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SQL Tuning in Oracle 10g: The Do's and Don'ts

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Database Manageability
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Outline

- Introduction
- Manual Tuning Challenges
- SQL Tuning & Access Advisor Overview
- SQL Tuning Advisor
 - Automatic SQL Tuning
 - Usage scenarios
 - User interface
- SQL Access Advisor
 - Usage scenarios
 - User interface
- Tips, Do's, Don'ts
- Conclusion

Introduction

- Automatic SQL Tuning solution consists of
 - SQL Tuning Advisor
 - SQL Access Advisor
- Provides comprehensive, automatic, and cost-effective solution for application tuning
- Reduces SQL tuning time by up to 80%
- Reduces management cost

Manual Tuning Challenges

- Requires expertise in several domains
 - SQL optimization: adjust the execution plan
 - Access design: provide fast data access
 - SQL design: use appropriate SQL constructs
- Time consuming
 - Each SQL statement is unique
 - Potentially large number of statements to tune
- Never ending task
 - SQL workload always evolving
 - Plan regressions

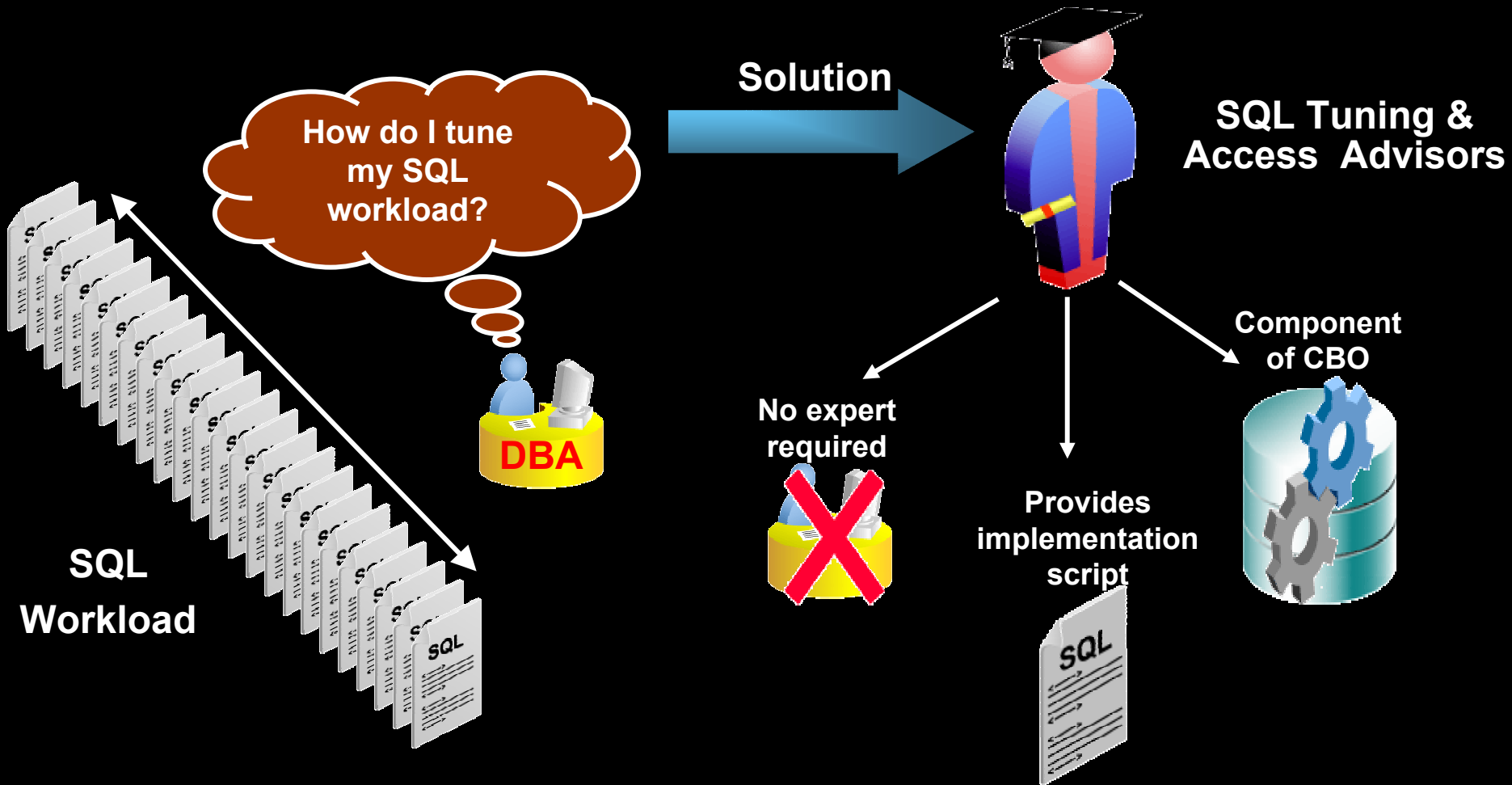
Manual Tuning Example

Packaged App Tuning Scenario

Manual Tuning

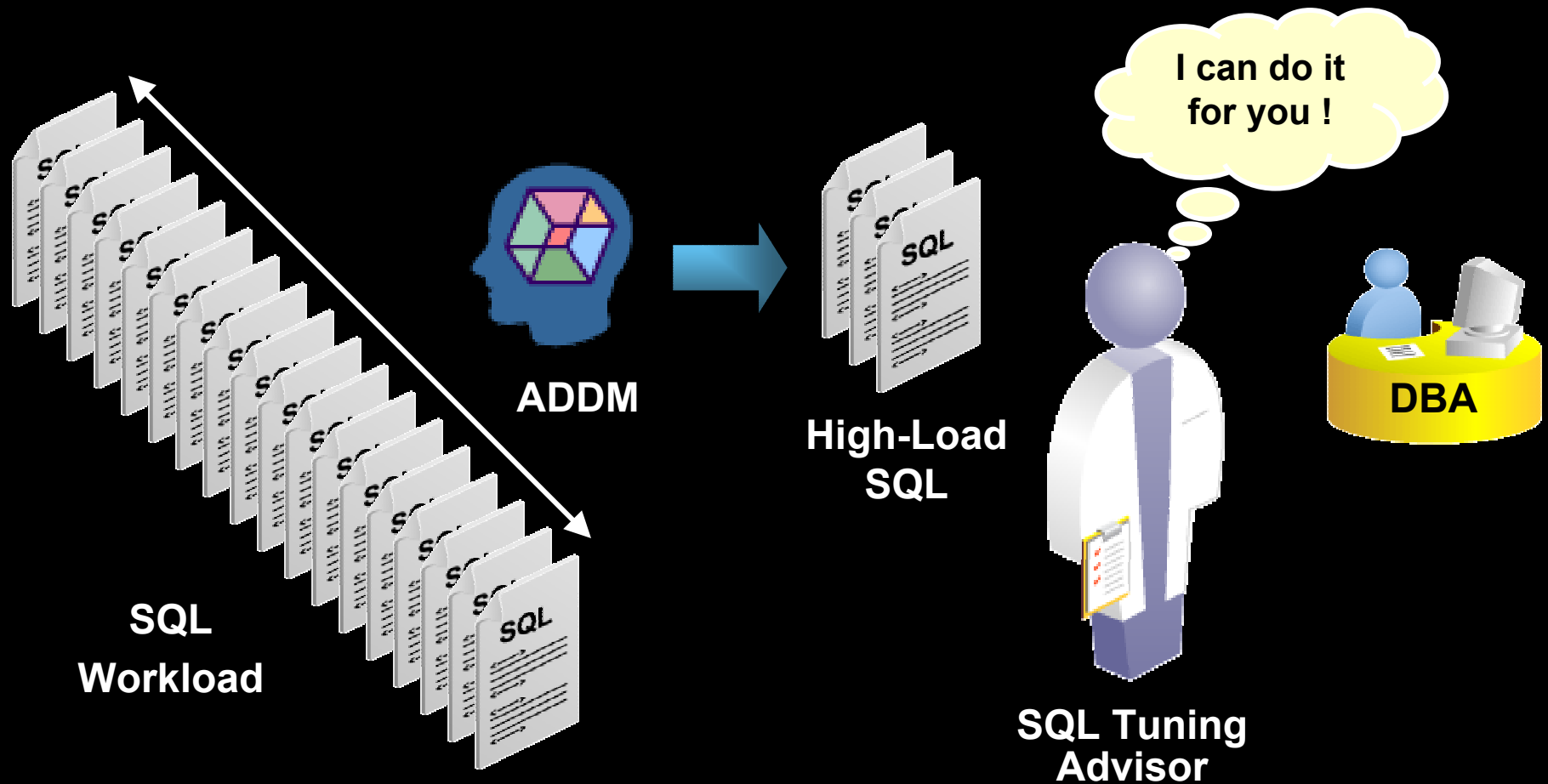
1. Get explain plan
2. Examine query objects and their sizes
3. Review and compare explain plan statistics with execution statistics (stored in V\$SQL view)
4. Identify the problem, e.g., “first rows” issue because only recent data is ever displayed despite large history being queried
5. Contact application vendor
6. Produce test case for vendor
7. Get a patch with appropriate code modifications from the vendor
8. Install the patch in next maintenance cycle

