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Managing Database Environments: The Oracle Difference

Oracle Technology Days

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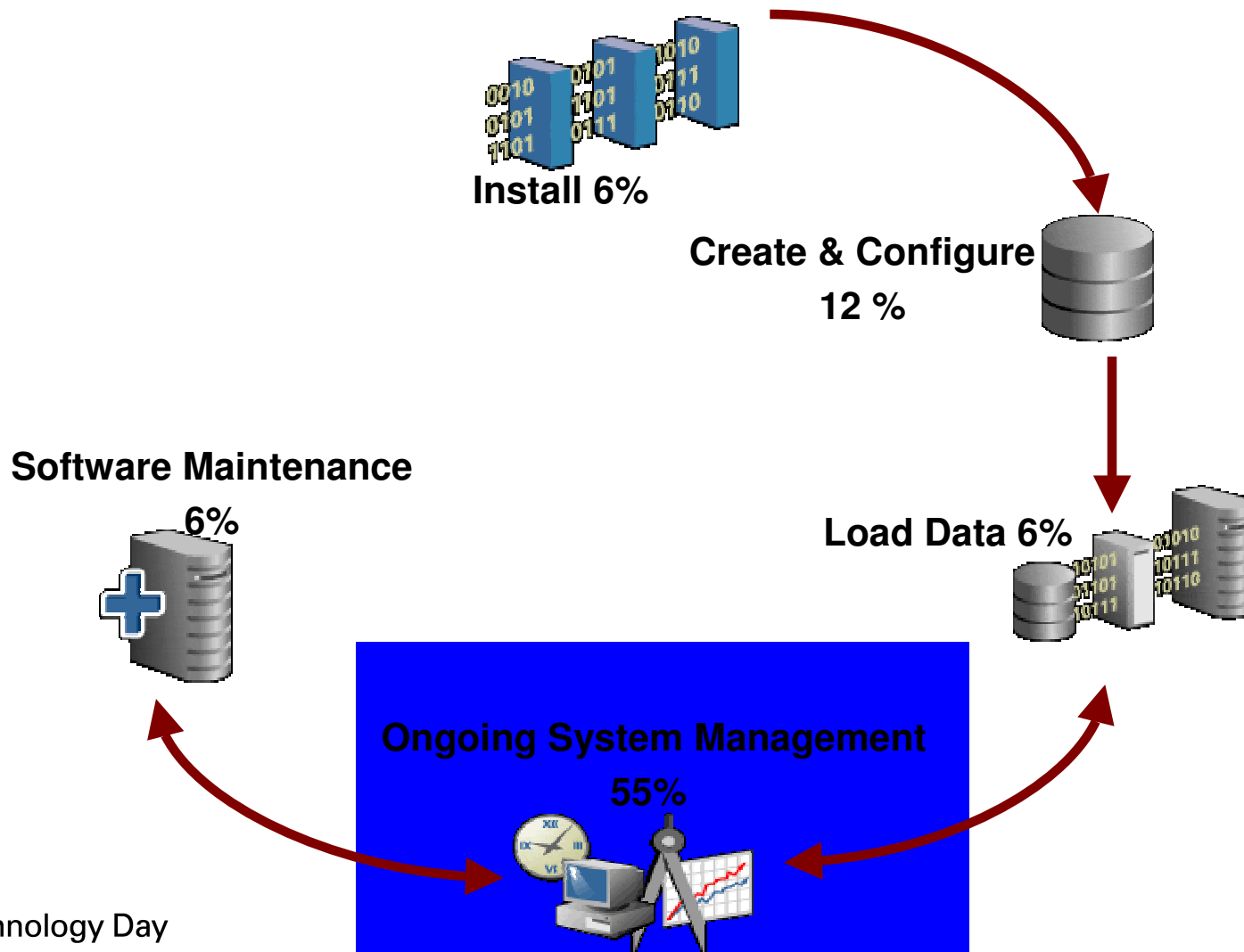
Overview

- Manageability Overview
- Diagnostic Pack
- Tuning Pack

Pain points

- *“We’re growing like crazy - adding new applications each quarter. We can’t keep up with the number of databases that are being added each year.”*
- *“Our time to diagnosis has shrunk from 60 minutes to 5. We don’t have the right tools to support this service level.”*
- *“We can no longer afford to wait for a patch from the vendor to solve performance problems. We need a fix right now.”*

Where DBA's spend their time



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Source: IOUG 2001 DBA Survey

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Ongoing System Management

55% of DBA's time is spent in ongoing management, monitoring and tuning

#1 Cause:

**Performance Diagnosis & Troubleshooting
Resource Tuning**

Database Diagnostics

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Traditional Performance Tuning Method

- Performance and Workload Data Capture
 - System Statistics
 - Wait Information, SQL Statistics, etc.
- Analysis
 - What types of operations DB is spending most time on?
 - Which resources is the DB bottlenecked & What is causing it ?
 - What can be done to resolve the problem?
- Problem Resolution
 - If multiple problems identified, which is most critical?
 - How much performance gain expected if solution implemented?

