



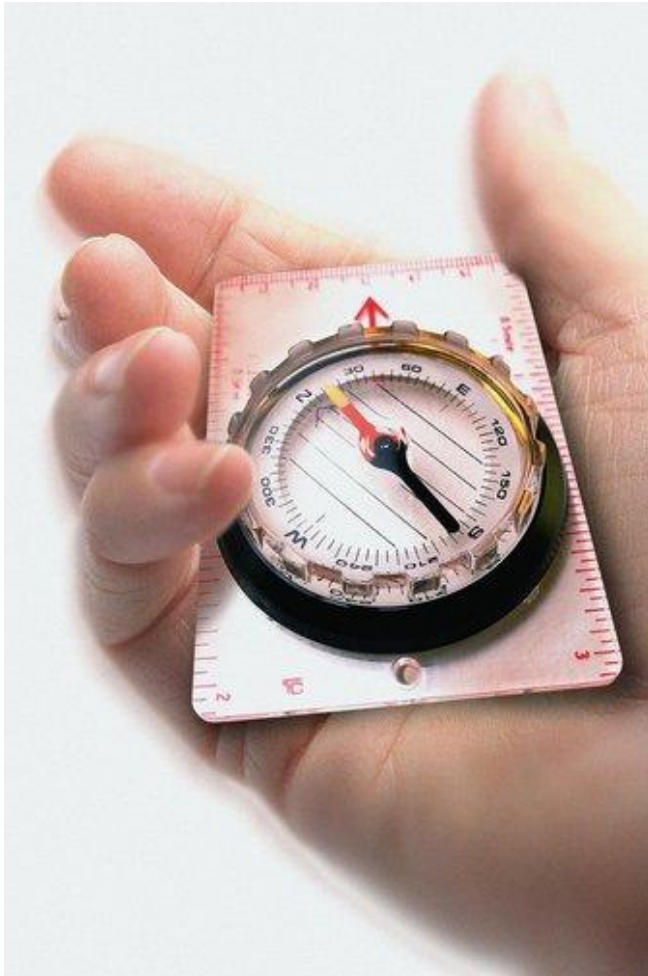
Monitoring and Management





Course objectives

By completing this course, you will be able to:



- Troubleshoot invalid and unusable objects
- Gather optimizer statistics
- View performance metrics
- Set warning and critical alert thresholds
- Use baseline metrics, tuning, diagnostic advisors, the Automatic Database Diagnostic Monitor, the Automatic Workload Repository





Course topics

Course's plan:



- **Managing Database Performance**
- **Monitoring Oracle**





Managing Database Performance



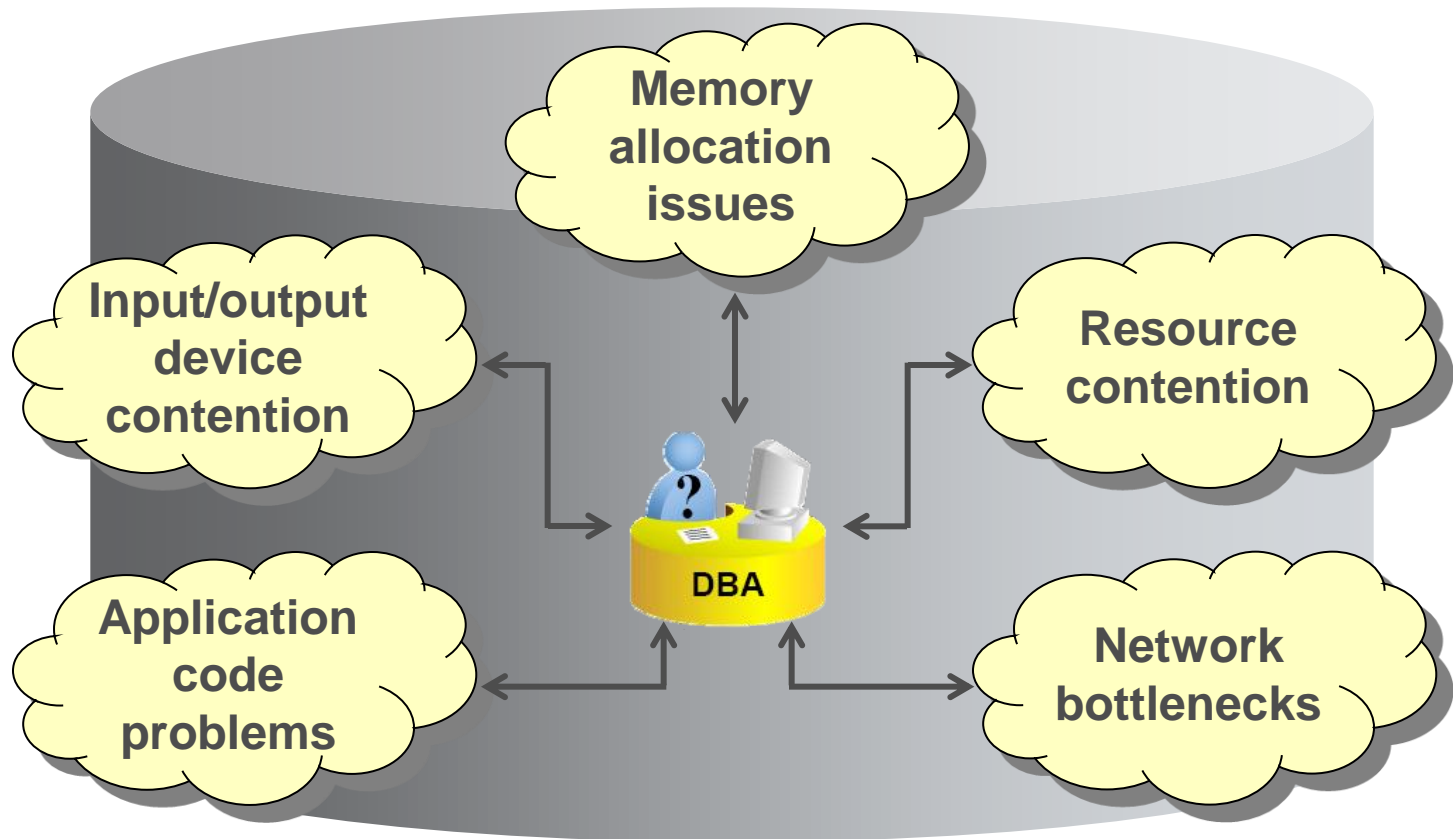
Preview

- Presentation
- Invalid Objects
- Unusable Indexes
- Optimizer Statistics
- Performance Metrics
- Reacting to Performance Issues