SQL Tuning & Access Advisor Overview

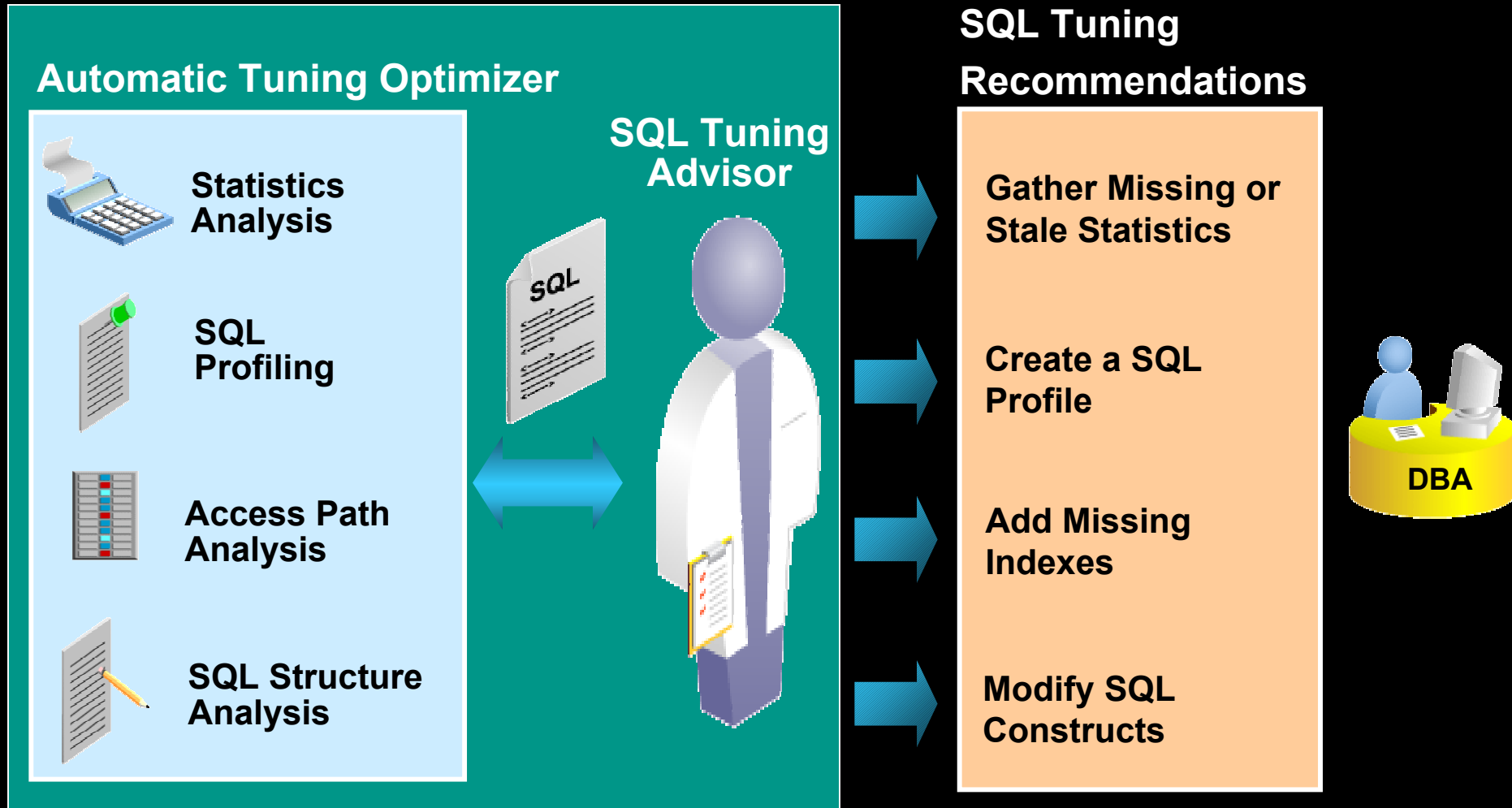


SQL Tuning Advisor

Oracle 10g Automates the SQL Tuning Process



Automatic SQL Tuning Overview

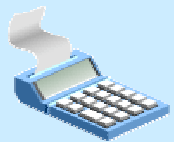


Automatic Tuning Optimizer (ATO)

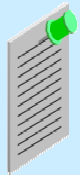
- It is the query optimizer running in tuning mode
 - Uses same plan generation process but performs additional steps that require significantly more time
- It performs verification steps
 - To validate statistics and its own estimates
 - Uses dynamic sampling and partial executions to validate
- It performs exploratory steps
 - To investigate the use of new indexes that could provide significant speed-up
 - To analyze SQL constructs that led to expensive plan operators

Statistics Analysis

Automatic Tuning Optimizer



Statistics Analysis



SQL Profiling

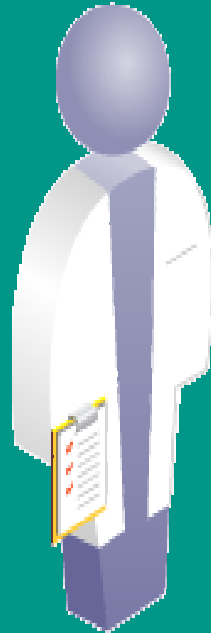


Access Path Analysis



SQL Structure Analysis

SQL Tuning Advisor



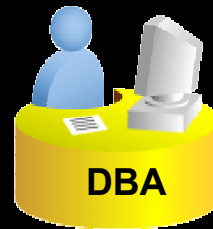
SQL Tuning Recommendations

Gather Missing or Stale Statistics

Create a SQL Profile

Add Missing Indexes

Modify SQL Constructs

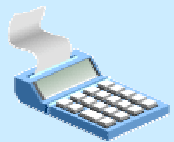


Statistics Analysis

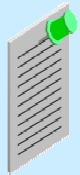
- Motivation
 - Statistics are key input to the query optimizer
 - Their availability and accuracy is very important
- In Oracle10g, the Automatic Statistics Collection maintains statistics up to date...
 - But it may not be enabled or properly configured!
- The ATO verifies statistics that it needs/uses
 - Generates auxiliary information to compensate for missing or stale statistics
 - Generates recommendations to gather statistics where appropriate

SQL Profiling

Automatic Tuning Optimizer



Statistics Analysis



SQL Profiling

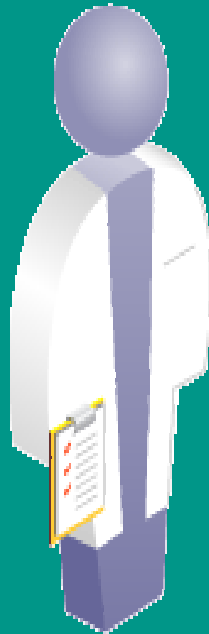
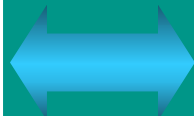


Access Path Analysis



SQL Structure Analysis

SQL Tuning Advisor



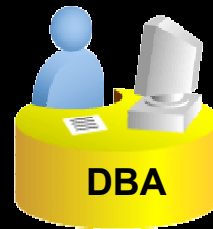
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SQL Profiling

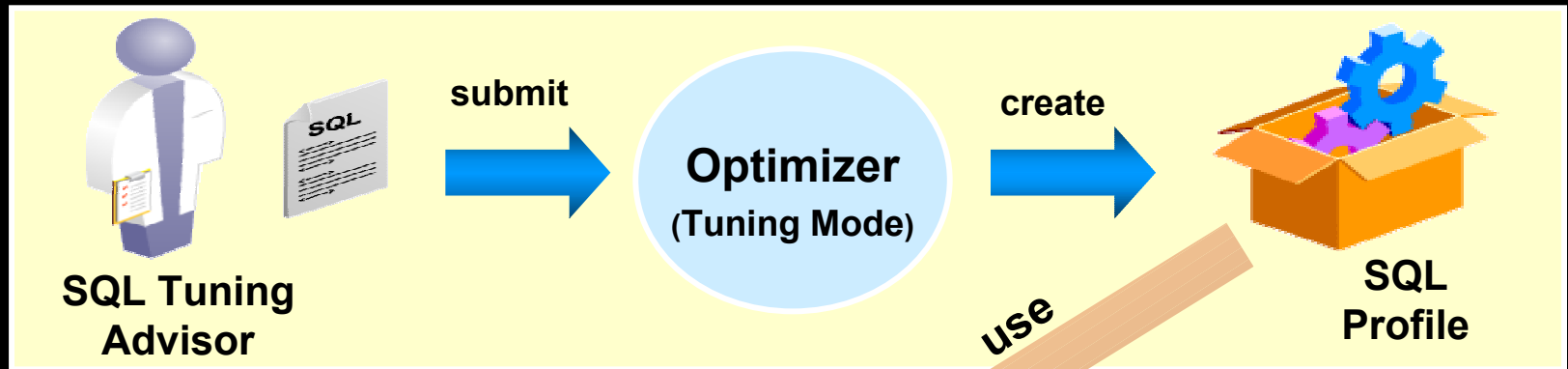
- Motivation
 - Empower query optimizer to find better plan by gathering additional information on query behavior
- The query optimizer has time constraints
 - Makes compromises while finding right plan
- The ATO is allowed a lot more time
 - Uses the time to gather customized information about the SQL statement, known as SQL Profile
 - Builds a SQL Profile and recommends it
 - Once implemented, SQL Profile is used by the query optimizer to generate a well-tuned plan

