Oracle® Enterprise Manager

Cloud Control Introduction

12*c* Release 1 (12.1.0.1)

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Oracle Enterprise Manager Cloud Control Introduction, 12*c* Release 1 (12.1.0.1)

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Preface

This manual introduces Oracle Enterprise Manager. It provides a brief overview of the system architecture and describes the key features of the product. The manual also details new features in this release.

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.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at
http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit
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Structure

The book consists of the following chapters:

Chapter 1, "New Features In Oracle Enterprise Manager Cloud Control 12c"
Highlights the new features available in Oracle Enterprise Manager Cloud Control 12*c* (12.1.0.1)

Chapter 2, "Overview of Oracle Enterprise Manager Cloud Control 12c"
Presents the Enterprise Manager Cloud Control architecture and briefly describes the key features of the product.

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.

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New Features In Oracle Enterprise Manager Cloud Control 12*c*

This chapter provides an overview of the new features available in Oracle Enterprise Manager Cloud Control 12*c* (12.1.0.1).

Feature areas covered include:

1.1 Framework Enhancements

Management Features for Oracle Products Now Provided Via Plug-ins

The core Enterprise Manager Cloud Control features for managing and monitoring Oracle technologies, such as Oracle Database, Oracle Fusion Middleware and Oracle Fusion Applications, are now provided via plug-ins that can be downloaded and deployed using the new Self Update feature. This new "pluggable" framework enables Cloud Control to be updated with management support for the latest Oracle product releases, without having to wait for the next Cloud Control release to provide such functionality. For example, when a new version of Oracle Database is released, you can simply download and deploy the latest Oracle Database plug-in, which will include management support for the latest release.

Personalization Support

You can customize the layout and data displayed in target home pages, such as the WebLogic Server home page, to suit your specific needs. The changes you make are

persisted for either the target instance and/or for the user currently logged in, enabling you to create customized consoles for monitoring various target types. Specifically, you can:

- Customize the layout of regions on a page
- Add a region to or remove a region from a page
- Specify the data displayed within each region
- Select the view that best meets your needs from a set of pre-defined home page layouts

User Interface Updates

Several user interface updates have been made to improve usability and personalization. These include new login and console "Welcome" pages, global search improvements, page and region personalization, a new "favorites" menu, and a new target selector dialog.

Management Agent Enhancements

Improved diagnosis capabilities allow you to monitor Management Agents and receive warnings regarding Agent problems. This reduces the need to install diagnostic patches or to reproduce an Agent issue. It also facilitates the monitoring and management of the health of the Enterprise Manager instance itself, including:

- Support Workbench support
- Distributed diagnostic patching
- Diagnostics Kit integration
- Administration of Management Agents as a group
- Monitoring of Cloud Control component services such as jobs and notifications

New Credential Model Integration with Job System and Deployment Procedures

The new credential model provides a much easier way of managing credentials across multiple targets and users. This will improve the experience of setting up credentials for jobs and Deployment Procedures and also provide improved security.

Compliance Management and Reporting

This feature provides the ability to evaluate the compliance of targets and systems as they relate to business best practices for configuration, security and storage. To support this functionality, a framework is provided for defining compliance frameworks, compliance standards and compliance standard rules. The feature also recommends configuration changes that will bring your targets and systems into compliance.

Reporting Enhancements

Integration is provided with Oracle Business Intelligence (BI) Publisher, an enterprise reporting solution that lets you author, manage, and deliver your highly formatted documents, such as operational reports, eletronic funds transfer documents, government PDF forms, shipping labels, checks, sales and marketing letters, and much more. Built on open standards, Oracle BI Publisher also permits the creation of custom reporting applications that can leverage an existing infrastructure. Reports can be designed using familiar desktop products and viewed online or scheduled for delivery to a wide range of destinations.

Enforced Security for Web Services

Username, token-based authentication is now supported for accessing Web services within Enterprise Manager, ensuring Web services are accessed only by authenticated clients.

Bulk Provisioning/De-provisioning of External Accounts

Managing accounts used to access Enterprise Manager is made easier by enabling users in external identity stores such as LDAP servers to be provisioned in bulk to the Management Repository. You can also de-provision accounts no longer needed.

Authentication Enhancements

LDAP authentication is now supported in Cloud Control. Support for the Kerberos strong authentication mechanism is also supported, enabling customers to meet corporate security standards that require strict security compliance.

Kerberos and Secure Socket Layer Authentication Support

Improved authentication allows users to securely manage connections to multiple database targets. Support for Kerberos Authentication Tickets, PKI Certification, and Secure Socket Layer (SSL) ensures that communication between Cloud Control and managed targets is secure. This feature also reduces the time and effort required to manage credentials for target access.

Fine-grained Privileges

Enterprise Manager Cloud Control includes more than 200 new granular privileges to control access to targets, objects and other resources, enabling Cloud Control administrators to segregate their duties. There are also new out-of-box roles that distinguish among different types of Enterprise Manager users. For example, consider the provisioning designer and provisioning operator roles. The former has greater responsibilities (creates components in the Software Library) than the latter (submits deployments) and must therefore provide more in-depth information in registering with the deployments wizard.

Administration Groups

The concept of *groups* is essential to managing many targets as a single entity. The new Administration Groups feature enables automatic deployment of monitoring settings and compliance standard settings across all targets in a group, simplifying the deployment process across large enterprises.

Templates Integration

Template collections, which consist of monitoring templates and compliance standards, streamline the process of deploying the appropriate monitoring settings and compliance standard settings to targets and their groups.

Blackout Enhancements

Blackouts primarily support planned maintenance periods for managed targets. Among the enhancements in this release is a consolidated blackout information summary in the General Region of the target home page.

Improved Enterprise Manager Diagnosis Support

This release provides the ability to diagnose issues related to Oracle Management Service and Management Agents by exposing problems related to these components in the Incident Manager. Also, you can now use Support Workbench to easily manage,

package and diagnose Enterprise Manager product issues, including those involving OMS and Agents.

1.2 Database Management Features

Database Creation Via Enterprise Manager Cloud Control

A wizard allows you to create an Oracle Database from within Enterprise Manager Cloud Control. You can create different configurations, including Single Instance and Real Application Clusters (RAC) databases, as well as file system and Automatic Storage Management (ASM) storage options.

Database Upgrade Via Enterprise Manager Cloud Control

You can now upgrade Single Instance and Real Application Clusters (RAC) Oracle databases through Cloud Control. This feature makes it possible to manage upgrades from a single console. You no longer have to access each individual database machine to perform upgrades.

Database Cloning Enhancements

Cloning procedures have been enhanced to capture configuration properties as well as the software payload. This is particularly useful when migrating databases from development to test to production or the reverse. A new EMCLI verb (clone_database) allows for database cloning using the same job type as the existing Clone Database feature of Cloud Control.

Oracle Exadata Server Management Enhancements

Oracle Exadata management capabilities now provide support for full target lifecycle management:

- Automatically discover Exadata targets
- Automatically create an Enterprise Manager System for end-to-end monitoring
- Provide extensive administration capabilities for databases, Exadata cells and Infiniband switches
- Simplify performance diagnostics with the help of in-depth performance charts covering all Exadata components

Manage Automatic Storage Management (ASM) Clusters as a Target

You can now manage clustered ASM resources as a single target, instead of each individual ASM instance having to be managed separately. Incident management and metric monitoring can be managed for the entire cluster.

Database Configuration Compliance Standards Support

Oracle database configuration data can now be managed within the new configuration and compliance standards frameworks.

Emergency Performance

This feature allows a DBA to diagnose and troubleshoot a hung or extremely slow database using the memory access mode. This mode is designed to bypass the SQL information retrieval layer and read performance statistics directly from the SGA of the target.

Database Backup and Restore Enhancements

You can now use Enterprise Manager Cloud Control to centrally maintain the settings for Oracle database and file system backups. This enhancement enables you to apply uniform settings to multiple databases and file systems when backing up multiple objects—all in one operation. Users can perform a backup on multiple databases concurrently or sequentially in one deployment procedure. An Oracle Home OSB tape backup can be restored either to the original or to a different location, and the restored Oracle Home can be reconfigured to function in the newly restored location.

Database System Discovery Enhancements

As the database system is now built upon the new target and association model, you can use it to monitor and manage a database's storage, connectivity, and high availability. This also enables you to easily monitor and manage the applications that are dependent on the database. The database discovery functionality is enhanced to work with the new discovery framework and to provide a reliable workflow to create a database system.

Change Plans Added to Change Management Pack

As part of the Oracle Change Management Pack, the new Change Plans function allows application developers and database administrators to encapsulate schema changes needed to be made to a database into a "change plan," which can be used to document, capture, and apply schema changes. Change Plans are also integrated with developer and DBA tasks into SQL*Developer and Oracle Enterprise Manager task automation. This integration reduces the manual processes between the various stakeholders involved in the process of promoting planned changes across enterprise databases while ensuring the integrity of the process.

