Managing the Complete Oracle Environment with Oracle Enterprise Manager 10g

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EXECUTIVE OVERVIEW

Today's businesses, whether e-business or traditional brick-and-mortar, all rely on Information Technology to produce, communicate, store and retrieve business-critical information. Having a highly reliable and highly available IT system becomes key, if not synonymous, to business success. IT organizations are continuously challenged to keep up with evolutions in business and technology, while striving to remain competitive by finding solutions that will simplify and lower the cost of managing their systems. Oracle Enterprise Manager 10g with new Grid Control feature provides this solution. Enterprise Manager is Oracle's single, integrated solution for administering and monitoring applications and systems that are based on the Oracle technology stack.

INTRODUCTION

All businesses have high demands on their IT systems, whether or not such IT systems are servicing internal company operations, or running the business itself. There are increasingly high demands for continuous service availability, scalability, simplified management, and value-added reporting. Oracle Enterprise Manager 10g Grid Control continues to meet these demands by providing complete monitoring of the Oracle technology stack with Systems Monitoring complemented with Application Service Level Management (ASLM), distributed database and application server administration, enhanced diagnostics via collection of performance and availability data, automated tuning of the Oracle environment, and a new internet-enabled architecture that allows administrators to manage from anywhere.

ROBUST, RELIABLE MANAGEMENT FRAMEWORK

Enterprise Manager uses a web-based architecture which is robust, reliable, globally scalable, and easy to deploy and operate within today's internet-enabled environments. Oracle Enterprise Manager 10g Grid Control provides the administrator with complete access to management information. Its HTML-based console interface allows an administrator to manage from anywhere – all that is needed is a Web browser.

The console interacts with the Oracle Management Service, which is a J2EE Web Application. The Oracle Management Service works with an Oracle database repository (called Management Repository) for its persistent data store. The
Management Repository contains centralized management information about all administrators, targets, and applications that are managed within Enterprise Manager.

Oracle Management Agents compose the last component of the framework. An Oracle Management Agent is a lightweight process that is deployed on each monitored host. Oracle Management Agents are responsible for monitoring all services on the host, for communicating monitoring information to the Oracle Management Service(s) and for execution of remote operations on the managed services.

![Figure 1: Enterprise Manager’s web-based architecture consists of an html-based console, a Management Service with database repository, and Management Agents on monitored targets.](image)

**Internet-enabled Management**

Communication between each tier is via HTTP, which seamlessly allows any part of the framework to work with and through firewalls that allow HTTP communications to pass through them.

The ability of Enterprise Manager to employ Secure Socket Layer (SSL) ensures that communication within the Enterprise Manager infrastructure is secure. SSL is an encrypted communication protocol that is designed to securely send messages across the Internet. It resides between the Oracle HTTP Server on the application layer and the TCP/IP layer, transparently handling encryption and decryption when a client makes a secure connection. The secure version is simply HTTP over SSL.
and is named HTTPS. HTTPS communication ensures that sensitive information passed on the wire, such as passwords, is encrypted and secure.

**Globally Scalable**

The underlying framework can easily scale as more targets are added to Enterprise Manager for management, and more Enterprise Manager administrators are added to manage those targets. The management of any new target within Enterprise Manager simply requires the installation of an Oracle Management Agent on the target’s host. Also available is the support to deploy Agents across your entire network via scripted and silent installations.

As an IT infrastructure scales across the globe, or as new administrators or new targets are added, additional Oracle Management Services can be seamlessly added in the same way that web-based applications add additional application servers to service additional load. Having multiple Oracle Management Services provides additional scalability for the Enterprise Manager framework, and when used in conjunction with a Server Load Balancer (SLB) multiple middle tiers offer robust failover capability as well.

**Self-monitoring Architecture**

Enterprise Manager contains self-monitoring capabilities that ensure its own critical components are available and functional. Each Management Service and Agent has its own watchdog that monitors the corresponding process. Should the Management Service or Agent be abnormally terminated, the appropriate watchdog would restart the process automatically without user intervention. In addition, key performance and availability metrics are automatically monitored for each critical component of the Enterprise Manager framework. System administrators would receive notifications should any of these components experience availability and/or performance degradation. Using Enterprise Manager’s Application Service Level Management (ASLM) features, Grid Control itself can be monitored like any web-based application to ensure administrators receive optimum performance as they use it to manage their enterprise.
SIMPLIFIED MANAGEMENT

Any corporation relies on IT systems and services to keep its business going. However, the environment to be managed is typically vast and complex, with applications, databases, and middle-tier servers that span the globe. Having administrators deploying, learning, and using multiple, non-integrated complex systems management tools is expensive and confusing. Rather, today’s administrators need a single, efficient tool to simplify managing their global enterprise – they call for Oracle Enterprise Manager.

Immediate Out-of-the-box Value

Configuring many products after an installation can be an arduous task for anyone. Administrators whose valuable time is best spent monitoring and maintaining targets do not want to devote time and effort into installing and configuring their
management tool(s). With Enterprise Manager, value is immediately obtained after installation – out-of-the-box. After installation, the necessary framework components’ processes are started allowing for automatic target discovery, default monitoring for targets, and configuration of email notification. Upon login to the central console, a personal console Home page is presented to each administrator, displaying a consolidated overview of his/her enterprise’s health. Included in the console Home page are availability, alert and job statuses across targets, configuration information for those targets, critical patch advisory information and the ability to drill down into more details in any area shown. This out-of-the-box experience greatly increases the productivity of any new or experienced Enterprise Manager administrator.

![Image](image.png)

**Figure 3:** The Console Home page provides administrators with a consolidated overview of their enterprise’s health.

**Consolidated Management with Target Home pages**

Each managed target has a ‘home page’ that provides a consolidated, at-a-glance view of its health and performance status. Only the most important metrics being measured for the target are displayed on this home page – while further details are available via drilldowns. Showing only the most important metrics up front helps the administrator to quickly isolate and diagnose the root cause of problems facing the target. In addition, target home pages provide administrators with direct access to configuration information and management features as well as quick access to administrative functions. The target home page feature also promotes a consistent
look-and-feel, irrespective of the type of target being monitored and managed, throughout all of Enterprise Manager.

**Management from Anywhere, Anytime**

Critical issues are not limited to the regular 9 to 5 office hours. Problems with a distributed enterprise can happen at anytime. When such an emergency occurs, administrators must be able to respond from home or on the road. Enterprise Manager satisfies this requirement by providing a full-featured, web-based console. An administrator simply needs access to a Web browser in order to manage his global enterprise.