SQL Profile

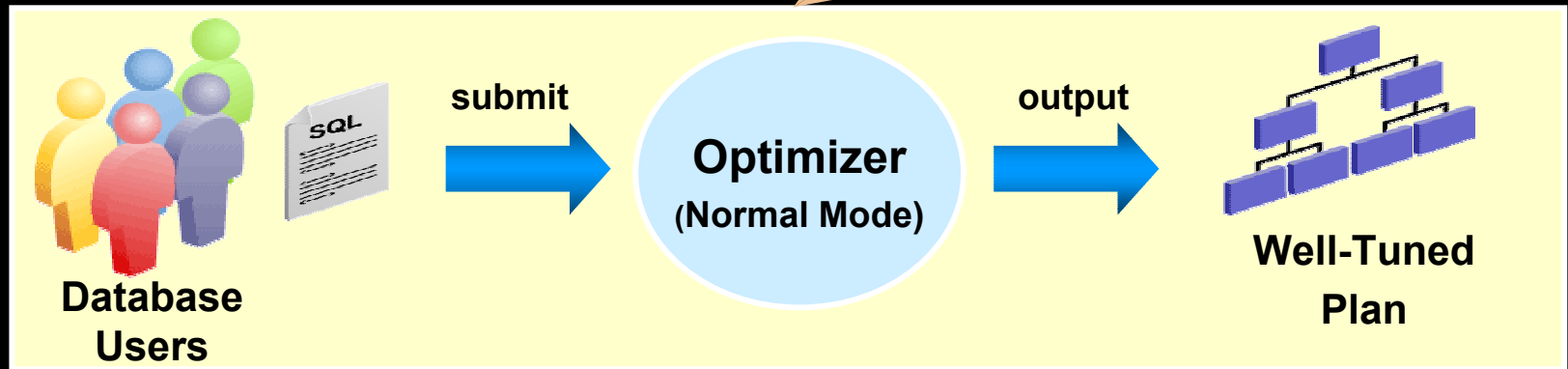
- Contains auxiliary information collected by the ATO for a SQL statement
 - Customized optimizer settings
 - Based on past execution history (e.g., first_rows vs. all_rows)
 - Compensation for missing or stale statistics
 - Compensation for errors in optimizer estimates
 - Estimation errors occur due to data skews and correlations, complex filters and joins
- Doesn't require any change to the SQL text
 - Ideal for Packaged Apps
- Persistence: Works across shutdowns & upgrades
- Transportable across databases (10.2)

SQL Profiling Flow

SQL Profiling

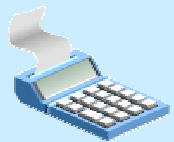


After ...

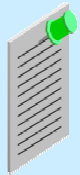


Access Path Analysis

Automatic Tuning Optimizer



Statistics Analysis



SQL Profiling

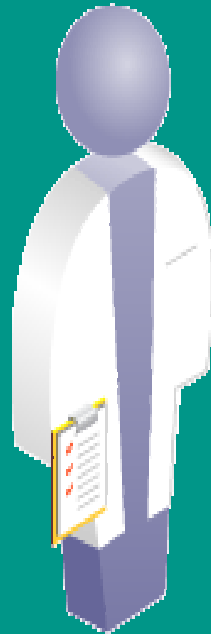


Access Path Analysis



SQL Structure Analysis

SQL Tuning Advisor



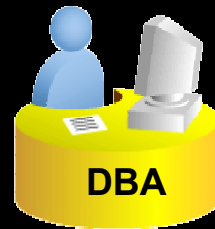
SQL Tuning Recommendations

Gather Missing or Stale Statistics

Create a SQL Profile

Add Missing Indexes

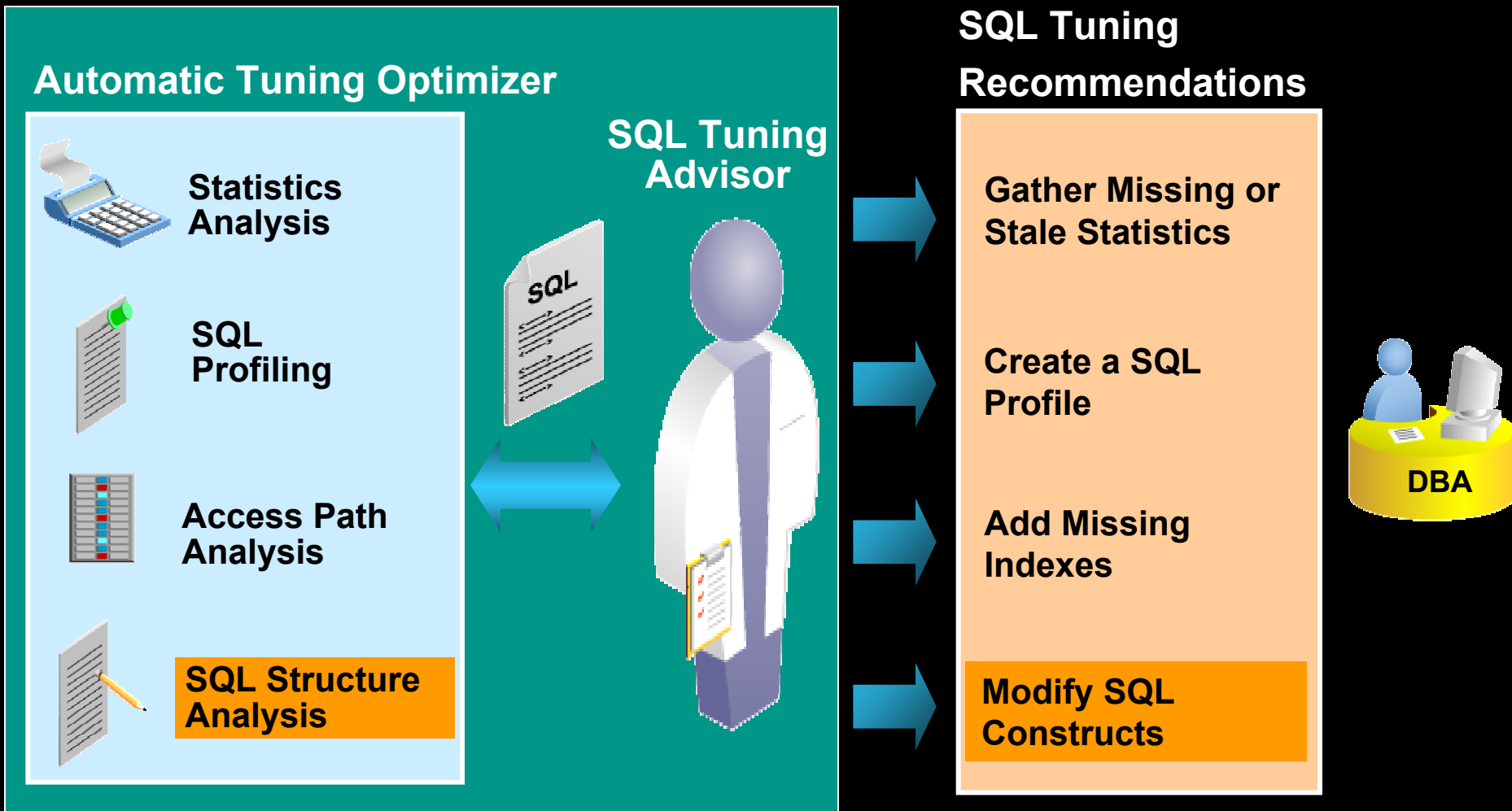
Modify SQL Constructs



Access Path Analysis

- Motivation
 - Adding an index may significantly improve the performance of a SQL statement
- Problem: A critical access path is missing
 - Index not created or mistakenly dropped
- ATO explores the use of new indexes
 - Recommends index if major performance boost provided
 - Also recommends running SQL Access Advisor to get comprehensive index analysis for entire workload
 - SQL Access Advisor also uses this analysis mode

