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Managing Oracle WebLogic Server with Oracle Enterprise Manager
Introduction ........................................................................................................................................... 3
Top Challenges for Administrators ........................................................................................................ 3
   Inability to Manage Multiple WebLogic Server Domains ................................................................. 3
   Application Performance Management ............................................................................................ 3
   Compliance to Information Technology Infrastructure Library Practices ................................. 3
Reduce Cost of Monitoring WebLogic Server Domains with Enterprise Manager .......................................................... 4
   Server Resource Monitoring ........................................................................................................ 5
   Real-time Performance and Historical Trends .................................................................................. 5
Complete Infrastructure Management Improves Visibility to Other Tiers .................................... 5
   Systems Dashboard ...................................................................................................................... 5
   Topology Viewer ........................................................................................................................ 5
   Improved Application Performance Using Proactive Monitoring ................................................. 5
   J2EE Application Monitoring ........................................................................................................ 6
   Web Services Management ............................................................................................................ 6
   Service Level Monitoring ............................................................................................................. 6
   End-to-end Application Performance Management ................................................................... 6
Improve Quality of Service by Complying with ITIL Processes .................................................. 9
   Robust Event Monitoring System .................................................................................................. 9
   Jobs and Corrective Actions ........................................................................................................... 9
   Configuration Management ........................................................................................................... 9
Conclusion ............................................................................................................................................... 12
Introduction
Organizations have to be agile to compete globally and adopt to changes in technology. Most organizations run middleware applications based on disparate systems and technologies. However, use of these disparate technologies poses many challenges and complexities to the administrators. This in turn makes the cost of administration too high.

Oracle Weblogic Server 10g is a core component of Oracle Fusion Middleware that provides the runtime engine for mission-critical Service Oriented Architecture (SOA) and middleware applications. This white paper outlines some common challenges faced by IT administrators running enterprise applications deployed on Oracle WebLogic Server and describes how Oracle Enterprise Manager enables customers to reduce the cost of management by providing a single management console to manage the complete application infrastructure.

Top Challenges for Administrators
To compete and survive in the midst of the current economic situation, organizations are trying to keep their costs low. This is putting more burdens on the IT infrastructure, which must remain agile to make the company’s applications highly available. IT administrators have more responsibilities and less resources for keeping their infrastructure running and maintaining the service levels of their applications. Oracle WebLogic Server administrators in particular are faced with a number challenges that come with managing a complex application architecture.

Inability to Manage Multiple WebLogic Server Domains
Most administrators are responsible for numerous WebLogic Server domains. For example, a typical WebLogic Server administrator may be responsible for domains that host development, quality assurance (QA), UAT and production servers for an application family. Many are responsible for several domains hosting production applications. Most of the management tools provided by Oracle, such as WebLogic Server Console, are effective for managing a single WebLogic Server domain but cannot be used to manage multiple domains. Hence administrators either perform many manual tasks on each individual domain or depend upon custom scripts to monitor the health of their applications and underlying infrastructure. If an application is deployed on a large number of clusters and servers, it becomes a very error-prone and expensive affair to manage.

Application Performance Management
One of the toughest challenges for administrators is to manage application performance and maintain service level expectations for the applications. Application performance issues may result in disruption of service or service level violations. In fact, administrators typically come to know about application performance issues from end-user complaints.

Thus it is important for administrators to proactively monitor application performance issues. However, most monitoring tools in the market work within silos, without providing visibility into other tiers. This makes it difficult for administrators because the application performance issue may be due to something outside the silo, such as a slow running database or host machine.

Most of application performance issues are hard to reproduce in a test environment, and most application diagnostics tools cannot be deployed in a production environment due to limitations such as performance over head and restart requirements.

Similarly it is very difficult to manage application performance from the real end-user perspective. Identifying end-user problems may greatly improve the user experience resulting in greater profitability.

Compliance to Information Technology Infrastructure Library Practices
Many IT organizations have a goal to follow the Information Technology Infrastructure Library (ITIL) framework – a set of guidelines that describe an integrated, process-based best-practices framework for managing IT services. This framework, tailored to meet the unique business needs of an IT organization, can bridge the gap between IT and the business community. By adopting ITIL practices, organizations can reap the following benefits:

- Improved service levels and quality of service
- Close IT and business alignment of IT services and processes
- Closed loop change management
- Reduced overall cost of management and total cost of ownership
- Improved service availability and performance resulting in increased business profitability

Unfortunately, the lack of an integrated solution that supports the ITIL process lifecycle has been a major inhibitor for application server administrators to adopt ITIL guidelines and architecture.

