

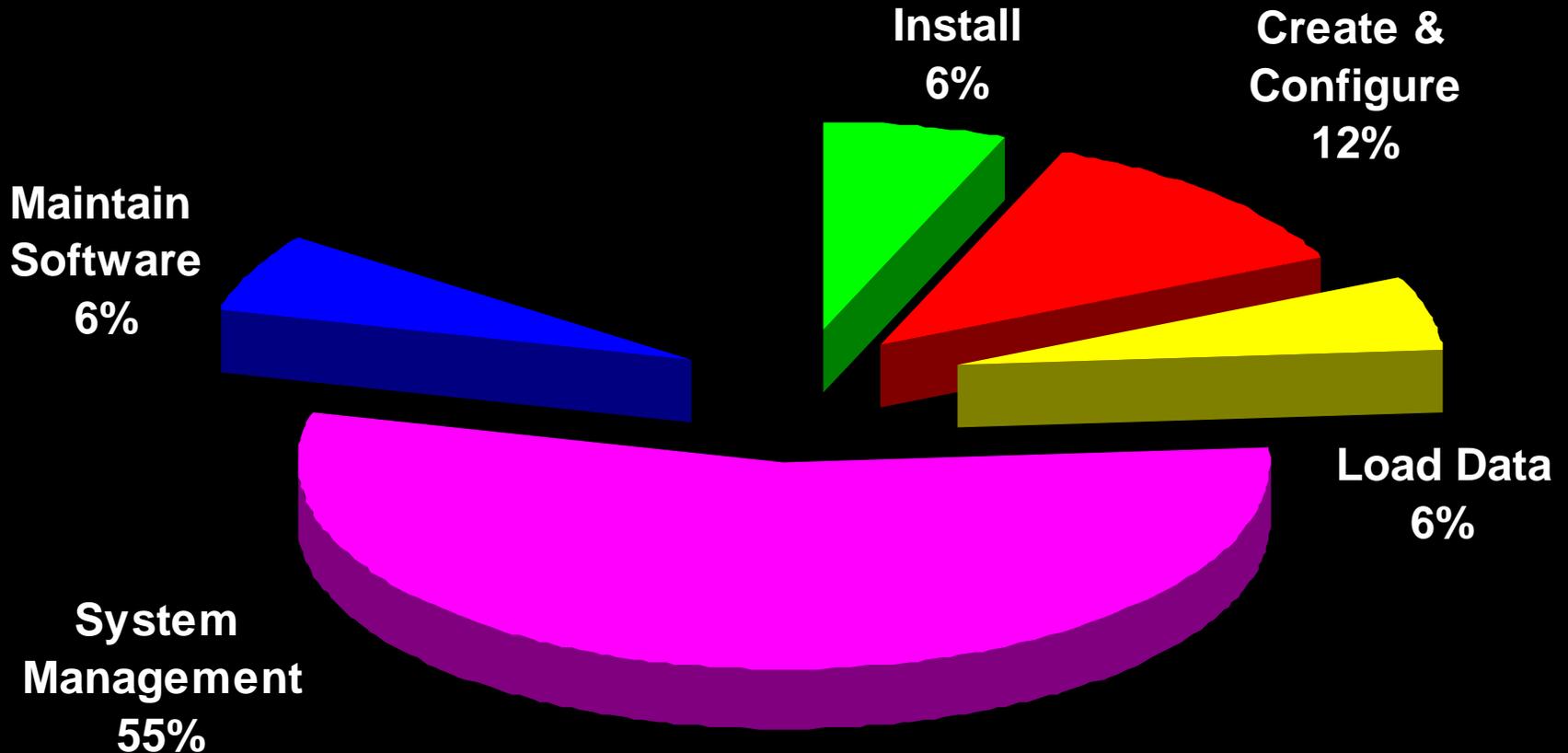
Oracle Database 10^g: Managing the Self- Managing Database