SQL Structure Analysis

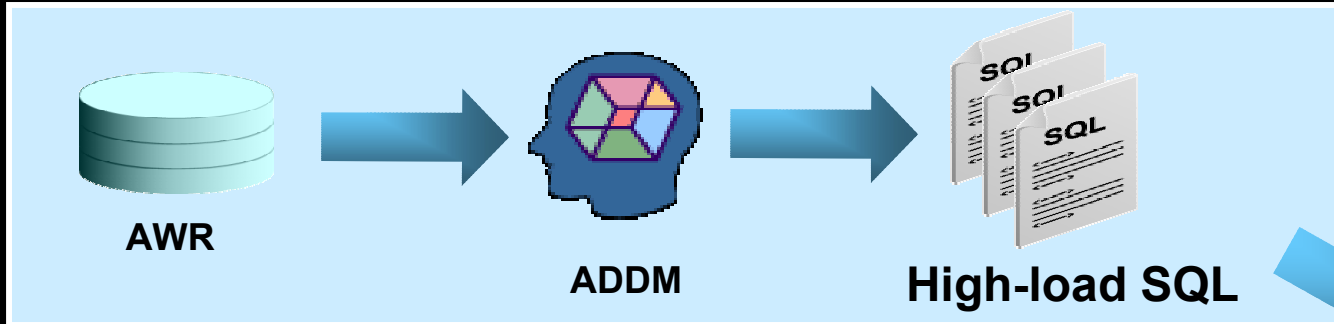


SQL Structure Analysis

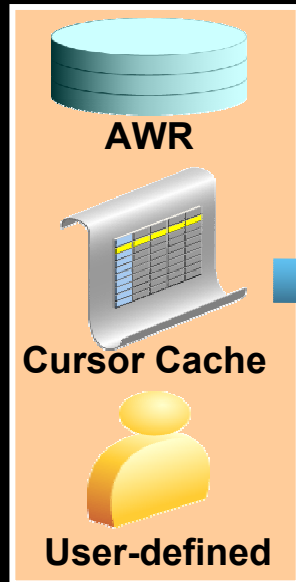
- Motivation
 - Help application developers identify poorly written SQL statements
 - Suggest restructuring of SQL for efficiency
- Problem categories
 - Semantic changes of SQL operators (e.g., use UNION ALL instead of UNION)
 - Subject to user acceptance of new result
 - Syntactic changes to predicates on indexed columns (e.g., remove type mismatch in column = :bind)
 - SQL design issues (e.g., add missing join predicate to eliminate a large Cartesian join)

SQL Tuning Usage Scenarios

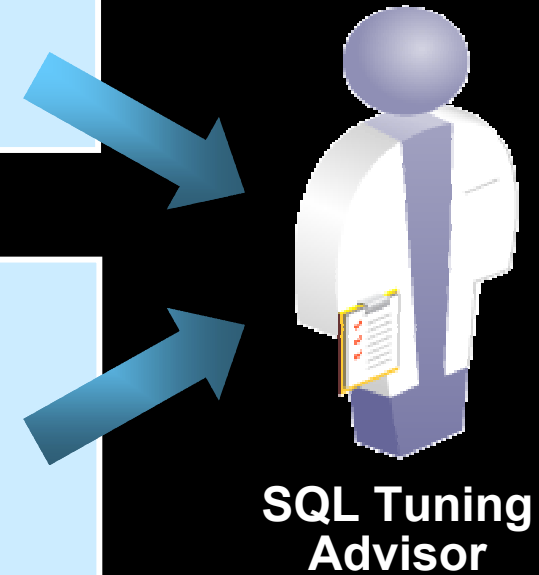
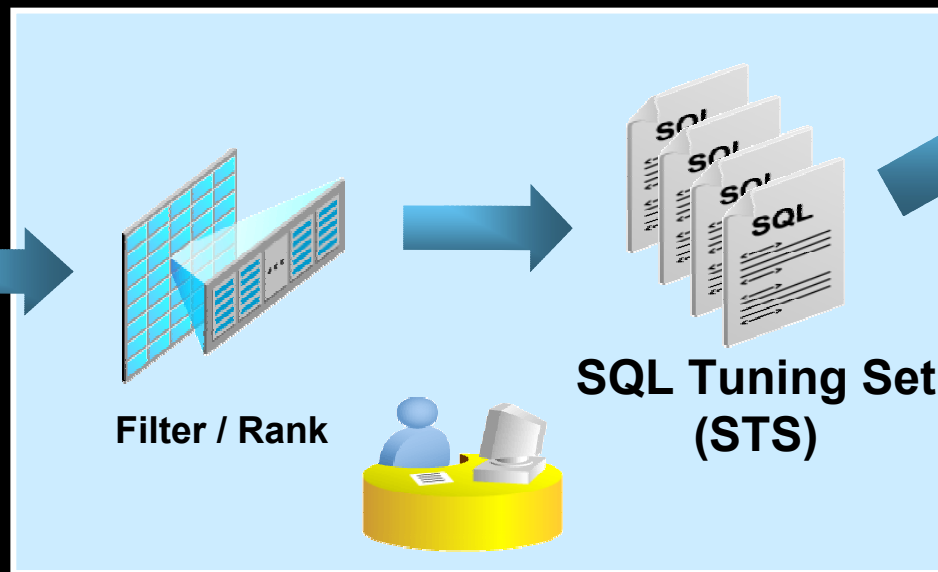
Automatic Selection



SQL Sources



Manual Selection



SQL Tuning Advisor

SQL Tuning Set (STS)

- Motivation
 - Enable user to tune custom set of SQL statements
- New object in Oracle10g for capturing and managing SQL workload
- Stores SQL statements along with:
 - Execution context: parsing user, bind values, etc.
 - Execution statistics: buffer gets, CPU time, elapse time, number of executions, etc.
- Transportable across databases (10.2)
- Created from any SQL source
 - AWR, cursor cache, user-defined workload, STS

SQL Tuning Set Benefits

- Allows selective, on-demand, custom SQL workload tuning
- Simplifies tuning of large number of SQL statements
- Is persistent
- Facilitates workload capture/management
- Provides a common infrastructure for dealing with SQL workloads
 - Can be used as a source for different tuning tasks

SQL Tuning Advisor User Interface

- GUI: Enterprise Manager
 - Launch SQL Tuning Advisor from a SQL Source page
 - ADDM Finding page, or
 - Top SQL page, or
 - SQL Tuning Set (STS) page
 - View/Implement SQL Tuning Recommendations
- Command line: DBMS_SQLTUNE package

SQL Source: ADDM Finding

Recommendations

Schedule SQL Tuning Advisor

Select All | Select None | Show All Details | Hide All Details

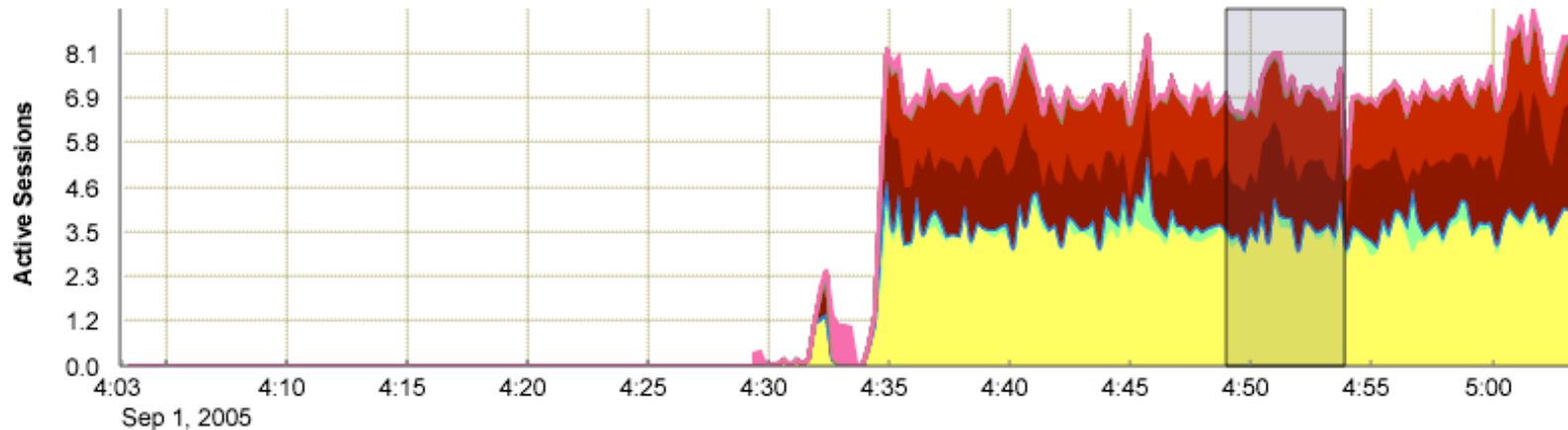
Select	Details	Category	Benefit (%)
<input type="checkbox"/>	Hide	SQL Tuning	26.1
Action Investigate the SQL statement with SQL_ID "g0fyfq5fatsbh" for possible performance improvements. SQL Text <code>UPDATE PARTS_CAT SET PNUM=1 WHERE PCAT='SPORTS'</code> SQL ID <code>g0fyfq5fatsbh</code>			
Rationale SQL statement with SQL_ID "g0fyfq5fatsbh" was executed 84 times and had an average elapsed time of 7.3 seconds.			
Rationale Waiting for event "enq: TX - row lock contention" in wait class "Application" accounted for 93% of the database time spent in processing the SQL statement with SQL_ID "g0fyfq5fatsbh".			
Rationale Waiting for event "buffer busy waits" in wait class "Concurrency" accounted for 4% of the database time spent in processing the SQL statement with SQL_ID "g0fyfq5fatsbh".			
<input type="checkbox"/>	Show	SQL Tuning	26.1
<input type="checkbox"/>	Hide	SQL Tuning	14.9
Action Investigate the SQL statement with SQL_ID "gqtf76mt3amcy" for possible performance improvements. View Tuning History SQL Text <code>SELECT /*+ DSS_Q60 */ 'B' t2.ch_featurevalue_09_id ch_featurevalue_09_id, ...</code> SQL ID <code>gqtf76mt3amcy</code>			
Action Run SQL Tuning Advisor on the SQL statement with SQL_ID "gqtf76mt3amcy". View Tuning History Run Advisor Now SQL Text <code>SELECT /*+ DSS_Q60 */ 'B' t2.ch_featurevalue_09_id ch_featurevalue_09_id, ...</code> SQL ID <code>gqtf76mt3amcy</code>			

