Managing the Oracle Application Server with Oracle Enterprise Manager 10g

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# Managing the Oracle Application Server with Oracle Enterprise Manager 10g

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INTRODUCTION

The Internet provides businesses with the opportunity to reach more customers quickly while at the same time reducing the complexity of business processes and information systems. This second benefit is achieved through the use of application servers such as Oracle Application Server 10g that allow you to integrate disparate business systems and simplify the development and deployment of Web-based applications.

Managing such a dynamic application server environment can be a challenge. The Oracle Application Server offers a rich set of functionality and has several components integrated within the platform. In addition, the application server does not exist alone in a vacuum – other services and components (such as host machines, databases, load balancers, etc.) are also required to host an application. Such a diverse environment is inherently complex, historically requiring trained and dedicated people to manage it.

To effectively manage such a diverse environment, the administrator needs a tool that simplifies his administration and monitoring responsibilities. Whether due to budget cuts or lack of experienced resources, frequently the database administrator or systems administrator or even the developer must work outside their area of expertise. For instance, the database administrator may be asked to manage a few production application servers in addition to some mission-critical databases. He needs a tool that is Web enabled - much like the e-business systems being managed, easy to use, intuitive, and does not require extensive training.

Such a novice administrator - or even the experienced one - is often unaware of performance problems with an application until the end user experiencing the problem logs a trouble ticket. So, understanding the response times experienced by end users, proactively monitoring these mission critical response times, as well as being able to quickly and efficiently determine where the bottleneck lies is crucial to effectively managing an application server.

To all of the above problems associated with managing an application server, Oracle provides a single, integrated solution: Oracle Enterprise Manager 10g. Oracle Enterprise Manager 10g provides out-of-the-box administration for Oracle Application Server, comprehensive management for the entire Oracle eco-system,
and robust tools for monitoring and maintaining application servers throughout the enterprise. Enterprise Manager also offers comprehensive solutions to difficult provisioning tasks such as cloning, patching, and application deployment. This simplification of management coupled with improved quality of management reduces the total cost associated with managing the Oracle Application Server.

**MANAGEMENT TOPOLOGY**

In order to fully appreciate how Enterprise Manager is able to solve several problems affiliated with managing the application server environment, it is helpful to understand the topology behind Enterprise Manager.

**Out-of-the-Box Administration**

After installing Oracle Application Server 10g, you gain immediate management value. The Web-enabled Oracle Enterprise Manager 10g Application Server Control Console enables an administrator to be productive without any further installation or complicated configuration. Application Server Control, based on the application server management stack of Distributed Configuration Management (DCM), Oracle Process Manager and Notification (OPMN), and Dynamic Monitoring Service (DMS), allows you to administer the local application server instance and all of its components, monitor real-time performance metrics, and diagnose and resolve problems facing the application server.

![Application Server Control](image)

*Figure 1: Application Server Control is installed with each instance of Oracle Application Server 10g.*

**Centralized and Comprehensive Management**

While Application Server Control provides direct administration and real-time performance monitoring for your local application server instance out-of-the-box, you can gain key additional management capabilities by deploying the Enterprise Manager framework. The framework consists of the following components:

- Oracle Enterprise Manager 10g Grid Control
- Oracle Management Service(s) with Oracle Management Repository
- Oracle Management Agents
Grid Control – the central console of Enterprise Manager - interacts with the Management Service, which, as a J2EE Web Application hosted by Oracle Application Server 10g, leverages all of the reliability, scalability, and robustness of the application server instance. The Management Service works in conjunction with an Oracle database repository (called Management Repository) for its persistent data store. The Management Repository stores information about administrators, targets (i.e. managed components), and applications that are managed within Enterprise Manager.

