provide proper authentication and credentials.
Stage and Apply	Helps you stage patches and apply them to the required Oracle homes. Also helps customize your patching operation by allowing you to specify custom pre/post-patching scripts that you may want to execute.
Standalone Database Patching	When patching standalone database by targets, provides additional options that allow you to shut down the database, apply SQL scripts (and start the database in Upgrade mode), and start up the database again.
Information Publisher	Provides a powerful central reporting framework that produces detail and summary reports on patch deployments and non-compliant installations. Supports both out-of-box and ad hoc reporting to satisfy different customer needs.
Shared Agent Patching	Automates patch applications on shared agents when they are NFS-mounted. During Shared Agent Patching, patches the central location where the agent is installed, shuts down and starts up the shared agents, and executes any pre/post-patching scripts (if specified).
Patching Validation	Helps you view the status of all the available patches and patch sets, then validate or invalidate particular patches.
Oracle Home Credentials	Allows you to override the preferred credentials required to access the selected Oracle homes. When overriding, you can choose to either specify one set of credentials for all Oracle homes, or specify different credentials for each home.

Figure 6–2 Stage or Apply Page in the Patch Wizard



Linux Host Patching

The "Patch Linux Hosts" tool, a powerful new feature in Grid Control, facilitates the automated management of Linux hosts in an enterprise. Use this feature to keep the Linux hosts in your enterprise up to date with vital software updates from your Linux vendor.

Patch Linux Hosts uses a reference-based grouped patching model, where you can create one or more reference package repositories containing up-to-date versions of various packages, and associate a group of Linux hosts with these package repositories.

The Patch Linux Hosts tool uses package repositories to patch the hosts as well as to monitor the deviation of the packages installed on the hosts. You can create different groups suited to your administrative needs and even associate different package repositories with different priorities for each group. You can independently control when and how often to update the hosts in the group, and how to determine their compliance with respect to the package repositories.

Note: To use this feature, make sure you have the following:

- Licenses for the Oracle Database Configuration Pack or Oracle Application Server Configuration Pack
- License for the Oracle Provisioning Pack
- "Operator" privileges on the host that you want to patch

Some additional patching features include:

- **Linux Host Patching Groups:** You can group a set of Linux hosts together to update all at once. Each group is associated with one or more package repositories that contain all the certified and appropriate versions of the software packages for the hosts of that group. Each group is configured with an update schedule for a recurring job to run to update the hosts with the associated package repositories.

  See Also: "Creating a New Linux Host Group" in the Grid Control online help

- **Compliance:** The compliance page contains information on the number of hosts in a group that are in compliance, as well as the number of "rogue" packages on a particular host. You can see metrics and charts to measure compliance for all Linux Host Patching Groups, as well as historical compliance data.
- **Emergency Patching:** This feature gives you the option of performing "forced" updates, outside of the established schedule, to immediately respond to critical bugs or security alerts for all configured Linux hosts.
- **Undo Patching:** This features adds flexibility by allowing you to roll back software to its previous stable version, or even de-install the unstable version completely if that software version was found to be unsuitable or to have a bug or security vulnerability.

Managing Critical Patch Advisories

You can use Grid Control 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, Grid Control 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. Grid Control 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 for 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 Grid Control Patch tool to download and deploy the patches to multiple targets.

See Also: "Managing Critical Patch Advisories" in the Grid Control online help

Applying Critical Patches in Offline Mode

The Critical Patch Facility enables administrators to simply download the Critical Patch metadata from *MetaLink* and upload it to the repository. This metadata can then be used by the "RefreshFromMetalink" job for performing Critical Patch calculations in offline mode. Administrators will be alerted to security updates—even if the Management Service is not connected to *MetaLink*.

Some data centers are not connected to the outside world. The Critical Patch Facility's offline mode makes it easy to keep your environment patched to the latest level. Subsequent patching can be done in offline mode as well, using the patch cache feature.

Accessing Critical Patch Advisories Pages in Grid Control

To access the Critical Patch Advisories pages in Grid Control:

- Click the **Deployments** tab, then click the link for the number of Patch Advisories in the Critical Patch Advisories for Oracle Homes section.
- Navigate to Grid Control Home page, then click the link for the number of Patch Advisories in the Critical Patch Advisories for Oracle Homes section.

This takes you to the Patch Advisories page, where you can view advisories, patch sets, and patches to apply, as well as affected Oracle homes and available "remedies."

Cloning

Enterprise Manager Grid Control gives you powerful cloning tools that simplify deployment management for your enterprise. Use cloning to propagate a fully patched and tested Oracle home to multiple hosts, clone database instances to create backups of important databases, and create new single-node Real Application Clusters (RAC) by cloning an existing RAC Oracle home. Cloning saves time, reduces costly configuration and deployment expenditures, and increases reliability for your IT infrastructure components.

This section covers the following areas:

Accessing Cloning Pages in Grid Control

To access the cloning pages in Grid Control, click the **Deployments** tab, then click the links found under the Cloning section:

- Clone Database
- Clone Oracle Home

These links invoke the cloning wizard, which guides you through the steps necessary to clone a database or an Oracle home.

Cloning Oracle Homes

You can use the Enterprise Manager Job System to clone existing Oracle home directories. Once you have configured an Oracle home into a desirable state—where you have chosen particular install options, applied required patches, and tested it—you can clone that Oracle home to one or more hosts using Grid Control's "Clone Oracle Home" tool.

There are many advantages to cloning an Oracle home:

- **Saves time.** When cloning a source Oracle home, all source home patches and settings are seamlessly cloned to the new home. Cloning is much faster than manually creating new homes and applying all source home patches and settings.
- **Clone to multiple destinations.** The Job System allows you to clone a source home to multiple hosts and homes in a single cloning job. This is more efficient

than connecting to each host, then running Oracle Universal Installer to install the homes.

- **Reduces risk of errors.** Cloned homes match the source home exactly; manually installing and patching homes can introduce discrepancies. For cloning, you do not have to remember all the settings and patches you used on the original source Oracle home.
- **Web-based operation.** Clone directly from Grid Control using a Web browser.

> **Note:** You can clone any Oracle home that Enterprise Manager recognizes as a clonable home. See "Out-of-Box Clonable Oracle Homes" in this chapter for more information.

Cloning Databases

In addition to Oracle homes, you can clone Oracle Database instances. Once you have configured an Oracle Database into a desirable state, you can clone that database instance using Grid Control's "Clone Database" tool.

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 cloned 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 Grid Control online help

Cloning Real Application Clusters

The Clone Oracle Home tool supports cloning of a RAC Oracle home in a multi-node RAC environment to a new single-node cluster.

In this scenario, the RDBMS RAC home will be cloned to form a single-node RAC cluster. The prerequisite is that the target node must already have Cluster Ready Services (CRS) installed on it. Since only single-node cloning is supported, you are not required to specify the node names. The RAC installation script (and consequently the RAC cloning script) identifies the node name from the host name.

If you clone a RAC home to multiple targets, each target constitutes a separate single-node RAC cluster.

Out-of-Box Clonable Oracle Homes

The Clone Oracle Home tool helps you to clone any Oracle home that Enterprise Manager recognizes as a clonable home.

Grid Control recognizes most Oracle products as "out-of-box clonable." This means that the installed Oracle homes of most Oracle products can be cloned as is, and do not require any additional support files to perform the cloning operation. Figure 6–5 lists the Oracle products and versions that are "out-of-box clonable."

Table 6–5 Out-of-Box Clonable Oracle Products

Oracle Product	Versions
Database	10.1.x and 10.2
RAC Database	10.1.x and 10.2
Application Server	10.1.2.0.0, 10.1.2.0.2
Oracle Clusterware	10.2

If you want to clone the Oracle home of a database or application server that is not in Table 6–5 (for example, Oracle Database 9.2.0.x or Oracle Application Server 9.0.4.x), you must patch Grid Control with the appropriate "Clone Support Files" before starting the cloning operation. These Clone Support Files, available from Oracle*MetaLink*, are released as one-off patches that must be applied to Grid Control.

Downloading Clone Support Files

To locate these clone support files at Oracle*MetaLink:*

1. Go to `http://metalink.oracle.com` and navigate to the **Advanced Search** option under **Patches and Updates.**
2. Select the **Enterprise Manager Grid Control** (emgrid) product from the list.
3. Select the appropriate release, platform, and patch type.
4. Enter "Clone Support Files" in the Description field, and click **Search.** The Patch Release Notes include instructions for installing the updated clone support files in the Management Service home.

Provisioning

System administrators spend a significant amount of their time installing and configuring new software. Enterprise Manager Grid Control's automated provisioning tools dramatically reduce the time and expense to deploy new systems and allows you to scale-out to more systems at minimal incremental cost.

Enterprise Manager Grid Control's provisioning tools allows administrators to store pre-configured and certified base images in a central software library, from which they can deploy fully configured Linux systems to bare metal, or standardize deployment of "gold images." These new systems can be deployed with any desired software configuration, certified to the appropriate version and patch level—all with a few simple clicks.

This section contains the following subsections:

Accessing Provisioning Pages in Grid Control

Use the provisioning application to add staging servers, boot servers, Red Hat Package Manager (RPM) repositories, default images, software libraries, and network configurations to set up your provisioning environment.

To access the provisioning application, in Grid Control:

1. Click the **Deployments** tab.
2. Click the **Provisioning** subtab.

Provisioning the Operating System

Operating system provisioning is the simplest way to deploy stable, high-performing, cost-effective systems. Grid Control provides "bare-metal" provisioning of the Linux operating system using a standardized PXE booting process. The provisioning application also facilitates the deployment of additional software on top of the operating system. Grid Control provisioning is template-based and can assign hardware profiles, storage layouts, and network configurations to the new machines. You can also use vendor-provided scripts to provision third-party hardware, such as storage disks or load balancers.

Provisioning the Software Library

You can use the provisioning application to put together a default image of the minimum set of software packages required to provision a bare-metal hardware server. The provisioning application uses the Grid Control Job System to stage the default image onto the staging server in preparation for installation. The default image can be installed on any new machine that boots over the network. When a new machine is plugged in and the network booted, the boot server directs the machine to install the specified default image. After installation, the hardware server is configured with the operating system defined in the default image. Provisioning also deploys a Management Agent to the new hardware server so that it can communicate with the central Management Service.

Figure 6–3 Provisioning Software Library

See Also: Chapter 8, "Job System"

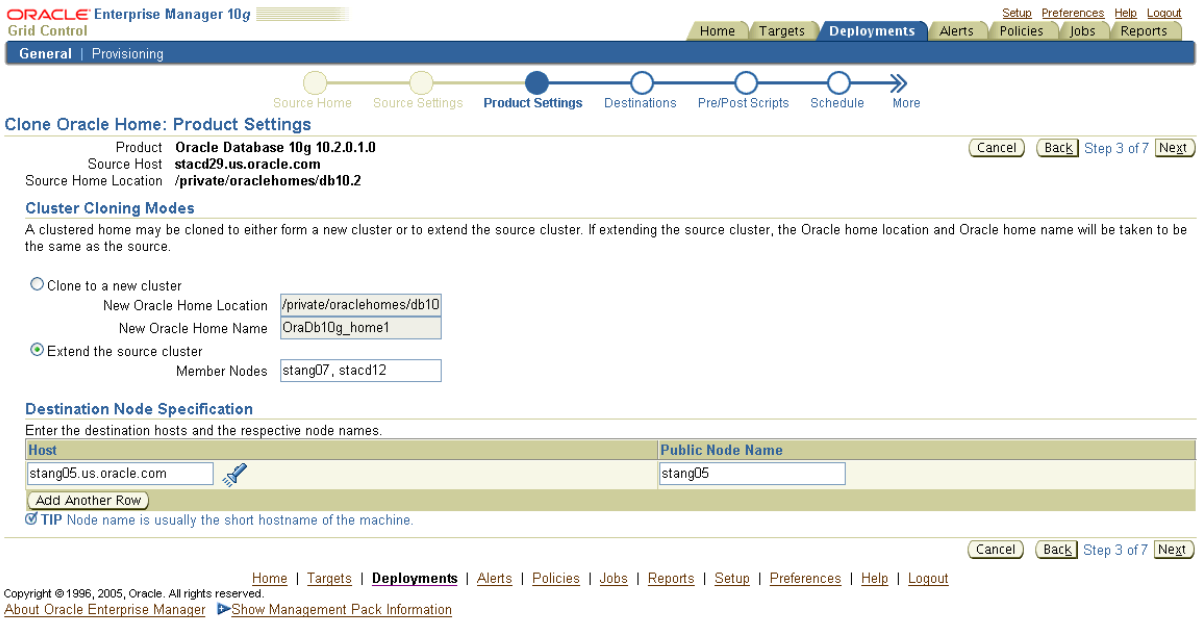
Cloning Gold Images

Cloning is an effective way to deploy tested and approved software images (commonly referred to as "gold images") from either a reference host or the centralized software library. You can use cloning to standardize the deployment of Oracle Database and Oracle Application Server instances—in both clustered and non-clustered environments.

For Oracle Application Server environments, the cloning feature has been enhanced to handle different types of middle-tier installations, including J2EE and WebCache, Portal and Wireless, and Business Intelligence middle tiers. Cloning allows you to deploy pre-patched software to multiple hosts in an efficient and scalable way.

One of Grid Control's most powerful features is the ability to create and extend Oracle Real Application Clusters and Oracle Application Server Cluster environments. From a single gold image of Oracle Clusterware and a single gold image of Oracle Real Application Clusters, you can build new clusters or add nodes to existing clusters. You can also easily convert a single instance database to a RAC database. Similarly, you can extend middleware by cloning application servers.

Figure 6–4 Using Cloning to Extend a RAC Cluster



Provisioning Concepts

Table 6–6 describes some key concepts used in provisioning:

Table 6–6 Key Concepts for Provisioning

Concept	Description
Hardware Server	Applies to computers or workstations that have been installed into a rack in a data center or server farm. Hardware servers can also be any computer or workstation made available to automatic remote provisioning, such as performance tuning and benchmarking labs, cyber-cafes, training centers, or even desktop machines hosting office productivity tools within an enterprise.
Staging and Boot Servers	The staging server is an important part of the provisioning application. During the provisioning process, files associated with the image being provisioned are copied to a directory structure on the staging server in preparation for the network installation. The boot server allows network booting of the target machine that needs to be provisioned. After the hardware server reboots, the boot server instructs the machine to install the operating system and other software components that are laid out on the staging server. The Management Agent runs on the boot server.

Table 6–6 (Cont.) Key Concepts for Provisioning

Concept	Description
Software Components	Refers to the Linux operating system software, Oracle software, and other third-party software applications with specific product release versions, patch versions, or software bundles that are packaged or released by a vendor. Software components are the fundamental building blocks of an image. Components may refer to other components, and they can be reused in multiple images. In provisioning, you can classify a component according to its type/property. You can also define your own component and customize it according to the requirements by classifying it as a Generic Component type. Such software components are individually maintained within the Oracle software library.
Images	Refers to specific sets of software components, including the Linux operating system, when bundled together with other supporting elements (such as directives) for the purpose of installation. The provisioning application helps you group, configure, and version such images within the software library. It also provides a basic set of software packages. The software components included in these packages have been determined by Oracle as the basic set of components required to create a default image.
Default Image	The Default Image consists of a minimum set of software components required to provision any Linux machine; for example, ssh, rpm, sudo, kernel, Management Agent, and so on. When a new hardware server (bare-metal machine) is connected to the enterprise network, and is booted for the first time via network boot protocol (PXE), this machine is automatically provisioned with the default image. When this hardware server comes up with the default image, you can use the Provisioning application to re-provision this machine with an image that meets your requirements.
Directives	The set of executable instructions that run from a supported shell (for example, Bourne, Perl), or a programming language (for example, Java). Directives are contained within a file that may be stored in the Oracle Software Library and referenced from the software components that employ them. Directive files are typed according to the technology able to execute them. The Provisioning application uses these directives associated with the software components to perform the actual work required during provisioning.
Software Library	Stores various versions of the software binaries, and acts as a repository for the software components that may be provisioned to the hardware servers in your enterprise. The Software Library is an infrastructure for storing and retrieving files and packages. The Oracle Software Library stores various versions of the software binaries and acts as a common repository for software components, scripts, and other files that can be used by provisioning, cloning, and future applications. The software library allows you to store, retrieve, update, and otherwise maintain all the software components that you create.

Table 6–6 (Cont.) Key Concepts for Provisioning

Concept	Description
Assignments	Hold the necessary information to provision images to the target hardware servers. Assignments contain information about the image, network profile, stage server, boot server, and list of targets to be provisioned. Once an assignment is created, you can provision it by clicking **Provision** on the Assignments tab. Provision assignments immediately or schedule them for later.

Policy Management

Policies define the optimal configurations of systems. Whether you use the out-of-box policies defined by Oracle or customize policies to meet your particular system requirements, any deviations to your systems or applications are reported. Examples of deviations include inappropriate settings and incorrect system configurations.

This section contains the following subsections:

- Accessing Policy Management Pages in Grid Control
- Out-of-Box Policies
- Customizing Policies
- Investigating Policy Violations
- Assessing Security
- Policy Violations Reports

Accessing Policy Management Pages in Grid Control

To access policy management pages in Grid Control:

- Click the **Policies** tab for a roll-up view of all policy violations across all targets. From this tab, you can also access policy associations, the policy library, "security at a glance" pages, and errors.
- Navigate to the Home page for a particular target. The links in the Policy Violations section display the number of policy violations according to severity level. Click the links to drill down to critical, warning, and informational policy violations for that target.

Out-of-Box Policies

Oracle provides a number of out-of-box policies (also known as policy rules) for various targets. When you add a target to Enterprise Manager, that target automatically uses all the predefined policy rules for that type of target. For example, Oracle provides security, configuration, and storage policy rules for the database instances and cluster databases. Security and configuration policy rules are provided for hosts.

Customizing Policies

You can customize policies by editing the existing policy rule settings. You can enable or disable a policy evaluation, change the importance for the compliance score calculation, assign a corrective action, prevent template override, override default

parameter values (when possible), and exclude objects from a policy's evaluation (when possible).

See Also: Online help for compliance scores

Defining Corrective Actions

One of the features of customizing policies is the ability to define corrective actions. Corrective Actions is a special type of job that executes automatically in response to a policy violation.

Corrective Actions utilize the Enterprise Manager Grid Control Job System and, like regular jobs, can consist of multiple steps, can be run with arbitrary host and target credentials, and reports its success or failure and its output to the Management Repository.

See Also: Chapter 8, "Job System"

Using Templates for Monitoring

A monitoring template defines all Enterprise Manager parameters you would normally set to monitor a target.

Monitoring templates simplify the task of setting up monitoring for large numbers of targets by allowing you to specify the monitoring and policy settings once and applying them as often as needed. You can save, edit, and apply these templates across one or more targets or groups.

See Also: "Monitoring Templates" in Chapter 4, "System Monitoring"

Investigating Policy Violations

Here are a few suggestions for investigating policy violations. Remember that you should attend to the most critical policy violations or those that have the biggest impact on your enterprise.

- Study the statistics on the Enterprise Manager Grid Control Home page. In particular, look at the statistics in the All Targets Policy Violations section. The policy violations with "Critical" severity should be dealt with first.
- Study the security-related violations reported in the Security Policy Violations section. Non-compliance with these policy rules can greatly impact the security of your enterprise.
- Address targets that have the lowest compliance scores.
- For the policy violations of a particular target, examine the home page for that target. The Policy Violations section provides overview information, but it also gives you access to the Policy Trend Overview for that target.
- To deal with policies regardless of the target, click **Policies.** Using this tab, you have access to all the policy violations for the enterprise, the policy associations, the policy rule library, security-only policies, and policy evaluation errors.
  - Navigate to the Policy Violations page and, using the Advanced Search option, enter an appropriate value in the "Most Recent Violation within *n* days" filter.
  - Suppress violations if you want to handle the violation at a later time.

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

Assessing Security

Security policies are available for many targets, including Host, Database Instance, Cluster Database, Listener, OC4J, Oracle HTTP Server, and Web Cache.

Because security is crucial to the stability of your enterprise, security policies are displayed prominently in Grid Control. On the Enterprise Manager Grid Control Home page, and many target home pages, there is a separate section displaying the Security Policy Violations for the target. This allows you to pay close attention to the critical policy violations.

In addition, the Security At a Glance feature provides an overview of the security health of the enterprise for all the targets or specific groups. This helps you to quickly focus on security issues by showing statistics about security policy violations and noting the critical security patches that have not been applied.

Policy Violations Reports

The Policy Violations Reports are available through the Reports feature. These reports deal with non-suppressed policy violations for all targets, groups, and a single target. In addition, suppressed violations are reported according to all targets, groups, and a single target.

See Also: Chapter 7, "Information Publisher"

7

Information Publisher

Information Publisher, Enterprise Manager's powerful reporting framework, makes information about your managed environment available to audiences across your enterprise. Strategically, reports are used to present a view of enterprise monitoring information for business intelligence purposes, but can also serve an administrative role by showing activity, resource utilization, and configuration of managed targets. IT managers can use reports to show availability of sets of managed systems. Executives can view reports on availability of applications (such as corporate email) over a period of time.

The reporting framework allows you to create and publish customized reports: Intuitive HTML-based reports can be published via the Web, stored, or e-mailed to selected recipients. Information Publisher comes with a comprehensive library of predefined reports that allow you to generate reports out-of-box without additional setup and configuration.

This chapter covers the following topics:

About Information Publisher

Information Publisher provides powerful reporting and publishing capability. Information Publisher reports present an intuitive interface to critical decision-making information stored in the Management Repository while ensuring the security of this information by taking advantage of Enterprise Manager's security and access control.

Information Publisher's intuitive user-interface allows you to create and publish reports with little effort. The key benefits of using Information Publisher are:

- Provides a framework for creating content-rich, well-formatted HTML reports based on Management Repository data.
- Out-of-box reports let you start generating reports immediately without any system configuration or setup.
- Ability to schedule automatic generation of reports and store scheduled copies and/or e-mail them to intended audiences.

- Ability for Enterprise Manager administrators to share reports with the entire business community: executives, customers, and other Enterprise Manager administrators.

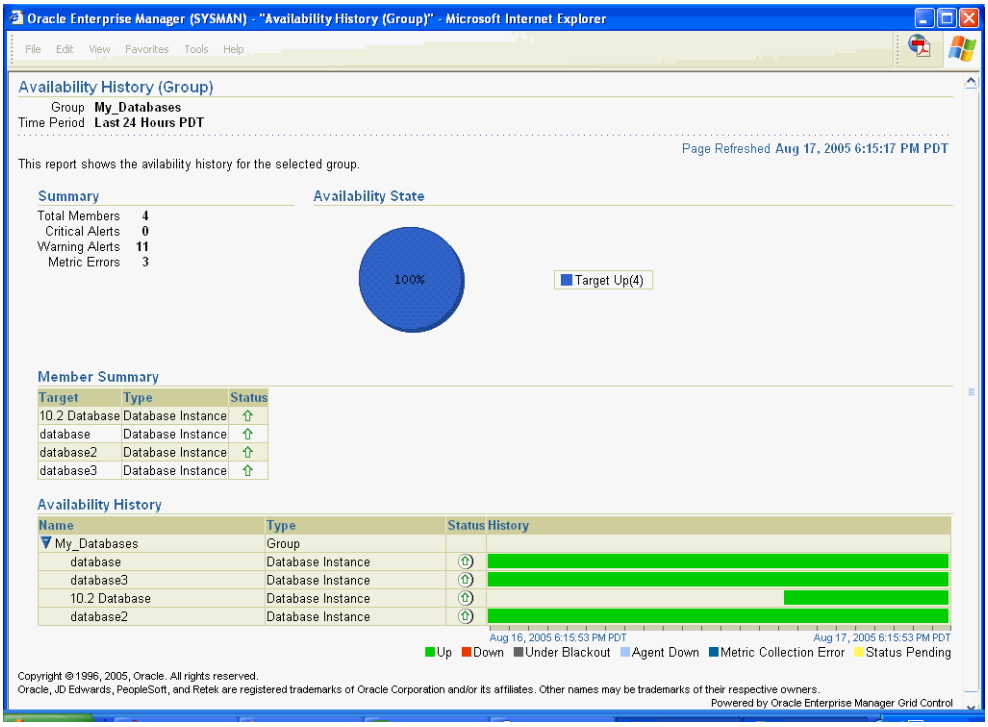
Information Publisher provides you with a feature-rich framework that is your central information source for your enterprise.

Out-of-Box Report Definitions

The focal point of Information Publisher is the report definition. A report definition tells the reporting framework how to generate a specific report by defining report properties such as report content, user access, and scheduling of report generation.

Information Publisher comes with a comprehensive library of predefined report definitions, allowing you to generate fully formatted HTML reports presenting critical operations and business information without any additional configuration or setup.. Figure 7–1 shows an example of the Availability History (Group) report, displaying availability information for all members of a group.

Figure 7–1 Availability History (Group) Report



Generating this HTML report involved three simple steps:

Step 1: Click **Availability History** (Group) in the report definition list.

Step 2: Select the group for which you want to run the report.

Step 3: Click **Continue** to generate the fully-formed report.

Supplied report definitions are organized by functional category with each category covering key areas. The following table lists the major functional categories and areas covered by out-of-box reports.

Table 7–1 Predefined Report Definitions

Functional Category	Areas Covered
Deployment and Configuration	Client Configurations Hardware Operating System Linux Operating System Patching Application Server Configuration Oracle Application Server Software Oracle Database Configuration Oracle Database Software Oracle Home Patch Advisories Oracle Home Patch History
Enterprise Manager Setup	Management Pack Access
Monitoring	Alerts and Policy Violations Availability History Dashboards Disabled Policies Service Alerts Service Performance and Usage Service Tests Web Application Page Performance Web Application Request Performance Web Application Transaction Performance
Security	Oracle Database Audit Oracle Database Privileges Security Policy Overview
Storage	Oracle Database Space Issues Oracle Database Space Usage

Custom Reports

Although the predefined report definitions that come with Information Publisher cover the most common reporting needs, you may want to create specialized reports. If a predefined report comes close to meeting your information requirements, but not quite, you can use Information Publisher's Create Like function to create a new report definition based on one of the existing reports definitions.

Creating Custom Reports

To create custom reports:

1. Choose whether to modify an existing report definition or start from scratch. If an existing report definition closely matches your needs, it is easy to customize it by using Create Like function.
2. Specify name, category, and sub-category. Grid Control provides default categories and sub-categories that are used for out-of-box reports. However, you can categorize custom reports in any way you like.
3. Specify any time-period and/or target parameters. The report viewer will be prompted for these parameters while viewing the report.
4. Add reporting elements. Reporting elements are pre-defined content building blocks, that allow you to add a variety of information to your report. Some examples of reporting elements are charts, tables, and images.
5. Customize the report layout. Once you have assembled the reporting elements, you can customize the layout of the report.

Report Parameters

By declaring report parameters, you allow the user to control what data is shown in the report. There are two types of parameters: target and time-period.

Example: If you are defining a report that will be used to diagnose a problem (such as a memory consumption report), the viewer will be able to see information for their target of interest.

By specifying the time-period parameter, the viewer will be able to analyze historical data for their period of interest.

Analyzing Historical Data

Information Publisher allows you to view reports for a variety of time-periods:

- Last 24 Hours/ 7 Days/ 31 Days
- Previous X Days/ Weeks/ Months/ Years (calendar units)
- This Week/ This Month/ This Year (this week so far)
- Any custom date range.

Report Elements

Report elements are the building blocks of a report definition. In general, report elements take parameters to generate viewable information. For example, the Chart from SQL element takes a SQL query to extract data from the Management Repository and a parameter specifying whether to display the data in the form of a pie, bar, or line chart. Report elements let you "assemble" a custom report definition using the Information Publisher user interface.

Information Publisher provides a variety of reporting elements. Generic reporting elements allow you to display any desired information, in the form of charts, tables or images. For example, you can include your corporate Logo, with a link to your corporate website. Monitoring elements show monitoring information, such as availability and alerts for managed targets. Service Level Reporting elements show availability, performance, usage and achieved service levels, allowing you to track compliance with Service Level Agreements, as well as share information about achieved service levels with your customers and business executives.

The following table lists the report elements that are supplied with Information Publisher.

Table 7–2 Report Elements

Report Element	Description
Generic Report Elements	**Element Descriptions**
Chart from SQL	Renders a line, pie or bar chart given a SQL or PL/SQL query.
Image Display	Displays a supplied image.
Separator	Displays a horizontal separator.
Styled Text	Displays text using a chosen style.
Table from SQL	Displays results of a SQL or PL/SQL query as a table.
Service Level Reporting Elements	**Element Descriptions**
Service Level Details	Displays Actual Service Level achieved over a time-period and violations that affected it.

Table 7–2 (Cont.) Report Elements

Report Element	Description
Service Level Violation	Displays details on Service Level violations for a set of services over a given time-range.
Service Level Summary	Displays information on Service Levels over different time-ranges.
Services Monitoring Dashboard	Displays the Services Monitoring Dashboard showing status, performance, usage and Service-Level information for a set of Services.
Service Status Summary	Displays information on Services' Current status, Performance, Usage and Component Statuses.
Enterprise Manager Setup Element	**Element Descriptions**
Management Pack Access	Displays licensable targets with management pack access.
Monitoring Elements	**Element Descriptions**
Application Server Clusters	Displays monitoring and configuration information for Application Server Clusters.
Application Server Targets	Displays monitoring and configuration information for Application Server Targets.
Availability Timeline (Group)	Displays availability of targets over a period of time. Groups, Systems, Redundancy Groups and Clusters are supported.
Metric Details	Displays a graph of a given metric for a set of targets of the same time, over a given time-period.
Open Alerts	Displays details for outstanding alerts for a user-customizable set of targets and severities.
Oracle HTTP Traffic	Displays Oracle HTTP/HTTPS Traffic information.
Service Metric Details	Displays graphs of Performance and Usage metrics for a given service.
System Monitoring Dashboard	Displays status and alert information for a Group or System.
Web Application Page Performance	Renders page performance information for a given Web Application.
Web Application Page Performance By Category	Web Application Page Performance By CategoryRenders page performance information by domain/region/visitor/web server.
Web Application Request Performance	Displays details about request performance of a web application.
Web Application Transaction Performance Details	Displays transaction performance details for a given transaction.
Web Application Transaction Performance Summary	Displays summary information about transaction performance.
Web Application URL Performance	Displays time series chart showing the performance for a given URL.

Scheduling Reports

Enterprise manager allows you to view reports interactively and/or schedule generation of reports on a flexible schedule. For example, you might want to generate an "Inventory Snapshot" report of all of the servers in your environment every day at midnight.

Flexible Schedules

Grid Control provides the following scheduling options:

- One-time report generation either immediately or at any point in the future
- Periodic report generation
  - Frequency: Any number of Minutes/ Hours/ Days/ Weeks/ Months/ Years
  - You can generate copies indefinitely or until a specific date in the future.

Storing and Purging Report Copies

Enterprise manager allows you to store any number of scheduled copies for future reference.

You can delete each stored copy manually or you can set up automated purging based on either the number of stored copies or based on retention time. For example, you can have Enterprise Manager purge all reports that are more than 90 days old.

E-mailing Reports

You can choose for scheduled reports to be e-mailed to any number of recipients. You can specify reply-to address and subject of the e-mail.

Sharing Reports

Information Publisher facilitates easy report sharing with the entire user community. Enterprise Manager administrators can share reports with other administrators and roles. However, there may be cases when you need to share reports with non-Enterprise Manager administrators, such as customers and/or business executives. To facilitate information sharing with these users, Enterprise Manager renders a separate reporting website that does not require user authentication.

> **Note:** To ensure that no sensitive information is compromised, only Enterprise Manager administrators with a special system privilege are allowed to publish reports to the Enterprise Manager reports website.

Information Publisher honors Enterprise Manager roles and privileges, ensuring that only Enterprise Manager administrators can create reports on the information they are allowed to see.

When sharing reports, administrators have an option of allowing report viewers to see the report with the owner's privileges. For example, as a system administrator you might want to share a host's performance information with a DBA using your server, but you do not want to grant the DBA any privileges on your host target. In this case, you could create a host performance report, and allow the DBA to view it with your privileges. This way, they only see the information you want them to see, without having access to the host homepage.