SQL Source: Top SQL

Top Activity

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

View Data Real Time: 15 Second Refresh



Detail for Selected 5 Minute Interval

Start Time Sep 1, 2005 4:48:56 PM PDT

Run ASH Report

Top SQL

Schedule SQL Tuning Advisor

Create SQL Tuning Set

Select All | Select None

Select	Activity (%)	SQL ID	SQL Type
<input type="checkbox"/>	30.48	g0fyfq5fatsbh	UPDATE
<input type="checkbox"/>	17.34	gqtf76mt3amcy	SELECT
<input type="checkbox"/>	12.32	fp6zqdsmsg0swt	SELECT

Top Sessions

View Top Sessions

Activity (%)	Session ID	User Name
12.90	249	DWH_TEST
12.86	247	KYAG
12.72	246	DWH_TEST

SQL Source: SQL Tuning Set

ORACLE Enterprise Manager 10g Database Control Setup Preferences Help Logout Database

Database Instance: r2e > SQL Tuning Sets Logged in As SYS

SQL Tuning Sets

Page Refreshed Oct 12, 2005 5:19:26 PM Refresh

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

Search Go
Filter on a name or partial name

Create SQL Tuning Set From Go

View Schedule SQL Tuning Advisor Run SQL Access Advisor Delete

Previous 1 of 20 Next 3

Select	Name	Schema	Description	Created	Last Modified
<input checked="" type="radio"/>	TUNING_SET_1125439500981	SYS	Automatically generated by ADDM	Aug 30, 2005 3:05:08 PM	Oct 6, 2005 11:06:50 AM
<input type="radio"/>	TOP_SQL_1127155565942	SYS	Automatically generated by Top SQL	Sep 19, 2005 11:46:09 AM	Sep 19, 2005 11:46:22 AM
<input type="radio"/>	TOP_SQL_1138	SYS	Automatically generated by Top SQL	Sep 19, 2005 11:42:22 AM	Sep 19, 2005 11:42:34 AM
<input type="radio"/>	TOP_SQL_1127155268031	SYS	Automatically generated by Top SQL	Sep 19, 2005 11:41:11 AM	Sep 19, 2005 11:41:12 AM

Enterprise Manager Interface

- Launch SQL Tuning Advisor from a SQL Source page
 - ADDM Finding page, or
 - Top SQL page, or
 - SQL Tuning Set (STS) page
- View/Implement SQL Tuning Recommendations

SQL Tuning Recommendations — Overview

ORACLE Enterprise Manager 10g

Database Control

[Setup](#) [Preferences](#) [Help](#) [Logout](#)

Database

Database Instance: r2e > [Advisor Central](#) > SQL Tuning Results:SQL_TUNING_1129151335852

Logged in As SYS

SQL Tuning Results:SQL_TUNING_1129151335852

Page Refreshed Oct 12, 2005 5:22:42 PM

[Refresh](#)

Status **COMPLETED**
SQL ID **7jwb3bmbc4gcd**
Time Limit (seconds) **1800**

Started **Oct 12, 2005 2:09:00 PM**
Completed **Oct 12, 2005 2:09:03 PM**
Running Time (seconds) **3**

Recommendations

[View Recommendations](#)

Select	SQL Text	Parsing Schema	SQL ID	Statistics	SQL Profile	Index	Restructure SQL	Miscellaneous	Error
<input checked="" type="radio"/>	SELECT SUM (QUANTITY_SOLD) FROM SALES S WHERE QUANTITY_SOLD <=2 AND PROD_ID = 121 AND S.CUST_ID NOT I...		7jwb3bmbc4gcd			✓			

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DBMS_SQLTUNE PL/SQL Package

- Contains API for SQL Tuning

Tuning Task Management

- Create Tuning Task
- Execute Tuning Task
- Display Advisor Recommendations
- Drop Tuning Task

STS Management

- Create STS
- Populate STS
- Query STS Contents
- Drop STS

SQL Profile Management

- Accept SQL Profile
- Drop SQL Profile
- Alter SQL Profile Attribute

Automatic vs. Manual SQL Tuning

Manual Tuning

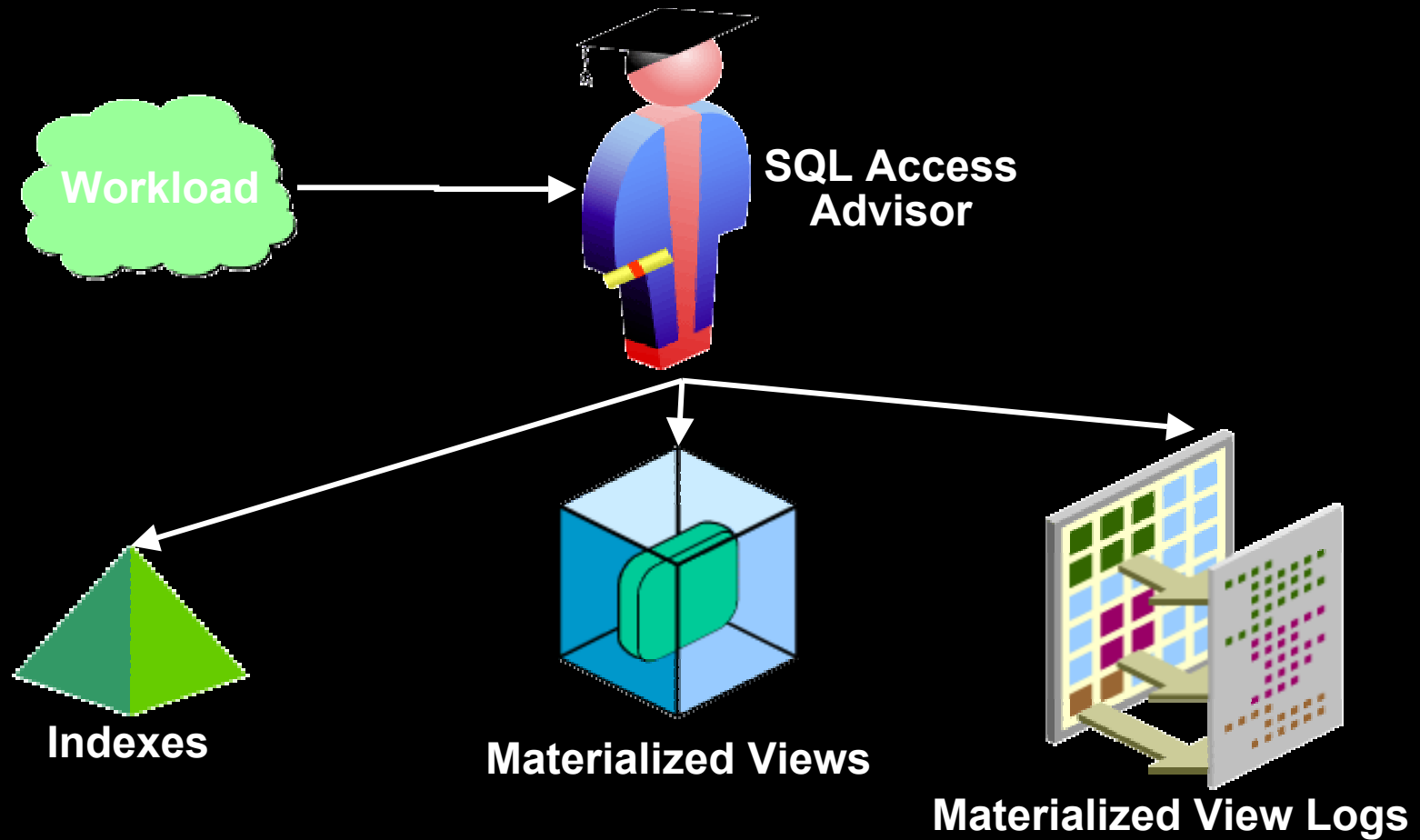
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6. Produce test case for vendor
7. Get a patch with appropriate code modifications from the vendor
8. Install the patch in next maintenance cycle

