Monitoring and Management

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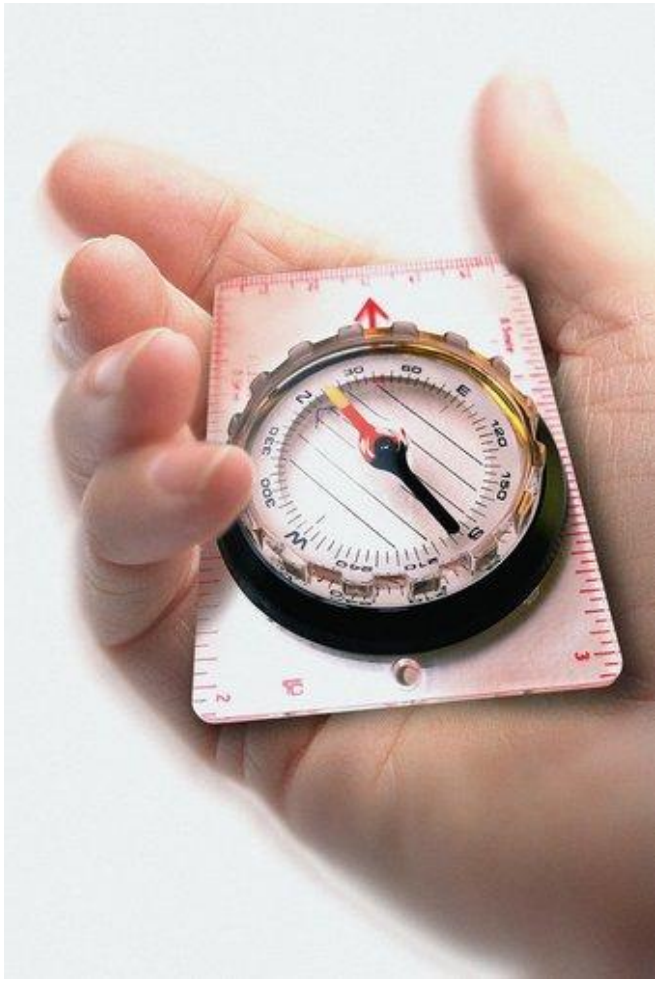
Course objectives

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:

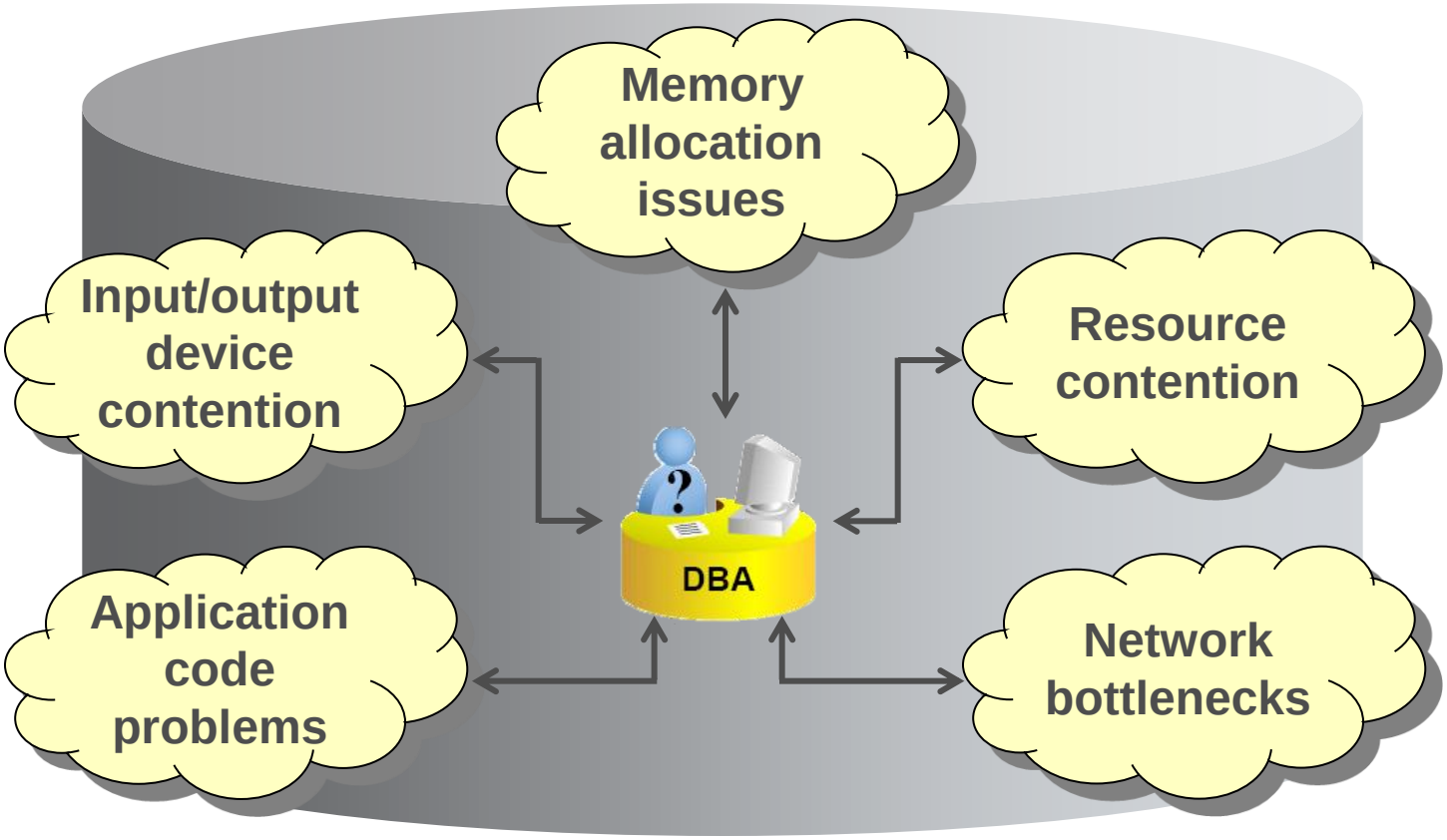
- Managing Database Performance
- Monitoring Oracle

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 :

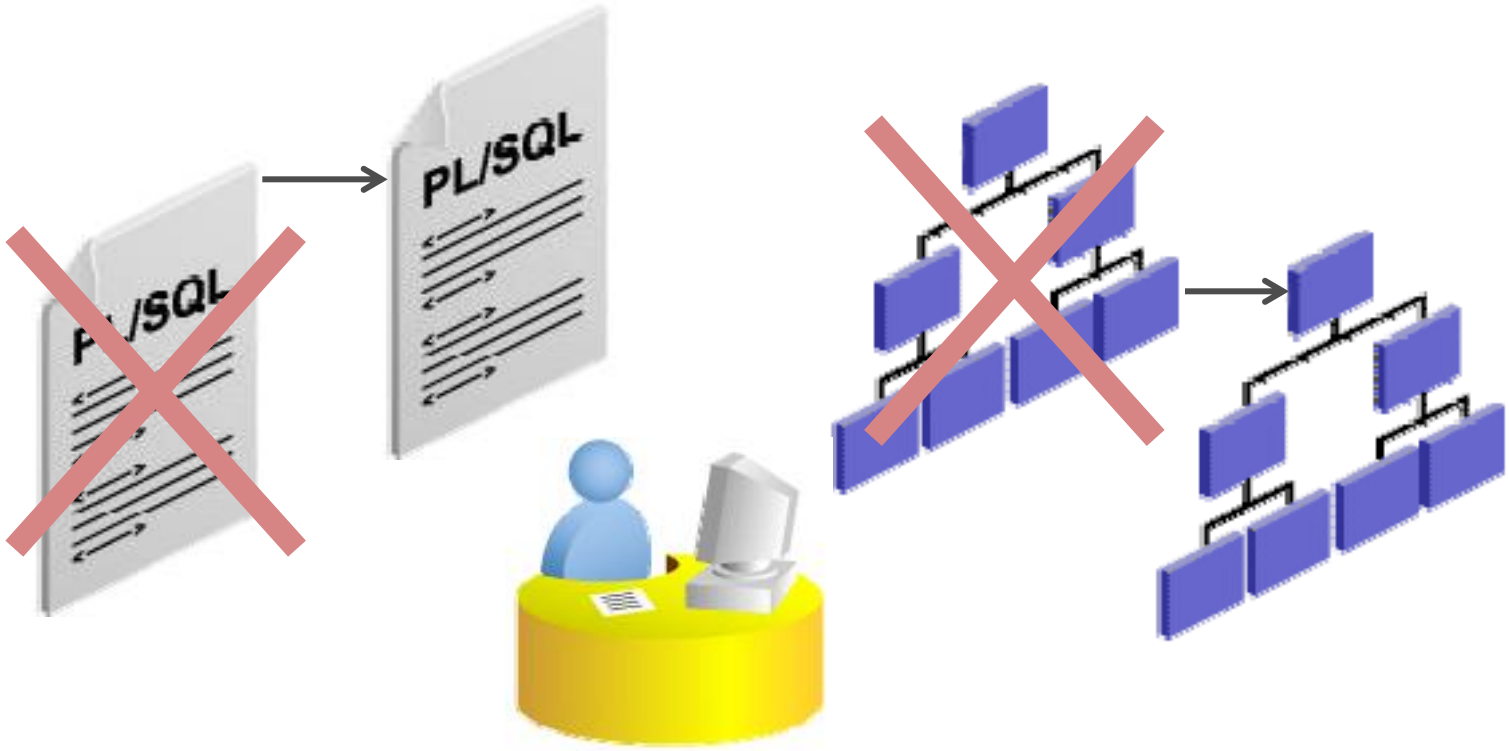
- Data dictionary
- Dynamic performance views
- Optimizer statistics