Reduce Cost of Monitoring WebLogic Server Domains with Enterprise Manager

Managing multiple Oracle WebLogic Server Domains presents administrators with a number of challenges. Oracle Enterprise Manager allows administrators to manage and monitor Oracle WebLogic Server domains from a single management console. This single management console enables you to not only correlate performance across the entire stack which supports an application, but to also determine the root cause of service failure.

Historically, the cost of managing large sets of systems has increased linearly with the addition of each new system. It’s simply not possible to maintain management costs in a constantly growing environment with traditional management...
solutions that do not scale. Oracle Enterprise Manager’s features maintain management costs at a flat or near flat rate as the number of managed systems increases. The lower cost of management comes from a “manage multiple as one” approach of Enterprise Manager, which enables you to monitor multiple instances at the Oracle WebLogic Server Cluster level. Using these features, you can perform such management functions as:

- Monitor Oracle WebLogic Servers in a cluster as one entity rather than individual Oracle WebLogic Server silos.
- Analyze performance and workload distribution for J2EE applications deployed to Oracle WebLogic Servers that are members of a cluster.
- View System Dashboards for Oracle WebLogic Server Clusters.

**Server Resource Monitoring**

Oracle Enterprise Manager helps you to monitor the health and performance of resources such as JDBC data sources, JMS servers and work managers. It provides a wide range of metrics for transactions, data sources, JMS queues, connectors, and JVMs that enable you to monitor performance of these resources.

**Real-time Performance and Historical Trends**

Oracle Enterprise Manager collects the performance, load and usage metrics of Oracle WebLogic Servers and the hosts they are running on. You can set thresholds on metrics, receive notifications, compare metrics across servers, view historical trends and create custom reports.

**Complete Infrastructure Management Improves Visibility to Other Tiers**

Oracle Enterprise Manager helps you to monitor the health and performance of other application tiers such as the database, web server, underlying host machine and messaging provider.

**Systems Dashboard**

Dashboards in Enterprise Manager provide a rich, highly customizable reporting framework. Using system dashboards, it is possible to get a quick glance of key metrics, alerts, policy violations, and so on related to your WebLogic Server infrastructure. You can also see the latest alerts in various system components.

The data on the dashboard is automatically refreshed allowing you to perform real time monitoring. You can add or remove metrics that are shown on the dashboard. Administrator can quickly drill down into a target that is likely to cause problem or needs attention. Thus dashboards provide powerful tool to the administrators to reduce reaction time and improve service levels by taking proactive actions.

**Topology Viewer**

You can access a pictorial view of the components of the service or system using Enterprise Manager via the topology viewer. This view shows all system components and highlights important information such as status, alerts and policy violations. You can easily obtain an overview of the service or system’s health and when problems arise, drill down further from the topology view to obtain further diagnostic information. The topology viewer can easily be re-configured to auto refresh in 30 second segments as desired to ensure the view is always up to date.

**Improved Application Performance Using Proactive Monitoring**

Oracle Enterprise Manager helps you to monitor the performance of J2EE and Web service applications. This helps administrators to take proactive measures to ensure availability and performance of their applications.
J2EE Application Monitoring

Oracle Enterprise Manager provides a wide range of application and server metrics for servlets, Enterprise JavaBeans (EJBs), transactions, data sources and JVM memory that you use to monitor the performance of your applications as well as resource usage.

Oracle Manager provides administrators with easy access to flexible diagnostic reports, such as top applications, top servlets, or top EJBs that can be based on current or historical data. These “Top Reports” are helpful in understanding the relations of performance metrics of applications to the performance metrics of underlying mid-tier components. In a large environment, these reports may also help administrators to distribute resources to various J2EE applications for optimal performance of all J2EE applications.

The J2EE application view from the Oracle WebLogic Server Cluster level provides an instant view of the performance of a J2EE application across all Oracle WebLogic Servers on which it is deployed.

Web Services Management

Oracle Enterprise Manager helps you monitor health and performance of Web services deployed onto WebLogic Server. It provides a wide range of metrics such as invocations and faults. It allows you to either manually test the web service or add a SOAP test that be invoked by a beacon transaction. This helps you maintain the service level for the service.

