

13

Performance Management

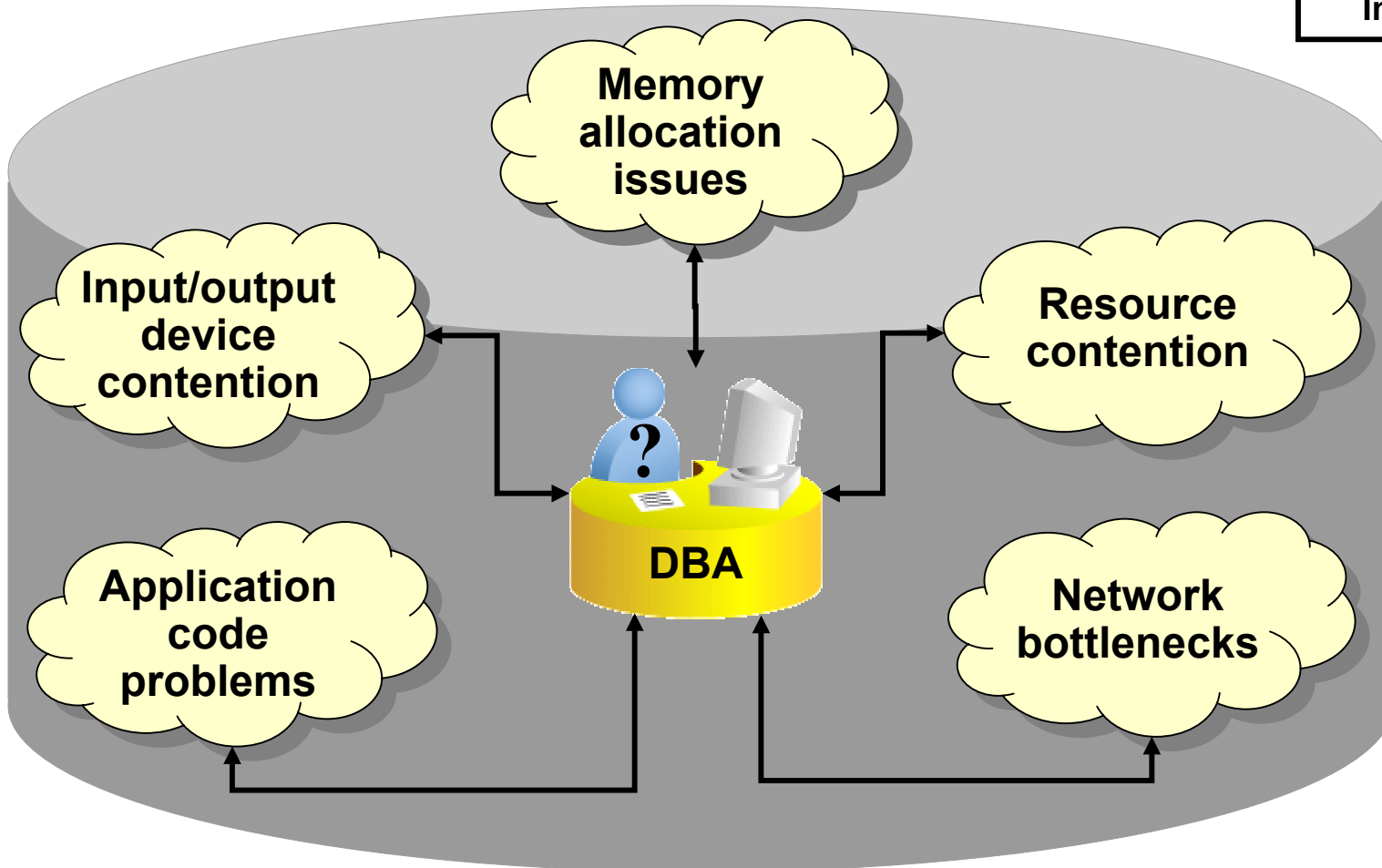
Objectives

After completing this lesson, you should be able to do the following:

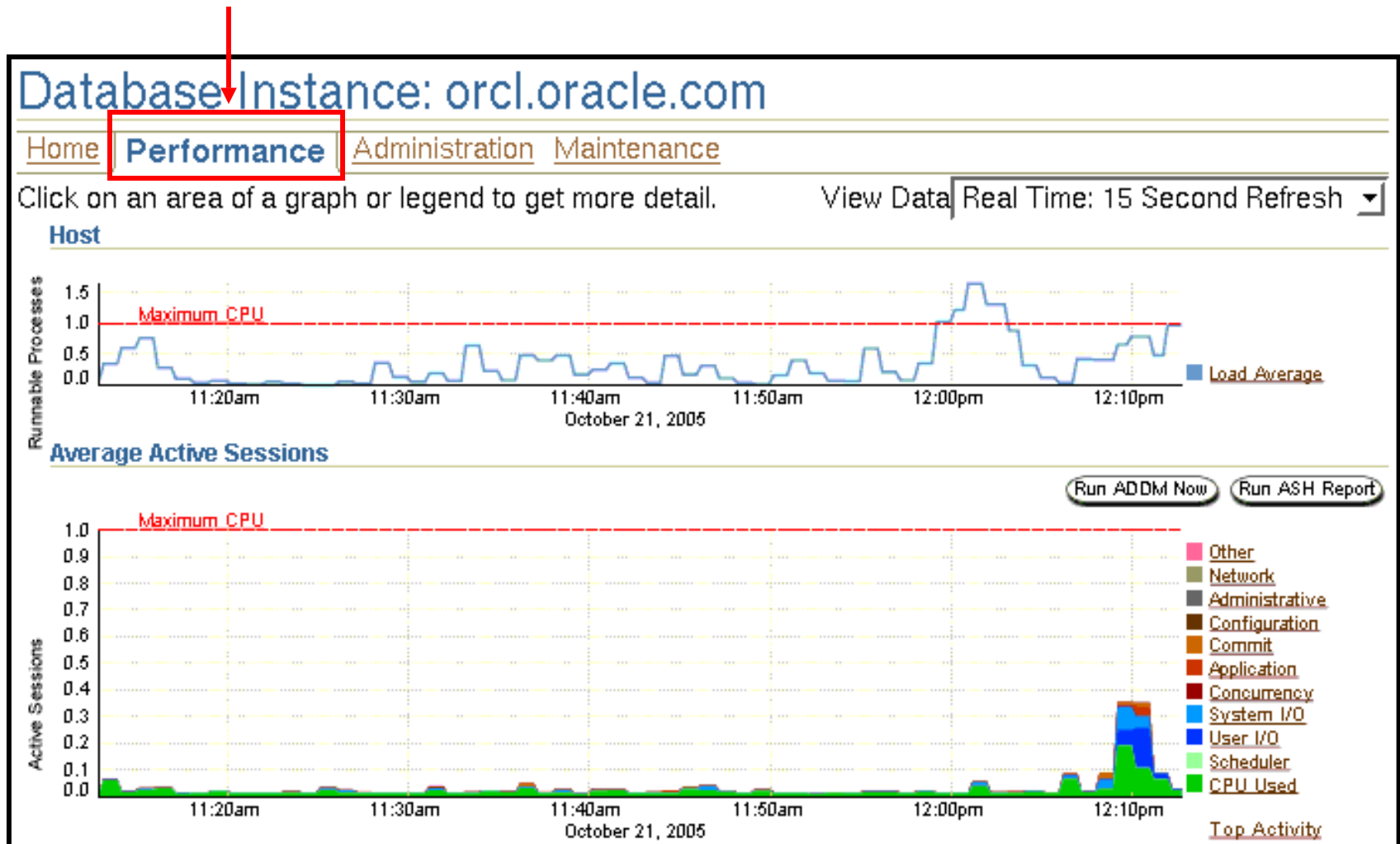
- **Use Enterprise Manager to monitor performance**
- **Tune SQL by using the SQL Tuning Advisor**
- **Tune SQL by using the SQL Access Advisor**
- **Use Automatic Shared Memory Management (ASSM)**
- **Use the Memory Advisor to size memory buffers**
- **View performance-related dynamic views**
- **Troubleshoot invalid and unusable objects**

Performance Monitoring

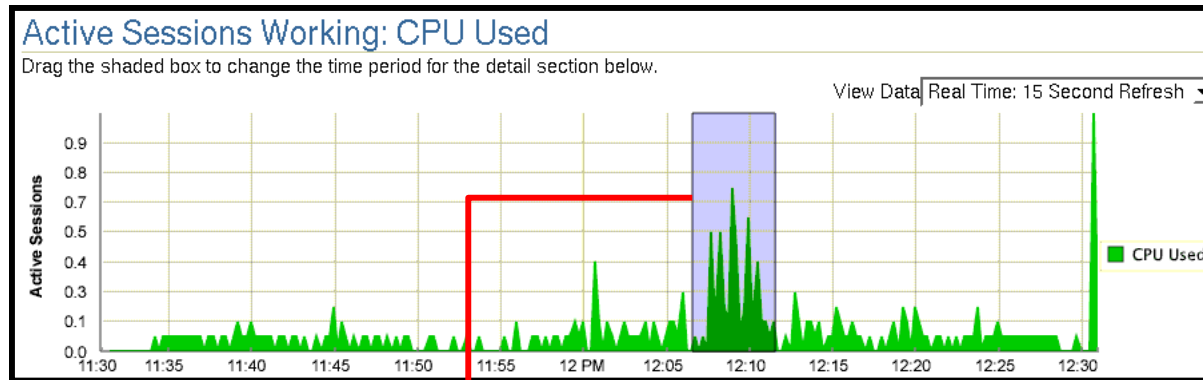
> **Perf Mon**
Tuning Adv
Access Adv
Memory
Stats
Invalid Obj