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

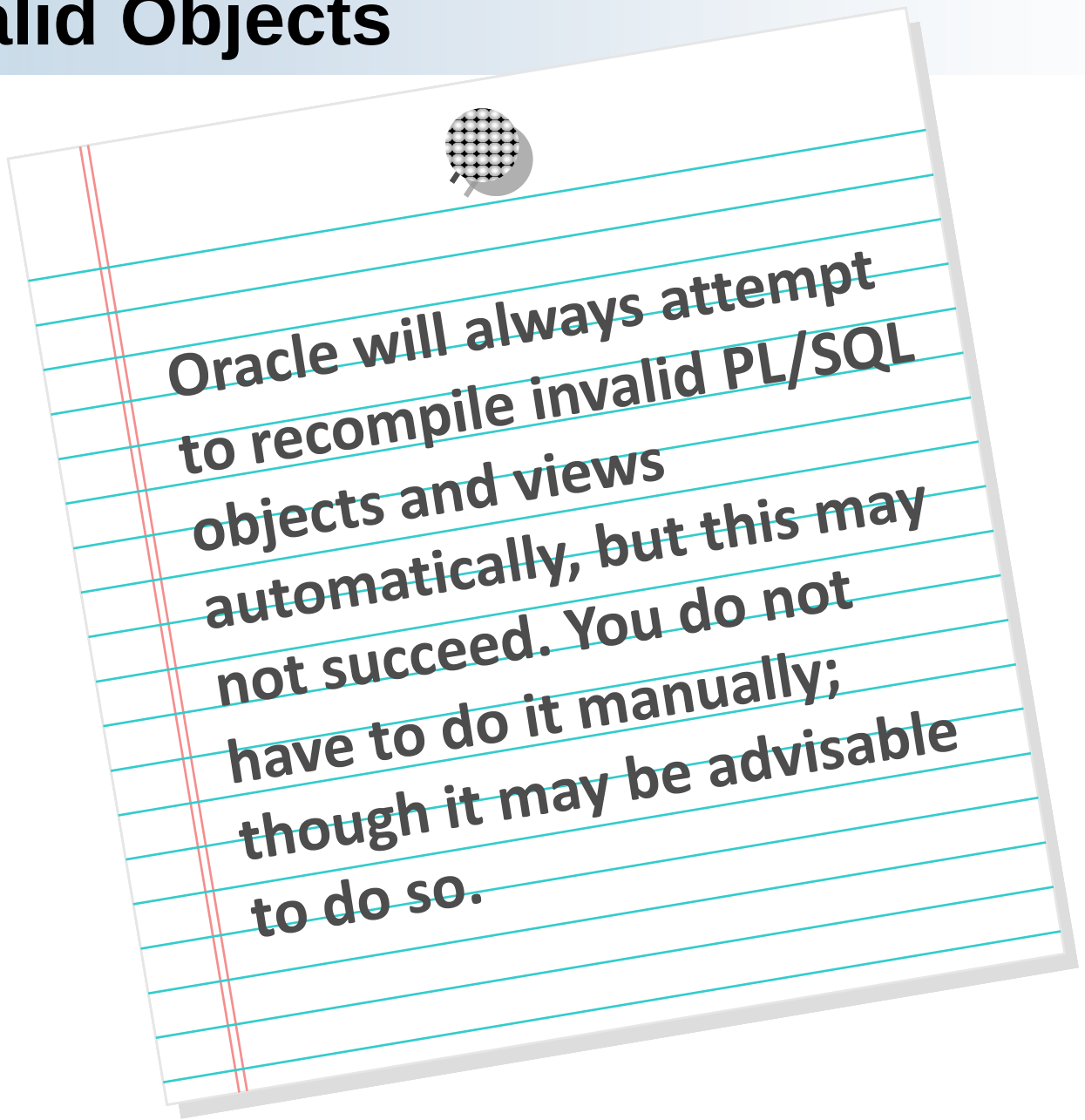
Identifying Invalid Objects

- 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



Invalid Objects

Repairing Invalid Objects

- To compile procedural objects, use le **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

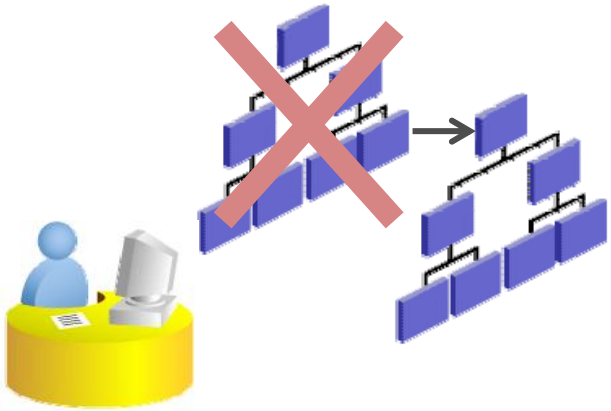
Repairing Invalid Objects

- 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.