Traditional Performance Tuning

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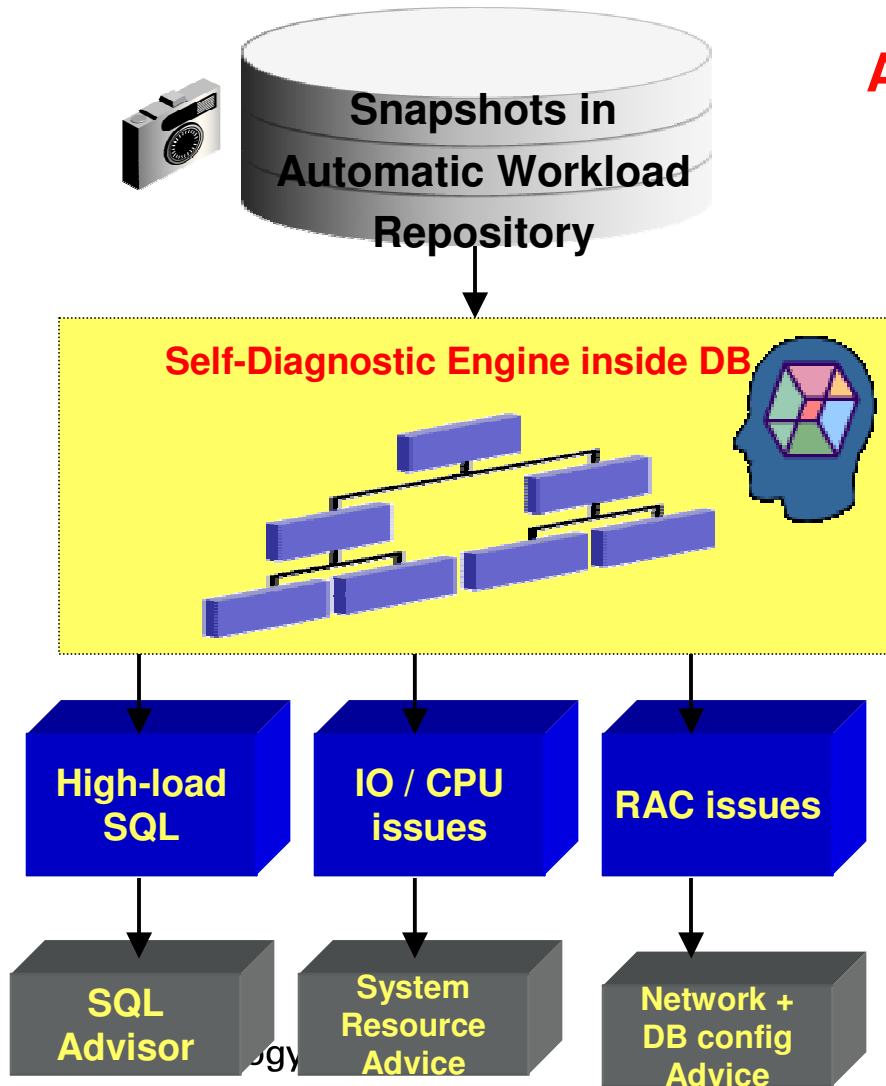


Oracle Database 10g Automates All Steps to Addresses Main Issues & Challenges

Key Features

- Automatic Performance Diagnosis
 - Self-diagnostic engine built into core database kernel, Automatic Database Diagnostic Monitor (ADDM)
 - Automatic Workload Capture and Historical Performance Analysis (Automatic Workload Repository)
 - Comprehensive System (Database & OS) Performance Monitoring
 - Advanced Event Management
- When Used With Grid Control
 - Manages Large Sets of Oracle Databases and other infrastructure
 - Cross-system Performance and Availability aggregation