Presentation





Presentation

Monitoring Methodologies

- Reactive
- Proactive
 - Server-generated alerts
 - Automatic Database Diagnostic Monitor (ADDM)





Presentation

Database and Instance Metrics

Several hundred different performance statistics are available through :

- Data dictionary
- Dynamic performance views
- Optimizer statistics





Presentation

Data Dictionary Metrics

Object status :

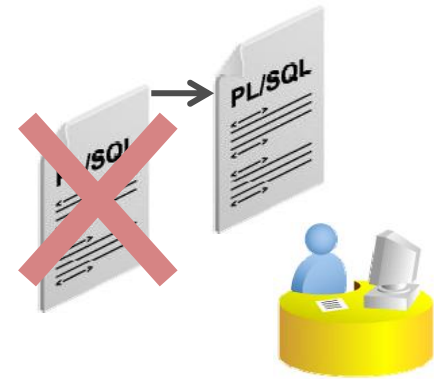
- PL/SQL code objects
- Indexes





Invalid Objects

- Stored PL/SQL is code stored and compiled within the data dictionary, as PL/SQL objects. This code can take these forms:
 - Procedures
 - Functions
 - Triggers
 - Packages
 - Object types
- When a procedural object is compiled, the compiler checks the data objects to which it refers in order to confirm that their definition is correct.





Invalid Objects

Identifying Invalid Objects

- Using data dictionary view **DBA_OBJECTS** (and **ALL_OBJECTS** or **USER_OBJECTS**)

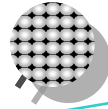
```
SQL> SELECT owner, object_name, object_type  
2 FROM dba_objects  
3 WHERE status='INVALID';
```

- The column **STATUS** should ideally always be **VALID**.
- First question to ask is whether the object was ever valid.
- If you do not know, then first step is to attempt to compile it.
- Even if the objects does compile when it is accessed, there may be a delay while the compilation takes place; it is better for perceived performance if this delay is taken by the DBA in advance.





Invalid Objects



Oracle will always attempt to recompile invalid PL/SQL objects and views automatically, but this may not succeed. You do not have to do it manually; though it may be advisable to do so.





Invalid Objects

Repairing Invalid Objects

- To compile procedural objects, use the **ALTER...COMPILE;** command.

```
SQL> ALTER PROCEDURE add_employee COMPILE;  
SQL> ALTER VIEW emp_details COMPILE;
```

- If it fails, then you need to work out why. For procedural objects, use **SHOW ERRORS** command.
- A useful starting point is to use the **DBA_DEPENDENCIES** view to identify the cause of compilation errors.

```
SQL> SELECT referenced_type, referenced_name  
2 FROM dba_dependencies  
3 WHERE name='ADD_EMPLOYEE'  
4 AND type='PROCEDURE';
```





Invalid Objects

Repairing Invalid Objects

- You may have to recompile hundreds or thousands of invalid objects.
- Typically, this occurs after an upgrade to an application, or after applying patches.
- Rather than recompiling them individually, use the supplied utility script.

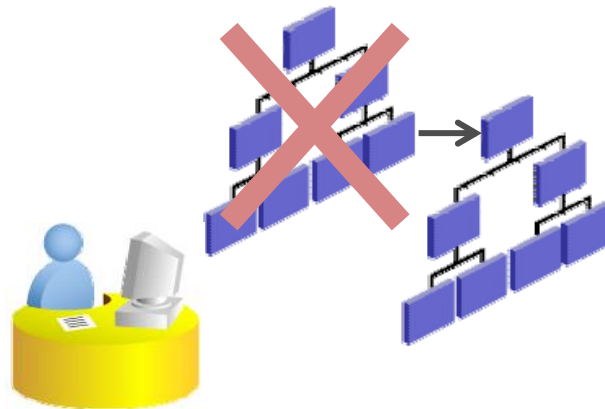
```
SQL> @?/rdbms/admin/utlrp
```





Unusable indexes

- If an index becomes unusable for any reason, it must always be repaired explicitly before it can be used.
- Perhaps the most common reason is that the table has been moved, with the `ALTER TABLE...MOVE` command.
- Oracle will be aware of this and will therefore not permit use of the index.
- Unusable indexes could reduce performance of some queries.





Unusable indexes

Identifying Unusable Indexes

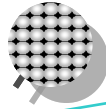
- Statements will always succeed, but perhaps at the cost of greatly reduced performance.
- The exception to this is if the index is necessary to enforce a constraint: if the index on a primary key column becomes unusable, the table will be locked for DML.
- To detect indexes which have become unusable, query the **DBA_INDEXES** view:

```
SQL> SELECT owner, index_name  
2     FROM dba_indexes  
3     WHERE status='UNUSABLE';
```





Unusable indexes



Rebuilding indexes may also be necessary as part of normal database maintenance. Indexes become inefficient with time, particularly if there are many deletions, or updates that affect the key values of rows.





