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ORACLE TUNING PACK FOR ORACLE DATABASE

Oracle Tuning Pack for Oracle Database offers an extremely cost effective and easy-to-use solution that automates the entire application tuning process. Enhancement of application performance is achieved through real-time monitoring of database operations and built-in tuning advisors that are seamlessly integrated into Oracle Database and Oracle Enterprise Manager. Together these database management solutions provide a comprehensive solution for automating the complex and time-consuming task of application tuning.

ORACLE
Enterprise Manager

THE NEED FOR OPTIMIZED PERFORMANCE TUNING

For database administrators and application developers, application tuning is a critically important area and a considerable amount of their time is spent performing this very important function. A poorly tuned business application can potentially affect not just a few users but an entire business operation and for this reason companies invest significant resources to ensure smooth running of applications vital for their businesses. However, database administrators and developers often use handcrafted scripts to address application performance issues. Although these scripts may resolve the symptoms manifested by the issue but it seldom addresses the root cause of a performance problem. The script-based approach has other inherent shortcomings. It is neither scalable nor does it stand the test of time as newer versions of the Oracle Database are released. As the number of databases in an organization increases the management of scripts becomes very tedious and error prone. Coupled with this, after every database upgrade there is a need to revisit the scripts and modify them to readjust to the changes in the database performance views.

FEATURES

- Database Operation Monitoring
- Real-Time SQL Monitoring
- SQL Tuning Advisor
- Automatic SQL Tuning
- SQL Access Advisor
- SQL Profiles
- In-Memory Advisor
- Object Reorganization

With ever-increasing data volume and user load, application performance often gets limited by the hardware it is running on forcing businesses to expensive hardware upgrades. With appropriate tuning tools and strategies, not only is the shelf life of the hardware extended but also the utilization of the hardware resources is optimized.

The Oracle Tuning Pack for Oracle Database addresses these problems and completely automates the database tuning process and since the tuning capabilities are built inside the database there is no impact due to database upgrades. The Oracle Tuning Pack also provides a cost-effective solution by reducing the organization's spending on hardware resources.

SQL AND DATABASE OPERATIONS MONITORING

The first step in SQL tuning is identifying a poor SQL that is consuming excessive system resources. Real-Time SQL Monitoring provides a very efficient way to identify and fix performance problems with long running SQL and PL/SQL statements. Any SQL statement running in parallel, or consuming at least 5 seconds of CPU or I/O time in a single execution is automatically monitored. Key performance metrics, including the elapsed time, CPU time, number of reads and writes, I/O wait time and various other wait times are automatically captured. But the ability to monitor a combination of SQL and PL/SQL running in a single session was not available.

Real-Time Database Operations Monitoring combines the capability to monitor both SQL and PL/SQL and allows an administrator to monitor long running database tasks such as batch jobs, ETLs etc. as a composite business operation. Live visual displays track the progress of SQL and PL/SQL queries associated with the business operation being monitored. Developers or DBAs can define business operations for monitoring by explicitly specifying the start and end of the operation or implicitly through the use of tags that identify the operation.
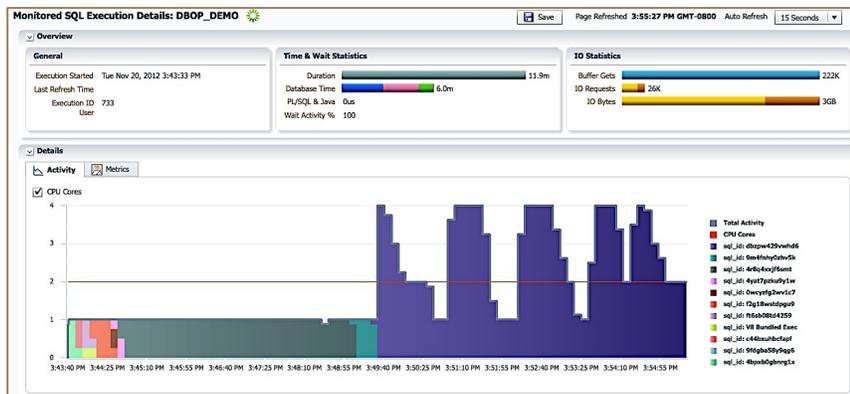

Figure1: Real Time Database Operations Monitoring

Real-Time SQL Monitoring, Database Operations Monitoring and Real-Time ADDM reports can be saved into the Automatic Workload Repository (AWR) which maintains performance statistics inside the database. This feature allows the administrator to go back in time and review a monitored execution of a query in the past. This is very useful in determining performance inconsistencies across executions of a particular SQL query.

COMPREHENSIVE AND TRANSPARENT SQL TUNING

SQL Tuning Advisor is Oracle's answer to all the pitfalls and challenges of manual SQL tuning. It automates the SQL tuning process by comprehensively exploring all the possible ways of tuning a SQL statement. The analysis and tuning is performed

by the database engine's significantly enhanced query optimizer. Six types of analysis are performed by the SQL Tuning Advisor:

Statistics Analysis: In this analysis, objects with stale or missing statistics are identified and appropriate recommendations are made to remedy the problem.

SQL Profiling: This feature revolutionizes the approach to SQL tuning. SQL profiling tunes SQL statements transparently without requiring any change to the application code.

Access Path Analysis: In this analysis, the Advisor recommends new indexes that can significantly enhance query performance.