**Applications Modeling**

Because today’s administrators must maintain an ever-growing number of systems and services, they need an efficient and effective way to logically organize their managed systems. By using Groups within Enterprise Manager, administrators are able to consolidate and easily monitor their distributed targets. From a Group’s Home page – whether the Group is based on a homogenous set of targets or modeled after a business’s application – administrators are able to monitor their services easily and reliably; seeing at a glance the Group’s availability and outstanding alerts. Additionally, administrators can define a summary metric for a Group in order to obtain overall performance information for the Group. Hence, when problems occur, administrators can quickly isolate the problems’ root cause with minimal time and effort through intuitive drilldowns.

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**Figure 4:** The Host Home page displays at-a-glance performance and monitoring information to aid administrators in resolving critical problems facing their environment.
Figure 5: Enterprise Manager Groups enable administrators to logically organize distributed targets for efficient and effective management and monitoring.

Administrator Roles and Privileges

System security is a major concern of any corporation. Giving the same level of access to all systems to all administrators is dangerous. Administrators also do not want to perform the tedious task of individually granting access to tens, hundreds, or even thousands of targets to every new member of their group. With Enterprise Manager’s administrator privileges and roles feature, this arduous task can be performed within seconds, instead of hours. By creating roles (roles are a collection of predefined Enterprise Manager target or system privileges) an administrator needs only to assign the appropriate roles to members of his team. These roles can be based upon geographic location (e.g. role for UK administrators to manage UK systems, or for Canadian administrators to manage Canadian systems), line of business (e.g. role for administrators of the human resource systems, or the sales systems), or any other IT model. Granting of such roles and/or privileges guarantees security across all functional areas of Enterprise Manager. That is, if an administrator is restricted to only accessing development databases, then throughout the product, only those development databases on which he’s been granted privileges will be available.
Figure 6: Allowing users to create Enterprise Manager Administrators based on Roles, System Privileges, and/or Target Privileges simplifies the administrator's job.

**Task Automation using the Job System**

The ability to automate maintenance tasks is a critical aspect of efficiently managing sets of systems. The Enterprise Manager job system allows administrators to automate the running of ad hoc or periodic tasks against individual systems or groups of systems. Administrators can use any of the predefined database job tasks (e.g., backup, export, import) or define their own logic using custom OS or SQL scripts. Jobs can be submitted to individual targets or groups of targets. Jobs submitted to a group automatically adapt to any changes in group membership.

For example, if a weekly backup job is defined against the group MAIL-DATABASES, then if a new database is added to this group, it will automatically be part of the weekly backup job.

When a job is submitted to set of targets, the status of all job executions across all targets is automatically rolled up. From these rollups, administrators can easily determine the job executions that have failed and the job executions that have succeeded. Quick links are provided to allow drilldown into details of the failed (or successful) executions. Similarly, job information for individual targets is automatically rolled up in each target home page (including the Group home page) so administrators can easily determine all job activity that is occurring on targets they are managing.

To support cooperative management of jobs, job privileges are available that will allow the job creator to selectively share his job with other administrators. He can choose to grant View access to other administrators who need to see the job’s
output. He can choose to grant Full access to administrators who may need to edit the job definition. Having these different types of privileges allows access to be granted on an as-needed basis.

Jobs that are used frequently can be stored in the Job Library for later re-use. Similar to active jobs, jobs in the library can be selectively shared with other administrators by granting the appropriate privilege to them.

HOLISTIC APPLICATIONS AND SYSTEMS MONITORING

Enterprise Manager provides a multi-dimensional, complementary approach to monitoring. For the first time, administrators have the ability to monitor their e-business systems from the top down and trace the experience of their end-users as they enter and navigate a Web site. Problems in the applications layer often become leading indicators of issues rooted in the technology stack. Systems Monitoring covers the other complementary dimension, i.e., monitoring of the performance and availability of system components that make up the applications' technology stack.

To ensure high availability and performance across all layers of the application stack, Enterprise Manager supports Oracle's 3-step monitoring methodology:

- **Monitor and measure** the performance and availability of your applications and system components
- **Isolate** availability outages and performance bottlenecks throughout the entire infrastructure.
- Employ **rapid problem resolution** tools to minimize downtime.

Enterprise Manager provides the necessary tools to monitor your applications and systems for availability and responsiveness, incorporating in-depth diagnostic capacity to isolate, diagnose, and repair bottlenecks throughout your application stack.

Figure 7: Enterprise Manager provides in-depth management across the e-business platform.
Application Service Level Management

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

Enterprise Manager Application Service Level Management (ASLM) tools present a major shift in system diagnostics and monitoring. Armed with knowledge of end-user response time, administrators are able to proactively monitor and manage their e-business systems from a holistic perspective, anticipating and avoiding performance problems before they occur.

ASLM can be configured out of the box to gather and report status and response times for all servers in the enterprise environment, including non-Oracle servers. Complete integration with the underlying framework of Enterprise Manager provides a consistent and integrated view of the entire enterprise system.

Web Application Availability Monitoring

Administrators recognize how critical availability is to their Web applications, but the rules for what constitutes availability may vary widely from one application to another. Additionally, a Web application can sometimes be available to some users while for others it is not. Using Enterprise Manager, administrators have the flexibility to define application availability for their unique environment.
Because a slowly responding Web site is often as unavailable as one with failed components, administrators can set response thresholds that determine acceptable performance for a production application. All availability criteria are continuously monitored and alert notifications are generated when pre-defined thresholds are exceeded. The information captured and sent via Enterprise Manager’s alert system details the issue affecting availability, allowing faster triage and resolution of outages. Intuitive graphs and status icons are also incorporated into the Enterprise Manager Console, providing a real-time view of Web application availability and responsiveness.

Monitor the End-User Experience

Enterprise Manager collects real-time response data for all end-users as they access the URLs of a Web application or Web site. Visitor tracking ensures that key customers, CEO’s, and all other important visitors are receiving adequate response times. Reports show where traffic originates and how much traffic stems from a particular location, so administrators can quantify the impact of performance problems. This information is invaluable when prioritizing repairs for system problems, empowering administrators to focus on problems having the largest impact while placing less critical issues at a lower priority.

Knowledge of the end-user experience enables administrators to proactively tune their application by anticipating problems and making corrections before their users experience any performance degradation.

Figure 9: Administrators can examine the response times experienced by end-users as they access the URLs of a Web application.
Monitor and Trace Business Transactions

Enterprise Manager proactively monitors critical business transactions to ensure Web applications are performing at all times. Administrators can quickly and intuitively record transactions by launching the transaction recorder and walking through the transaction in a Web browser. Data-driven clicks such as logons and online purchases can be played back and monitored without any additional coding. The recorded transaction is stored in the Enterprise Manager repository and can be deployed from any monitored host, anywhere in your system. Deploying and playing these recorded transactions from different locations enables administrators to measure transaction performance from various user communities in your network. Administrators can proactively detect performance problems in the transaction and immediately know whether it is internal or external to their data center. A monitored transaction is further broken out by the time spent in each phase of its navigation path.