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

By deploying the Management Service(s) with Management Repository and then installing the Management Agent on any host running an application server instance, you gain valuable benefits such as the following:

- Management of other targets that reside on the host machine (e.g. databases and the host itself).
- Automatic monitoring - with defaults set out-of-the-box to Oracle recommended settings – for all targets on the host system. This leads to zero time to management.
- Share responsibilities and information across multiple administrators.
- Application Service Level Management for monitoring e-business systems from the top down and tracing the experience of end users as they enter and navigate a web site.
- Configuration Management for tracking hardware and software configurations and implementing changes throughout the datacenter enterprise.
- Quick access to each instance’s Application Server Control Console for direct administration.
- Published schemas for creating custom reports based on the rich data collected and stored in the Management Repository.
- An extensible environment with an SDK that leverages the capabilities of the Enterprise Manager framework for managing custom applications.
MANAGEMENT WITH APPLICATION SERVER CONTROL

Administrators keep busy with the many day-to-day tasks associated with managing an application server instance. Enterprise Manager enables and empowers administrators to perform these tasks more efficiently from a single Web-based interface.

Single Point for Administration

Application Server Control is the single interface for administering the entire Oracle Application Server platform. After logging in to a standard URL, administrators are presented with the Application Server Home page. From this home page, administrators can at-a-glance determine the instance’s overall status and resource usage, as well as similar data for each configured and enabled component. In addition, from the Application Server Home page administrators can drill down to perform routine administrative actions such as the following:

- Start and stop services.
- Modify server configurations.
- Deploy and monitor J2EE applications.
- Review diagnostic log files.
- Perform backup and recovery actions.

Figure 3: Application Server Control Console’s Application Server Home page provides at-a-glance information on the application server instance and its enabled components.

**Topology of the Application Server Environment**

A visual representation of the application server environment is essential for administrators to understand component relationships, e.g. where applications are deployed across an entire OracleAS Farm or OracleAS Cluster. Enterprise Manager satisfies this requirement through the Topology Viewer available from the Application Server Control Console. Topology Viewer provides a graphical, real-time view of application server processes managed by OPMN. From Topology Viewer, an administrator can perform various common tasks such as:

- View status of the farm, cluster, and member components.
- Start, stop, or restart processes.
- Monitor performance across the application server environment.
- Drilldown to component home pages for more details.
Deploying J2EE Applications

J2EE applications are developed using Java development tools such as Oracle JDeveloper. During the development process, the application is bundled into an Enterprise Archive (EAR) file and is ready for deployment to the J2EE container. Application Server Control helps the administrator deploy the J2EE application to the Oracle Application Server Containers for J2EE (OC4J) through an intuitive wizard. This deployment wizard expertly guides the user through the various stages of deployment:

- 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.

With such an intuitive deployment wizard, administrators need not have a complete and thorough understanding of the J2EE environment in order to deploy a J2EE application.
Figure 5: The Deploy Application wizard automates the process of deploying J2EE applications to OC4J.

After deployment, the administrator can then maintain the J2EE application by continuing to use Application Server Control. In addition to browsing through all the applications deployed to a container or deployed to multiple containers of a single application server instance, he can choose to un-deploy, re-deploy, or recover to a previous version of the application. Simplifying the application deployment process and allowing easy maintenance of the application including its data sources allows administrators to have more time to focus on other important administrative tasks.

Unified Management Operations

Administrators need a consistent and consolidated solution for performing common operations across application server components. Learning different interfaces or following different procedures for administrative tasks across components is not a productive use of an administrator’s time. Application Server Control addresses this problem by providing a consistent look-and-feel across all components, and by unifying common cross-component operations such as managing ports and viewing diagnostic log files through an integrated management solution.

Centralized Port Management

Oracle Application Server contains many components – each of which rely on one or more port settings. Maintaining a list of port ranges for each component, remembering which ports are in use by which component, and modifying such port settings – especially while unaware of various port dependencies across components – is a daunting task that no administrator enjoys.

With Application Server Control this tedious burden is lifted; replaced with a simple user interface for performing such port administration. Through the Ports
property page on the Application Server Home page, administrators are presented with a single view of port ranges and ports in use across all application server components. With a single click, administrators can access additional pages from which they can edit port settings and easily determine any other cross component/port dependencies.