Unusable indexes

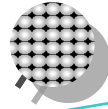
Repairing Unusable Indexes

- Indexes are marked unusable if the rowid pointers are no longer correct.
- To repair the index, it must be re-created with the **ALTER INDEX...REBUILD** command.
- The **REBUILD** command has several options:
 - **TABLESPACE** to move the index to another tablespace
 - **ONLINE** to allow DML during the re-creation
 - **NOLOGGING** to avoid generating redo for the index rebuild operation: rebuild proceed much faster but you have to back up the tablespace immediately





Unusable indexes



While an index rebuild is in progress, additional storage space is required. The original unusable index is dropped after the new index is completed.





Optimizer Statistics

Manually Gather Optimizer Statistics

- If database was not created with the DBCA
- If tables are extremely volatile

Database: dba10g

[Home](#) [Performance](#) [Administration](#)

Utilities

[Export to Files](#)
[Import from Files](#)
[Import from Database](#)
[Load Data from File](#)
[SQL Access Advisor](#)
[Gather Statistics](#)
[Reorganize Objects](#)
[Make Tablespace Locally Managed](#)

Introduction Default Method Object Selection Schedule **Review**

Gather Statistics Wizard: Review

[Cancel](#) [Back](#) [Step 5 of 5](#) [Submit](#)

Review the following for accuracy and make changes as necessary:

Job ID GatherStats1908451 **Execution Time** Immediately

Generated SQL for gathering statistics

```
begin
dbms_stats.gather_schema_stats(
  ownname=> 'HR',
  granularity=> 'DEFAULT',
  block_sample=> FALSE,
  cascade=> TRUE,
  method_opt=> 'FOR COLUMNS SIZE AUTO',
  options=> 'GATHER AUTO');
end;
```





Optimizer Statistics

Automate Optimizer Statistics Collection

- Use the Oracle Scheduler to automate customized statistics collection.

Database: dba10g > Jobs > Create Job

Create Job

Show SQL Cancel OK

General Schedule Options

* Name

* Owner

Enabled ☒ Yes ☐ No

Description

Logging Level
Set how much logging pertaining to this job should be done

Job Class

Auto Drop
Whether the job should remain after having completed

Restartable
Whether the job can be safely restarted (and should be restarted in case of failure)





Optimizer Statistics

Schedule Optimizer Statistics Collection

- Statistics should be gathered as needed to ensure the optimizer can make appropriate decisions.

The screenshot shows the 'Create Job' dialog box with the 'Schedule' tab selected. The 'General' tab is also visible. The 'Options' tab is not selected. The 'Schedule Type' is set to 'Standard'. The 'Time Zone' is 'GMT -07:00'. The 'Repeating' section has 'Repeat' set to 'Do Not Repeat'. The 'Start' section has 'Immediately' selected. The 'Date' is 'Feb 16, 2004' and the 'Time' is '5:00 PM'.

Create Job

Show SQL Cancel OK

General **Schedule** Options

Schedule Type: Standard

Time Zone: GMT -07:00 Change Time Zone

Repeating

Repeat: Do Not Repeat

Start

☒ Immediately
☐ Later

Date: Feb 16, 2004 (example: Feb 16, 2004)

Time: 5:00 PM





Optimizer Statistics

How to Get Information

Optimizer statistics are:

- Not real-time
- Persistent across instance restarts

```
SELECT COUNT(*) FROM hr.employees;
```

COUNT(*)
214

```
SELECT num_rows FROM dba_tables  
WHERE owner='HR' AND table_name = 'EMPLOYEES';
```

NUM_ROWS
107





Optimizer Statistics

Dynamic Performance views

Dynamic performance views are:

- Real-time
- Non-persistent across instance restarts

```
SELECT name, value FROM v$sysstat  
WHERE name='sorts (memory)' ORDER BY name;
```

NAME	VALUE
sorts (memory)	4476

/

NAME	VALUE
sorts (memory)	5021





Performance Metrics

Viewing Metric Information

- Use the All Metrics link in the Related Links region.
- Drill-down for in-depth analysis.

Database: [orcl.oracle.com](#) > All Metrics

[All Metrics](#)

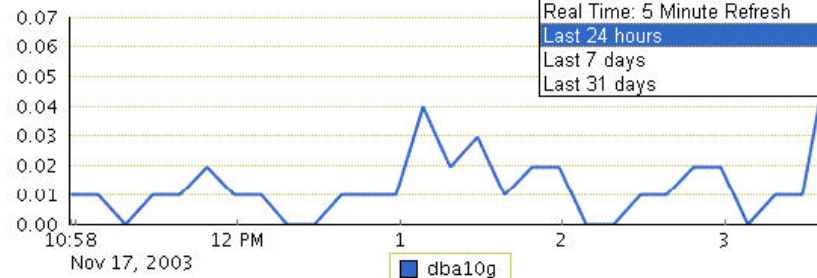
[Expand All](#) | [Collapse All](#)

Metrics	Thresholds
▼ orcl.oracle.com	
▶ Alert Log	Some
▶ Alert Log Content	None
▶ Alert Log Error Status	All

Statistics for Last 24 Hours

Last Known Value **.06**
Average Value **.01**
High Value **.06**
Low Value **0**
Warning Threshold **Not Defined**
Critical Threshold **Not Defined**
Threshold Occurrences **No data**