Response thresholds can be defined and assigned to trigger an alert if they are exceeded. Proactively monitoring transactions enables administrators to tune their application by pre-empting problems and making corrections before performance degradation adversely affects users.

![Figure 10: By examining transaction performance as measured from different user communities, administrators can determine if problems are server-related or attributed to the network.](image)

When performance problems are identified, Enterprise Manager’s transaction tracing functionality provides a hop-by-hop blueprint of the traversal path and responsiveness of online transactions. The tracing functionality provides an on-demand tool that lets administrators examine in detail all invocation paths of a transaction, and isolate the exact tier and location of a problem. All invocation paths of a transaction are traced and hierarchically broken down by servlet/JSP,
EJB, JDBC/SQL times. Further drill-downs into each component identify response time breakouts by invocation path. Click-to-SQL drill-downs allow administrators to navigate down from a transaction view and examine the underlying SQL statements. If for example, performance degradation is identified at the SQL statement level, administrators can easily navigate to Enterprise Manager’s comprehensive database management tools to quickly resolve the problem all within a single management solution. In addition, administrators can run the trace facility following the resolution of a problem to reassure them that the situation has been satisfactorily remedied.

**Trace Results - Component Details**

<table>
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<tr>
<th>Inversion Path</th>
<th>Method</th>
<th>Total Time</th>
<th>SQL Execution Time</th>
<th>Error Time</th>
<th>Error Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>selectippiD from TOPIC where (error = 7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>157</td>
<td>7</td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>152</td>
<td>7</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 11:** The Interactive Transaction Trace functionality shows every invocation path traversed by the transaction down to the SQL statement level

**Analyze Middle Tier Page Performance**

Enterprise Manager’s middle tier page performance diagnostics are instrumental to the application server and back-end problem diagnosis process. Web application content in the middle tier is broken out into servlet, JSP, JDBC, and EJB method processing times per URL accessed. Slowest URL processing times and their total number of hits are highlighted so that administrators can easily recognize where problem resolution efforts should be prioritized. Application administrators need to know how their middle tier components are performing, including the top JSPs, and servlets by processing time and request rates so that they can accurately identify how these components are affecting overall response times.

URL processing time and load activity graphs provide administrators with information on the impact of server activity on response times. Analyzing the middle tier at the subcomponent level allows administrators to make informed and accurate decisions to tune or repair the appropriate elements of a Web application. Easy to read graphs of URL processing times by OC4J subsystem allow administrators to quickly assess where the most time is spent. Further drill-downs bring administrators directly to in-depth URL processing call stack details. For
faster problem resolution, administrators can refer to an advice window for repair and tuning suggestions.

Figure 12: Middle tier URL processing time, load, and detailed call stack breakouts let administrators effectively tune and repair application performance bottlenecks.

**Correlate Application Performance**

Application performance degradation can often be the cause of one or more factors residing in different Web application components. Correlation can help administrators rapidly pinpoint these factors and components causing performance bottlenecks. Enterprise Manager presents component resource utilization, response times, load and availability in a single view so that administrators can easily compare and isolate factors that have contributed to performance bottlenecks.

Enterprise Manager provides correlation of CPU utilization, memory, and I/O usage of all Web application components to help administrators determine where resources are constrained. The application performance correlation feature helps administrators understand the load supported and response times delivered by all monitored Web application components. The availability of all application components including the database, HTTP Server, Host, OC4J, and Web cache are presented in the same view so that administrators can immediately identify the offending component in the event of an outage or if a URL cannot be processed.

Graphical views of correlated metrics provide for an at-a-glance view of the performance of all Web application components. Selecting a time slice on one graph automatically highlights the same time period for all graphs, thus allowing for an easy correlation view.
Figure 13: Component resource utilization, response, load, and availability correlation helps administrators determine factors affecting performance.

**Monitor Your Extended Network and Critical URLs**

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

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

**Systems Monitoring**

Enterprise Manager complements applications monitoring with complete, in-depth monitoring of each component that make the application’s technology stack. Because monitoring is inherently built into the Enterprise Manager architecture, the monitoring features described in this section apply to each layer of the technology stack – from base System Components to User-defined Groups to end-user Business Applications that work on top of the technology stack.

**Proactive Monitoring of the entire Oracle Platform**

Enterprise Manager provides proactive, unattended monitoring of the complete Oracle platform. A comprehensive set of performance and health metrics provide monitoring of each component (and subcomponent) of the Oracle stack – business
applications, application server, database --- as well as the backend components on which they rely – hosts and operating systems.

The Agent on each monitored host monitors the status, health and performance of all targets on that host. If the target goes down, or if a performance metric crosses a warning or critical threshold, an alert is generated and sent to the Enterprise Manager console and to administrators who have registered interest in receiving such notifications.

**Out-of-the-box Monitoring**

Out-of-the-box monitoring simplifies a critical but potentially time-consuming administrator task of setting up monitoring for managed targets. As targets are added to Enterprise Manager, the target is automatically monitored at Oracle recommended settings. This means the target will be monitored using an Oracle recommended set of metrics and thresholds. Novice administrators can simply rely on these Oracle-recommendations, and more experienced administrators continue to have the flexibility of later fine-tuning these thresholds to suit their particular environments. All monitored metrics are also stored and aggregated in the repository to allow administrators to perform trend analysis later on.

**System Availability Monitoring**

Maximizing availability is one of the most important goals in managing any target. Enterprise Manager proactively monitors the availability of every target it manages, and allows administrators to be notified if the target goes down, if the target is ‘black out’ for scheduled maintenance, or even if its current status cannot be determined due to network outages.

Coupled with these proactive notifications are availability status reports that are accessible via the HTML console. For each monitored target, EM provides a consolidated availability summary that shows its current and past availability status within the last 24 hours, 7 days, or month (31 days). This simple and concise report provides critical information to administrators who are responsible for day-to-day target availability, and for upper management to determine if they are meeting SLA goals.
Administrators often want thresholds for performance metrics to be based on deviations from real target performance instead of absolute numbers. For example, if for a given day, performance for a database was acceptable, and that database was running under normal workload, then administrators might want to define thresholds such that they are notified only when database performance becomes 10% worse than that given day. Such thresholds can be defined using Metric Baselines.

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

In the Enterprise Manager console, an administrator defines a metric baseline by first specifying a date in the past that will be used as the performance ‘norm’. Next he specifies percentage values from the metric baseline that represent the points at which performance becomes a problem at a warning, then more critical level. These percentages are then calculated into specific warning and critical threshold values for the performance metrics.

