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Enterprise Manager 12c Cloud Control Application Performance Management

Executive Overview 2

Introduction 2

Business Application Performance Monitoring..... 3

 Business Application 4

 User Experience Monitoring 5

 Business Transaction Management..... 6

 Java and DB Diagnostics..... 7

 Discovery and configuration management..... 8

 Analytics and Reporting..... 9

Conclusion 11

Executive Overview

Oracle Enterprise Manager is Oracle's integrated enterprise IT management product line and provides the industry's first complete cloud lifecycle management solution. Oracle Enterprise Manager's Business-Driven IT Management capabilities allow you to quickly set up, manage and support enterprise clouds and traditional Oracle IT environments from applications to disk. Enterprise Manager allows customers to achieve:

- *Best service levels for traditional and cloud applications* through management from a business perspective including Oracle Fusion Applications
- *Maximum return on IT management* investment through the best solutions for intelligent management of the Oracle stack and engineered systems
- *Unmatched customer support experience* through real-time integration of Oracle's knowledgebase with each customer environment

Oracle Enterprise Manager's Business-driven application management solution provides a full Application Performance Management (APM) solution for Custom Applications and Oracle Applications (including E-Business Suite, Siebel, PeopleSoft, JD Edwards, and Fusion Applications). The APM solution is built to monitor cloud or traditional deployments, and is supported on Oracle and non Oracle platforms.

Introduction

Adequate performance and availability of business applications are essential to any organization. A poorly performing business application can have a negative effect on revenue, customer satisfaction, and availability. IT organizations are challenged to minimize these effects in a cost effective manner. The advent of cloud computing has only compounded these challenges. Agile application development approaches, and more increased rate of application changes, are leading organizations to rethink application management from the usual development and operations silos, to new approaches based on "DevOps" models.

Traditionally, an IT Operation team will deploy tools to monitor the infrastructure components the application is running on and to alert the operators in case of component failure. However, there are three major flaws with this approach:

1. It is impossible to monitor every component that may affect the performance of the business application. Some components cannot be instrumented, others may be deemed not important enough for it.
2. The many monitors create many alerts. It is common for an operator to receive hundreds of alerts every day. While some require immediate action, others are insignificant or redundant. The operator has no means to understand the business significance of each alert and thus cannot prioritize his/her actions to minimize the adverse impact on the business.
3. The application management team (DevOps, in many cases) has no visibility into the performance, availability of the application itself and how key business activities are being supported.

Oracle enterprise manager's APM solution addresses these problems. In addition to the component level monitoring, EM monitors the application from the business perspective. It measures the experience of real users and monitors the execution of business transactions.

Business Application Performance Monitoring

Traditional system monitoring does not provide an answer to the ultimate one question an application owner is most concerned with: Is my application working right now? System monitoring can tell you a server is out of disk space, but it doesn't mean that the application is down. System monitoring can find no errors and no threshold violations, but still the application may be nonfunctioning. User Experience Monitoring is the first step to overcome this problem. It looks at the performance and availability from the user perspective. As long as real users can use the application, the business application is working. Still, it is possible that the user interaction is working well, but the backend transactions are not performing. E.g. the user can submit a purchase request, and may even receive a confirmation page, but the purchase transaction fails to execute or be committed in the back-end environment. To complete the coverage, Business Transaction Management monitors the backend transactions. Now, with System monitoring, End User monitoring, and Business Transaction monitoring, all together, the business owner can tell if his/her application is working.

When a problem is identified, the goal is to resolve the issue as fast as possible. The first step would be to identify the culprit component (Triage). Here again User Experience monitoring and Business

Transaction monitoring play a role. IT operator can use user experience data to pinpoint the problem to a specific network, region, department, etc. or detect that the problem is in the backend system. If the latter, Business Transaction Monitoring can be used to identify the problematic component.

Once the culprit component is identified, a domain expertise is required to solve the problem. Deep dive diagnostics tools can help the expert identifying the root cause of the problem. For these tools to be effective, they must be available at the time the problem occurs (eliminating the time and effort it takes to reproduce the problem in a staging environment). This requires the tools to be able to monitor the component 24x7, with minimal overhead.

One common reason to problems in production applications is an unknown change to configuration or deployment. Security update to the OS may be deployed across the data center and unknowingly cause a system failure on a single host serving a business application. A change in configuration to handle one issue can cause another issue that will pop-up only a day later. If the application worked earlier and is not working now, it means that something changed. Configuration management tool can discover the infrastructure components, and scan them periodically for changes. An IT operator can use this tool as a first step to eliminate the possibility that a change to the application is the root cause of the problem.