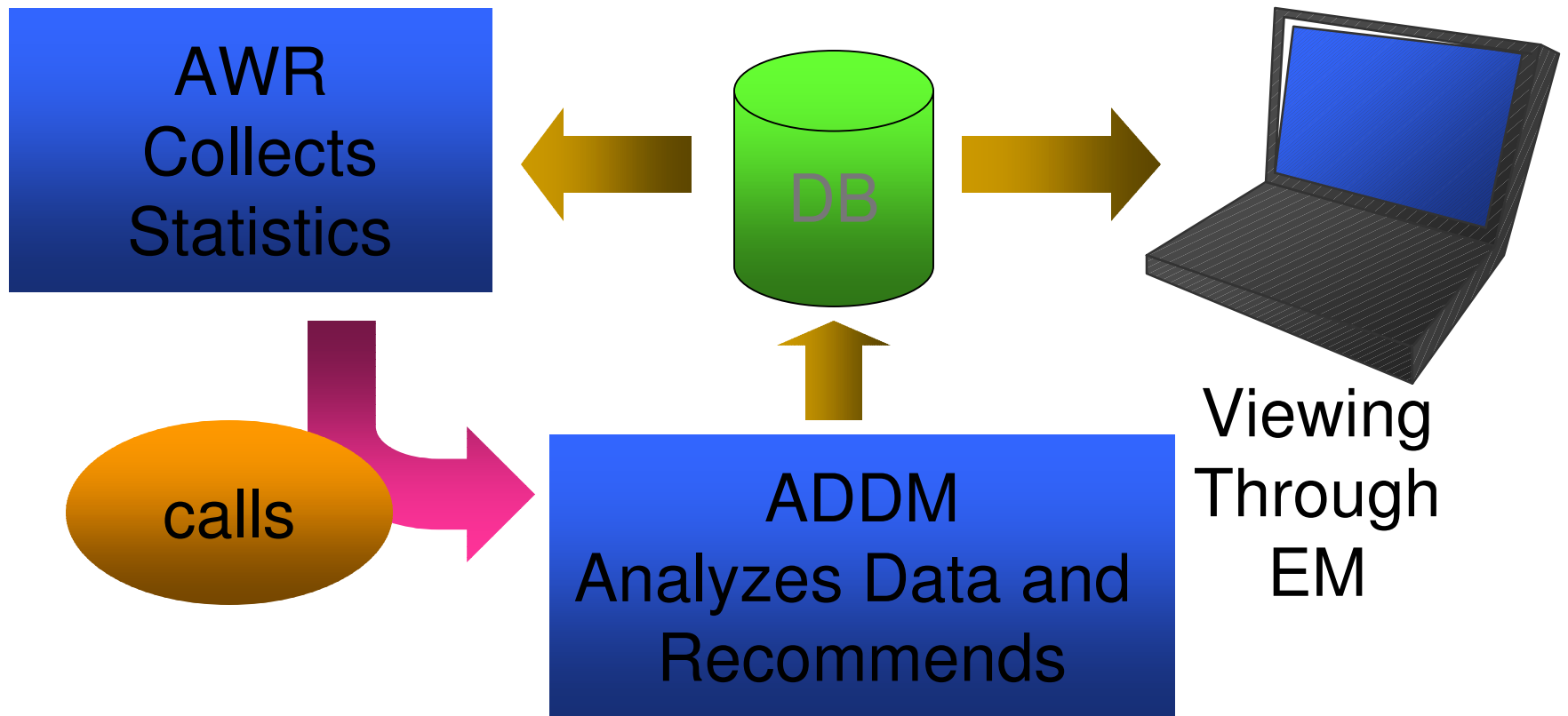
Proactive Performance Tuning



Automatic Database Diagnostic Monitor (ADDM)

- Self-Diagnostic Engine In the Database
- Integrate all components together
- Automatically provides database-wide performance diagnostic
- On-Demand Performance Analysis
- Provides impact and benefit analysis, non problem areas
- Runs proactively out of the box, reactively when required

Workflow



Oracle Enterprise Manager (SYSMAN) - Automatic Database Diagnostic Monitor (ADDM) - Microsoft Internet Explorer

Address: http://pulsar.qualcomm.com:7777/em/console/database/instar

Cluster: crs > Cluster Database: SMQCDEV > Cluster Database Instance: SMQCDEV_SMQCD1 > Advisor Central > Automatic Database Diagnostic Monitor (ADDM) Logged in As SYSTEM

Automatic Database Diagnostic Monitor (ADDM)

Page Refreshed Jun 15, 2004 5:29:56 PM Refresh

Database Activity

The selected icon below the graph identifies the performance analysis period. Click on a different icon to select a different analysis period.

Performance Analysis

Task Name **ADDM:296429929_1_455** View Snapshots View Report

Database Time (minutes) **136.96** Period Start Time **May 21, 2004 11:00:48 AM** Period Duration (minutes) **29.78**
 Task Owner **SYS** Average Active Sessions **4.6**

| Impact (%) | Finding | Recommendations |
|------------|------------------------------------------------------------------------------------------------------|--------------------|
| 100 | SQL statements consuming significant database time were found. | 2 SQL Tuning |
| 76.74 | Individual database segments responsible for significant user I/O wait were found. | 2 Segment Tuning |
| 50.13 | The buffer cache was undersized causing significant additional read I/O. | 1 DB Configuration |
| 13.3 | Read and write contention on database blocks was consuming significant database time in the cluster. | 1 Schema |
| 3.53 | Contention on buffer cache latches was consuming significant database time. | 1 SQL Tuning |

Local intranet

Oracle Enterprise Manager (SYSMAN) - Performance Finding Details - Microsoft Internet Explorer

Address: http://pulsar.qualcomm.com:7777/em/console/database/instance/hdm?event=findingDetails&findingID=9&target=SMQCDEV_SMQCD1&type=oracle_database&dbPageNur

ORACLE Enterprise Manager 10g
Grid Control

Cluster: crs > Cluster Database: SMQCD1
Automatic Database Diagnostic Monitor (ADDM)