SQL Structure Analysis: Here, the Advisor suggests re-writes of SQL constructs based on poorly written SQL that may be the source of performance problems.

Degree of Parallelism: The SQL Tuning Advisor recommends options to improve SQL performance by taking advantage of system resources by employing parallel slaves at certain stages of the execution.

Alternative plans: In this analysis, the SQL Tuning Advisor helps application recover from SQL query regressions by identifying alternate execution plans using real-time and historical performance data.

The output of these analyses is in the form of recommendations, along with a rationale for each recommendation and its expected performance benefit.

The SQL Tuning Advisor offers a powerful, intuitive, and user-friendly way for performing SQL tuning. Tuning of SQL statements no longer has to be the domain of experts. Oracle has built a tuning expert inside the database engine to perform this very important function for database administrators in a fraction of the time and cost needed to carry out the same task manually.

AUTOMATIC SQL TUNING

The SQL Tuning Advisor also runs in automatic mode. In this mode, the advisor runs automatically during system maintenance windows as a maintenance task. During each run, the advisor selects high-load SQL queries in the system, and generates recommendations on how to tune them.
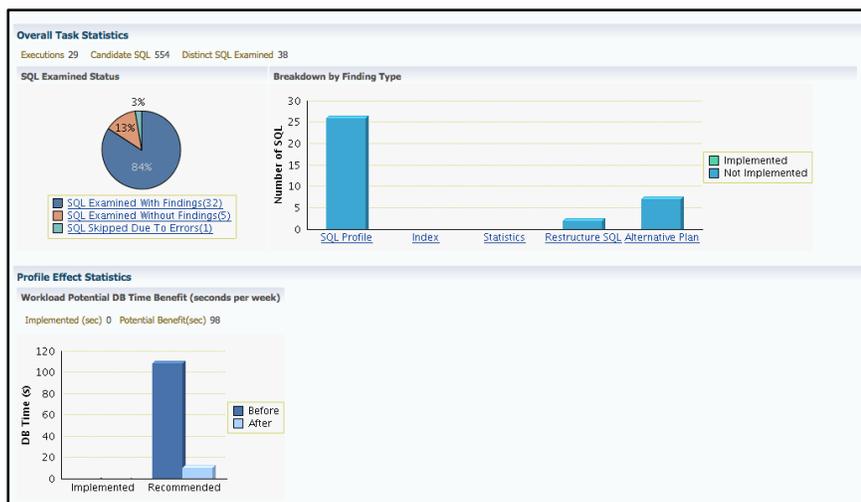

Figure2: Automatic SQL Tuning Results Summary

The Automatic SQL Tuning Advisor can be configured to automatically implement SQL profile recommendations. If you enable automatic implementation, the advisor will create SQL profiles only for those SQL statements where performance improvement would be at least threefold. Other types of recommendations such as to create new indexes, refresh optimizer statistics or restructure SQL can only be implemented manually. DML statements are not considered for tuning by the Automatic SQL Tuning Advisor.

You can view a summary of the automatic SQL tuning results over a specified period, and can view a detailed report on recommendations made for all SQL statements processed. A manual process can then implement the recommendations selectively. You can also view the recommendations that were automatically implemented

OPTIMIZING SCHEMA THROUGH ACCESS STRUCTURE DESIGN

The design of the database schema can have a big impact on overall application performance. SQL Access Advisor provides comprehensive advice on how to optimize schema design in order to maximize application performance. The SQL Access and SQL Tuning Advisors together provide a complete solution for tuning database applications. The SQL Access Advisor accepts input from all possible sources of interest, such as the database memory i.e. cursor cache, the Automatic Workload Repository (AWR), any user-defined workload, and will even generate a hypothetical workload if a schema contains dimensions or primary/foreign key relationships. It comprehensively analyzes the entire workload and provides recommendations to create new partitions or indexes, drop any unused indexes, create new materialized views and materialized view logs. Determining the optimal partitioning or indexing strategy for a particular workload is a complicated process that requires expertise and time. SQL Access Advisor can recommend range, hash, interval and list-based partition schemes along with btree and bitmap indexes. SQL Access Advisor considers the cost of insert/update/delete operations in addition to the queries on the workload and makes appropriate recommendations, accompanied by a quantifiable measure of expected performance gain as well as scripts needed to implement the recommendations. The SQL Access Advisor takes the mystery out of access structure design process. By automating this very critical function; SQL Access Advisor obviates the need for the error-prone, lengthy, and expensive manual tuning process

IN-MEMORY ADVISOR

Database In-Memory is an In-Memory column store which accelerates database performance by orders of magnitude for analytics, data warehousing, and reporting while also speeding up online transaction processing. Part of the Oracle Tuning Pack, the Database In-Memory Advisor analyzes your workload and makes recommendations on which database objects to place in the In-Memory column store for optimal performance. The In-Memory Advisor reports on which objects to place In-Memory and the expected benefit, along with the required commands to implement the recommendations. The Advisor enables a quick and easy implementation of Database In-Memory.

OBJECT REORGANIZATION

Oracle Tuning Pack also provides the ability to reorganize objects. Managing the space usage of your tablespaces efficiently by removing wasted space is not only a good space management practice but it also enhances performance by reducing unnecessary disk I/Os. Reorganization is used for: 1) rebuilding indexes and tables that are fragmented, 2) relocating objects to another tablespace, and 3) recreating objects with optimal storage attributes.

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