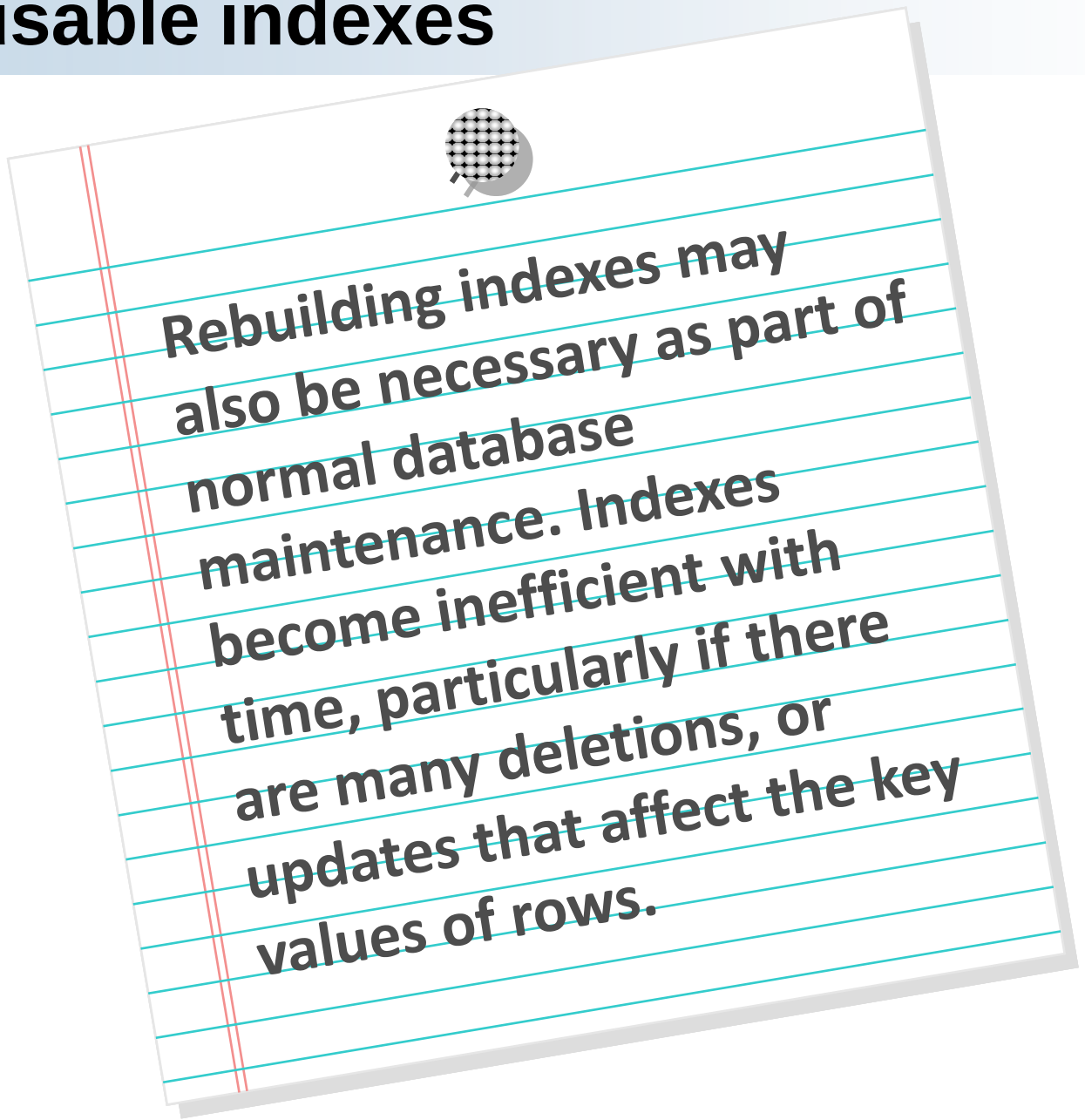
Unusable indexes

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

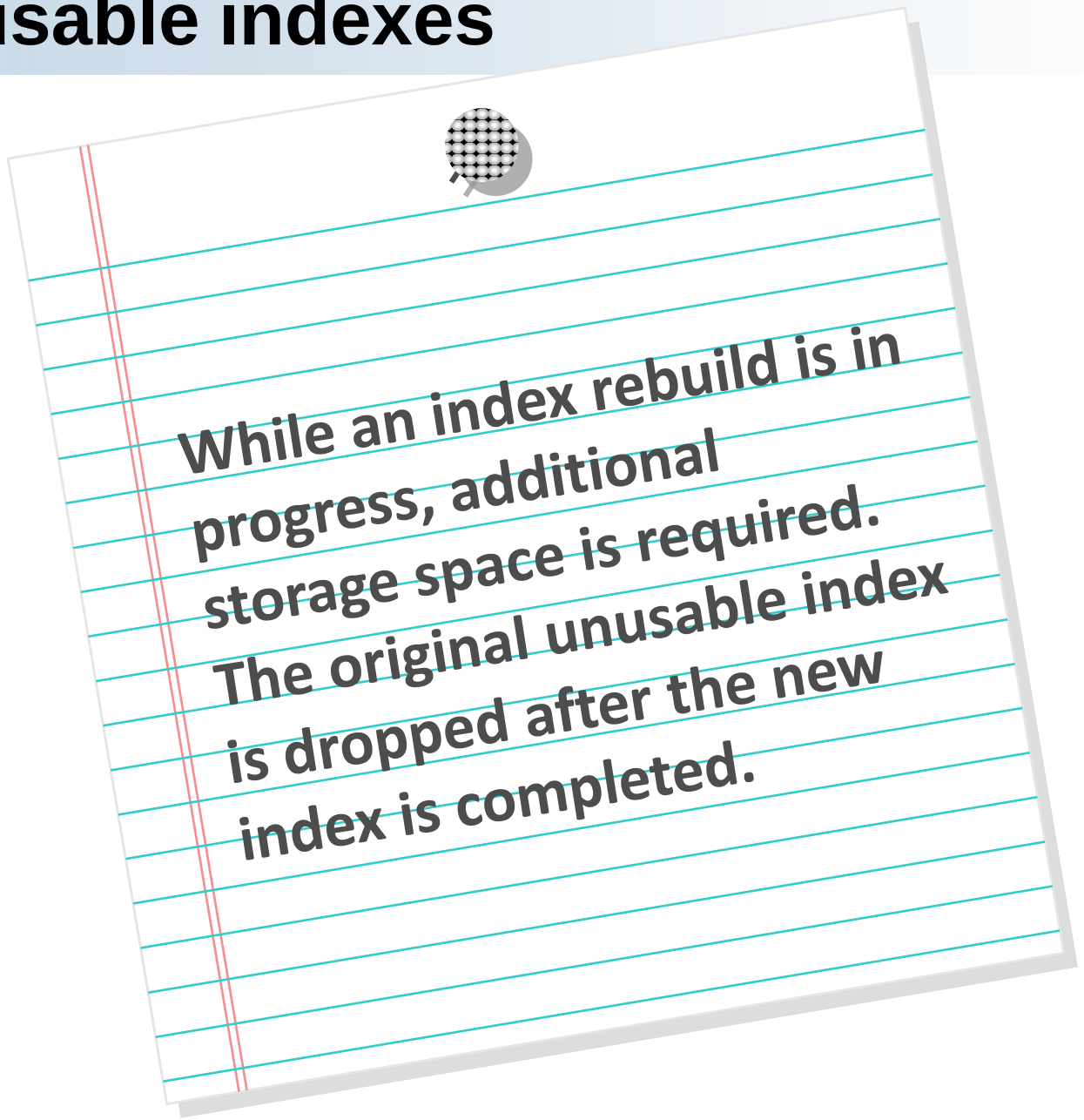


Unusable indexes

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

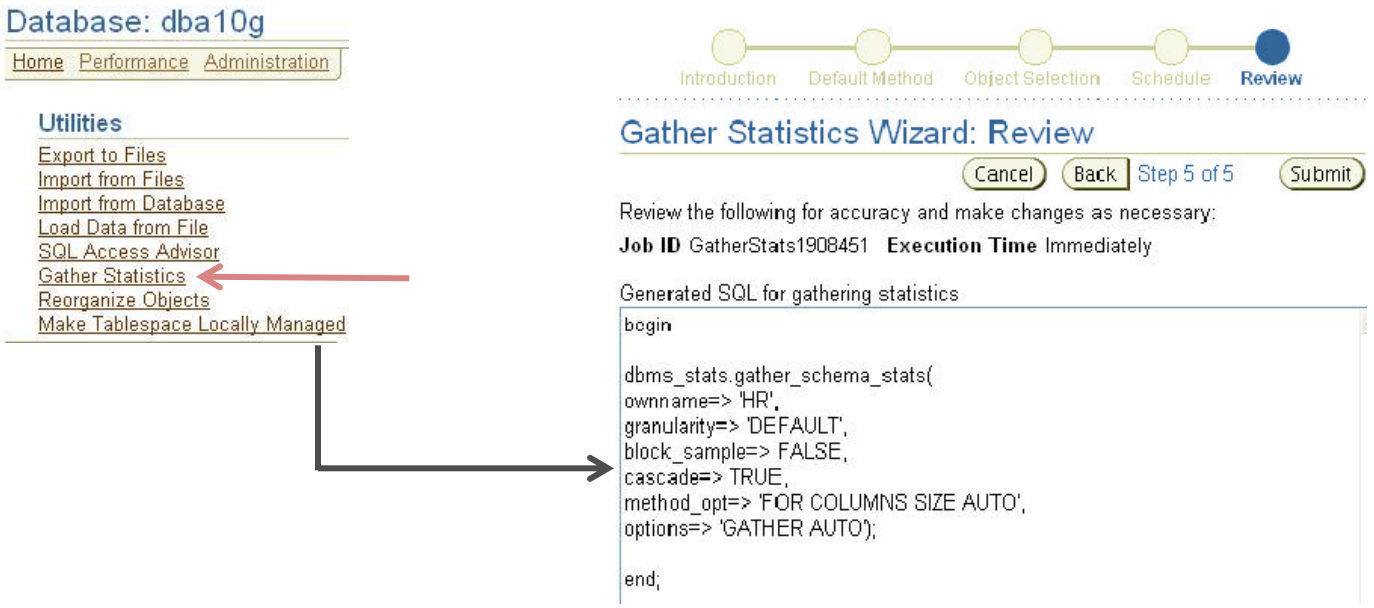
Unusable indexes



Optimizer Statistics

Manually Gather Optimizer Statistics

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



Optimizer Statistics

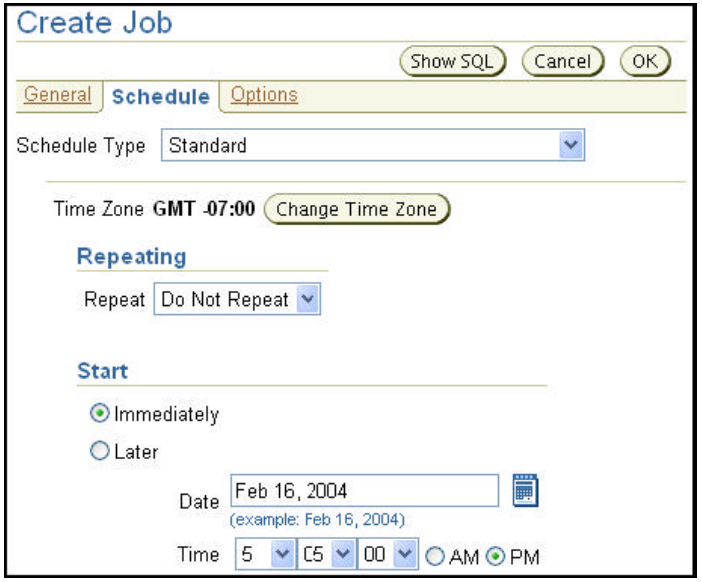
Automate Optimizer Statistics Collection

- Use the Oracle Scheduler to automate customized statistics collection.

Optimizer Statistics

Schedule Optimizer Statistics Collection

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