Compare Period Advisor

This feature compares the performance of a database over two different time ranges. It analyzes changes in performance, workload, configuration, and hardware to highlight changes between the two time periods. The Compare Period Advisor gives the DBA the ability to compare two arbitrary periods of time.

Compare Functionality

The Compare functionality has been enhanced with new capabilities such as template support, system level comparison, and change notification. Users can now selectively include or ignore types of differences. Output of a comparison can easily be saved and exported, both in printable (for example, plain text) and data-centric (for example, CSV) formats. Users can select comparison start and end dates and view a history of changes for composite targets.

Active Reports

A new Active Reports function allows users to save performance data into an HTML file. Once saved, the report can be used for offline analysis or sent to other users, including Oracle Support. Active Reports enhances the visual representation of performance data and facilitates the convenient exchange of complex data.

Real Application Testing and Data Masking Integration

Real Application Testing and Data Masking integration provides users with the ability to perform secure testing in situations where data in production needs to be shared by nonproduction users due to organization or business requirements. Typically testing is done in a nonproduction environment or by a different group or organization. This

integration addresses a common requirement that the data used for testing be shared in a manner that adheres to data privacy and compliance regulations.

Application Templates for Data Masking and Data Subsetting

This feature provides predefined data masking and data subsetting templates for applications. It allows users to automatically create test systems based on best practices recommendations.

Data Subsetting

Data subsetting provides the ability to create a smaller sized copy of the original production data that can be given to developers for testing. While it is a data subset, the referential relationships are preserved so that the data set is complete. This allows enterprises to lower storage costs while making production data available to developers for testing, without having to incur the storage footprint of the entire production database.

Application Data Model Support for Data Masking

The application data model (ADM) now stores the sensitive data elements used to generate mask definitions dynamically. Instead of having to manually discover sensitive data, the application data model identifies and stores the sensitive data elements.

Reversible Data Masking

Using encryption and decryption algorithms, reversible masking allows encryption of a user's data deterministically into a format chosen by the user as a regular expression. Unmasking reverses the process to revert back to the original data. This feature is useful in environments where sensitive data needs to be masked and sent to a third party for processing. Coupling integrated masking with the application data model (ADM), an application's data model is now available for certain packaged applications and can serve as a knowledge base containing sensitive column and data relationships.

Performance Diagnostics Enhancements

With the interactive user interface in the Active Session History (ASH) Viewer, users now can visualize the many performance dimensions that were not available to them in earlier releases. The Enhanced Enterprise Manager Performance and Top Activity pages allow users to visualize the multidimensional data in ASH. The ASH viewer enhances the performance troubleshooting capabilities of a DBA by providing the facility to detect skews in workload. Emergency ADDM adds performance diagnostics for databases suffering from severe performance problems.

Streams and XStreams Support

Streams and XStreams configurations can now be managed and monitored using Cloud Control. In addition to improvements in configuration and performance monitoring screens, logical change record (LCR) tracking is available for high-level diagnosis of replication issues. Cloud Control also simplifies the management and monitoring of replicated environments.

1.3 Fusion Middleware Management Features

Topology Views of Fusion Middleware Environment

This feature allows you to visualize and monitor Oracle Fusion Middleware environments in a graphical display. Oracle Enterprise Manager Cloud Control now

provides predefined graphical topologies of the middle-tier environment. These topologies can be against a single SOA composite, an Oracle WebLogic domain, or across multiple Oracle WebLogic domains.

Oracle Exalogic Management Plug-in

This release supports full management capabilities with dedicated dashboards for Oracle Exalogic Elastic Cloud targets, allowing administrators to easily monitor and manage Exalogic hosts, WebLogic Server domains, application deployments, and Coherence clusters running on Exalogic machines.

Oracle Fusion Middleware Provisioning Enhancements

A centralized Middleware Provisioning page now provides access to view, create, edit, and track activity for Fusion Middleware provisioning profiles and deployment procedures. It also provides support for locking deployment procedures by designer to limit the numbers of inputs required from the operator. Support for creating software library entities for Fusion Middleware software is now available. You can create a provisioning profile entity with binaries and domain configuration or a middleware home entity with just binaries. You can clone a WebLogic domain or Middleware home from software library entities. There is a new out-of-box deployment procedure for deploying, re-deploying and un-deploying Java EE applications from the Cloud Control console. You can now access provisioning operations from the WebLogic domain menu. You can clone and scale out/up WebLogic domains without requiring that SOA Suite be installed to the domain.

Oracle Directory Server Enterprise Edition Monitoring

This release includes performance monitoring for Oracle Directory Server Enterprise Edition (formerly Sun Java Directory Server Enterprise Edition). The system collects a wide range of out-of-box performance metrics for monitored Oracle Directory Server Enterprise Edition targets.

PaaS and IaaS Environment Enhancements

This enhancement allows a PaaS (Platform-as-a-Service) user to request an environment with a WebLogic Server cluster and to allow the user to make additional requests to scale out the requested environment. This update also allows an IaaS (Infrastructure-as-a-Service) user to request an environment with two Linux servers and storage and to allow additional requests for more storage to be submitted.

SOA and Support Workbench

SOA Infrastructure target type now has a Support Workbench capability.

Performance Summary Baseline Support

With this release, you can create a performance summary baseline for a middleware-related target, save it, and compare baseline performance data against current performance data.

Composite Application Dashboard

The new Composite Application dashboard allows a comprehensive view to be built representing a multi-tier composite application composed of multiple application deployments and Services Oriented Architecture (SOA) composites. You can easily include all additional components (such as databases, service buses, Coherence clusters, and other middleware and non-middleware targets). The Composite Application dashboard provides full visibility across the composite application with access to key monitoring and diagnostics regions, which can be easily customized and

personalized. The overall result of this enhancement is a single dashboard view providing not only health information about the application, but also deeper visibility into component health and incidents at a glance.

Java Virtual Machine (JVM) Monitoring and Diagnostics Enhancements

The latest JVM monitoring and diagnostic enhancements include a broad range of capabilities related to ease of use, greater flexibility, and deeper visibility. Most significant, all JVMs are now considered Enterprise Manager targets. This means users have more granular control over their settings, access, and flexibility with respect to the new personalization features for including JVM metrics in other dashboards such as the new Composite Application dashboard. The new JVM home page allows users to quickly enable deep JVM monitoring and drill into heap analysis, live threads, and overall JVM health metrics related to CPU utilization, garbage collection, thread state, and heap consumption. Filters can be deployed with a simple click allowing the JVM to be analyzed by method, request, thread state, database, database state, SQL calls, and even ECID monitoring to isolate transactions. Users now can navigate bi-directionally between live JVM threads and database sessions with the correlation between JVM thread analysis and database diagnostics, enabling DBAs and developers to collaborate in diagnosing cross-tier issues.

Service Level Agreement (SLA) Management Enhancements

Enhancements to the Service Level Agreement (SLA) management framework in Enterprise Manager ensure that it is flexible enough to represent any SLA in your environment. This feature provides a hierarchical SLA framework where Service Level Indicators (SLIs) represent key metrics and Service Level Objectives (SLOs) tie those SLIs together to define service level thresholds and requirements. SLAs use SLOs to define how the business requirements and associated notifications tie in to the overall monitoring service level framework. Using this arrangement, administrators and operations can now represent any SLA required within their environment in a manner that represents both their business and technical requirements.

Enterprise-Wide Web Service Policy Dashboard

If you use Oracle Web Services Manager for security, you can now monitor all of your policies across the enterprise in a single central dashboard. From there, you can drill down into the specifics of any violation on each server.

Middleware Diagnostic Advisor

This release includes a new tool to help administrators quickly resolve performance issues. The Middleware Diagnostic Advisor de-emphasizes administrator expertise in WebLogic internals and cross-tier functioning by taking advantage of WebLogic Server internal metrics. The Middleware Diagnostic Advisor significantly reduces problem resolution time by presenting "root cause" findings shown in context of the most relevant configuration parameters and by offering out-of-box suggestions for each finding. Trending and correlation metrics help administrators understand performance patterns and assist with diagnosing and resolving performance issues.

WebLogic and Fusion Middleware Log Viewer

This release enables you to centrally search logs generated by WebLogic and Oracle Fusion Middleware across all Oracle Fusion Middleware components. You can perform structured log searches based on log properties such as time, severity, or Execution Context ID (ECID). You can also download log files or export messages to a file. This feature provides ready access to log files no matter where they are stored on the file system.

Configuration Comparison Enhancements

Enhancements to the compare functionality include new capabilities such as template support, system level comparison, and change notification. Administrators can now selectively include or ignore types of differences. Output of a compare can easily be saved and exported, both in printable (for example, plain text) and data-centric (for example, CSV) formats. Administrators can select comparison start and end dates and view a history of changes for composite targets.