Automatic Tuning

1. Run SQL Tuning Advisor
2. Implement recommendations.

SQL Access Advisor

SQL Access Advisor



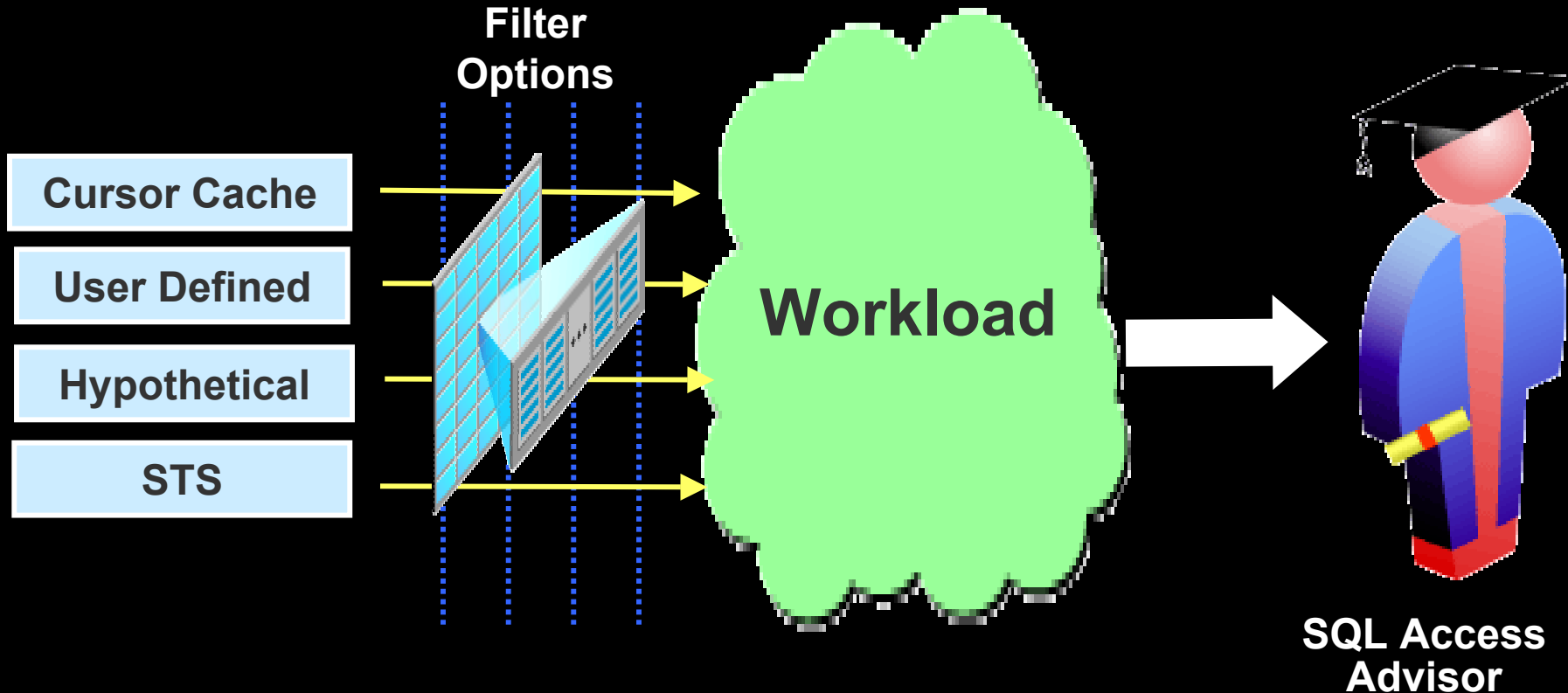
SQL Access Advisor Features

- De-mystifies access structure design for optimal application performance
- Recommends indexes, materialized views, and materialized view logs to create and/or drop for faster performance
- Analyzes entire workload and not just independent SQL statements
- Takes into account impact of new access structures on DML operations
- Considers storage, creation and maintenance costs

SQL Access Advisor Features

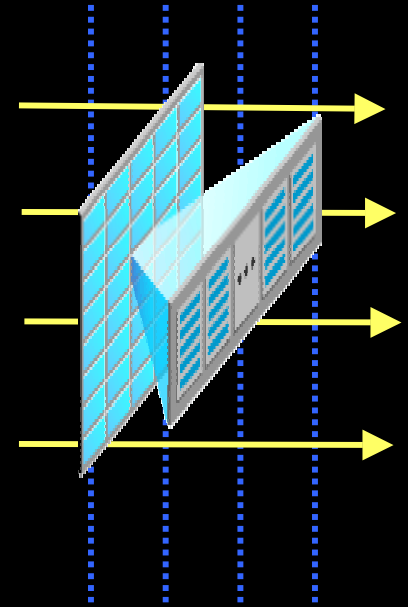
- Simultaneously considers
 - index solutions
 - materialized view solutions
 - combinations of both
- Optimizes materialized views for
 - maximum query rewrite usage
 - fast refresh
- Recommends materialized view logs for fast refresh
- Combines similar indexes into single index
- Impact of new access structures on DML considered
- Considers storage, creation & maintenance costs

Usage Scenarios



Filter Options

- Don't have to use the entire workload
- Filter by
 - Application or module name
 - Number of SQL statements
 - Queries during a specified time window
 - Username
 - Tables
 - must be in this list
 - not in this list



SQL Access Advisor User Interface

- GUI: Enterprise Manager
 - Launch SQL Access Advisor from Advisor Central
 - Select workload source
 - Set options
 - Workload
 - Recommendation
 - Advanced
 - Schedule job
 - Review job and submit
 - Monitor job
 - View Recommendations
 - Implement Recommendations
- Command line: DBMS_ADVISOR package

Launch SQL Access Advisor

The screenshot shows the Oracle Enterprise Manager web interface. The breadcrumb navigation path is: Hosts > Databases > Application Servers > Web Applications > Groups > All Targets. The current page is 'Advisor Central' for the database 'demoDB'. A red arrow points to the 'SQL Access Advisor' link under the 'Advisors' section.

Advisors

- [ADDM](#)
- [SQL Tuning Advisor](#)
- [SQL Access Advisor](#)
- [Memory Advisor](#)
- [MTR Advisor](#)
- [Segment Advisor](#)
- [Undo Management](#)

Advisor Tasks

Search

Select an advisory type and optionally enter a task name to filter the data that is displayed in your results set.

Advisory Type: Task Name: Advisor Runs:

Results

Select	Advisory Type	Name	Description	User	Status	Start Time	End Time	Expires In (days)
<input checked="" type="radio"/>	ADDM	ADDM:1_36_37	ADDM run between snapshots 36 and 37 in database with id 3310338926 and instance 1	SYS	COMPLETED	23-Jul-2003 00:00:00	23-Jul-2003 00:00:00	30
<input type="radio"/>	SQL Access Advisor	SQLACCESS2394833	SQL Access Advisor	SYSTEM	COMPLETED	22-Jul-2003 00:00:00	22-Jul-2003 00:00:00	29

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About Oracle Enterprise Manager

Select Workload Source

The screenshot shows the Oracle Enterprise Manager interface. At the top, there is a navigation bar with the Oracle logo and 'Enterprise Manager' text. To the right of the logo are links for 'Setup', 'Preferences', 'Help', and 'Logout'. Below this is a secondary navigation bar with tabs for 'Home', 'Targets', 'Configuration', 'Alerts', and 'Management System'. A third navigation bar contains links for 'Hosts', 'Databases', 'Application Servers', 'Web Applications', 'Groups', and 'All Targets'. Below these is a progress indicator with four steps: 'Introduction', 'Workload' (the current step, highlighted with a blue circle), 'Recommendation Options', and 'Review'. The main content area is titled 'SQL Access Advisor: Workload' and shows the database 'DemoDB'. There are 'Cancel', 'Back', 'Step 2 of 4', and 'Next' buttons. A paragraph explains that providing an accurate workload is crucial for the advisor's recommendations. Below this is a section titled 'Workload Source' with four radio button options: 'Current and recent SQL activity' (selected), 'User-Defined Workload, Import SQL from a table' (with a text input field), 'Create a hypothetical workload from the following schemas' (with a text input field), and 'Import Workload from SQL Repository' (with a text input field). An 'Advanced Options' button is located at the bottom left.

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Enterprise Manager

Setup Preferences Help Logout

Home Targets Configuration Alerts Management System

Hosts Databases Application Servers Web Applications Groups All Targets

Introduction Workload Recommendation Options Review

SQL Access Advisor: Workload

Database **DemoDB** Cancel Back Step 2 of 4 Next

Providing the SQL Access Advisor with an accurate workload is crucial to the effectiveness of the recommendations the advisor will generate. The performance of SQL not found in the workload may be adversely affected by recommendations to improve the SQL in the workload. The best workload is one that fully represents all the statements used to access the underlying tables.

Workload Source

- Current and recent SQL activity
SQL will be selected from the cache.
- User-Defined Workload, Import SQL from a table
Table must contain at least the SQL_TEXT and USERNAME columns.
- Create a hypothetical workload from the following schemas
The advisor can create a hypothetical workload if the schema contains dimension or primary/foreign key constraints.
- Import Workload from SQL Repository Enter the name of the SQL Tuning Set
You may choose any SQL Tuning set from the SQL Repository.

Advanced Options

Set Workload Options

SQL Access Advisor: Workload Advanced Options

Cancel

OK

Workload Type

- Read Only (Data Warehouse)
- Allow Advisor to determine workload type based on workload

Drop Unused Indexes

- No, there are statements missing from the workload that might be adversely affected by an index removal.
- Yes, generate recommendations to drop unused access structures.

Filter Options

You can apply filters to reduce the scope of the statements found in the workload. This will allow you to direct the advisor to make recommendations based on a specific subset of statements from the workload. Application and Action are strings that can be associated with SQL statements via the DBMS_APPLICATION_INFO package to allow for better SQL statement identification and tuning.

- Evaluate entire workload.
- Filter workload based on these options.
 - Only the top resource consuming SQL statements

Number of Statements Order By

- Only SQL statements executed by the following users

Set Recommendation Options



SQL Access Advisor: Recommendation Options

Database **DemoDB**

[Cancel](#) [Back](#) [Step 3 of 4](#) [Next](#)

The SQL Access Advisor recommends index and materialized views to improve the performance of the SQL statements in the workload. These indexes and materialized views reduce the time it takes to read data. This benefit is balanced against the time required to maintain the index or materialized view. Through the analysis of the SQL in the workload and the volatility of the underlying tables the SQL Access Advisor makes the appropriate recommendations. You may choose to limit the advisor to recommendations based on a single access method.