8

Job System

Because today's IT environments are composed of many sets of components, you need to minimize the time needed to support those IT components and eliminate the human error associated with component maintenance. The Enterprise Manager Grid Control Job System provides the capacity to automate routine administrative tasks and synchronize components in your environment so you can manage them more efficiently.

This chapter describes the Job System in the following sections:

What Is a Job?

The Enterprise Manager Job System serves a dual purpose:

- Provides for the automation of many administrative tasks, for example, backup, cloning, and patching
- Allows 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. Job results are displayed on the target's home page.

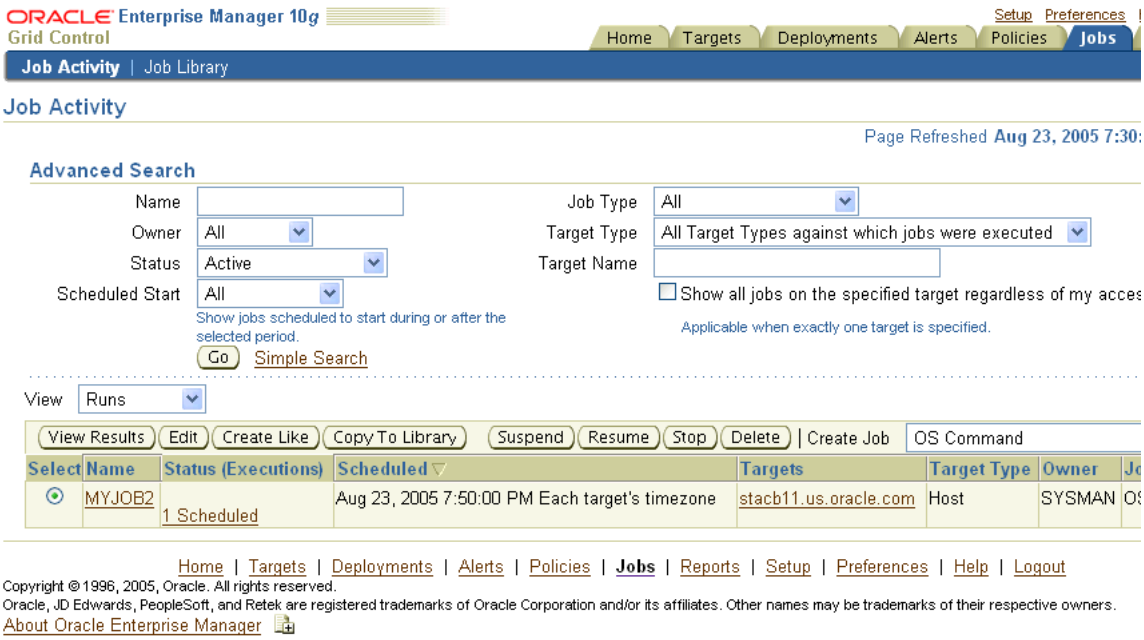
The Job Activity page (Figure 8–1) is the hub of the Job System. From this page you can:

- 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 8–1 Job Activity 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.

See Also: Chapter 6, "Managing Deployments"

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 roll-up 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 unavailable, or the job needs to be postponed. Once you suspend a job, any scheduled executions do 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 after the cause of the problem has been determined. This alleviates the need to create 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.

> **See Also:** For more information on job executions and runs, refer to Enterprise Manager Grid Control online help.

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, back up 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 job types:

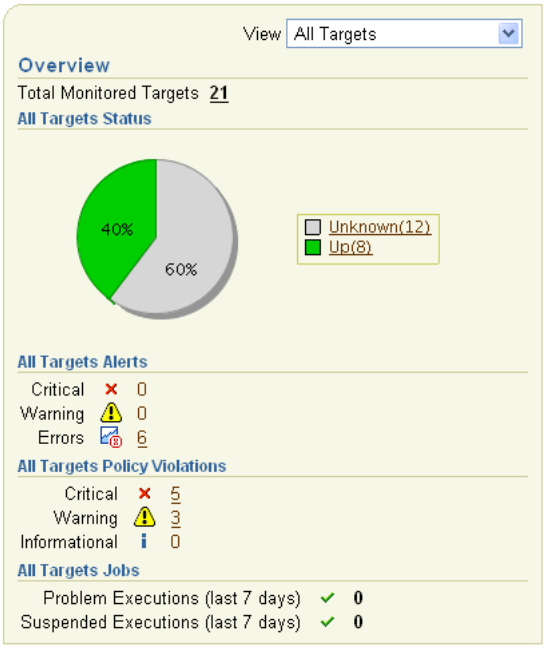
- **CloneHome**: Copies the known state of an Oracle home. For example, after you have an Oracle home in a known state (you have chosen particular install options for it, applied required patches to it, and tested it), you may want to clone this Oracle home to one or more hosts.
- **Host Command**: Use to execute a user-defined OS script.
- **Patch**: Finds and applies a patch or patch set.
- **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 12, "Database Management" for information about the Database Scheduler
>
> "About Jobs," "About Scheduler," "About Cloning," and "About Patching" in the Enterprise Manager Grid Control 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 Console Home page. Figure 8–2 shows the All Targets Jobs information on the Grid Control Console Home page.

Figure 8–2 Summary of Target Jobs on the Grid Control Console Home Page



This information is particularly important when you are examining jobs that execute against hundreds or 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 automatically becomes 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 only runs against applicable targets in the group.

By accessing the Group Home page, you can analyze the job activity for that group.

See Also: Chapter 5, "Group Management"

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.

See Also: "Roles" in Chapter 2, "Setting Up Enterprise Manager"

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.

Job Notifications

The Grid Control Notification system allows you to define a notification rule to send e-mail to the job owner when a job enters a chosen state (Scheduled, Running, Suspended, Completed, or Problems). New functionality has been added to the Notification system (rule creation) that allows you to easily associate specific jobs with a notification rule.

See Also: "Notifications" in Chapter 4, "System Monitoring"

Multitask Jobs

Multitask jobs allow you to create complex jobs consisting of one or more distinct tasks. Because multitask jobs can run against targets of the same or different type, they can perform ad hoc operations on one or more targets of the same or different type.

You can create a multitask job consisting of two tasks, each a different job type, each operating on two separate (and different) target types. For example,

- Task 1 (OS Command job type) performs an operation on Host 1.
- If Task 1 is successful, run Task2 (SQL Script job type) against Database 1 and Database 2.

The Job System's multitask functionality makes it easy to create extremely complex operations.

9

Extending Enterprise Manager

Enterprise environments consist of a wide variety of components: OS platforms, hardware, software, network, and storage devices. All of these components work in concert to deliver critical information and functionality required to keep enterprise operations performing optimally and providing information to make important business decisions. While Oracle Enterprise Manager Grid Control allows you to monitor and manage a variety of components out-of-box, you may want to monitor third party components or custom applications specific to your environment. For example, with this release, you can seamlessly monitor WebLogic and WebSphere application servers (refer to "Third-Party Target Management" in Chapter 15, "Host and Third-Party Target Management" for more information). Additional plug-ins are being developed and will be announced as they become available.

In addition, you can use the same mechanism used by Oracle and partners to extend Enterprise Manager to monitor custom components via modular Management Plug-ins. Once a plug-in is defined, you use the Enterprise Manager Grid Control console to deploy the new plug-in throughout your enterprise environment.

This chapter discusses the following topics:

Benefits of Extending Enterprise Manager

Extending Enterprise Manager for monitoring additional components provides the following benefits:

- **Centralize management information in a single console:** When deployed, components defined by the Management Plug-in automatically appear in the Grid Control console. Being able to monitor all targets in your environment provides a consolidated view of your entire enterprise, thus allowing you to monitor and manage all components from a central point.
- **Extend Enterprise Manager's monitoring and management features to non-Oracle components:** Newly added components automatically inherit Enterprise Manager's powerful monitoring and management features, such as: alerts, policies, blackouts, monitoring templates, groups/systems, configuration management, and enterprise reporting.
- **Comprehensive Service-Level Management:** By managing all of your enterprise components with Enterprise Manager Grid Control, you can more fully utilize the Service-Level Management features offered in Enterprise Manager Grid Control.

See Also: Chapter 11, "Service Management"

Developing Management Plug-ins

Management Plug-ins allow you to seamlessly monitor and manage non-Oracle components from the Grid Control console by providing an easy way to specify new classes of components for Enterprise Manager to monitor. Once you have created the new Management Plug-in, you then deploy it to Management Agents within your enterprise.

The complete lifecycle of extending Enterprise Manager consists of five stages:

1. Design your Management Plug-in.
2. Develop the plug-in.
3. Validate the plug-in.
4. Package the plug-in into a portable archive file.
5. Deploy the Management Plug-in throughout your Enterprise Manager environment.

About the Oracle Management Agent

In order to understand what it takes to develop a Management Plug-in, it is important to study the architecture of the Oracle Management Agent. Oracle Management Agents are deployed on each host, and are responsible for monitoring all components on that host. Out-of-box, the Management Agent knows how to monitor default target types, such as the Oracle Database. In order to monitor a particular target type, the agent uses two XML files:

- **Target Type Metadata File**: specifies the metrics that should be monitored for this target type, and methods to retrieve those metrics.
- **Target Type Default Collections File**: specifies the default collection intervals and alert thresholds for each of the target metrics.

For each metric, the Management Agent retrieves the appropriate data using fetchlets, which are parameterized data access mechanisms that take arguments for input and return formatted data. The following table lists available fetchlets.

Table 9–1 Fetchlets

Fetchlet	Description
OS Command	Obtains metric data by executing OS commands (either individually or from scripts) that return a standard out data stream.
SQL	Executes a given SQL statement on an Oracle Database as a given user.
JDBC	Executes SQL against any JDBC-enabled database.
SNMP (v.1)	Polls an SNMP agent on a given host for corresponding instances given a list of object identifiers (OIDs). An object identifier (OID) corresponds to either a MIB variable instance or a MIB variable with multiple instances.
HTTP Data	Contacts a Web Server at a URL, and parses returned data.
URLXML	Obtains the XML content of a given URL, and extracts information based on a given pattern.

Table 9–1 (Cont.) Fetchlets

Fetchlet	Description
WBEM	Accesses a CIMOM and retrieves requested information using the specified CIM class.
JMX	Fetches data from a JMX-enabled server
Java Wrapper	Executes Java code to return data.
SQL Timing	Times a SQL operation.
URL Timing	Gets the contents of a given URL, timing not only the base page source but any frames or images in the page as well.

The Agent uses the information in the Target Type Default Collections file to determine, for each target, the metrics that need to be collected and the corresponding collection frequency. It then uses information in the Target Type Metadata Files to determine how to collect the data. Based on this information, the Agent uses the appropriate fetchlet to retrieve data from the monitored targets.

Designing your Management Plug-in

The design stage of the management plug-in creation process involves defining the monitoring parameters required to accurately monitor and manage your new component. This involves:

- Identifying performance and configuration metrics that should be collected.
- Determining how often each metric should be collected. Oracle recommends that the collection frequency for any metric should not be less than once every five minutes.
- Based on customer-specific operational practices, specifying default warning and/or critical thresholds on these metrics. Whenever a threshold is crossed, Enterprise Manager generates an alert, informing administrators of potential problems.

Developing Your Management Plug-in

Developing a plug-in based on the requirements identified in the design phase involves:

1. For each metric, determining the appropriate component-level API that exposes the metric.
2. Mapping a method used to retrieve a particular metric to a 'Fetchlet' provided with the Agent, writing appropriate scripts to retrieve metrics, and determining input parameters for fetchlets. For example, the OS fetchlet will require an OS script, and a URL Timing fetchlet will require a URL parameter.
3. Defining two XML files (Target Type definition file and Default Collections file) that the agent will use to monitor the new target type. This involves declaring appropriate metrics, metric collection methods, collection frequencies, and metric thresholds in the specified XML format.

The example below is an excerpt from a target type Metadata file showing a sample metric declaration for collecting CPU Utilization. The OS Command fetchlet is used to retrieve the metric value by running an existing Perl script.

Example 9–1 Target Type Metadata File Excerpt

```
<Metric NAME="Load" TYPE="TABLE">
   <TableDescriptor>
       <ColumnDescriptor NAME="CPU Utilization" TYPE="NUMBER"/>
   </TableDescriptor>
   <QueryDescriptor FETCHLET_ID="OS">
<Property NAME="scriptsDir" SCOPE="SYSTEMGLOBAL"> scriptsDir     </Property>
<Property NAME="script" SCOPE="GLOBAL"> %scriptsDir% /cpu_util.pl </Property>
</QueryDescriptor>
</Metric>
```

Once a metric has been defined in the Target Type Metadata file, the next step is to define metric collection frequency and appropriate metric thresholds. The following example includes a sample collections file for the *MyDatabase* target type, where CPU Utilization is collected every 10 minutes, and a critical alert should be generated when the metric value is greater than ("GT") ninety percent.

Example 9–2 Target Type Default Collections File

```
<TargetCollection TYPE="MyDatabase">
  <CollectionItem NAME="Load">
    <Schedule>
        <IntervalSchedule INTERVAL="10"/>
    </Schedule>
    <Condition column_name ="CPU Utilization" critical="90" operator="GT"/>
  </CollectionItem>
</TargetCollection>
```

Validating the Plug-in

Successful integration of new target types with the Enterprise Manager framework relies on accurate XML. It is essential that the Target Type Metadata file and Default Collections file are syntactically and structurally correct. It is also critical to simulate a runtime data collection for a new target type to ensure that proper data is collected, as well as ensuring that there are no adverse performance effects. To facilitate the validation process, Enterprise Manager provides a tool call ILINT.

Packaging the Plug-in

You package all of the files associated with a Management Plug-in (metadata files, monitoring scripts, report files) into a Management Plug-in Archive (MPA) via EM CLI. The MPA is a ".jar" file that contains one or more Management Plug-ins, thus facilitating easy import/export of plug-ins.

To run the EMCLI, open a terminal window on any machine where the EMCLI client is installed and execute the add_mp_to_mpa verb. The following example demonstrates verb usage:

Example 9–3 Using the EMCLI to create a Management Plug-in Archive

```
emcli add_mp_to_mpa
      -mpa="/my_dir/my_new_type.jar"
      -mp_version="2.0"
      -ttd="/my_dir/ttd/new_type.xml"
      -dc="/my_dir/dc/new_type.xml"
      -file="MONITORING_SCRIPT:/my_dir/script1.pl"
      -file="MONITORING_SCRIPT:/my_dir/script2.pl"
      -func_desc="Management Plug-in to define target type new_type"
```

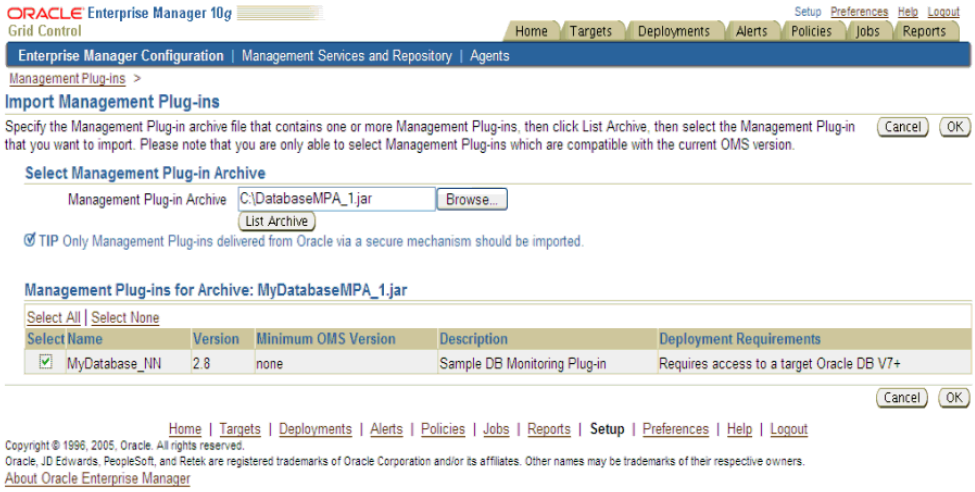
After you have added one or more Management Plug-ins to the archive file, you are ready to deploy your plug-in to Management Agents in your enterprise.

Deploying the Management Plug-in

After a Management Plug-in Archive file is created, Enterprise Manager makes it simple to deploy the new Management Plug-in. The deploy operation is performed directly from the Grid Control console and consists of three steps:

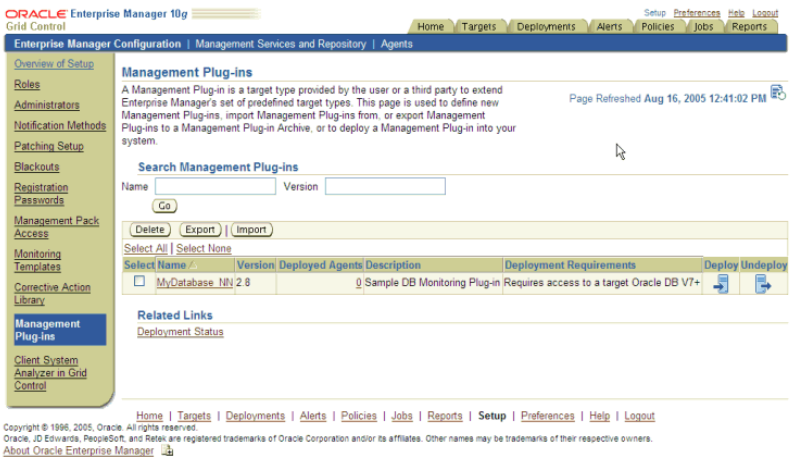
1. Import the Management Plug-ins into the Grid Control console.

Figure 9–1 Management Plug-in Import Page



Once imported, the plug-ins appear on the Management Plug-ins page, and can be deployed to any number of Management Agents simultaneously.

Figure 9–2 Management Plug-ins Page

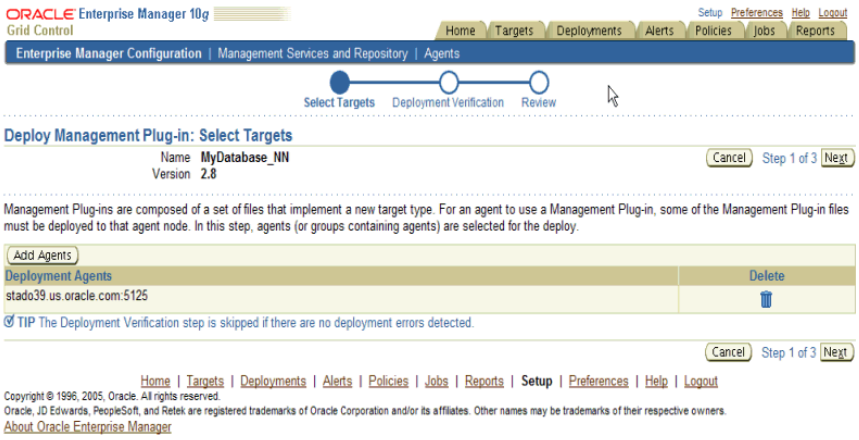


2. Deploy the Management Plug-in(s) to the appropriate Agents.

   Management Plug-ins can be deployed simultaneously to any number of Agents without causing any downtime to production environments. Enterprise Manager

automatically copies appropriate metadata files and monitoring scripts to the selected Agents.

Figure 9–3 Deploy Management Plug-in Page



Once the Management Plug-in is deployed, Management Agents can monitor targets of the new type.

3. Discover the Management Plug-ins at the Agent.

   Once a Management Plug-in is deployed, the Agent knows how to monitor the new target type. At this point, all that remains is to instruct the Agent to start monitoring one or more instances of the new target type. This involves discovering targets from the Agent home page by specifying a small set of target properties, such as SID and Username for a database.

Management Plug-in User Interface

Each Enterprise Manager managed target has a default home page that provides a consolidated, at-a-glance view of its health and performance status. The home pages also provide direct access to configuration information and management/monitoring features such as Blackouts, Monitoring Configuration, and Alert History. This rich user interface is available to Management Plug-Ins out-of-box, *without any custom code.*

Figure 9–4 Default Target Home Page

Enhancing Default Target Home Pages with Real-Time Reports

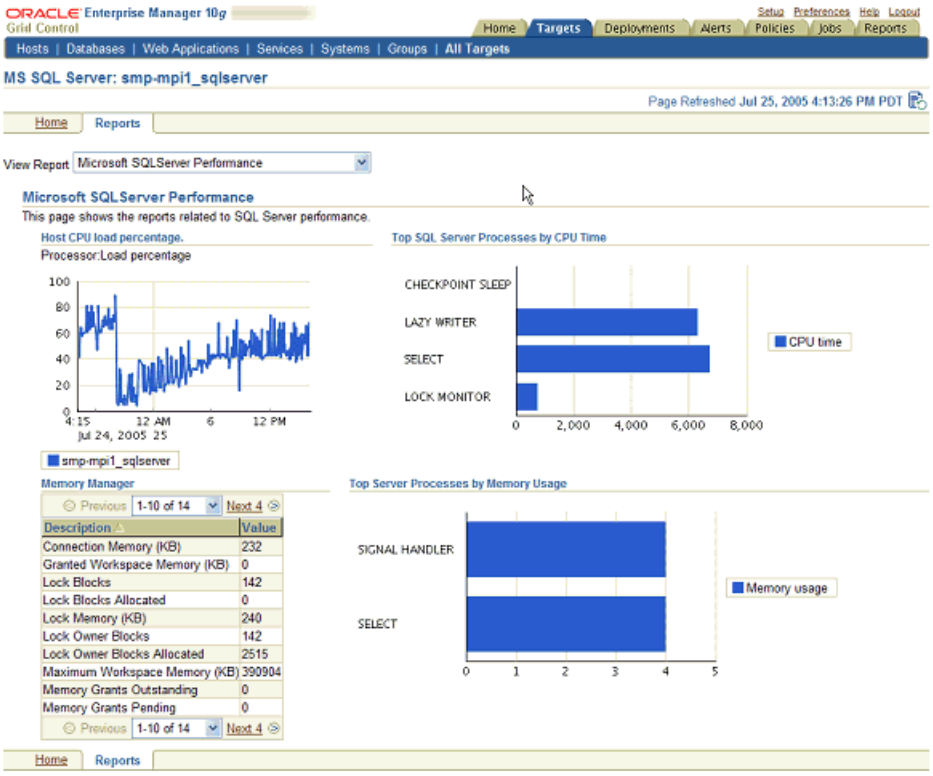
Enterprise Manager provides a powerful reporting framework called Information Publisher, which allows you to:

- Create custom reports against the Management Repository via the Grid Control console or by using the Information Publisher PL/SQL API.
- Generate reports on a schedule and share them with the entire user community.
- Create out-of-box monitoring, configuration, and service-level reports.

When developing a Management Plug-in, you can enhance information available from a default target home page by developing a management report definition using the Information Publisher PL/SQL API. These report definitions can be packaged with the plug-in, and are available from the Reports tab on the default target home page.

See Also: Chapter 7, "Information Publisher"

Figure 9–5 Default Target Home Page with Real-Time Report



10

Managing from Anywhere Using 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

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 10–1). 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.

Note: If you are using EM2Go in a firewall environment, refer to "Configuring Enterprise Manager for Firewalls" in *Oracle Enterprise Manager Advanced Configuration* for information about accessing Oracle Enterprise Manager 10*g* Grid Control through a firewall.

Figure 10–1 EM2Go Logon Page

Intuitive Interface

EM2Go provides an intuitive interface, similar to the Grid Control console. Because the layout is easy to use, you can quickly assess the availability and health of the Oracle Environment. Figure 10–2 displays a consolidated and personal Grid Control Console Home page.

Figure 10–2 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.
- In addition to monitoring targets, EM2Go supports the administration of Host and Oracle Database targets.

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 email to your PDA.

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

For example, you receive an email 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 datafiles, manually resizing one of the datafiles, or adding another datafile.

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 email. 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 quickly assess the health of the host.
- Viewing storage information about tablespaces and datafiles.
- Observing transaction alerts, beacons, and availability of your Web applications.
- Studying availability and performance metrics of your Oracle Application Server.

Part II

Managed Targets

This part contains chapters that describe the different targets that Enterprise Manager can monitor, administer, maintain, and manage.

Refer to the chapters in Part I for descriptions of the general Grid Control features that apply across all targets.

Part II contains the following chapters:

11

Service Management

This chapter introduces the concepts of services and service management in the following sections.

Introduction to Services

The critical and complex nature of today's business applications has made it very important for IT organizations to monitor and manage application service levels at high standards of availability. Problems faced in an enterprise include service failures and performance degradation. Since these services form an important type of business delivery, monitoring these services and quickly correcting problems before they can impact business operations is crucial in any enterprise.

Service-level agreements are used to evaluate service availability, performance, and usage. By constantly monitoring the service levels, IT organizations can identify problems and their potential impact, diagnose root causes of service failure, and fix these in compliance with the service-level agreements.

Enterprise Manager Grid Control provides a comprehensive monitoring solution that helps you to effectively manage services from the overview level to the individual component level. When a service fails or performs poorly, Grid Control provides diagnostics tools that help to resolve problems quickly and efficiently, significantly reducing administrative costs spent on problem identification and resolution. Finally, customized reports offer a valuable mechanism to analyze the behavior of the applications over time.

Grid Control monitors not only individual components in the IT infrastructure, but also the applications hosted by those components, allowing you to model and monitor business functions using a top-down approach, or from an end-user perspective. If modeled correctly, services can provide an accurate measure of the availability, performance, and usage of the function or application they are modeling.

Defining Services in Enterprise Manager

A "service" is defined as an entity that provides a useful function to its users. Some examples of services include CRM applications, online banking, and e-mail services.

Some simpler forms of services are business functions that are supported by protocols such as DNS, LDAP, POP, or SMTP.

Grid Control allows you to define one or more services that represent the business functions or applications that run in your enterprise. You can define these services by creating one or more service tests that simulate common end-user functionality. Using these service tests, you can measure the performance and availability of critical business functions, receive alerts when there is a problem, identify common issues, and diagnose causes of failures.

You can define the following service types: Generic Service, Web Application, and Aggregate Service. Web applications, a special type of service, are used to monitor Web transactions.

The following elements are important to understanding Grid Control's Service Level Management feature:

- **Service:** Models a business process or application.
- **Availability:** A condition that determines whether the service is considered accessible by the users or not.
- **Service Test:** The functional test defined by the Enterprise Manager administrator against the service to determine whether or not the service is available and performing.
- **System:** A group of underlying components, such as hosts, databases, and application servers, on which the service runs. For more information on systems, refer to the "Managing Systems" section in this chapter.
- **Beacons:** A functionality built into Management Agents used to pre-record transactions or service tests.
- **Performance and Usage:** Performance indicates the response time as experienced by the end users. Usage refers to the user demand or load on the system.
- **Service Level:** Operational or contractual objective for service availability and performance.
- **Root Cause Analysis:** Diagnostic tool to help determine the possible cause of service failure

Modeling Services

You can create a new target, called a service, to model and monitor your business applications from within Grid Control. While creating a service, you can define the availability, performance and usage parameters, and service-level rules.

Availability

"Availability" of a service is a measure of the end users' ability to access the service at a given point in time. However, the rules of what constitutes availability may differ from one application to another. For example, for a Customer Relationship Management (CRM) application, availability may mean that a user can successfully log on to the application and access a sales report. For an online store, availability may be monitored based on whether the user can successfully log in, browse the store, and make an online purchase.

Grid Control allows you to define the availability of your service based on service tests or systems.

- **Service Test-Based Availability:** Choose this option if the availability of your service is determined by the availability of a critical functionality to your end users. Examples of critical functions include accessing e-mail, generating a sales report, performing online banking transactions, and so on. While defining a service test, choose the protocol that most closely matches the critical functionality of your business process, and beacon locations that match the locations of your user communities. You can define one or more service tests using standard protocols and designate one or more service tests as "Key Tests." These key tests can be executed by one or more "Key Beacons" in different user communities. A service is considered available if one or all key tests can be executed successfully by at least one beacon, depending on your availability definition.
- **System-Based Availability:** Your service's availability can alternatively be based on the underlying system that hosts the service. Select the components that are critical to running your service and designate one or more components as "Key Components," which are used to determine the availability of the service. The service is considered available as long as at least one or all key components are up and running, depending on your availability definition. For more information on systems, refer to the "Managing Systems" section in this chapter.

Performance and Usage

You can define metrics to measure the performance and usage of the service. Performance indicates the response time of the service as experienced by the end user. Usage metrics are based on the user demand or load on the system.

Performance metrics are collected for service tests when the service tests are run by beacons. You can calculate the minimum, maximum, and average response data collected by two or more beacons. For example, you can monitor the time required to retrieve e-mails from your e-mail service in San Francisco, Tokyo, and London, then compare results. You can also collect performance metrics for system components, then calculate the minimum, maximum, and average values across all components. For example, you can monitor average CPU utilization, memory utilization, and disk I/O utilization across several hosts.

Usage metrics are collected based on the usage of the system components on which the service is hosted. For example, if you are defining an e-mail service that depends on an IMAP server, you can use the Total Client Connections metric of the IMAP server to represent the usage of this e-mail service. You can monitor the usage of a specific component or statistically calculate the minimum, maximum, and average values from a set of components. You can also set thresholds on the above metrics and receive notifications and alerts. For more information on setting thresholds, see the "Monitoring Services" section of this chapter.

Setting Service-Level Rules

Service-level parameters are used to measure the quality of the service. These parameters are usually based on actual service-level agreements or on operational objectives.

Grid Control's Service Level Management feature allows you to proactively monitor your enterprise against your service-level agreements to verify that you are meeting your needs for availability and performance within the service's business hours. For service-level agreements, you may want to specify the levels according to operational or contractual objectives.

By monitoring against service levels, you can ensure the quality and compliance of your business processes and applications.

Monitoring Templates for Services

Administrators are often faced with the task of defining similar monitoring attributes or rules for many applications. The same set of rules are often applicable to different applications. This can be achieved through the Monitoring Templates feature in Grid Control. A monitoring template for a service contains definitions for one or more service tests, as well as a list of monitoring beacons. You can create a monitoring template from a standard service target, then copy this template to create service tests for any number of service targets and specify a list of monitoring beacons. This helps reduce the required configuration time where a large number of applications need to be monitored.

> **See Also:** "Monitoring Templates" in Chapter 4, "System Monitoring"

Managing Systems

A "system" is a logical grouping of targets that collectively hosts one or more services. It is a set of infrastructure targets (hosts, databases, application servers, and so on) that function together to host one or more applications or services.

In Enterprise Manager Grid Control, systems constitute a new target type. For example, to monitor an e-mail application in Enterprise Manager, you would first create a system, such as "Mail System," that consists of the database, listener, application server, and host targets on which the e-mail application runs. You would then create a service target to represent the e-mail application and specify that it runs on the Mail System target.

Note: An Enterprise Manager "System" is used specifically to monitor the components on which a service runs. Many of the functions and capabilities for groups and systems are similar. See Chapter 5, "Group Management" for a detailed explanation of groups and how they are used.

Creating Systems

Use the Create System pages to perform the following configuration tasks:

- Select target components for a new system.
- Define the associations between the components of the system using the Topology Viewer.
- Add charts that will appear in the System Charts page. The charts represent the overall performance for the system or components of the system. Based on the target type of the components you select in the Components page, some charts are predefined.
- Select a set of columns you want to appear in the System Components page and in the system's Oracle Grid Control Dashboard.
- Customize the refresh frequency and specify the format for viewing component status, alerts, and policy violations in the system's Oracle Grid Control Dashboard.

> **See Also:** "System Dashboard" in Chapter 5, "Group Management"

Enterprise Manager provides a Topology Viewer for several applications. The Topology Viewer allows you to view the relationships between components, nodes, or

objects within different Oracle applications. You can zoom, pan, see selection details and summary information, and evaluate aggregate components. Individually distinct icons are used for each object type, and standardized visual indicators are used across all applications.