Configuration Search Enhancements

With the configuration search functionality, administrators are now able to search configuration attributes within an Oracle Fusion Middleware target (such as the Oracle WebLogic Server) as well as follow relationships to other targets. In addition, administrators can also now create and save user-defined searches.

Configuration Compliance Enhancements

The former BEA Guardian product's health checks have been integrated into the Cloud Control console. Consequently, administrators are better able to verify that their WebLogic environment is in compliance with these standards.

1.4 Oracle Fusion Applications Management

Oracle Fusion Applications Management Support

You can now manage and monitor all Oracle Fusion Applications targets across the enterprise, including Fusion instances, product families and application instances, from a single console. Unlike other management tools, Cloud Control enables management of multiple Fusion Applications components within a WebLogic Server domain. This release also supports scale out of clustered Fusion Products and Fusion Applications.

Support Workbench Support for Oracle Fusion Applications

To enhance troubleshooting of Fusion Applications issues, the Enterprise Manager Support Workbench framework now includes incident filtering based on application type and incident consolidation from multiple tiers.

Oracle Fusion Applications Installation Backup and Recovery

You can now perform a full or partial backup and recovery of a Fusion Applications installation. You can back up all components of the Fusion Applications environment, including database and all component file systems, in one procedure. Likewise, you can implement recovery of a full environment or of individual components. This feature replaces the manual Fusion Applications backup and recovery procedure with fully-automated backup and recovery workflows in Cloud Control, based on the System Backup and Recovery framework.

Enterprise Scheduler Service

You can now monitor the performance of Oracle Enterprise Scheduler (ESS) components and jobs.You can also view the status of job requests, including completed job requests by user, application, and work assignment.

1.5 Application Performance Management Features

Java Virtual Machine (JVM) Diagnostic Integration With Automatic Database Diagnostic Monitor (ADDM)

This feature provides seamless navigation between the JVM Diagnostics and Automatic Database Diagnostic Monitor (ADDM) to allow users to maintain context when dealing with JVM issues that correlate with database calls. By providing database administrators true cross-tier navigation, they can now quickly resolve SQL issues that arise from Java applications by tracing issues directly from the JVM.

Application Replay

Application Replay allows you to capture real application level workload from a production system for a specific time segment and re-run it in a test environment. This feature enables changes in application infrastructure including mid-tier, database, operating system, and hardware to be tested and analyzed using real production application workloads.

Simplified Middleware Diagnostics Deployment and Configuration

This release simplifies the process of enabling Middleware diagnostic features such as JVM Diagnostics and Application Dependency and Performance. In the past, these components were deployed via manual, time-consuming, error prone installation processes. Now, managers and agents for both JVM Diagnostics and Application Dependency and Performance can be deployed and configured from the Cloud Control console interface.

Application Data Model

The Application Data Model feature provides a comprehensive repository of application data attributes, including referential relationships and sensitive data. The model allows application owners to track, store, and report critical metadata about their applications, which simplifies and automates application data management tasks such as data subsetting and data masking.

Data Comparison

In most application life cycle processes, enterprises maintain separate test, staging and production systems. Over time, system changes may introduce differences in application data. To detect differences and to troubleshoot problems, administrators, application developers, and application managers can use data comparisons to easily detect and rectify application problems caused by missing or extraneous data, or by variances in data.

Workload and Test Management Console

The new Workload and Test Management Console enables users to capture data such as real application workload, to author performance test scenarios, and to conduct test trials. This data can be used to keep track of trial history, view and compare test results, and perform in-depth application performance diagnostics.

Dashboard and Reporting Enhancements

A new Service Level Agreement (SLA) modeling and reporting solution is now available. With Services and Support gaining focus, this solution is one of the key parts to a successful integration model. A key aspect of the model is the ability to define and monitor SLAs. A new dashboard feature allows users to create a composite application

consisting of related middleware and database targets that are loosely coupled together to provide concrete business functionality.

Diagnostic Snapshot Support

The new diagnostic snapshot feature captures both Oracle WebLogic Server and Java Virtual Machine (JVM) data and packages it for later analysis. The feature displays a page of diagnostic snapshots that can be imported into and exported out of Enterprise Manager, allowing much more flexibility with respect to when and where you analyze the data. Should a similar situation arise, the diagnostic snapshot can be preserved to allow for later analysis and comparison. Also, diagnostic snapshots can be shared with Oracle Support to ensure that Oracle can better assist in critical issues where additional support is needed. If you combine this feature with the WebLogic Support Workbench that was introduced in the previous release, Enterprise Manager truly is integrated deeply into the My Oracle Support Portal and Oracle Support in general to streamline support and the exchange of information necessary to resolve issues quickly.

SOA Dehydration Store Diagnostics

This release enhances the Oracle Services Oriented Architecture Suite by providing a dedicated view to analyze the behavior of the SOA dehydration database. In particular, you can monitor SQL performance metrics and table growth specifically in the context of the SOA Suite's use of the database. The view displays both throughput and wait bottleneck data, allowing you to monitor the general health of the target database instance. Using Active Session History, you can track usage data and display it as a table space chart, a growth rate chart, or an execution chart. Accurate CPU performance data is vital to properly administer your SOA applications.

1.6 Cloud Management Features

Cloud Management Support

New cloud management features include dynamic provisioning of applications and required resources based on service level requirements, and tracking of resource usage trends and costs. Other capabilities include:

- Managing zones and virtual server pools
- Viewing and monitoring details of the virtual server pool such as guest virtual machines in the pool, metrics, network, and storage details
- Creating networks, storage servers and storage repositories
- Deploying assemblies and templates

Schedule Server Availability for Power Management

You can schedule Oracle VM servers to be powered off at certain times; for example, during low demand times such as from midnight to 6:00 in the morning. You can also migrate Guest VMs on other servers or shut them down as part of the physical server shutdown.

View Cloud Infrastructure Topology

You can now view the topology of your cloud infrastructure, and drill down from applications to disk within the cloud. For example, you can drill down from the E-Business Suite middle tier to the Oracle Database to the Guest VM to the Oracle VM server to storage details, viewing each tier in detail.

Consolidation Planner

The new Consolidation Planner helps you determine optimal server consolidation scenarios by leveraging data collected by Cloud Control against business and technical constraints. Using this capability, enterprises can reduce their capital expenditures as well their labor costs by consolidating separate databases and application servers into a smaller consolidated set of systems.

Metering and Chargeback

This feature allows you to track the usage of business-critical resources or metrics by consuming entities (for example, cost centers) and allows businesses to report back the usage charges to the consuming entities. IT departments can accurately share or report costs with business users or business units commensurate with the usage of the resources.

1.7 Incident Management Features

Incident Manager

The Incident Manager provides administrators with a central point of control for managing events, incidents and problems within the infrastructure detected by Enterprise Manager. Key features include:

- Out-of-box and user-defined views to show incidents of interest (for example, show all incidents assigned to me)
- In-context access to diagnostic and resolution capabilities
- In-context access to My Oracle Support for access to knowledge base articles and creation/viewing of service requests
- Visibility and integration with external ticketing systems to display the status of help desk tickets opened for Enterprise Manager-generated incidents

Incident Rules

This feature enables the automation of business and operational processes as they relate to the management of events, incidents and problems. The feature includes a complete set of out-of-box rules for auto-creating incidents for important events. It also provides support for common operational and notification practices used in managing events and incidents.

Incident Framework Integration

The new Incident Framework feature integrates the job and provisioning framework. Numerous enhancements in this release include job-level debugging, EMCLI verbs to enable debug mode, improved error messages, and user and support-level logging. In the event of a failure, relevant logs are archived as part of the incident and attached with support tickets. This feature improves troubleshooting of issues with Oracle Support. Improvement will continue over time as critical logs are archived and attached to tickets automatically.

Automatic Target Discovery

Cloud Control can now automatically discover potential targets on hosts that it manages. Targets that are discovered in this fashion can then be promoted to managed target status. The feature also supports mass deployment of Management Agents to selected targets to facilitate target promotion.

Out-of-Box and User-Defined Systems Support

The *out-of-box systems* feature supports discovery of Oracle-provided systems as a single entity, including discovery of targets that make up the system as well as the relationships between them. The *user-defined systems* feature enables you to model and monitor your application system infrastructure in Enterprise Manager by creating *systems* targets. System target creation involves choosing the targets of the system and defining how system availability should be computed. Both features provide richer support for monitoring the infrastructure systems of managed custom applications.

Metrics Enhancements

User interface enhancements to the Metrics Settings include improved usability, support for changing settings for all metrics, and a new threshold suggestions feature. Changing and viewing metric settings are common tasks for many types of users. The enhancements included in this release are designed to improve the user experience and fill in feature gaps based on customer usage.

