

ORACLE ENTERPRISE MANAGER 10^g ORACLE DIAGNOSTICS PACK

KEY FEATURES AND BENEFITS

- Automatic Performance Diagnostic liberates administrators from this complex and time consuming task, and ensures quicker resolution of performance bottlenecks
- Automatically maintained workload history facilitates historical performance analysis
- Comprehensive System Monitoring, Dynamic Metric Baselines, Advanced Event Notification, and Monitoring Template Support reduce management cost and help deliver better quality of service.

Oracle Diagnostics Pack, a part of the Oracle Database 10g product set, offers a comprehensive set of automatic performance diagnostics and monitoring functionality built into core database engine and Oracle Enterprise Manager. Whether you are managing one or many databases, Oracle Diagnostic Pack offers a complete, cost effective, and easy to use solution for managing the performance your Oracle Database environment. When used as part of Enterprise Manager Grid Control, Diagnostic Pack additionally provides enterprise-wide performance and availability reporting, a centralized performance repository, valuable cross-system performance aggregation, and monitoring templates support that significantly simplifies the task of managing large sets of databases and other targets.

Automatic Performance Diagnostics

Diagnosing a slowly performing system is a time consuming task often surrounded by myths and legends, few of them based on fact. A number of third party tuning tools are available today but few of them are geared towards answering common questions such as 'How can I make the biggest improvements in the system?' or 'Why is the system slower today than it was last week?' Most products simply provide a graphical display of raw database statistics, leaving users to determine the root cause on their own by drilling through large amounts of raw data. Even with the best of tools, this can be a complex and tedious task.

Oracle Diagnostics Pack 10g includes a self-diagnostic engine built right into the Oracle Database 10g kernel, called the Automatic Database Diagnostic Monitor (ADDM). This is a revolutionary, first of its kind performance self-diagnostic solution that enables the Oracle Database 10g to automatically diagnose its performance problems, thereby completely liberating administrators from this complex and arduous task.

ADDM periodically examines the state of the database, automatically identifies potential database performance bottlenecks, and recommends corrective actions. This is all done within a few seconds with negligible impact on overall system performance. Oracle Enterprise Manager presents ADDM's findings and recommendations in a convenient and intuitive fashion, and guides administrators step-by-step to quickly resolve performance problems by implementing ADDM's recommendations.

ADDM starts its analysis by focusing on the activities that the database is spending

most time on and then drills down through a sophisticated problem classification tree to determine the root causes of problems. ADDM's ability to discover the actual cause behind performance problems, rather than just reporting symptoms, is just one of the several factors which makes it much superior to any other Oracle database performance management tool or utility. The problem classification tree used by ADDM encapsulates decades of performance tuning experience of Oracle's own performance experts and it has been specifically designed to accurately diagnose the most frequently seen problems, such as CPU/IO bottlenecks, poor connection management, undersized memory, resource intensive SQL statements, lock contention, etc. Each ADDM finding has an associated impact and benefit measure to enable prioritized handling of the most critical issues.

Performance Analysis

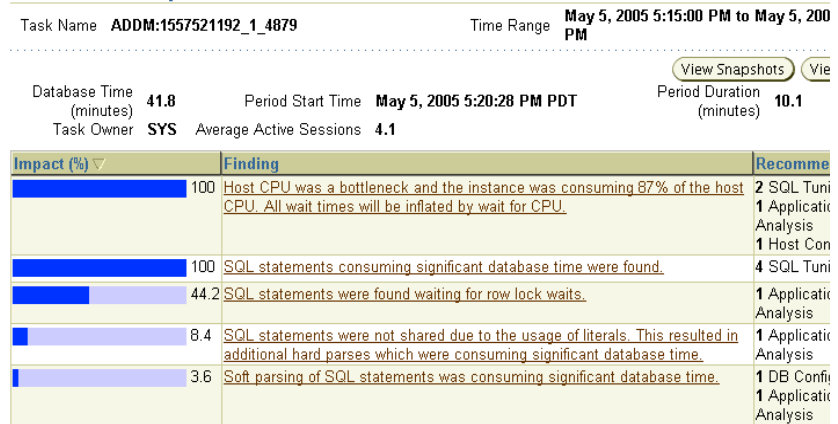


Figure 1: ADDM performance diagnostics findings displayed in Enterprise Manager

In addition to reporting potential performance issues, ADDM also documents the non-problem areas of the system. Sub-components that are not significantly impacting the performance of the system are pruned from the classification tree at an early stage. Administrators can quickly identify areas where there is little or no overall performance gain, thus saving time and effort. Finally, as stated earlier, ADDM is implemented right inside the core database engine, which makes it the most efficient and accurate performance diagnostic solution for Oracle Database 10g.