You may want to create system topologies for a number of reasons:

- Graphically model relationships
- Identify the source of a failure
- Perform visual analysis for high-level problem detection

When creating a system topology, you specify associations between the components in the system to logically represent the connections or interactions between them. For example, you can define an association between the database and the listener to indicate the relationship between them. Components are represented as icons, and associations are depicted as arrow links between components. After you have customized the topology to suit your needs, you can then view the overall status of the components in your system by accessing the System Topology page.

> **See Also:** "Create System Topology Page" in the Enterprise Manager online help

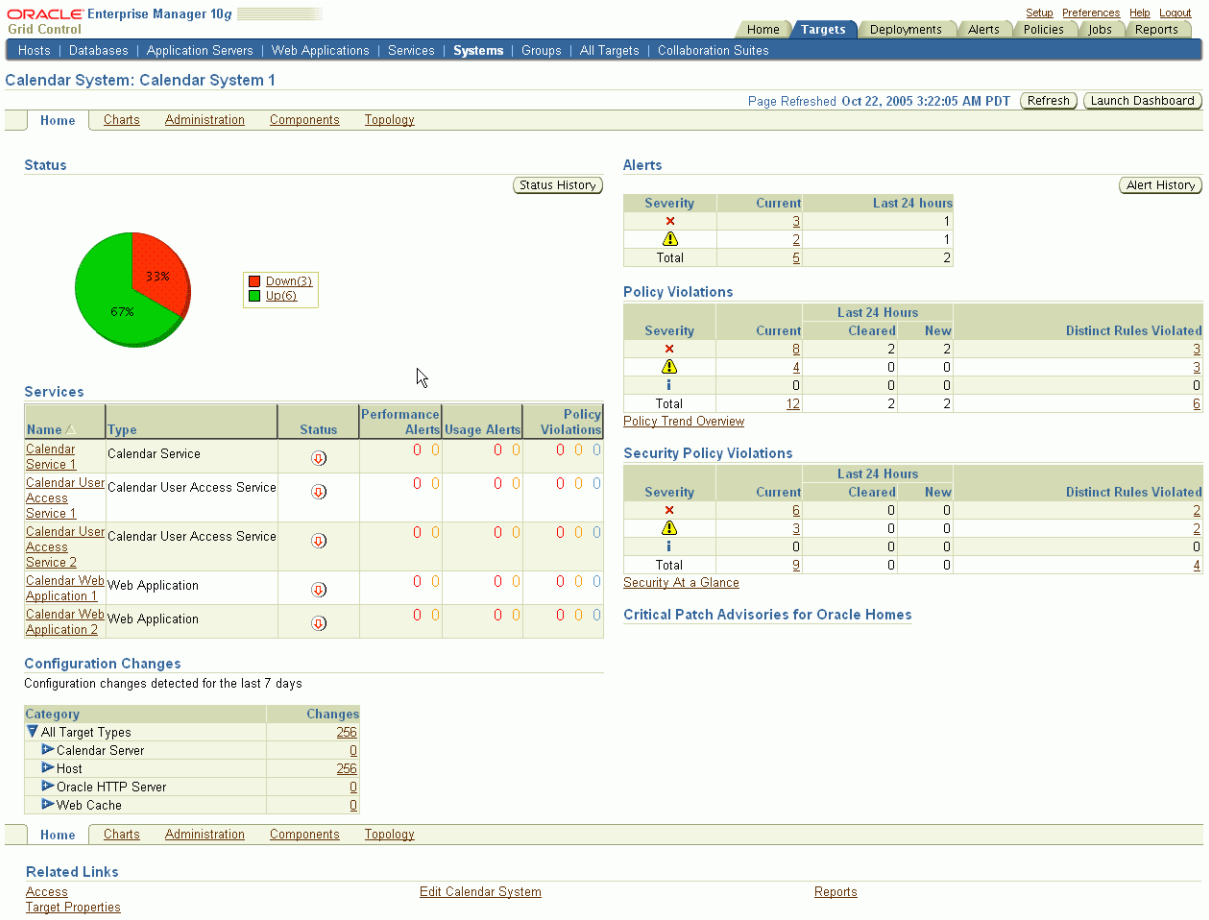
Monitoring Systems

Use the System pages to perform the following monitoring and administration tasks:

- Quickly view key information about components of a system, such as outstanding alerts and policy violations.
- View metric data for several time periods.
- View summary information determined by the columns you configured when you created the system.
- Perform administrative tasks, such as creating jobs and blackouts.
- View the topology of system components, including the associations between them.

> **See Also:** "System Topology" in this chapter

Figure 11–1 System Home Page



Monitoring Services

Monitoring a service helps you ensure that your operational and service-level goals are met. To monitor a service, define service tests that simulate activity or functionality that is commonly accessed by end users of the service. For example, you may want to measure a service based on a particular protocol, such as DNS, LDAP, and IMAP. To proactively monitor the availability and responsiveness of your service from different user locations, designate the geographical locations from which these service tests will be executed. Run service tests from specified locations using Enterprise Manager Beacons. You may also measure a service based on the usage of the service's system components.

Services Dashboard

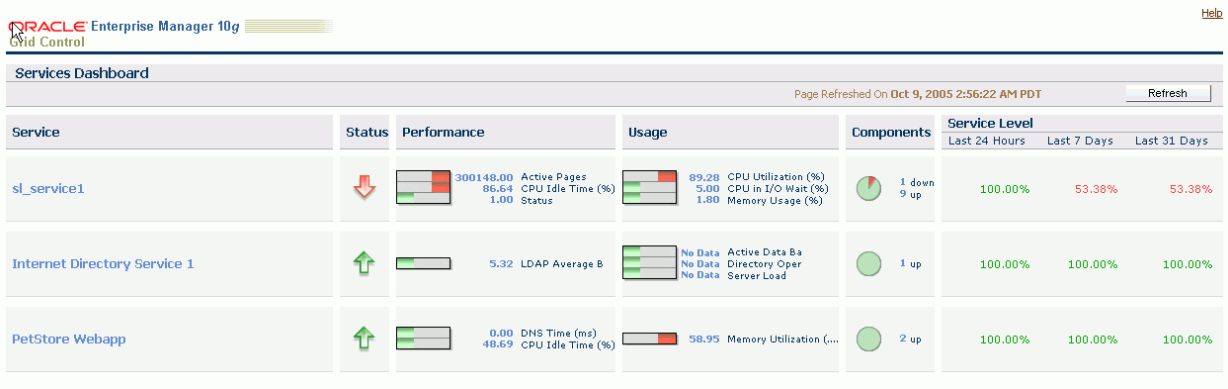
In Grid Control, service levels are defined as the percentage of time during business hours that a service meets the specified availability and performance criteria. Using the Services Dashboard, administrators can determine whether the service levels are compliant with business expectations and goals.

The Services Dashboard enables administrators to browse through all service-level-related information from a central location. The Services Dashboard illustrates the availability status of each service, performance and usage data, as well as service-level statistics. You can easily drill down to the root cause of the problem or determine the impact of a failed component on the service itself.

The following details are displayed in the Services Dashboard:

- **Availability:** A measure of the end users' ability to access the service at a given point in time. Service level agreements typically require a service be available at least for a minimum percentage of time.
- **Performance:** Response time is a good measure of the performance experienced by the end users when they access the service. When the service performance is poor, the availability of the service may be affected.
- **Usage:** Indicates end-user usage, or level of user activity, of the service.

Figure 11–2 Consolidated Dashboard View of Multiple Services

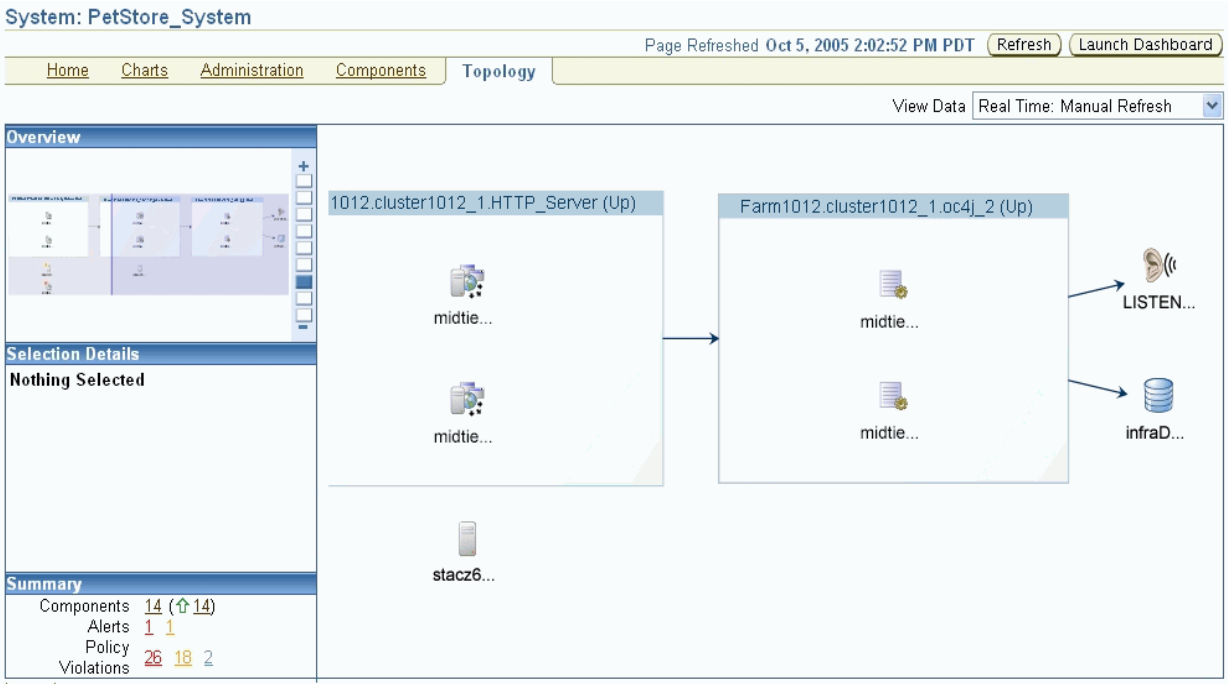


System Topology

The System Topology page enables you to view the dependency relationships between components of the system. From the topology view, you can drill down to detail pages to get more information on the key components, alerts and policy violations, possible root causes and services impacted, and more.

Use the System Topology page, shown in Figure 11–3, to get a quick overview of the status of your system's components. The status indicators over each icon enable you to quickly assess which components are down or have open alerts. You can get more detailed information for any key component from this page.

Figure 11–3 System Topology Page



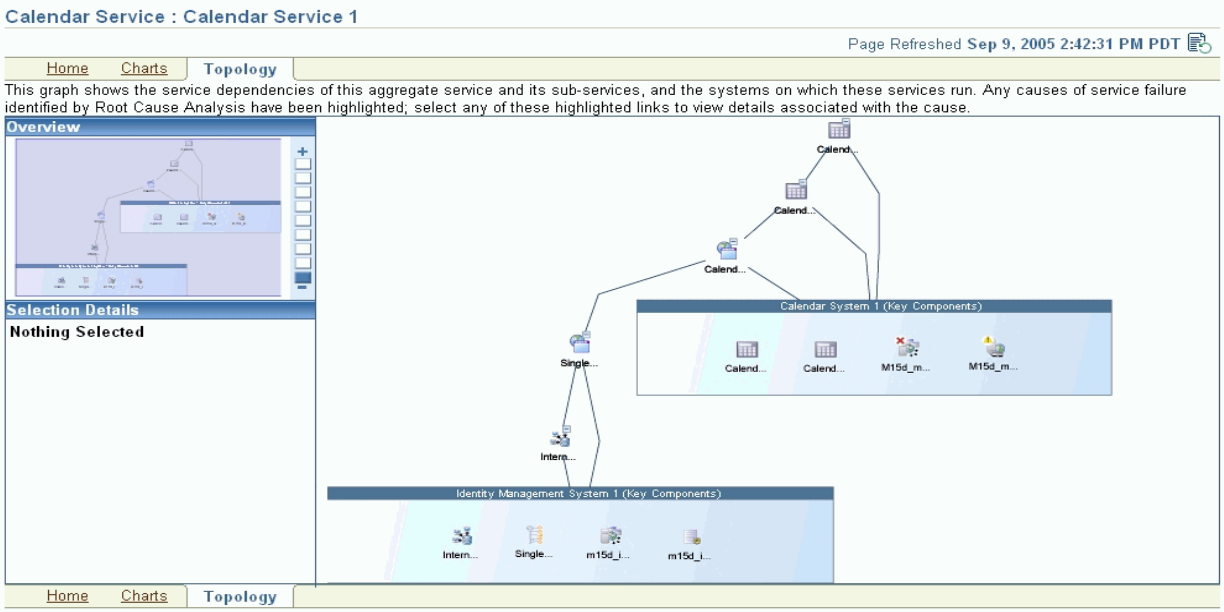
See Also: "Creating Systems" in this chapter

Service Topology

Use the Service Topology page, shown in Figure 11–4, to view the dependencies between the service, its system components, and other services that define its availability. Upon service failure, the potential causes of failure, as identified by Root Cause Analysis, are highlighted in the topology view. In the topology, you can view dependent relationships between services and systems.

Some data centers have systems dedicated to one application or service, while others have shared systems that host multiple services. In Grid Control, you can associate a single service or multiple services with a system, based on the setup of the data center.

Figure 11–4 Service Topology Page for a Collaboration Suite Service



Reports

Enterprise Manager provides out-of-box reports that are useful for monitoring services and Web applications. You can also set the publishing options for reports so that they are sent out via email at a specified period of time. Some of the reports that can be generated include Web Application Alerts, Web Application Transaction Performance Details, and Service Status Summary.

See Also: "Chapter 7, "Information Publisher"

Notifications, Alerts, and Baselines

Using Grid Control, you can proactively monitor a service and address problems before users are impacted. Each service definition has performance and usage metrics that have corresponding critical and warning thresholds. When a threshold is reached, Grid Control displays an alert. There are a standard set of notification rules that specify the alert conditions for which notifications should be sent to the appropriate administrators. Apart from these standard sets of rules, you can define and set up schedules so that administrators are notified when the specified alerts conditions are met. For example, thresholds can be defined so that alerts are generated when a system is down, if the end user cannot login to an application, or if the online transaction cannot be successfully completed.

You can set up baselines for a specified period and use these baselines to evaluate performance. Statistics are computed over the baseline period for specific target metrics. You can use these statistics to automatically set metric thresholds for alerting, as well as to normalize graphical displays of service performance.

See Also: Chapter 4, "System Monitoring"

Service Performance

Grid Control provides a graphical representation of the historic and current performance and usage trends in the Performance and Usage Charts. You can view

metric data for the current day (24 hours), 7 days, or 31 days. The thresholds for any performance or usage alerts generated during the selected period are also displayed in the charts. This helps you to easily track the performance and usage of the service test or system over time and investigate causes of service failure. Users can choose the default chart for the Services Home page; all performance and usage charts are available on the Charts page.

Use the Test Performance page to view the historical and current performance of the service tests from each of the beacons. If a service test has been defined for this service, then the response time measurements as a result of executing that service test can be used as a basis for the service's performance metrics. It is possible to have multiple response time measurements if the service access involves multiple steps or the service provides multiple business functions. Alternatively, performance metrics from the underlying system components can also be used to measure performance of a service.

If performance of a service seems slow, it may be due to high usage of the service. Monitoring the service usage helps diagnose poor performance by indicating whether the service is affected by high usage of a system component.

Monitoring Web Application Services

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?

The Web application management features complement the traditional target monitoring capabilities of Enterprise Manager Grid Control. Full integration with the Enterprise Manager target monitoring capabilities allow you to monitor the performance and availability of components that make up the applications' technology environment, including the back-end database and the middle-tier application servers.

In Grid Control, you can define a Web application service to monitor Web transactions. This allows you to 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. You can monitor the Web application service through the Services Dashboard, Topology Viewer, Charts, Reports, and more. For more information on these features, refer to the "Monitoring Services" section in this chapter.

Additionally, you can monitor the end-user performance response times, which enables you to effectively manage your e-business systems and understand the impact of application service-level problems.

Transactions

Transactions are service tests that are used to test the Web application performance and availability. Important business activities for the Web application are recorded as transactions, which are used to test availability and performance of a Web application. A transaction is considered "available" if it can be successfully executed by at least one beacon. You can record the transaction using an intuitive playback recorder that automatically records a series of user actions and navigation paths.

End-User Performance Monitoring

The End-User Performance Monitoring feature enables you to measure the actual response time as experienced by the end users. When configured with Oracle Application Server Web Cache or Oracle HTTP Server/Apache HTTP Server, the

End-User Performance Monitoring feature provides response time data generated by actual end users as they access and navigate your Web site.

You can track the response times for each user and all individual pages, allowing you to assess the end-user experience and address potential issues. You can also view the response times by individual visitor, domain, user-defined region, Web server, or a combination of these criteria. For example, tracking the response time of visitors ensures that critical customers, executives, and other important visitors are experiencing adequate response times.

You can set up Watch Lists of important URLs and view the response metrics of these critical pages at a glance. You can also use the Analyze feature to analyze the performance data stored in the Management Repository.

Diagnosing Service Problems

Grid Control offers you tools to help diagnose service problems, including Root Cause Analysis, Topology Viewer, and Web application diagnostics. If a service is unavailable or performing poorly, use these tools to determine the potential causes.

Root Cause Analysis

When a service fails, Root Cause Analysis returns a list of potential causes on the Service Home page. Potential root causes include failed subservices and failed key system components.

By default, Root Cause Analysis evaluates a key component's availability status to determine whether or not it is a cause of service failure. You can specify additional conditions, or component tests, for Root Cause Analysis to consider. If a key component is unavailable, or if any of your component test's conditions are not met, then this component is considered a possible cause of the service failure.

You can also specify additional conditions, or component host tests, for the host on which this key component resides. If Root Cause Analysis identifies the key component as a cause of service failure, the component's host is then analyzed to see if it potentially caused the component, and therefore the service, to fail.

You can also access the Root Cause Analysis information from the Topology Viewer, which shows a graphical representation of the hierarchical levels displaying relationships between components. Red lines between the services and system components represent the associated failure. Follow these red lines to discover possible causes of failure.

Grid Control can also be integrated with the EMC SMARTS solution to detect network failures in Root Cause Analysis. When problems in the network are detected, you can use the SMARTS network adapter to query Root Cause Analysis information related to the hosts and IP addresses in the network.

Diagnosing Web Application Problems

When a Web application is unavailable, the Root Cause Analysis feature allows you to determine the causes of service failure. Apart from this feature, Grid Control provides tools to diagnose application performance degradation issues and pinpoint problem areas within the application stack. Comprehensive diagnostic tools enable you quickly drill down into the Oracle Application Server stack and monitor response times in various application server and database components.

Interactive Transaction Tracing

When the performance of a Web application is slow, you can trace problematic transactions as required using Interactive Transaction Tracing. You can record the transaction using an intuitive playback recorder that automatically records a series of user actions and navigation paths. You can play back transactions interactively and perform an in-depth analysis of the response times across all tiers of the Web application for quick diagnosis.

The Interactive Transaction Tracing facility complements the Transaction Performance Monitoring and End-User Performance Monitoring features by helping you diagnose the cause of a performance problem. This in-depth drill-down diagnostics tool enables you to trace the transaction path and performance across the application tiers, and helps identify the cause of performance bottlenecks. Using these diagnostic tools, you can quickly resolve application problems, thus reducing the mean-time to repair.

All invocation paths of a transaction are traced and hierarchically broken down by servlet/JSP, EJB, and database times to help you locate and solve the problem quickly. Once a problem is resolved, you can also run Interactive Transaction Tracing to reassure you that the problem has been satisfactorily repaired. In addition, you can use the **SQL Statement Analysis** link to view details.

Request Performance Diagnostics

Grid Control provides in-depth historical details on the J2EE and database performance of all URL requests. By examining the detailed J2EE and database breakdown and analyzing the processing time of a request, you can determine whether the problem lies within a servlet, JSP, EJB method, or specific SQL statement. Using this information, you can easily isolate the cause of the problem and take necessary action to quickly repair the appropriate components of your Web application.

Grid Control's Request Performance Diagnostics feature is instrumental to the application server and back-end problem diagnosis process. Slowest URL request processing times and the number of hits are provided so that you can easily recognize where problem resolution efforts should be prioritized. Application administrators need to know how their J2EE and database components are performing, including the top JSPs and servlets by processing time and request rates so that they can identify how these components are affecting overall response times.

URL request processing time and load graphs provide you with information on the impact of server activity on response times. Analyzing the J2EE and database at the subcomponent level helps you make accurate decisions to tune or repair the appropriate elements of a Web application.

Easy to read graphs of URL request processing times by theOC4J subsystem allows you to quickly assess where the most time is spent. Further drill-downs bring you directly to in-depth URL request processing call stack details. You can correlate URL request times (EJB time, database time, and so on) to the underlying system component metrics.

12

Database Management

This chapter introduces the concept of database management in the following sections:

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 receive:

- 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 separate consoles that you can use to monitor your database: Database Control and Grid Control.

- Database Control is the Enterprise Manager Web-based application for managing Oracle Database 10*g* Release 2 (10.2). Database Control is installed and available with every Oracle Database 10*g* installation. From Database Control, you can monitor and administer a single Oracle Database instance or a clustered database.
- Grid Control is the Enterprise Manager console you use to centrally manage your entire Oracle environment. Within Grid Control, you access the multiple database targets using the **Targets** tab, then **Databases.**

Database Home Page as the Management Hub

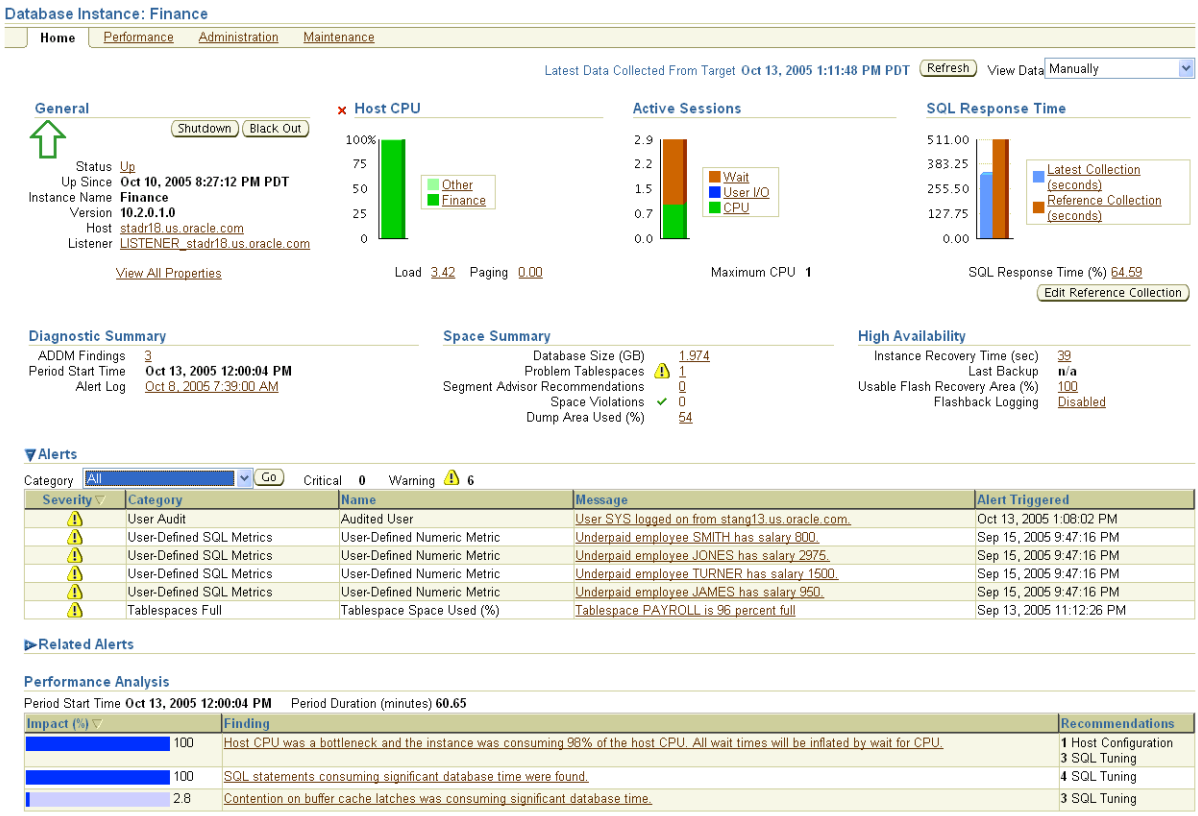
The Enterprise Manager Database Home page (Figure 12–1) shows important status and performance information about your database instance from a single source, including:

- A quick view of the status of the database and basic information about the database
- Relative CPU utilization of the Oracle host
- Amount of time the instance consumed using CPU and I/O, and the amount of time it consumed in bottlenecks
- Current response of the tracked set of SQL versus the reference collection response
- The number of Automatic Database Diagnostic Monitoring (ADDM) findings, the number of policy violations (Database Control only), and the Alert Log status
- Storage-related issues and recommendations for improved performance, and information about space violations and ADDM
- The most recent backup time and backup status
- Outstanding alerts and related alerts
- Rolled-up number of Oracle policy violations across all member targets in a system
- A quick view of database security
- Job executions that show the scheduled, running, suspended, and problem executions

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 activities such as editing metric thresholds, analyzing job activity and metric collection errors, and accessing 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 12–1 Database Home Page



Monitoring Databases

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

Enterprise Manager uses data from the Automatic Workload Repository (AWR) to display performance information and initiate database alerts. The user interface provides several real-time performance charts and drill-downs for the targets you manage. Both aggregate and instance-specific performance statistics are displayed using color-coded charts for easier viewing. To help you identify the source of a problem and resolve it, you can click a legend link next to a chart to display a detail page that provides comprehensive information.

The basic work flow in monitoring performance is to first go to the Database Performance page, which provides a high-level, comprehensive overview of important performance indicators.

Assessing Database Performance

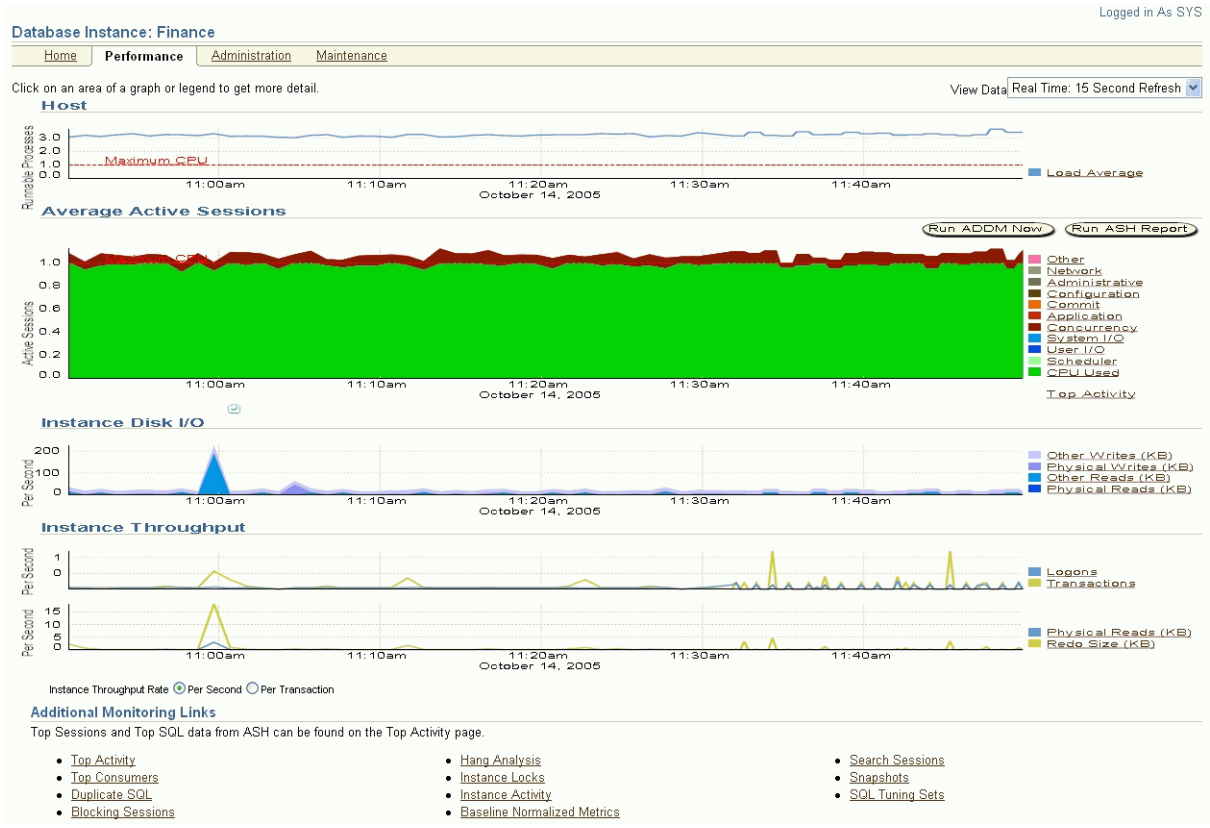
Database tuning is much easier and more effective when all the information for an in-depth performance diagnosis is available on a single screen. On the Database Performance page (Figure 12–2), which is accessible from the Database Home page, you can quickly view performance data for the instance and its underlying host. Additionally, you can analyze trends for all critical performance metrics and compare the trends to those of other database instances.

The most direct method for investigating and diagnosing performance problems from this page consists of accessing the Automatic Database Diagnostic Monitor (ADDM). After you start your Oracle database, the Automatic Workload Repository (AWR) begins taking snapshots of database activity once every hour by default, and ADDM executes when the snapshots are collected. ADDM uses these snapshots to perform a top-down analysis of your database activity and then provide tuning recommendations.

Another method for investigating and diagnosing performance problems consists of observing which of the wait classes beside the Average Active Sessions chart appears to be consuming an excessive amount of time, shown as a spike above the Maximum CPU line, then drilling down for more information. This provides a way for you to visualize the data for which ADDM has made its recommendations.

Either method assists you in diagnosing and resolving problems. The first automated method produces textual findings, whereas the second interactive method produces graphical findings.

Figure 12–2 Database Performance Page



The charts on the Database Performance page display current and recent metric information on a common time axis that enables visual correlation of metrics. These charts provide context-sensitive drill-downs where you can find additional details for rapid problem diagnosis.

Table 12–1 Performance Page Charts

Chart	Description
Host	This chart shows potential problems outside the database. The load average is a moving average of the run queue length. The run queue length indicates the level of contention for CPU time.
Average Active Sessions	This chart is the centerpiece of Oracle performance monitoring, and shows potential problems inside the database. It displays a profile of the amount of time sessions are either working or waiting to work in the database instance. 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 indicate where you should focus your tuning efforts.
Instance Disk I/O	This chart shows the total requests that represent the rate at which the database instance is issuing read/write requests.
Instance Throughput	The charts show any contention that appears in the Average Active Sessions chart

The Additional Monitoring Links section enables you to access several related pages. Among those, the following pages have real-time diagnostic capabilities:

- Top Activity
- Top Consumers
- Instance Activity
- Historical SQL

> **See Also:** "Performance Page" in the Enterprise Manager online help

Diagnosing Problems Interactively

You can manually diagnose problems using an interactive method by first investigating a wait class that you think may be problematic, then drilling down from there for either SQL details or session details. You can alternatively investigate all wait classes in one location and then drill down from there. The following sections explain these methods.