Recommendation Types

- Indexes
- Materialized Views

Advisor Mode

- Limited Mode: Perform analysis that includes highest cost statements
- Comprehensive Mode: Perform an exhaustive analysis

[Advanced Options](#)

Advanced Options

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites Media Print Mail

Limited Mode
Analysis will focus on highest cost statements

Comprehensive Mode
Analysis will be exhaustive

[Hide Advanced Options](#)

Space Restrictions

Indexes and materialized views increase performance at the cost of space. When the SQL Access Advisor is invoked with no space limitations it will make the best possible performance recommendations. In the review step you can pick and choose which recommendations to implement. If you have a hard space limit you can pass that to the advisor such that any generated recommendation will fit within the space requirement. Do you wish the sum of the recommendations sizes to fit within a certain space limit?

No, show me all recommendations

Yes, space is limited. Space Limit (GB)





Tuning Options

Prioritize tuning of SQL statements by
SQL statements will be analyzed in descending order of the value of the prioritized statistic. Optimizer Cost will be used as the secondary sort criteria

Limit the number of indexes on a table. Index Limit

Default Storage Locations

By default indexes will be placed in the schema and tablespace of the table they reference. Materialized views will be placed in the schema and tablespace of the first table referenced in the query. You may override these defaults.

<input checked="" type="checkbox"/> Index	Tablespace	<input type="text"/>	
	Schema	<input type="text"/>	
<input checked="" type="checkbox"/> Materialized View	Tablespace	<input type="text"/>	
	Schema	<input type="text"/>	

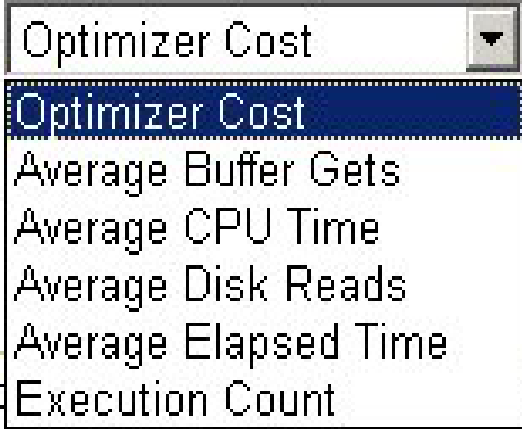
[Home](#) | [Targets](#) | [Configuration](#) | [Alerts](#) | [Jobs](#) | [Management System](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

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[About Oracle Enterprise Manager](#)

Advanced Tuning Options

- SQL statements will be tuned according to the resources they use

Tuning Options

- Prioritize tuning of SQL statements by  Optimizer Cost
- SQL statements will be analyzed in descending order of the p
- Limit the number of indexes on a table

Default Storage Locations

By default indexes will be placed in the same tablespace as the table referenced in the query. You may override these defaults.

Schedule Job

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media

Workload Source Recommendation Options **Schedule** Review

SQL Access Advisor: Schedule

Database **demoDB** Cancel Back Step 3 of 4 Next

The Advisor Task will be scheduled to run immediately by default. You may choose to schedule the task to run at a later time

Advisor Task Name

Task Name


Task Description

Scheduling Options

Time Zone

Start

Immediately
 Later

Date 
(example: Dec-12-2002)

Time AM PM


Repeat

One Time Only
 Interval

Frequency

Repeat Until

Indefinite
 Custom

Date 
(example: Dec-12-2002)

Time AM PM
(Ignored except when repeating by minutes or hours.)

Review & Submit

The screenshot shows the Oracle Enterprise Manager interface for the SQL Access Advisor. The breadcrumb trail is: Home > Targets > Configuration > Alerts > Jobs > Management System > All Targets. A progress bar shows four steps: Workload Source, Recommendation Options, Schedule, and Review (the current step). The page title is "SQL Access Advisor: Review" for database "demoDB". At the top right, there are buttons for "Cancel", "Show SQL", "Back", "Step 4 of 4", and "Submit". The "Submit" button is circled in red. Below the buttons, a paragraph explains that the task will be submitted and run as a job. The task name is "Lillian_hyp_run" and the description is "SQL Access Advisor - Hypothetical Run". The scheduled start time is "23-Jul-2003 07:05:00". There is a section for "Advisor Options" with a summary of the requested options. A table lists the options and their values. At the bottom, there are navigation buttons: "Cancel", "Show SQL", "Back", "Step 4 of 4", and "Submit".

Database **demoDB** Cancel Show SQL Back Step 4 of 4 Submit

This page allows for review of your chosen input parameters to the SQL Access Advisor. The advisor task will actually be submitted and run as a job.

Task Name **Lillian_hyp_run**
Task Description **SQL Access Advisor - Hypothetical Run**
Scheduled Start Time **23-Jul-2003 07:05:00**

Advisor Options

This is a summary of the SQL Access Advisor options you have requested. Please review this information. To Change any of these options you must use the Back button to revisit the page where the option was initially set.

⊖ Previous 1-6 of 6 Next ⊕

OPTION ▲	VALUE
Advisor Mode	Limited Mode
Recommendation Type	Indexes Only
Storage Limitation	10(GB)
Workload Scope	Partial Workload
Workload Source	Hypothetical
Workload Type	Allow Advisor to determine workload type based on workload content

Cancel Show SQL Back Step 4 of 4 Submit

Home | **Targets** | Configuration | Alerts | Jobs | Management System | Setup | Preferences | Help | Logout

Monitor the Job

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Copy Paste Find People Links

Address http://gallison-sun:4889/em/console/database/instance/advisorTasks?advisorURL=&advisoryCentralURL=&advisoryNameFilter=SQL+Access+Advisor&taskNameFilter=&advisorRunsFil

ORACLE Enterprise Manager Setup Preferences Help Logout

Home Targets Configuration Alerts Jobs Management System

Hosts Databases Application Servers Web Applications Groups All Targets

Host: gallison-sun.us.oracle.com > Database: database > Advisor Central Logged in As sys

Advisor Central

Collected From Target August 13, 2003 1:31:24 PM EDT

Advisors

[ADDM](#) [Memory Advisor](#) [Segment Advisor](#)
[SQL Tuning Advisor](#) [MTRR Advisor](#) [Undo Management](#)
[SQL Access Advisor](#)

Advisor Tasks

Search

Select an advisory type and optionally enter a task name to filter the data that is displayed in your results set.

Advisory Type Task Name Advisor Runs

SQL Access Advisor [] Last 24 Hours [Go]

Results

View Result Edit Delete Actions Re-schedule [Go]

Select	Advisory Type	Name	Description	User	Status	Start Time	End Time	Expires In (days)
<input checked="" type="radio"/>	SQL Access Advisor	Lilian_cache5	SQL Access Advisor	SYS	COMPLETED	13-Aug-2003 11:48:37	13-Aug-2003 11:49:38	30
<input type="radio"/>	SQL Access Advisor	Lilian_cache4	SQL Access Advisor	SYS	ERROR	13-Aug-2003 13:28:47	13-Aug-2003 13:28:47	30
<input type="radio"/>	SQL Access Advisor	Lilian_cache1	SQL Access Advisor	SYS	ERROR	13-Aug-2003 11:41:08	13-Aug-2003 11:41:09	30
<input type="radio"/>	SQL Access Advisor	SQLACCESS9599680	SQL Access Advisor	SYS	ERROR	13-Aug-2003 10:21:10	13-Aug-2003 10:21:11	30

Home | Targets | Configuration | Alerts | Jobs | Management System | Setup | Preferences | Help | Logout

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http://gallison-sun:4889/em/console/database/instance/advisorTasks?advisorURL=&advisoryCentralURL=&advisoryNameFilter=SQL+Acces Local intranet

View Recommendations

SQL Access Advisor: Review Recommendations by SQL

The SQL Access Advisor can improve the following sql statements. By selecting a SQL statement you will choose to implement, edit or generate a report on all the recommendations that affect that statement.

View: Recommendations

SQL

Go

SQL Statements Improved by Recommendations

The following chart and table initially list SQL statements ordered by their percentage improvement by the recommendations. The top SQL statement will be the SQL statement that is improved the most by the recommendations. Selecting a column header in the table will re-sort the table by that column and also change the chart to show graphically the column values

Workload Improvement %



Select SQL statements to be improved

Generate Report Edit Implement

Select All | Select None

Select Id	Statement	Recommendation Id	Workload Improvement %	Original Cost	New Cost	Execution Count	Access Structures
<input type="checkbox"/> 1	Select sum(e.sal), d.deptno, m.mgr from emp e, dept d, emp f ...	1	23	400	365	100	1
<input type="checkbox"/> 2	Select sum(d.amount) from debits d where ...	2	15	400	370	125	5
<input type="checkbox"/> 3	Select deptno,count(*) from scott.emp group by deptno	1	10	20	18	5	2
<input type="checkbox"/> 4	Select empno from scott.emp where sal < 10000	3	0	10	10	1	2

Cancel

Implement Recommendations

SQL Access Advisor: Review Recommendations by SQL

The SQL Access Advisor can improve the following sql statements. By selecting a SQL statement you will choose to implement, edit or generate a report on all the recommendations that affect that statement.