הדר פייס

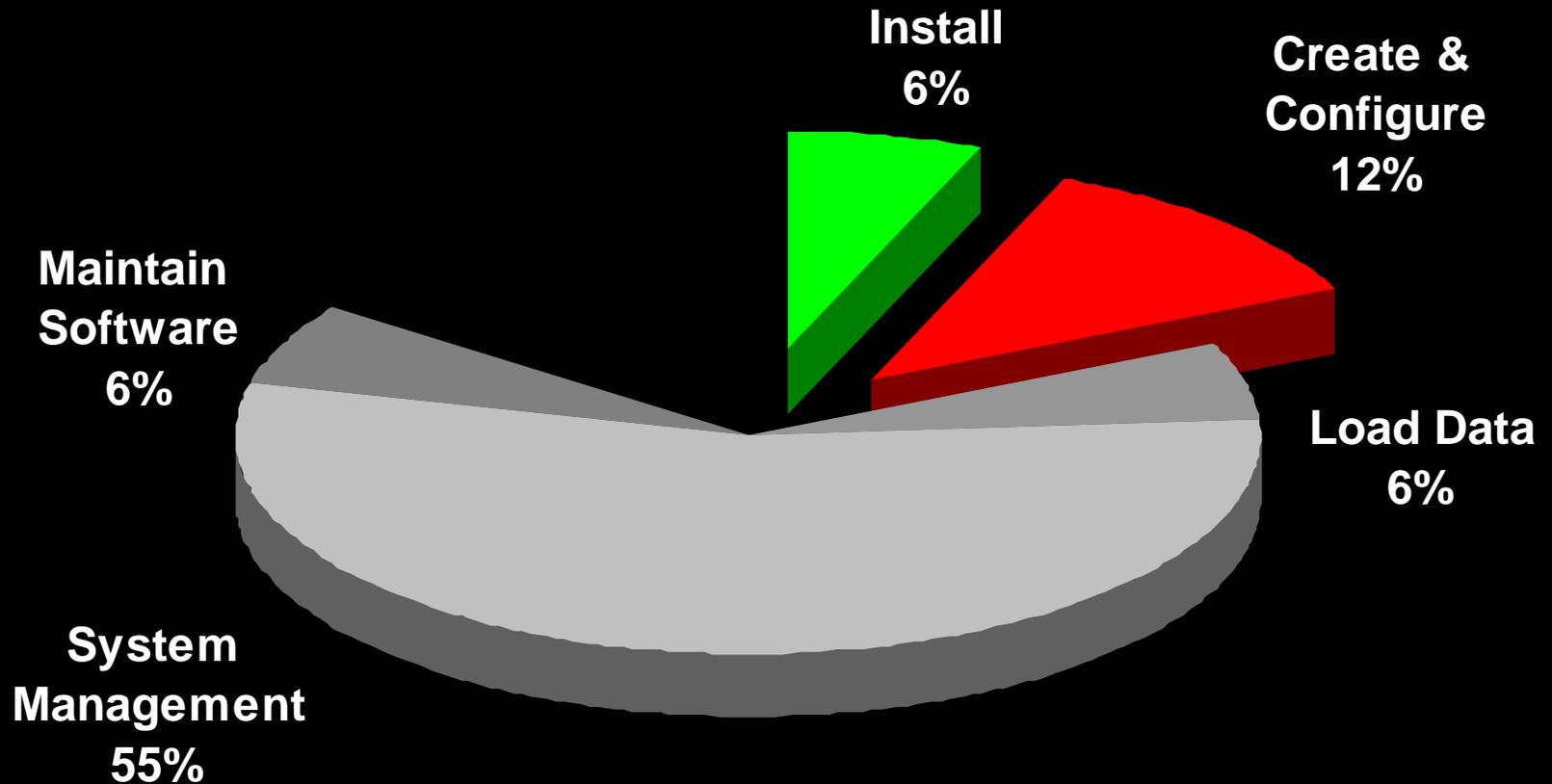
יונתן טולדנו

Certified Oracle 10g Technician

How DBAs Spend Their Time?



How DBAs Spend Their Time?