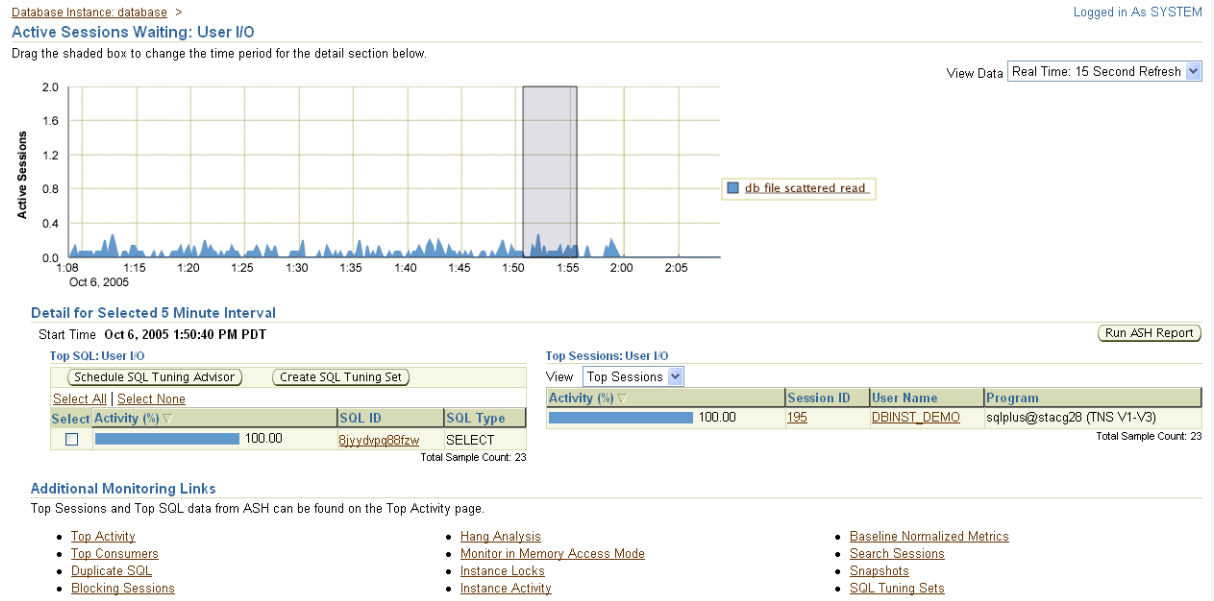
Investigating a Wait Class

Wait class drill-downs enable you to investigate a specific wait class where it appears that time is accumulating. You can then determine whether the problem is caused by one or several SQL statements that are accumulating an unusual amount of time, or whether the problem is caused by one or several sessions.

The wait class drill-downs are called Active Sessions Waiting pages. The pages are sourced from the Active Session History (ASH), which samples session activity every second. It continuously records what is happening, such as which sessions are using CPU and which sessions are waiting on I/O.

Select a wait class link beside the Average Active Sessions chart to obtain detailed information for the wait class. For instance, if you click **User I/O**, the Active Sessions Waiting: User I/O page appears, as shown in Figure 12–3.

Figure 12–3 Active Sessions Waiting Page



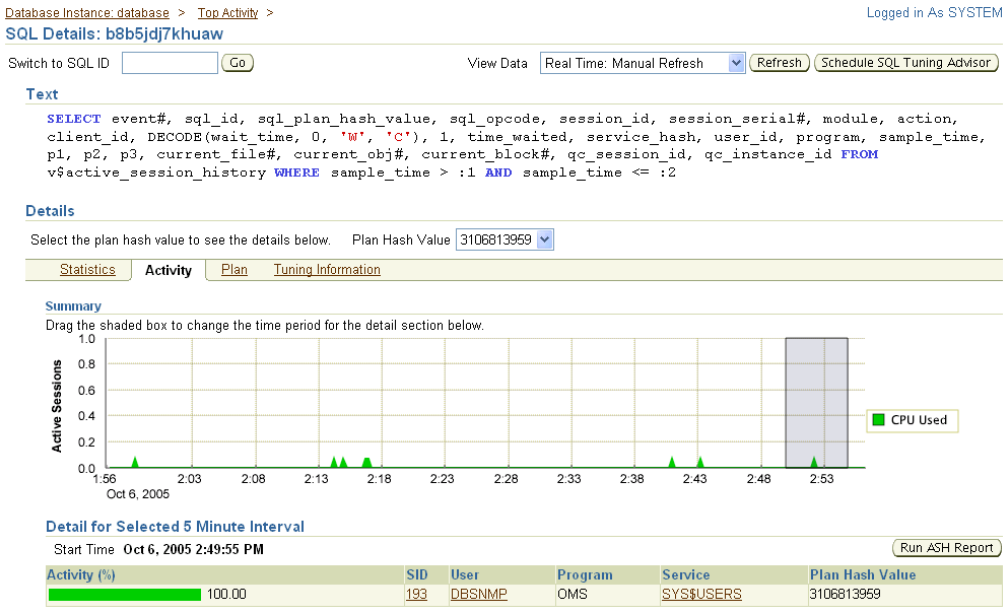
By default, the largest consumers of resources appear at the top of the detail tables. Look for skewed activity for either Top SQL or Top Sessions. If an excessive accumulation of activity appears to originate from an SQL source, you can click its associated SQL ID to go to the SQL Details page, which shows the SQL statement and activity. If excessive accumulation appears to originate from a session source, you can click its associated Session ID to go to the Session Details page, where you can kill the session if needed. You can also view the wait events associated with the session.

> **See Also:** "Active Sessions Waiting Page" in the Enterprise Manager online help

Viewing SQL Details The SQL Details page, shown in Figure 12–4, displays the SQL statement you select in the Active Sessions Waiting page. You can also:

- Examine the activity of this SQL statement over time.
- View SQL-level statistics.
- Investigate the SQL plan.
- Access any prior Tuning Advisor run.
- Schedule a Tuning Advisor run.

Figure 12–4 SQL Details Page

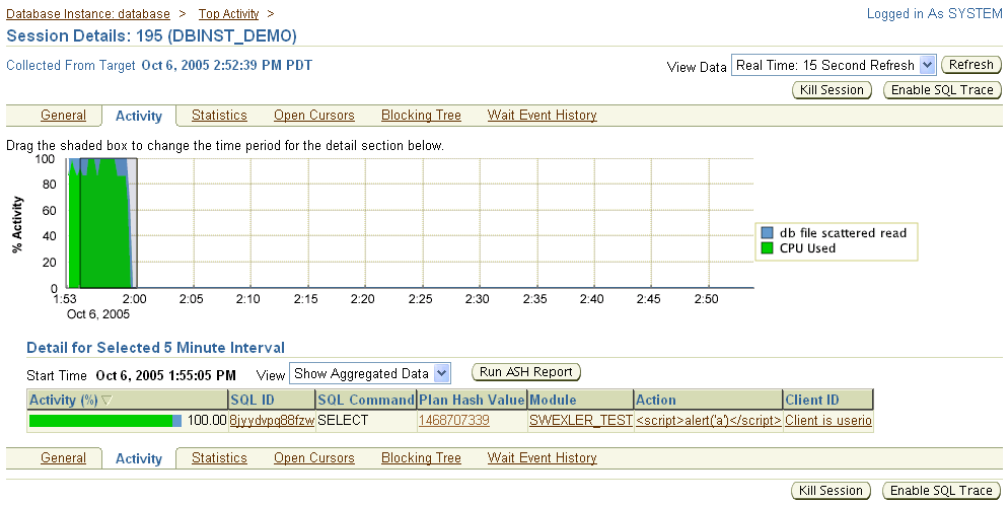


See Also: "SQL Details Page" in the Enterprise Manager online help

Viewing Session Details The Session Details page, shown in Figure 12–5, displays the wait events associated with the session you selected in the Active Sessions Waiting page. You can also:

- View the current values for metrics associated with the current session.
- View the list of currently open cursors in the selected session, including their hash value and SQL text.
- View sessions that are blocking other sessions.

Figure 12–5 Session Details Page

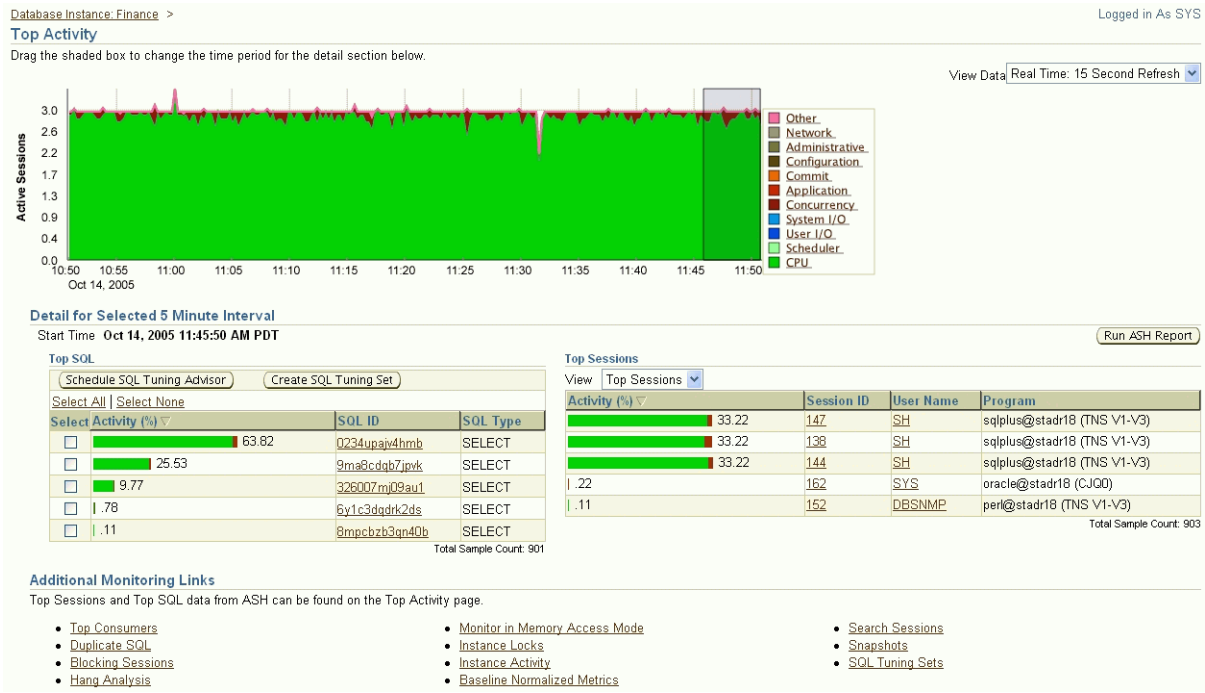


See Also: "Session Details Page" in the Enterprise Manager online help

Viewing Top Activity

The Top Activity page, shown in Figure 12–6, is essentially the sum of all wait class drill-downs. The interface format is the same as the Active Sessions Waiting page, but rather than showing the average active sessions for a particular wait class, the Top Activity page shows the average active sessions for all wait classes. The page also shows the Top SQL and Top Sessions consumers for all wait classes. As with the Active Sessions Waiting pages, look for skewed activity for either Top SQL or Top Sessions.

Figure 12–6 Top Activity Page



See Also: "Top Activity Page" in the Enterprise Manager online help

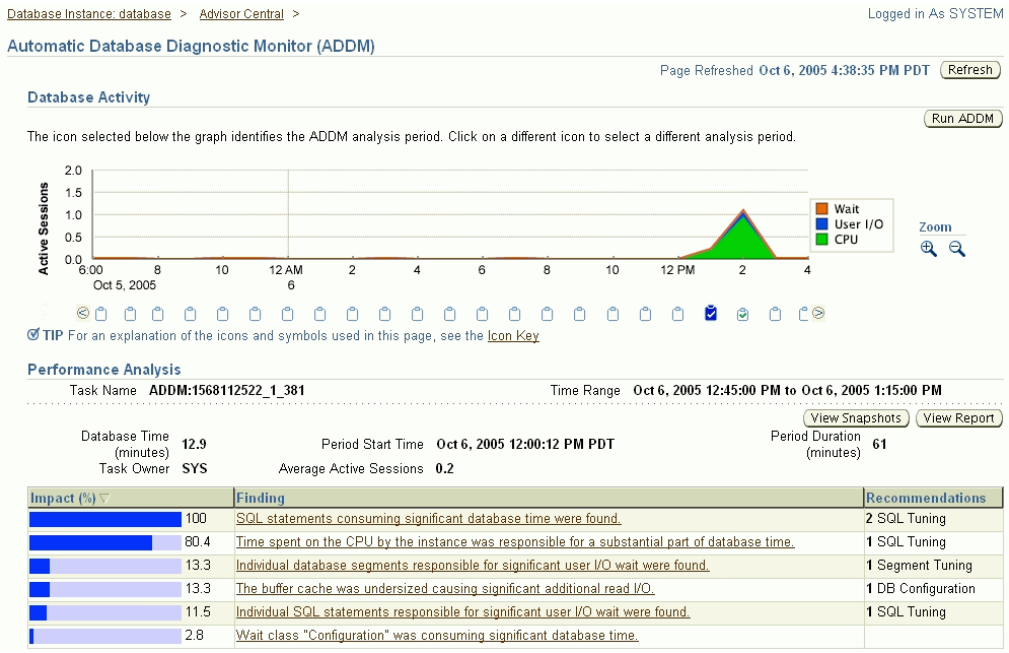
Diagnosing Problems Automatically

As mentioned in Assessing Database Performance, you can use the Automatic Database Diagnostic Monitor (ADDM) to automatically investigate and diagnose performance problems from either the Database Home page or the Database Performance page. Using regularly scheduled snapshots of the database activity, ADDM identifies the most resource-intensive components or operations, and determines whether or not these components or operations are acting as performance bottlenecks. If one or more problems have occurred, ADDM diagnoses these potential problems and provides advice, which may recommend that you run an advisor or change your database configuration.

You can view ADDM findings over a predetermined period of recent time or at the present time. You can view ADDM findings for the most recent time interval by clicking the **ADDM Findings** link in the Diagnostic Summary section of the Database Home page. You can also view ADDM findings for this interval by clicking the small ADDM icon below the Average Active Sessions chart in the Database Performance page. Either option displays the Automatic Database Diagnostic Monitor page, shown in Figure 12–7. To determine ADDM findings at the present time, you can click the **Run ADDM** button on the Database Performance page.

By default, the database takes snapshots at 60-minute intervals. You can use the Automatic Workload Repository to change the snapshot interval, ranging from 10 minutes to 2 hours.

Figure 12–7 Automatic Database Diagnostic Monitor Page



See Also: "Performance Finding Details Page" in the Enterprise Manager online help

Using Additional Diagnostic Pages

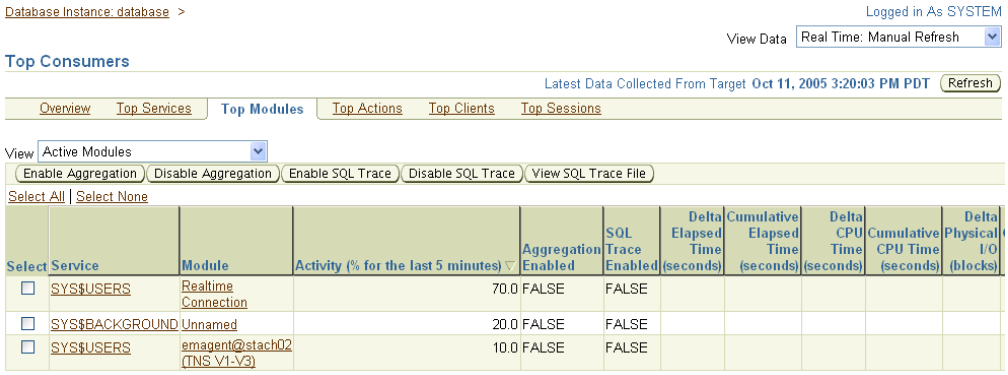
Besides the primary diagnostic pages discussed above, there are other important secondary pages that can assist you in diagnosing and correcting performance problems. The following sections discuss these diagnostic pages:

- Top Consumers
- Instance Activity
- Historical SQL

Top Consumers

The Top Consumers link provides global summary information for the top database consumers of system resources. You can access detailed metrics data for a specific top consumer, such as sessions, services, modules, and clients. This enables you to pinpoint the most problematic areas on which to focus your database tuning efforts. Figure 12–8 shows the Top Modules page of Top Consumers, where you can perform tasks such as enabling and disabling aggregation and SQL traces for the consumer. You can use an SQL trace to trace statistics of SQL statements, such as CPU time, elapsed time, and the Explain Plan.

Figure 12–8 Top Consumers Top Modules Page

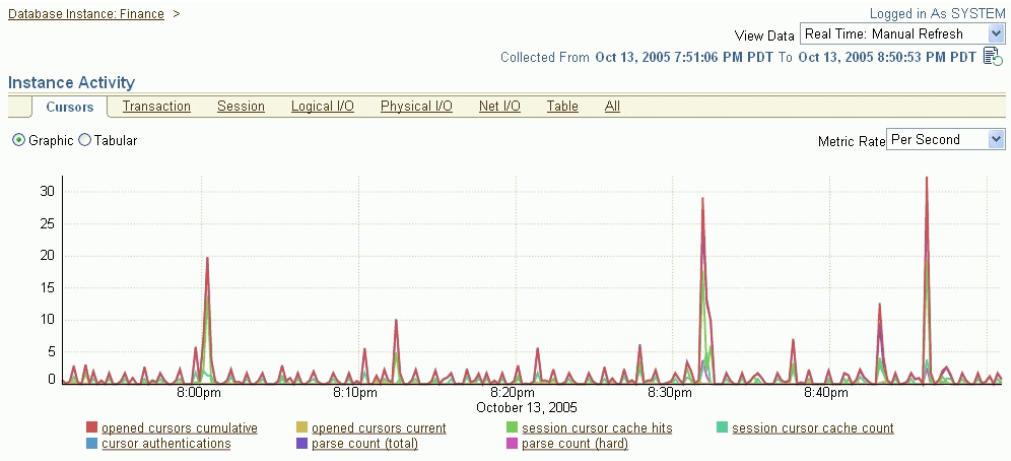


See Also: "Top Consumers Page" in the Enterprise Manager online help

Instance Activity

The Instance Activity link displays database activity for specific data about groups of metrics, such as cursors, sessions, and transactions (Figure 12–9). For instance, the Cursors metric group displays information about opened and session cursors along with authentications and parse counts. The legend links below the chart in the graphic view, or the name links in the table view, enable you to access the Top Sessions page for more detailed information.

Figure 12–9 Instance Activity Page



See Also: "Instance Activity Page" in the Enterprise Manager online help

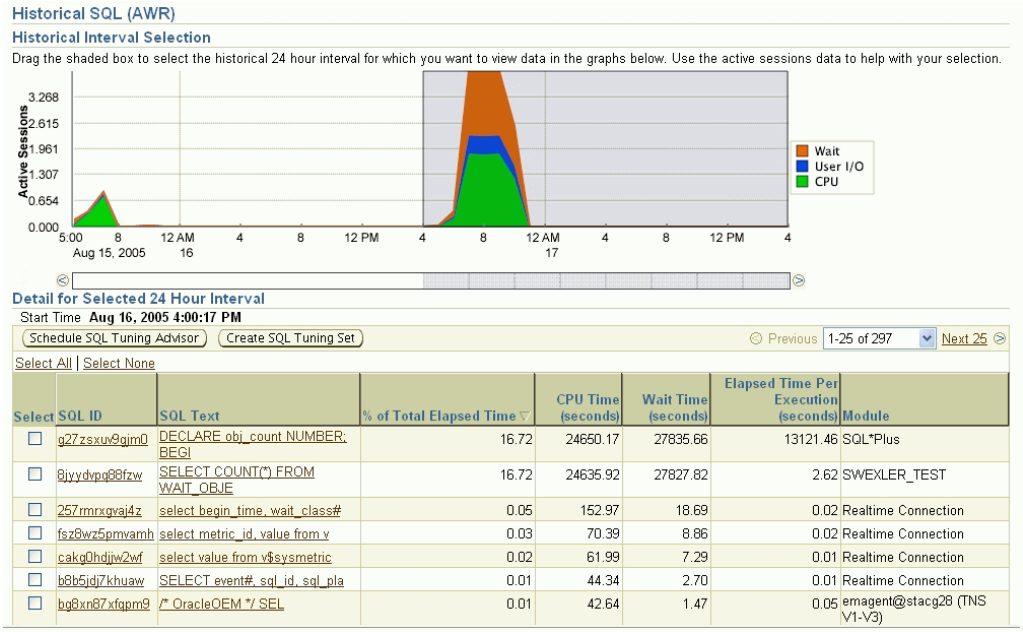
Historical SQL

The Historical SQL (AWR) link displays statements stored in the Automatic Workload Repository (AWR) for a 24-hour period. This link is available in the Additional Monitoring Links section when you select the Historical data view (Figure 12–10).

The table at the bottom of the page shows an analysis of all SQL statements for performance and resource consumption. You can select a statement link to see SQL details (statistics, activity, SQL plan, and tuning information) for the statement.You

can also run the SQL Tuning Advisor to receive recommendations for one or more statements.

Figure 12–10 Historical SQL Page



See Also: "Historical SQL (AWR) Page" in the Enterprise Manager online help

Using Other Performance Tools

Enterprise Manager offers several tools that provide additional assistance ranging from viewing the relationships between system components to collecting system statistics when database performance is degraded. The following sections discuss these tools:

- Topology Viewer
- Metric Baselines
- Memory Access Mode
- Hang Analysis

Topology Viewer

Enterprise Manager provides a Topology Viewer for several applications. The Topology Viewer allows you to view the relationships between components, nodes, or objects within different Oracle applications. You can zoom, pan, see selection details and summary information, and evaluate aggregate components. Individually distinct icons are used for each object type, and standardized visual indicators are used across all applications.

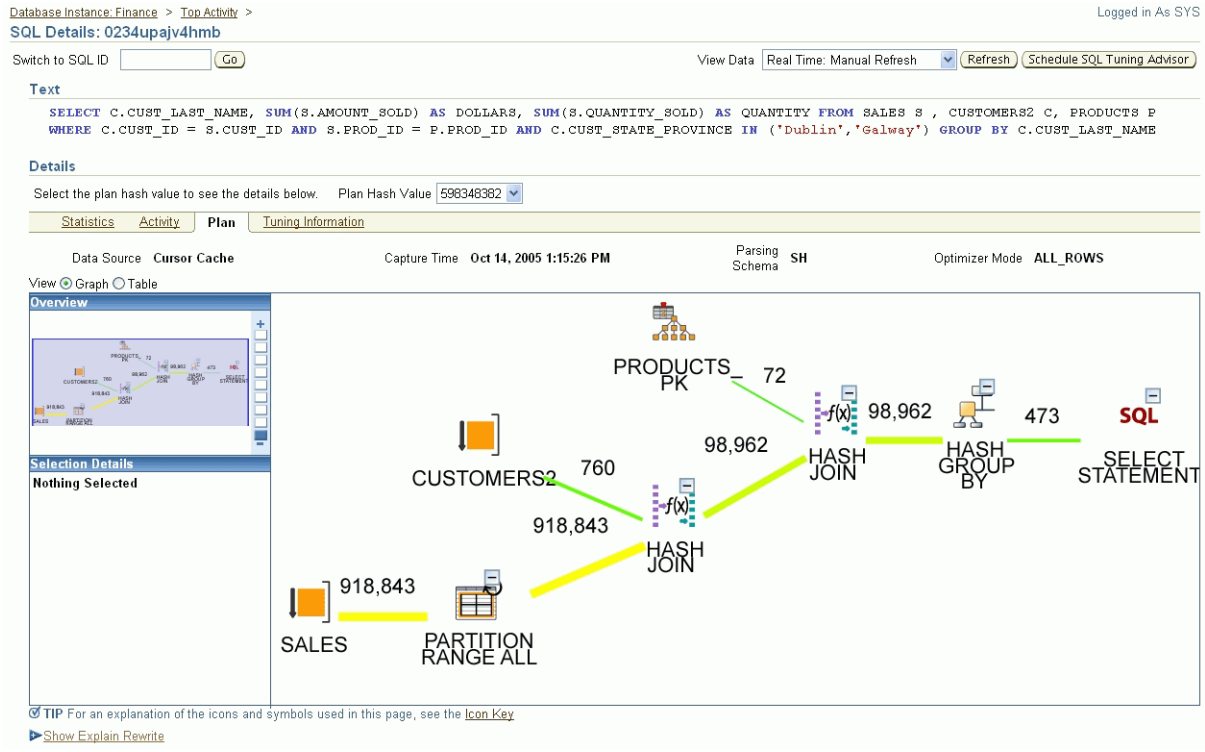
The Topology Viewer is available for the following database applications:

- Scheduler
- SQL Details
- SQL Explain Plans

- Real Application Clusters
- Cluster Databases

Figure 12–11 shows the Topology Viewer for the SQL Details Plan page. The Topology Viewer provides a graphical representation of your SQL steps as modeled in Enterprise Manager.

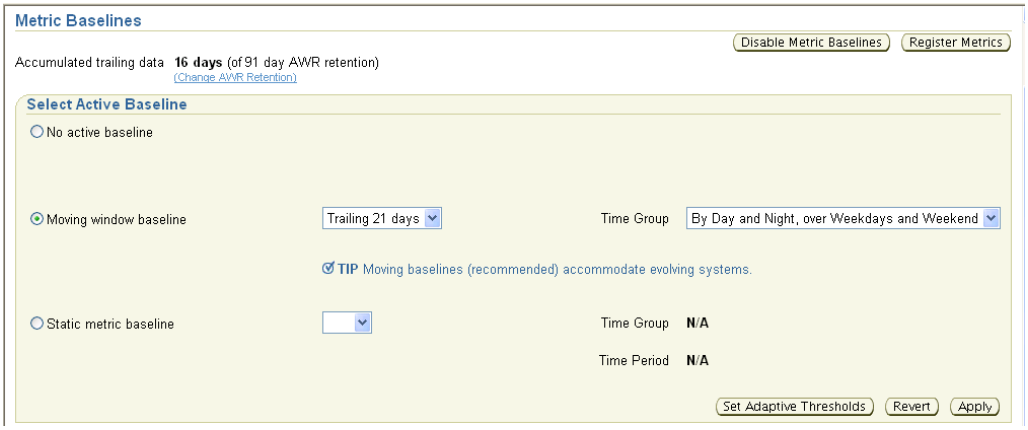
Figure 12–11 Topology for SQL Details Plan



Metric Baselines

From the Database Performance page, you can set a metric baseline—a time period associated with a target that you can use as a reference for evaluating target performance (Figure 12–12). Statistics are computed over the baseline period for specific target metrics. You can use these statistics to automatically set metric thresholds for alerts, as well as to normalize graphical displays of system performance.

Figure 12–12 Metric Baselines Page



See Also: "Metric Baselines Page" in the Enterprise Manager online help

Memory Access Mode

When the database server experiences performance issues, diagnostic queries could further impact the system. A new feature, called Memory Access Mode, assists you in diagnosing performance-related problems by collecting system statistics even when the database is either slow or hung.

Instead of relying on the normal SQL engine, the data is retrieved by accessing tables directly from the Shared Global Area (SGA). The data collection is quick and does not further impact a system that is already slow. Potentially, this allows for sub-second sampling of performance metrics without causing any additional load on a system.

You can disable the standard SQL Access Mode and switch to Memory Access Mode by clicking the **Monitor in Memory Access Mode** link in the Related Links section.

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

Hang Analysis

A new feature, called Hang Analysis, enables you to diagnose locking issues that might either slow down a system or cause hanging. Normally, if a system is slow or in a hung state, the diagnostic queries are also either extremely slow or never return a result. This utility bypasses the typical query engine instead, and leverages the Oraclebug API to return results quickly even on systems that might be seemingly in a hung state.

The Hang Analysis page shows a visual map of the sessions that are either blocking or are blocked. A tree view of the sessions is displayed, and the problem session that is blocking other sessions is located at the root of the tree. Each session is shown color-coded, signifying how long the session has been blocked. Clicking on the session box brings up another page that shows session details. Using information from this page, you can cancel the problem session and return the system to its normal state.

You can access the Hang Analysis page by clicking the Hang Analysis link in the Additional Monitoring Links section.

See Also: "Hang Analysis Page" in the Enterprise Manager online help

Administering Databases

Oracle Enterprise Manager effectively keeps your Oracle Databases available and running efficiently. Enterprise Manager can help database administrators perform everyday tasks. Specifically, it provides a graphical user interface for managing database storage structures and schemas. As with database monitoring, administration of the Oracle Database begins with the Oracle Database Home page. From this page, you can display an overview of your database properties and performance. However, you can also use the Administration section of the page to perform common administration tasks such as the following:

- Allocating system storage and planning future storage requirements for the database system
- Creating and managing primary database storage structures (tablespaces)
- Creating and managing primary objects (tables, views, indexes)
- Enrolling users and maintaining system security by controlling and monitoring user access to the database
- Backing up and restoring the database

Just as Enterprise Manager monitoring identifies problem areas in your database and database groups, you can administer your database using the Enterprise Manager administration tools. The administration tools allow you to manage database objects and initiate database operations inside an Oracle Database. The following sections provide an overview of the database administrative features available to you in Enterprise Manager.

Managing Storage Objects

As an administrator, you can use the administration tools in Oracle Enterprise Manager to optimize database performance. Using these tools, you can manage storage structures such as control files, tablespaces, datafiles, and archive logs. In addition to viewing, editing, and deleting these structures, you can also perform other functions such as making tablespaces locally managed, displaying the dependencies of a datafile, or backing up a control file to a trace.

Using Database Configuration Features

Oracle Enterprise Manager incorporates many features that help you to manage your database configuration. For example, you can use Enterprise Manager to manage the memory size of the system global area and program global area of your system. You can also use the Undo Management feature to provide a means of explicitly specifying the amount of undo information to retain and ensure that undo information is not overwritten.

You can create or edit initialization parameters for the current database, setting these parameters to specific values to initialize many of the memory and process settings of an Oracle Database instance. You can also display a list of database features, showing how often the features are used in the operation of the database. Usage information can be utilized by support groups and other organizations to gain knowledge about how the system is being used, and to help apportion resources as necessary.

Using Automatic Storage Management

Enterprise Manager uses Automatic Storage Management (ASM) to automate and simplify the layout of datafiles, control files, and log files. Database files are

automatically distributed across all available disks, and database storage is rebalanced whenever the storage configuration changes. You can manage your entire Automated Storage Management environment through Enterprise Manger. Additionally, you can easily migrate an existing database to Automatic Storage Management on the same host by using the migration tool in Enterprise Manager. The process defines the migration request and submits a job to complete the migration process.

Converting Single Instances to Real Application Clusters

Oracle Real Application Clusters (RAC) provides a high-availability database environment spanning multiple hosts. Each cluster can be comprised of multiple cluster databases, each of which consists of multiple cluster database instances. A cluster database is available as long as one of its instances is available. You can use Enterprise Manager to asynchronously convert a single-instance database to a RAC database.

Converting to a Locally-Managed Tablespace

An added feature allows you to convert a dictionary-managed tablespace to a locally-managed tablespace, thereby simplifying space allocation, improving performance, and reducing reliance on the data dictionary.

Controlling Resources with Resource Manager

The Database Resource Manager controls the distribution of resources among various sessions by controlling the execution schedule inside the database. By controlling which sessions run and for how long, the Database Resource Manager can ensure that resource distribution matches the plan directive and hence, the business objectives. You can use the Database Resource Manager to automatically assign sessions to specific consumer groups by setting up mappings between session attributes and consumer groups. You can also map consumer groups in specified categories to users, client programs, modules, or services.

Resource consumer groups let you group user sessions together by resource requirements. Resource consumer groups are different from user roles; one database user can have different sessions assigned to different resource consumer groups. You can then use a resource plan to specify how the resources are to be distributed among various resource consumer groups.

Resource plans specify the resource consumer groups belonging to the plan and contain directives for how resources are to be allocated among these groups. Plan information is stored in tables in the data dictionary. Several views are available for viewing plan data. In addition to containing resource consumer groups, a plan can contain subplans. Use Enterprise Manager to manage all aspects of the resource plan.

Tracking Statistics to Improve Database Performance

The Workload Repository provides you with a mechanism for gathering database statistics for specific time intervals. You can use the Optimizer Statistics feature of Enterprise Manager to simplify the management of Optimizer Statistics operations such as gathering, restoring, deleting, locking, and unlocking statistics. Use these statistics to improve the performance of your SQL statements.

