

ORACLE TUNING PACK 11G

KEY FEATURES:

- SQL Tuning Advisor
- Automatic SQL Tuning Advisor
- SQL Profiles
- SQL Access Advisor
- SQL Tunings Sets
- Object Reorganization Wizard

KEY BENEFITS:

- Comprehensive solution for application and SQL tuning that eliminates need for manual tuning.
- Provides automatic tuning of SQL statements.
- Enhances system performance and reliability and significantly lowers management costs.

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. Oracle Tuning Pack, a part of Oracle Database 11g product set, offers an extremely cost effective and easy-to-use solution that automates the entire application tuning process. Enhancement of SQL performance is achieved through SQL Advisors that are seamlessly integrated with the Enterprise Manager Database Control and Grid Control, and together provide a comprehensive solution for automating the complex and time-consuming task of application tuning.

SQL Tuning Advisor

Manual SQL tuning is a complex process that presents many challenges. It requires expertise in several areas, is very time consuming, and requires an intimate knowledge of the schema structures and the data usage model of the application. All these factors make manual SQL tuning a challenging and resource intensive task that is ultimately very expensive for businesses.

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. Four types of analysis are performed by the SQL Tuning Advisor:

- **Statistics Analysis:** The query optimizer needs up-to-date object statistics to generate good execution plans. In this analysis objects with stale or missing statistics are identified and appropriate recommendations are made to remedy the problem.
- **SQL Profiling:** This feature, introduced in Oracle Database 10g, revolutionizes the approach to SQL tuning. Traditional SQL tuning involves manual manipulation of application code using optimizer hints. SQL Profiling eliminates the need for this manual process and tunes the SQL statements without requiring any change to the application code. This ability to tune SQL without changing the application code also helps solve the problem of tuning

packaged applications. Packaged application users now no longer need to log a bug with the application vendor and wait for several weeks or months to obtain a code fix for tuning the statement. With SQL profiling the tuning process is automatic and immediate.

- **Access Path Analysis:** Indexes can tremendously enhance performance of a SQL statement by reducing the need for full table scans. Effective indexing is, therefore, a common tuning technique. In this analysis new indexes that can significantly enhance query performance are identified and recommended.
- **SQL Structure Analysis:** Problems with the structure of SQL statements can lead to poor performance. These could be syntactic, semantic, or design problems with the statement. In this analysis relevant suggestions are made to restructure selected SQL statements for improved performance.

The output of this analysis is in the form of recommendations, along with a rationale for each recommendation and its expected performance benefit. The recommendation relates to collection of statistics on objects, creation of new indexes, restructuring of the SQL statement, or creation of a SQL Profile. A user can choose to accept the recommendation to complete the tuning of the SQL statements.

The screenshot shows the 'SQL Tuning Results: REGRESSIONTEST1' page. At the top right, it says 'Page Refreshed May 29, 2007 7:27:56 PM PDT' with a 'Refresh' button. The status is 'COMPLETED', started on 'May 1, 2007 3:15:26 AM', and completed on 'May 1, 2007 3:15:54 AM'. Tuning Set Owner is 'APPS', Tuning Set Name is 'HR_WORKLOAD', Time Limit (seconds) is '1800', and Running Time (seconds) is '28'. Below this is a 'Recommendations' section with a 'View' button and 'Implement All Profiles' link. The main table has columns: 'Select SQL Text', 'Parsing Schema', 'SQL ID', 'Statistics', 'SQL Profile', 'Index', 'Restructure SQL', 'Miscellaneous', and 'Error'. Three rows of recommendations are visible, each with a radio button and checkmarks in the 'SQL Profile' and 'Restructure SQL' columns.

Select SQL Text	Parsing Schema	SQL ID	Statistics	SQL Profile	Index	Restructure SQL	Miscellaneous	Error
<input checked="" type="radio"/> SELECT /* my_query_14_scott */ /*+ ORDERED INDEX(t1) USE_HASH(t1) */ 'B' t2.pg_featurevalue_0...	APPS	2wtgqbjz6u2hy		✓		✓	✓	
<input type="radio"/> SELECT /* my_query_1_scott */ DISTINCT 'B' t1.pg_featurevalue_15_id pg_featurevalue_15_id FRO...	APPS	1h3c2y092ds9d		✓			✓	
<input type="radio"/> SELECT /* my_query_4_scott */ DISTINCT 'B' t1.pg_featurevalue_47_id pg_featurevalue_47_id FRO...	APPS	ftp9za0hqk2km		✓			✓	

Figure 1: SQL Tuning Advisor recommendations page.

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 the database administrators in a fraction of the time and cost needed to carry out the same task manually.

Automatic SQL Tuning Advisor

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.

The Automatic SQL Tuning Advisor can be configured to auto-implement SQL Profile recommendations. If you enable automatic implementation, the advisor will create SQL Profiles for only 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 (such as the previous seven days), and can view a detailed report on recommendations made for all SQL statements processed. The recommendations can then be implemented selectively by a manual process. You can also view the recommendations that were automatically implemented.

The Automatic SQL Tuning Advisor can be configured to run in any maintenance window or can be disabled altogether if desired.