Software Installation

- Fast lightweight install
 - Major redesign of installation process
 - Single CD, 20 Minutes
 - CPU, memory, disk space consumption greatly reduced
 - Extremely lightweight client install (3 files) using Oracle Instant Client
- Automation of All Pre and Post Install Steps
 - Validate OS Configuration, patches, resource availability etc.
 - Configure all components (listeners, database, agent, OMS, OID etc.) for automatic startup and shutdown
- Enhanced silent install

Simplified Creation & Configuration

- Greatly reduced database creation time using pre-configured, ready-to-use database
- 90% reduction of initialization parameters: < 30 Basic parameters
- Automatically setup common tasks, e.g. backups
- Automatically configures LDAP server
- Automatic Shared Server Set-up
- Easy Connect Naming

Basic Parameters

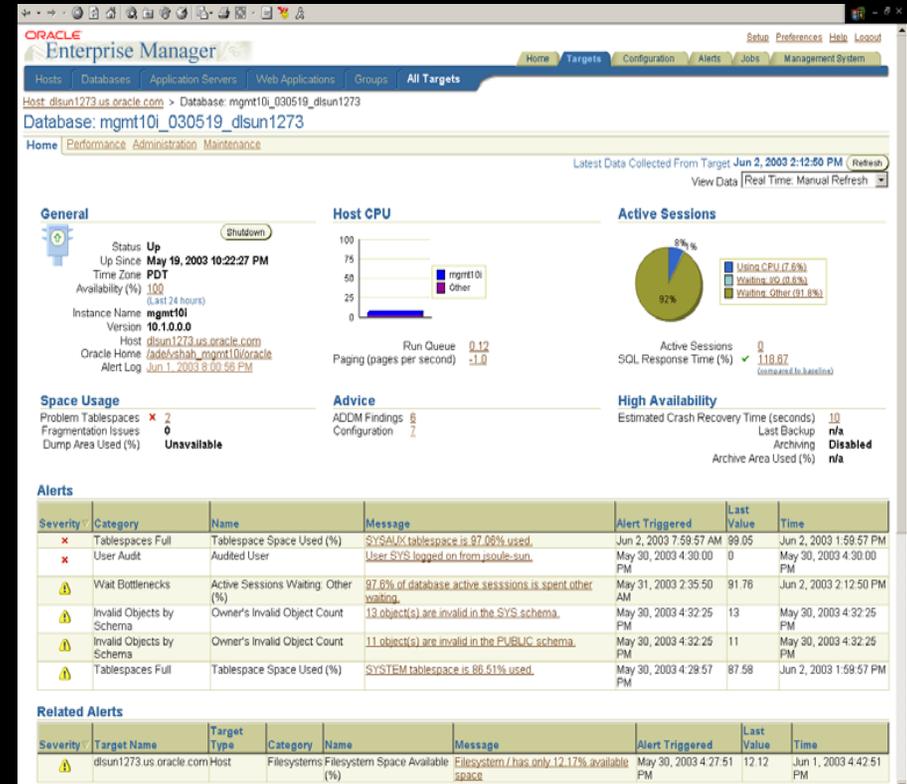
- compatible
- processes
- sessions
- pga_aggregate_target
- nls_language
- nls_territory
- db_domain
- shared_servers
- instance_number
- cluster_database
- db_block_size
- sga_target
- control_files
- db_name
- db_recovery_file_dest
- remote_listener
- db_recovery_file_dest_size
- db_create_online_log_dest_n
- db_create_file_dest
- log_archive_dest_n
- log_archive_dest_state_n
- remote_login_passwordfile
- db_unique_name