Using Oracle Scheduler

Oracle Enterprise Manager uses the Scheduler to enable database administrators and application developers to control when and where various tasks occur in the database environment. Using the Scheduler helps to improve the management and planning of these tasks. By separating a task into its component parts such as time, location, and database object, the Scheduler provides an easier way to manage your database environment. Database administrators can schedule and monitor recurring database maintenance jobs, such as backups or nightly data warehousing loads and extracts, and they can schedule job execution based on time or events.

With Enterprise Manager, you can enable and disable Scheduler jobs, alter the settings for existing jobs, start or stop current jobs, and view Scheduler information.

Working With Database Schemas

A schema is a collection of database objects comprised of logical structures that directly refer to the data in the database. Schema objects include structures such as tables, views, and indexes. These schema objects can be created and managed using the tools available in Oracle Enterprise Manager.

Managing Database Objects

Oracle Enterprise Manager provides a comprehensive set of tools that allows you to manage all aspects of database directory objects such as tables, indexes, and views. You can use the tools available in Enterprise Manager for fundamental tasks such as creating, editing, and viewing object properties, but you can also use Enterprise Manager for more comprehensive tasks such as running the Segment Advisor to evaluate a table for block and space usage and to determine whether space can be saved by shrinking highly fragmented segments. The space gained by the implementation of these recommendations is returned to the table.

Indexes are optional structures associated with tables that can be created to increase the performance of data retrieval. When you manage indexes in Enterprise Manager, you can perform functions such as shrinking segments to compact segments and free the recovered space to the current tablespace. Alternatively, you can also eliminate space problems by reorganizing space usage while changing the storage settings and location of the index.

Views are customized presentations of data in one or more tables or other views. In addition to creating, deleting, and managing views, you can also view the objects that are dependencies of the view. The Dependencies table shows you the Object Name and the Object Type that is dependent on the current view. Conversely, Enterprise Manager can also show you the objects on which the current view is dependent.

In general, use the Action menu on the Search page or Property page of any database object to see a list of the available functions you can perform on that object.

Enterprise Manager allows you to manage program structures, such as packages, package bodies, functions, and triggers in the same way. In addition to creating and viewing these elements, you can compile Java Sources, for example, or generate the data definition language (DDL) code for a specified object such as package. For more information about the various functions available for a specific object, you can refer to the online Help.

XML Database Features in Oracle Enterprise Manager

XML, eXtensible Markup Language, is the standard way to identify and describe data on the Web. Oracle XML DB treats XML as a native datatype in the database. Oracle XML DB offers a number of easy ways to create XML documents from relational tables. The result of any SQL query can be automatically converted into an XML document. Oracle also includes a set of utilities, available in Java and C++, to simplify the task of creating XML documents.

Managing Users and Privileges

Oracle includes security features that control how a database is accessed and used. Privileges and roles control user access to data and the types of SQL statements that can be executed. There are three types of privileges and roles: system privileges, object privileges, and roles. The system privilege is an Oracle-defined privilege usually granted only to and by administrators. It allows users to perform specific database operations. An object privilege is an Oracle-defined privilege that controls access to a specific object. A role can be created by users, usually administrators, and is used to group together privileges and other roles. This facilitates the granting of multiple privileges and roles to users.

Privileges and roles can be granted to other users by users who possess the power to do so. Oracle Enterprise Manager allows you to create and manage users, roles and profiles. You can also expire passwords and lock or unlock users by applying those actions against one or more users. When managing roles, you can display all users and roles assigned to the specified role by using the Show Grantees function.

Auditing is the monitoring and recording of selected user database actions. It can be based on individual actions, such as the type of SQL statement run, or on combinations of factors that can include name, application, time, and so on. Security policies can cause auditing when specified elements in an Oracle Database are accessed or altered, including content. You can set up and adjust audit settings easily within the Enterprise Manager interface. With Enterprise Manager, you can view the database audit configuration and manage audited objects, privileges, and statements. You can also view the content of the audit trail. Out-of-box, Enterprise Manager also provides audit reports to help you monitor successful and failed login attempts, as well as SYSUSER operations.

Managing Materialized Views

Materialized views are schema objects that can be used to summarize, compute, replicate, and distribute data. They are suitable in various computing environments such as data warehousing, decision support, and distributed or mobile computing. Enterprise Manager lets you create and manage materialized views and provides a set of additional tools that allows you to perform specific actions against the view. The Explain Materialized View feature helps you to determine what is possible with a materialized view by indicating whether a materialized view is fast-refreshable, what types of query rewrites you can perform with this materialized view, and whether PCT refresh is possible.

Oracle maintains the data in materialized views by refreshing them after changes are made to their master tables. The refresh method can be incremental (fast refresh) or complete. For materialized views that use the fast refresh method, a materialized view log keeps a record of changes to the master tables. You can use Enterprise Manager to advise you when a query can be rewritten. You can then take the appropriate action required to make a query rewrite. Query rewrite transforms a SQL statement

expressed in terms of tables or views into a statement accessing one or more materialized views that are defined on the detail tables.

Materialized views can be refreshed either on demand or at regular time intervals. You can use the Action menu in Enterprise Manager to manually refresh a materialized view.

About Change Management

A dictionary baseline is an object containing a set of database definitions captured at a certain time. Baselines are stored internally in the Enterprise Manager repository, and are in a form that other Change Management applications can use. You can use Enterprise Manager to capture the database object definitions at a particular point in time and create reusable baseline scope specifications. By capturing a dictionary baseline, you can compare different database objects at different points in time and track changes applied to the database objects.

A dictionary comparison identifies differences in database object definitions between two databases, a database and a baseline, or two schemas within a single database/baseline. With Enterprise Manager, you can compare, view, and track differences between two sets of database object definitions at different points in time. The comparison result displays identical objects, objects/attributes that are different, and objects present either in the left or right source.

Using Advisors in Oracle Enterprise Manager

Advisors are procedures that you can invoke, or Enterprise Manager can invoke internally, that designate a specific object for analysis. An advisor can report on a variety of aspects of the object, and describe a recommended action for each condition worthy of user intervention. The advisor might report that the condition can be corrected by an automated task that it provides.

Some advisors also provide what-if analysis for specific situations. For example, the Undo Advisor provides an analysis of the impact of changing the retention period for undo records on the size of the undo tablespace. Additionally, the Memory Advisor graphically displays the impact on performance of changing the size of a component of the SGA.

You can invoke an advisor from the Advisor Central Home page that is displayed when you click the Advisor Central link under the Related Links heading on the Database Home page, or on other pages where it is listed. You can also invoke advisors in the context of recommendations from alerts. Advisors are powerful tools for tuning your database. In general, advisors produce more comprehensive recommendations than alerts, since alert generation is intended to be low cost and have minimal impact on performance. On the other hand, because Advisors are often user-invoked, they can consume more resources and perform more detailed analysis. Their automated analysis can provide more results than you might normally be able to produce manually in the time afforded you as part of regular operations. This analysis, along with the what-if capability of some advisors, provides vital information for tuning that cannot be procured from any other source.

Maintaining Databases

You can use Oracle Enterprise Manager to control the flow of data between or outside Oracle Databases. The following sections provide an overview of the functions available to you that can help you maintain your Oracle Database.

Using Backup

Backup of an Oracle Database generally refers to physical backup; protecting the files that make up your database. The files protected by the backup and recovery facilities built into Oracle Enterprise Manager include datafiles, control files, and archived redo log files. The backup mechanisms that work at the physical level protect against damage at the file level, such as the accidental deletion of a datafile or the failure of a disk drive. The focus in Oracle backup and recovery is generally on the physical backup of database files, which permit the full reconstruction of your database.

Enterprise Manager's physical backup and recovery features are built on Oracle's Recovery Manager (RMAN) command-line client. Enterprise Manager carries out its backup tasks by composing RMAN commands and sending them to the RMAN client. Enterprise Manager makes available much of the functionality of RMAN, as well as wizards and automatic strategies to simplify and further automate implementing RMAN-based backup and recovery.

Managing backups consists of two things: managing the backups themselves as they exist on disk or tape, and managing the record of backups kept in the RMAN repository.

Datafiles or archived redo logs copied at the operating system level can be cataloged and added to the RMAN repository, after which they can be used in data restore and recovery operations just as if they had been created with RMAN. Backup maintenance provided in Enterprise Manager includes the following:

- Viewing lists of backups (backup sets and image copies) recorded in the RMAN repository
- Cross-checking your repository, which marks as expired any backups that are in the repository but not accessible at the time of the crosscheck
- Deleting expired backups from your RMAN repository
- Deleting obsolete backups from the repository and from disk. Note that if you use a recovery area for your backup storage, many maintenance activities are reduced or eliminated because of the flash recovery area's automatic management of disk space.

Recovery

Media recovery using Enterprise Manager can be either complete recovery or point-in-time recovery. In complete recovery, all changes from the logs are applied and the database returns to its state at the time of failure. You can then reopen the database with no loss of data.

In point-in-time recovery, you can choose any System Change Number (SCN) between the time of the datafile backup and the last change in the redo logs, and apply only changes up through that SCN. You can thus return your database to any SCN (and thus any point-in-time) between the time of your backup and the most recent SCN in the redo logs. This technique can be used to recover from situations such as user errors that cause logical corruption in the database. Point-in-time recovery is sometimes referred to as incomplete recovery, since not all changes are applied.

Media recovery requires a control file, datafiles, and all online and archived redo logs from the time the datafiles were backed up. It is typically used only in the case of database failure.

Crash recovery is used to recover from a failure either when a single-instance database crashes, or all instances of a RAC database crash. Instance recovery refers to the case where a surviving instance recovers a failed instance in a RAC database. Datafile

media recovery is used to recover from a lost or damaged current datafile or control file. Block media recovery is a technique for restoring and recovering individual data blocks while all database files remain online and available.

Flashback Recovery

Enterprise Manager's flashback features provide a range of physical and logical data recovery tools as efficient, easy-to-use alternatives to physical and logical backups. Flashback table allows you to revert a table to its contents at a time in the recent past; and flashback drop allows you to rescue dropped database tables. Neither requires advance preparation such as creating logical-level exports to allow for retrieval of your lost data, and both can be used while your database is available.

Flashback database lets you quickly recover an Oracle Database to a previous time to correct problems caused by logical data corruptions or user errors. If a flash recovery area is configured, then you can return the database to a prior time. Flashback table lets you recover tables to a specified point in time. You can restore table data along with all its associated attributes, such as indexes, triggers, and so on. This is done while the database is online by rolling back only the changes to the given tables. You can revert the table and its contents to a specific time or user-specified SCN. Use flashback table with flashback query and row versions to find a time to which the table should be restored.

The larger the flash recovery area, the more useful it becomes. Ideally, the flash recovery area should be large enough to hold two complete backup copies of your datafiles, plus any incremental backups and archive logs required to restore your database to any point in time during your recovery window.

Backup and Recovery Settings

You can use Enterprise Manager to configure a number of settings and policies that determine how backups are stored, which data is backed up, how backups perform, and how long backups are retained before being purged from the recovery area. You can also configure settings to improve backup performance. For disks, you can configure the default format for storing backups, the location on disk where backups are stored, and whether backup tasks are run in parallel for improved performance. Oracle backups to disk can be saved as image copies or backup sets. Backups to tape and similar media management devices must be stored as backup sets.

Managing Restore Points

You can use Enterprise Manager to create a restore point as a designated point in time to which you can restore your database. A restore point is a name associated with a past point-in-time of the database. You can flash back the database to a restore point if the required flashback logs and archived logs exist. A Guaranteed Restore Point is a restore point to which you can always flash back the database. Each restore point has a name and creation time. The restore points are sorted by creation time beginning with the most recent.

Overview of Data Guard

Oracle Data Guard ensures high availability, data protection, and disaster recovery for enterprise data. Data Guard provides a comprehensive set of services that create, maintain, manage, and monitor one or more standby databases to enable production Oracle Databases to survive disasters and data corruptions. Data Guard maintains these standby databases as transactionally consistent copies of the production

database. Then, if the production database becomes unavailable because of a planned or an unplanned outage, Data Guard can switch any standby database to the production role, thus minimizing the downtime associated with the outage.

Data Guard can be used with traditional backup, restoration, and cluster techniques to provide a high level of data protection and data availability. With Data Guard, administrators can optionally improve production database performance by offloading resource-intensive backup and reporting operations to standby systems.

A Data Guard configuration consists of one production database and one or more standby databases. You can manage primary and standby databases using Enterprise Manager. You can use Enterprise Manager to monitor the status of a configuration as well as the online redo log file activity of the primary and standby databases. At the most basic level, the Data Guard Overview page for the configuration not only displays information about the configuration, but it also includes summary information about its databases.

Additional Maintenance Features

Enterprise Manager allows you to easily move data from files or databases into an existing database. You can export and import data, and you can clone databases using the tools available in Enterprise Manager. The following sections describe the features available in the Maintenance area of the Database Home page.

Exporting and Importing Features

The Export to Files feature enables you to move existing data in Oracle format to and from Oracle Databases. For example, export files can archive database data or move data among different Oracle Databases that run on the same or different operating systems. Using Export to Files, you can back up logical database objects while the database is open and available for use. It writes a read-consistent view of the database's objects to an operating system file.

Conversely, you can use Enterprise Manager to import the contents of a database, objects, and tables. You can also import the contents of a database by using the Import from Database feature. You can import an entire database, schemas within a database and the objects in the schemas, or one or more tables from within a schema. Use the Load Data from File feature to load data from a non-Oracle database into an Oracle Database.

Use the Monitor Export and Import Job feature to view the status of an import and export operation such as a full database export or a tablespace export. You can change the state of a job by suspending it, canceling it, or resuming it if it had previously been suspended. You can also increase the number of threads dedicated to the job and thus increase its resources.

Cloning Databases or Transporting Tablespaces

You can use the Enterprise Manager Clone Database tool to clone an Oracle Database instance to an existing Oracle home. After you have an Oracle Database instance in a known state, you may want to clone that database to another existing Oracle home.

Use the Transport Tablespaces feature to transport tablespaces between different machine architectures and operating systems. Transportable tablespaces entirely bypass the unload and reload steps. Using transportable tablespaces, Oracle datafiles (containing table data, indexes, and almost every other Oracle Database object) can be directly transported from one database to another. You can use the transportable

tablespaces feature to move a subset of an Oracle Database and plug it in to another Oracle Database, essentially moving tablespaces between the databases.

Overview of Oracle Streams

Oracle Streams enables the propagation and management of data, transactions, and events in a data stream either within a database, or from one database to another. The stream routes published information to subscribed destinations. As users' needs change, they can simply implement a new capability of Oracle Streams, without sacrificing existing capabilities. Oracle Streams can stream data between databases, nodes, or blade farms in a grid and can keep two or more copies in sync as updates are applied. It also provides a unified framework for information sharing, combining message queuing, replication, events, data warehouse loading, notifications, and publish/subscribe into a single technology.

Oracle Streams provides a set of elements that lets users control what information is put into a stream, how the stream flows or is routed from node to node, what happens to events in the stream as they flow into each node, and how the stream terminates. By specifying the configuration of the elements acting on the stream, you can address specific requirements, such as message queuing or data replication.

Use the tools in Oracle Enterprise Manager to set up and manage your Oracle Streams environment.

Working with Software Configurations

The Oracle Management Agent on a host collects host configuration information for the host and database configuration information for the Oracle Databases on the host and client configuration information and communicates that information over HTTPS to the Oracle Management Service, which stores it in the Oracle Management Repository. Enterprise Manager lets you compare these configurations to determine differences between two or more hosts, clients or databases. The Generic Compare feature allows you to compare various types of current/saved configurations with one or more current/saved configurations.

Using this feature, you can compare the current configuration of a selected target type with one or more current configurations of other targets of the same type, or compare saved configurations with one or more saved configurations of the same or other targets. You can also compare saved configurations with one or more current configurations of the same or other targets, or compare a specific configuration with another configuration and list the differences immediately. Lastly, you can compare a specific configuration with another configuration and schedule the comparison as a job.

Using Database Software Patching

Use Enterprise Manager to simplify the patching of Oracle software on any host where an Oracle Management Agent is running, and to provide critical patch advisories. Enterprise Manager simplifies the process of patching Oracle software. Oracle Patch Advisories describe critical software patches for Oracle products. To help ensure a secure and reliable configuration, all relevant and current critical Oracle patches should be applied. To promote critical patch application, Enterprise Manager performs an assessment of vulnerabilities by examining the host configurations collected for your enterprise to determine the Oracle homes that require one or more critical patches to be installed. All the Critical Patch Advisories are listed with their corresponding Impact areas, a brief description of each advisory, the number of Affected Hosts, and Oracle homes for each advisory.

You can connect to Oracle*MetaLink* via Enterprise Manager, perform a search, download the required patches/patch sets, and apply the patches. You can perform all the patching activities from the Patch Cache. That is, even when the OMS is not connected to Oracle*MetaLink* via the Internet, you can perform a search, download, and apply a patch/patch set.

Monitoring Real Application Clusters

Oracle Real Application Clusters (RAC) provides a high-availability database environment spanning multiple hosts. Each cluster can be comprised of multiple cluster databases, each of which consists of multiple cluster database instances. A cluster database is available as long as one of its instances is available.

Enterprise Manager provides performance pages to monitor all levels of a cluster environment, including the cluster, the cluster database, and the cluster database instances. Managing Real Application Clusters databases and instances is similar to managing single-instance databases. Using Enterprise Manager, you can perform various tasks, such as:

- Managing clusters, cluster databases, and cluster database instances
- Monitoring key performance statistics
- Performing administration and maintenance tasks
- Managing Real Application Clusters features, such as Cluster Managed Database Services

RAC enables each computer (or host) that is a member of the cluster to share access to the database. If one cluster host fails or is taken offline, the other hosts of the cluster continue operating, and the entire RAC database remains available for applications. This means that two or more computers with typical performance appear to applications as if they were a much more powerful computer.

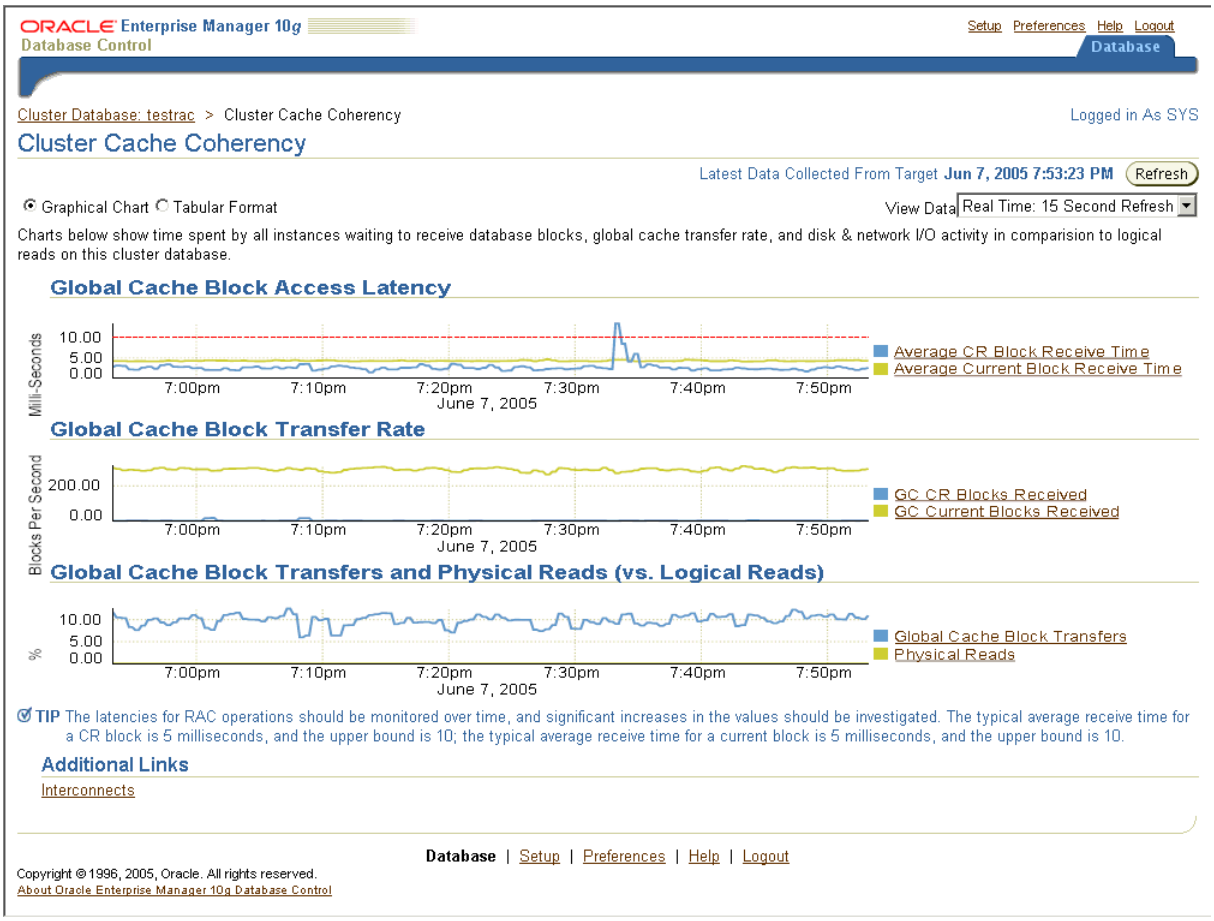
To increase performance, availability, and reliability of a two-host RAC database, you can add cluster hosts. Because data is not partitioned between hosts, adding hosts to the cluster does not create instability; instead, applications can run faster or support more users. The more hosts your RAC database has, the less the loss of any individual node affects the database.

Cluster Cache Coherency

Concurrent read and write activity on shared data in a cluster occurs frequently. Depending on the service requirements, this activity does not normally cause performance problems. However, when global cache requests cause a performance problem as indicated on the Cluster Database page, a successful strategy for performance tuning is to optimize SQL plans and the schema to achieve effective local cache hit efficiency and minimize I/O. To assist you in resolving the problem, the Cluster Cache Coherency page enables you to view cache coherency metrics for the entire cluster database, identify processing trends, and optimize performance for your Real Application Clusters environment (Figure 12–13).

> **See Also:** "Cluster Cache Coherency Page" in the Enterprise Manager online help

Figure 12–13 Cluster Cache Coherency Page



The charts have the following purposes:

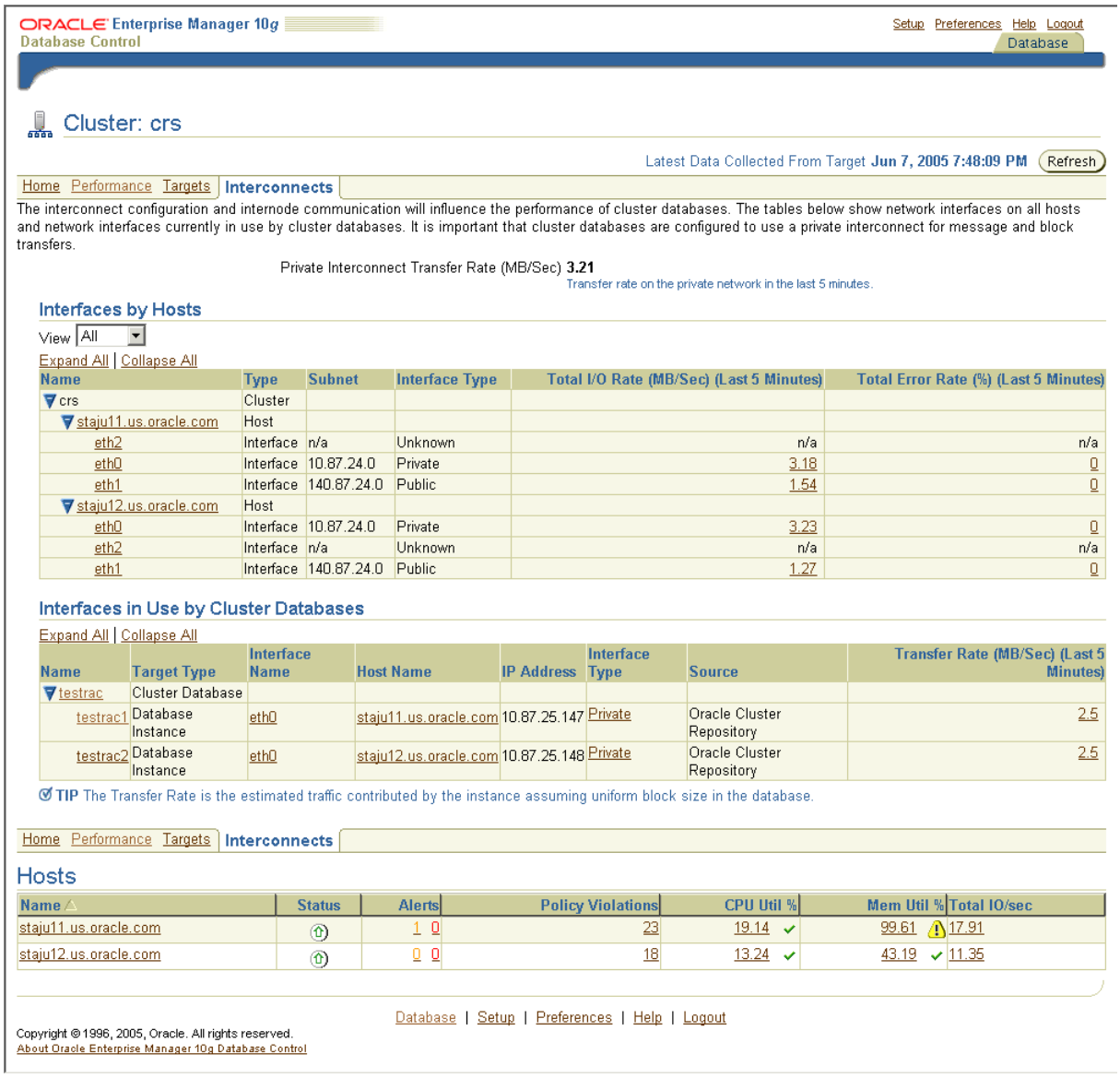
- **Global Cache Block Access Latency** represents the end-to-end elapsed time or latency for a block request.
- **Global Cache Block Transfer Rate** shows the total aggregated number of data blocks received by all instances in the cluster through an interconnect.
- **Global Cache Block Transfers and Physical Reads** shows the percentage of logical reads that read data from the buffer cache of other instances through Direct Memory Access and from disk.

Cluster Interconnects

The Cluster Interconnects page enables you to view the current state of interfaces on hosts (Figure 12–14). You can use this page to monitor the interconnect interfaces, determine configuration issues, and identify transfer rate-related issues, such as excess traffic. This page helps determine the load added by individual instances and databases on the interconnect. Sometimes, you can immediately identify interconnect delays due to applications outside the Oracle Database.

> **See Also:** "Cluster Interconnects Page" in the Enterprise Manager online help

Figure 12–14 Cluster Interconnects Page



Cluster-Managed Database Services

Services are groups or classifications of applications that comprise business components that extend and respond to application workloads. Examples of services are Accounts Payable, Customer Relationship Management, and so on. Services in RAC enable continuous, uninterrupted database operations to support multiple services on multiple instances.

Services enable RAC to integrate cluster database resources into a single system image to optimize cluster manageability. This simplifies system deployment, testing, disaster recovery, and administrative overhead. With services, users connect to a database without regard for which instance executes the SQL application service.

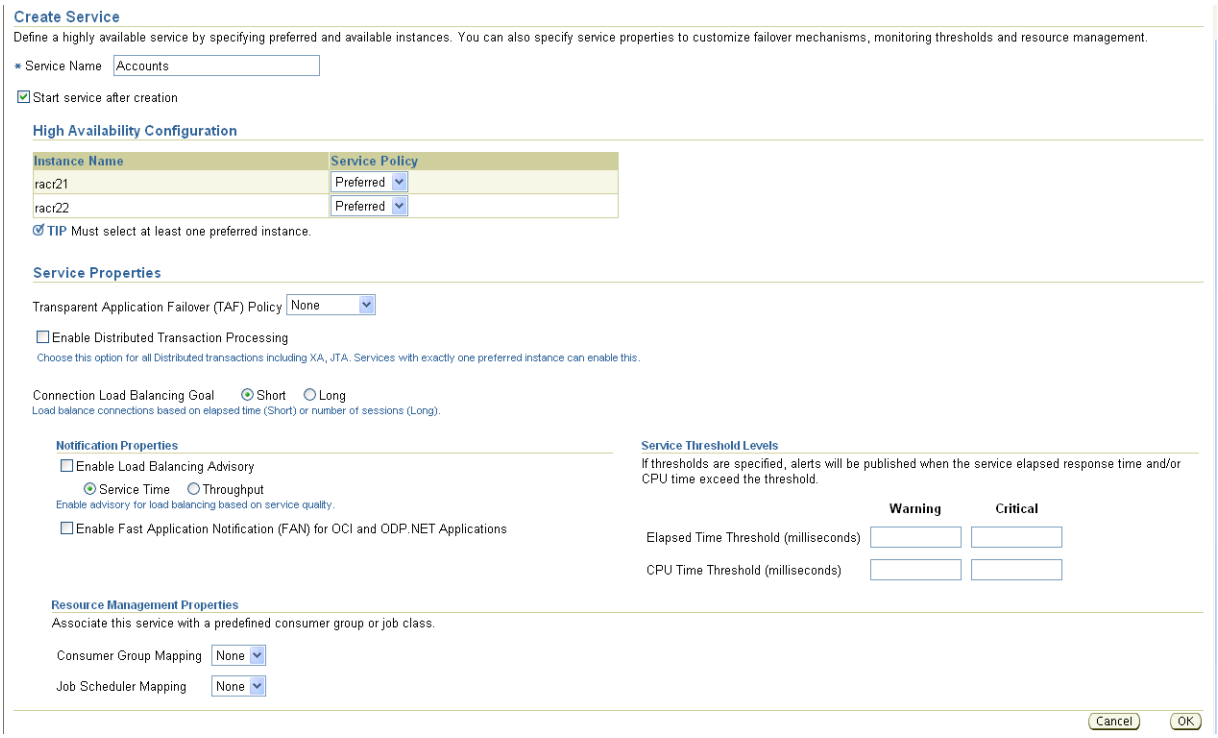
You assign services to run on one or more instances, and alternate instances can serve as backup instances in case the primary instance fails. If a primary instance fails, Oracle moves the service from the failed instance to a surviving alternate instance.

Services enable you to model and deploy both planned and unplanned operations for all types of high availability or disaster recovery scenarios. During outages, RAC automatically restarts key components. Components that are eligible for automatic restart include instances, Oracle Net Services listeners, and the database as well as several database subcomponents.

You can create and edit services using the Create Services page in Enterprise Manager, which you can access from the Cluster Managed Database Services link in the Enterprise Manager Maintenance page (Figure 12–15).

> **See Also:** "Create Service Page" in the Enterprise Manager online help

Figure 12–15 Create Service Page



Oracle Clusterware and High Availability

When you combine Oracle Clusterware and RAC, you can achieve excellent scalability and high availability. To maintain high availability, the Oracle Clusterware components can respond to status changes to restart applications and processes according to high availability rules you can specify in the Create Service page (Figure 12–15). Oracle Clusterware achieves high availability with the components in Table 12–2.

Table 12–2 Oracle Clusterware High Availability Components

Component	Description
Voting Disk	The voting disk manages cluster membership by using a health check, and arbitrates cluster ownership among the instances in case of network failures. RAC uses the voting disk to determine which instances are members of a cluster.

Table 12–2 (Cont.) Oracle Clusterware High Availability Components

Component	Description
Oracle Clusterware Registry	The OCR maintains database and cluster database configuration information as well as configuration information about any cluster database within the cluster. The OCR also manages information about processes that Oracle Clusterware controls.
Application Programming Interface	Oracle Clusterware provides a high availability application programming interface (API) that you can use to manage applications or processes that run on single-instance Oracle databases or RAC databases. This enables you to provide high availability for all of your applications.

13

Application Server Management

This chapter describes how you can use Enterprise Manager to manage the crucial components of your middle-tier Oracle 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 are described in the following sections:

- Out-of-Box Management Using Application Server Control
- Centralized Management Using Grid Control
- Automated Monitoring and Alerts
- Diagnostics and Historical Analysis
- Monitoring Application Server Farms and Clusters
- Viewing Application Server Topology
- Complete Administration

Out-of-Box Management Using Application Server Control

Each Oracle Application Server 10*g* instance is installed with Application Server Control to manage that instance. Application Server Control provides Web-based management tools designed to monitor and administer application server instances, farms, and clusters. You can also deploy applications, monitor real-time performance, manage security, and configure the application server components.