User Notification Enhancements

This release provides users with more choices in how to be notified of events and incidents. This includes support for the commonly-used SNMP v3 protocol, which provides more security enhancements for notifications. There is more optimized support for the "page me for critical issues, e-mail me for warnings" notification requirement. Notifications can even be prioritized so that more critical event notifications will be delivered before other events.

Availability Events Enhancements

The ability to generate events that may lead to incidents is critical to monitoring target availability. This release adds several features to availability events, including event generation for various availability status values (such as Target Down, Agent Unreachable) and Incident Manager integration to provide details on target availability.

1.8 My Oracle Support Integration

View Service Requests

You can view details for current service requests filed with Oracle Support via Enterprise Manager Cloud Control. The My Oracle Support menu opens the Service Request page where you can monitor, update and create service requests and relate them to the configurations found in Enterprise Manager.

View Patch Recommendations

Patch recommendations identify missing recommended patches issued by Oracle. Oracle compares the patches installed in your configuration with what Oracle recommends, and identifies any missing patches. You can view current patch recommendations for your environment via the Patch Recommendations region available from the Enterprise menu in Cloud Control.

1.9 Security Features

Nonpassword Credentials (Kerberos and PKI Certificate) Support

This release supports management of nonpassword credentials for target access. Because SSH key-based authentication is supported for host access, Kerberos ticket

and PKI certificate are supported for database access. The ability to manage nonpassword-based credentials helps you take advantage of strong authentication to secure target access.

Named Credential Audit Support

Accountability and traceability of the use of named credentials now meets a user's security compliance requirement. The system audits all operations on named credentials, including creating, updating, deleting, associating, and accessing a named credential.

Credential Sharing and Recycling Support

As an Enterprise Manager administrator, you can now share and recycle credentials without disclosing the sensitive content of the credentials. These credentials can be shared with other administrators by the control of fine-grained privileges. The sharing and recycling of named credentials significantly reduces the number of credentials that Enterprise Manager must maintain to access managed targets, reducing the time and effort needed to manage the stored credentials.

Centralized and Secure Credential Storage

All credentials used to access managed targets are named, encrypted, and maintained in a centralized logical credential store. This storage saves time and effort for Enterprise Manager administrators who must manage the credentials with tasks such as keeping credentials synchronized.

Fine-Grained Privileges for Access Control of Named Credentials

This release introduces fine-grained privileges to control access to stored and shared credentials. These fine-grained privileges now keep sensitive credentials protected to meet the security requirement, while simplifying and facilitating the sharing of the credential.

Independent Life Cycle of Named Credentials

A named credential's life cycle is no longer tied to specific credential consumers, such as jobs, deployment procedures, or targets. A credential can exist without any entity association. The independent life cycle of named credentials simplifies the management of credentials, from creation to deletion, by separating credentials from the life cycles of other entities in Enterprise Manager.

Named Credentials Testing and Verification

This release introduces the ability to test and verify a named credential and provide enough diagnosis information in the log file for analysis. This feature allows a user to verify the credentials before using them; this prevents use of the wrong credential in jobs or deployment procedures.

1.10 Lifecycle Management and Provisioning Features

Provisioning Bundle Updates Via the Self-Update Feature

You can now access provisioning bundles directly through the Self Update feature, greatly simplifying the process of updating deployment procedures, software library entities, and other provisioning artifacts.

Software Library Entity Enhancements

You can now assign privileges to Software Library entities, allowing the enterprise to implement segregation of duties and thus help in complying with corporate security policies. There is a single console for all Software Library entities. This reduces the time spent searching for entities while providing more meaningful ways to display information. This release also includes support for different storage types, such as agent file system, NFS, and HTTP.

Database Provisioning Enhancements

This release provides a centralized console for managing provisioning profiles and database provisioning deployment procedures. It also provides support for locking deployment procedures by designer to limit the numbers of inputs required from the operator. There also is a new Provisioning Profile, which is a read-only snapshot of an existing database environment.

Cleanup Mode

Cleanup mode enables you to undo all changes made by a deployment procedure. You can trigger this event manually either on failure of the deployment procedure or to undo the provisioning action. This mode is integrated with the Incident Framework, where incidents are automatically created for critical failures. An incident triggers dump scripts to collect debug information, which can then be packaged in an archive and sent to Oracle Support for analysis.

Web Service APIs for Deployment Procedures and Job Submission

With this release, a new set of Web Service APIs provides support for deployment procedures and job submissions. Improvements include a simplification update for EMCLI verbs, which enables system administrators to streamline maintenance processes.

Deployment Procedure Enhancements

Deployment Procedure interviews, the user-friendly wizards that guide you through the provisioning activity, now support saving of default variable values for use by other users. Additional enhancements include role-based access for Deployment Procedures and jobs. There also is support for User-Defined Deployment Procedures (UDDP), which allow automation of custom, and often complex, processes (for example, third-party application provisioning, JRE upgrade, and so forth).

1.11 Extensibility Support

Extensibility Developers Kit

This release provides an Extensibility Developers Kit (EDK) to support development of custom plug-ins for managing target types with no out-of-box support.

Plug-in and Connector Lifecycle Management

The Self Update feature provides a user-friendly mechanism for downloading and deploying management plug-ins and connectors. There also is a console for managing the lifecycle of plug-ins, enabling standardized management of different plug-in types and simplified deployment of plug-ins to Oracle Management Server and Management Agents.

Connector Integration with Incident Management

This release integrates ticketing systems with the new incident model and management features in Cloud Control, providing:

- Automatic or manual creation of help desk tickets based on Enterprise Manager incidents
- Display of ticket ID and status in the Incident Manager
- Synchronization of changes in the ticket based on changes in the incident attributes/fields
- Creation of tickets only for root-cause incidents

New Metric Extensions Model Replaces User-Defined Metrics

Metric Extensions are the next generation of User-Defined Metrics, enabling you to extend Enterprise Manager to monitor conditions specific to the enterprise's environment by creating new metrics for any target type. A new feature enables migration of existing User-Defined Metrics to Metric Extensions.

Additional enhancements include:

- Improved support for data collection mechanisms beyond operating system and SQL queries
- Create/update life cycle support for metrics, including versioning and deployment
- Implicit support for all features that support metrics, such as the System Dashboard and reporting capabilities

1.12 Coherence Management Features

Monitoring and Diagnostics

With this release, you can customize performance views:

- Select multiple metrics at a time for correlation
- Overlay metrics for comparison and better analysis
- Compare performance impact on periodic basis
- Maintain historical views for trend analysis

A new system topology view provides a better overview of associations and dependencies, complete with drill-down capabilities for detailed analysis. Enhanced log file alerts improve your ability to discover log file patterns and to generate an alert on any matching pattern. Improved monitoring support includes monitoring for push replication, reap sessions, and transactional caches.

Cache Administration

A new interface for Cache Data Management provides query-based data operations and a central user interface for key cache operations. This new feature saves time in cache operations and simplifies administrator tasks. Queries can now be saved for future reference. Cache data can be exported and imported to a file. This feature gives administrators the ability to plan the downtime without loosing the cached data and to better prepare caches in a new data center (such as in a high availability scenario).

Provisioning

This release provides support for node updating. You can automate the update process tasks (for example updating configuration files, application JARs, and so forth) on the nodes, which reduces risk and time. A central repository is now available for asset management. Provisioning enhancements include support for WKA-based topologies, additional development and production options (such as Mode of Deployment), and improved flexibility in provisioning.

Configuration Management

Improved configuration management allows you to set configuration parameters to make historical comparisons available. You can save your configuration into a repository as a *reference image* or *gold image* and then compare it against a current configuration. This feature allows you to quickly identify performance and availability issues related to configuration changes.