Automatic Workload Capture

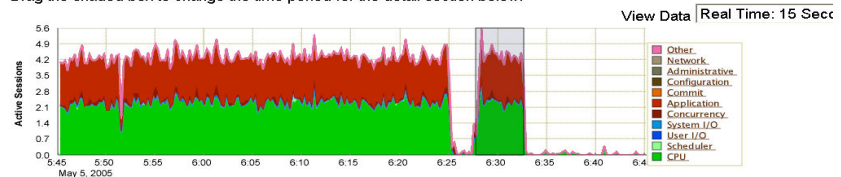
To enable ADDM to accurately diagnose performance problems, it is important that it has detailed knowledge of database activities and the workload the database is supporting. Oracle10g Diagnostics Pack, therefore, includes a built in repository within every Oracle10g database, called Automatic Workload Repository (AWR), which contains operational statistics about that particular database and other such information. At regular intervals (once an hour by default), the Oracle Database 10g takes a snapshot of all its vital statistics and workload information and stores them in AWR. This information is retained in AWR for a given period of time (one week by default) before being purged. The frequency at which snapshot are made as well as their retention period can both be customizable to suit unique needs of different environments.

AWR is designed to be lightweight and to automatically manage its use of storage space, ensuring that it does not put any additional management burden on administrators.

AWR forms the foundation for all the self-management functionality of Oracle Database 10g. It is the source of information that gives the Oracle Database 10g an historical perspective on how it is being used and enables it to make decisions that are accurate and specifically tailored for the environment that system is operating in. For database administrators, AWR provides a wealth of information about the database performance and workload, out-of-the-box. Those using *Statspack*, or other similar data capture capabilities, should find AWR very attractive. AWR captures all of the data previously captured by Statspack and much more.

Top Activity

Drag the shaded box to change the time period for the detail section below.



Detail for Selected 5 Minute Interval

Start Time May 5, 2005 6:27:47 PM PDT

Top SQL			Top Sessions			
Select All Select None	SQL ID	SQL Type	Activity (%)	Session ID	User Name	Pro
<input type="checkbox"/>	g0fyfq5fatsbh	UPDATE	41.16	258	DWH_TEST	sqlp (TN:
<input type="checkbox"/>	gqt76mt3amcy	SELECT	21.33	252	DWH_TEST	sqlp (TN:
<input type="checkbox"/>	fp6zqdsmg0swt	SELECT	17.45			
<input type="checkbox"/>	1uk5m5qbj1vt	PL/SQL EXECUTE	.87	255	CUST01	sqlp (TN:
<input type="checkbox"/>	bxwy3b20r5mgb	ALTER SYSTEM	.32	256	CUST02	sqlp (TN:
<input type="checkbox"/>	c1599tjmzu1fc	PL/SQL	.24	227	PBEL	sqlp (TN:

Figure 2: Historical performance analysis using AWR data

The information stored in AWR also facilitates historical performance analysis. AWR contains all required information to draw a complete picture of database activities at any given time in the past. This enables easy diagnosis of transient problems that may be difficult to recreate. The findings and recommendation of ADDM are also stored in AWR and are retained for the duration of snapshot retention period. This makes the task of determining the cause of a reported performance problem that occurred at a time in the past extremely simple. Just a quick look at the ADDM output for the relevant time period is all that is needed.

Comprehensive System Monitoring

Oracle Diagnostics Pack 10g includes powerful technologies that automate the monitoring of the complete environment and make the required information readily available to administrators. It automatically examines the vital signs of different components, such as database and host operating system, and stores the required historical information to provide administrators a long-term view of their system behavior and help them administer service level goals more effectively. For example, one quick look at the Enterprise Manager screen (Figure 3) tells the administrator whether the availability related service level goals are being met or not. If not, just another mouse click provides all the details regarding any planned

and unplanned outages.

When used as part of Enterprise Manager 10.2 Grid Control, the Diagnostics Pack supports Monitoring Templates that can be used for setting up monitoring of large number of targets of the same type (or groups). Monitoring template support greatly simplifies the task of managing many targets in an enterprise system by providing rich functionality to specify policy settings, metrics, alert thresholds, schedules, and corrective actions that can be taken to remedy alert situations.

Oracle Diagnostics Pack 10g also provides administrators with a rich set performance related information to help them better understand what is currently going on in their system. The new performance pages in Oracle Enterprise Manager 10g display information about the running of the database and the host system in a manner that is easily absorbed and allows for rapid manual drilldown to the source of the problem.