Enterprise Manager provides administrators with easy access to flexible diagnostic reports, such as top web services within an application or server that can be based on current or historical data. These “Top Reports” are helpful in understanding the relations of performance metrics of SOA / Web services applications to the performance metrics of underlying middle tier components.

Service Level Monitoring

Oracle Enterprise Manager Service Level Management Pack allows application owners to monitor the performance that end users are experiencing for every action performed within the application and determine whether these are meeting service level expectations. It allows application owners and IT organizations to:

- Define service level objective for web application or web services
- Define synthetic transactions, monitor service level and generate alerts on service level violations
- Service and system dashboards for reporting

End-to-end Application Performance Management

As a Weblogic Administrator, Oracle Enterprise Manager helps you to manage performance management of your applications end-to-end.
Oracle Real User Experience Insight gives you real world view how endusers are experiencing your applications. By adding real user perspective, it provides additional unique data that will provide the complete picture of all-around performance analysis of your application infrastructure, servers, network, etc. This will help you diagnose performance issues for your applications and help improve performance of your applications from end user perspective.

The Composite Application Modeler and Monitor (CAMM)/Composite Application Performance Management (CAPM) pack allows you to pin point performance issues of complex multi-tiered applications. This will also enhance visibility of your applications as it automatically creates a model for your Java or composite application by understanding flow of business transactions.

Oracle Applications Diagnostics for Java (AD4J) and Jrockit Mission control help you diagnose issues in the JVM by isolating resource/applications problems.

Figure 2: End-to-end application performance management Oracle with Enterprise Manager

Monitor End-User Performance and Behavior

According to industry experts, over 70% of user issues are still reported by end-users, not by system monitoring tools. Oracle Real User Experience Insight identifies and helps resolve user experience issues and revenue problems before business and users are impacted. Oracle Real User Experience Insight uses a state-of-the-art network protocol analysis technology to analyze performance and availability as well as user behavior. It has no impact on the performance of your applications and requires no changes to them. It can be used on traditional Web-based applications as well as SOA and AJAX enabled applications. You can use Real User Experience Insight enables you to manage Oracle WebLogic Server applications from the users’ perspective.

Reduce Problem Resolution Time with Model Driven Diagnostics

As the only tool with visibility into the “functional logic” and component relationships within a J2EE application, Oracle Enterprise Manager’s Composite Application Performance Management (CAPM) Pack identifies performance trends and
provides user-friendly root cause analysis from top-level components like servlets, web services, and JSP down to the actual piece of problematic underlying Java code while keeping an eye on the full transactional context of the measurement. This is particularly important in modern J2EE applications which routinely take advantage of shared components like EJBs within the application infrastructure.

Common J2EE components are automatically mapped and modeled to provide a model-driven interface for delving into performance metrics in order to quickly identify bottlenecks. This model is then automatically kept up to date using a change detection mechanism, which ensures that the model always represents the live environment. In addition to the automated modeling of most J2EE application infrastructure components, this pack also provides the flexibility to supplement those capabilities with custom metrics for POJO classes for monitoring purposes and via those defined custom metrics, it enables the user to diagnose performance issues for applications using POJO frameworks such as Spring, Oracle TopLink or JBoss Hibernate.

**Diagnostics of Production Java Applications**

The Diagnostics Pack for Oracle Middleware includes two products that can help you diagnose production Java applications running on Oracle WebLogic Server.

Oracle Application Diagnostics For Java (Oracle AD4J) is a low overhead monitoring and diagnostic solution to improve the application availability and performance. It helps administrators to proactively monitor application performance and learn about problems. When problems occur administrators will be able to get in-depth application details to diagnose problems such as:

- Detection of memory leaks
- Detection of thread dead-locks and differential thread analysis
- Exposure of cross-tier performance issues by displaying Java threads waiting for the database

Oracle AD4J requires near zero-overhead resources and can be deployed without having to restart your server or application. These attributes make it a perfect solution for monitoring and diagnosing production applications.