Performance Finding Details

Database Time (minutes) 136.96 Period
Task Owner SYS Task Name ADDM:296429929_1_455 Average Active Sessions 4.6

Finding SQL statements consuming significant database time were found.
Impact (minutes) 150.15
Impact (%) 100

Recommendations

Select Item(s) and... Run SQL Tuning Advisor

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

| Select Details | Category | Benefit (%) |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------|
| <input checked="" type="checkbox"/> | Hide SQL Tuning | 103.35 |
| SQL Text UPDATE AM_HistoryEvents_TBL SET cntid=:1 , cntvalue=:2 , AMEventId=:3 , ConnectionId=:4 , ParameterId=:5 , ServerEventId=:6 , ServerTime=:7 , Status=:8 , RawServerTime=:9 , Assigned=:10 , EventDate=:1 | | |
| Action Run SQL Tuning Advisor on the SQL statement with SQL_ID "7k5zq6bb58f3c". Run Advisor Now | | |
| <input checked="" type="checkbox"/> | Show SQL Tuning | 6.28 |

Findings Path

Expand All | Collapse All

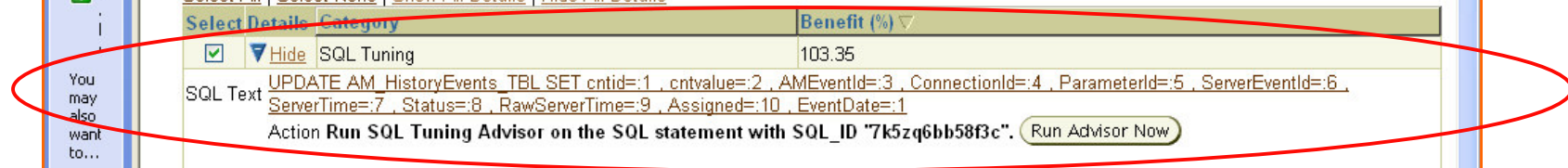
| Findings | Impact (%) | Additional Information |
|----------------------------------------------------------------|------------|------------------------|
| SQL statements consuming significant database time were found. | 109.63 | |

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

Local intranet

start 100% 5:30 PM

...the offending SQL statement. Also, recommended running SQL Tuning Advisor as the solution.



Database Tuning

Common Causes of Poor SQL Performance

- Poor plan selection due to incorrect optimizer estimates
 - Manually hinting SQL a solution, but ...
 - Requires significant expertise
 - Is time consuming – trial and error method
 - Does not work for packaged applications
- Bad SQL design
 - Only real remedy is to restructure SQL
 - Requires expertise, time, application knowledge

Database Tuning Pack

Main Features

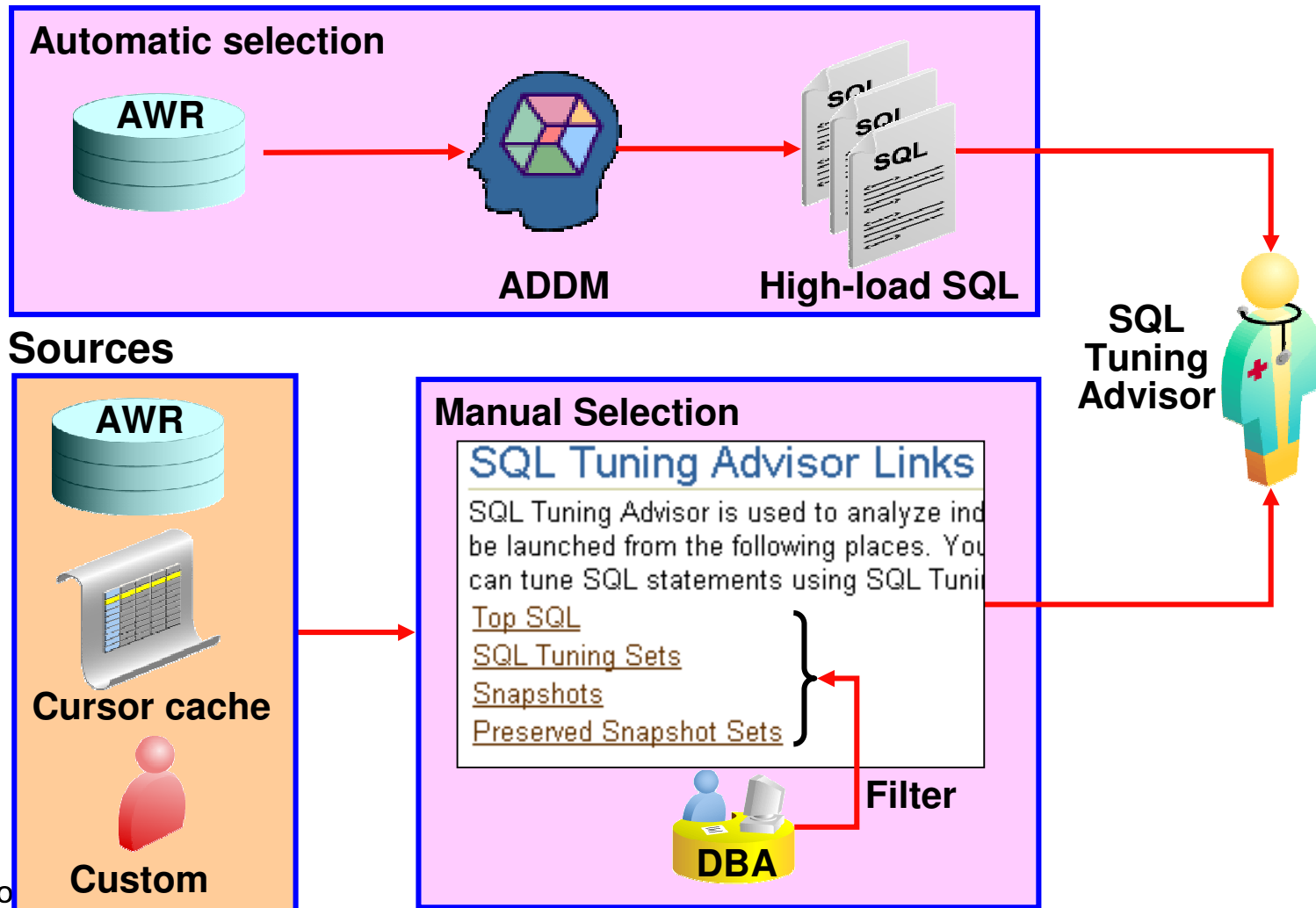
- SQL Tuning Advisor
- SQL Access Advisor
- Object Reorganization