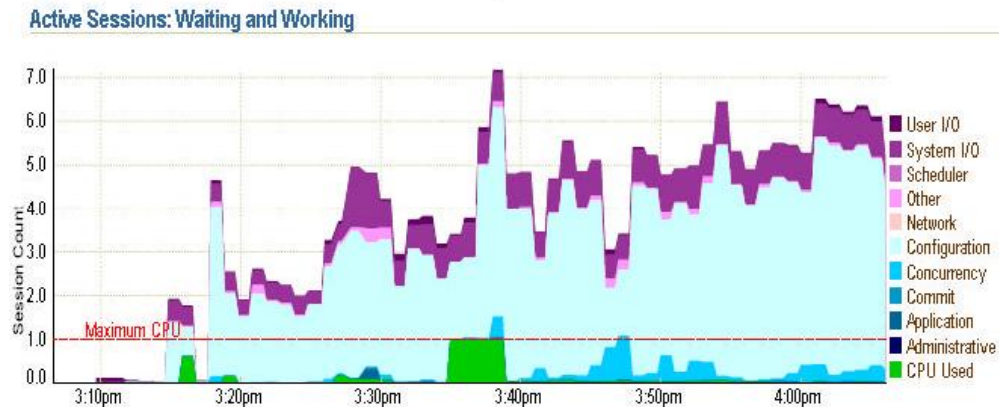
Metric Value History





Reacting to Performance Issues

- Use Enterprise Manager to:
 - Find key performance issues
 - Drill down to the root cause

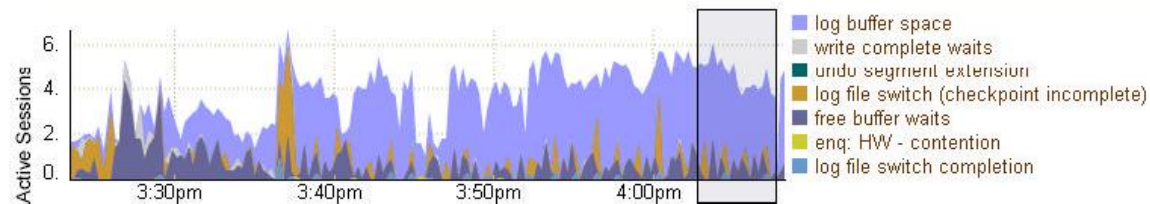




Reacting to Performance Issues

- Drill down into performance measurements to identify bottlenecks

Active Sessions Waiting: Configuration



- Key bottleneck: log buffer space





Part 1 Summary

Presentation

Optimization

**How to get
information**





Part 1 Stop-and-think

Do you have any questions ?





Monitoring Oracle



Monitoring Oracle Preview

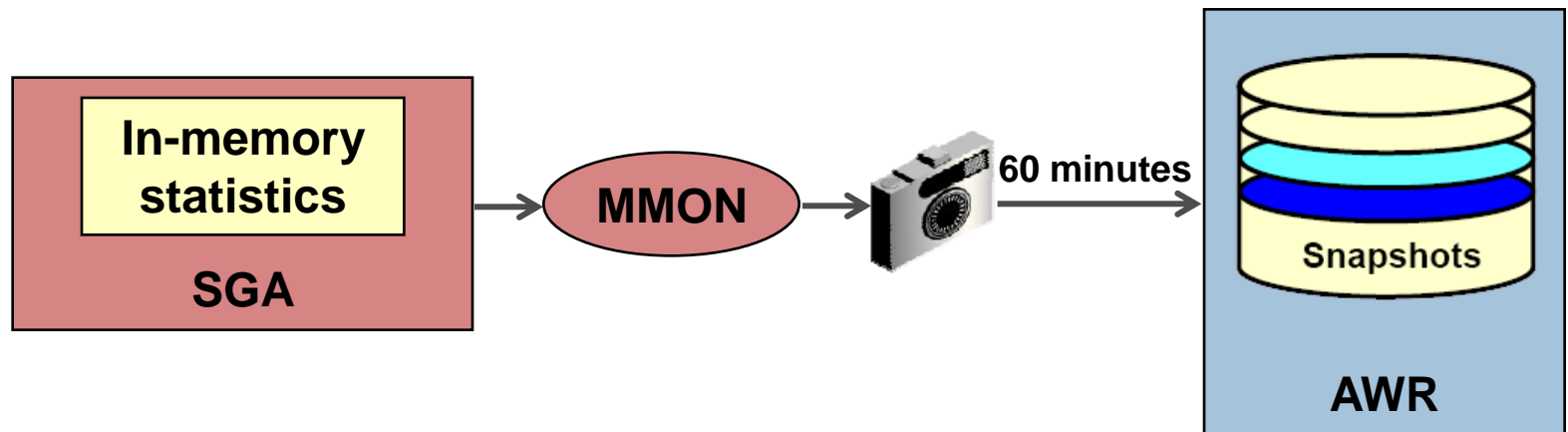
- Automatic Workload Repository
- Automatic Database Diagnostic Monitor
- Server-Generated Alerts





Automatic Workload Repository

- Built-in repository of performance information
- Snapshots of database metrics are taken every 60 minutes and retained for 7 days
- Foundation for all self-management functions





Automatic Workload Repository

Managing the AWR

- Retention period
 - Default 7 days
 - Consider storage needs
- Collection interval
 - Default 60 minutes
 - Consider storage needs, performance impact
- Collection level
 - Basic (disables most of ADDM functionality)
 - Typical (recommended)
 - All (adds additional SQL tuning information to snapshots)

Edit Settings

Database: dba10g > Workload Repository > Edit Settings

Snapshot Retention ☒ Use Time-Based Retention

Retention Period (Days)