![Application Server Control's Ports property page](image)

**Figure 6: Application Server Control’s Ports property page simplifies port administration.**

**Diagnostic Log Viewer**

Whenever there is a performance problem or configuration issue affecting the application server, administrators must locate, examine, and compare many different log files from potentially several components. During a systems failure, time is of the utmost importance. An administrator cannot waste valuable minutes or hours searching for the correct diagnostic log files, only to spend even more time scanning them for various error messages to help pinpoint the issue. The Application Server Control Console’s Log Viewer capabilities reduce this costly burden. From a single HTML interface, administrators can quickly select one or more components from which they would like to see log files. All associated log files are then displayed for the selected component(s), and the administrator is free to directly search the log as needed.

Advanced search capabilities are also available that allow administrators to further restrict the list of log files to those that apply only to their current task or
responsibility. For example, from an advanced search an administrator can choose to display only those log files that affect a particular J2EE application.

Figure 7: Using Application Server Control Console’s Log Viewer, administrators can selectively choose and filter on log files to be reviewed.

In addition to choosing and scanning application server log files, Log Viewer can also be used together with Log Loader and the Log Repository. Log Loader loads log file entries from component log files into a file-based or database-based Log Repository. Using Log Viewer you can then query from the repository for quick access to operational and diagnostic information across multiple components. For example, you can view a list of the error messages that have been generated in the last four days by any of the application server component log files that Log Loader has loaded into the Log Repository.

Changing Infrastructure Services

In a data center environment, a set of common infrastructure services is typically present. These include an Identity Management service to allow central management of user identities across multiple applications used in the enterprise and product metadata repository services required for an enterprise deployment of components such as Portal. In addition, the clustering capabilities available with Oracle Application Server can be leveraged by configuring an instance to use either a database-based or file-based farm repository.
Often there is a need for reconfiguration of one or more of these infrastructure services. This need may arise due to consolidation (e.g. multiple departmental LDAP servers being consolidated into a single instance), network reconfiguration (e.g. move of the database server to a different subnet), scaling hardware to keep up with demand (e.g. move of the database server to a new host), or disaster recovery scenarios. Application Server Control provides a set of wizards that guide the administrator through the steps required to adjust a middle tier in the event that one or more of the infrastructure services that it uses has changed.

**Identity Management**

A key requirement in changing the identity management services used by an Application Server mid tier is to support the test to stage to production lifecycle of an application. In a typical environment a new application is first introduced into a test environment. From here, it moves into a staging environment and once the necessary validation has been completed successfully, the application is moved into production. In a test and stage environment, the application typically uses a test identity management service. When it moves into production, the application server must change its identity management service to now use the production LDAP instance. An intuitive wizard coupled with a best practices document guides the user through the process of moving an application through the various phases.

*Figure 8: The Configure Identity Management wizard guides administrators through associating an application server instance with Oracle Internet Directory and/or OracleAS Single Sign-On.*

**Metadata Repository**

The Metadata Repository is a component of infrastructure services, and during installation components are configured to use its default schemas. There are cases, however, where administrators may want to use a different Metadata Repository post installation. For example, an administrator may want to balance his hardware and software resources as follows:
• Install multiple Metadata Repositories on different hosts in the environment.

• Associate the Metadata Repositories with a common Oracle Internet Directory.

• Install multiple application server instances and configure each instance with a unique Metadata Repository.

Application Server Control helps the administrator change the Metadata Repository an application server instance uses via an intuitive and easy to use wizard.