Simplified Upgrade

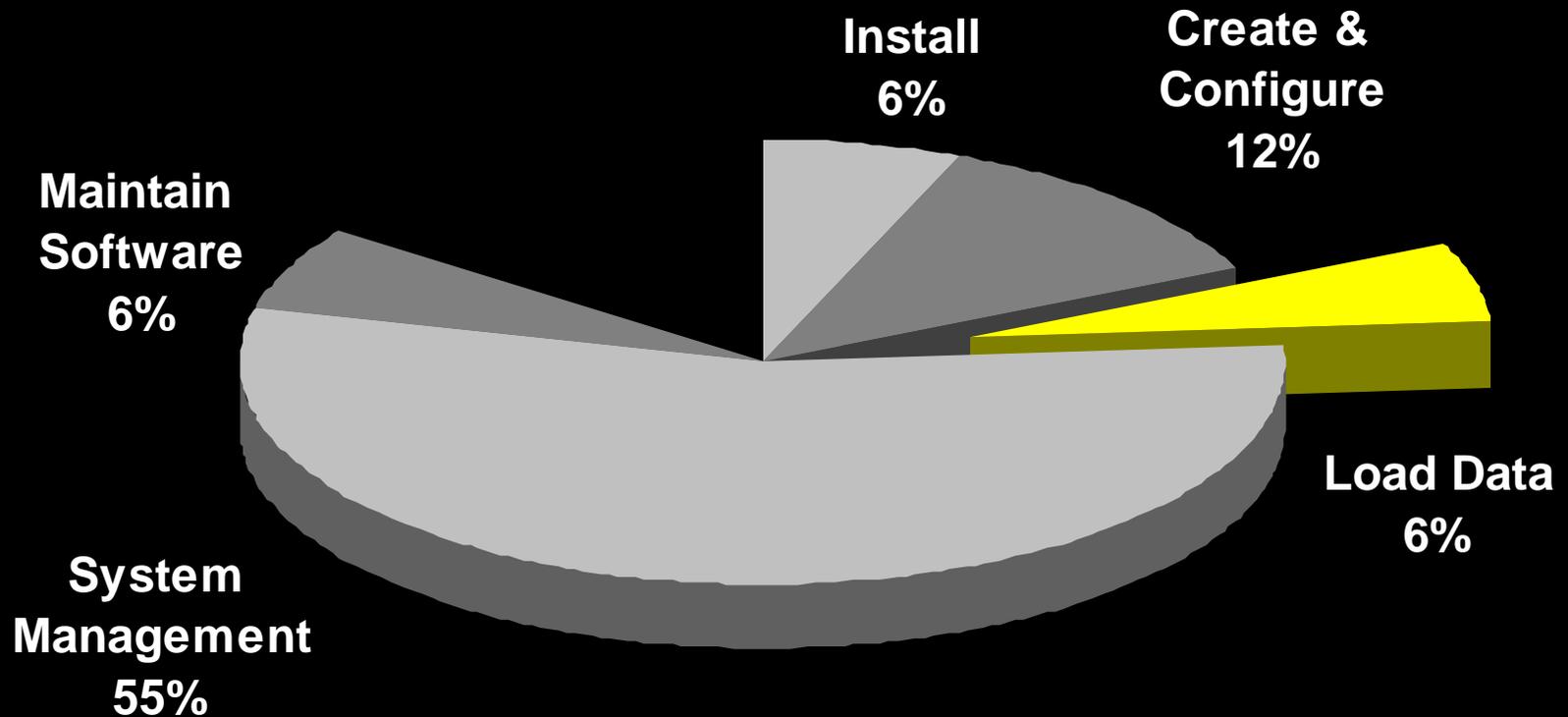
- Pre upgrade checks (e.g. parameter settings)
- Post upgrade status checks
- Time estimator
- Re-startable
- Guide administrators in using best practices

Out-of-the-Box Database Control

- No separate install
- Fully functional administration and monitoring after database creation
- Listener discovery, configuration & monitoring



How DBAs Spend Their Time?



Data Pump: What is it?

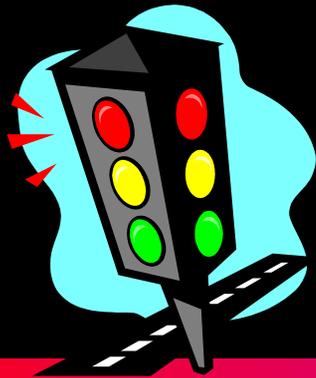
- Server-based facility for high performance loading and unloading of data and metadata
- Callable: DBMS_DATAPUMP. Internally uses DBMS_METADATA
- Data written in Direct Path stream format. Metadata written as XML
- New clients expdp and impdp: Supersets of original exp / imp.
- Foundation for Streams, Logical Standby, Grid, Transportable Tablespaces and Data Mining initial instantiation.

Features: Performance!!