Figure 2: Automatic SQL Tuning Report.

SQL Tuning Sets

The SQL Advisors are designed to accept input from several SQL sources, such as Automatic Database Diagnostic Monitor (ADDM), Automatic Workload Repository (AWR), cursor cache, and custom SQL as defined by the user. This enables the tuning of practically all SQL statements that would be of interest to a user. SQL statements from these input sources are typically first loaded in a new object called SQL Tuning Set, which is then submitted as input to the advisor.

A SQL Tuning Set (STS) is a new database object used for capturing SQL workload information. It includes:

- One or more SQL statements
- Associated execution context, such as user schema, list of bind values, etc.
- Associated basic execution statistics, such as elapsed time, CPU time, etc.

Database Instance: orcl > Logged in As SYSTEM

SQL Tuning Sets

Page Refreshed May 29, 2007 7:45:58 PM PDT

A SQL Tuning Set is a collection of SQL Statements that can be used for tuning purposes.

Search
Filter on a name or partial name

	<input type="button" value="Details"/>	<input type="button" value="Drop"/>	<input type="button" value="Export"/>	<input type="button" value="Schedule SQL Tuning Advisor"/>	<input type="button" value="Schedule SQL Access Advisor"/>	
Select	Name	Schema	Description	SQL Count	Created	Last Modified ▾
<input checked="" type="radio"/>	HR_WORKLOAD	APPS	HR SQL Workload	50	4/6/07 6:22 PM	4/6/07 6:22 PM

Related Links

[SQL Performance Analyzer](#)

Figure 3: Managing SQL Tuning Sets.

SQL Tuning Sets provide the basic framework for capturing, managing, and tuning of SQL workloads. They allow selective, on-demand tuning of system generated and custom (user-defined) workloads and greatly simplify the task of tuning multiple SQL statements. With SQL Tuning Sets, users can capture any SQL statements of interest and store them in an STS for future tuning. They no longer need to manually build and maintain SQL scripts for tuning purposes. Furthermore, information pertaining to execution context and statistics that is captured in an STS allows for more superior and efficient tuning than would be possible from any custom SQL script.

SQL Access Advisor

The design of the database schema can have a big impact on the overall application performance. SQL Access Advisor, provides comprehensive advice on how to optimize schema design in order to maximize application performance. SQL Access and SQL Tuning Advisors, together, provide a complete solution for tuning database applications. These two advisors automate all manual-tuning techniques currently practiced and form the core of Oracle's automatic SQL tuning solution.

The SQL Access Advisor accepts input from all possible sources of interest, such as the 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 if required, 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 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.

Figure 4 shows the SQL Access Advisor recommendations page. The recommendations are ordered by the workload improvement factor. User can select one or all of the recommendations and implement them by simply clicking the *Implement* button.



Figure 4: SQL Access Advisor Recommendations page.

The SQL Access Advisor takes the mystery out of access structure design process. It tells the user exactly what the type of indexes, partitions, and materialized views are required to maximize application performance. By automating this very critical function, SQL Access Advisor obviates the need for the error-prone, lengthy, and expensive manual tuning process. It is fast, precise, easy-to-use and, together with the SQL Tuning Advisor, offers the most accurate and cost-effective solution for application performance tuning.

Object Reorganization Wizard

Oracle Tuning Pack 10g 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:

- Rebuilding indexes and tables that are fragmented
- Relocating objects to another tablespace
- Recreating objects with optimal storage attributes

Oracle Tuning Pack 10g provides a wizard than can perform reorganization at schema and tablespace levels, and gives the option for both online and offline reorganization. The wizard also provides an impact analysis report as well as a review script that contains the exact operations that will be performed. This helps

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RELATED PRODUCTS AND SERVICES:

Oracle Diagnostics Pack 11g delivers maximum benefits when used with the following Oracle products:

- Oracle Diagnostics Pack

users to precisely understand the implications of the operation before implementing it. Figure 5 shows the Reorganization wizard EM interface.

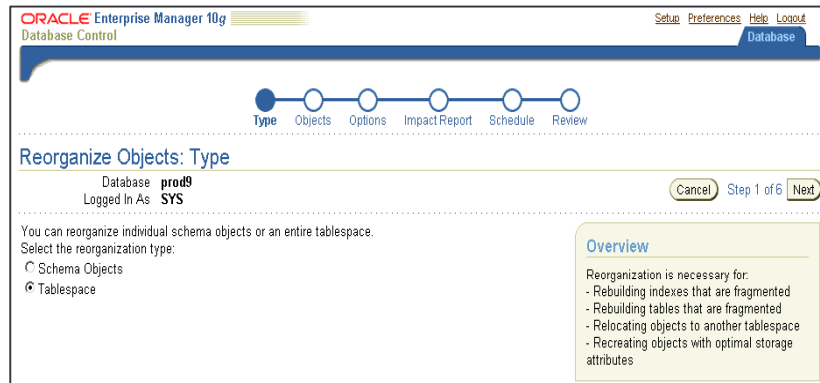


Figure 5: Object Reorganization Wizard

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