Farm Repository Management

Oracle Application Server provides powerful clustering capabilities for the J2EE container. In order to begin creating and using clusters, the administrator must first identify a farm repository in which to store components’ information. This farm repository can be hosted in either a database instance or in the file system. Then, an application server instance can be added to the selected farm repository through an Application Server Control wizard. Instances within the same farm can then be clustered together to ensure consistent configurations and consistency of deployed applications across all members of the cluster.
Automated Provisioning

Enterprise Manager significantly reduces the cost of managing an application server grid environment. From Application Server Control, application deployment and configuration can be automated across a cluster. An administrator can create an application server cluster and use the deployment wizard to rollout an application. The management infrastructure automatically propagates the deployed application to all members of the cluster. In addition, any configuration change made to one instance in an OracleAS Cluster is automatically propagated to all instances in the cluster. Also valuable in managing within a grid environment is the ability to take a configuration snapshot of an application server instance and either archive or version it, or re-apply the configuration on a different application server instance. This feature, available from Distributed Configuration Management (DCM), provides increased flexibility allowing administrators to revert back to previous configurations and to facilitate easy mirroring of application server instances.

Backup and Recovery

Maintaining a high level of availability for mission critical enterprise application server environments is one of the most important tasks for administrators. In the event of a catastrophic system or hardware failure, administrators need to have confidence that their system backups are not only valid, but also recent enough to ensure minimal data loss. Because thousands and sometimes millions of dollars are lost for every hour these systems are unavailable, a quick recovery of these systems is vital for a business.

Enterprise Manager simplifies and automates Oracle Application Server 10g backup and recovery tasks. Using the Application Server Control Console, administrators can with confidence, perform and monitor regular backups of their middle-tier environment. Using Enterprise Manager an administrator can, with a couple of clicks, recover a system after an irreparable failure has occurred. By using this powerful management tool, an administrator can recover a system in a matter of minutes instead of hours, thus saving the company thousands if not millions of dollars.
MANAGEMENT WITH GRID CONTROL

Administrative tasks are fundamental necessities of keeping the Application Server platform running smoothly day-to-day. As one knows, its end user experience, or performance, that is the most common wrench that can ruin even the best-maintained, well-oiled environments. Ensuring that an application server meets required levels for an e-business is a daunting assignment, but Enterprise Manager enables administrators to monitor their environment thoroughly and easily. Not only can Enterprise Manager provide administrators with performance and resource usage necessary for locating bottlenecks, Enterprise Manager can provide invaluable monitoring of current systems to proactively avoid performance issues. In addition, with historical data collections, administrators can make strategic decisions concerning future capacity and application usage.

Out-of-the-Box Monitoring

The Enterprise Manager framework (i.e. Grid Control, Management Service with Management Repository, and Management Agents) enhances the out-of-the-box manageability of Oracle Application Server. After the Management Service with repository is installed, Management Agents can be installed on any host machines that contain targets to be monitored by Grid Control. When the Management Agent is installed, any currently installed Application Servers or other supported targets (e.g. database, listener, host) will be automatically discovered and displayed in the Grid Control Console. When more application servers are installed post agent installation, administrators can automatically add them to the Grid Control Console from either the Grid Control Console or the appropriate Application Server Control Console.

While critical performance monitoring is built into the application server itself, Enterprise Manager 10g Grid Control continuously monitors the application server and its components as well. With automatic performance monitoring relying on Oracle recommended threshold settings and default e-mail notifications for critical alerts, administrators can rest assured that they would be notified should critical issues affect their environment. Novice administrators can simply rely on these Oracle out-of-the-box
recommendations; while more experienced administrators continue to have the flexibility of later fine-tuning these thresholds to suit their particular needs.
Figure 12: Grid Control Console’s Application Server Performance page allows administrators to view several performance metrics over time.

**Historical Collections And Analysis**

When using the central console, administrators have the added benefit of a database Management Repository in which to collect performance data over time. Using this historical data, administrators can then analyze performance over time, diagnose past problems as they occurred, look for trends, and report on historical performance and availability.

The historical data maintained in the Management Repository allows administrators to track performance trends and compare data across other application server systems. For example, an administrator may investigate the following scenario:
What is the current memory usage for application server #1? How was its memory usage over the past twenty-four hours? How does that performance trend compare to application server #2? Logical diagnostic processes such as these are easily performed using the Grid Control Console.