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

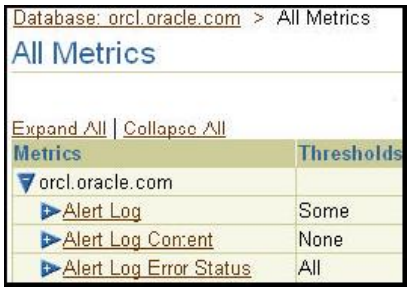
```
/
```

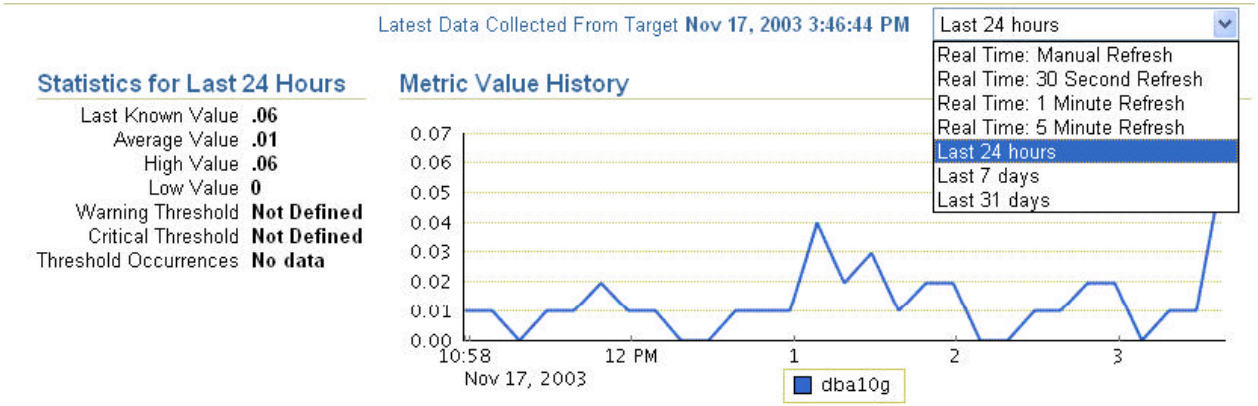
NAME	VALUE
sorts (memory)	5021

Performance Metrics

Viewing Metric Information

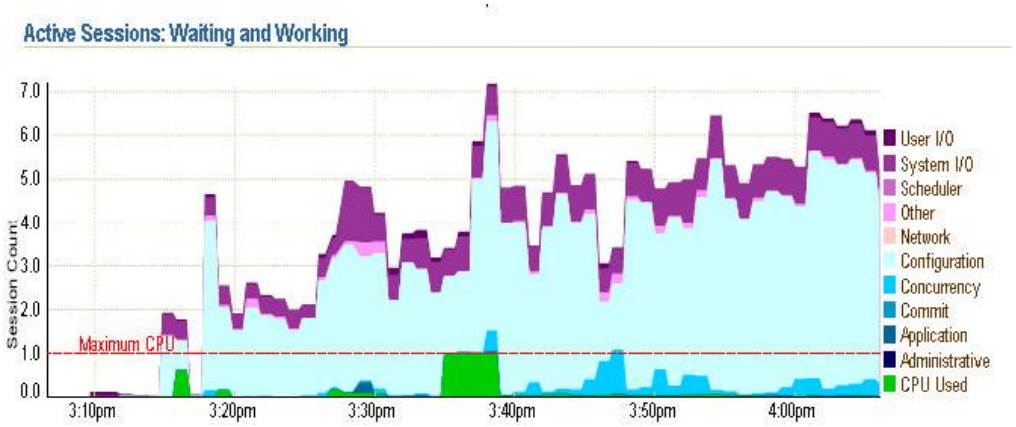
- Use the All Metrics link in the Related Links region.
- Drill-down for in-depth analysis.





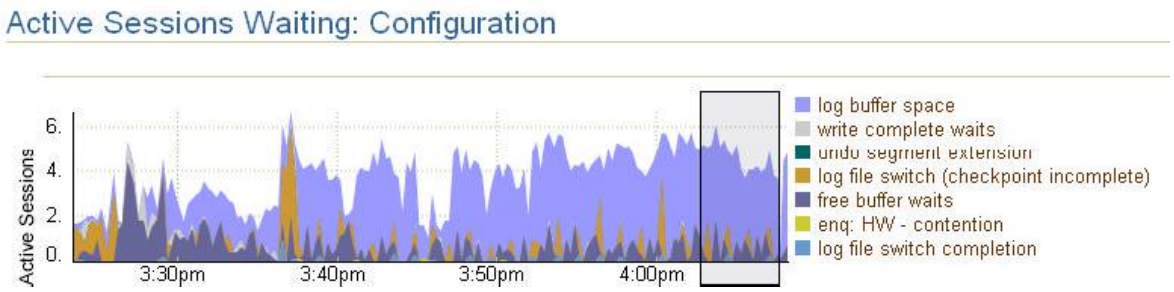
Reacting to Performance Issues

- 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



- Key bottleneck: log buffer space

Part 1 Summary

Presentation

Optimization

How to get information

Part 1 Stop-and-think

Do you have any questions ?