Performance Monitoring



Performance Monitoring



Detail for Selected 5 Minute Interval

Start Time Oct 21, 2005 12:06:35 PM PDT

Top Working SQL

Schedule SQL Tuning Advisor

Create SQL Tuning Set

Select All | Select None

Select	Activity (%)	SQL ID	SQL Type
<input type="checkbox"/>	30.19	a0q0ya8fx52s	INSERT
<input type="checkbox"/>	9.43	257rmrxgvaj4z	SELECT
<input type="checkbox"/>	7.55	8f4zf0m1b7b6u	INSERT
<input type="checkbox"/>	7.55	9c3326865m2h9	SELECT
<input type="checkbox"/>	7.55	cakg0hdjjw2wf	SELECT
<input type="checkbox"/>	3.77	fsz8wz5pmvamh	SELECT
<input type="checkbox"/>	3.77	6uvk7uc8m4mf0	SELECT
<input type="checkbox"/>	3.77	4c1xvq9ufwcjc	SELECT
<input type="checkbox"/>	1.89	f787fyhjmkp61	INSERT

Total Sample Count: 53

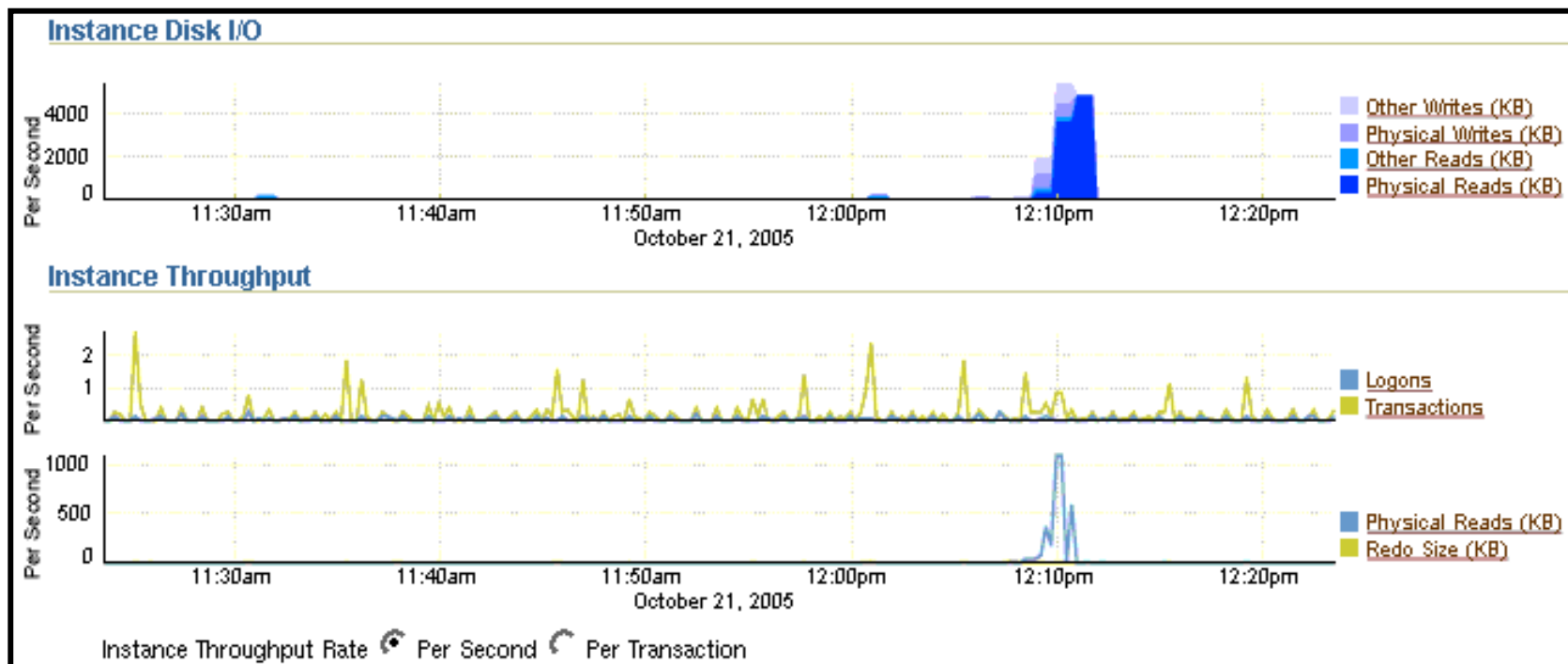
Top Working Sessions

View Top Sessions

Activity (%)	Session ID	User Name	Program
41.43	132	HR	sqlplus.exe
22.86	159	DBSNMP	OMS
11.43	167	SYS	oracle@edrsr9p1 (DBW0)
10.00	145	SYS	oracle@edrsr9p1 (m000)
4.29	128	SYSMAN	OMS
2.86	141	SYSMAN	OMS
2.86	137	SYSMAN	OMS
1.43	146	SYS	oracle@edrsr9p1 (q000)