2

Overview of Oracle Enterprise Manager Cloud Control 12*c*

This chapter provides an overview of Enterprise Manager Cloud Control 12*c* (12.1.0.1) and helps you understand its architecture and the various core components that are integrated within the product. It contains the following sections:

- About Enterprise Manager Cloud Control
- Enterprise Manager Cloud Control Architecture
- Key Features

2.1 About Enterprise Manager Cloud Control

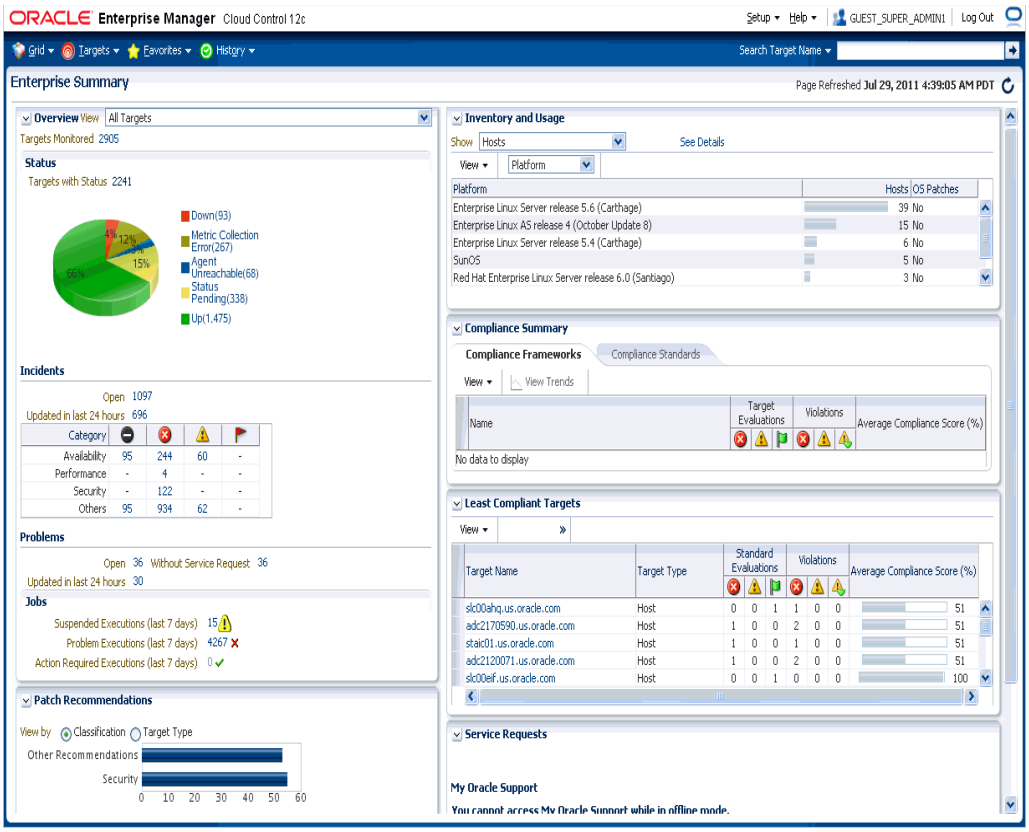
Enterprise Manager Cloud Control is system management software that delivers centralized monitoring, administration, and life-cycle management functionality for the complete IT infrastructure, including systems running Oracle and non-Oracle technologies.

Your infrastructure may comprise multiple Oracle Databases, Oracle WebLogic Servers, Web applications deployed on these servers, hosts running these targets, and so on. You can, of course, use the individual product consoles to monitor the status of each of these targets, but it becomes cumbersome to shuttle between multiple console windows and track the performance of each of these targets using so many windows.

Enterprise Manager Cloud Control offers a solution that allows you to monitor and manage the complete Oracle IT infrastructure from a single console (Figure 2–1). In addition, it provides support for business-driven IT management and business-centric top-down application management to manage your business services, user experience, and infrastructure. It also offers support for monitoring certain non-Oracle products, for example, IBM WebSphere Application Server, Microsoft SQL Server, Juniper Networks NetScreen Firewall, and so on.

Note: Enterprise Manager Cloud Control does not require a private or public cloud.

Figure 2–1 Enterprise Manager Cloud Control



With a broad set of end-to-end monitoring, administration, configuration management, provisioning, and security capabilities, Enterprise Manager Cloud Control reduces the cost and complexity of managing such grid computing environments. Robust service-level management functionality within Enterprise Manager Cloud Control dramatically improves service levels through robust transaction and end-user performance monitoring and deep diagnostics for multi-tier Internet applications.

For more information about Enterprise Manager Cloud Control, access the following URL:

`http://www.oracle.com/us/products/enterprise-manager/index.html`

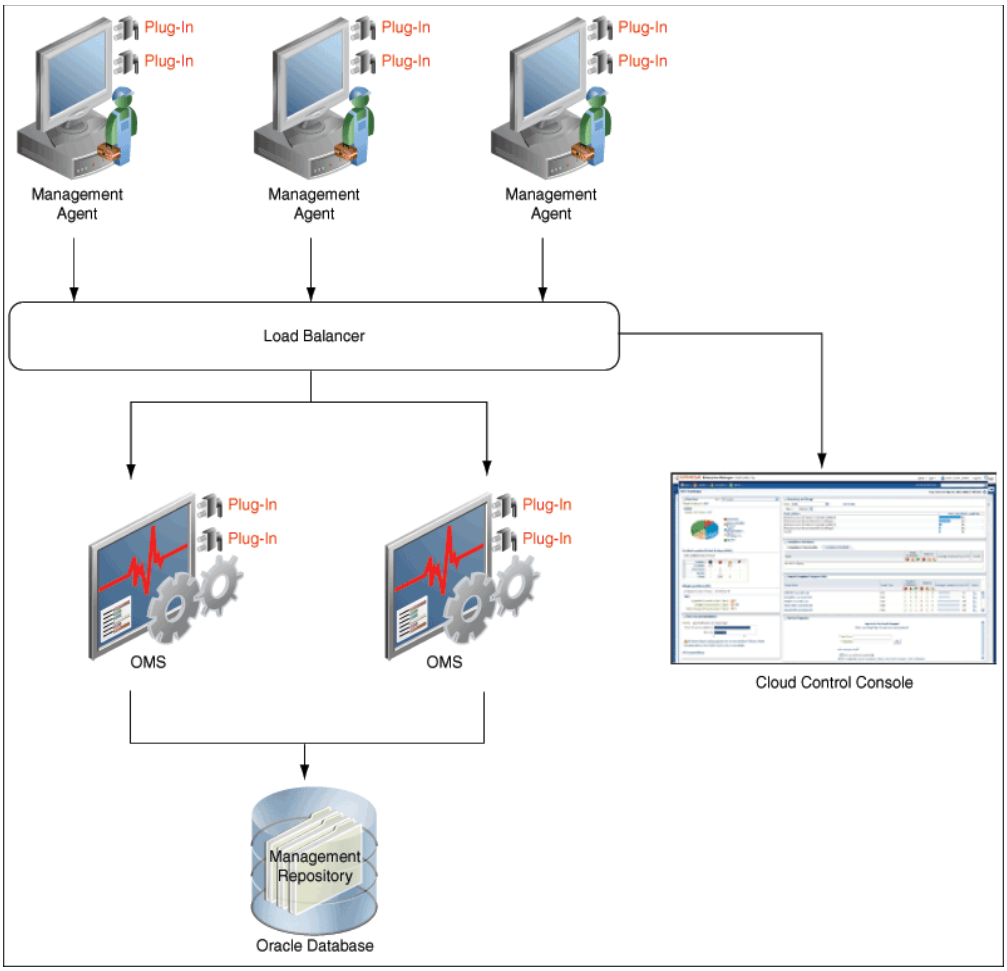
2.2 Enterprise Manager Cloud Control Architecture

Although Enterprise Manager Cloud Control is viewed as a single entity, technically, it is built with the following components:

- Oracle Management Agent
- Oracle Management Service
- Oracle Management Repository
- Oracle Management Plug-ins
- Enterprise Manager Cloud Control Console

Figure 2–2 shows a sample Enterprise Manager Cloud Control architecture and illustrates how these core components fit into the architecture.

Figure 2–2 Enterprise Manager Cloud Control Architecture



Note: In Figure 2–2, the load balancer and the multiple OMSes are depicted only to indicate how a sample Enterprise Manager Cloud Control architecture would look in a large organization. They are not a prerequisite or a requirement for an Enterprise Manager system installation. If you do not have a load balancer, then the Management Agents communicate directly with the OMSes.

The following sections describe the core components of Enterprise Manager Cloud Control.

Oracle Management Agent (Management Agent)

The Management Agent is an integral software component that is deployed on each monitored host. It is responsible for monitoring all the targets running on those hosts, communicating that information to the middle-tier Oracle Management Service, and managing and maintaining the hosts and its targets.

Oracle Management Service (OMS)

The OMS is a Web-based application that orchestrates with the Management Agents and the Management Plug-ins to discover targets, monitor and manage them, and store the collected information in a repository for future reference and analysis. The

OMS also renders the user interface for Enterprise Manager Cloud Control. The OMS is deployed to the Oracle Middleware Home (middleware home), which is the parent directory that has the Oracle WebLogic Server home, the OMS home, the Management Agent home, the plug-in home, the Java Development Kit (JDK), the OMS instance base directory, the Oracle WT directory, the Oracle Common directory, and other relevant configuration files and directories. While deploying the OMS, the Enterprise Manager Cloud Control Installation Wizard installs Oracle WebLogic Server if it does not already exist in your environment. As a result, a WebLogic Server admin console is also installed.

Oracle Management Repository (Management Repository)

The Management Repository is a storage location where all the information collected by the Management Agent gets stored. It consists of objects such as database jobs, packages, procedures, views, and tablespaces.