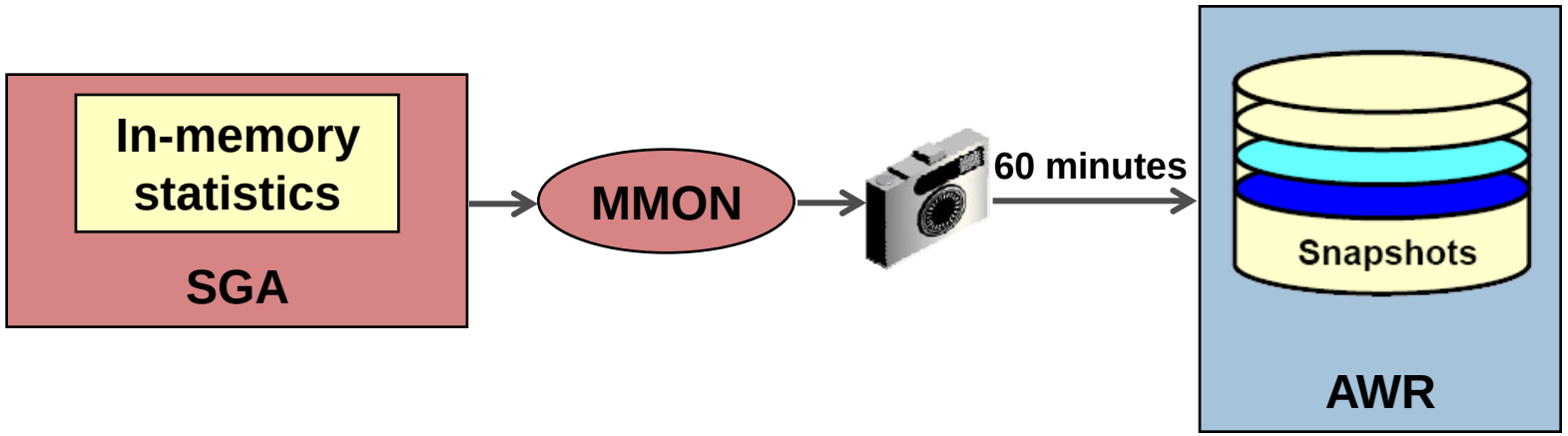
Monitoring Oracle

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



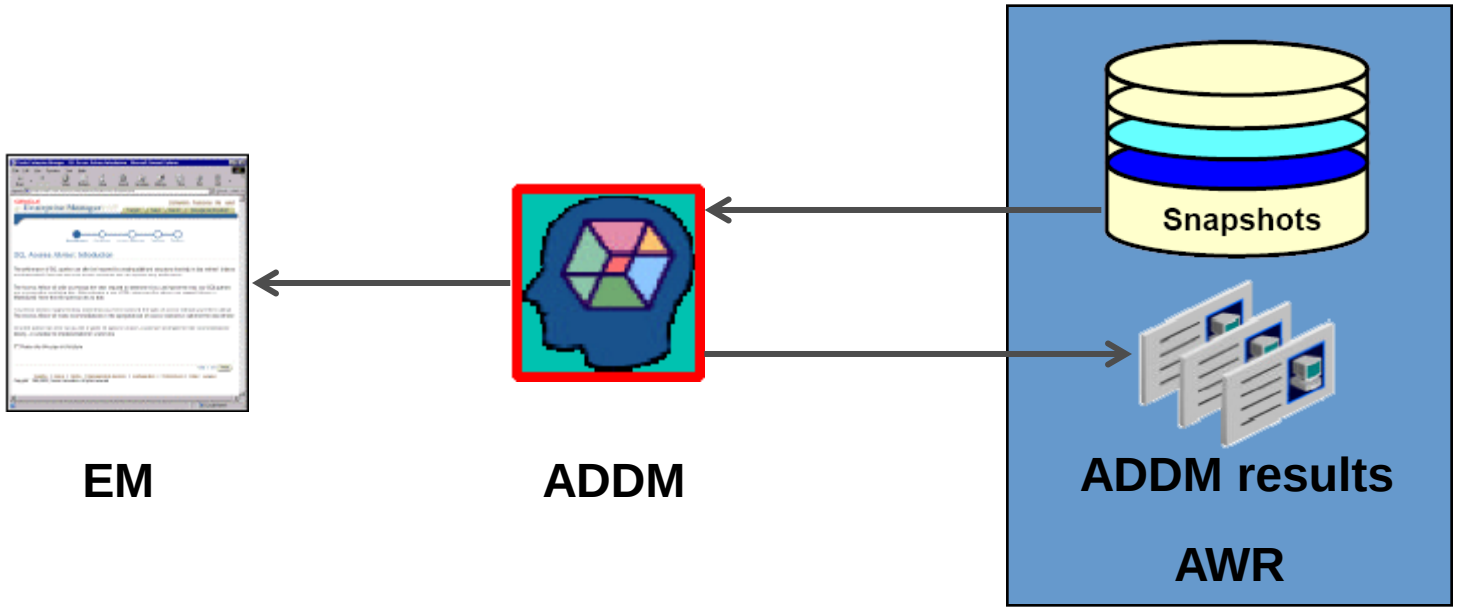
Automatic Workload Repository

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)

Automatic Database Diagnostic Monitor

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



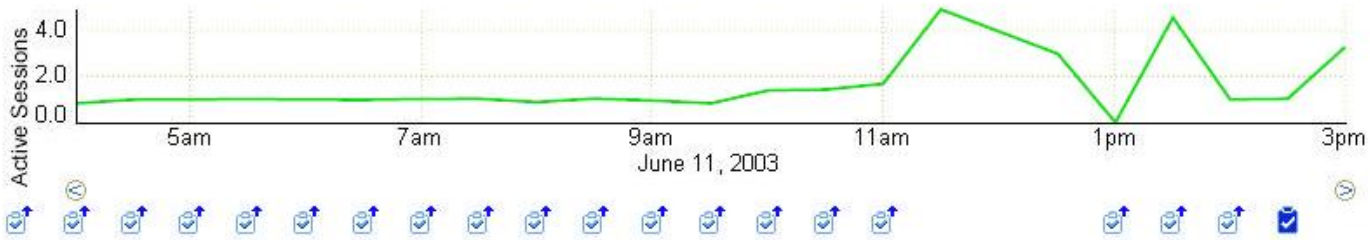
Automatic Database Diagnostic Monitor

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.