Total Sample Count: 70

Performance Monitoring




Performance Monitoring: Top Sessions

Database Instance: [orcl.oracle.com](#) > Top Consumers Logged in As SYS

View Data | Real Time: 15 Second Refresh ▾




Top Consumers

Collected From Oct 21, 2005 1:29:35 PM To Oct 21, 2005 1:29:50 PM 

[Overview](#)
[Top Services](#)
[Top Modules](#)
[Top Actions](#)
[Top Clients](#)
[Top Sessions](#)

[Show Active SQL](#)
[Customize](#)

[Kill Session](#)
[View](#)
[Disable SQL Trace](#)
[Enable SQL Trace](#)

Select	SID	DB User	CPU (1/100 sec) ▾	PGA Memory (bytes)	Physical Reads	Logical Reads	Hard Parses	Total Parses	Disk Sorts	Status	Program	OS PID	Machine	OS User	SQL Trace
	152	SH	430	781908	69451	72832	0	8	0	ACTIVE	sqlplus.exe	20866	WORKGROUP\TBEST-LAP	tbest	DISABLED
	135	HR	354	7597652	0	29851	1	1215	0	ACTIVE	sqlplus.exe	20351	WORKGROUP\TBEST-LAP	tbest	DISABLED
	159	DBSNMP	12	1175124	0	0	0	0	0	ACTIVE	OMS	20349	edrsr9p1.us.oracle.com		DISABLED

Performance Monitoring: Top Services

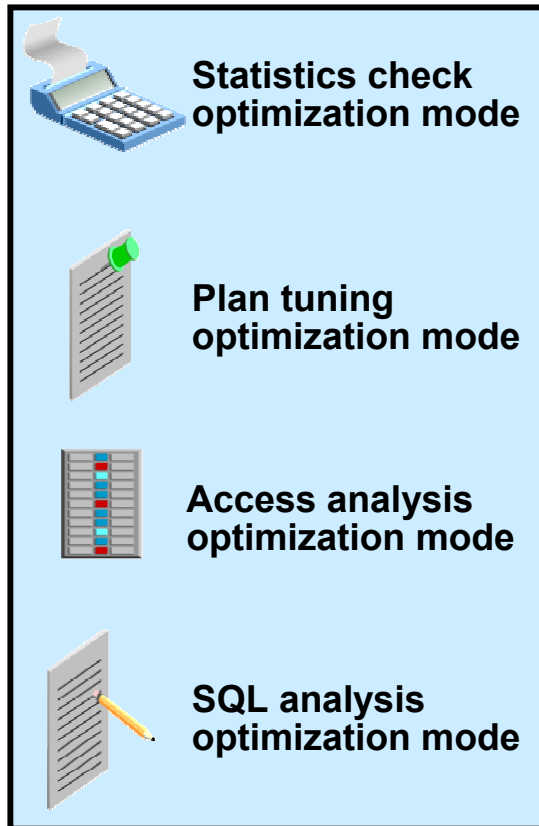
Select	Service	Activity (% for the last 5 minutes) ▾	SQL Trace Enabled	Delta Elapsed Time (seconds)
<input type="checkbox"/>	SYS\$USERS	37.8	FALSE	1
<input type="checkbox"/>	SYS\$BACKGROUND	27.0	FALSE	0
<input type="checkbox"/>	inventory.oracle.com	24.3	FALSE	0
<input type="checkbox"/>	orcl.oracle.com	8.1	FALSE	0
<input type="checkbox"/>	hr.oracle.com	2.7	FALSE	1

Cumulative Elapsed Time (seconds)	Delta CPU Time (seconds)	Cumulative CPU Time (seconds)	Delta Physical I/O (blocks)	Cumulative Physical I/O (blocks)
4874	1	1774	9518	362289
0	0	0	1	328437
262	0	58	0	10250
2486	0	1186	0	4977
1124	0	73	5874	55841

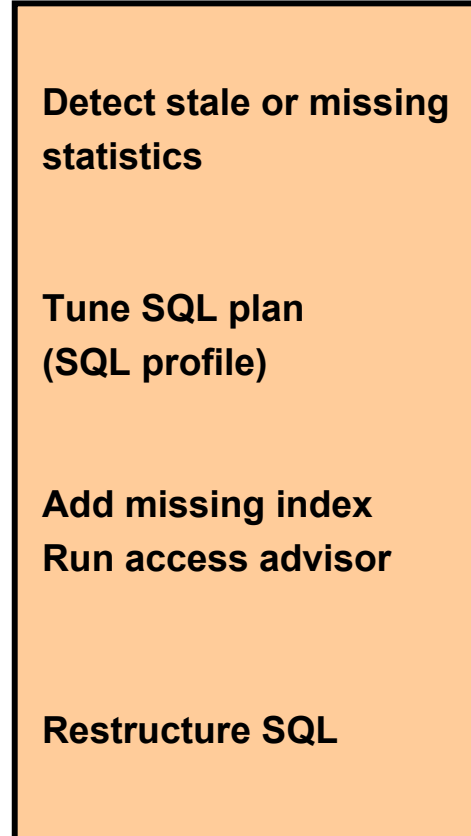
SQL Tuning Advisor: Overview

Perf Mon
> **Tuning Adv**
Access Adv
Memory
Stats
Invalid Obj

Automatic Tuning Optimizer



Comprehensive SQL tuning



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](#)