The second component, Oracle JRockit Mission Control, provides operational information about Java applications with minimal overhead. It employs a unique non-intrusive monitoring technology and diagnostic tools for Oracle JRockit JVM environments. It reduces operational costs while accelerating time-to-market through greater insight into the JVM, higher developer productivity and, reduced end-to-end application latency. Oracle JRockit Mission Control features include:

- Quick deployment without requiring application code changes
- Near zero overhead monitoring, diagnostics and profiling
- Real-time monitoring of JVM
- Memory leak detection and analysis
- Application and JVM profiling
- Latency analysis
- Eclipse IDE integration
Improve Quality of Service by Complying with ITIL Processes

Often times, IT organizations that adopt ITIL also adopt a multitude of tools in order to maintain compliance with ITIL processes. Such a practice is not efficient or cost effective. Oracle solves this dilemma by offering an integrated solution that supports ITIL processes. In fact, Oracle Enterprise Manager, as part of the Oracle IT Service Management Suite, has achieved ITIL version 2 certification for six core ITIL processes: Incident, Problem, Change, Configuration, Release and Service Level Management. Consequently, organizations that use Oracle Enterprise Manager can quickly deploy ITIL-compatible processes to achieve greater IT efficiency, easily integrate IT and business processes for enhanced organizational value and attain greater control over compliance and governance processes. The sections below describe specific features of Oracle Enterprise Manager that help WebLogic administrators comply with the ITIL Incident, Change and Configuration Management processes while earlier sections of this white paper describe features for the other ITIL processes.

Robust Event Monitoring System

Availability and performance issues visible in an application are often rooted in problems in the underlying technology stack. Continuous proactive monitoring of an application’s underlying IT infrastructure thus becomes critical to ensuring application availability and performance. Enterprise Manager provides robust event monitoring for Oracle WebLogic Server.

- Offers corrective actions as a way to automate responses to alerts or events, eliminating the need for operator intervention and minimizing human error, while increasing the speed of resolution.
- Provides Monitoring Templates to facilitate implementation of best practice monitoring standards across managed groups and systems. Administrators can create a customized set of monitoring settings - metrics, thresholds, corrective actions - that are appropriate for their environment, save these in a monitoring template, and propagate the template settings across managed groups and systems.
- Administrators can further customize notification rules and notification methods for the alerts to filter out alerts of interest.

Jobs and Corrective Actions

Administrators often need to start/stop/restart Oracle WebLogic Servers during the application lifecycle. Enterprise Manager allows administrators to remotely do so as long as the node manager is running on that machine. Using Enterprise Manager you can set start/stop/restart jobs as a corrective action for a metric alert. This allows administrators to quickly and proactively respond to critical events in the system.

Configuration Management

Oracle Enterprise Manager provides comprehensive configuration management features for Oracle WebLogic Server. These features reduce manual and error prone tasks; thereby freeing administrators to focus on more proactive maintenance activities that ultimately lead to a more stable and efficient environment.

Automated Discovery and Asset Tracking

Oracle Enterprise Manager 10gR5 does not provide out-of-the-box automation capabilities for installing, patching, or cloning Oracle WebLogic Server software. These features are expected in a future release.
Traditionally, tracking assets and configuration items across the IT environment relies upon the knowledge of key individuals, time consuming ad hoc processes, and manual, error-prone spreadsheets. In contrast, Oracle Enterprise Manager automatically collects configuration information about Oracle WebLogic Server. The following Oracle WebLogic Server information is collected at regular intervals, stored in the Oracle Enterprise Manager Configuration Management Database (CMDB), and presented via a central console to create a comprehensive view of all heterogeneous components in the data center.

- Configuration files (e.g. config.xml, xIDS-0899-jdbc.xml, oim_jms_module-jms.xml)
- Ports, resource usage and tuning settings
- Deployed applications and their associated modules
- Java Data Base Connectivity (JDBC) data sources and connection pools
- Virtual hosts Java Message Service (JMS) resources
- Configuration of startup/shutdown classes, JOLT connection pools, and Work Managers

![Figure 3. Automatically collected configuration items related to JDBC resources for Oracle WebLogic Server](image.png)

### Comparing Configurations

By keeping Oracle WebLogic Servers configured to a standard baseline and identifying any configuration changes that occur helps organizations reduce “configuration drift” and confirm if and when a planned or unplanned change takes place. Oracle Enterprise Manager provides capabilities that allow an administrator to quickly and easily pinpoint configuration differences across distributed Oracle WebLogic Servers. For instance, an administrator can create an Oracle WebLogic Server gold configuration and then use that gold standard as a baseline against which all other Oracle WebLogic Servers are to be compared. Such comparisons – performed ad hoc or scheduled, one-to-one or one-to-many – help to eradicate configuration drift. In addition, they can also simplify investigations into why systems presumed to be identical may be behaving differently. A common use case for this feature is when an application is moved from staging to production. Often times, the application though thoroughly tested in staging is not performing as expected in production. Using this feature, an administrator can quickly compare configurations of the two environments and pinpoint the potential cause.