![Grid Control Console](image)

**Figure 13:** Use the Grid Control Console to compare application server performance through collected historical data.

### J2EE Application Diagnostics

In addition to automated monitoring, the Grid Control Console provides the administrator with easy access to flexible diagnostic reports, such as top applications, top servlets, or top EJBs. These diagnostic reports can be generated based on a variety of criteria. For example, identifying the top servlets by processing time or by requests processed.

![Grid Control Console](image)

**Figure 14:** With the Grid Control Console, administrators gain access to flexible diagnostic reports.
As with all Enterprise Manager diagnostics, these application server diagnostic reports can be based on current or historical data. Application server metrics are collected and stored in the Management 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.

**Application Service Level Management**

The Grid Control Console's Application Service Level Management (ASLM) tools present a major shift in system diagnostics and monitoring of Web applications. ASLM tools provide a holistic solution that addresses the e-business challenges of service level management, rising administrative costs, maintaining customer satisfaction, and increasing revenues. 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. Armed with knowledge of end-user, application, and transaction response times, administrators are able to proactively monitor their e-business system and pre-empt performance problems before they impact end-users and affect business profitability. Furthermore, Enterprise Manager lowers administrative costs by reducing the time spent on problem identification and resolution through simplified root cause diagnosis.

**Application Availability**

At a business transaction level, an administrator can define a combination of one or more critical paths in their Web application to be used as the criteria for determining the site’s availability. For example, a CRM application may require that a user successfully log on to the Web site and access a sales report in order for the application to be considered available. For an e-commerce application, availability may mean that an end-user can access the home page, search for an item, and complete an online purchase. Enterprise Manager uses these logical business tasks or ‘transactions’ to define the availability of a Web application.

These critical paths of business processes are recorded, and the stored transaction can be launched at a user-defined interval from strategic locations across the e-business enterprise. Each system component involved in the transaction is continuously monitored for availability. 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 Grid Control Console, providing a real-time view of Web application availability and responsiveness.
Figure 15: At a glance, administrators are provided with a summarized view of the availability and performance of a Web application.

Is my application available to all of my user Communities?

In addition to monitoring the availability of the application itself, availability can be monitored from various global user communities within the network. A web site may be unavailable for all users or it may be a problem that is impacting users contained only within a specific network or location. To determine application availability from different end-points, ‘beacons’ are used to play back transactions at specified intervals from various locations that are representative of your user communities. Beacons are client robots that collect performance data at specified intervals at strategic locations in the network. For example, if your application is hosted in San Francisco, an administrator can configure beacons in London, New York and Sydney to simulate the performance and availability of your application from these user communities. Response times can differ, depending on various factors in the network, therefore, what constitutes acceptable response times for Sydney users may not be acceptable for New York users. To address these situations, Enterprise Manager lets administrators adjust response time thresholds on a per beacon or user community basis.

Proactively Monitor Business Transactions

Business transactions are recorded using an intuitive playback recorder that automatically records a series of user actions and navigation paths. Transactions are typically defined in a way that simulates a user performing an online task that invokes the Web application. Transactions are then replayed automatically at specified intervals from various user communities using beacons.

Enterprise Manager’s ability to monitor transactions from different user communities provides a powerful tool that lets administrators understand the
performance of different user communities as well as isolate network latency from true application problems. For example, if all users from different user communities are experiencing the same performance degradation trends over time, this may be an indication of a server-side application problem. On the other hand, if performance bottlenecks are occurring within only one user community, this may indicate a localized problem attributed to the network.

In addition, using 'local' beacons, which are typically located closest to the application itself, network latencies are factored out of response time measurements. Local beacon measurements provide administrators with server-side only response times. They are also useful in determining delays attributed to the network when the local beacon measurements are compared to the response times from remote user communities.

**Figure 16:** By examining transaction performance as measured from different user communities, administrators can determine if problems are server or network related.

Warning and critical thresholds can be set individually for each user community so that administrators are alerted when transaction response times are exceeded. Administrators can detect for error strings in any of the transaction’s pages to indicate failure. Drill-down capabilities provide a breakdown of times consumed in each phase of a transaction. Proactively monitoring transactions enables administrators to tune their application by pre-empting problems and making corrections before performance degradation adversely affects users.