Technically, the OMS uploads the monitoring data it receives from the Management Agents to the Management Repository. The Management Repository then organizes the data so that it can be retrieved by the OMS and displayed in the Enterprise Manager Cloud Control console. Since data is stored in the Management Repository, it can be shared between any number of administrators accessing the Enterprise Manager Cloud Control.

At the time of installation, the Enterprise Manager Cloud Control Installation Wizard configures the Management Repository in your existing, certified database. The wizard, however, does not install a new database.

Oracle Management Plug-ins (Plug-ins)

Plug-ins are pluggable entities that offer special management capabilities customized to suit specific target types or solution areas. Unlike the earlier releases of Enterprise Manager, in Enterprise Manager Cloud Control, the plug-ins work in conjunction with the OMS and the Management Agent to monitor every target in your environment. Therefore, they are deployed to the OMS as well as the Management Agent. In the earlier releases, plug-ins were primarily meant for monitoring third-party targets, but in Enterprise Manager Cloud Control, plug-ins are meant for monitoring all types of targets in your environment.

Plug-ins have independent release cycles, so every time you have a new version of an Oracle product released, you will have a new version of the plug-in released to support monitoring of that new product version in Enterprise Manager Cloud Control. This simplifies things because you no longer have to wait to upgrade your Enterprise Manager system to support a new product version; instead you can upgrade your plug-ins to monitor the new product version.

Table 2–1 lists the mandatory plug-ins that are installed by default with a new Enterprise Manager system. In addition to these mandatory plug-ins, you can optionally install other plug-ins available in the software kit (DVD, downloaded software bundle, and so on). The installer offers a screen where you can select the optional plug-ins and install them.

Table 2–1 Mandatory Management Plug-ins

Name	Description
Oracle Database	Enables you to monitor and manage Oracle Database and related targets such as Oracle Real Application Clusters (Oracle RAC), Oracle Automatic Storage Management (Oracle ASM), and so on.

Table 2–1 (Cont.) Mandatory Management Plug-ins

Name	Description
Oracle Fusion Middleware	Enables you to monitor and manage Oracle Fusion Middleware products such as Oracle WebLogic Domain, Oracle WebLogic AdminServer, Oracle WebLogic Server, Oracle SOA Suite, Oracle Web Tier, and so on.
Oracle My Oracle Support	Enables you to log in to My Oracle Support from within the Cloud Control console, search the knowledge library for notes and documents, raise service requests, and create patch plans and templates for patching monitored targets.
Oracle Exadata	Enables you to monitor and manage Oracle Exadata targets.

Enterprise Manager Cloud Control Console

The Enterprise Manager Cloud Control console is the user interface you see after you install Enterprise Manager Cloud Control. With the help of the console, you can monitor and administer your entire computing environment from one location on the network. All the systems and services including enterprise application systems, databases, hosts, middleware application servers, listeners, and so on, are easily managed from one central location.

2.3 Key Features

Enterprise Manager enables users to manage their applications from top to bottom - from monitoring service levels to proactively isolating business exceptions before they escalate to addressing issues at any level in the IT stack. Users can manage the entire application life cycle with comprehensive application quality management and compliance solutions. Key features include:

Software Library
System Monitoring
Groups Management
Job System
Database Management
Compliance Management
Enterprise Configuration Management
Application Dependency and Performance Integration
Cloud Management
JVM Diagnostics
Middleware Monitoring and Management
Fusion Applications Monitoring and Management

2.3.1 Software Library

Oracle Software Library (Software Library) is one of the core features offered by Enterprise Manager Cloud Control. Technically, it is a repository that stores certified software entities such as software patches, virtual appliance images, reference gold images, application software and their associated directive scripts. In addition to storing them, it also enables you to maintain versions, maturity levels, and states of these software entities.

Besides acting as a repository for software entities, Software Library is a logical interface between the deployment models and the automation framework required to perform a number of patching and provisioning operations. You can select any of the Oracle-owned entities, customize them or create a custom entity of your own. Once defined, you can reference these reusable entities from a Deployment Procedure to

automate the patching, provisioning or mass-deployment of software, software updates, and servers in a reliable and repeatable manner. A Deployment Procedure encapsulates the workflow of all the tasks that need to be performed for a particular life-cycle management activity.

Software Library also provides multiple configuration options for storing or referencing software binaries and script files associated with the entities. The software entities can use these associated software binaries and script files present in a file system location accessible to the OMS, either locally or through an Agent. Software Library enables you to utilize the existing IT infrastructure of your organization in an optimal way for provisioning and patching operations by having the entities refer to files saved by a File Server or Web Server.

2.3.2 System Monitoring

Enterprise Manager provides comprehensive, flexible, easy-to-use monitoring functionality that supports the timely detection and notification of impending IT problems across your enterprise. For applications built on Oracle, Enterprise Manager offers the most comprehensive monitoring of the Oracle Cloud environment.

For example, the Enterprise Manager monitoring functionality is tightly integrated with Oracle Database manageability features such as server-generated events. These events are generated by the database itself about problems it has self-detected. Server-generated events 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 Cloud.

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 event is generated and sent to Enterprise Manager and to Enterprise Manager administrators who have registered interest in receiving such notifications.

Cloud Summary Page

The Enterprise Manager Cloud Summary page gives you an at-a-glance view of the overall status of your monitored environment. The Summary page summarizes key monitoring areas such as availability across all managed targets, open events, compliance violations, and recent problems with job executions. Links on this page allow you to drill down to detailed performance information.

Incident Manager

In addition to monitoring your environment, Enterprise Manager enables you to manage the environment in one central location. *Incident Manager* is the central point for summarizing, managing, diagnosing, and resolving events, incidents, and problems that impact your enterprise. An *incident* is an event that represents an issue requiring resolution, whereas a *problem* is an undiagnosed underlying root cause of one or more related incidents.

Incident Manager enables you to assign incidents to specific personnel, thus distributing the workload among the administrators. You can also prioritize, escalate, and track incidents through various states of resolution. If you are the person working the incidents and problems, you can acknowledge that you are working the incidents and problems, and provide information to the user community regarding the progress of the resolution. You can directly access My Oracle Support from Incident Manager.

Incident Rules

In conjunction with Incident Manager, you can define *Incident Rules* that enable you to manage the automation and implementation of operational practices that manage events, incidents, and problems.

By using incident rules, you can automate the response to incoming incidents and their updates. A rule consists of the selection criteria to identify the incidents the rule applies to, the conditions when the rule should be applied (for example, if an incident priority is changed to P1), and actions to be taken in response to the incident.

The actions supported for incidents include: notifications, changing of the appropriate resolution management attributes, and ticket creation.

Performance and Health Metrics

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

Some metrics have predefined limiting parameters called thresholds that cause alerts to be generated when metric values exceed these thresholds. A metric alert, which is a type of event, indicates a potential problem indicating that a warning or critical threshold for a monitored metric has been crossed. An event can also be generated for various availability states such as:

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

When an event is generated, you can access details about the event from the Incident Manager page. Administrators can be automatically notified when an event is generated, and corrective actions can be automatically set up to resolve an event condition.

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 event is generated and sent to Enterprise Manager and to Enterprise Manager administrators who have registered interest in receiving such notifications.

Corrective Actions

Corrective actions allow you to specify automated responses to events. They ensure that routine responses are automatically executed, thereby saving administrators time and ensuring problems are dealt with before they impact users.

2.3.3 Groups Management

Today's IT operations staff are often responsible for managing a great number of components, such as databases, application servers, hosts, or other components. The Enterprise Manager Group Management System lets you combine components (called targets in Enterprise Manager) into logical sets, called *groups*. By organizing targets into groups, you can manage and monitor many components as one. The group management system enables you to organize, manage, and effectively monitor the potentially large number of targets in your enterprise.

The group management system allows you to:

- 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.
- Grant administrators access to the different groups of targets so that they can access only allowed areas. Use group privileges to grant users the ability to add or delete a target in a specific group and to grant privileges on a group.
- Apply blackouts to all targets in a group by using the Create Blackout wizard.

Besides creating conventional groups, you can also create redundancy groups. A redundancy group contains members of the same type that function collectively as a unit. A 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.

It is possible for the owner of a group, at the time of group creation, to specify the group to be a privilege propagating group. Users creating a privilege propagating group must have full privileges on member targets.

Privilege propagation groups enable administrators to grant privileges to other administrators in a manner where new administrators get the same privileges as its member targets. For example, granting Operator privilege on a Group to an Administrator grants Operator privilege on its member targets as well. Privilege propagating groups can contain individual targets.

2.3.4 Job System

The Enterprise Manager Job System automates routine administrative tasks and synchronizes components in your environment so you can manage them more efficiently. A *job* is a unit of work that you define to automate commonly-run tasks. One advantage of jobs is that you can schedule a job to start immediately or start at a later date and time. You have the option to have the job run once or at a specific interval.