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

Application Server Control consists of the Application Server Control console 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 additional management functionality (for example, application service level management, deployments, historical data collections for performance trending alerts, and so on), you can use Enterprise Manager Grid Control.

Centralized Management Using Grid Control

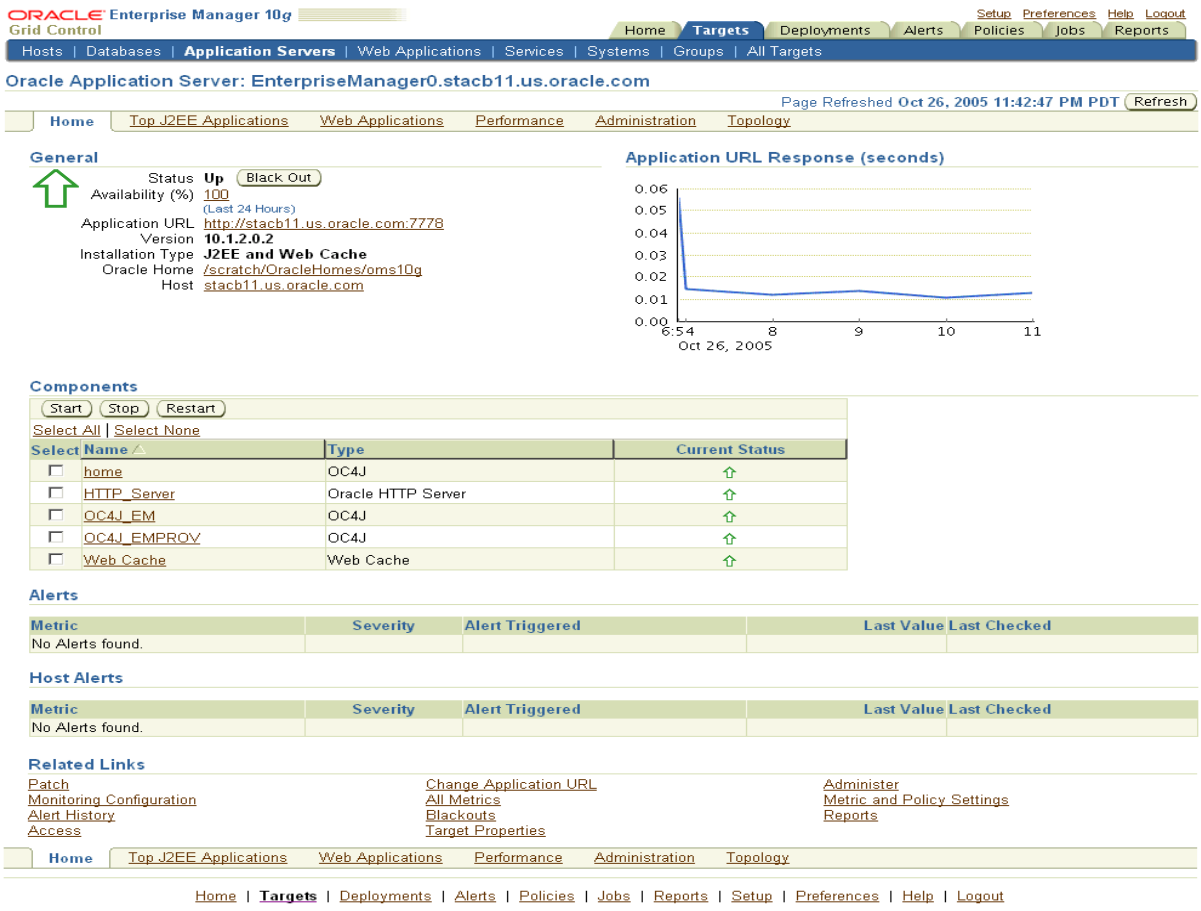
While Application Server Control provides standalone management for one application server and its components, you can centrally manage all your application servers through a single window using Enterprise Manager Grid Control (Grid Control).

For example, if you have ten application servers installed on ten different hosts, you can use Grid Control to manage all these ten application servers. With the help of Management Agents deployed on each host, Grid Control automatically discovers the application servers on these hosts and begins monitoring them using default monitoring levels, notification rules, and so on.

Both Application Server Control and Grid Control have their own application server home pages that provide easy access to key information required by the administrators. The Application Server Home page on Grid Control (Figure 13–1) provides:

- Application server status, responsiveness, and performance data
- Resource usage for the application server and its components
- List of core components that were installed and configured for the application server, and links to their home pages
- Functionality to start, stop, and restart any of those core components
- Alerts and diagnostic drill-downs so you can identify and resolve problems quickly
- Links to Application Server Control for administration operations such as starting and stopping components, modifying configurations, and deploying applications
- Links to other pages in Grid Control that might be helpful in accomplishing your given task

Figure 13–1 Application Server Home Page



Automated Monitoring and Alerts

Enterprise Manager provides a comprehensive set of features that facilitates automated monitoring and generation of alerts. The Oracle Management Agent on a host automatically discovers the Oracle Application Server targets on that host, and helps Enterprise Manager perform unattended monitoring of their status, health, and performance.

Enterprise Manager gathers and evaluates diagnostic information from these targets distributed across the enterprise, and an extensive array of application server performance metrics are automatically monitored against predefined thresholds.

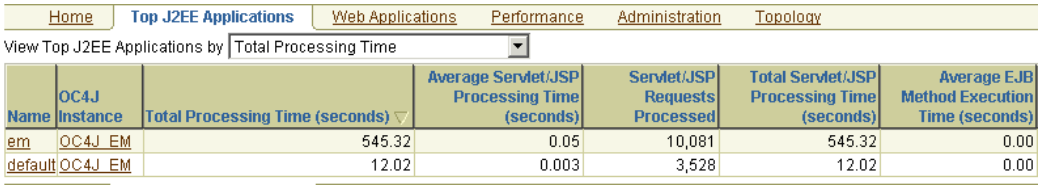
For example, Enterprise Manager can automatically monitor:

- 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).
- HTTP Server session volumes, connection duration, and error rates.
- Oracle Application Server Web Cache hit rates and volumes.
- Top servlets based on number of requests, maximum processing time, and highest average processing time.

If an Oracle Application Server or any of its core components go down, or if a performance metric crosses a warning or critical threshold, an alert is generated by Enterprise Manager and a notification is sent to you. Enterprise Manager supports notifications via e-mail (including e-mail-to-page systems), SNMP traps, and/or by running custom scripts.

When you receive an alert notification, Enterprise Manager makes it easy for you to investigate the problem and take corrective actions wherever required. For example, notification of excessive CPU consumption by OC4J may lead to investigation of the applications running in that container. By using the Top J2EE Applications tab of the Application Server Home page (Figure 13–2) in Grid Control, 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 to identify the bottleneck.

Figure 13–2 Monitoring the Performance of Your Deployed J2EE Applications



You can set up corrective actions to automatically resolve an alert condition. These corrective actions ensure that routine responses to alerts are automatically executed, thereby saving you time and ensuring that problems are dealt with before they noticeably impact the users.

You can also use monitoring templates to simplify the task of standardizing monitoring settings across your enterprise. You can specify the monitoring settings once and apply them to all Oracle Application Server targets. A Monitoring template defines all Enterprise Manager parameters you would normally set to monitor an Oracle Application Server target, such as:

- Target type to which the template applies.
- Metrics (including user-defined metrics), thresholds, metric collection schedules, and corrective actions.

When a change is made to a template, you can reapply the template across affected Oracle Application Server targets in order to propagate the new changes. You can reapply monitoring templates as often as needed.

Diagnostics and Historical Analysis

The following sections describe important management tasks, such as:

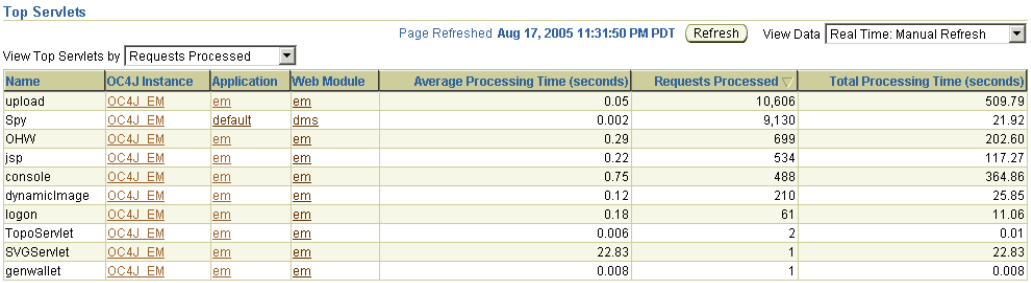
- Diagnosing Performance Issues with Top Reports
- Analyzing Historical Performance

Diagnosing Performance Issues with Top Reports

When you are troubleshooting performance problems, it can be helpful to know which servlets or JSPs are the most active. By using the Top Servlets or Top JSPs performance links of the Application Server Performance page (Figure 13–3 and Figure 13–4) in Grid Control, you can identify the top Java servlets or JSPs running on the application

server instance. You can then sort them to identify the servlets and JSPs by number of requests, maximum processing time, or highest average processing time.

Figure 13–3 Monitoring the Top Servlets for a J2EE Application



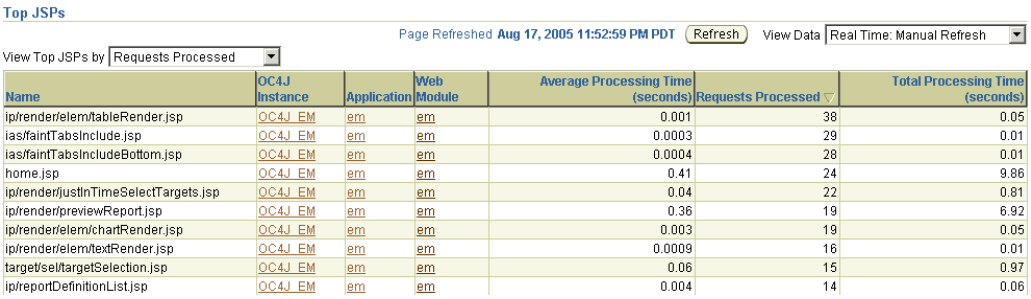
Top Servlets

Page Refreshed Aug 17, 2005 11:31:50 PM PDT Refresh View Data Real Time: Manual Refresh

View Top Servlets by Requests Processed

Name	OC4J Instance	Application	Web Module	Average Processing Time (seconds)	Requests Processed	Total Processing Time (seconds)
upload	OC4J_EM	em	em	0.05	10,606	509.79
Spy	OC4J_EM	default	dms	0.002	9,130	21.92
OHW	OC4J_EM	em	em	0.29	699	202.60
jsp	OC4J_EM	em	em	0.22	534	117.27
console	OC4J_EM	em	em	0.75	488	364.86
dynamicImage	OC4J_EM	em	em	0.12	210	25.85
logon	OC4J_EM	em	em	0.18	61	11.06
TopoServlet	OC4J_EM	em	em	0.006	2	0.01
SVGServlet	OC4J_EM	em	em	22.83	1	22.83
genwallet	OC4J_EM	em	em	0.008	1	0.008

Figure 13–4 Monitoring the Top JSPs for a J2EE Application



Top JSPs

Page Refreshed Aug 17, 2005 11:52:59 PM PDT Refresh View Data Real Time: Manual Refresh

View Top JSPs by Requests Processed

Name	OC4J Instance	Application	Web Module	Average Processing Time (seconds)	Requests Processed	Total Processing Time (seconds)
ip/render/elem/tableRender.jsp	OC4J_EM	em	em	0.001	38	0.05
ias/faintTabsInclude.jsp	OC4J_EM	em	em	0.0003	29	0.01
ias/faintTabsIncludeBottom.jsp	OC4J_EM	em	em	0.0004	28	0.01
home.jsp	OC4J_EM	em	em	0.41	24	9.86
ip/render/justInTimeSelectTargets.jsp	OC4J_EM	em	em	0.04	22	0.81
ip/render/previewReport.jsp	OC4J_EM	em	em	0.36	19	6.92
ip/render/elem/chartRender.jsp	OC4J_EM	em	em	0.003	19	0.05
ip/render/elem/textRender.jsp	OC4J_EM	em	em	0.0009	16	0.01
target/sel/targetSelection.jsp	OC4J_EM	em	em	0.06	15	0.97
ip/reportDefinitionList.jsp	OC4J_EM	em	em	0.004	14	0.06

Analyzing Historical Performance

As with all Enterprise Manager diagnostics, the application server diagnostic reports can be based on current or historical data. Application server metrics are collected and stored in the Management Repository, so you can 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.

You can even provide a customized time period for which the data should be retrieved from the Management Repository. You can customize the time period for:

- Pre-defined range of the last 24 hours, last 7 days, or last 31 days
- Customized range of any number of days, weeks, months, or years
- Any start date and end date (such that the duration is not greater than 99 years)

Monitoring Application Server Farms and Clusters

Enterprise Manager provides a complete set of features for managing Oracle Application Server Farms (OracleAS Farm) and Oracle Application Server Clusters (OracleAS Cluster).

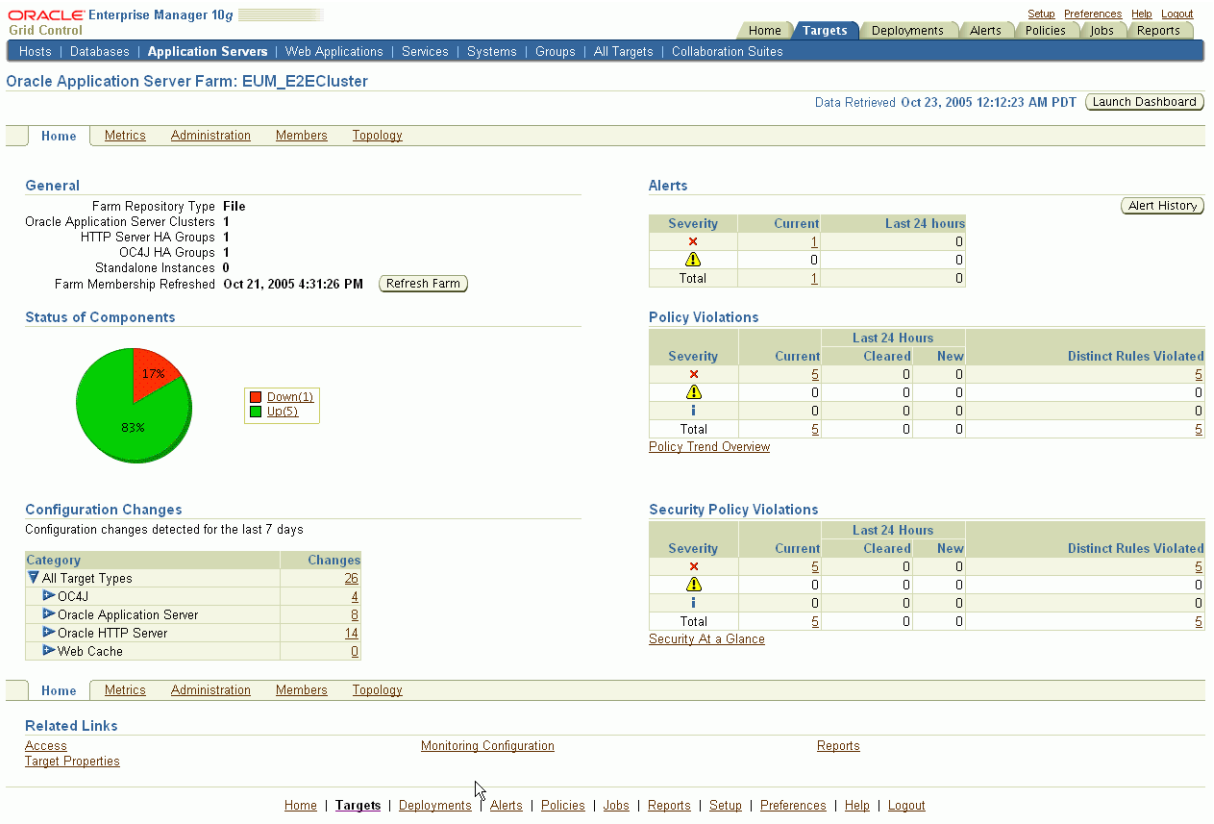
An OracleAS Farm is a collection of OracleAS Clusters and application server instances that share the same Farm Repository.

An OracleAS Cluster is a collection of application server instances with identical configuration and application deployment characteristics.

Using Grid Control, you can add OracleAS Farms, OracleAS Clusters and their members to Enterprise Manager for monitoring and centrally managing a set of application server instances and clusters.

Grid Control provides home pages for OracleAS Farms (Figure 13–5) and OracleAS Clusters that help you monitor their overall health. The home pages provide information about the status and availability of all their targets, generated alerts, policy violations, configuration changes, and so forth.

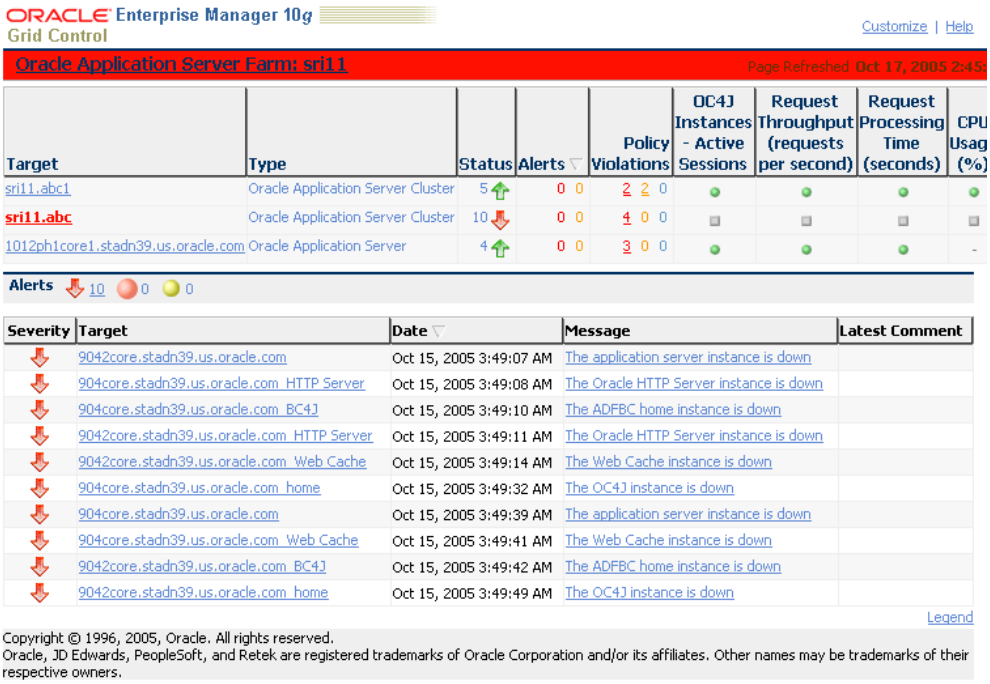
Figure 13–5 OracleAS Farms Home Page



Enterprise Manager also helps you study the High Availability grouping done for the members of an OracleAS Cluster. A High Availability Group is a group composed of similar individual components of application server instances clustered together in a DCM managed cluster. For example, an OC4J High Availability Group has a group of OC4J instances in an OracleAS Cluster.

You can also access the Oracle System Monitoring Dashboard (Figure 13–6) and view the health of OracleAS Farms, OracleAS Clusters, OC4J High Availability Groups, and HTTP Server High Availability Groups. Oracle System Monitoring Dashboard presents information using intuitive icons and graphics that let you spot recent changes and quickly identify and respond to problems. You can customize the display attributes to match information requirements of managed targets, monitor status indicators for recent problems, and see new alerts that have been triggered since the dashboard was last viewed.

Figure 13–6 Oracle System Monitoring Dashboard



Along with managing OracleAS Farms, OracleAS Clusters, and High Availability Groups as targets, Enterprise Manager provides comparative statistics at each level for workload distribution and performance analysis. For example, the Metrics pages for OracleAS Farms, OracleAS Clusters, and HA Groups provide key aggregated metrics from all components in graphical form for performance analysis and component correlation. You can click any of these metric charts to drill down and see more detailed information.

Although Enterprise Manager provides some pre-defined metrics for all of these targets, the Metrics pages are completely customizable to the requirements of a particular deployment. You can include other metrics of your choice, remove existing metrics, or adjust the layout of the metrics as needed.

In addition to monitoring the health of your OracleAS Farms and OracleAS Clusters, you can also monitor the J2EE applications deployed and running across all OC4Js for the application server instances.

You can monitor the members of your OracleAS Farms and Clusters, and take administrative actions like starting, stopping, or restarting each of those members. You can perform administrative operations such as:

- Scheduling jobs to automate commonly-run tasks.
- Creating blackouts to perform scheduled maintenance on the targets.
- Viewing all the installations of the selected target types in your enterprise configuration. For example, you can view all the application server installations, all the database installations, and so on.
- Accessing a list of predefined search queries to search and retrieve information for the targets. For example, you can search all data sources for OC4Js, all deployed applications for OC4Js, all J2EE modules for OC4Js, and so on.

Using Grid Control, you can also view the topology for OracleAS Farms and OracleAS Clusters, the details of which are given in the following section.

Viewing Application Server Topology

Besides monitoring the performance of application servers, OracleAS Farms, and OracleAS Clusters, you can also view their topology to understand what application servers and components are running on which hosts, how these components are related to each other, and how requests are routed through different layers of the deployment. This kind of visualization of the data center enterprise topology helps administrators effectively monitor, manage, and validate the enterprise architecture.

Grid Control provides three different views of topology. Each view provides the overlay of some key metrics of components including current status, number of alerts and policy violations, and CPU/memory utilization performance metrics.

- **Host View** shows the physical view of deployment and visually shows the relationship between hosts and various components and instances hosted by them.
- **Routing Overview** shows the routing view of topology and provides an end-to-end view of wired component and application flow through them. The routing includes routing from OracleAS Web Cache to Oracle HTTP Server to OC4J to DB instances.
- **Routing Details** also shows the protocol and port used by various components to route requests to other components in the topology.

These routing views enable you to fix various topology configuration problems immediately. For example, if an OC4J instance is not accepting any user requests, the routing details view confirms if the front-ending Oracle HTTP Server instances are configured correctly to route user requests to that OC4J instance. OracleAS Web Caches, Oracle HTTP Server or OC4J components are displayed in the same box, if they provide redundancy for each other. For example, a set of OracleAS Web Caches are combined in the same box if all of them are routing to the same set of Oracle HTTP Server instances. Similarly, a set of OC4J instances are combined in the same box if they are routed by the same set of Oracle HTTP Server instances, and are also hosting the same set of J2EE applications. As the like-components are grouped together, the topology visual representation in routing overview or routing details view provides instant Root Cause Analysis for the service availability problems.

Complete Administration

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

- Starting, stopping, or restarting any of the core components of the application server.
- Performing configuration management tasks, such as viewing and comparing configuration information. Refer to "Managing Configurations" in this chapter for more information.
- Accessing a list of predefined search queries to search and retrieve configuration information. Refer to "Managing Configurations" in this chapter for more information.
- Integrating application instrumentation in Enterprise Manager's event monitoring infrastructure. Refer to "Extensible Monitoring" in this chapter for more information.
- Staging or applying an interim patch or patch set, and/or cloning an application server's Oracle home to one or more hosts. Refer to "Cloning and Patching the Application Server Environment" in this chapter for more information.

- Performing scheduled backup and recovery. Refer to "Backup and Recovery of the Application Server Environment" in this chapter for more information.
- Creating blackouts to perform scheduled maintenance.
- Viewing the number of scheduled, running, suspended, and problem (stopped/failed) executions for all Enterprise Manager jobs submitted on the application server.
- Creating Application Server Farms and managing their components.

The following sections describe some of the administrative functions that can be performed.

Managing Configurations

Enterprise Manager provides a suite of configuration management functions that can be performed on Oracle Application Server and its components (OracleAS Web Cache, Oracle HTTP Server, and OC4J).

The Oracle Management Agent collects configuration information about Oracle Application Server targets from their respective configuration files, and communicates this information over HTTP/HTTPS to the Oracle Management Service, which stores it in the Management Repository. This information is periodically collected and updated while maintaining the audit of changes. Enterprise Manager's configuration management capabilities efficiently guide the users to desired configuration data in a particular component.

> **See Also:** "Hardware and Software Configurations" in Chapter 6, "Managing Deployments"

In addition to collecting and tracking hardware and software installations (binaries version number/patch level) of Oracle Application Server targets, Enterprise Manager also tracks configuration details of core components (OracleAS Web Cache, Oracle HTTP Server, and OC4J) of all Oracle Application Server instances. You can compare these configuration details and view the differences and similarities between the core components. You have the flexibility to compare two configurations in the Management Repository or two saved configuration files. You can also compare one configuration with multiple configurations or one configuration in the Management Repository with a saved configuration file.

Using Grid Control, you can search configurations across application servers and find configuration anomalies - whether they are a mismatch of an install/patch version of Oracle Application Server software, or they are a mismatch of software configuration data for the core components of Oracle Application Server. You can perform more intelligent searches to identify all the components hosting a particular application or other resources.

You can also perform some out-of-box searches. The Administration page in Grid Control provided for Oracle Application Server targets allows you to search one or more:

- Origin servers.
- Application servers with particular installation settings.
- Data sources used by the applications deployed across your enterprise configuration.
- J2EE applications deployed in a particular OC4J instance, application server instance, or host.

- Modules of J2EE applications deployed across your enterprise configuration.
- Application server ports across your enterprise topology.

Extensible Monitoring

Many administrators often require custom logic to be written to check for conditions specific to their application environments. Enterprise Manager allows integration of application instrumentation in Enterprise Manager's event monitoring infrastructure. If application developers expose application instrumentation using standards like JMX or Web Services operations, then you can build management plug-ins for the instrumentation using easy-to-use command line tools, and leverage Enterprise Manager's event monitoring system to monitor it. You do not have to edit any XM files or write any integration code to integrate such instrumentation in Enterprise Manager. Simply follow these procedures to integrate application defined instrumentation in Enterprise Manager:

- Use Command Line Interfaces that analyze MBean interfaces for JMX and WSDL for Web Services and create management plug-ins.
- Import Management Plug-in Archive in Enterprise Manager.
- Deploy Management Plug-in to Management Agents.
- Create Target-type instances for the target types defined in Management Plug-in Archive.
- Leverage Enterprise Manager's event monitoring system including monitoring templates, corrective actions, historical and real time metric views, alerts, customization of notification rules, and methods on events generated from application instrumentation metrics.

Cloning and Patching the Application Server Environment

Using Enterprise Manager's automated provisioning tools, you can ensure standardization in your data center and also significantly reduce the time spent on these tasks. To consistently maintain standardization in the topology, it is recommended that the new instances be added through "cloning" rather than "install and configure".

Cloning ensures that the new instance is installed and configured exactly like other instances in the enterprise topology. Cloning is the process of copying an existing installation to a different location while preserving its configuration and deployments. Enterprise Manager's cloning wizard automates the duplication of application server installations; specifically, the directories where the Oracle homes reside. Its "multicasting" capability also helps you create multiple clones on multiple target hosts in a single operation.

Using a direct link to Oracle MetaLink, Enterprise Manager proactively and regularly retrieves the list of critical patches that have to be applied on Oracle Application Server installations. Enterprise Manager also analyzes the data center environment and notifies you of patches that are applicable to their application server instances. All other patches can also be manually found in the context of a specific target. You can also automate the application of patches using robust job system infrastructure. You can apply the patches instantly or schedule the application in the maintenance window while backing out Oracle Application Server instances in the maintenance window.

See Also: "Cloning" and "Patching" in Chapter 6, "Managing Deployments"

Backup and Recovery of the Application Server Environment

Backup and recovery refers to the various strategies and procedures involved in guarding against hardware failures and data loss, and reconstructing data should there be a loss. A comprehensive backup strategy should involve a coordinated approach to backing up your entire application server environment, including the middle tiers and the Application Server Infrastructure Oracle homes.

Enterprise Manager helps you manage the backup and recovery of a single application server or a group of application servers.

Using Grid Control, you can:

- Schedule backups.
- Restore application server backups for recovery.
- Display the status of backup jobs.
- Display the status of recovery jobs.
- Configure the required settings for backup.

For more information on the types of backups and recommended strategy for performing backup and recovery, see the *Oracle Application Server Administrator's Guide*.

14

Oracle Collaboration Suite Management

Oracle Collaboration Suite provides capabilities—mail, calendar, web conferencing, and content services—that are critical to the productivity of an organization. Users access Collaboration Suite services every day to communicate with colleagues, host remote meetings, and share information; therefore, it is important that Collaboration Suite administrators have reliable, comprehensive tools to effectively manage the performance and availability of their Collaboration Suite deployments.

Oracle Enterprise Manager Grid Control provides the monitoring and administration capabilities administrators need to ensure that the performance and availability of Collaboration Suite services meet customer expectations and service level goals.

This chapter describes how you can use Grid Control to manage your Oracle Collaboration Suite instances and components.

This chapter contains the following sections:

Visualizing Your Collaboration Suite Deployment

Oracle Enterprise Manager Grid Control utilizes the following Enterprise Manager concepts to visualize your Collaboration Suite deployment:

Collaboration Suite Services

Critical application functions are defined and monitored as services in Grid Control. Each Collaboration Suite component (such as Mail, Calendar, Content Services, and so on) is a service. In addition, each component is made up of a set of services.

For example, the Mail service includes services that represent IMAP, SMTP, and the Web Mail application. By breaking down the Mail service into individual sub-services, you can monitor specific Mail functionality separately. You can then, for example,

distinguish between all Mail services being unavailable versus just the Web Mail application being inaccessible to users.

Because Collaboration Suite provides critical end-user functionality, it is useful to treat these functions as services. Each service is monitored by Grid Control beacons, which run service tests that simulate real user access to the service. Service availability and performance are monitored automatically, and problems are immediately reported to the administrator. By monitoring availability and performance of Collaboration Suite services, you can identify and resolve user-visible problems more quickly and thus minimize the impact on users.

The hierarchy of services that represent Collaboration Suite is used to visualize a Collaboration Suite deployment in Grid Control. The Collaboration Suite target subtab shows Collaboration Suite services in a hierarchical listing along with critical performance, usage, and availability data for each. You can also see an overview of Collaboration Suite performance, usage, and availability in the Services Dashboard. The dashboard also shows service-level compliance data. Finally, the service topology is a graphical tree view of your Collaboration Suite deployment.

Oracle Enterprise Manager Grid Control also provides the following features to help you visualize, monitor, and manage your Collaboration Suite instances and components:

- **Collaboration Suites Tab**

  After you add the Collaboration Suites tab in Grid Control, you can configure a Collaboration Suite service for each of your Collaboration Suite instances, and manage all the instances from the Collaboration Suites tab.

  > **See Also:** "Adding the Collaboration Suites Tab" in the Grid Control online help

- **Configuring Collaboration Suite Services**

  A Collaboration Suite service is a logical target configured by Grid Control that models the hierarchy of a Collaboration Suite instance and its components. You use Grid Control to step you through the process of configuring a Collaboration Suite service for each of your Collaboration Suite instances. After you configure a Collaboration Suite service, that service is displayed on the Collaboration Suite Services page.

  When you configure a Collaboration Suite service for a Collaboration Suite instance, Grid Control also configures services for the Collaboration Suite components.