Availability: database

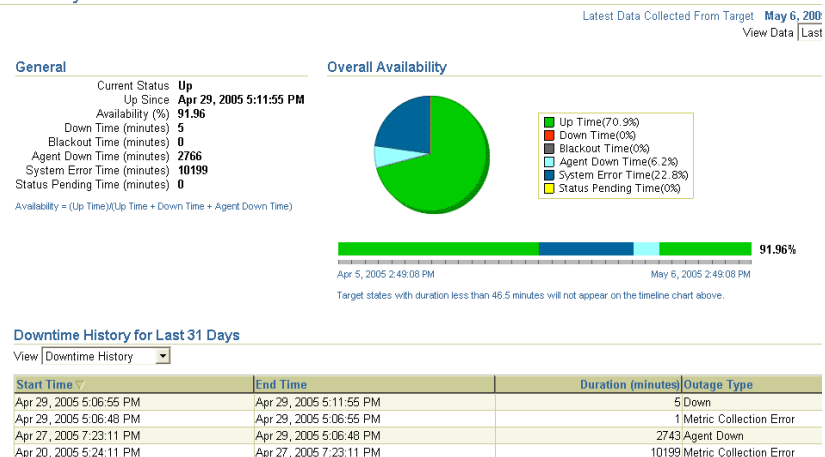


Figure 3: Enterprise Manager event/metric history

Organized in three sections, the Database Performance Page displays host information, user activity and throughput information on a common screen, for easy correlation. With this information the DBA can verify that the machine has ample CPU and memory resources available before analyzing the database. Then the database health can be assessed from the Active Sessions graph that shows how much CPU the users are consuming and if there are users waiting for resources instead of running on the CPU. Finally the page shows a throughput graph that can be used to correlate if throughput is affected by machine resources, CPU consumption, or resource contention.

The database performance page also contains several links to provide quick access to charts showing top resource activity by various dimensions (“Top SQL”, “Top Sessions”, Top Consumers”), a summary of instance activities, and database locking information. Further, “Memory-Based” or “Direct Access” performance monitoring that allows for diagnosing extremely slow moving or hung databases is also supported for 10.2 Oracle databases. When a database is slow moving or hung, traditional SQL-based monitoring techniques cannot be used since connection to the database might not be possible or the issued SQL might cause additional load on the

system. ORADEBUG Hang Analysis, a utility traditionally used by support to diagnose hung systems is also integrated into EM Memory-Based monitoring mode. It provides a graphical view of hung sessions along with appropriate details.

The Host Performance Page provides a quick glimpse of the CPU, memory and disk bandwidth utilization at the machine level. Using the information presented on this page and associated drilldowns, the administrator can find out the details regarding how machine resources are being used and which user or application are consuming most system resources.

These powerful monitoring capabilities of the Oracle Diagnostics Pack 10g can be used with all supported versions of Oracle Database software, including Oracle9i.

Advanced Event Notification

Enterprises require early problem detection in order to ensure timely resolution, but over-alerting has historically plagued too many systems with high overhead and false alarms. The Oracle Database 10g provides a built-in, push-based alerting mechanism that is extremely efficient and accurate. Oracle Database 10g's server-generated alerts along with Enterprise Manager's sophisticated adaptive alert threshold setting, metric baselines, and event notification system provide the foundation to a complete performance monitoring and proactive database administration system.

Adaptive alert thresholds help setup system accurately for alerts with minimal configuration based on statistical significance and prior observation of the system such as based on time of the day or week, moving time window etc. Enterprise Manager Grid Control also supports *dynamic* metric baselines. A "baseline" of workload performance metrics (that define the workload running on the system in terms its type or shape and volume) can be taken when the performance is normal or good. The "baseline" can be then used to compare to the workload metrics when performance is bad to diagnose the causes of poor performance or slowdown. The baseline can be defined as fixed/static based on a user specified time interval or dynamic based on partitioned moving window timeframe (e.g., by hour, day, or weekends over three weeks duration). Adaptive thresholds can then be set using a pre-defined baseline to accurately detect alert conditions when a system has predictably varying workloads, such as night-time batch processing and day-time OLTP. The metric baseline data is presented to end-users in a viewable manner by normalizing the data to its statistical significance so multiple metrics can be compared easily on a common Y-axis, and only significant event data is presented.

Oracle Diagnostics Pack 10g extends this alerting capability by allowing administrators to be notified when they are away from their desks. Enterprise Manager's *Notification Methods* allow administrators to specify different mechanisms for sending notifications, including e-mail, SNMP traps and running custom scripts or PL/SQL procedures. *Notification Rules* specify guidelines for "when" and "how" notifications should be sent. *Blackout* periods, temporary suspension of notification deliveries, can be specified to prevent false alerts being raised during scheduled maintenance operations.

ORACLE DIAGNOSTICS PACK 10G

The Oracle Diagnostics Pack for Database is integrated with the following Oracle Management applications:

- Management Packs for Database
 - Tuning Pack
 - Diagnostics Pack
 - Configuration Pack
 - Change Management Pack
- Management Packs for Application Server
 - Diagnostics Pack
 - Configuration Pack
- Stand Alone Management Packs
 - Service Level Management Pack
 - Configuration Management Pack for Non-Oracle Systems
 - Provisioning Pack
- Management Plug-ins
 - System Monitoring Plug-in for Hosts
 - System Monitoring Plug-in for Non-Oracle Databases
 - System Monitoring Plug-in for Non-Oracle Middleware
 - System Monitoring Plug-in for Network Devices
 - System Monitoring Plug-in for Storage

Management Connectors

Detailed information on these products can be located at www.oracle.com

As alerts are being generated, the Oracle Enterprise Manager framework provides an advice-driven intuitive response system that walks the administrator through alerts resolution, including capabilities to setup automated responses where appropriate.

Oracle Diagnostics Pack 10g's alert notification functionality is available for all supported versions of the Oracle Database software.

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