☐ Retain Forever

Snapshot Collection ☒ System Snapshot Interval

Interval

☐ Turn off Snapshot Collection

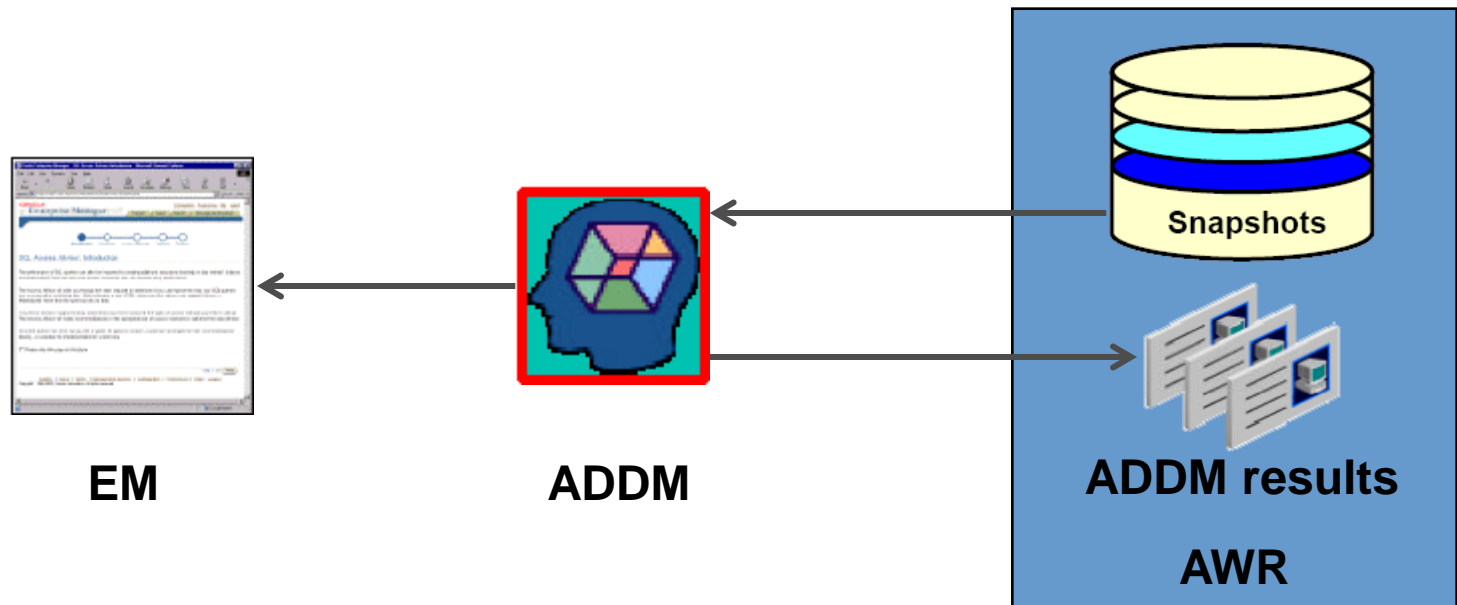
Collection Level TYPICAL





Automatic Database Diagnostic Monitor

- Runs after each AWR snapshot
- Monitors the instance and detects bottlenecks
- Results stored within the AWR





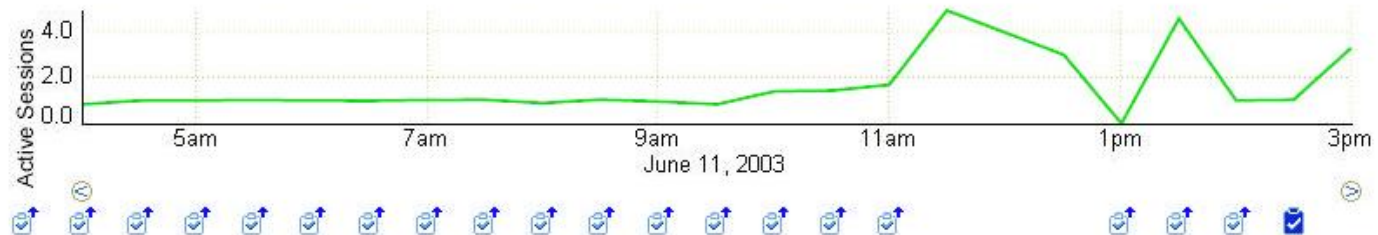
Automatic Database Diagnostic Monitor

ADDM Findings

Choose ADDM Task

Create ADDM Task...

Select the ADDM Task for which you would like to see details using the icons. Session activity is shown in the graph to help you.



ADDM Task Detail

Database Time (minutes) **94.33** Analysis Start Time **Jun 11, 2003 2:30:14 PM** Analysis Duration (minutes) **29.85**

Finding	Impact (%) ▾	Recommendation Summary
<u>Read and write contention on database blocks was consuming significant database time.</u>	16	SCHEMA 3
<u>Contention on buffer cache latches was consuming significant database time.</u>	2	SQL TUNE 2





Automatic Database Diagnostic Monitor

ADDM Recommendations

[Host: usunrdi20](#) > [Database: mgmt10i_usunrdi20](#) > [Advisor Central](#) > [ADDM Task](#) > ADDM Finding Details

ADDM Finding Details

Analysis Start Time **Jun 10, 2003 9:30:30 AM**
Analysis Duration (minutes) **29.75**
Finding **Read and write contention on database blocks was consuming significant database time.**
Database Time (minutes) **274.16**
Impact (minutes) **98.23**
Impact (%) **35.83**