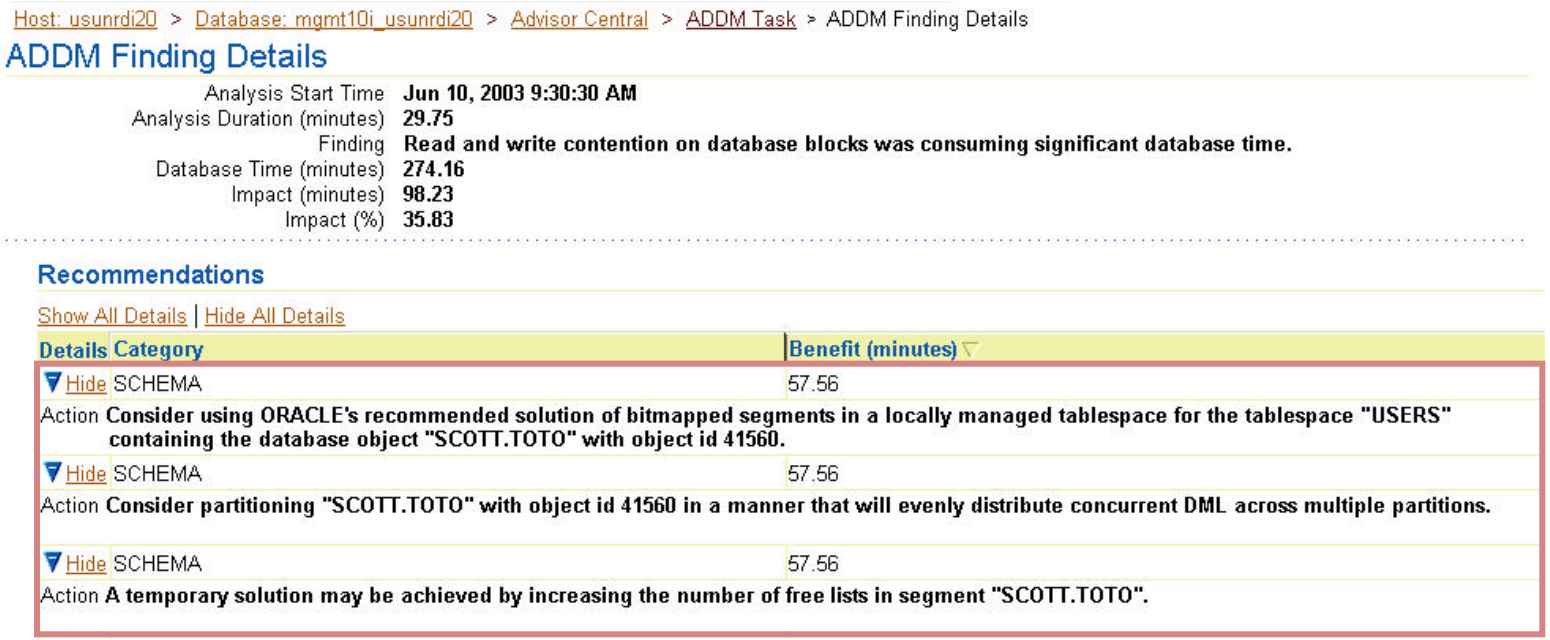
ADDM Task Detail

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

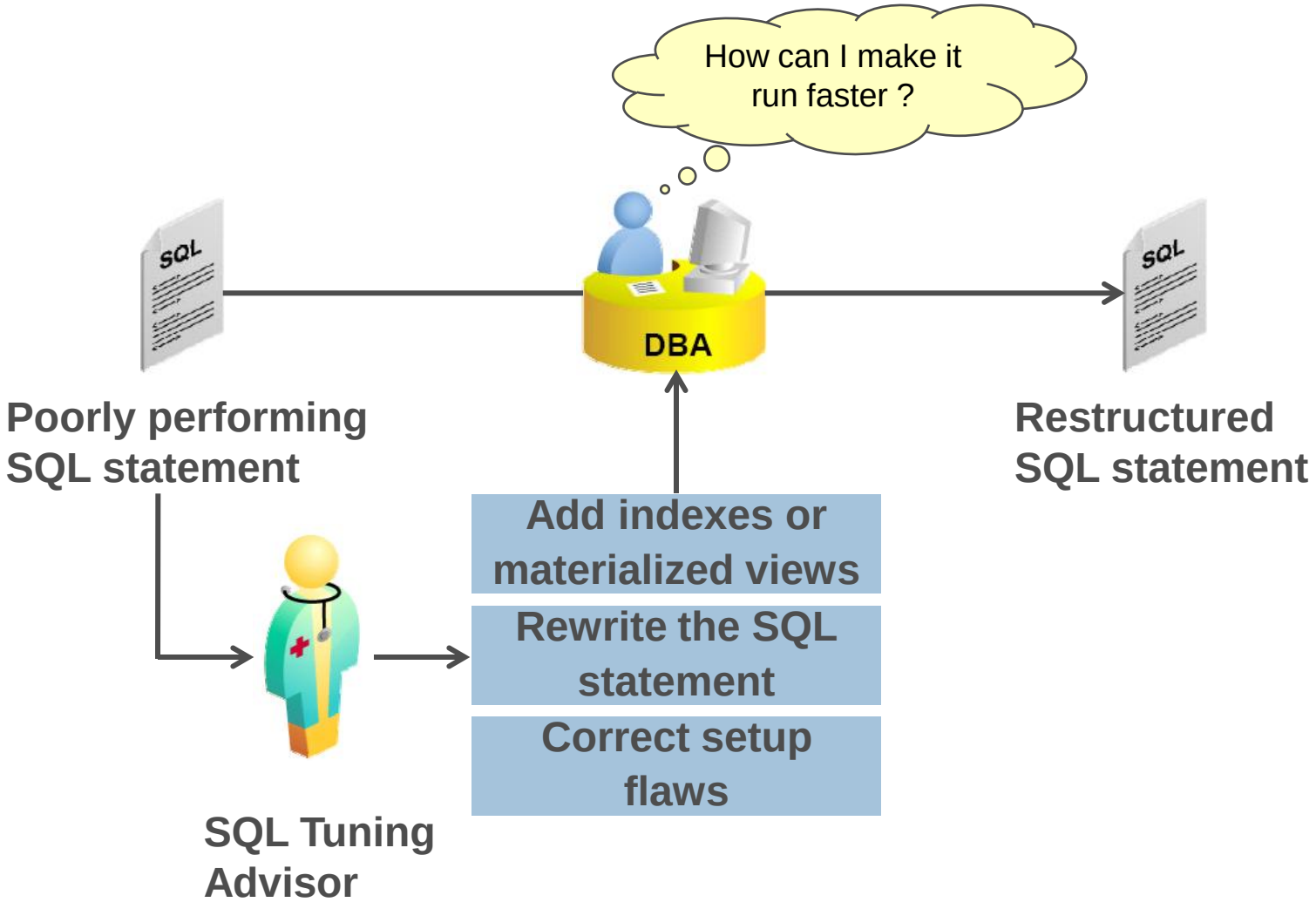
Finding	Impact (%)	Recommendation Summary
Read and write contention on database blocks was consuming significant database time.	16	SCHEMA 3
Contention on buffer cache latches was consuming significant database time.	2	SQL TUNE 2