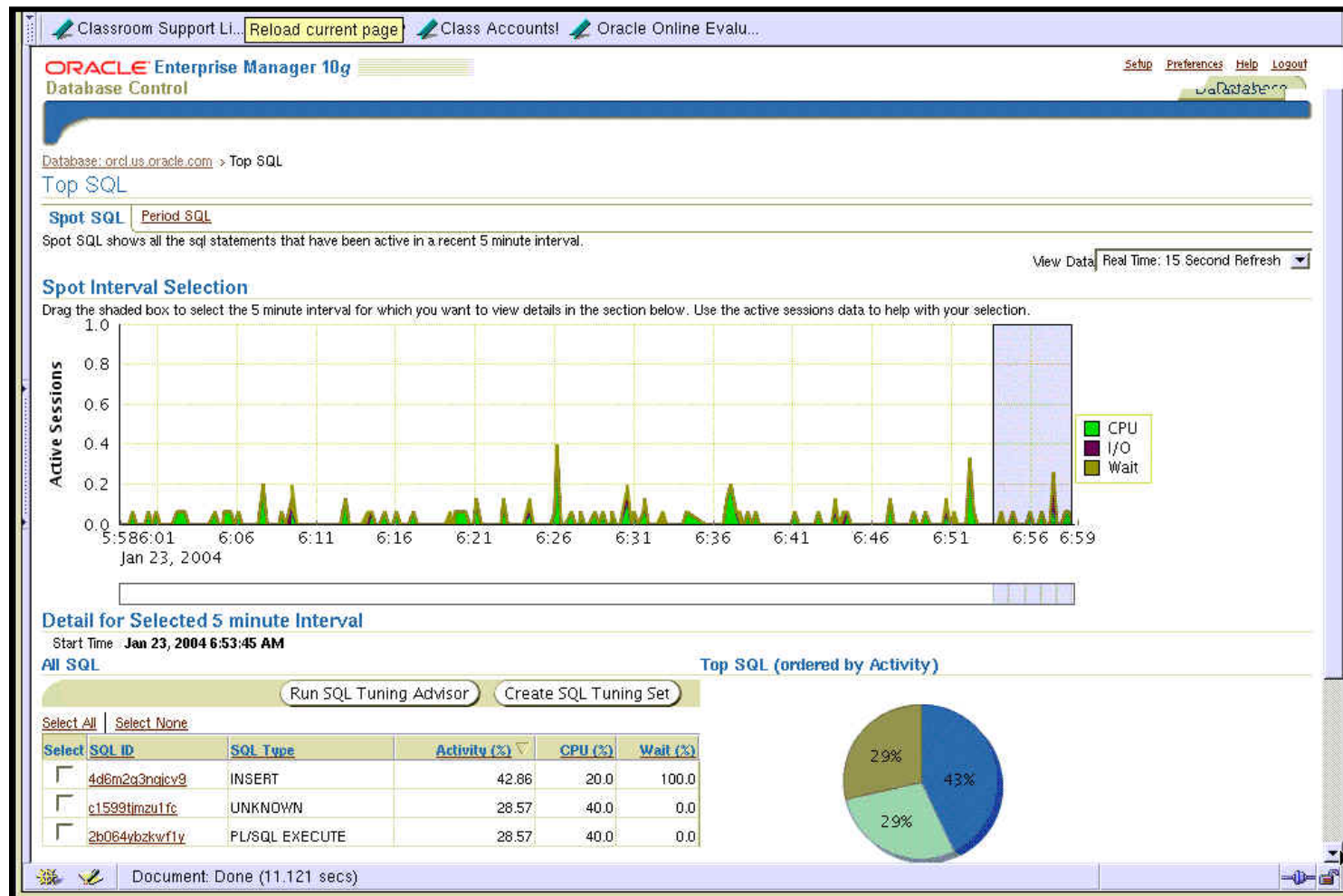
[Implement](#)

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	

Using the SQL Tuning Advisor

- **Use the SQL Tuning Advisor to analyze SQL statements and obtain performance recommendations.**
- **Sources for SQL Tuning Advisor to analyze**
 - **Top SQL: Analyzes the top SQL statements currently active**
 - **SQL Tuning Sets: Analyzes a set of SQL statements you provide**
 - **Snapshots: Analyzes a snapshot**
 - **Baselines: Analyzes a baseline**

Using the SQL Tuning Advisor: Example



SQL Tuning Advisor: SQL Statistics

```
select count(*) from x
where object_id < 340
```

```
select count(*) from x
where object_id < 220
```

Each statement causes a hard parse.