As an example, if the database supporting the financial system had good performance on July 1, 2002, an administrator could use July 1, 2002 to set up the metric baseline for the financial database. Next he specifies 10% and 20% as warning and critical percentages respectively. Enterprise Manager then calculates
values that are 10% and 20% ‘worse’ than the baseline data, and provides these calculated values as the warning and critical thresholds for the databases’ performance metrics. The administrator can review or edit the calculated values, then apply them as thresholds for the target. When any performance metric crosses its threshold, an alert is generated.

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

Figure 15: Using metric baselines to calculate thresholds

Notifications

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

Enterprise Manager supports these various notification mechanisms via Notification Methods. A Notification Method is used to specify the particulars associated with a particular notification mechanism, e.g. which SMTP gateway(s) to use for email, which OS script to run to log trouble-tickets, etc.
Administrators perform a one-time setup of the various types of Notification Methods available for use. Once defined, other administrators can create Notification Rules that specify ‘when’ and ‘how’ notifications should be sent. The ‘when’ involves specifying the targets, its metrics and severities for which notifications should be sent. The ‘how’ involves specifying which Notification Method(s) to use. For example, you can set up a rule that sends email when CPU Utilization is at a critical 90%, or another rule that creates a trouble-ticket when a database is unavailable.

Notifications are not limited to alerting administrators. Notification Methods can be defined to run any custom OS script or PLSQL procedure, and thus can be used to automate any type of response to an alert. For example, administrators can define methods that call into a trouble ticketing system, invoke third party API’s to share alert information with other monitoring systems, or even log a bug against a product.

**Customizing Notifications**

Notifications that are sent to Administrators can be customized based on message type and work schedule.

Message customization is useful for administrators who rely on both email and page systems as a means for receiving notifications. The message formats for these systems typically vary – messages sent to email can be lengthy and can contain URLs and messages sent to a pager are brief and limited to a finite number of characters. To support these types of mechanisms, Enterprise Manager allows administrators to associate a long or short message format with each email address. Email addresses that are used to send ‘regular’ emails can be associated with the ‘long’ format; email addresses that are used to send pages can be associated with the ‘short’ format. The ‘long’ format contains full details about the alert; the ‘short’ format contains the most critical pieces of information.

Notifications can also be customized based on an Administrator’s work schedule. As a simple example, an administrator can have a 2-week rotation schedule where he is accessible via his work email address from 9-6 during the week, and accessible via his email-to-page address on the weekends. In reality, administrators’ schedules can be more complicated and can vary from one week to the next. To support various types of schedules, Enterprise Manager allows administrators to define a repeating schedule whose definition can span from 1 to 8 weeks. A notification schedule is essentially a template for specifying conditions like “for my 3 week rotation, contact me via my work address during the first two weeks, contact me via my pager on the third week”. For each hour of the day in the schedule, administrators specify whether or not they should be notified and if so, how they should be notified (i.e. which email address to use for notifications). All alerts that are sent to an administrator automatically adhere to his specified schedule.
Real time Monitoring and Historical Data Analysis

Each target home page in Enterprise Manager provides access to both real-time as well as historical status and performance data for that target. Real time data displays current values of key performance metrics and shows how they compare against acceptable thresholds. Administrators who prefer to keep a constant eye on performance can choose to enable auto-refreshing of performance data at user-specified intervals.

Performance and availability data for each target are automatically collected and aggregated over time. When alert details are shown, they are displayed in context of the metric’s historical values over time. Administrators can examine this historical data to watch for trends where problems have occurred. They can also correlate a target’s metric data with its past historical averages or even compare its values with other targets. Measurement against past performance or against other targets provides a powerful tool in diagnosing whether or not a problem is isolated in time or space. For example, if the CPU Utilization on host PROD1 seems unusually high, the administrator might want to compare it against its average to see if what he is observing is a spike or a more serious problem. He might further want to compare it against the CPU utilization of other hosts that support the same application, to determine if some load balancing of work is needed across multiple hosts.

Figure 16: Comparing CPU Utilization between 2 hosts

Performance Diagnosis with Diagnostic Drilldowns

Each monitored target has a home page that provides consolidated performance and availability information for that target. If the target consists of other components, its home page will provide the rolled-up view of the status and
performance of the target as a whole, and include aggregate performance of each component.

For example, the home page for an Oracle Application Server instance provides a rolled-up view of the performance of the application server instance, including the aggregate performance of each component in the instance. Administrators can easily identify components that may require diagnostic investigation and drill down into those components for more detailed performance information, such as deployed applications. The OC4J Home Page presents a roll-up of status and performance metrics for the container and its applications, including:

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

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

**Advice-driven responses to alerts**

When an alert is generated to notify administrators of availability or performance problems, administrators can check the Enterprise Manager console for more information about the metric that triggered the alert. This includes information on the metric’s historical values that might show trends over the past week or month, and online help that provides advice on what the administrator can do to fix or further diagnose the problem. For example, if an alert is sent reporting ‘3 segments in the USERS tablespace are unable to extend’, then an administrator can consult the online help which would suggest that he look into increasing the value of the segment’s MAXEXTENTS storage parameter, or rebuild the segment with a larger extent size.

**Automated responses to alerts**

If a response to an alert can be automated, Enterprise Manager allows administrators to set this up by specifying Response Actions for the appropriate metric. Automated responses come in the form of scripts that are automatically run by the Agent when a monitored metric crosses its threshold. For example, if a disk becomes 80% full, an automated response might be to run a script that clears out space in the temp directory. Each monitored (performance and availability) metric can be assigned its own automated response action. Administrators need
only specify the script once, and let Enterprise Manager respond to it automatically at the appropriate time.

**User-Defined Metrics**

User-Defined Metrics allow administrators to extend the reach of Enterprise Manager’s monitoring to conditions specific to their particular environments. Specifically, if an administrator wants to monitor a particular condition (e.g., check successful completion of monthly system maintenance routines), he can write a custom script that will monitor that condition, then create a user-defined metric that will use his custom script. Each time the metric is evaluated by Enterprise Manager, it will use the script specified by the administrator, relying on that script to return the value of the condition. Once a user-defined metric is defined, all other monitoring features – threshold-based alerting, proactive notifications, historical collections, seamless integration with the console, etc – are automatically available to it. Administrators that already have their own library of custom monitoring scripts can leverage these monitoring features by integrating their scripts as user-defined metrics in Enterprise Manager. Thus, monitoring can be consolidated and simplified by relying on Enterprise Manager as the single monitoring solution for their enterprise.