- **Collaboration Suite Services Page**

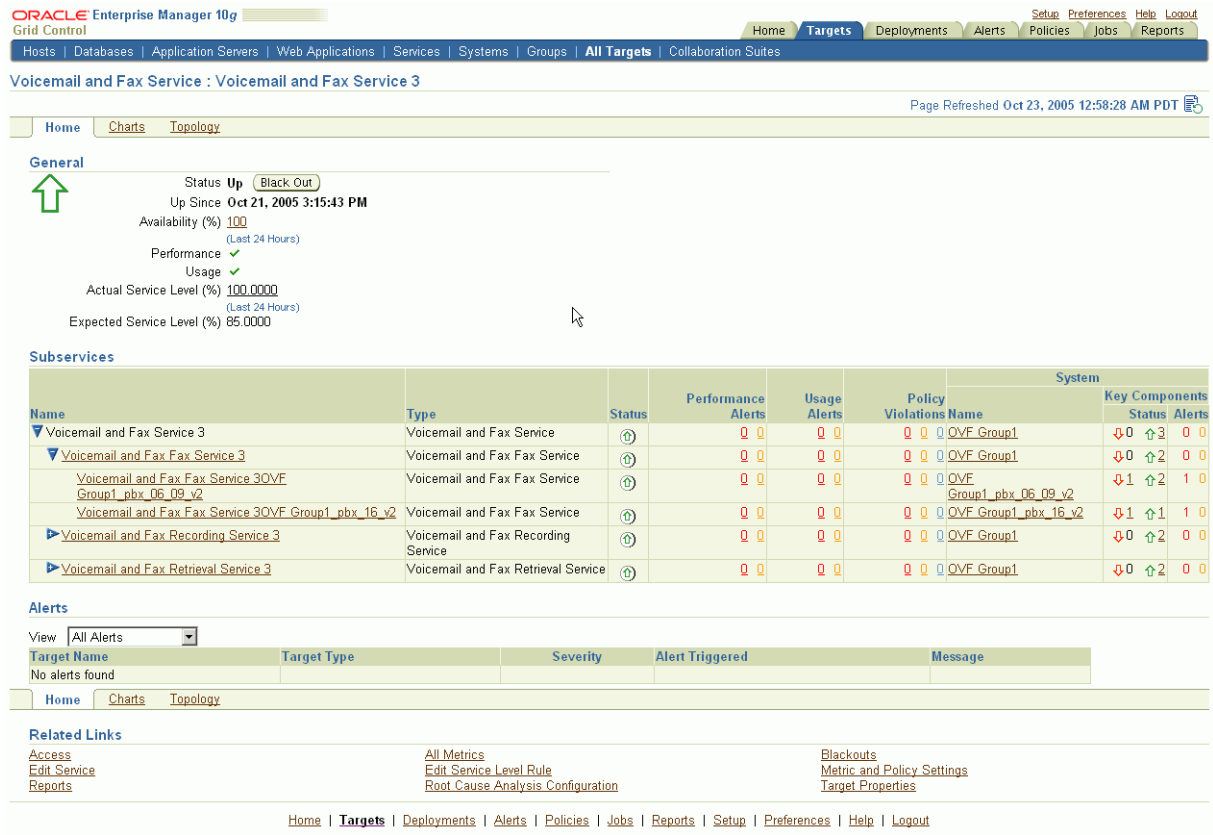
  The Collaboration Suite Services page provides you with a graphical, tree view of Collaboration Suite services. On this page, you can see the relationship between the various services that make up your Collaboration Suite deployment. This page also provides summary information about the availability, performance, and usage of each of the Collaboration Suite instances for which you have configured a Collaboration Suite service. From the Collaboration Suite Services page, you can drill down to more detailed information about your Collaboration Suite instances and components.

- **Collaboration Suite Services Dashboard**

  The Services Dashboard provides a high-level view of the status, performance, and usage of each Collaboration Suite component. Service-level compliance for various time periods are also included for each service on the dashboard. You can launch

the dashboard directly from the Collaboration Suite home page. You can also publish the Services Dashboard so that it can be viewed by non-Enterprise Manager users. This allows you to provide a self-service status web page to your end users.

Figure 14–1 Collaboration Suite Service Home Page



Service Monitoring

Grid Control enables you to monitor all of your Collaboration Suite services and their component services. Each service is monitored for performance, usage, and availability.

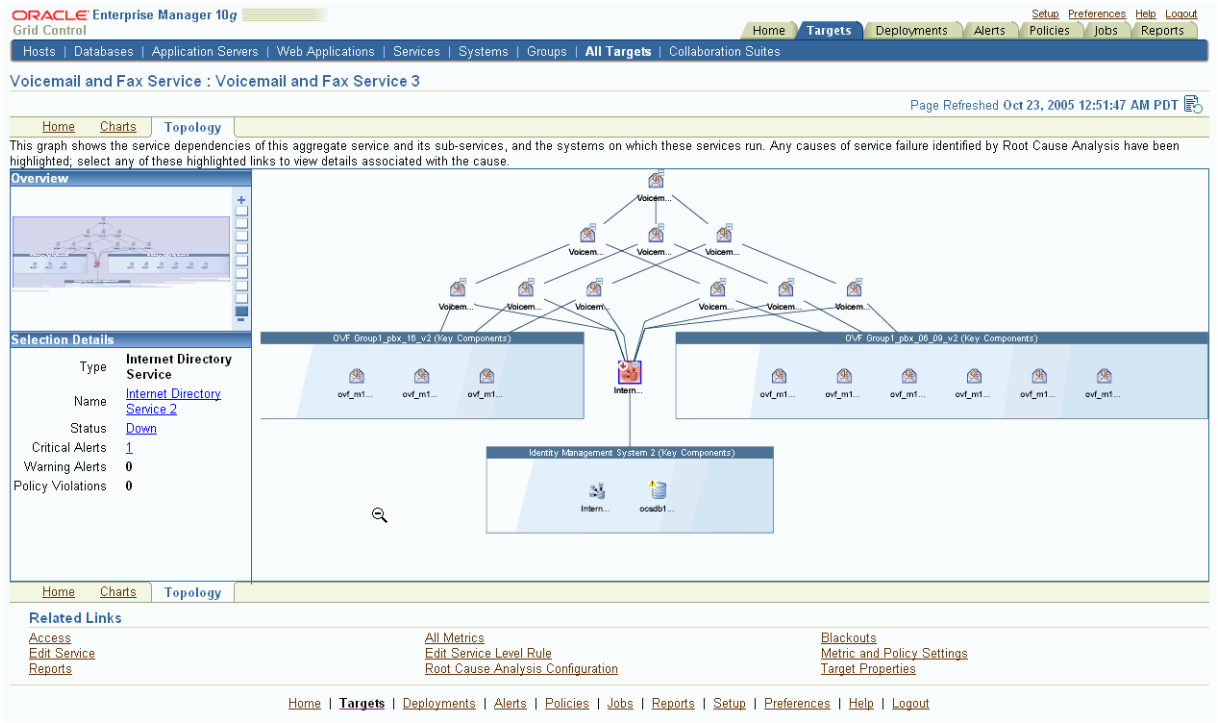
Each service has its own home page. The Service Home pages in Grid Control provide:

- Status, responsiveness, and performance data
- Resource usage data for the service
- Summary information such as status, performance alerts, usage alerts, and policy violations for the service's subcomponents, including other services and associated systems
- Links to home pages for the service's subcomponents
- Alerts and diagnostic drill-downs so that you can identify and resolve problems quickly
- The service's Topology Viewer
- Access to the Services Dashboard
- Related Links to do the following:

- View metrics for the service
- View client configurations
- Manage reports
- Edit the service
- View the service target's properties
- Manage blackouts
- View and manage metric thresholds and policies

See Also: Chapter 11, "Service Management"

Figure 14–2 Collaboration Suite Service Topology Page



Collaboration Suite Systems

Collaboration Suite services run on a Collaboration Suite system defined in Grid Control. The system includes the software infrastructure components that the Collaboration Suite services rely on. The system includes components such as databases, HTTP servers, OC4Js, and other servers (such as IMAP or Calendar servers) used by Collaboration Suite.

The system is a collection of server targets that are grouped together in Grid Control to give you a view of the "data-center" components that comprise your Collaboration Suite. Grid Control also monitors the performance and availability of these components and provides a System Dashboard to view the health of the Collaboration Suite system in a single window.

Automated Collaboration Suite Monitoring and Alerts

Enterprise Manager automatically gathers and evaluates diagnostic information from Collaboration Suite targets distributed across the enterprise. As with all targets managed by Enterprise Manager, an extensive number of Collaboration Suite performance metrics are automatically monitored against predefined thresholds. Alerts are generated in Grid Control when metrics exceed these thresholds.

See Also: "Monitoring Basics" in Chapter 4, "System Monitoring"

Oracle Collaboration Suite Root Cause Analysis

Individual services in Collaboration Suite are associated with the critical service and system components they rely on. This allows Enterprise Manager to perform Root Cause Analysis down to the system level whenever a service outage is detected. When you are configuring a Collaboration Suite service or component service in Grid Control, some of the UI pages give you the option of providing information about beacons, databases, and application servers that are critical for the component. If you do specify this information, Grid Control will be able to take these beacons, databases, and application servers into account when performing a Root Cause Analysis for the service.

See Also: "Diagnosing Service Problems" in Chapter 11, "Service Management"

Diagnosing Oracle Collaboration Suite Performance and Availability Problems

You can use Grid Control to diagnose performance and availability problems with your Oracle Collaboration Suite services. For example, if a service outage occurs, Root Cause Analysis will determine if the primary cause is an outage of a critical service or system component. If a service performance issue is found, an administrator can examine detailed metrics over time related to that service and any of the service or system components used by that service. When you suspect there is a problem with one or more server components in the Collaboration Suite system, the system home pages provide metrics and charts for diagnosing the issue.

See Also: "Monitoring Services" and "Diagnosing Service Problems" in Chapter 11, "Service Management"

Collecting and Using Collaboration Suite Client Configuration Data

The Oracle Collaboration Suite extensions to the basic Client System Analyzer (CSA) application enable Collaboration Suite-specific information to be collected from Windows client machines. After CSA for Collaboration Suite collects the information, it uploads it to the Grid Control Management Repository.

See Also: "Client Configurations" in Chapter 6, "Managing Deployments"

Collaboration Suite administrators and help desk personnel assisting Collaboration Suite users can use the collected information to identify clients that are not properly configured to use Oracle Collaboration Suite.

After installing and configuring the Collaboration Suite enhancements to CSA, the Collaboration Suite administrator can provide users with the URL for the CSA for the

Collaboration Suite application. When users access the URL, they can give permission for the CSA applet to be downloaded to their Windows client machine. After it is downloaded, the applet collects Collaboration Suite-specific information on the Windows client machine, including:

- Operating system user privileges. Only a user with administrator privilege can install Collaboration Suite Connector for Microsoft Office. CSA will check whether a user is an administrator.
- Type, version, and installation location of the mail client. CSA can identify Microsoft Office, Netscape, Mozilla, and Outlook Express mail clients on the client machine. If there are multiple mail clients installed, information on all of them will be collected.
- IMAP server and SMTP server settings.
- Execution mode for Outlook Express 98 or 2000 mail clients. Oracle Connector for Microsoft Outlook Express only works if Outlook Express is configured in Workgroup mode. In Outlook Express 2002 and later, the execution mode is always set to Workgroup.
- Type of Oracle Calendar client installed. If the Oracle Calendar thick client is installed, information about the version and install location of Oracle Calendar is collected.
- Browser versions and minimum recommended versions for optimally using various Collaboration Suite components, such as Web Access Client and Web Conferencing.
- Latency between the client machine and mail servers (IMAP, NNTP, POP, and SMTP).

Users who use CSA will see the summary report the applet displays after it collects the Collaboration Suite-specific data. The report identifies the areas in which the client does not meet Oracle Collaboration Suite requirements.

Administrators can use Grid Control to view the Oracle Collaboration Suite-specific client configuration information collected by CSA by navigating to the Collaboration Suite Service page, then clicking the **Client Configurations** link in the Related Topics section.

> **See Also:** "Viewing Collaboration Suite Client Configuration Information" in the Grid Control online help

Oracle Collaboration Suite Reports

You can define reports for Oracle Collaboration Suite services and systems, and also for Collaboration Suite component services, systems, and redundancy groups.

> **See Also:** "Out-of-Box Report Definitions" in Chapter 7, "Information Publisher"

Leveraging the Grid Control Management Framework

Grid Control includes many general features that are useful to a Collaboration Suite administrator, including:

- **Job Automation:** You can use the Grid Control job system to schedule tasks you want to automate.

- **Patching:** The configuration management capabilities in Grid Control allow you to manage and apply patches to your Collaboration Suite installations. You are also alerted automatically when critical patch updates are released.
- **Policies:** You can utilize the policy framework to ensure your Collaboration Suite infrastructure adheres to your site-specific standards.
- **Database and Application Server Management:** Using the single Grid Control console, you can also manage the specific databases and application servers in your Collaboration Suite deployment if needed.
- **Extensions:** Grid Control also includes monitoring of key network components that may be part of your Collaboration Suite deployment. You can also extend Grid Control to monitor other components that are not recognized out-of-box by Enterprise Manager.

Administration for Oracle Collaboration Suite Instances

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

Application Server Control Console for Collaboration Suite is the Enterprise Manager Web-based application for managing Oracle Collaboration Suite releases 9.0.4 and 10*g* Release 1 (10.1). Application Server Control for Collaboration Suite provides Web-based management tools designed specifically for Collaboration Suite.

You can use Application Server Control for Collaboration Suite to monitor and administer a single Collaboration Suite instance, a group of Collaboration Suite instances, or individual components for a Collaboration Suite instance. You can also deploy applications, monitor real-time performance, manage security, and configure the components of your Collaboration Suite instance.

Application Server Control for Collaboration Suite relies on various underlying technologies to discover, monitor, and administer the Collaboration Suite environment.

Application Server Control for Collaboration Suite consists of Application Server Control Console for Collaboration Suite 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 for Collaboration Suite Control.

For additional management functionality, for example, Service Level Management, deployments, historical data collections for performance trending alerts, and so on, you can use Enterprise Manager Grid Control.

See Also: *Oracle Collaboration Suite 10gR1 Administrator's Guide*

While Application Server Control for Collaboration Suite provides standalone management for a Collaboration Suite instance and its components, you can centrally manage all your Collaboration Suite instances through one tool (rather than through several Application Server Controls for Collaboration Suite) by using Grid Control. For example, suppose you have 10 Collaboration Suite instances deployed on 10 hosts.

By deploying a Management Agent on each host, Enterprise Manager automatically discovers the key Collaboration Suite components on these hosts, and automatically begins monitoring them using default monitoring levels, notification rules, and so on.

15

Host and Third-Party Target Management

Today's IT infrastructure has evolved to include a variety of server platforms from different vendors such as Red Hat, SUSE, Sun, IBM, HP, and Windows. A typical enterprise also contains hardware components and applications from a number of vendors to run services, provide storage, perform load balancing, and control IP traffic.

Out-of-box, Enterprise Manager Grid Control allows you to centrally manage more than just your Oracle infrastructure:

- Monitor and maintain the operating system and hardware for the hosts running your Oracle software.
- Monitor IBM and BEA application servers and clusters, F5 Server Load Balancers, Network Appliance Filers.

This chapter contains the following major sections:

Host Management

With the array of available server platforms, it becomes more and more difficult for system administrators to maintain the operating systems and hardware for the server, or host, on which Oracle software runs. With Grid Control, as soon as a Management Agent is deployed to the host, Grid Control automatically starts monitoring alert and configuration information for that machine. System administrators—and anyone who requires host information, such as DBAs managing databases on those hosts—benefit from Grid Control's host management feature.

Note: To access the host management pages in Grid Control, do the following:

1. Click the **Targets** tab.
2. Click the **Hosts** subtab.

This will display all the monitored hosts in your enterprise. Click the **Help** link on any page to access the Grid Control online help system.

Host management allows users to:

- Analyze performance trends for host hardware to predict future performance
- Measure service levels by monitoring host performance in real-time

- Validate software and hardware configuration across the enterprise

Monitoring Hosts

Like for other managed targets, Grid Control's full suite of monitoring features, including alerts, custom notifications, blackouts, corrective actions, monitoring templates, and more, are available for hosts.

> **See Also:** Chapter 4, "System Monitoring" for a complete description of Grid Control's monitoring features

Host Home Page

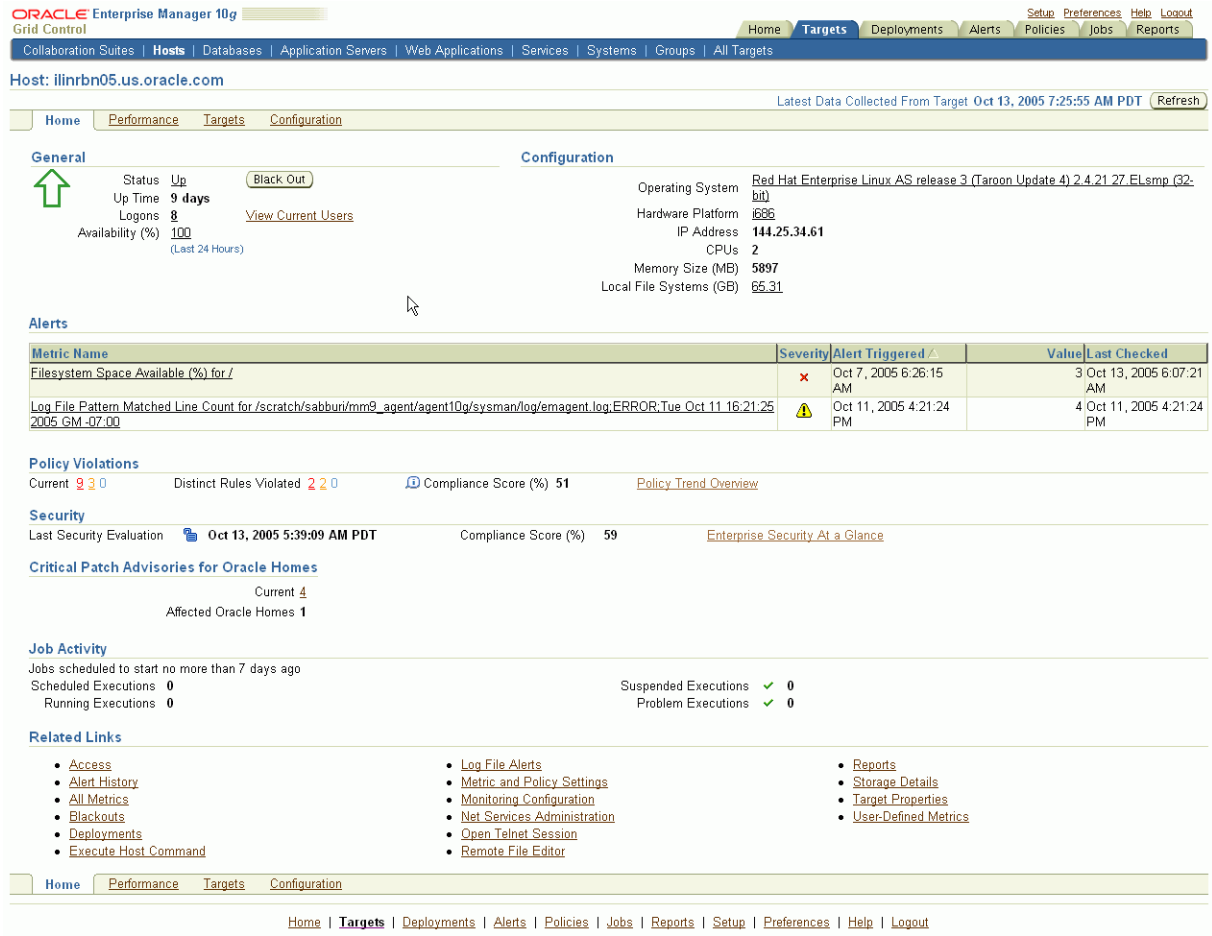
The Host Home page provides an overview of the status and vital statistics for each host that is part of the Grid Control environment.

Grid Control consolidates the relevant host information into a convenient single-screen Host Home page. You can see the availability, key configuration information, and outstanding alerts, as well as other pertinent information about the host. Convenient links allow you to view all the metrics collected for the host, change the thresholds as appropriate, or directly log in to the host to perform administrative actions.

Using the Host Home page, you can do the following:

- Drill down to view detailed metrics
- View operating system, hardware, and other configuration information for the host
- View policy violations and alerts for the host
- Analyze the job activity
- Determine whether there are outstanding patch advisories
- Determine the last security evaluation of the host
- Navigate to other pages to help you investigate the health of the host

Figure 15–1 Host Home Page



Host Performance Page

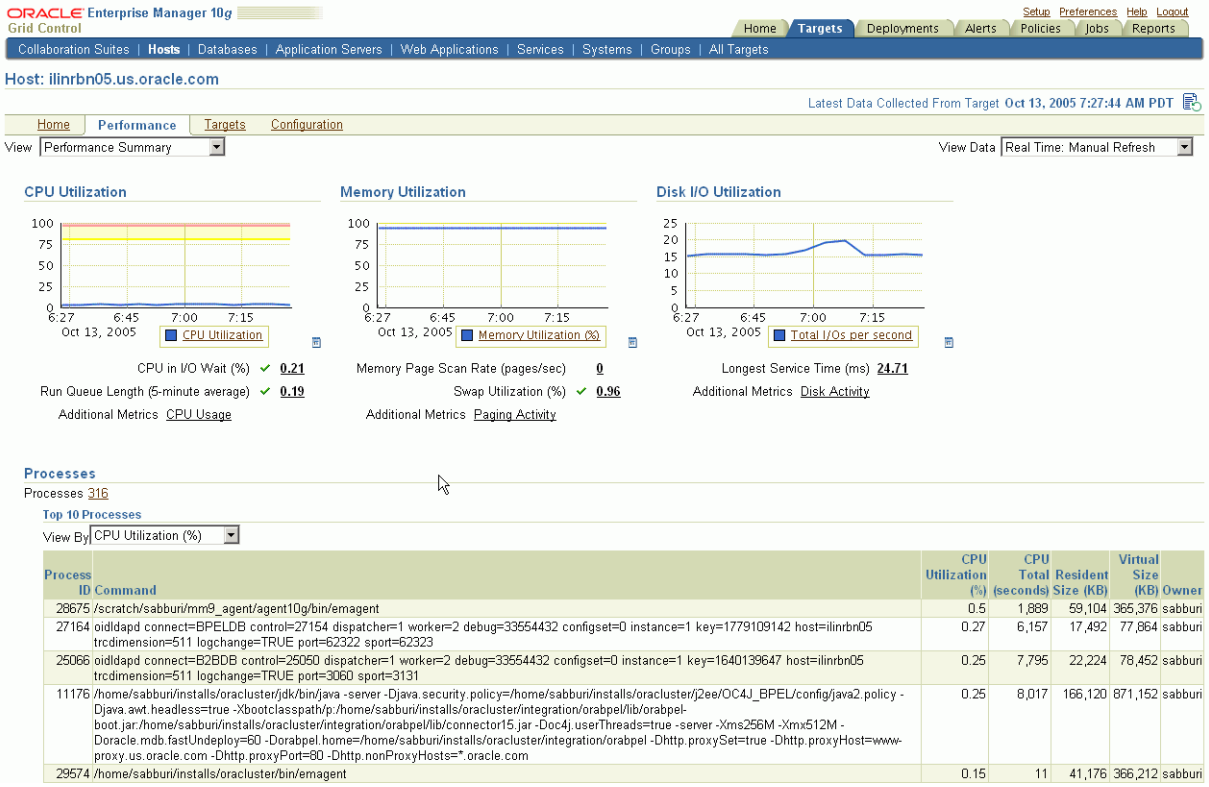
The Host Performance page provides an overview of the utilization statistics (CPU, Memory, Disk I/O, and Program Resource Utilization) for an individual host. Choose one of these options from the **View** menu. With this information, system administrators can determine whether resources need to be added or redistributed. You can also view the top processes consuming the most CPU or Memory and take appropriate action.

The performance metrics that are collected out-of-box for the host span several different categories: CPU Usage (including idle, wait, and user times), Disk Activity (including Average Disk I/O rate), and Network Interface Activity, among others. You can also view real-time metrics such as buffer activity.

Using the Performance page, you can:

- View various utilization charts by selecting an option in the **View** menu. Related metrics are also displayed under the charts. Click a metric link to view the metric in more detail.
- View the processes that are using the most CPU or memory resources.
- View performance data in real-time, or historical data over defined periods.

Figure 15–2 Host Performance Page



Host Configuration Page

The Host Configuration page lists not only operating system and hardware configuration information, but all Oracle software and operating-system registered software on the host as well. You can also compare configurations for single or multiple hosts.

> **See Also:** "Hardware and Software Configurations" in Chapter 6, "Managing Deployments"

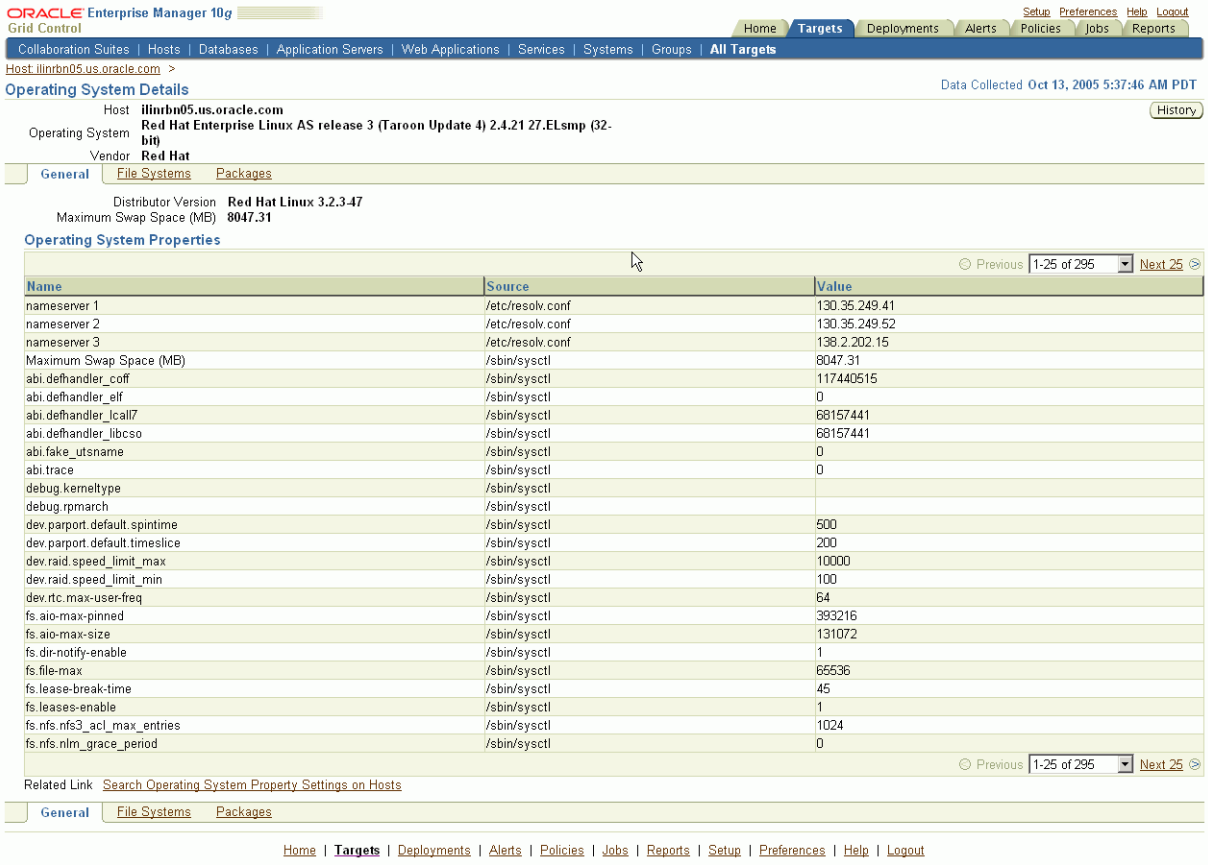
Operating System Details

Enterprise Manager Grid Control surfaces key operating system-level information for hosts. You can obtain general information about the operating system, such as the distributor and the version. You can also drill-down for specific information such as system properties, file systems, and operating system-level packages. This information helps when troubleshooting performance problems that arise because of configuration issues.

Note: To access the Operating System Details page:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **Operating System** link under Configuration.

Figure 15–3 Host Operating System Details Page



The File Systems page includes information about the various mount points for the host, type of mount point, time of the mount, and the directory where the file system is mounted.

The Packages page lists all of the operating system packages installed on the host.

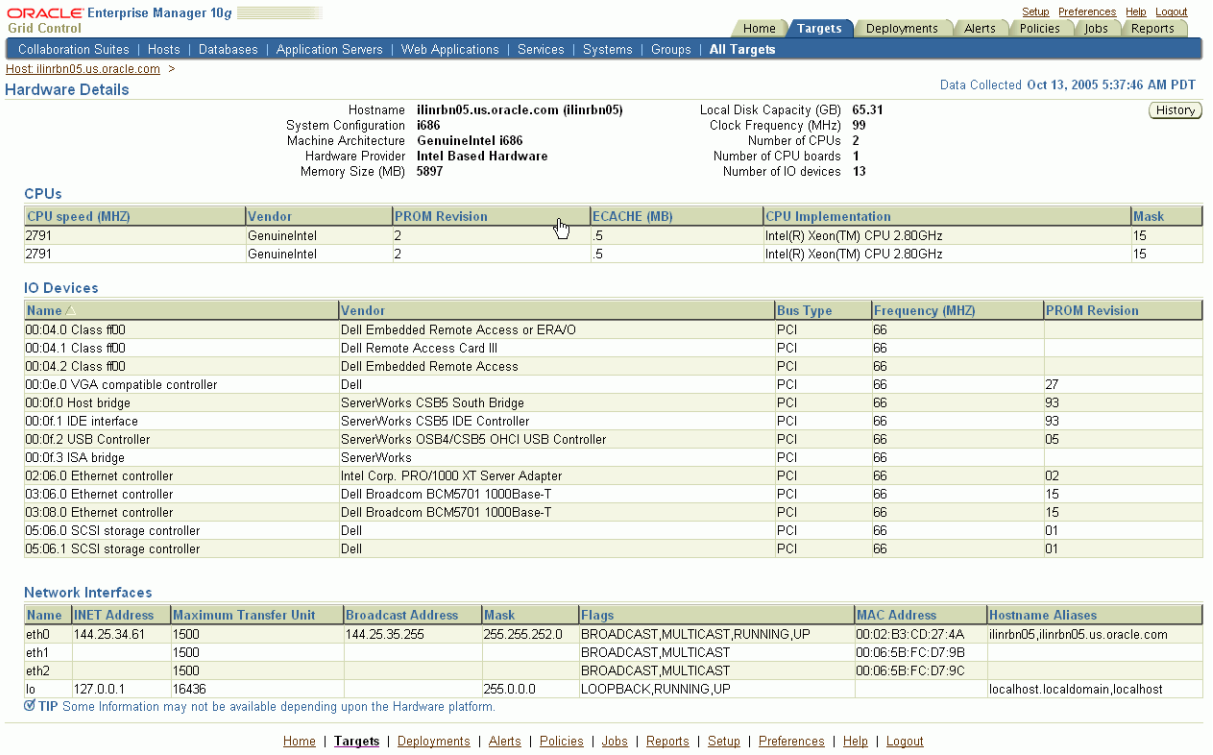
Hardware Details

The Hardware Details page allows you to view the CPU, I/O, and Network Interfaces associated with the host. It also helps the user keep track of the hardware changes that occur over time. The type of operation (INSERT, UPDATE, or DELETE) and the category of the hardware that is updated are reflected on this page.

Note: To access the Hardware Details page:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **Hardware Platform** link under Configuration.

Figure 15–4 Host Hardware Details Page



Log File Monitoring

Grid Control monitors the log files for the occurrence of operator-specified patterns. Use this facility to monitor abnormal conditions recorded in the log files present on the host.

Log files are periodically scanned for the occurrence of desired patterns and an alert is raised when the pattern occurs during a given scan. During a scan, new content created since the last scan is searched for the occurrence of the desired patterns. Use this page to view, clear, and purge open alerts generated during log file monitoring.

Note: To access the Log File Alerts page:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **Log File Alerts** link under Related Links.