Shared Cursors Statistics

Total Parses	1
Hard Parses	1
Child Cursors	1
Child Cursors With Loaded Plans	1
Invalidations	0
Largest Cursor Size (KB)	9.88
All Cursor Size (KB)	9.88
First Load Time	Apr 22, 2005 11:58:08 AM
Last Load Time	Apr 22, 2005 11:58:08 AM

Shared Cursors Statistics

Total Parses	1
Hard Parses	1
Child Cursors	1
Child Cursors With Loaded Plans	1
Invalidations	0
Largest Cursor Size (KB)	8.83
All Cursor Size (KB)	8.83
First Load Time	Apr 22, 2005 11:58:02 AM
Last Load Time	Apr 22, 2005 11:58:02 AM

SQL Tuning Advisor: Identifying Duplicate SQL

Expand All Collapse All		
Duplicates	Plan Hash Value	SQL Text
▼ Duplicates		
▶ 6	989401810	select count(*) from x where object_id < 340
▶ 5	2941724873	select * from x where object_id < 500

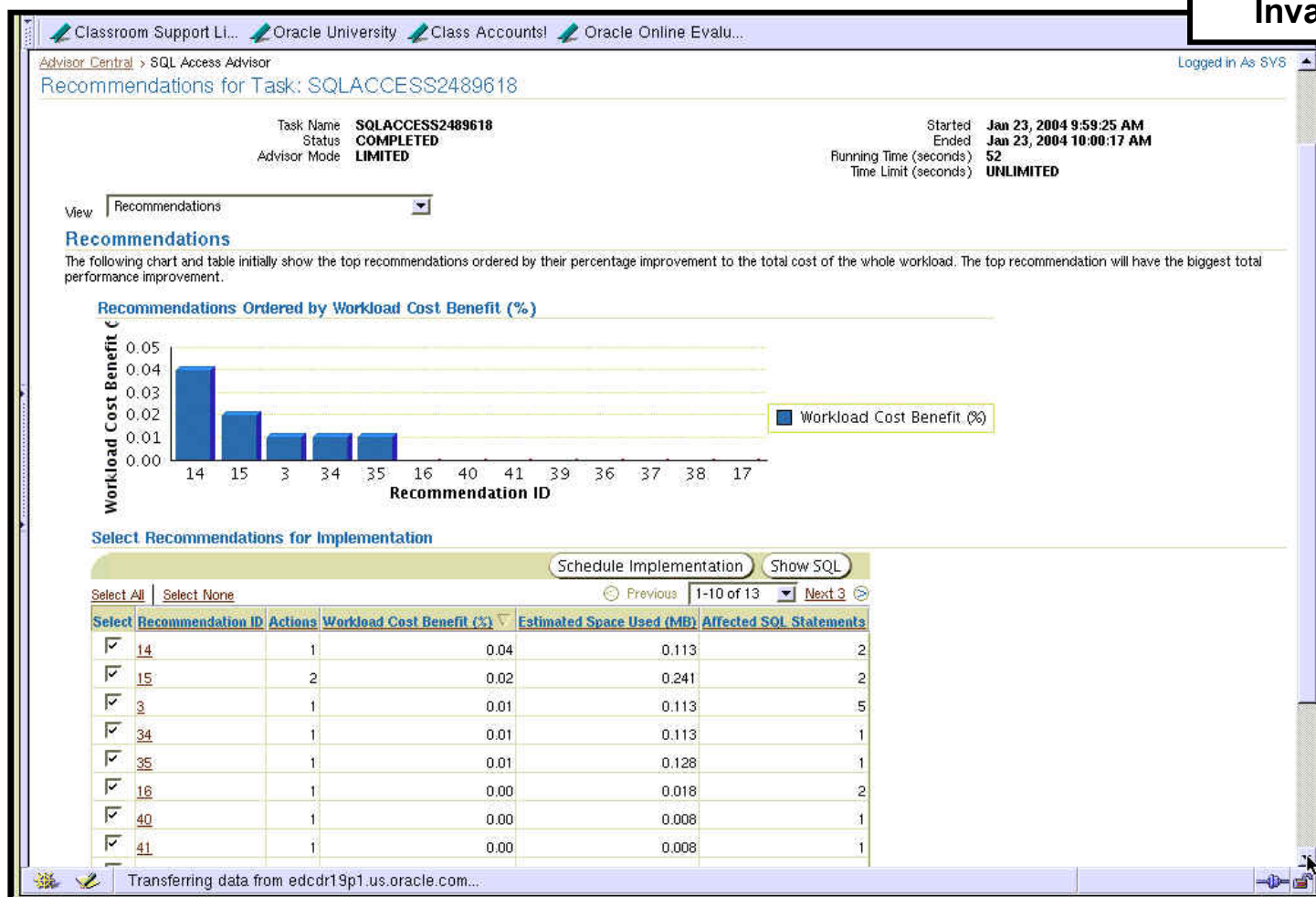


▼ 6	989401810	select count(*) from x where object_id < 340
	989401810	select count(*) from x where object_id < 340
	989401810	select count(*) from x where object_id < 220
	989401810	select count(*) from x where object_id < 520
	989401810	select count(*) from x where object_id < 620
	989401810	select count(*) from x where object_id < 300
	989401810	select count(*) from x where object_id < 420