In addition to immediate production issues, IT organizations need to address long term goals of efficiency improvement and planning for changes in demand and resources. User Experience monitoring, Business Transaction monitoring, infrastructure monitoring, and the deep dive diagnostics tools, collect and store large amount of performance and demand data. Analyzing this data as a whole, can provide the organization with essential information that can help reduce operation cost and prevent future capacity and performance issues.

Business Application

Business Application is a new target type in Oracle Enterprise Manager. It is a logical entity that represents one business application. The entity groups several subordinate entities: User Flows, Business Transactions, SLA, and System. User flows are defined by the operator as part of the Real User Experience monitoring (see below). They represent a sequence of operations made by the end users (e.g. the three operations: 'search catalog', 'add to cart', 'submit purchase request', can be one user flow). Business transactions are the backend transactions invoked by the user activity (the 'purchase' transaction is invoked by the 'submit purchase request' step in the user flow example above). The system is the entire infrastructure used to support the application including the web servers, application servers, databases and the hosts they are running on. SLAs can be define on System metrics, transaction performance, end user KPIs or even availability based on synthetic monitoring.

Using the Business Application Dashboard, users can see cumulative KPIs and statuses for all the underlying entities. These statuses can represent the current, long term, and future status of the business application:

- the combination of the user flows and the business transaction statuses represent the current status
- long term status can be concluded from the sum of the SLA calculations

- future status can be indicated by the System status. Although the application may behave well now, it is possible that low level failures may affect it later if not handled in time (e.g. one of multiple load balanced servers is down)

Figure 1. Business Application Dashboard. One pane of glass exposing the true status of a business application

User Experience Monitoring

Oracle Enterprise Manager's Real User Experience Insight (RUEI) offers a common solution for monitoring the real user experience of all web-enabled and SOA applications via network protocol analysis. The Service Level Management (SLM) module of Oracle Enterprise Manager complements RUEI's passive monitoring capability by monitoring user experience using synthetic tests. Combining these two approaches, the User Experience Monitoring products capture very rich RAFT (Response, Availability, Fault, Throughput) data about applications, application components (pages, objects, queries), and user initiated transactions. In addition, business KPI's can also monitored and reported in real time.

Both RUEI and SLM are also integrated with Oracle's application testing product, Application Testing Suite (ATS), in order to support close-loop application performance lifecycle management. Functional and load tests that are defined in ATS can be reused for production monitoring, and production application activities captured from actual users can be used to generate functional and load testing scripts to support on-going application development.