**Understand Your End-User Experience**

Most end-user and Web application monitoring tools require that the administrator manually configure the URLs they wish to monitor. Consider
that a Web site like www.oracle.com has over 80,000 URLs. It is, in practice, virtually impossible for an administrator to actively monitor the entire site. Enterprise Manager makes what has been extremely impractical and time-consuming into a simple task. Enterprise Manager automatically collects real-time response data for all end-users as they access a Web application or Web site. This comprehensive performance data is rolled up and stored in the Management Repository, providing robust reporting of the end-user experience. Now administrators can both quickly identify URLs that are troublesome and gain the confidence that every URL in their application is monitored for responsiveness.

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. The Analyze functionality lets you view detailed reports in context by group, URL, domain, visitor, or application as well as in a daily, weekly, or monthly context. Further drill-downs provide administrators with response time and load distribution information to help balance Web server resources.

![Figure 17: Administrators can view the response times experienced by end users as they access the URLs of a Web application.](image)

**Interactively Trace Business Transactions**

The performance diagnostic process requires tools that allow administrators to easily and accurately pinpoint bottlenecks. The business transaction tracing facility
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 further response time breakouts. Click-to-SQL drilldowns allow administrators to navigate down from a transaction view and examine the underlying SQL statements. In addition, administrators can run the trace facility following the resolution of a problem to reassure them that the situation has been satisfactorily remedied.

![Figure 18: The interactive trace facility provides in-depth details of all invocation paths down to the SQL statement level.](image)

### Analyze Middle Tier Page Performance

Enterprise Manager’s middle tier performance analysis tool is 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 the 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 identify how these components are affecting overall response times.
URL processing time and load graphs provide administrators with information on the impact of server activity on response times. Analyzing 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 19:** Middle tier processing time and load graphs, 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 within different Web application components. Graphical views of correlated metrics provide for an at-a-glance view of the performance of all your 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 your Web application components. The availability of all your 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.

Figure 20: Correlation lets administrators easily understand how component resources, response, availability, and other system-related factors have affected application performance at a specific point in time.

With Application Service Level Management features like those described above, any administrator can use Enterprise Manager to confidently monitor and diagnose application performance problems without being a J2EE expert.

Managing An Application Server Grid

Enterprises are moving towards an enterprise grid-computing model. With grid computing, datacenters can standardize on low-cost modular servers, consolidate servers into clusters, and automate resource provisioning and application monitoring. With grid computing, resources are virtualized and managed as a single system. This allows IT managers to distribute workload across hardware resources to provide better performance, reliability, and availability.

Through Grid Control, administrators can organize distributed Application Server instances across the grid into a single, logical entity referred to as a Group. By making "many to one", an administrator can monitor, for instance, an application server farm as one logical service. Performance metrics for a group can then be rolled up to determine averages and identify any workload management adjustments required. In addition, various Enterprise Manager features can be
done against a group of instances as opposed to against each single standalone instance; examples include creating a blackout or a notification rule against a group of Application Servers instead of against each instance itself.

Additional capabilities from the Grid Control Console allow administrators to measure and report availability and response times for various applications hosted on the grid.

Configuration Management

Tracking hardware and software configurations and implementing changes throughout an enterprise is one of many difficult tasks administrators face on a regular basis. Being able to quickly and accurately view a snapshot of hardware, 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 deploy those changes quickly and accurately.

Enterprise Manager provides a comprehensive solution for viewing current configurations and tracking software changes. Using the Grid Control Console, administrators can capture and store hardware and software information for machines in 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 an administrator’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 machines, track changes to systems and perform many other important configuration tasks.