- Automatic, two-level parallelism
 - Direct Path for inter-partition parallelism
 - External Tables for *intra*-partition parallelism
 - Simple: parallel=<number of active threads>
 - Dynamic: Workers can be added and removed from a running job in Enterprise Edition
 - Index builds automatically “parallelized” up to degree of job
- Simultaneous data and metadata unload
- Single thread of data unload: 1.5-2X exp
- Single thread of data load: 15X-40X imp
- With index builds: 4-10X imp

Features: Checkpoint / Restart

- Job progress recorded in a “Master Table”
- May be explicitly stopped and restarted later:
 - Stop after current item finishes or stop immediate
- Abnormally terminated job is also restartable
- Current objects can be skipped on restart if problematic



Features: Monitoring



- Flexible GET_STATUS call
- Per-worker status showing current object and percent done
- Initial job space estimate and overall percent done
- Job state and description
- Work-in-progress and errors

Features: Network Mode



- Network import: Load one database directly from another
- Network export: Unload a remote database to a local dumpfile set
 - Allows export of read-only databases
- Data Pump runs locally, Metadata API runs remotely.
- Uses DB links / listener service names, not pipes. Data is moved as 'insert into <local table> select from <remote table>@service_name'
- Direct path engine is used on both ends
- It's easy to swamp network bandwidth: Be careful!

Features: Fine-Grained Object Selection

- All object types are supported for *both* operations: export *and* import
- Exclude: Specified object types are excluded from the operation
- Include: Only the specified object types are included. E.g, just retrieve packages, functions and procedures
- More than one of each can be specified, but use of both is prohibited by new clients
- Both take an optional name filter for even finer granularity:
 - INCLUDE PACKAGE: “LIKE ‘PAYROLL%’ “
 - EXCLUDE TABLE: “IN (‘FOO’,’BAR’, ...)” “

New Clients – expdp / impdp



- Similar (but not identical) look and feel to exp / imp
- All modes supported: full, schema, table, tablespace, transportable. Superset of exp / imp
- Flashback is supported
- Query supported by both expdp *and* impdp... *and* on a per-table basis!
- Detach from and attach to running jobs
- Multiple clients per job allowed; but a single client can attach to only one job at a time
- If privileged, attach to and control other users' jobs

New Clients – expdp / impdp



- Interactive mode entered via Ctl-C:
 - ADD_FILE: Add dump files and wildcard specs. to job
 - PARALLEL: Dynamically add or remove workers
 - STATUS: Get detailed per-worker status and change reporting interval
 - STOP_JOB{=IMMEDIATE}: Stop job, leaving it restartable. Immediate doesn't wait for workers to finish current work items... they'll be re-done at restart
 - START_JOB: Restart a previously stopped job
 - KILL_JOB: Stop job and delete all its resources (master table, dump files) leaving it unrestartable
 - CONTINUE: Leave interactive mode, continue logging
 - EXIT: Exit client, leave job running

Features: Other Cool Stuff...

- Can extract and load just data, just metadata or both
- SQLFILE operation generates executable DDL script
- If a table pre-exists at load time, you can: skip it (default), replace it, truncate then load or append to it.
- Space estimates based on allocated blocks (default) or statistics if available
- Enterprise Manager interface integrates 9i and 10g
- Callable!

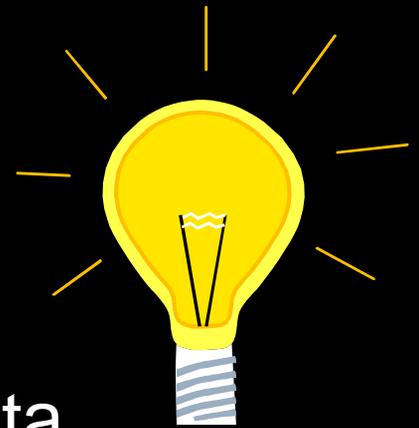


Large Internet Company

2 Fact Tables: 16.2M rows, 2 Gb

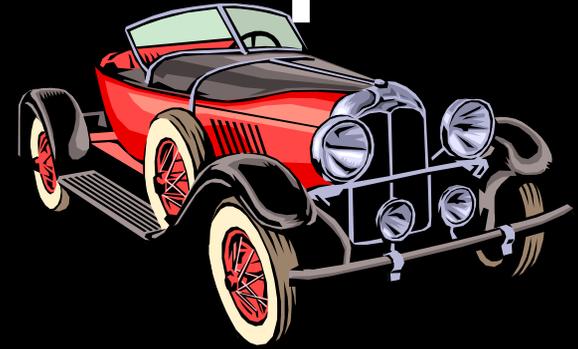
Program	Elapsed
exp out of the box: direct=y	0 hr 10 min 40 sec
exp tuned: direct=y buffer=2M recordlength=64K	0 hr 04 min 08 sec
expdp out of the box: Parallel=1	0 hr 03 min 12 sec
imp out of the box	2 hr 26 min 10 sec
imp tuned: buffer=2M recordlength=64K	2 hr 18 min 37 sec
impdp out of the box: Parallel=1	0 hr 03 min 05 sec