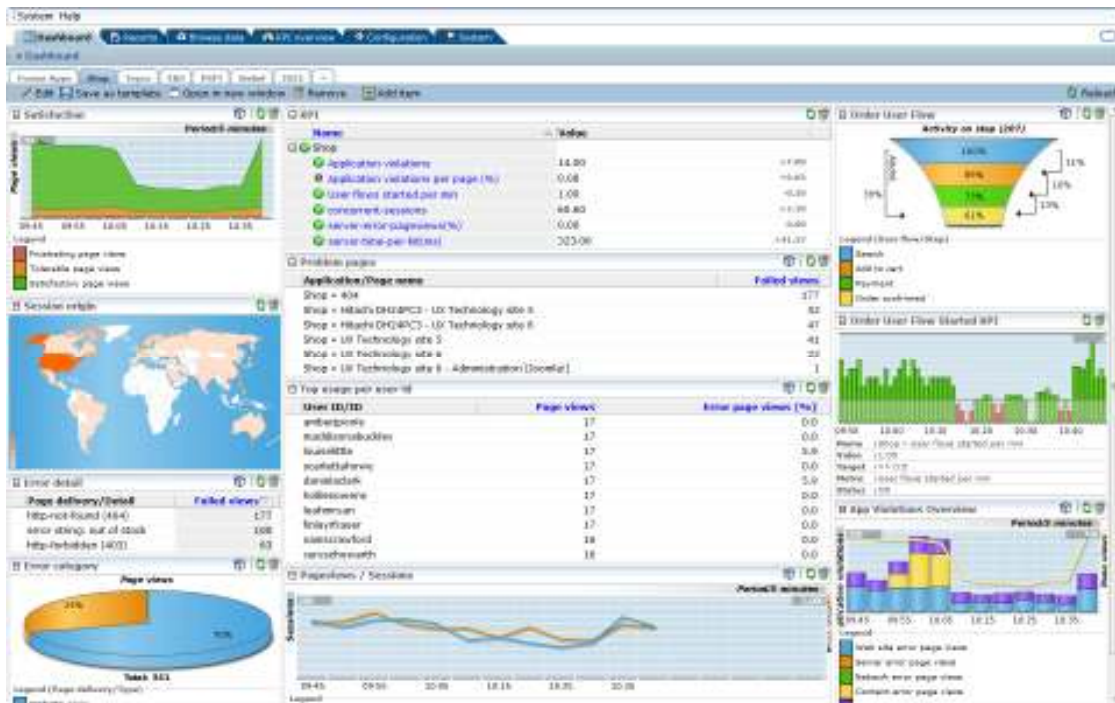


Figure 2. Oracle Enterprise Manager's Real User Experience Insight provides a complete view of actual user activity on your applications, allowing you to manage not only performance and availability but also quality of experience and end user behavior.

Business Transaction Management

Cross-tier and Cross-application transactions are modeled and traced end-to-end with the Oracle Business Transaction Management (BTM) product in a non-intrusive manner (i.e. no changes to the messages themselves). The transactions are automatically discovered by utilizing a patent pending finger printing algorithm or can be manually stitched together by leveraging custom properties in the message header or payload. These end-to-end transactions are then monitored in real-time, along with business KPI's extracted from the payload. Transactions can be searched for and aggregated to better trace, track, and troubleshoot problems.

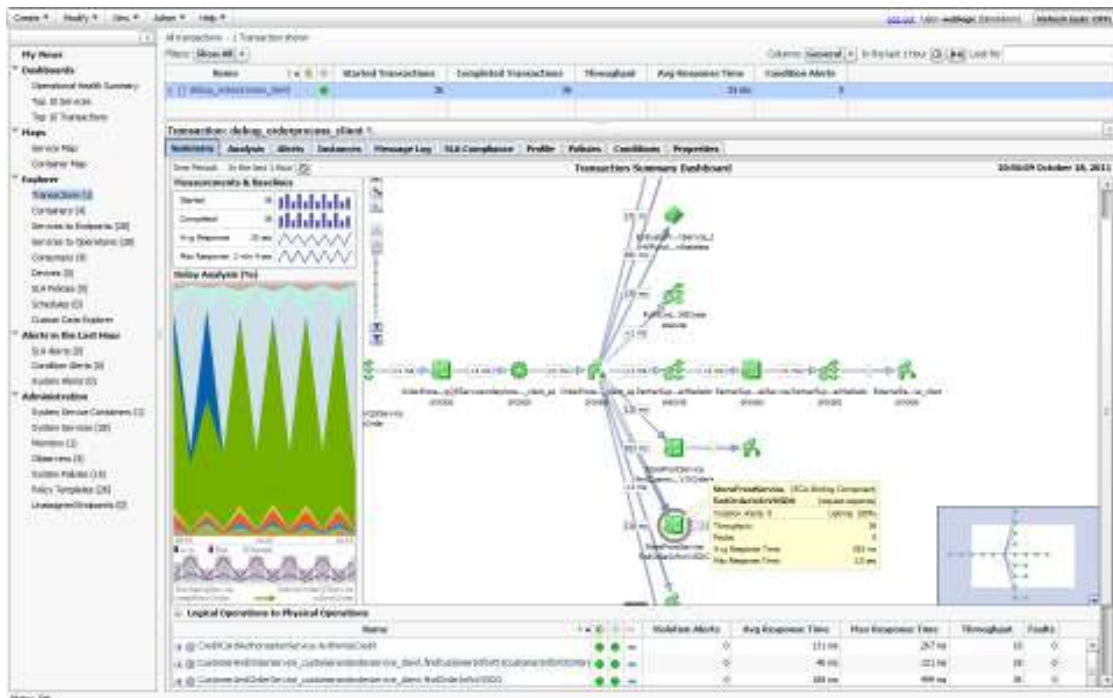


Figure 3. Oracle Enterprise Manager's Business Transaction Management discovers and monitors sync and async transactions, as they flow through multiple backend tiers.

Java and DB Diagnostics

Oracle Enterprise Manager includes deep dive diagnostics tools for Java and Oracle Databases. These tools are built to run in your production environment, with zero overhead and present no risk to the running application.