Automatic Database Diagnostic Monitor

ADDM Recommendations



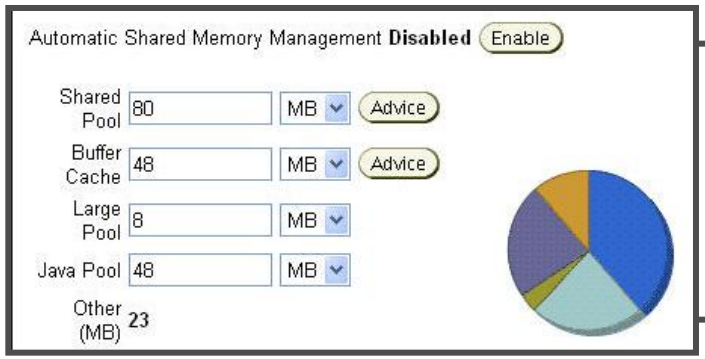
SQL Tuning and Access Advisors

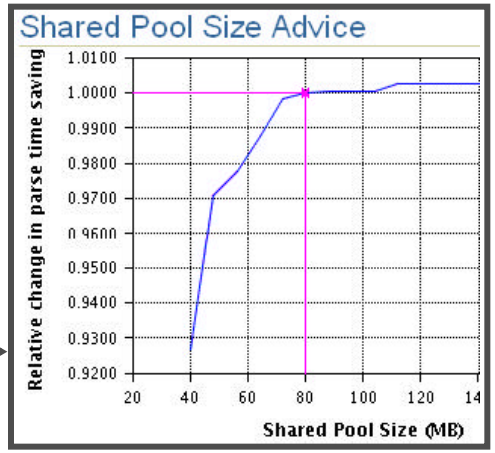


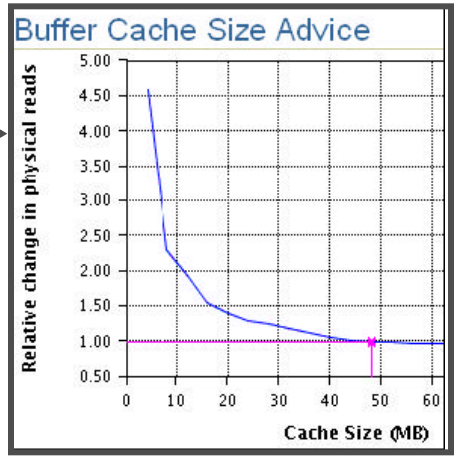
SQL Tuning and Access Advisors

Memory Advisors

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



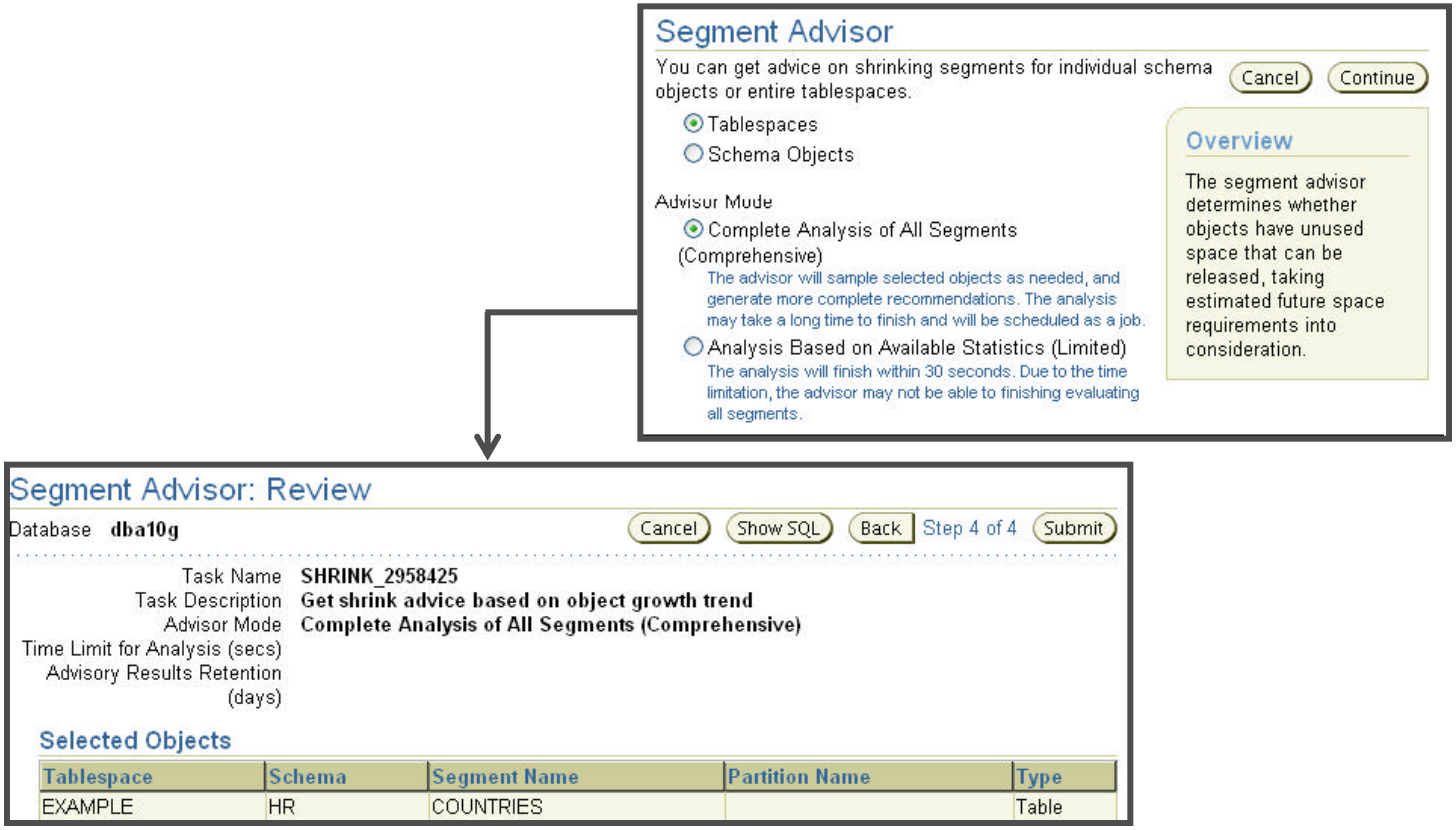




SQL Tuning and Access Advisors

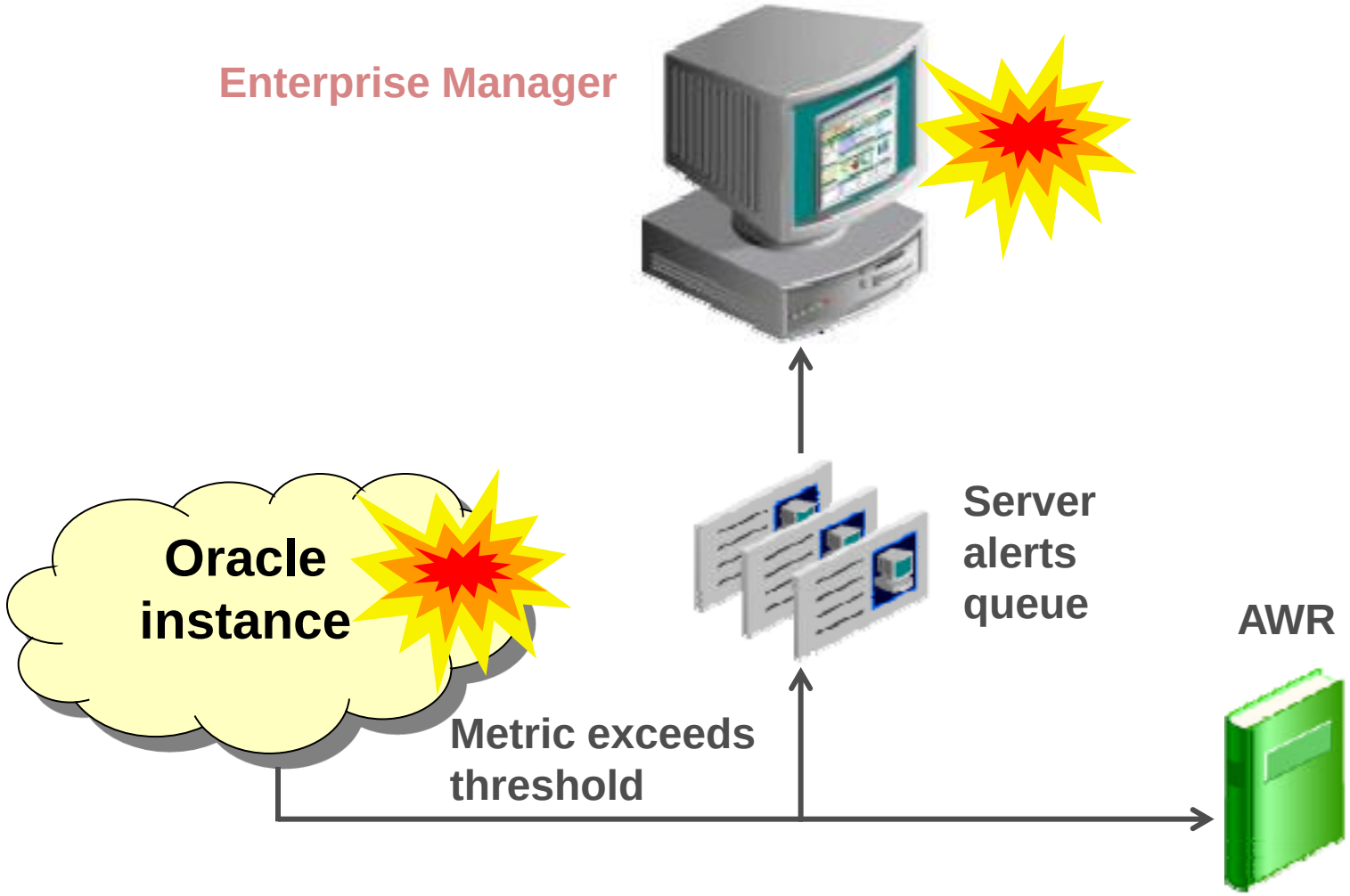
Segment Advisor

- Entire tablespace
- Individual schema objects



Server-Generated Alerts

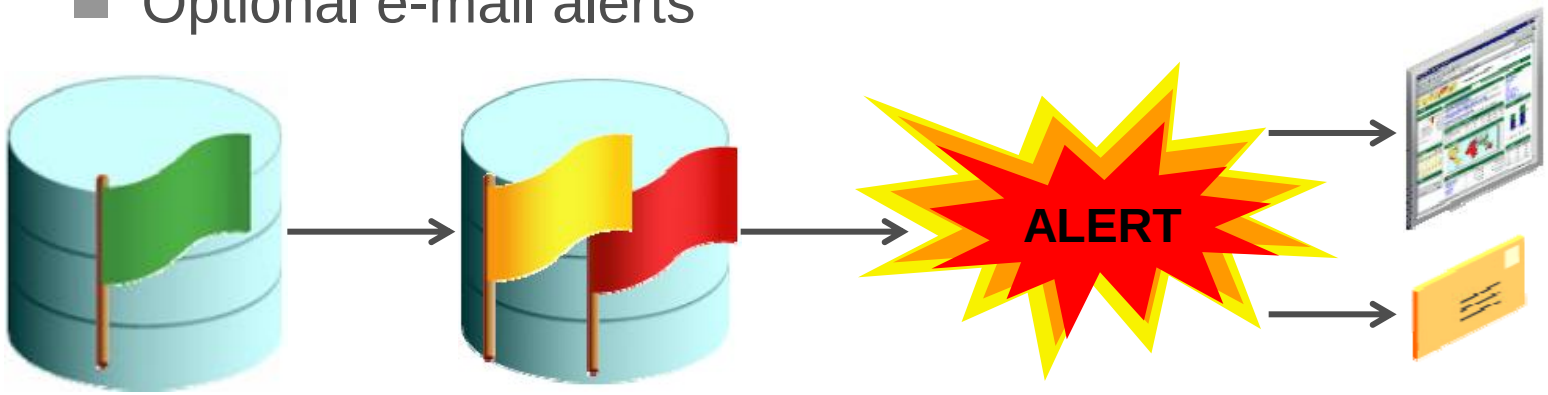
Managing Thresholds



Server-Generated Alerts

Reacting to Performance Issues

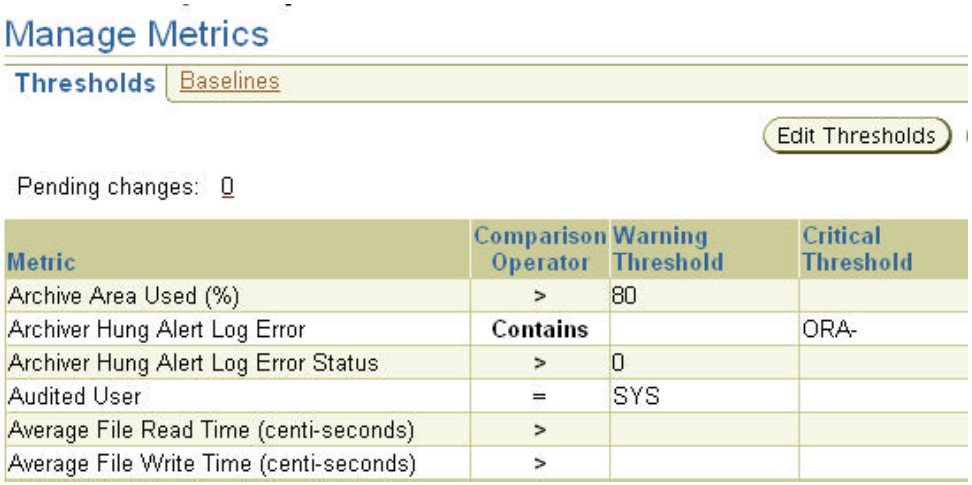
- Each metric can be assigned two thresholds:
  - Warning
  - Critical
- When thresholds are reached, alerts are triggered by:
  - Notifications that appear in the Alerts region of the Database Control home page
  - Optional e-mail alerts



Server-Generated Alerts

Setting Thresholds

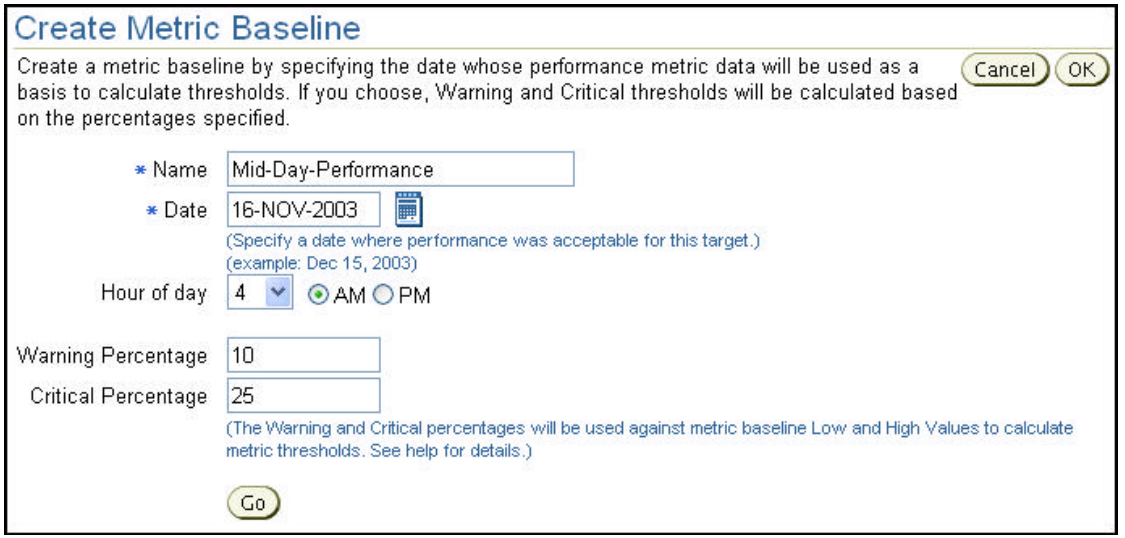