View: Recommendations

SQL

Go

SQL Statements Improved by Recommendations

The following chart and table initially list SQL statements ordered by their percentage improvement by the recommendations. The top SQL statement will be the SQL statement that is improved the most by the recommendations. Selecting a column header in the table will re-sort the table by that column and also change the chart to show graphically the column values

Workload Improvement %



Select SQL statements to be improved

Generate Report

Edit

Implement

Select All | Select None

Select	Statement Id	Statement	Recommendation Id	Workload Improvement %	Original Cost	New Cost	Execution Count	Access Structures
<input type="checkbox"/>	1	Select sum(e.sal), d.deptno, m.mgr from emp e, dept d, emp f ...	1	23	400	365	100	1
<input type="checkbox"/>	2	Select sum(d.amount) from debits d where ...	2	15	400	370	125	5
<input type="checkbox"/>	3	Select deptno,count(*) from scott.emp group by deptno	1	10	20	18	5	2
<input type="checkbox"/>	4	Select empno from scott.emp where sal < 10000	3	0	10	10	1	2

Cancel

Tips, Do's, Dont's

Capturing SQL Workload

- Use cursor cache capture capability of STS
 - Run workload
 - Capture workload in STS simultaneously

```
DBMS_SQLTUNE.CAPTURE_CURSOR_CACHE_SQLSET(  
sqlset_name => 'MY_STS',  
time_limit => 3600,  
repeat_interval => 60,  
sqlset_owner => own);
```

SQL Profile Cursor Sharing

- Cursor sharing can be enforced at database or SQL level
 - Database level: CURSOR_SHARING=FORCE
 - SQL level: Set SQL Profile attribute FORCE_MATCH=TRUE

```
DBMS_SQLTUNE.ACCEPT_SQL_PROFILE (  
  task_name => 'my_sql_tuning_task',  
  name => 'my_sql_profile', )  
force_match => TRUE);
```

Tuning Considerations

- Resource consumption
 - Running SQL advisors consumes CPU, I/O, memory and can affect system performance
- Potential negative impact of recommendation
 - Implementing recommendations *may* impact system negatively, e.g., optimizer stats refresh
- Before initiating tuning, answer the following questions
 - How much resources will be consumed by tuning activity?
 - Can the system spare resources needed for tuning?
 - How can the production system be shielded from possible negative impact of tuning actions?

Resource Consumption of SQL Advisors

- SQL Tuning Advisor
 - **Limited mode**: Resource consumption minimal
 - Stats, index and SQL restructure analysis is cheap
 - Average is less than 1 second per SQL statement
 - **Comprehensive mode**: Resource consumption may be significant
 - SQL Profiling can potentially consume non-trivial resources
 - Roughly comparable to amount of resources/time consumed when executing SQL statement(s)
- SQL Access Advisor
 - Resource consumption depends on size of SQL workload
 - For small number of SQL, resource consumption not very high

Tuning Options

- Options
 - Direct tuning of live system
 - Remote tuning
- Live system tuning
 - Run SQL Tuning Advisor in **Comprehensive** mode
 - Run SQL Tuning Advisor in **Limited** mode only if ...
 - System does not have spare resources to tune SQL
 - Run SQL Access Advisor for few SQL at a time
- Perform remote tuning, if ...
 - Cumulative resources/time consumed by all SQL statements being tuned significant
 - System cannot spare resources

Live System Tuning Tips

1. Ensure tables referenced in SQL have representative optimizer stats
2. Run SQL Access Advisor
 - For individual SQL, set “Recommendation Type” to indexes
 - MV not suitable for tuning individual statements
3. Run SQL Tuning Advisor
 - Test profile before making it PUBLIC

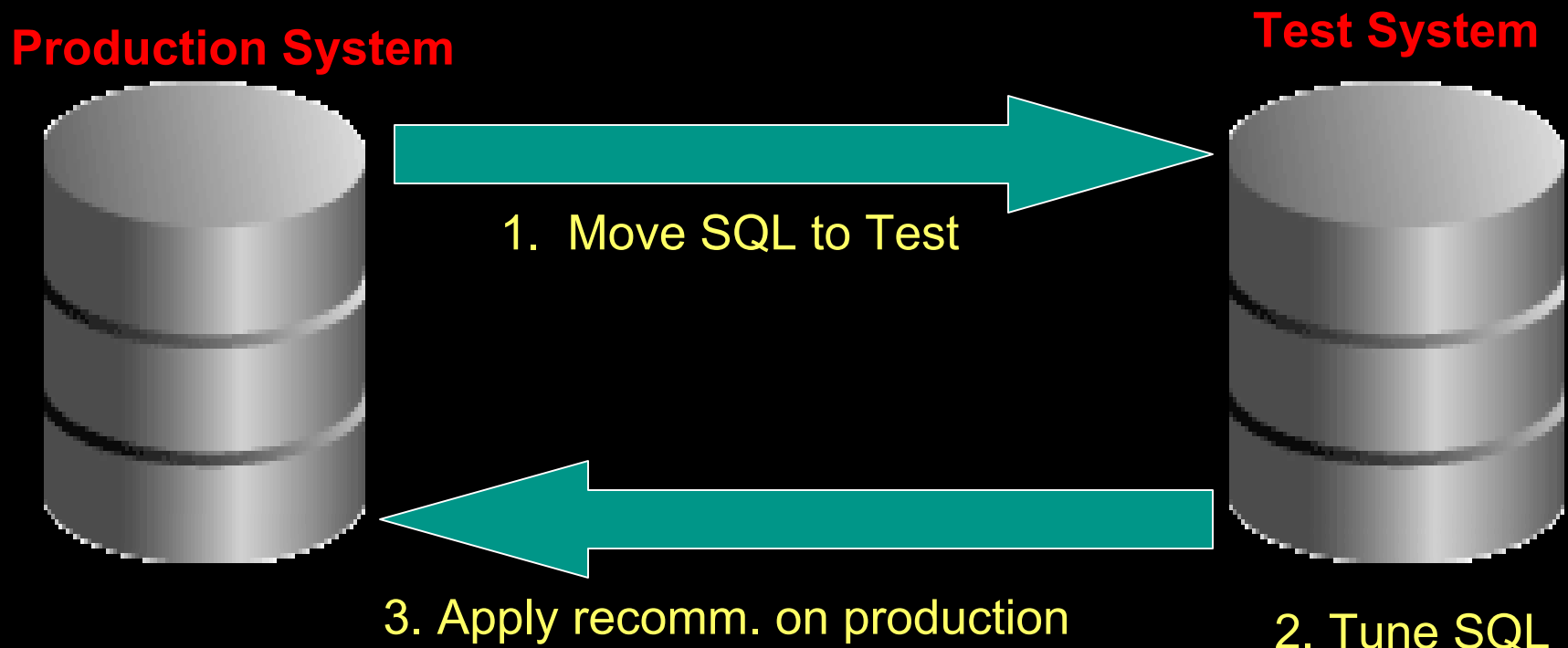
```
DBMS_SQLTUNE.ACCEPT_SQL_PROFILE (  
task_name => '<tuning task name>',  
category => 'MY_CATEGORY' );  
  
ALTER SESSION SET SQLTUNE_CATEGORY='MY_CATEGORY' ;
```

- Once satisfied with results set category to DEFAULT

```
DBMS_SQLTUNE.ALTER_SQL_PROFILE ()
```

Remote Tuning Tips

- Performed to shield production system from performance impact of running SQL advisors



Remote Tuning Tips

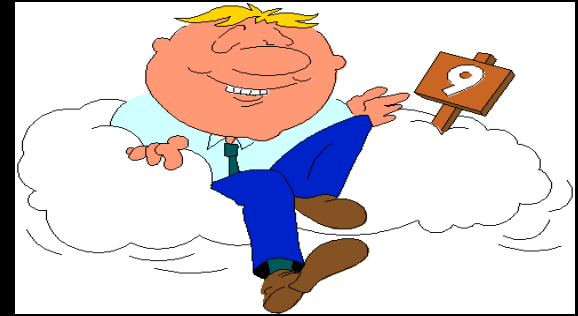
- Move SQL to test
 - Use Transportable STS
 - `DBMS_SQLTUNE.XXX_STGTAB_SQLSET`
- Apply recommendation on production
 - Use Transportable SQL Profiles
 - `DBMS_SQLTUNE.XXX_STGTAB_SQLPROF`

Automatic SQL Tuning Summary

SQL Tuning Advisor and SQL Access Advisor together completely automate SQL tuning

Analysis Types	Performed By
Statistics	SQL Tuning Advisor
SQL Profile	SQL Tuning Advisor
SQL Structure	SQL Tuning Advisor
Access Path: Indexes	SQL Tuning/Access Advisor
Access Path: Materialized Views	SQL Access Advisor
Access Path: Materialized View Logs	SQL Access Advisor

Conclusion



- SQL Advisors help address critical SQL tuning challenges
- Provides targeted and automated tuning
- Makes possible comprehensive tuning of packaged applications
- Eliminates need for highly skilled performance experts

Thank You!

A large, semi-transparent logo in the background consisting of a grey 'Q', a red ampersand '&', and a grey 'A'.

QUESTIONS
ANSWERS

ORACLE®