SQL Tuning Advisor

Designed to accept input from several SQL sources:

- **Automatic Database Diagnostic Monitor (ADDM)**
 - Shows high-load SQL with impact %
 - Based on analysis of SQL, recommends SQL advisors as needed
 - Not all high-load SQL are good candidates for advisors
 - E.g., SQL with HWM enqueue wait problem cannot be tuned by SQL advisors but requires space reconfiguration
- **Top Activity Enterprise Manager (EM) screens**
 - Real Time Mode:
 - Source: v\$active_session_history (ASH)
 - Period: Last one hour
 - Historical Mode:
 - Source: Automatic Workload Repository (AWR)
 - Period: Last 7 days (default)

SQL Tuning Advisor: Usage Model



DB Control and SQL Tuning Advisor

Database: orcl > Advisor Central

Advisor Central

Advisors

- ADDM
- SQL Tuning Advisor**
- SQL Access Advisor

SQL Tuning Advisor Links

SQL Tuning Advisor is used to analyze and tune SQL statements. It can be launched from the following places. You can tune SQL statements using SQL Tuning Advisor.

- Top SQL**
- SQL Tuning Sets
- Snapshots
- Preserved Snapshot Sets

Top SQL

Spot SQL | [Period SQL](#)

Spot SQL shows all the sql statements that have been active in a recent 5 minute interval.

View Data: Real Time: 15 Second Refresh

Spot Interval Selection

Drag the shaded box to select the 5 minute interval for which you want to view details in the section below. Use the active sessions data to help with your selection.

Detail for Selected 5 minute Interval

Start Time **Jan 30, 2004 4:49:28 AM**

All SQL | [Run SQL Tuning Advisor](#) | [Create SQL Tuning Set](#)

Select All | Select None | Previous | 1-10 of 11 | Next 1

| Select | SQL ID | SQL Type | Activity (%) | CPU (%) | Wait (%) |
|-------------------------------------|----------------|----------------|--------------|---------|----------|
| <input checked="" type="checkbox"/> | fu02g80b2kva1 | SELECT | 98.96 | 99.37 | 92.50 |
| <input type="checkbox"/> | 2b064ybzkwf1y | PL/SQL EXECUTE | 0.25 | 0.21 | 0.83 |
| <input type="checkbox"/> | 5t7dh3thzrfrh | PL/SQL EXECUTE | 0.25 | 0.00 | 4.17 |
| <input type="checkbox"/> | 3us6atcjyh40w | UPDATE | 0.15 | 0.16 | 0.00 |
| <input type="checkbox"/> | 8ggw94h7mxd7 | COMMIT | 0.10 | 0.11 | 0.00 |
| <input type="checkbox"/> | db78fxqxwxt17r | UNKNOWN | 0.05 | 0.05 | 0.00 |

Top SQL (ordered by Activity)

- fu02g80b2kva1(99%)
- 2b064ybzkwf1y(0.2%)
- 5t7dh3thzrfrh(0.2%)
- 3us6atcjyh40w(0.1%)
- 8ggw94h7mxd7(0.1%)
- Other(0.3%)

SQL Tuning Advisor: Options and Recommendations

Scope

- Limited. Analysis without SQL Profile recommendation. Takes about 1 second per statement.
- Comprehensive. Complete analysis including SQL Profile. May take a long time.