**Bind variable
candidates**

Using the SQL Access Advisor

Perf Mon
Tuning Adv
> Access Adv
Memory
Stats
Invalid Obj



Managing Memory Components

Perf Mon
Tuning Adv
Access Adv
> **Memory**
Stats
Invalid Obj

- **Automatic Shared Memory Management:**
 - Is recommended to simplify management
 - Enables you to specify the total SGA memory through one initialization parameter
 - Enables the Oracle server to manage the amount of memory allocated to the shared pool, Java pool, buffer cache, streams pool, and the large pool
- **Manually setting shared memory management:**
 - Sizes the components through multiple individual initialization parameters
 - Uses the Memory Advisor to make recommendations

Enabling Automatic Shared Memory Management (ASMM)



Database: orcl.us.oracle.com > Memory Parameters

Memory Parameters

SGA PGA

The System Global Area (SGA) is a group of shared memory structures that in memory when an Oracle database instance is started.

Automatic Shared Memory Management **Disabled**

Shared Pool MB

Buffer Cache MB

Large Pool MB

Java Pool MB

Other (MB)

Total SGA (MB) **161**

Click Enable to enable Automatic Shared Memory Management.

Manually Setting Shared Memory Management

Current Allocation

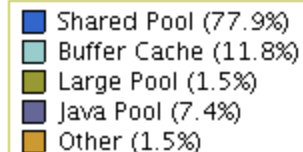
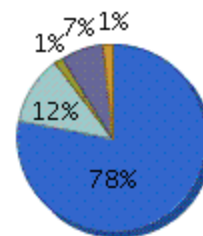
Automatic Shared
Memory Management **Enabled**

Disable

Total SGA Size (MB) 272

Advice

SGA Component	Current Allocation (MB)
Shared Pool	212
Buffer Cache	32
Large Pool	4
Java Pool	20
Other	4



Maximum SGA Size

The Maximum SGA Size specifies the maximum memory that the database may allocate. If you specify the Maximum SGA Size, you can later dynamically change the Total SGA Size above (provided Total SGA Size does not exceed the Maximum SGA Size).

Maximum SGA Size* (MB) 272

Using the Memory Advisor

Database Instance: orcl.oracle.com > Memory Parameters

Memory Parameters

Page Refreshed September 13, 2005 11:16:45 AM PDT

Refresh

Show SQL

Revert

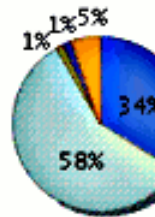
Apply

SGA PGA

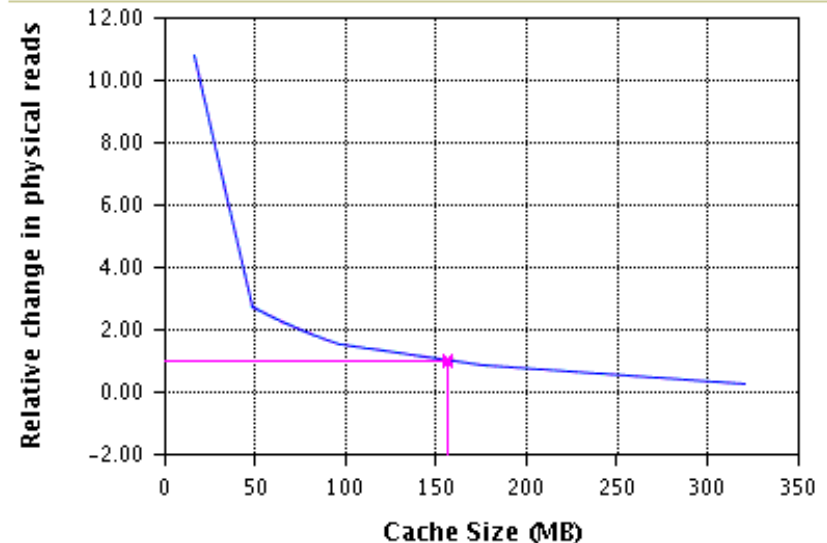
The System Global Area (SGA) is a group of shared memory structures that contain data and control information for one Oracle database. The SGA is allocated in memory when the database instance is started.

Automatic Shared Memory Management Disabled

Shared Pool	92	MB	<input type="button" value="Advice"/>
Buffer Cache	156	MB	<input type="button" value="Advice"/>
Large Pool	4	MB	
Java Pool	4	MB	
Other (MB)	14		
Total SGA (MB)	270		<input type="button" value="Calculate"/>



Buffer Cache Size Advice



- Change in physical reads for various cache sizes
- Current cache size

Cache Size (MB) 156

☒ TIP You can click on the curve in the graph to set new value.