JVM Diagnostics samples the JVM heap and gives the user detailed insight into threads, locks, memory usage, and local variables usages. Operators can utilize this tool to identify the root cause of performance and functional problems. The tool provides historical and real time analysis, helping solve problems on the spot. The deployment of JVMD can be done from a central location, while the application is running, restart of the JVM or the App is not required. This unique capability allows operators to investigate and solve problems the first time they happen, even if the JVM is not monitored at the time the application starts.

Oracle Database 11g includes a self-diagnostic engine built right into the Database kernel that completely liberates administrators from the complex and arduous task of diagnosing performance problems. Whether you are managing one or many databases, the database performance management features built into the Oracle database offers a complete, cost effective, and easy to use solution for managing the performance your Oracle Database environment. When used as part of Oracle Enterprise Manager, Diagnostics Pack additionally provides enterprise-wide performance and availability reporting, a centralized performance repository, and valuable cross-system performance aggregation, significantly simplifying the task of managing large sets of databases.

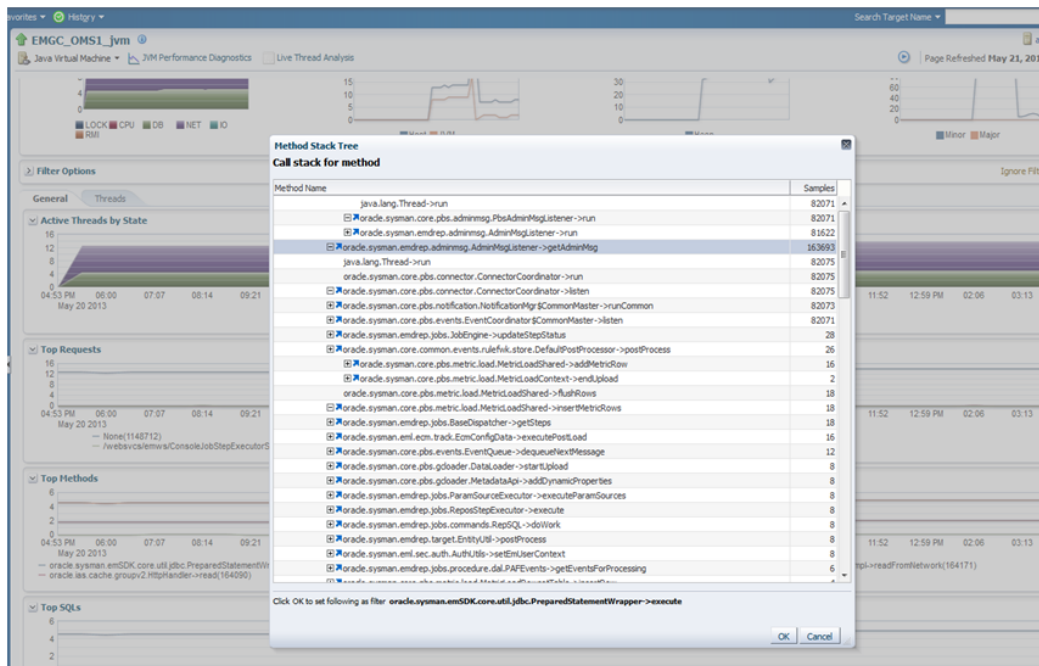


Figure 4. Oracle Enterprise Manager's JVM Diagnostics provides detail information for each thread executed by the JVM

Discovery and configuration management

Oracle Enterprise Manager discovers target application, application component, and transaction models via a combination of configuration file analysis, JMX and Byte Code Instrumentation.

Enterprise Manager discovers and model these key attributes and dependencies:

- Discover both Static dependencies and Dynamic dependencies
- Discover and model the application component and service dependencies as distinct from the system dependencies.
- System dependencies are statically discovered and stored in the CMDB. Application and service dependencies are generally dynamically discovered (based on execution context), and are associated with configuration items in the CMDB model
- The relationship between virtual machines and their host servers.

Detailed configuration settings are collected periodically. Changes in configuration are reported and can be alerted on.