The Enterprise Manager Job System serves the following purposes:

- Provides for the automation of many administrative tasks, such as backup, cloning, and patching
- Enables users to create their own jobs using their own custom OS and SQL scripts
- Enables users to migrate custom OS or SQL scripts into the Enterprise Manager job system for centralized tracking and management

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 forth. Besides predefined job tasks, you can define your own job tasks by writing code to be included in OS and SQL scripts, or you can create complex custom jobs by joining several tasks into one multi-task job.

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 accounts for the membership of the group as it changes.

The job system publishes status change events when a job changes its execution status, and these events have different severities based on the execution status. Normal

administrators can add targets in the target filter. Apart from adding targets to the target filter, super administrators can edit the Job Event filter based on status buckets and also targetless jobs. You can create a rule set applying to jobs and rules for job status change event class. By default, Problem and Action Required status buckets are enabled, but administrators will have to add targets to enable publishing events for jobs submitted on a selected target.

2.3.5 Database Management

Database management enables you to monitor, administer, and maintain the databases and database groups in your enterprise. Enterprise Manager provides you with:

- 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

Using these abilities, you can perform the following tasks:

- Monitor databases
- Administer databases
- Manage database security
- Monitor Oracle Real Application Clusters
- Mask sensitive data for non-production use
- Maintain databases

The following sections explain how you can use these abilities to manage databases in Oracle Enterprise Manager Cloud Control.

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 database's 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.

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. You can perform common administration tasks such as the following:

- Allocate system storage and plan future storage requirements for the database system
- Create and manage primary database storage structures (tablespaces)

- Create and manage primary objects (tables, views, indexes)
- Enroll users and maintain system security by controlling and monitoring user access to the database
- Back up and restore 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.

Managing Database Security

Some of the important components of Enterprise Manager database security include:

- **Users, roles, profiles, and audit settings** — 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. Oracle Enterprise Manager allows you to create and manage users, roles and profiles. Auditing is the monitoring and recording of selected user database actions.
- **Transparent data encryption** — Oracle Advanced Security provides transparent data encryption to support your compliance efforts.
- **Oracle Label Security (OLS)** — This security option enables you to assign data classification and control access using security labels, addressing privacy and regulatory compliance requirements.
- **Virtual Private Database (VPD)** — VPD enables you to enforce security at the row and column level.
- **Enterprise user security** — This feature, combined with Oracle Identity Management, enables you to centrally manage database users and authorizations in one location.
- **Oracle Database Vault** — Strong internal controls are necessary to access, disclose or modify sensitive information that could lead to fraud, identity theft, financial irregularities, and financial penalties. Oracle Database Vault addresses common regulatory compliance requirements and reduces the risk of insider threats.

Monitoring Oracle 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 Oracle Real Application Clusters databases and instances is similar to managing single-instance databases.

Oracle 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 Oracle 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.

Masking Sensitive Data

Data masking (also known as data scrambling and data anonymization,) is the process of replacing sensitive information copied from production databases to test non-production databases with realistic, but scrubbed, data based on masking rules.

Data masking is ideal for virtually any situation when confidential or regulated data needs to be shared with other non-production users; for instance, internal users such as application developers, or external business partners, like offshore testing companies or suppliers and customers. These non-production users need to access some of the original data, but do not need to see every column of every table, especially when the information is protected by government regulations.

Maintaining Databases

You can use Oracle Enterprise Manager to control the flow of data between or outside Oracle Databases. You can use the following tools to maintain one or more databases:

- **Back-ups** — Back-up of an Oracle Database generally refers to physical back-up; protecting the files that comprise your database. The files protected by the back-up and recovery facilities built into Oracle Enterprise Manager include data files, control files, and archived redo log files.
- **Recovery** — Media recovery using Enterprise Manager can be either a complete recovery or point-in-time recovery.
- **Flash 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 back-ups. 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.
- **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.
- **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.
- **Database software patching** — Enterprise Manager simplifies the patching of Oracle software on any host where an Oracle Management Agent is running, and provides critical patch advisories. Oracle Patch Advisories describe critical software patches for Oracle products. To promote critical patch applications, 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.

2.3.6 Compliance Management

Using Enterprise Manager, you can test the conformance of your targets for security standards, and configuration and storage requirements. By continually testing your systems, services, and targets, you are ensuring the best possible protection and performance for your system.

Enterprise Manager supports compliance standards and compliance frameworks. A compliance standard is a collection of checks or rules. A compliance framework is a collection of compliance standards which can span one or more target types and serve

as benchmarks by which targets are assessed or evaluated. Together these define the optimal configurations of systems.

Whether you use the out-of-box compliance standards and compliance frameworks or customize compliance standards and compliance frameworks to meet your particular system requirements, any deviations of your systems or applications are reported. Examples of deviations include inappropriate settings and incorrect system configurations. Using the Information Publisher feature, you can view reports of any compliance violations and compliance framework reports.

2.3.7 Enterprise Configuration Management

Enterprise Manager Cloud Control provides the means to view, save, track, search, compare, and customize the configuration information stored in the Management Repository for all managed entities known to the enterprise.

Enhanced Access to Configuration Data

Enterprise Manager provides unprecedented access to extensive configuration data collections, using the following components:

- Configuration Search
- Configuration History
- Configuration Browser

Use Configuration Search to search configuration data across the enterprise. Enterprise Manager ships with a set of out-of-box configuration searches, which you can use as a starting point to explore the volume of configuration data collected. As you work with a provided search, you can tailor the search criteria to refine or broaden the results, and save the altered search under a new name.

Perform powerful searches across the enterprise using sophisticated combinations of search filters, options, and relationships.

The search capability derives its power from its flexibility, enabling you to reach across target types to ferret out information: Show me all hosts running Oracle database 11i on Linux 64 machines at patch level x.x and higher.

Use Configuration History to monitor change activity across the enterprise. The history is a log of changes to a managed entity (target) recorded over a period of one year; it includes changes both to configurations and to relationships. Relationships are the associations that exist among managed entities.

While viewing a configuration history you can:

- Track changes to targets over time by specifying and refining search criteria.
- View change history and manipulate how the information is presented.
- Annotate change records with comments that become part of the change history.
- Schedule a history search to capture future changes based on the same criteria.
- View the status of scheduled history jobs.
- Notify others of future change detection.
- Save change history details to a file.

Use Configuration Browser to view configuration data in the context of a single managed entity. Configuration data can include:

- Configuration item types and properties, and their values

- System configuration data as well as all system members and their configuration data
- System and target relationships (immediate, member of, uses, is used by, and so forth)
- Custom configuration collection data

The viewed data can be the latest collected or a previously saved snapshot.

Configuration Comparisons and Comparison Templates

Enterprise Configuration Management deals with the collection, storage, and monitoring of configuration data tied to managed entities within the enterprise. A host, for example, has configuration item types related to its hardware and software components—number of CPUs, memory, IO devices, OS platform and version, installed software products, and so forth.

Changes to configuration data invariably happen, typically because of common events like patches and upgrades. At some point a change to one component can affect the overall system in a negative way. Detecting the root cause becomes paramount.

The comparison tool enables you to compare configurations of a target with configurations of another target of the same type. The comparisons can be done on the current configuration or configurations previously saved (perhaps, for example, just before applying a patch or doing an upgrade).

A comparison template is an exemplar for fine-tuning a comparison of like configurations. A template is associated with a specific target type, which determines the configuration item types, items, and properties to be compared. A set of default templates ships out-of-box to support certain target types.

A template enables you to establish certain constants to take into account when comparing configurations of the given target type; for example, which property differences to ignore, and which property differences trigger an alert. You also can use constraints to establish acceptable values for specific properties. A configuration being compared that does not comply with the constraint constitutes a difference.

A template can invoke rules, or expressions, to be evaluated in determining when there is a match for comparison purposes, and when to disregard differences detected in a comparison.

For systems, you design a system template that references member templates, based on the target types that make up the system. Create the member templates before you create the system template.

Comparisons allow you to do the following:

- Ignore certain attributes during a comparison
- Notify key personnel when differences are detected
- Design and share comparison templates with other administrators
- Schedule a comparison to run on a recurring basis
- Compare complete target systems; match target system members automatically or manually
- Compare configuration file data as raw file content or in a parsed format

Custom Configuration Specifications

Custom configurations provide end users the means to define configurations to collect that Enterprise Manager has no way of knowing about. These customized

configurations can be collected on well-known target types or on target types introduced as part of the custom configuration definition.