Enterprise Manager's Manage Metrics property page provides access to threshold settings.



Server-Generated Alerts

Baseline Measurements

Baseline measurements provide threshold recommendations based on actual performance data.

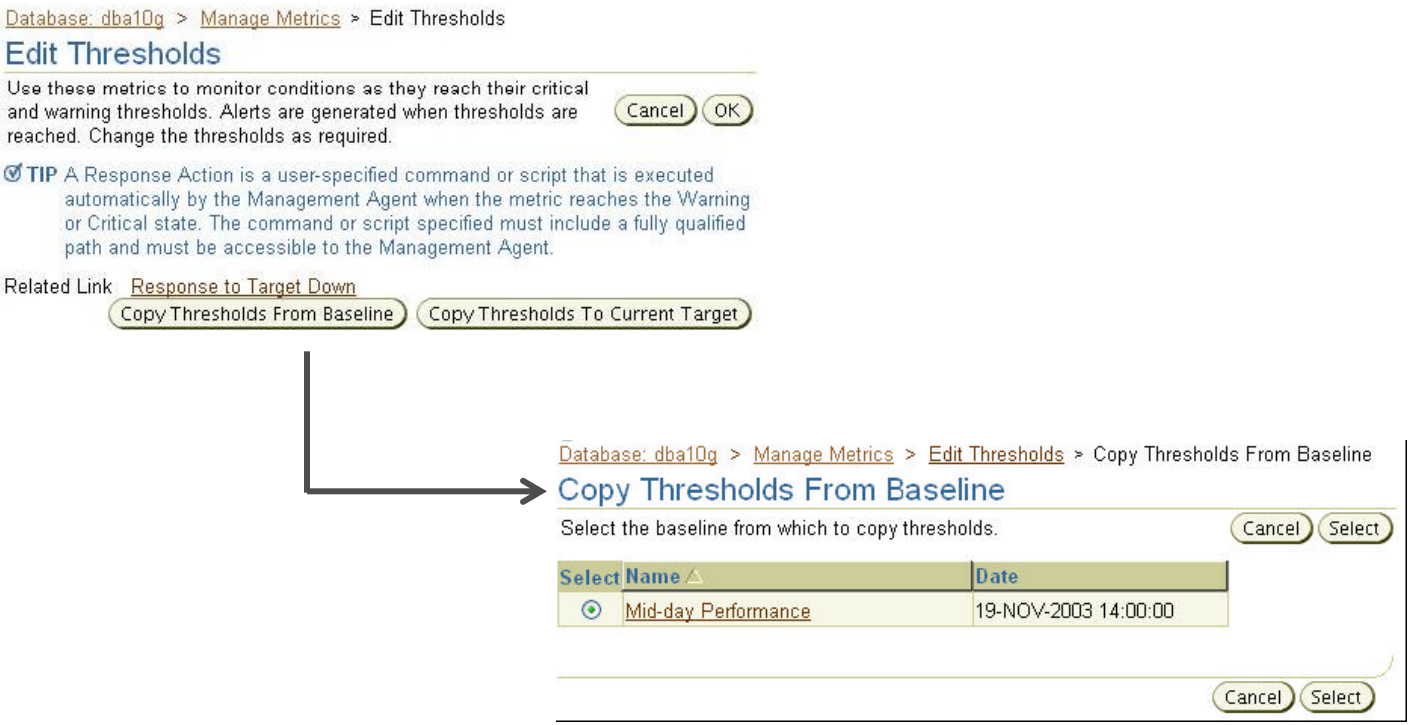


Server-Generated Alerts

Using Baselines

To activate a stored baseline :

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



Part 2 Summary

- Managing Thresholds
- SQL Tuning and Access Advisors
- Automatic Workload repository
- Automatic Database Diagnostic Monitor

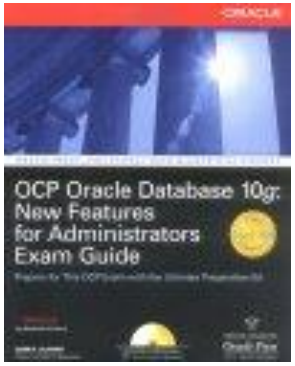
Part 2 Stop-and-think

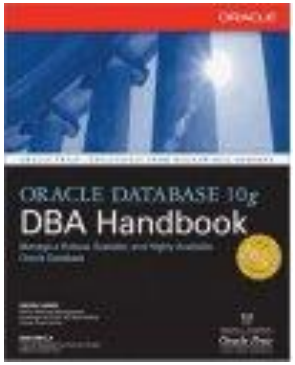
Do you have any questions ?

For more

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

Publications





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Certifications

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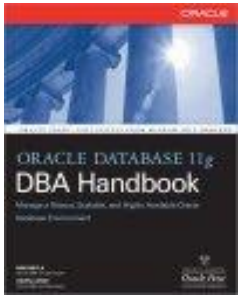

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The end


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