See Also: "Configuring Generic Log File Monitoring Criteria" in Grid Control online help

Program Resource Utilization Monitoring

Enterprise Manager allows you to track resource use for programs and users. For example, you can track CPU usage by user, by program, or a combination of the two.

The Program Resource Utilization page provides a quick glimpse of the programs being monitored on this host. With this information, you can see trends in resource usage for:

- A specific program or set of programs

- A specific user or set of users
- A combination of programs and users

Note: To access the Program Resource Utilization page:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, go to the **Performance** page.
3. From the Host Performance page, select **Program Resource Utilization** from the View menu.

   You can also access the page from the All Metrics page for that host.

See Also: "Configuring Program Resource Utilization Monitoring Criteria" in Grid Control online help

File and Directory Monitoring

Enterprise Manager monitors the files and directories for the operator-specified criteria on hosts running various versions of the UNIX operating system. The operator should configure the criteria for monitoring the desired files and directories.

Note: To access the File Directory Monitoring page:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **All Metrics** link under Related Links.
3. From the All Metrics page, select **File and Directory** from the list of metrics.

See Also: "Configuring File and Directory Monitoring Criteria" in Grid Control online help

Hardware Monitoring for Dell PowerEdge Systems

Hardware-specific monitoring is available out-of-box for Dell PowerEdge Linux hosts with Enterprise Manager. The following hardware health statistics can be monitored as part of the Dell PowerEdge Linux host target:

- Processor Status
- Memory Status
- PCI Device Status
- Power Supply Status
- System BIOS Status
- Fan Status
- Remote Access Card Status
- Temperature Probe Status

Note: To access the Hardware Monitoring page for Dell PowerEdge Systems:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **All Metrics** link under Related Links.
3. From the All Metrics page, select the metric you want to monitor from the list of metrics.

See Also: "Enabling Hardware Monitoring for Dell PowerEdge Linux Hosts" in Grid Control online help

Storage Resource Tracking

Tracking the storage resource allocation and usage is essential to large IT departments. Unallocated and underutilized storage can be put to better use. Historical trends at a business entity-level enable you to plan for future growth.

Storage Details are relevant to Enterprise Manager targets that are associated with one or more hosts. In particular:

- Summary attributes presented are rolled up for one or multiple associated hosts.
- Storage Details helps in tracking storage resource allocation and usage for one host or a group of hosts, and tracks historical usage trends.
- A host is associated with a group either through explicit membership, or implicit membership inherited through a group member target.

Note: To access the Storage Details page:

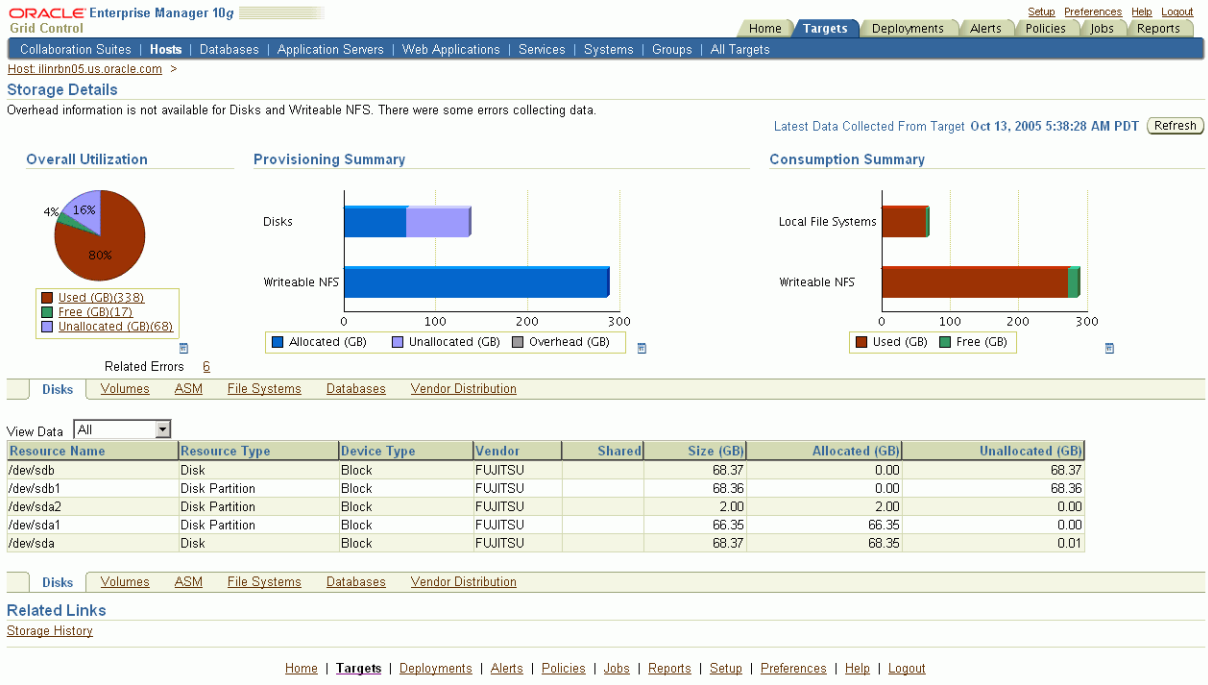
1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **Storage Details** link under Related Links.

The Storage Details page displays the following charts:

- **Overall Utilization:** Shows summary attributes that provide a system-level view of storage resource utilization.
- **Provisioning Summary:** Shows allocation-related summary attributes for File Systems, ASM, Volumes, and Disks for the associated hosts.
- **Consumption:** Shows usage-related summary attributes for Databases and File Systems.

  The Disks option on the Storage Details page shows the allocated and unallocated storage for all the disks and disk partitions on a host. All disks are listed, including virtual disks from external storage systems such as EMC Storage Array.

Figure 15–5 Host Storage Details Page



Host Administration

In addition to the general Grid Control features and tools described in Part I, "General Grid Control Features" you can administer your hosts using Grid Control's tools designed for host management.

Execute Host Command

With the appropriate privileges, you can execute non-interactive host commands remotely over the network, as well as view and edit text files. The Execute Host Command page enables you to type operating system commands against one or more hosts, or all the hosts in a group, enabling you to perform multiple administrative operations at the same time.

Note: To access the Execute Host Command page:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **Execute Host Command** link under Related Links.

Job System

You can leverage the Job System to run operating system commands for your host. From the Execute Host Command page, use the "Load from Job Library" option to search the Job Library for existing jobs that you can reuse.

From the Load from Job Library page, click the icon in the **Load** column of any row to return to the Execute Host Command page, loading the complete context of the library job in that row. The complete context includes the host command, OS script, targets, and credentials.

See Also: Chapter 8, "Job System"

Note: To access the Load from Job Library page:

1. From the Execute Host Command page, click the **Switch to Multiple Target Mode** link.
2. Click the **Load from Job Library** button.

Remote File Editor

The Remote File Editor page enables you to view, edit, copy, and save text files present on the remote host target. For example, using this utility, you can update the contents of configuration files on the remote host.

Note: To access the Remote File Editor page:

1. From the **Hosts** subtab, select a host target.
2. From the Host Home page, click the **Remote File Editor** link under Related Links.

Managing Host Deployments

Use Grid Control's deployment management tools to:

- View and compare host configurations
- Perform automated patching for your hosts
- Deploy new hosts using the provisioning facility

See Also: "Linux Host Patching" and "Provisioning the Operating System" in Chapter 6, "Managing Deployments"

Third-Party Target Management

Grid Control enables you to manage hardware and software from certain third-party vendors out-of-box. Most tools, functions, and features available for monitoring and administering Oracle targets can be used to manage other targets in your data center.

See Also: Chapter 4, "System Monitoring"

Note: Use Grid Control to manage your complete data center by developing Management Plug-ins for your managed targets. Refer to "Developing Management Plug-ins" in Chapter 9, "Extending Enterprise Manager" for more information.

Support for BEA WebLogic and IBM WebSphere

With tools and features similar to managing Oracle Application Server targets, Grid Control allows you to monitor the following third-party application server targets, as well as the applications deployed on the servers:

- BEA WebLogic Domains, Clusters, and Managed Servers
- IBM WebSphere Cells, Clusters, and Application Servers

WebLogic Domains and WebSphere Cells represent logically-related groups of application server resources. All the resources in a Domain are centrally managed by the WebLogic Administration Server; Cell resources are managed by the Deployment

Manager. Clusters for both products provide a high-availability application server environment. WebLogic Managed Servers and WebSphere Application Servers are used to deploy applications, EJBs, and other resources.

Grid Control monitors Domains and Cells as composite targets, containing rolled-up information on the member targets that make up the group. BEA WebLogic Managed Servers and IBM WebSphere Application Servers are monitored as individual targets, much like Oracle Application Servers.

JMX fetchlets specific to each product environment communicate with the BEA WebLogic Administration Server or IBM WebSphere Deployment Manager to collect the metric information for the individual application servers that make up the Domain or Cell, respectively. There is no need to deploy Oracle Management Agents to each application server node; as long as an agent is locally or remotely deployed to the host on which the Administration Server or Deployment Manager resides, Grid Control can manage those targets.

Some of the features available for BEA and IBM application server targets are as follows:

- **Robust monitoring.** Automatic performance and availability monitoring with Oracle recommended settings, out-of-box notifications for critical alerts, J2EE application monitoring for clusters, historical collections, blackouts, monitoring of application-defined MBeans, and more.
- **Service management.** Transaction performance monitoring, end-user performance monitoring, system monitoring, dashboards, Root Cause Analysis, and more.
- **Group management.** Group-level roll-ups for monitoring and task automation, monitoring templates.
- **Reporting.** Out-of-box and user-defined reports.
- **Policy violations.** Out-of-box and user-defined policies.
- Administration. Process control for start, stop, and restart.

> **See Also:** "Managing BEA WebLogic Servers" and "Managing IBM WebSphere Application Servers" helpsets in Grid Control online help

Network Appliance Filer

When you use Oracle Enterprise Manager to manage your Oracle environment, you can monitor not only your databases and application servers, but also supporting hardware, such as IP traffic controllers and storage devices.

Network Appliance Filers configured to use the ONTAP operating software (release 6.0 or later) are one type of storage device that can be managed out of the box. Network storage devices can be an important part of your Oracle environment. Use them to store and access large amounts of database and application data.

Similar to other managed targets, Grid Control's full suite of monitoring features are available for Network Appliance Filers. Key aspects of Network Appliance Filer monitoring are displayed as part of the Network Appliance-specific target pages, and include the following:

- Availability
  - Filer Target
  - Cluster Filer's Partner Status
- Storage Space Allocation and Usage Monitoring

  - Traditional Volumes
  - Flexible Volumes
  - Aggregates
  - Qtrees
  - Snapshots
  - System Level Storage Capacity Summaries
- Performance Monitoring
  - CPU Utilization
  - NFS/CIFS Calls
  - Disk I/O
  - Network I/O
  - Network Interface I/O
  - NFS Statistics
- Health Monitoring
  - Power Supplies
  - Fans
  - Temperature
  - NVRAM Batteries
  - Cluster Partner/Interconnect Status
  - Network Interface Status/Errors/Discards
  - Disk Failures
  - NFS/CIFS Bad Calls
  - Spare Disks

See Also: "Overview of Adding a Network Appliance Filer" in Grid Control online help

F5 Load Balancer Switches

In addition to monitoring the performance of your database, the effectiveness of your mid-tier applications, and the response time of your Web pages, Grid Control helps you monitor load balancer switches. Load balancer switches are an important part of any complex Web application environment, because they distribute user requests to the Web servers.

F5 BIG-IP Load Balancers from F5 Networks running OS version 4.2 PTF-06, or later, can be managed out of the box from Grid Control. The user interface allows you to navigate through the relationships that exist among the entities present in the switch.

As with other managed targets, Grid Control's full suite of monitoring features are available for F5 Load Balancer Switches. Key aspects of F5 Load Balancer Switch monitoring are displayed on the Load Balancer Switch-specific target pages, and include the following:

- Availability
  - Load Balancer Switch Target

  - Virtual Server Status
  - Real Server Status
- Performance Monitoring
  - Switch Level
    * CPU Utilization
    * Memory Utilization
  - Switch, Virtual Server, Server Group and Real Server Level
    * Bits In Rate
    * Bits Out Rate
    * Connections Per Second
  - Physical Interface Level
    * Bits In Rate
    * Bits Out Rate

    See Also: "Overview of Adding a Load Balancer Switch" in Grid Control online help

16

E-Business Suite Management

The Oracle Grid Control Plug-in for Oracle Applications extends Enterprise Manager 10*g* Grid Control to help you to more effectively monitor and manage your E-Business Suite targets. This plug-in integrates Oracle Applications Manager with Grid Control to provide a consolidated solution for end-to-end management of Oracle Applications. This chapter describes the features and use of this new extension for Grid Control.

Overview of the Grid Control Plug-in for Oracle Applications

The Oracle Grid Control Plug-in for Oracle Applications provides extensions for the Enterprise Manager 10*g* Grid Control Management Service, Management Repository, and Management Agent. This plug-in introduces new target types that can be monitored within Grid Control, including:

- Oracle Applications System
- HTTP Server for Oracle Applications 11*i*
- JServ for Oracle Applications 11*i*
- Forms Listener for Oracle Applications 11*i*
- Reports Server for Oracle Applications 11*i*
- Discoverer for Oracle Applications 11*i*

The plug-in helps to manage the technology stack specific to Oracle Applications, such as Concurrent Manager, workflow, and native services. Administrators spend a lot of time managing the native technology stack of E-Business Suite, since their business depends on these set of technologies. Grid Control offers trending and charting capabilities for this native technology stack, which are not offered by Oracle Applications Manager.

The plug-in also provides new pages within Grid Control, which help you to monitor the performance and availability of your Oracle Applications systems. Grid Control provides a complete view of your enterprise, allowing you manage all of your Oracle Applications systems from a single console. Not only can you take advantage of advanced Grid Control features, such as Service Level Management and monitoring tools, but you can also seamlessly drill down into Oracle Applications Manager to access the management features that are built directly into the Oracle Applications system. Grid Control and Oracle Applications Manager work together to provide a comprehensive Oracle Applications system management solution.

Once you have registered your Oracle Applications systems, you are ready to start using the new features of Grid Control to manage these systems. Grid Control allows you to monitor multiple Oracle Applications systems from a single console and drill

down into Oracle Applications Manager where you can control, configure, troubleshoot, and maintain individual systems.

Note: The features offered within Grid Control for individual Oracle Applications systems are dependent on the patch levels of those systems:

- The Grid Control Plug-in for Oracle Applications provides advanced features for Oracle Applications 11*i* systems that meet the standard interoperability patch level. These advanced features include extended performance metrics and links from Grid Control to Oracle Applications Manager.
- For Oracle Applications 11*i* systems that do not meet the interoperability patch level, basic monitoring is provided.

To obtain full management functionality within Grid Control for a given Oracle Applications system, you may need to apply one or more patches to that system.

About Oracle Applications Manager

Oracle Applications Manager delivers a powerful system management solution for Oracle E-Business Suite. Oracle Applications Manager helps IT staff configure, monitor, control, maintain, and support the E-Business Suite. Oracle Applications Manager can help improve IT efficiency, system availability, and application performance. Oracle Applications Manager is part of the Oracle E-Business Suite, an integrated set of applications that are engineered to work together.

For more information on Oracle Applications Manager, including the Grid Control Plug-in for Oracle Applications, visit the following URL:

`http://www.oracle.com/technology/products/applications/index.html`

Oracle Applications in Grid Control

Access Oracle Applications in Grid Control by clicking **Oracle Applications** in the Targets tab. To view this page, you must first enable the Oracle Applications subtab.

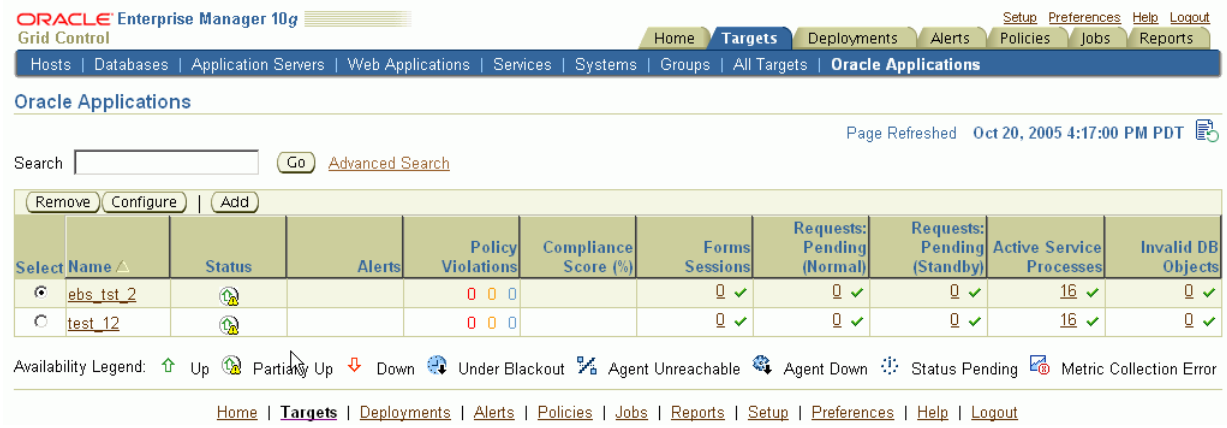
Enabling the Oracle Applications Subtab

The Grid Control Plug-in for Oracle Applications provides a new Oracle Applications subtab under the Targets tab of Grid Control. You can enable or disable this subtab, depending on your preferences. By default, this new subtab is enabled only for the SYSMAN super administrator user.

To enable the subtab:

1. In Grid Control, click the **Preferences** link.
2. On the Preferences page, click **Target Subtabs.**
3. Select **Oracle Applications** from Available Target Subtabs and move it to Selected Target Subtabs.

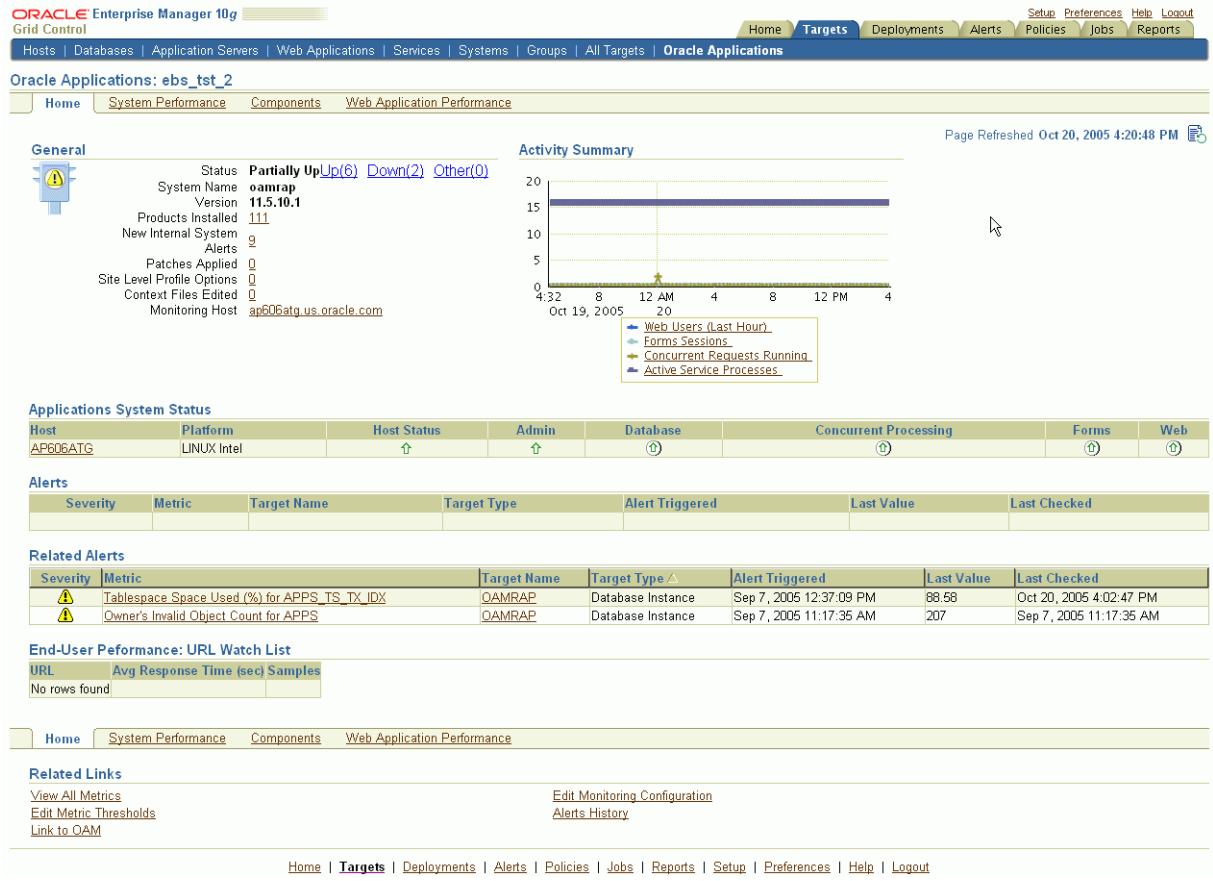
Figure 16–1 The Oracle Applications Subtab in Grid Control



The Oracle Applications Page

This page provides an overview of the Oracle Applications systems that have been registered with Grid Control. Use this page to add or remove Oracle Applications systems from Grid Control and edit the monitoring configuration of a system. The Management Repository holds management data for multiple E-Business Suite instances, which administrators can use to compare two instances side-by-side.

Figure 16–2 The Oracle Applications Home Page in Grid Control



The Oracle Applications page summarizes the status of each Oracle Applications system that has been registered with Grid Control. For each system, the page also provides a set of metrics that summarize aspects of system usage and performance. You can drill down on the Oracle Application system Name to access the home page for that system. You can also drill down on any summary metric to view the historical values of that metric.

You can configure the summary metrics that are displayed in the Oracle Applications page by clicking **Preferences** in Grid Control, then selecting **Metric Columns.** Next, select Oracle Applications System as the type, and use the shuttle control to select the summary metric columns that you would like to appear in the Oracle Applications page.

Glossary

adaptive alert thresholds

Computed statistical alert thresholds using either static (user-defined) or dynamic (self-adjusting) baselines.

See also **metric baselines**.

ADDM

See **Automatic Database Diagnostic Monitor (ADDM)**.

administrator account

Enterprise Manager administrator account that provides permission to perform daily administration work and access administrative information.

agent

See **Oracle Management Agent**.

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.

Automatic Database Diagnostic Monitor (ADDM)

Application that automatically takes regularly scheduled snapshots of the database activity. ADDM identifies the most resource-intensive components or operations and provides advice, which may recommend running an advisor or making configuration changes to your database.

Automatic Storage Management (ASM)

Application that automates and simplifies the layout of datafiles, control files, and log files. Database files are automatically distributed across all available disks, and database storage is rebalanced whenever the storage configuration changes.

automatic target discovery

Process by which targets are located and added to Enterprise Manager. Automatic discovery begins when the Oracle Management Agent starts up after installation.

Targets located on the Agent are discovered and added to Enterprise Manager to be monitored and administered. How the targets are installed determines which targets are automatically added.

Automatic Workload Repository (AWR)

Automatic capture of statistics data for real-time and historical performance analysis. AWR includes snapshot data, active session history data, and workload reports.

availability

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

AWR

See **Automatic Workload Repository (AWR)**.

Beacon

Application to monitor transactions from different user communities or geographical regions. You can enable the Beacon software 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.

blackout

Maintenance tool for suspending any data collection activity on one or more monitored targets. This allows you to perform scheduled maintenance on targets while excluding these special-case situations from the data analysis to obtain a more accurate, long-term picture of a target's performance.

cluster cache coherency

For Real Application Clusters (RAC) environments, helps you identify processing trends and optimize performance. The Cluster Cache Coherency page enables you to view the global cache block access latency, global cache block transfer rate, and global cache block transfers and physical reads.

control

See **Oracle Enterprise Manager 10g Grid Control**, **Oracle Enterprise Manager 10g Database Control**, **Oracle Enterprise Manager 10g Application Server Control**, **Oracle Enterprise Manager 10g Application Server Control for Collaboration Suite**.

dashboard

Tool for proactively monitoring status and alerts as they occur by viewing the health of managed targets in real time. The dashboard presents information using intuitive icons and graphics that let you spot recent changes and quickly identify and respond to problems.

database configuration

The configuration information Enterprise Manager collects for an Oracle database, which includes:

- General database and instance information, such as the database name, instance name, and whether or not the database is running in restricted mode or archive log mode
- Initialization parameter values

- System Global Area values
- Tablespaces and their parameters
- Datafiles and their parameters
- Control files and their attributes
- Redo logs and their attributes
- Rollback segments and their parameters
- High availability information
- License information
- Database options information

database instance

Running Oracle Database consisting of memory structures (SGA) and background processes. An instance only exists while it is up and running. Essentially, a database resides on disk, while an instance resides in memory.

A database is normally managed by only one instance. However, when using Real Application Clusters, multiple instances can be started for a single database (on different hosts of a cluster).

See also **Real Application Clusters (RAC)**.

enterprise configuration

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

fast-start failover

Ability of Data Guard to rapidly and automatically fail over to a standby database without requiring manual intervention. This improves the degree of availability as well as the disaster resilience for the system infrastructure.

Grid Control console

See **Oracle Enterprise Manager 10g Grid Control console**.

group

Single logical unit that 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). Groups enable you to enable you to collectively monitor and administer many targets.

home page

See **target home page**.

host configuration

Configuration information that Enterprise Manager collects for a host that is a managed target, including:

- Hardware for the host (including memory, CPU, I/O device, and network interface information)
- Operating system for the host (including information such as operating system properties, packages, and installed patches)

- Installed Oracle software, including (but not limited to) installed products and their components, patch sets, and interim patches on the host. Enterprise Manager uses the Oracle Universal Installer inventory or inventories on a host to obtain information about the Oracle products installed on the host.

instance

See **database instance**.

J2EE

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

Management Agent

See **Oracle Management Agent**.

Management Plug-in

See **Oracle Management Plug-in**.

Management Repository

See **Oracle Management Repository**.

Management Services

See **Oracle Management Service**.

metric

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

metric baselines

Named period of time associated with a target and used as a reference for evaluating target performance. Statistics are computed over the baseline period for specific target metrics. You can use these statistics to automatically set metric thresholds for alerting, as well as to normalize graphical displays of system performance.

See also **adaptive alert thresholds**.

Oracle ecosystem

Organization of software, hardware, and their environment so that they function as a unit. Typically, this consists of an Oracle platform and all third-party software, including storage systems, hosts, routers, and so on. The Grid Control Home page provides a unified view of your ecosystem.

Oracle Enterprise Manager 10*g*

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

Oracle Enterprise Manager 10*g* Application Server Control

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

Oracle Enterprise Manager 10*g* Application Server Control console

The Enterprise Manager Web-based user interface for managing Oracle Application Server 10*g*. The Application Server Control console is installed and available with every Application Server 10*g* installation.

From the Application Server Control console, 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 10*g* Application Server Control for Collaboration Suite

Application Server Control for Collaboration Suite consists of a Web-based user interface and a set of underlying technologies. Oracle Enterprise Manager 10*g* Application Server Control for Collaboration Suite is installed and available with every Collaboration Suite installation.

Oracle Enterprise Manager 10*g* Application Server Control Console for Collaboration Suite

The Enterprise Manager Web-based user interface for managing Oracle Collaboration Suite. The Application Server Control for Collaboration Suite console is installed and available with every Oracle Collaboration Suite installation. From this console, you can monitor and administer a single Oracle Collaboration Suite instance.

Oracle Enterprise Manager 10*g* Database Control

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

Database Control consists of the Database Control console 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 console
- A local version of the Oracle Management Agent designed to provide monitoring data to the local Management Service

Oracle Enterprise Manager 10*g* Database Control console

The Enterprise Manager Web-based user interface for managing Oracle Database 10*g*. The Database Control console is installed and available with every Oracle Database 10*g* installation.

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

Oracle Enterprise Manager 10*g* Grid Control

Grid Control relies on various underlying technologies to discover, monitor, and administer your computing environment. Grid Control consists of the Grid Control console and these underlying technologies:

- One or more Oracle Management Services

- The Oracle Management Repository
- The central Management Agent
- Remote Oracle Management Agents, installed on each monitored host

Oracle Enterprise Manager 10*g* Grid Control console

Enterprise Manager Web-based user interface for centrally managing your entire computing environment.

From the Grid Control console, 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 Management Agent

A process deployed on each monitored host. 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 its targets.

Oracle Management Plug-in

Target type provided by the user or a third party to extend Enterprise Manager's set of predefined target types.

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 Agent. The Management Repository then organizes the data so it can be retrieved by the Management Service and displayed on Grid Control.

Oracle Management Service

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

Oracle*MetaLink*

Oracle Support Services site where customers can get information about released patches and outstanding bugs. You can use Enterprise Manager to download patches from Oracle*MetaLink.*

Oracle Streams

Propagation and management of data, transactions, and events in a data stream either within a database, or from one database to another. Controls what information is put into a stream, how the stream flows from database to database, what happens to messages in the stream, and how the stream terminates.

policy

Defines the desired behavior of systems and is associated with one or more targets or groups. Policies include different categories of policy rules, such as configuration, security, and storage rules. Enterprise Manager compares the targets for which policy rules exist with the policy rules for that target type, and identifies the policy violations for the target.

policy association

Relationship of a policy rule and its settings to a target or monitoring template.

policy compliance score

Number denoting the conformance of a target to a set of requirements (policy rules.) The score, ranging from 0% to 100%, is much like a test score. A score of 100% means that the target was fully compliant with the goals of the policy. The policy compliance score facilitates your assessment of the relative levels of attention needed for various targets given the violations on those targets.

policy evaluation

Process of testing a policy's condition and recording any violations in the repository.

policy rule

A conditional expression that tests values from a target against a condition; for example, verifying that database profile limits are set as expected.

policy rule library

Collection of policy rules.

policy settings

Conditions related to a policy. The policy settings include, but are not limited to, parameter values and excluded objects.

policy trend

The policy compliance trend of a policy in the domain of a particular target.

policy violation

Infringement of a policy rule. For example, one of the host security policy rules checks for open ports. The recommendation is that the insecure ports not be opened. Therefore, the violation is that there are open ports.

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.

Real Application Clusters (RAC)

Option that allows multiple concurrent instances to share a single physical database. It provides a high-availability database environment spanning multiple hosts. Each cluster can be comprised of multiple cluster databases, each of which consists of multiple cluster database instances.

repository

See **Oracle Management Repository**.

roles

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

Secure Socket Layer (SSL)

Software to secure the communications between the Management Service and the Management Agent. Encrypted communications between the Management Agent and Management Service over HTTPS ensures the privacy of data sent from one computer to another.

service

Entity that provides a useful function to its users, such as CRM applications, online banking, and email services. Some simpler forms of services are business functions that are supported by protocols such as DNS, LDAP, POP, or SMTP.

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 so that it becomes the new master database.

Super Administrator

Enterprise Manager administrator that can 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.

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 system-wide, 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 log in to Enterprise Manager the first time

system

Logical grouping of targets that collectively hosts one or more services. It is a set of infrastructure targets (hosts, databases, application servers, and so on) that function together to host one or more applications or services.

system privilege

Allows a user to perform system-wide 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 10*g* 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

- Linux 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 compliance score

Average of the individual policy compliance scores for policies that have been associated with a target. Also, a target's security compliance score is the average of the compliance scores for security policies associated with that target.

You can use a compliance score to assess a target's overall compliance, and a group can use a score to determine the most troubled targets with respect to policy violations.

target home page

Page that contains general information about the selected target. From a target home page, you can drill down for more detailed performance information.

target privilege

Privilege that allows an administrator to perform operations on a target. For example, the View Target privilege allows an 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.

topology

Graphically shows the relationships between components, nodes, or objects within different Oracle applications.

wait classes

Grouping of wait events. Whenever an Oracle process waits for something, it records the wait using one of a set of predefined wait events. These wait events are grouped in wait classes, which show how much of the database is waiting for CPU time. The wait classes appear in the Database Performance page.

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