A custom configuration is a specification intended for deployment to an agent-monitored target where the agent uses it to gather configuration data about target instances. A custom configuration can be a combination of the following:

- File specifications—configuration files in a specified directory on the target to collect and upload to the repository
- Command specifications—commands and scripts to run against the target, given appropriate credentials, and upload command/script output as configuration data to the repository
- Query specifications—SQL database queries to run against a database on the target, given appropriate credentials, and upload query results to the repository

The configuration data that the agent collects and uploads is stored in both raw and parsed form. The custom configurations application has a host of out-of-box parsers that you can use to convert collected configuration data into a standard format for storing in the repository. You can view collected configuration data in both raw and parsed form.

2.3.8 Application Dependency and Performance Integration

Application Dependency and Performance (ADP) analyzes Java EE, SOA, and Portal applications to capture the complex relationships among various application building blocks.

ADP delivers an Application Service Management (ASM) environment that self-customizes out-of-box, evolves with change, and delivers a holistic, service-oriented view across heterogeneous environments.

Using ADP, you can:

- Monitor the performance of the service-oriented architecture (SOA), Oracle Service Bus (OSB), Java EE, WebLogic Portal, and WebCenter applications.
- Gain visibility into components defined by way of metadata within a framework (for example, components within a composite) with deep dive visibility, where available.
- View static relationships defined between components and services, such as OSB business and proxy services, and SOA services and references.
- Configure thresholds for various measurements called Service Level Objectives (SLOs). Configuring SLOs is a key activity for establishing and maintaining an effective performance monitoring system.

2.3.9 Cloud Management

Virtualization is the ability to run multiple virtual machines on a single piece of hardware. It enables you to install multiple operating systems that are able to run simultaneously and independently, in their own secure environment, with minimal reduction in performance. Each virtual machine has its own virtual CPU, network interfaces, storage and operating system. Enterprise Manager 12c's Cloud Management solution allows you to monitor virtualization targets and perform administration and provisioning operations on these targets.

The Cloud Management plug-in provides a complete and pre-integrated framework that allows you to build and manage your private cloud. It includes the following:

- **Management of Virtualization Targets**: Set up and monitor virtualization targets like zones, virtual server pools, virtual servers, and guest virtual machines.
- **Self Service Provisioning**: Set up the self service portal so authorized end users can provision applications on demand without any IT intervention.
- **Assemblies and Templates**: Facilitate deployment and management of Oracle products, a set of pre-configured assemblies and templates are available out-of-the-box. These can be provisioned across several guest virtual machines as required. For example, an assembly consisting of a database application, a mid-tier application server, and a proxy/load balancer can be deployed as a complete e-Business suite application.
- **Policies**: Define policies for resource allocations, resource balancing, power optimization, and other management workflows.
- **Chargeback and Trending**: Bill for resource usage and establish patterns of resource use

More on Chargeback

Chargeback, as the name implies, is a tool of accountability. The application's primary uses can generally be described as follows:

- Provide resource usage metering by aggregating and normalizing the enormous amount of metric data Enterprise Manager collects.
- Provide IT a means to "charge" a dollar amount to internal organizations that use resources.
- Provide internal organizations and users with reports detailing their consumption and charges.

Chargeback uses three universal metrics against which to compute resource consumption: CPU, memory, and disk usage. These three comprise the basic charges applied to all targets signed up for chargeback. Given the variety of processor architecture, the base plan can bill different rates based on CPU model.

In addition, you can create extended charge plans that are target-specific. Extended charge plans provide flexibility in how you bill for services, allowing you to:

- Override base plan rates
- Establish different rates based on target configuration
- Charge flat or usage-based rates

For resource consumption by internal users, you create a business hierarchy against which to charge for services. A business hierarchy consists of cost centers that typically correspond to business units—sales, engineering, human resources, and so forth. Cost centers in turn consist of individual consumers of services within the organization.

Consolidation Planning

Over the years, an enterprise's data centers grow by adding more and more servers to satisfy increasing business requirements. This typically results in maintenance of excess servers that occupy rack space, consume a lot of power for cooling, and require system maintenance such as security and patching, many of them are under-utilized. The goal of consolidation is to identify such under-utilized servers and find a way to consolidate them, making it possible to free up as many servers as possible while continuing to maintain service levels.

The Consolidation Planner feature enables you to match managed servers you want to consolidate with generic physical machines, Oracle Exadata database machines, or

Oracle virtual servers they can be consolidated to. The feature leverages data collected from managed targets by Cloud Control and factors in business and technical requirements to help you determine the optimum scenarios.

A set of pre-configured consolidation scenarios are provided, representing conservative, aggressive, and medium consolidation schemes. Each scenario is generated based on inputs you provide. Alternatively, you can create your own custom scenarios that best suit your situation. Once created, you can compare the various scenarios to determine which consolidation strategy best meets your requirements.

2.3.10 JVM Diagnostics

Mission critical Java applications often suffer from availability and performance problems. Developers and IT administrators spend a lot of time diagnosing the root causes of these problems. Many times, the problems occurring in production environments either cannot be reproduced or may take too long to reproduce in other environments. This can have a strong negative impact on the business.

JVM Diagnostics enables you to diagnose the root cause of performance problems in the production environment without having to reproduce them in the test or development environment. You can identify Java problems or database issues that are causing application downtime without any detailed application knowledge. This in-depth diagnosis greatly reduces the time required to resolve performance problems and improves the availability and performance of your application. With JVM Diagnostics, you can:

- View Historical JVM data.
- View live JVM data and perform real-time analysis.
- Perform real-time transaction tracing.
- Detect and analyze memory leaks.
- Correlate database activity.
- Upload diagnostics images.

2.3.11 Middleware Monitoring and Management

Middleware is the software that enables your enterprise applications to run. Managing the underlying middleware technology can be difficult, and IT organizations often have to rely on a variety of specialized tools. This can lead to inefficiency and may introduce complexities and risks.

Enterprise Manager Cloud Control is the definitive tool for middleware management and allows you to manage both Oracle applications and custom Java EE applications that run on a combination of Oracle Fusion Middleware as well as non-Oracle middleware software.

Enterprise Manager Cloud Control supports the discovery, monitoring and central management of the entire family of Oracle Fusion Middleware components, including:

- Oracle WebLogic Server farms, domains, clusters and single server instances
- Clustered and standalone Java EE applications
- Web tier components, including Oracle HTTP Server
- Service-Oriented Architecture (SOA) components
- Oracle Web Cache

- Oracle Identity Management
- Metadata Services repositories
- Oracle WebCenter
- Oracle Portal
- Oracle Business Intelligence Discoverer
- Oracle Forms Services
- Oracle Reports
- Directory Server Enterprise Edition
- Oracle Coherence
- Oracle Exalogic Elastic Cloud

A key benefit of Enterprise Manager Cloud Control is that unlike other Fusion Middleware management utilities - such as Fusion Middleware Control and the WebLogic Server Administration Console - you can monitor and manage multiple target instances, such as all of the WebLogic Server instances within a domain, from a single console.

You can also view real time as well as historic performance metrics collected from middleware targets. This enables you to monitor the availability and performance of Oracle Fusion Middleware software both in real time and from a historical perspective for trend analysis and diagnosing availability and performance problems.

Enterprise Manager Cloud Control also enables you to manage the infrastructure upon which the middle-tier depends. You can manage underlying operating systems and hosts on which the middleware software is installed. You can also monitor the databases used by deployed applications, enabling you to diagnose application performance problems and identify the true root cause of the problem and the tier (middleware, database) on which it occurs.

The built-in topology viewer allows you to visualize and monitor your entire Oracle Fusion Middleware environment in a graphical display. Topologies can be viewed for a single SOA composite, an Oracle WebLogic Domain, or across multiple Oracle WebLogic Domains.

Management of Service-Oriented Architecture (SOA) components such as BPEL processes and infrastructure components such as Oracle Service Bus, is also supported. The infrastructure provides monitoring, fault management, configuration management, deployment and dependency views of wiring between components.

2.3.12 Fusion Applications Monitoring and Management

Enterprise Manager Cloud Control enables you to manage and monitor Oracle Fusion Applications components deployed in your infrastructure as managed targets. Supported target types include:

- Fusion Instances containing one or more Fusion Product Families
- Fusion Products and Product Families
- Fusion Java EE application instances

Cloud Control provides data on the following, enabling you to monitor the status of Oracle Fusion Applications targets active within the domain:

- The database instance used by the target

- Incidents raised due to issues with the target
- Changes made to the target's configuration
- Oracle-recommended patches applied to the target

When demand for a clustered Fusion Application increases, Enterprise Manager Cloud Control enables you to "scale out" the application by adding an additional WebLogic Server instance, with an instance of the Fusion Application running on it, to the cluster. After you provide the information required to provision the new WebLogic Server instance, Enterprise Manager initiates a deployment procedure to automatically complete the provisioning and deployment processes.

For Product Families that use Enterprise Scheduler Service (ESS), you can view job status data for related ESS instances. You can view pending and running requests by user and application. You can also view a Historical Reports page that displays completed job requests by user, application and work assignment.

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