Total Time limit Minutes

[Execution Plan](#)
[Current Statistics](#)
[Execution History](#)
[Tuning History](#)
Collected From Target Jan 30, 2004 5:00:29 AM

The following table lists all the recommendations available for the SQL statement.

| Plan Hash Value | Advisor Task Owner | Advisor Task Name | Task Completion |
|-----------------|--------------------|--------------------------|-------------------------|
| 2840254885 | SYS | SQL_TUNING_1075467455060 | Jan 30, 2004 4:58:19 AM |

Recommendations [View Recommendations](#)

| Select | SQL Text | Parsing Schema | SQL ID | Statistics | SQL Profile | Index | Restructure SQL | Miscellaneous | Error |
|----------------------------------|--------------------------------------------------------------------------|----------------|-------------------------------|------------|-------------|-------|-----------------|---------------|-------|
| <input checked="" type="radio"/> | select time_id, QUANTITY_SOLD, AMOUNT_SOLD from sales s, customers c ... | SH | fu02q80b2kva1 | | ✓ | | | | |

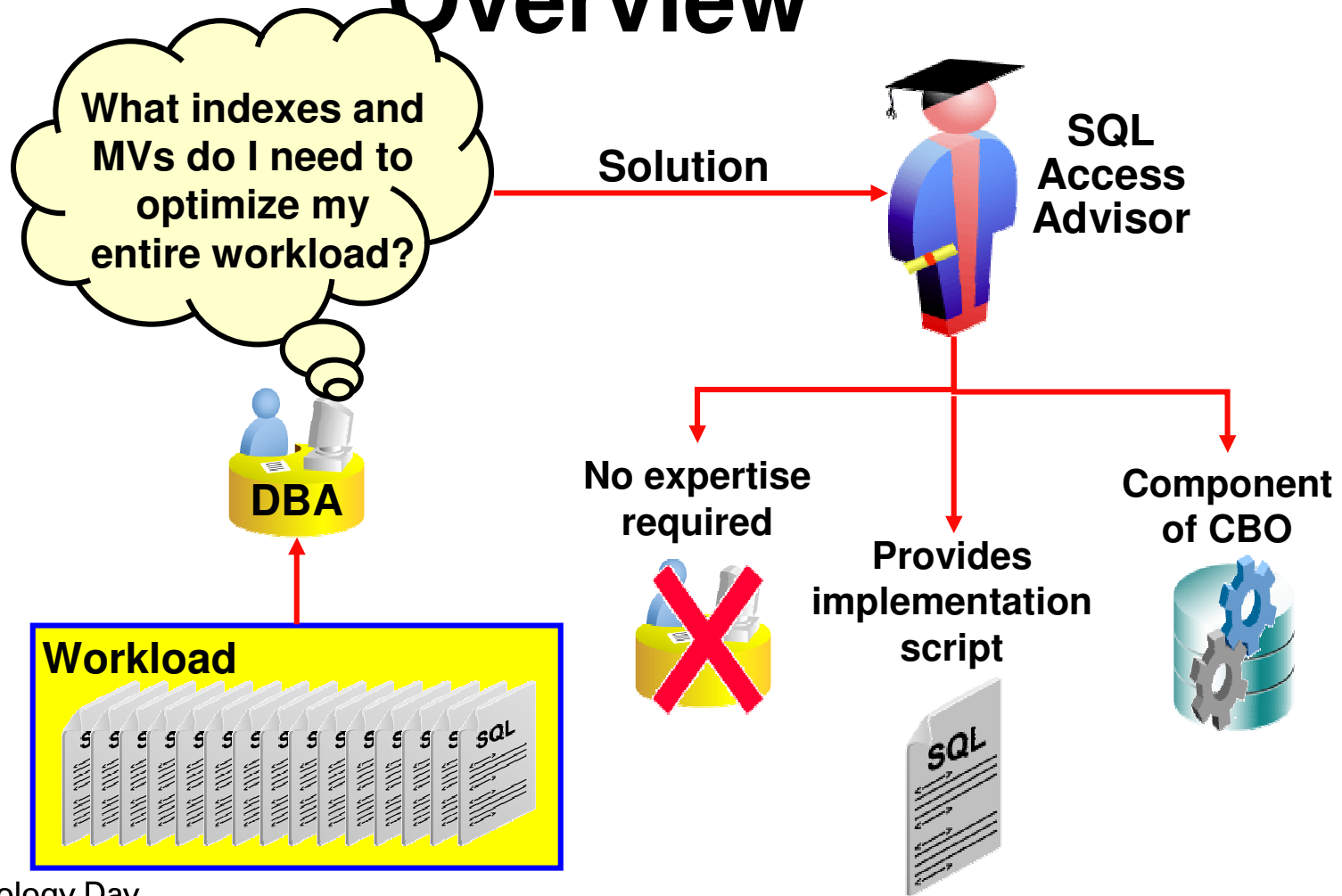
Select Recommendation [Original Explain Plan](#)