**Blackouts**

Blackouts allow the suspension of target monitoring to allow administrators to schedule in maintenance periods for these targets. Blacking out a target prevents
unnecessary alerts from being sent when the target is purposely brought down for maintenance. Administrators who strive to meet SLA goals can use blackouts to ensure that scheduled down periods are not calculated as true down time when computing overall target availability.

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

Blackout functionality is available from both the console UI as well as via the Agent’s command-line interface (CLI). The CLI is often useful for administrators who would like to incorporate the blacking out of a target within their maintenance scripts.

Figure 18: Blackouts suspend monitoring to accommodate scheduled maintenance periods.
COMPREHENSIVE DATABASE MANAGEMENT

Enterprise Manager is the premier database management tool for Oracle databases. Database management with Enterprise Manager offers

- The most integrated and complete feature set for managing Oracle databases
- Unparalleled scalability for managing 1,000s of instances
- Industry-leading ease of deployment and use

Database Homepage as the Management Hub

Enterprise Manager’s new Database home page gives the user a comprehensive summary of all relevant instance information on a single screen:

- Current instance availability
- Outstanding alerts
- Session and SQL-related performance information
- Key space usage metrics
- Instance name, database version, Oracle Home location and other pertinent instance data

Additional details are intuitively accessible via drill-downs from the Database home page.
Integrated Performance Management

Database performance management in real-time assumes a central role in Enterprise Manager. The Database Performance page is only a mouse-click away from the home page. Here, the user can quickly see real-time and historical performance graphs for both the database and the underlying host.

The Performance page has three main areas:

Host – Displays the run queue length and paging rate of the host system that the database is running on.
Active Sessions: Waiting and Working – Shows the sessions that are waiting, e.g. for I/O, or for the network, or due to concurrency issues, and the sessions that are using the CPU.

Instance Throughput – Shows transactions and logons per second, and redo size and physical reads per second.

Each of these areas can be drilled for further detail. For example, if the Active Sessions graph shows that there is a concurrency problem, a drill-down might reveal that the specific problem is due to buffer busy waits. The drill-down also shows the top SQL statements and top sessions by wait count. Thus it becomes possible to identify the session and exact SQL statement that are causing the problem.

Figure 18: The Performance page shows real-time and historical performance graphs for both the database and the host.
Managing Multiple Databases

Database Administrators who are responsible for a large number of database instances appreciate the powerful new group management capabilities of Enterprise Manager. Multiple instances – e.g. all production databases – can be collected into a group and efficiently monitored on a single screen. The Database Group page helps to quickly identify those databases that are down, most bottlenecked or have the most severe alert status. In addition, users get key availability and performance data on all members of the group with hyperlinks for further drilldown. The Database Group page alleviates the need for cumbersome navigation between multiple instances and prevents performance degradation trends from going unnoticed.

Enhancing DBA Productivity

Enterprise Manager significantly improves DBA productivity through automating many time-consuming and difficult tasks that would typically require the attention of the most senior DBAs.
Policy Violations – Enterprise Manager automatically compares the configuration settings of all managed database instances against a set of Oracle-recommended settings in areas such as parameter usage, space management, availability, security, and new features. For example, instances with an insufficient number of control file copies are flagged for further review. This automatic configuration check cuts down on manual audits and improves system availability and uniformity.

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

Complete Database Management Solution
Due to space constraints, the wide-ranging database management capabilities of Enterprise Manager cannot be exhaustively discussed in this document. Enterprise Manager offers powerful features for managing

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

In summary, Enterprise Manager is the only tool needed to manage all aspects of the Oracle database.

APPLICATION SERVER MANAGEMENT
Oracle Enterprise Manager provides “out-of-box” management for the Oracle Application Server. Oracle Application Server systems are automatically discovered and monitored by Enterprise Manager. The central console provides consolidated management and monitoring of Oracle Application Servers, including:

- Central view of status and performance for distributed Oracle Application Servers.
- Support for monitoring all Oracle Application Server components: J2EE & Web Cache, Portal, Security, Integration, Business Intelligence and so forth.
- Extensive repository of Oracle Application Server performance data for historical analysis and monitoring trends.
- Pre-set monitoring, performance thresholds and data collection for immediate out-of-box value.
− Autonomous, automated performance warning and alert notifications.
− J2EE application diagnostic drilldowns.
− Web application transaction performance and tracing, and client response time monitoring.
− Home pages for application server and components, which provide rolled-up status and performance.
− Links to perform Oracle Application Server administration tasks using Application Server Control.

**Application Server Home Page**

The central console provides an Application Server home page for easy access to the key information required by application server administrators:

− Application server status and performance.
− A single view of all J2EE applications and web services.
− Resource usage and responsiveness.
− Alerts and diagnostic drilldowns.
− Links to Oracle Application Server component home pages.
− Links to pages for Oracle Application Server administration operations such as modifying configurations and deploying applications.
Figure 22: The Central Application Server Home Page provides easy access to all of the information and operations required to manage the application server.

Application Server Monitoring and Alerts

Enterprise Manager automatically gathers and evaluates diagnostic information from Oracle Application Server systems distributed across the enterprise. As with all services managed by Enterprise Manager, an extensive array of Oracle Application Server performance metrics are automatically monitored against pre-defined thresholds and alerts are generated when metrics exceed these thresholds. Examples of automated Oracle Application Server monitoring include:

- Excessive CPU or memory consumption by the application server, including detailed granular monitoring of individual JVMs being run by the server’s OC4J J2EE containers.
- J2EE application responsiveness monitored from the application down through individual servlets and EJBs.
- HTTP Server session volumes, connection duration and error rates.
- Web Cache hit rates and volumes.

When an Oracle Application Server alert notification is received, Enterprise Manager makes it easy to investigate the problem. For example, notification of excessive CPU consumption by an OC4J server may lead to investigation of the applications running in that container. The highest volume and/or least responsive
application can quickly be identified and the performance application’s servlets, JSPs and EJBs can be immediately diagnosed to pinpoint the bottleneck.

**Application Server Diagnostics**

In addition to automated monitoring, Enterprise Manager provides the application server administrator with easy access to flexible diagnostic data in the form of “top” reports, such as the top servlets or EJBs. These diagnostic reports can be generated based on a variety of criteria, for example, identifying the top servlets by response time or session activity.

As with all Enterprise Manager diagnostics, the Oracle Application Server diagnostic reports can be based on current or historical data. Oracle Application Server metrics are collected and stored in the Enterprise Manager repository, allowing analysis to occur well after the situation has changed. For example, an application performance problem that occurred days or even weeks ago can be quickly researched using historical data and diagnostic reports.