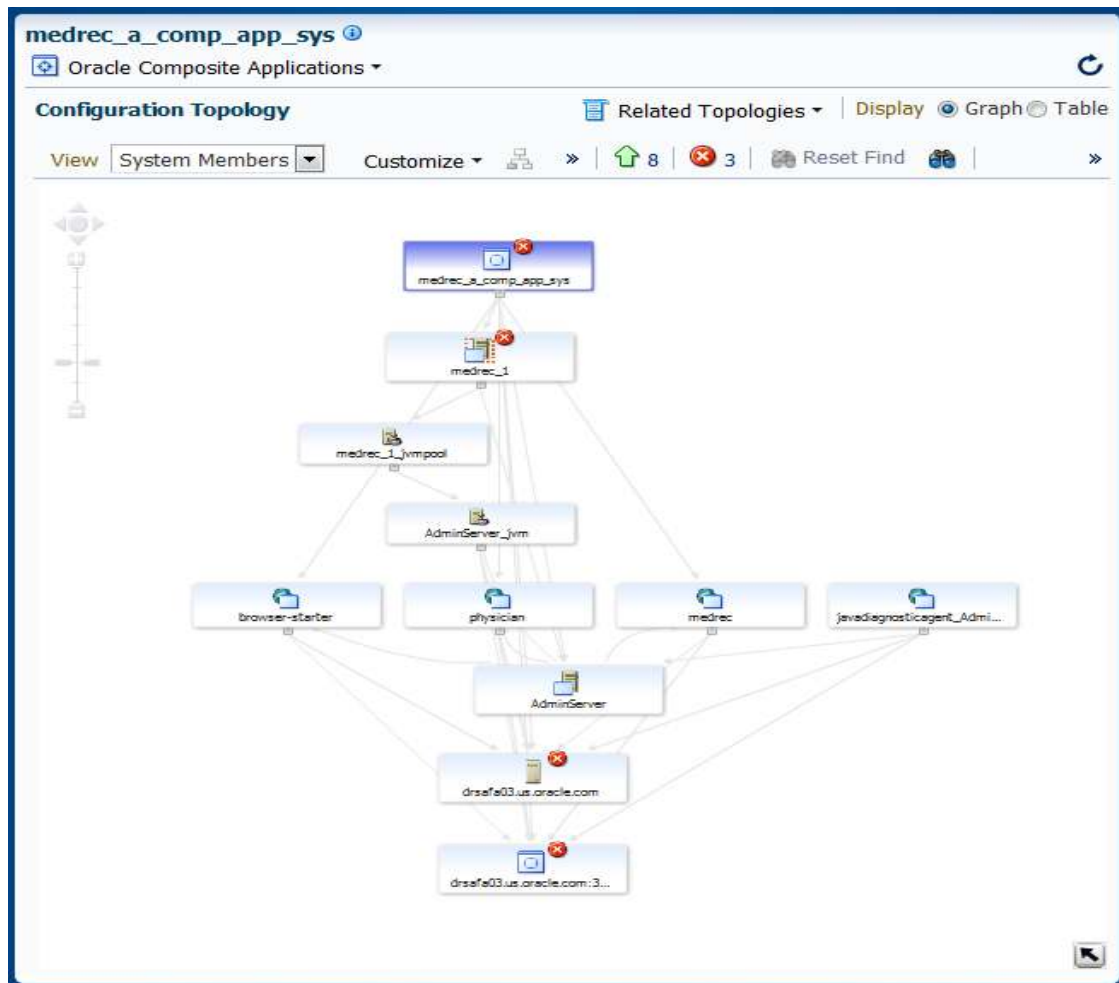


Figure 5. Oracle Enterprise Manager discovers target application, application component, and transaction models

Analytics and Reporting

RUEI, BTM, the infrastructure monitoring, and Java/DB Diagnostics, collect and store large amounts of monitoring data. This data is summarized and transferred into a performance warehouse database. Oracle Enterprise Manager is integrated with Oracle Business Intelligence Publisher (BI Publisher) which utilizes this database for analytics and reporting.

BI Publisher is Oracle's enterprise reporting server for authoring, managing, and delivering all types of highly formatted documents (including performance analytics reports). End users can easily design report layouts directly in a Web browser or using familiar desktop tools, dramatically reducing the time and cost needed to develop and maintain reports. Built on open standards, IT staff and developers can create sharable data models against practically any data source and use BI Publisher APIs to build custom applications leveraging existing data sources and infrastructure. Extremely efficient and highly

scalable, BI Publisher can generate tens of thousands of documents per hour with minimal impact to transactional systems.