Recommendations

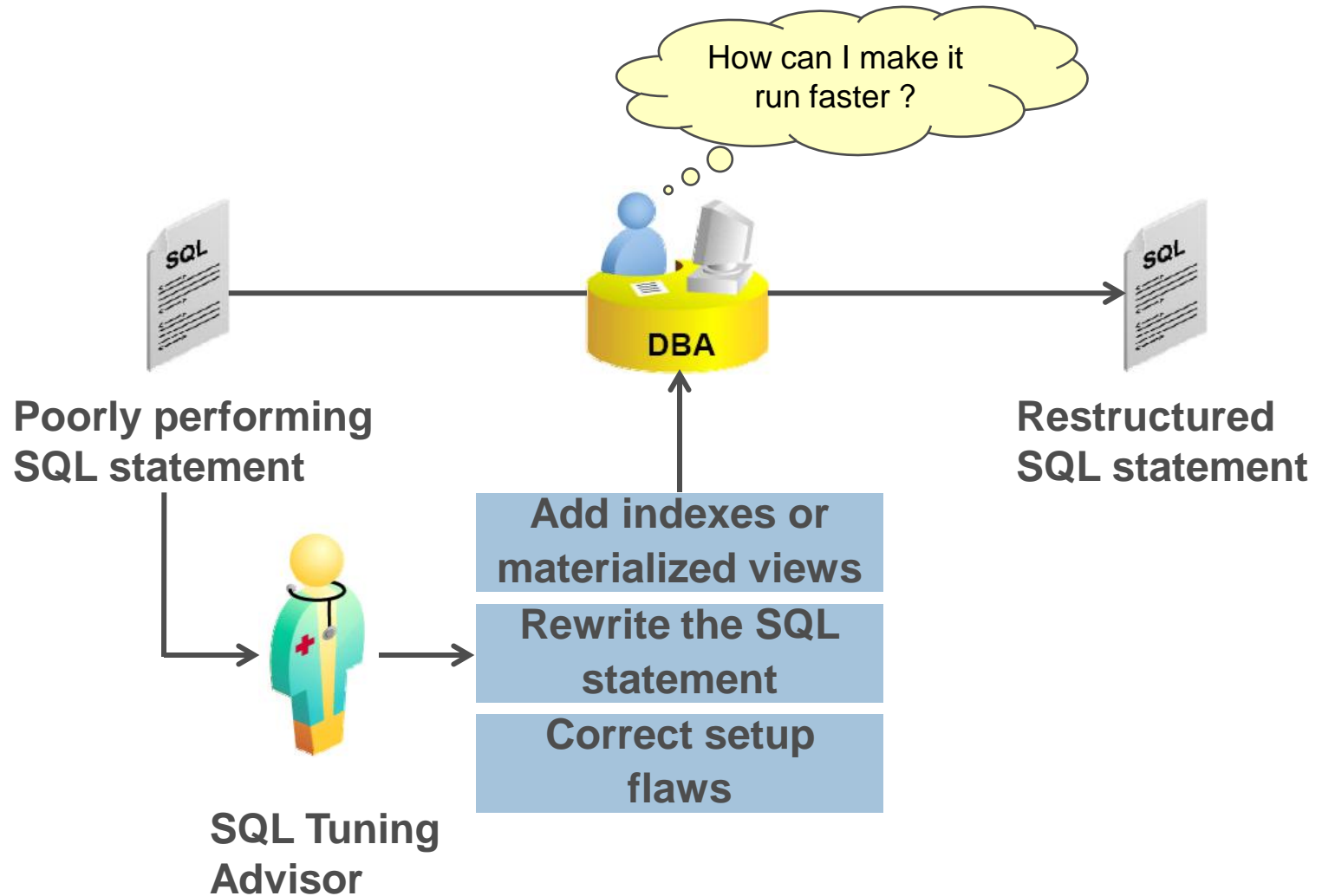
[Show All Details](#) | [Hide All Details](#)

Details	Category	Benefit (minutes) ▾
▼ Hide	SCHEMA	57.56
Action	Consider using ORACLE's recommended solution of bitmapped segments in a locally managed tablespace for the tablespace "USERS" containing the database object "SCOTT.TOTO" with object id 41560.	
▼ Hide	SCHEMA	57.56
Action	Consider partitioning "SCOTT.TOTO" with object id 41560 in a manner that will evenly distribute concurrent DML across multiple partitions.	
▼ Hide	SCHEMA	57.56
Action	A temporary solution may be achieved by increasing the number of free lists in segment "SCOTT.TOTO".	





SQL Tuning and Access Advisors

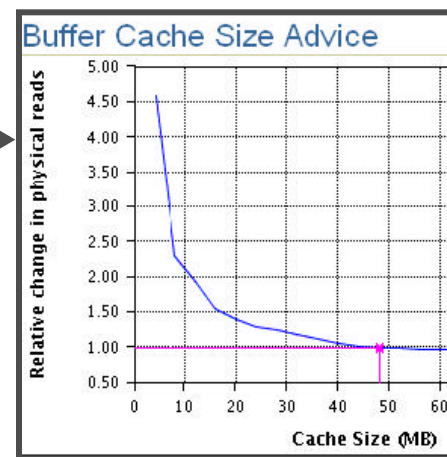
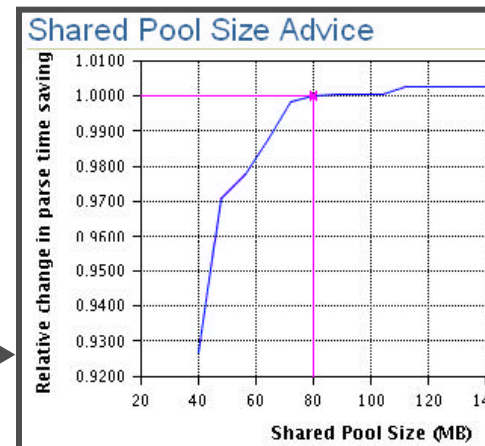
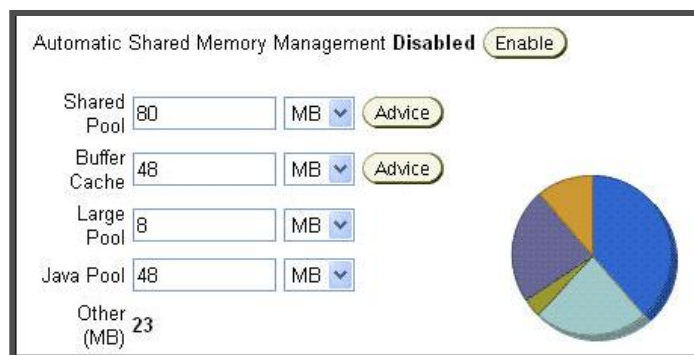




SQL Tuning and Access Advisors

Memory Advisors

- Shared pool
- Database buffer cache
- Program Global Area (PGA)





SQL Tuning and Access Advisors

Segment Advisor

- Entire tablespace
- Individual schema objects

Segment Advisor

You can get advice on shrinking segments for individual schema objects or entire tablespaces.