[Implement](#)

| Select | Type | Findings | Recommendations | Rationale | Benefit (%) | New Explain Plan |
|----------------------------------|-------------|-------------------------------------------------------------------|-------------------------------------------------|-----------|-------------|------------------|
| <input checked="" type="radio"/> | SQL Profile | A potentially better execution plan was found for this statement. | Consider accepting the recommended SQL profile. | | 99.97 | |

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SQL Access Advisor: Overview



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SQL Access Advisor - Recommendations

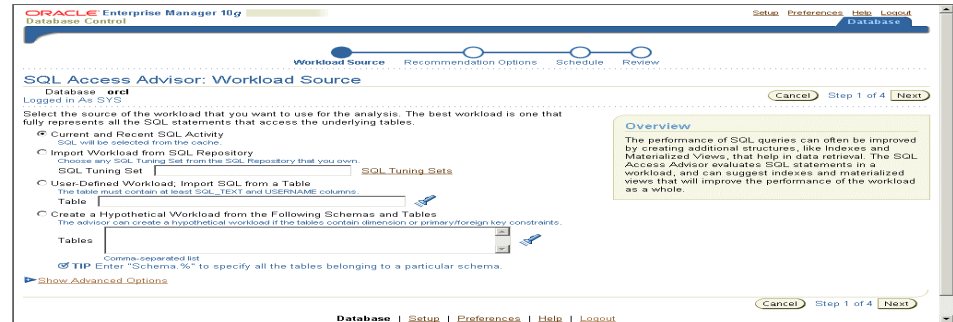
| Recommendation | Can Be |
|------------------------------------------------------------------------|--------|
| Add new index on table or materialized view | YES |
| Drop an unused index | YES |
| Modify an existing index by changing index type | YES |
| Modify an existing index by adding columns at the end | YES |
| Add a new materialized view | YES |
| Drop an unused materialized view | YES |
| Add a new materialized view log | YES |
| Modify an existing materialized view log to add new columns or clauses | YES |

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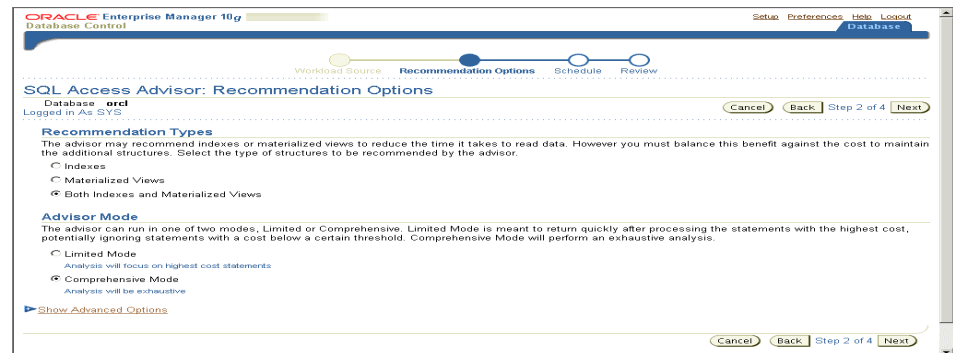
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Typical SQL Access Advisor Session

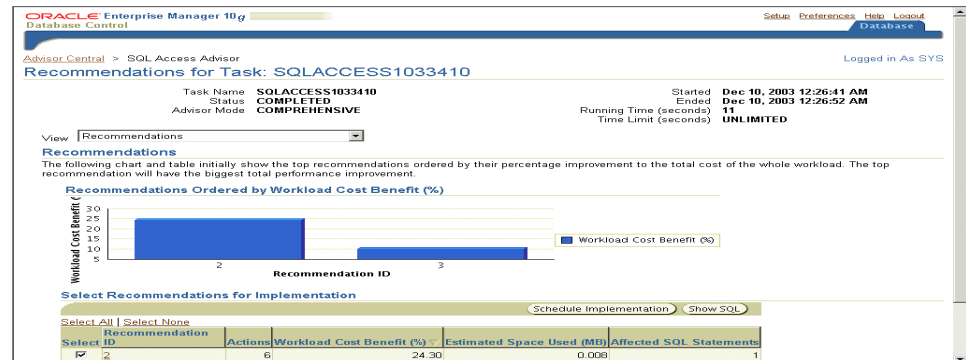
SQL Access Advisor



Recommendation Options



Review Recommendations



Object Reorganization

- Reorganization is used for:
 - Rebuilding indexes and tables that are fragmented
 - Relocating objects to another tablespace
 - Recreating objects with optimal storage attributes

The screenshot shows the Oracle Enterprise Manager 10g Database Control interface. At the top, the title bar reads "ORACLE Enterprise Manager 10g Database Control" on the left and "Setup Preferences Help Logout Database" on the right. Below the title bar is a navigation breadcrumb: "Type" (selected), "Objects", "Options", "Impact Report", "Schedule", and "Review".