The historical data maintained by Enterprise Manager allows administrators to track performance trends and compare data across other Oracle Application Server systems. For example, an Oracle Application Server administrator may investigate the following sequence: What’s the average request processing time for OC4J server #1 at this moment? How did it do over the past twenty-four hours? How
does that performance trend compare to OC4J server #2? Logical diagnostic processes such as this are easily performed using Enterprise Manager.

*Figure 24: Enterprise Manager provides historical performance data trending and comparison for application server diagnostics.*

**Application Server Administration**

In addition to the central console support for application server monitoring and diagnostics, Enterprise Manager provides a console for performing application server administration tasks, known as the Oracle Enterprise Manager Application Server Control.

The Application Server Control is installed with Oracle Application Server 10g to provide out-of-box administration. This administration console is also integrated with the central console to provide a direct link to management task for the centrally monitored application servers.
Figure 25: Oracle Enterprise Manager Application Server Control provides a single interface for application server administration.

Oracle Enterprise Manager Application Server Control is the single interface for administering the entire Oracle Application Server platform: J2EE, Portal and Wireless and Business Intelligence components. The Application Server Control is used for the following types of operations:

- Starting and stopping application servers and components.
- Enabling and disabling application server components
- Modifying server configurations.
- Creating and configuring J2EE resources.
- Deploying and monitoring J2EE applications.
- Examining application server logs.

Unified Management Operations

The Application Server Control consolidates and simplifies common operations across application server components, such as ports administration and monitoring diagnostic logs.

Central Ports Administration

The Application Server Control Ports Table consolidates information on the various ports that have been configured across all of the components in an application server installation and provides links to the Enterprise Manager pages...
where the port configurations can be modified. The Ports page provides helpful information for configuring ports and understanding the dependencies between port settings across components.

**Figure 26: The Application Server Control provides a single view of all application server ports.**

**Central Log Viewing**

The Application Server Control’s Log Viewer simplifies the process of locating and viewing Oracle Application Server log information. This includes the diagnostic logs produced by OC4J, Web Cache, HTTP Server, and OracleAS Portal. A single HTML interface provides a list of the discovered logs, any of which can be viewed and searched directly.
Figure 27: The Oracle Application Server Control Log Viewer simplifies locating and viewing server logs for all application server components.

In addition to viewing Oracle application Server log files; the Log Viewer can also be used with another feature, the Log Loader - Repository. The Log Loader builds a repository of log entries for major Oracle Application Server components, which can be queried from the Log Viewer for quick access to operational and diagnostic information.

J2EE Administration

The Application Server Control provides complete support for configuring and managing Oracle Application Server OC4J J2EE services:

- Adding and configuring OC4J containers.
- Managing J2EE resources, such as data sources and application security.
- Deploying and monitoring J2EE and Web Services applications.

Simplified Application Deployment

J2EE applications are developed using java development tools such as Jdeveloper. During this process the application is bundled into an EAR file and is ready for deployment to the J2EE container. The Application Server Control provides a wizard that walks the administrator through the process of deploying a J2EE application to the OC4J container. Deployment involves the following tasks:
– Mapping URL paths required by the application's web modules to URLs defined in the OC4J web site configuration file.

– Mapping data sources referenced in the application to resources defined for the OC4J container. This also includes defining a data source to track session state for EJB applications that use container managed persistence.

– Selecting a user manager for the application.

The deployment wizard simplifies the process by identifying the operations required for the specific application being deployed and guiding the deployer through the process.

Enhanced OC4J Administration

For Oracle Application Server 10g, several enhancements have been added to the console's OC4J administration functionality:

• All applications deployed to the Oracle Application Server home across multiple OC4J containers can be viewed from a single console page.

• Java Messaging Services (JMS) providers can be configured and managed from the console.

• Message Driven Beans can be configured and monitored from the console.

• The console includes a new “create-like” feature that provides the ability to create new data sources based upon an existing configured data source.

Enhanced Web Cache Monitoring

The Application Server Control’s Web Cache monitoring pages provide a consolidated roll-up of metrics for all source-Web servers used by the Web Cache. For Oracle Application Server 10g, this diagnostic information has been enhanced to provide a breakdown of Web Cache performance metrics for each contributing Web server.

Web Cache monitoring is also enhanced to provide information on popular web documents that are not currently being cached. This provides the administrator with valuable information that can be used to tune the Web Cache rules to allow these popular documents to cache for faster access.

Cluster Management

Enterprise Manager provides a single point for configuring and managing Oracle Application Server clusters. An Oracle Application Server installation can be managed as a single instance or grouped with other instances for centralized management. Clusters provide a central point for managing multiple Oracle Application Server instances that collectively host a common set of OC4J applications.

The Application Server Control is used to create and manage clusters. Configuration settings that are common across the cluster can be modified once for all instances in the cluster. Applications can be deployed across a cluster in a single
action. The Oracle Application Server Cluster Home Page can also be used to check the status of a cluster and to start or stop all instances in cluster.

**Summary—Application Server Management**

Oracle Enterprise Manager provides a central point for monitoring and managing Oracle Application Server. The central console is used for centrally monitoring distributed application servers, databases, host systems and applications. The Application Server Control provides a single point for performing Oracle Application Server administration tasks, without the central console. Both consoles provide an integrated solution for monitoring and administering the application servers across the entire enterprise.

**VALUE-ADDED REPORTING**

With the coming of the Information Age there has been quite an influx of data available to users. While many applications simply present users with a vast amount of raw data, Enterprise Manager turns this sometimes confusing and bewildering amount of data into useful, coherent information via the reporting views within the management repository. The reporting views are objects within the EM repository which can be accessed by any standard reporting platform. Products such as Oracle Portal, Oracle Discoverer, and other third-party tools can now access this data directly from the repository for service level reporting, executive summaries, and other reporting needs.

**Customized User Interfaces via reporting views**

Through the repository reporting views administrators can quickly assemble custom pages that fit their business and support needs. They also can create different, custom pages based on their audience – CEO, IT professionals, or end users. The following is an example of what can be done using a product such as Oracle Portal. With access to this type of information, administrators enable executives to make mission critical decisions about their systems in real time.
Figure 28: Oracle Management Portlets allow administrators to create custom Portal pages based upon data stored in the Management Repository.

Service Level Reporting

The ability to monitor and report on service levels is crucial to any e-business, because performance and availability is everything. It offers internal IT organizations a proof point as to how they meet agreed upon service levels defined by their users, as well as indicating any service that adversely impacts system availability. This capability is even more critical to Application Service Providers (ASP) who, through service level agreements, are bound to provide certain service levels. Enterprise Manager provides a mechanism for monitoring and comparing actual service levels against predefined, required levels so administrators, executives, and end users alike can ensure that proper service levels are being maintained at all times.