ORACLE

Dynamic Performance Statistics

...
Access Adv
Memory
> Stats
Invalid Obj

Systemwide

V\$SYSSTAT

- statistic#
- name
- class
- value
- stat_id

V\$SYSTEM_EVENT

- event
- total_waits
- total_timeouts
- time_waited
- average_wait
- time_waited_micro

Session specific

V\$SESSTAT

- sid
- statistic#
- value

V\$SESSION_EVENT

- sid
- event
- total_waits
- total_timeouts
- time_waited
- average_wait
- max_wait
- time_waited_micro
- event_id

Service specific

V\$SERVICE_STATS

- service_name_hash
- service_name
- stat_id
- stat_name
- value

V\$SERVICE_EVENT

- service_name
- service_name_hash
- event
- event_id
- total_waits
- total_timeouts
- time_waited
- average_wait
- time_waited_micro

 Cumulative stats

 Wait events

Troubleshooting and Tuning Views

Instance/Database

V\$DATABASE
V\$INSTANCE
V\$PARAMETER
V\$SPPARAMETER
V\$SYSTEM_PARAMETER
V\$PROCESS
V\$BGPROCESS
V\$PX_PROCESS_SYSSTAT
V\$SYSTEM_EVENT

Memory

V\$BUFFER_POOL_STATISTICS
V\$LIBRARYCACHE
V\$SGAINFO
V\$PGASTAT

Disk

V\$DATAFILE
V\$FILESTAT
V\$LOG
V\$LOG_HISTORY
V\$DBFILE
V\$TEMPFILE
V\$TEMPSEG_USAGE
V\$SEGMENT_STATISTICS

Contention

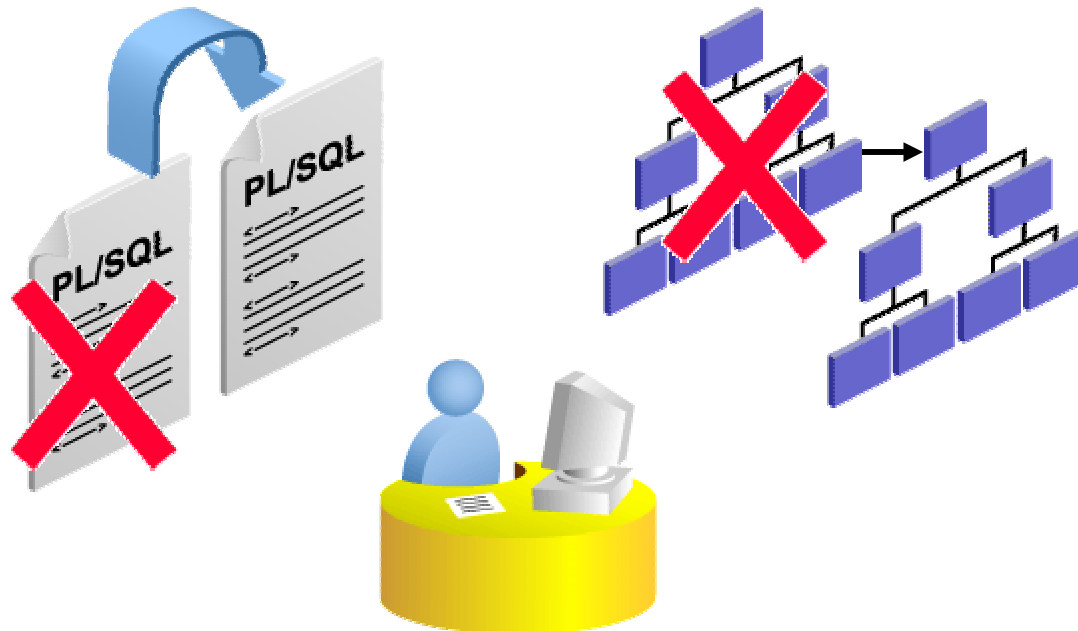
V\$LOCK
V\$UNDOSTAT
V\$WAITSTAT
V\$LATCH

Invalid and Unusable Objects

Perf Mon
Tuning Adv
Access Adv
Memory
Stats
> [Invalid Obj](#)

Effect on Performance:

- PL/SQL code objects are recompiled.
- Indexes are rebuilt.



Summary

In this lesson, you should have learned how to:

- **Use Enterprise Manager to monitor performance**
- **Tune SQL using the SQL Tuning Advisor**
- **Tune SQL using the SQL Access Advisor**
- **Use Automatic Shared Memory Management**
- **Use the Memory Advisor to size memory buffers**
- **View performance-related dynamic views**
- **Troubleshoot invalid and unusable objects**

Practice Overview: Monitoring and Improving Performance

This practice covers the following topics:

- **Detecting and repairing unusable indexes**
- **Using the SQL Tuning Advisor**
- **Using the Performance page in Enterprise Manager**