The main content area is titled "Reorganize Objects: Type". It displays the following information:

- Database: **prod9**
- Logged In As: **SYS**

Navigation buttons include "Cancel", "Step 1 of 6", and "Next".

The main instruction reads: "You can reorganize individual schema objects or an entire tablespace. Select the reorganization type:"

Two radio button options are provided:

- Schema Objects
- Tablespace

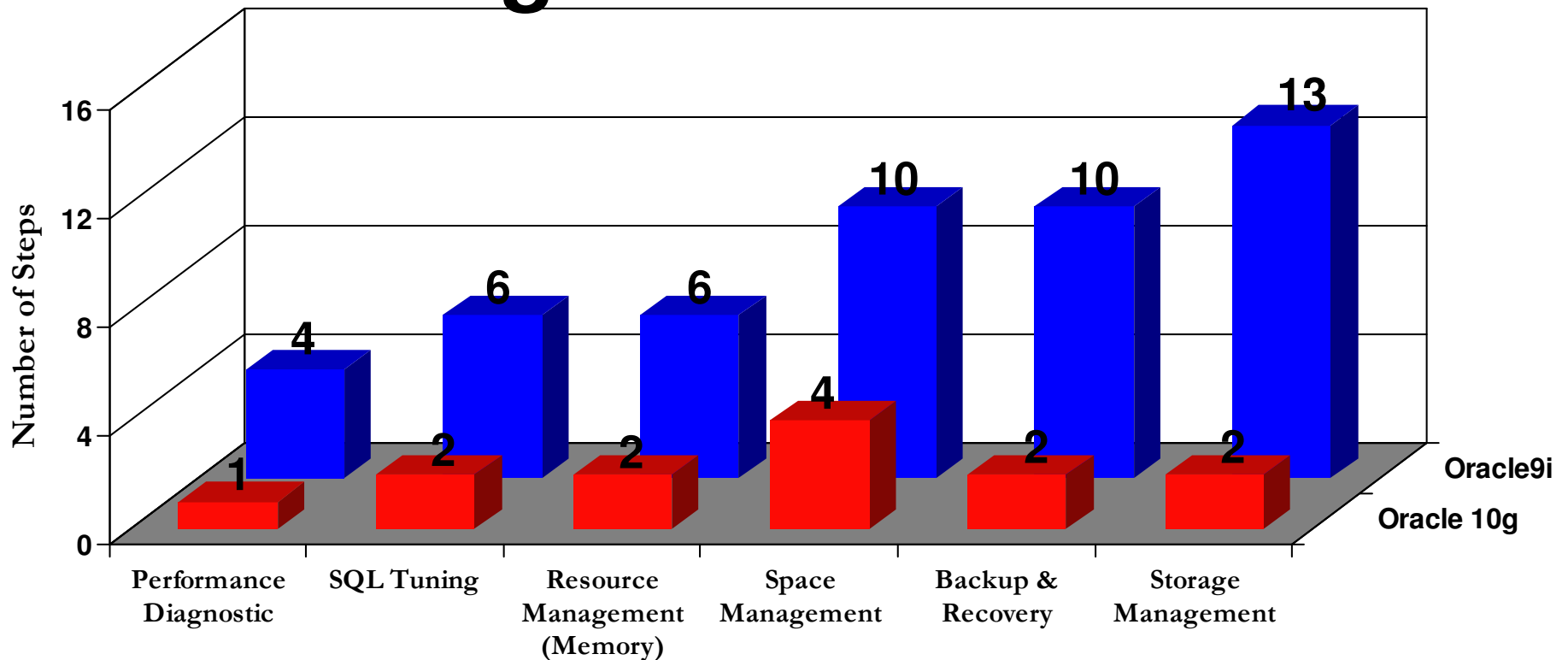
An "Overview" box on the right contains the following text:

Reorganization is necessary for:

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

Summary

Oracle Database 10g : Twice as Manageable as Oracle9i



Summary
44% less time
47% fewer steps

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Benefits...

- No need to build manually tuning scripts
- Allows for more superior and efficient tuning
- Provide advice on improving the performance of the SQL Statements and the benefits
- Tuning without SQL modification

Conclusion

- Automates management of performance issues for the Oracle Database
 - Automatic problem identification and resolution
 - Unique to Diagnostics Pack
 - Automatic and transparent SQL Tuning
 - Unique to Tuning Pack
 - Guided problem resolution
 - Graphical, intuitive and easy to use – “Point & Click”
- Adds significant business value
 - Enhances DBA’s quality of life and productivity
 - Makes available more resources to focus on strategic initiatives

A large graphic featuring a black 'Q' and 'A' with a red ampersand in the center. The words 'QUESTIONS' and 'ANSWERS' are written in a bold, black, sans-serif font across the middle of the graphic.

QUESTIONS
ANSWERS

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