ENTERPRISE CONFIGURATION MANAGEMENT

Tracking hardware and software configurations, cloning software or applying patches are some of the more difficult and time-consuming tasks database and system administrators face on a regular basis. Being able to quickly and accurately view a snapshot of server configurations, operating systems, and software installed across an enterprise from a single console is key to making solid business decisions regarding changes to existing software configurations and upgrades of hardware and software. Ready access to this information allows administrators to easily determine what changes must be made and implement those changes quickly and accurately.

Enterprise Manager provides a comprehensive solution for tracking hardware and software changes. Using Enterprise Manager, administrators can capture and store hardware and software information for servers deployed across their enterprise.
Once data is collected, system administrators can perform critical configuration management operations based on the collected information.

**Automated Collection of System Data**

Enterprise Manager collects configuration information for all designated hosts as well as their operating systems and installed Oracle software across a user's enterprise. This robust, comprehensive data store is the foundation of Enterprise Manager's configuration management system, providing administrators with the ability to report on what configurations are in place in their enterprise, identify hardware and software configuration differences between hosts, track changes to systems and perform numerous important configuration management tasks.

By default, data is collected every day. In addition, users may refresh this data at any time with the click of a button. This allows for real-time monitoring of changes occurring and also provides for historical tracking of changes across an enterprise.

**Reporting Collected Data**

System administrators often struggle to track hardware and software installed within their company. At times, they may resort to homegrown solutions in an attempt to track the systems they are responsible for maintaining. Enterprise Manager displays the system data in a simple, easy-to-read format that administrators can drill down on for more detail, making the need for homegrown systems a thing of the past.

![Figure 22: At a glance, administrators can view configuration information for Hosts, Operating Systems and Oracle Software.](image)

**Query and Analysis of Collected Data**

In addition to knowing what software is installed on what hosts across the enterprise, it is frequently important to determine the specific software and
configuration differences between two or more systems. Enterprise Manager provides tools for comparing systems enterprise-wide at great detail, allowing an administrator to quickly and easily pinpoint any potential differences. This helps to keep systems synchronized and reduces "configuration drift". It also simplifies investigations into why systems that are presumed to be identical may behave differently.

Figure 23: Administrators can quickly compare hardware, operating system and software installations across an enterprise.

In addition to comparing collected data, Enterprise Manager provides several out of box queries allowing administrators to quickly research system configuration details, such as

- Which servers have a particular version of the Oracle Database installed
- Which Oracle installation are missing a particular patch or patch set
- Which Oracle Databases have a specific initialization parameter setting
- Which hosts have a specific OS patch applied
- Which databases are using a particular feature (Oracle 10g only)

Saved Host Configurations

Administrators often need to build new systems that are similarly configured to an existing system. One way to do this is to take a "snapshot" of an existing system, which can then be used as a blueprint for creation of new systems. Enterprise Manager fully supports this process of capturing, storing and analyzing system configuration information.
**Historical Change Tracking**

Administrators sometimes are faced with a situation where a system that once worked well is suddenly not performing at an acceptable level. Did someone make a change to a configuration parameter? Apply an Operating System patch? Remove memory? Trying to determine the exact change responsible for the decrease in system performance could take hours if the administrator had to go through each of the possible scenarios by hand. Enterprise Manager makes it simple by tracking all changes to hardware and software installations and configurations. This makes it quick and easy for the administrator to view changes that have been made since the last time the machine was functioning appropriately, and apply the appropriate solution to get the system back up to an acceptable level.

**Patching**

Enterprise Manager provides administrators with tools to quickly query for patches available for Oracle products installed across their enterprise. Patches can be found either in the context of a specific target or, if desired, the administrator can query for a specific patch. Once the necessary patch is located, Enterprise Manager can download it from Oracle MetaLink and stage it to the appropriate target hosts. Optionally, Enterprise Manager can execute an end-user provided script to install the patch. Each of these steps allows for easier and more timely application of patches across the customer’s enterprise.
Enterprise Manager allows administrators to search for patches within the context of a specific host.

Using Enterprise Manager to find, download, stage and apply patches increases administrator productivity by automating the routine low value-add aspects of patch management. This allows administrators more time to conduct patch impact assessments and proactive system management work.

**Cloning an Oracle Home**

Duplicating software installations for development or QA purposes is a routine task in many data centers. For Oracle software, such installation cloning has become a lot easier with Enterprise Manager. Enterprise Manager’s cloning wizard automates the duplication of database and application server installations (specifically, the directories where the corresponding Oracle homes reside). Thanks to its “multicasting” capability even multiple clones on multiple target hosts can easily be created in a single operation. Enterprise Manager home cloning is intelligent: host names, IP addresses and other environment dependent settings are automatically adjusted for the newly cloned homes. With Enterprise Manager, cumbersome cloning via homegrown scripts may well be a thing of the past.
EXTENSIBILITY

Most enterprise environments include custom applications that require the same level of management provided by Enterprise Manager, leveraging the same valuable management infrastructure such as event monitoring, real time diagnostics, and service level reporting. The Zero-barrier to entry extensibility allows you to extend the reach of Enterprise Manager to hardware and software modules for immediate monitoring from within Enterprise Manager.

Immediate monitoring for custom targets

The extensibility features of Enterprise Manager, allow you to define and begin collecting metrics in under an hour. Further extension of Enterprise Manager (at the Management Repository level), while providing increased value, exacts a much higher cost. It enables you to:

- Easily add custom targets and have the standard Enterprise Manager capabilities like real-time monitoring and historical analysis, automatically apply to those custom targets. This is the first and easiest step in extending Enterprise Manager.

- Obtain pertinent management information at the right grain and density for a wide variety of users, through predefined repository views. Access through these interfaces follows the same roles and security mechanisms that have been defined for the repository user.

- Extend the display capabilities of Enterprise Manager to your custom targets by creating custom homepages.

- Improve the system management workflow by providing access to Oracle management content from external applications.

- Easily customize the data views for your audience – CEO, IT professional, or end-user by using Oracle Management Portlets. The following are just a few of the many Management Portlets available: Outstanding Alerts, Metric Details, and Executive Summary. These views into the management and monitoring are at appropriate level of detail for executives to make mission critical decisions quickly.

Integration Points

Integration points to the Enterprise Manager framework are published via a published SDK (Software Development Kit). The SDK allows you to define and instrument your own custom targets and metrics such that they can be administered and monitored by the new framework in a plug-and-play fashion. Using the SDK you can add or change the set of metrics that are being monitored in real-time and stored in the diagnostic repository. Diagnostic information that is changed at the
The managed target will only need minimal configuration at the repository or the client-interface level before the information is usable by the end user.