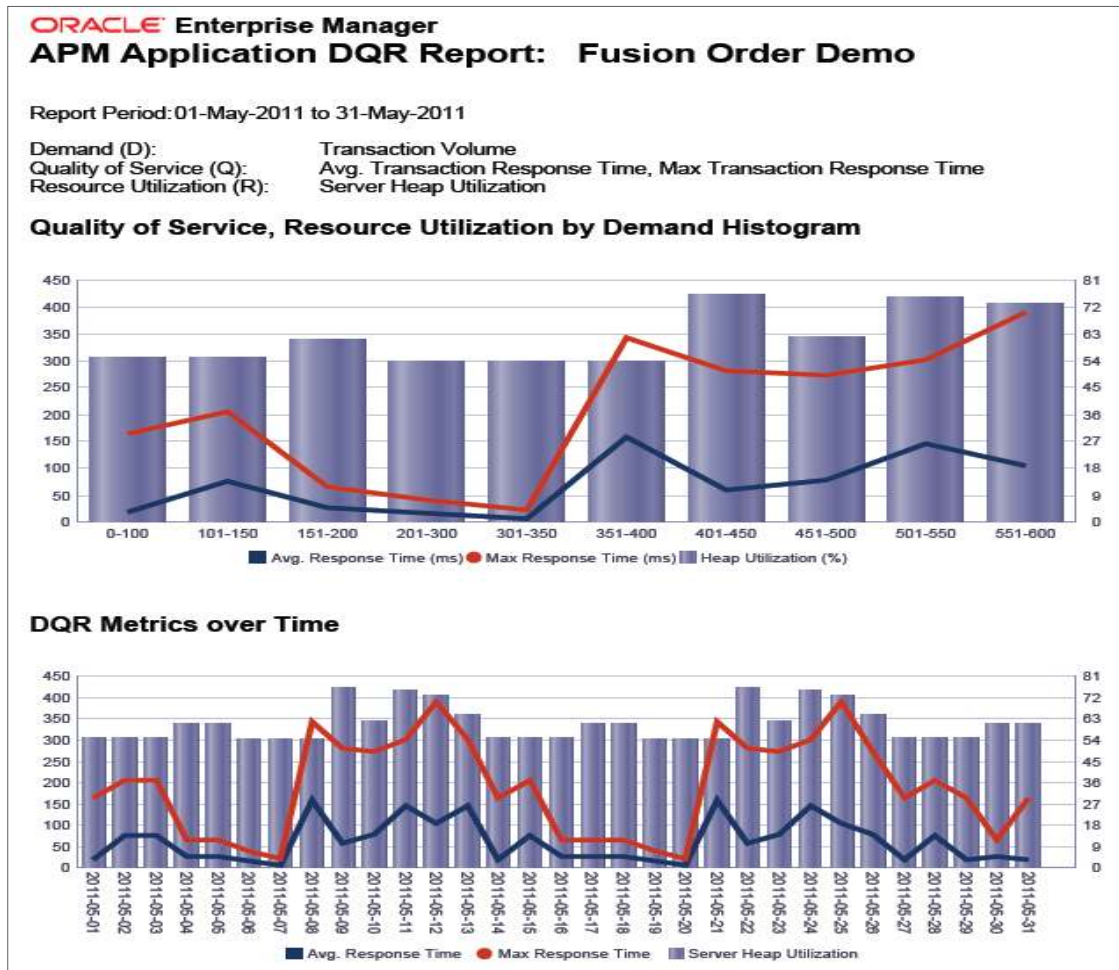


Figure 6. Oracle Enterprise Manager utilizes Oracle BI to report and analyze data across multiple domains

Another important analytics capability is provided by Oracle Enterprise Manager Real User Experience Insight. The real user monitoring data collected presents the richest combination of business and performance data that can be used to perform sophisticated usage trending analysis in addition to performance diagnostics. The data is stored in a cube structured database that enables the built-in monitoring views to be structured according to business data (e.g. customer location, line of business, customer type). Built-in console reports can then expose performance metrics sliced by any available criteria. Real User Experience Insight provides a wide range of out-of-box reports including the Business Transaction Funnel Report and User Satisfaction Report.

Conclusion

With ever growing datacenter size and complexity, and ongoing pressure to reduce operation costs, IT organizations need to become more effective. When it comes to Application Management, the only way to effectively maintain the required service level is to manage the business applications based on business matrices. Oracle Enterprise Manager delivers Business Driven Application Performance Management, by monitoring User Experience and Business Transactions. Integrating these business metrics with infrastructure monitoring, Enterprise Manager provides IT operators, managers, and developers with a business perspective status of the monitored application, powerful triage capabilities, and deep diagnostics tools, working together to minimize downtime and ensure effective utilization of the IT resources.



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