By default, data is collected every day. In addition, customers 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 on 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. The Grid Control Console 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](image)

**Query and Analysis of Collected Data**

In addition to knowing what is installed in an enterprise, it is important to know of differences between systems within an enterprise. The central console provides tools for comparing systems enterprise wide, allowing an administrator to quickly
and easily pinpoint differences in key systems. This may aid in determining why two application server instances the administrator believes to be the same are operating differently, and also allows for proactive monitoring and updating of systems before such issues arise.

Figure 23: Administrators can quickly compare hardware, operating system and software installations across an enterprise using the Grid Control Console.

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

- How many application server instances are versioned 9.0.4?
- How many application server instances are on Linux versus Solaris?
- Are the Linux systems all installed on identical hardware?
- Are certain operating system patches applied to the Linux systems?

Patching

The Grid Control Console enables administrators to quickly query for patches from Oracle MetaLink 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 be used to download and deploy it. Optionally, Enterprise Manager can execute an end-user provided script to install the patch. Enterprise Manager
can automatically alert administrators when a critical application server patch, specific to their software and platform, has been released by Oracle. Each of these steps allows for quicker application of patches across the Application Server environment.

Using Enterprise Manager to find, download, stage, deploy, apply, and track 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.

Figure 24: The Grid Control Console allows administrators to search for applicable patches within the context of a specific target.

Cloning an Oracle Home

Duplicating software installations for development or quality assurance purposes is a routine task. For Oracle software, such installation cloning has become a lot easier with Enterprise Manager. The Grid Control Console’s cloning wizard automates the duplication of application server installations (specifically, the directories where
the 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 becomes a thing of the past.

CONCLUSION

Managing the Oracle Application Server and its components, along with databases, hosts, firewalls, network, and other targets within an enterprise, is a challenge to both a novice administrator as well as a seasoned application server administrator. Administrators require an integrated and comprehensive solution. Oracle offers such a solution through Oracle Enterprise Manager 10g. With a wide-range of robust features such as:

- Out-of-the-box application server administration.
- Robust framework for complete datacenter management.
- Comprehensive application server monitoring and diagnostics.
- Configuration Management.
- Application Service Level Management.

Enterprise Manager lowers total cost of management by providing a simplified management solution that improves the quality of managing Oracle Application Server 10g.
**SUMMARY OF NEW FEATURES**

The table below summarizes all new features introduced in Oracle Enterprise Manager 10g Application Server Control Release 10.1.2 for application server management.

<table>
<thead>
<tr>
<th>Application Server Control New Features (10.1.2.0.0)</th>
<th>Application Server Control New Features (10.1.2.0.1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Graphical topology view of application server environment</td>
<td>• Perform backup and recovery operations for middle tier and infrastructure instances using Application Server Control</td>
</tr>
<tr>
<td>• Complete integration of Oracle Web Cache administration into the Application Server Control Console</td>
<td>• Additional middle tier cloning support via command line utility (i.e. All Services install type as well as continued support for those install types introduced in 10.1.2.0.0)</td>
</tr>
<tr>
<td>• Additional middle tier cloning support via command line utility (i.e. J2EE &amp; Web Cache associated with database-based OracleAS Farm Repository, Portal &amp; Wireless, Business Intelligence install types)</td>
<td>• Oracle HTTP Server load balancing metrics</td>
</tr>
<tr>
<td>• All Metrics page with drilldowns to metric details View and configure file-based OracleAS Farm Repository, Manage file-based OracleAS Clusters</td>
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<tr>
<td>• Query from database-based diagnostic log repository</td>
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<td>• Automation of configuration steps to modify Oracle HTTP server listen port</td>
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<td>• Ability to change port values of Application Server Control components via command line interface</td>
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<tr>
<td>• View and change Infrastructure Services for Identity Management</td>
<td>• View and change Infrastructure Services for Identity Management</td>
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<tr>
<td>• Out-of-box database administration of Metadata Repository with Oracle Enterprise Manager 10g Database Control</td>
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</tr>
</tbody>
</table>

*Figure 26: Oracle Enterprise Manager 10g Application Server Control provides several new features for managing Oracle Application Server 10g Release 10.1.2.*