Configuration comparison is a key function in change management. By comparing baselines before a change as well as after a change, administrators can verify that all of the configuration changes introduced were planned and expected.
Administrators are faced with situations 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 performance could take hours if the administrator had to go through each of the possible scenarios by hand. Oracle Enterprise Manager makes it simple by automatically tracking all changes to Oracle WebLogic Server configurations as well as its underlying hardware and operating system. This makes it quick and easy for the administrator to view changes that have been made since the last time the machine and software were functioning properly, and apply the appropriate solution to get the system back up to an acceptable level. This feature is critical in managing compliance, since it accurately captures “what changed, when and why.”

Besides tracking what configuration changes have occurred in the past, administrators can also detect real-time configuration changes to Oracle WebLogic Server and its underlying host and operating system. Such capabilities are exposed through the Configuration Change Console. Furthermore, because Oracle Enterprise Manager can integrate with popular change management systems such as Remedy, the Configuration Change Console can also determine if a change was authorized via an open request for change in the change management system.

Analytics and Reporting

Today more than ever, understanding the vulnerability of all systems across the enterprise is critical. Oracle Enterprise Manager provides a centralized inventory of configuration items and a rich set of standard and ad hoc search capabilities to search for specific configuration values across the datacenter. Oracle Enterprise Manager allows an administrator to search important artifacts such as J2EE applications, modules, and JDBC resources across Oracle WebLogic Servers. For example, an administrator can easily

- Search a data source by a Java Naming and Directory Interface name or pool name
- Search a data source by URL
- Search an Enterprise JavaBeans module in a server
Facilitate Compliance with Security and Governance Policies

Proactive assessment of key compliance areas such as security and configuration helps identify vulnerabilities and indicates where best practices are not being followed. Oracle Enterprise Manager ships with the following out-of-the-box policies for Oracle WebLogic Server and also enables administrators to define their own specific policies and groups.

- Server Domain Administration Port is enabled
- Server Performance Pack is enabled
- Managed Server Production Mode is enabled

Oracle Enterprise Manager tracks violations of these policies in a manner similar to performance metrics—notification rules can be applied and corrective actions can be assigned to violations.

This proactive approach to enforcement is supplemented by compliance reports that denote the compliance score for Oracle WebLogic Server targets. Administrators can view these compliance scores over time and drill down into the violations and impact for each Oracle WebLogic Server. Oracle Enterprise Manager can also be integrated with problem ticketing solutions to automatically send policy violation information to a ticketing system allowing incident tickets to be created without the need for manual intervention.

Policies can also be applied in policy groups. Policy groups contain a predefined or user-defined set of policies and determine an overall score based on a weighted average. Policy group scores can be viewed within a compliance dashboard that offers administrators an at-a-glance view of how their systems comply with best practices. The dashboard presents both a summary of the current scores with the ability to drill down into the details as well as a historical trend for each policy group in order to track compliance progress over time.

These features of Oracle Enterprise Manager enable IT departments to quickly demonstrate compliance with regulations and standards such as Sarbanes-Oxley (SOX) and Payment Card Industry (PCI). Oracle Enterprise Manager can also be extended to ensure compliance against other standards an IT department may be using.

Conclusion

Administrators are plagued by countless challenges as they attempt to efficiently and effectively manage middleware in their IT organization. Whether the challenges lie in the realm of monitoring application performance and diagnosing problems; automating common administrative tasks; managing multiple application servers, or just understanding what is installed and running in their enterprise, one tool provides a single solution – Oracle Enterprise Manager 10g. Enterprise Manager allows administrators to deliver heightened application performance and realize dramatic savings in middleware administration and maintenance costs. In a time when administration resources are at a premium, and businesses are forced to tightly control IT spending budgets, Enterprise Manager is a must-have tool for managing Oracle Fusion Middleware.