☒ Tablespaces
☐ Schema Objects

Advisor Mode

☒ Complete Analysis of All Segments (Comprehensive)
The advisor will sample selected objects as needed, and generate more complete recommendations. The analysis may take a long time to finish and will be scheduled as a job.

☐ Analysis Based on Available Statistics (Limited)
The analysis will finish within 30 seconds. Due to the time limitation, the advisor may not be able to finishing evaluating all segments.

[Cancel](#) [Continue](#)

Overview

The segment advisor determines whether objects have unused space that can be released, taking estimated future space requirements into consideration.

Segment Advisor: Review

Database **dba10g** [Cancel](#) [Show SQL](#) [Back](#) [Step 4 of 4](#) [Submit](#)

Task Name **SHRINK_2958425**
Task Description **Get shrink advice based on object growth trend**
Advisor Mode **Complete Analysis of All Segments (Comprehensive)**
Time Limit for Analysis (secs)
Advisory Results Retention (days)

Selected Objects

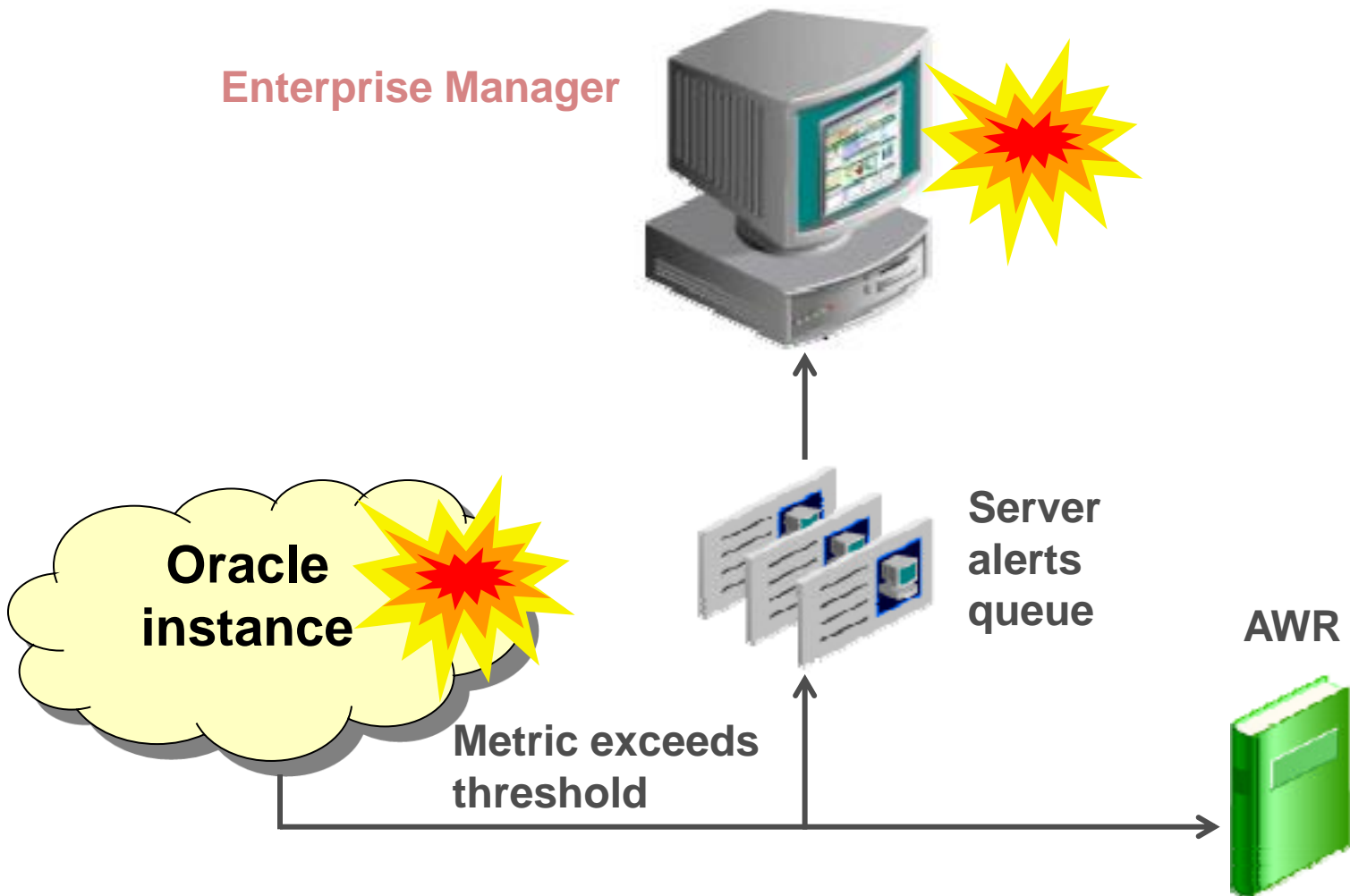
Tablespace	Schema	Segment Name	Partition Name	Type
EXAMPLE	HR	COUNTRIES		Table