The SDK is broadly comprised of three components: The Agent, Repository and the Console. As an integrator into Enterprise Manager, your primary points of integration are with the Agent and the Console. The integration begins at the agent level where you create a definition of the target you want integrated in Enterprise Manager. The repository is designed to be a generic data store and has no knowledge of its data and thus does not need any customizations for new targets being integrated into Enterprise Manager. However Enterprise Manager provides repository APIs so you can write custom UIs or slice and dice the repository data using your favorite tools. You can either take advantage of the default UI provided by the Enterprise Manager Console or create a custom target overview screen that can be integrated into the Enterprise Manager Console. The former can be achieved with no work on the integrator’s part, while the latter requires custom development using the SDK.

The Agent’s metric engine supports data-driven and procedural discovery mechanisms. The data driven mechanism specifies targets on the system using the XML format. Each discovered target instance has a name, type and values for optional named properties. The agent ships with “Fetchlets” that handle the data retrieval. A fetchlet is a parameterized data access mechanism that takes some arguments for input and returns formatted data. A fetchlet is provided with each of the most common data access mechanisms, such as SQL, SNMP, HTTP and DMS. There is also an OS fetchlet and a Java Wrapper Fetchlet for metrics that are more complicated to collect. As an integrator, you simply need to identify the fetchlet that best suits your needs and provide the command and the arguments that will fetch the desired values.

You may then use the public interface to the management data, to write your own reports and present information to users in whatever way makes sense for them. The repository is open by design and is customizable to allow you to add different functionality like your own custom rollups, custom events etc., to the schema. The console also allows you to create a custom homepage for your target and automatically extend the display capabilities of Enterprise Manager to your target. You may also plug in administration components in addition to monitoring components that are based off the data collected in the Repository. The administration components could directly connect to the targets to control them or go via the Agent to effect changes on the managed target.

**EM2GO 10g MOBILE GRID CONTROL**

As an IT executive you are continuously faced with enormous pressures to keep up with the increasing pace of technology change and deliver 100% uptime. Not only do you have to manage more with less but also have to juggle with the ever-
increasing lifestyle demands such as flexible working. EM2Go is the mobile component of Enterprise Manager and enables connectivity of your administrator’s to your enterprise to manage anytime, anyplace, anywhere.

**Continuous Service Availability**

Mobile enables the transmission and use of time-sensitive information whose value is inherent in its immediate delivery. For a 24x7 critical system, information transmitted too late can incur significant costs. EM2Go bridges this requirement by enabling critical information to reach administrators 24x7, so they can take immediate action without the necessity of being in the close proximity of the office. EM2Go extends the reach of the user to access systems at their convenience.

**Immediate Out-of-Box Value**

Getting started with EM2Go could not be easier. It follows the same out-of-box principals as Enterprise Manager. In fact there is no additional configuration as EM2Go leverages the existing Enterprise Manager architecture providing an integrated solution, without the need to create an additional infrastructure to maintain for wireless connectivity to your managed environment. EM2Go enables the administrator to access the existing enterprise manager functionality over wireless devices.
Ease Of Use

EM2Go provides a very intuitive interface that makes enterprise management like clicking on a set of web links from your PDA. Performance forms a special place as ease of use not only results from the layout but also from how quickly one is able to reach the desired information. EM2Go has been designed following the same user interface standards as Enterprise Manager ensuring that the end user experience is identical.

Notifications ‘On the Move’

Imagine as an administrator you are away from the office on a weeks training course. Using the notification functionality of Enterprise Manager an administrator can schedule notifications to be sent via email or SMS to his PDA.

For example the administrator receives an email notification that the Tablespace Full metric has triggered. The administrator logs in to the EM2Go Console to view the alert details. Before solving the problem the administrator can use the host information to check the file system space available. EM2Go can then be used to increase the size of the tablespace by enabling automatic extension of one of it’s data files, manually resizing one of it’s datafiles or adding a new datafile.

Ad hoc SQL and OS Queries

There are occasions when an administrator would like to do quick database queries or OS commands. EM2Go provides a tool exactly for this purpose allowing the administrator to enter and execute SQL/OS commands dynamically. For example an alert from the CPU Utilization for Top Processes % metric has been received via mobile email. The administrator uses ‘Execute OS Commands’ tool to check the load on the system using the UNIX uptime, top or ps –ef commands.

Mobile Security

System security is a major concern of any corporation even more so when it comes to using wireless devices to access corporate data. Wireless is a relatively new technology and therefore security is of utmost concern.
Em2Go offers a highly secure and scalable enterprise management solution as it leverages the security features offered by Enterprise Manager. So not only does it utilize HTTPS communications but also the underlying user security model of administrator privileges and roles. When an administrator connects his browser to the EM2Go URL a login prompt is issued to enter his Enterprise Manager preferred credentials. He will then only see the targets to which he’s been granted privileges. A lost or stolen device is also a security risk, for this purpose no enterprise data is stored on the device itself.

Mobile Administration and Performance Monitoring

EM2Go has a subset of Enterprise Manager functionality specific to the needs of a mobile administrator. EM2Go wireless-enables the following services already offered by Oracle Enterprise Manager 10g:

- Administer database operations on instances, control files, tablespaces, datafiles, rollback segments and redo
- Monitor Health Overview of the Database instance and listener
- View Storage information about tablespaces, datafiles
- Manage lock features – User Locks, Blocking Locks
- Monitor Performance to gauge activity trends for CPU, memory and disk I/O for both the database and the underlying host
- Identify Top Resource Consumers, Top SQL drilldown to SQL Text, statistics and assessment details, Top Processes
- Oracle Top Session features - Detailed session management i.e. Query on the Active & Inactive Sessions, Terminating User Sessions
- Execute SQL & OS commands
- View Alert Log content
- Determine job activity - view details about jobs including the job parameters and their values
- Host configuration details – OS parameters, swap space, CPU’s, memory, file system details
- Web Application Monitoring – transaction alerts, beacons, availability
- Application Server Monitoring – availability and performance metrics
CONCLUSION

In order to effectively compete in today’s world, businesses set high demands on their management tool(s). Simply stated, they need one tool that can satisfy the following requirements:

- Offer 24x7 availability of its management infrastructure
- Scale to global deployments
- Provide simplified management out-of-the-box
- Offer comprehensive applications and systems monitoring
- Allow for customized reporting
- Help manage target configurations
- Easily extend to satisfy unique business needs
Oracle Enterprise Manager 10g offers a single, integrated, robust solution for meeting these critical needs. Enterprise Manager is the only in-depth solution to comprehensive systems management and with EM2Go the administrator can access Enterprise Manager functionality over wireless, in real-time and from anywhere.