Server-Generated Alerts

Managing Thresholds

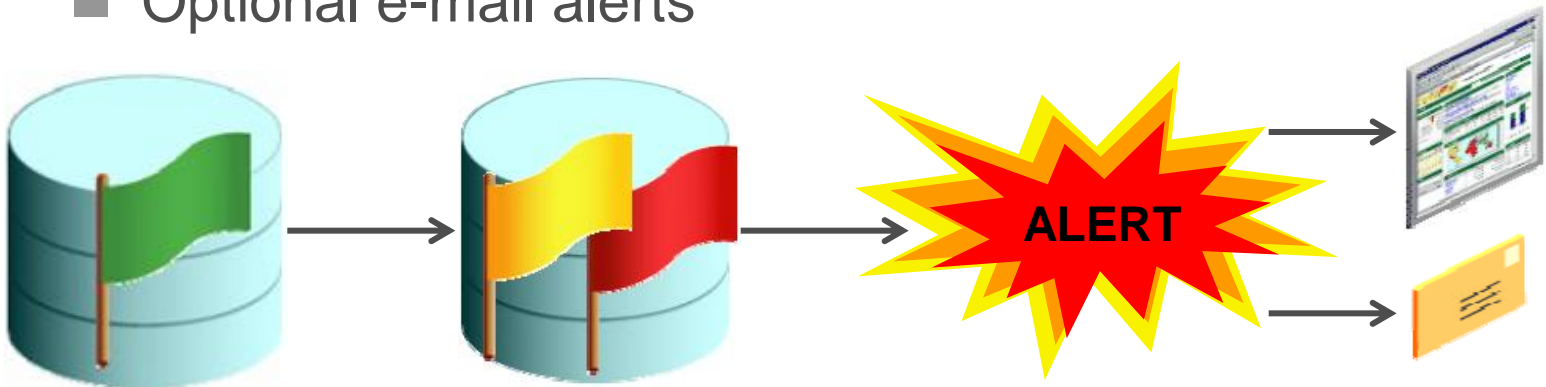




Server-Generated Alerts

Reacting to Performance Issues

- Each metric can be assigned two thresholds:
 - Warning
 - Critical
- When thresholds are reached, alerts are triggered by:
 - Notifications that appear in the Alerts region of the Database Control home page
 - Optional e-mail alerts





Server-Generated Alerts

Setting Thresholds

Enterprise Manager's Manage Metrics property page provides access to threshold settings.

Manage Metrics

Thresholds [Baselines](#)

Edit Thresholds

Pending changes: 0

Metric	Comparison Operator	Warning Threshold	Critical Threshold
Archive Area Used (%)	>	80	
Archiver Hung Alert Log Error	Contains		ORA-
Archiver Hung Alert Log Error Status	>	0	
Audited User	=	SYS	
Average File Read Time (centi-seconds)	>		
Average File Write Time (centi-seconds)	>		





Server-Generated Alerts


Baseline Measurements


Baseline measurements provide threshold recommendations based on actual performance data.

Create Metric Baseline

Create a metric baseline by specifying the date whose performance metric data will be used as a basis to calculate thresholds. If you choose, Warning and Critical thresholds will be calculated based on the percentages specified. Cancel OK

* Name

* Date 
(Specify a date where performance was acceptable for this target.)
(example: Dec 15, 2003)

Hour of day  ☒ AM ☐ PM

Warning Percentage

Critical Percentage
(The Warning and Critical percentages will be used against metric baseline Low and High Values to calculate metric thresholds. See help for details.)

Go





Server-Generated Alerts

Using Baselines

To activate a stored baseline :

- Click Copy Thresholds From Baseline.
- Select the appropriate threshold.

Database: dba10g > Manage Metrics > Edit Thresholds

Edit Thresholds

Use these metrics to monitor conditions as they reach their critical and warning thresholds. Alerts are generated when thresholds are reached. Change the thresholds as required.

Cancel

OK

TIP A Response Action is a user-specified command or script that is executed automatically by the Management Agent when the metric reaches the Warning or Critical state. The command or script specified must include a fully qualified path and must be accessible to the Management Agent.

Related Link [Response to Target Down](#)

Copy Thresholds From Baseline

Copy Thresholds To Current Target

Database: dba10g > Manage Metrics > Edit Thresholds > Copy Thresholds From Baseline

Copy Thresholds From Baseline

Select the baseline from which to copy thresholds.

Cancel

Select

Select	Name	Date
<input checked="" type="radio"/>	Mid-day Performance	19-NOV-2003 14:00:00

Cancel

Select





Part 2 Summary

**Managing
Thresholds**

**SQL Tuning
and Access
Advisors**

**Automatic
Workload
repository**

**Automatic
Database
Diagnostic
Monitor**





Part 2 Stop-and-think

Do you have any questions ?

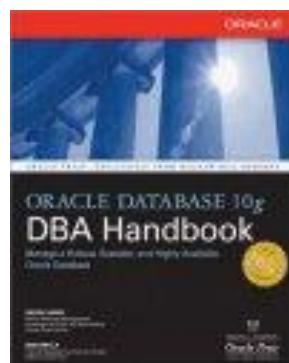
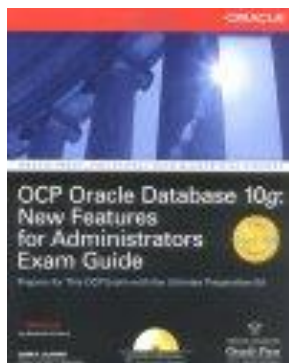




For more

If you want to go into these subjects more deeply, ...

Publications



<http://www.oracle.../bookstore/>

Courses

Cursus: Merise & SQL

Cursus: PL/SQL

Cursus: DBA1 & DBA2

Cursus: DWH, OAS & BIS

Web sites

<http://www.labo-oracle.com>

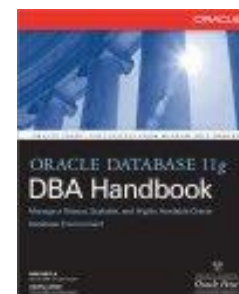
<http://www.oracle.com>

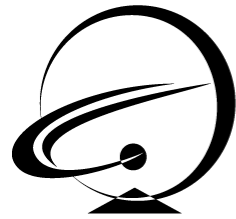
<http://otn.oracle.com>

Certifications

1Z0-042

1Z0-043





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**Oracle Technologies
Monitoring and Management**

The end