Keep in Mind:



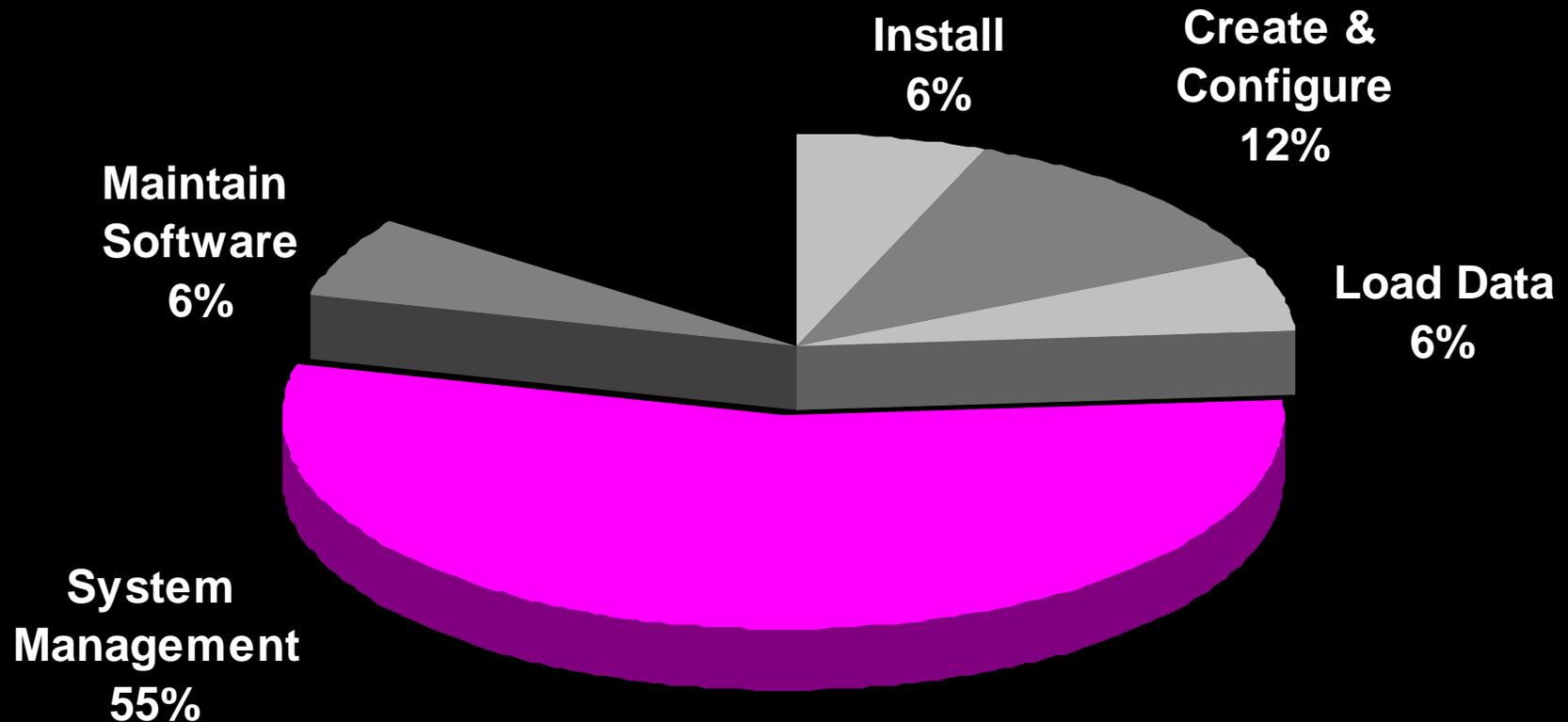
- Designed for *big* jobs with lots of data.
 - Metadata performance is about the same
 - More complex infrastructure, longer startup
- XML is bigger than DDL, but much more flexible
- Data format in dump files is ~15% more compact than exp
- Import subsetting is accomplished by pruning the Master Table

Original exp and imp

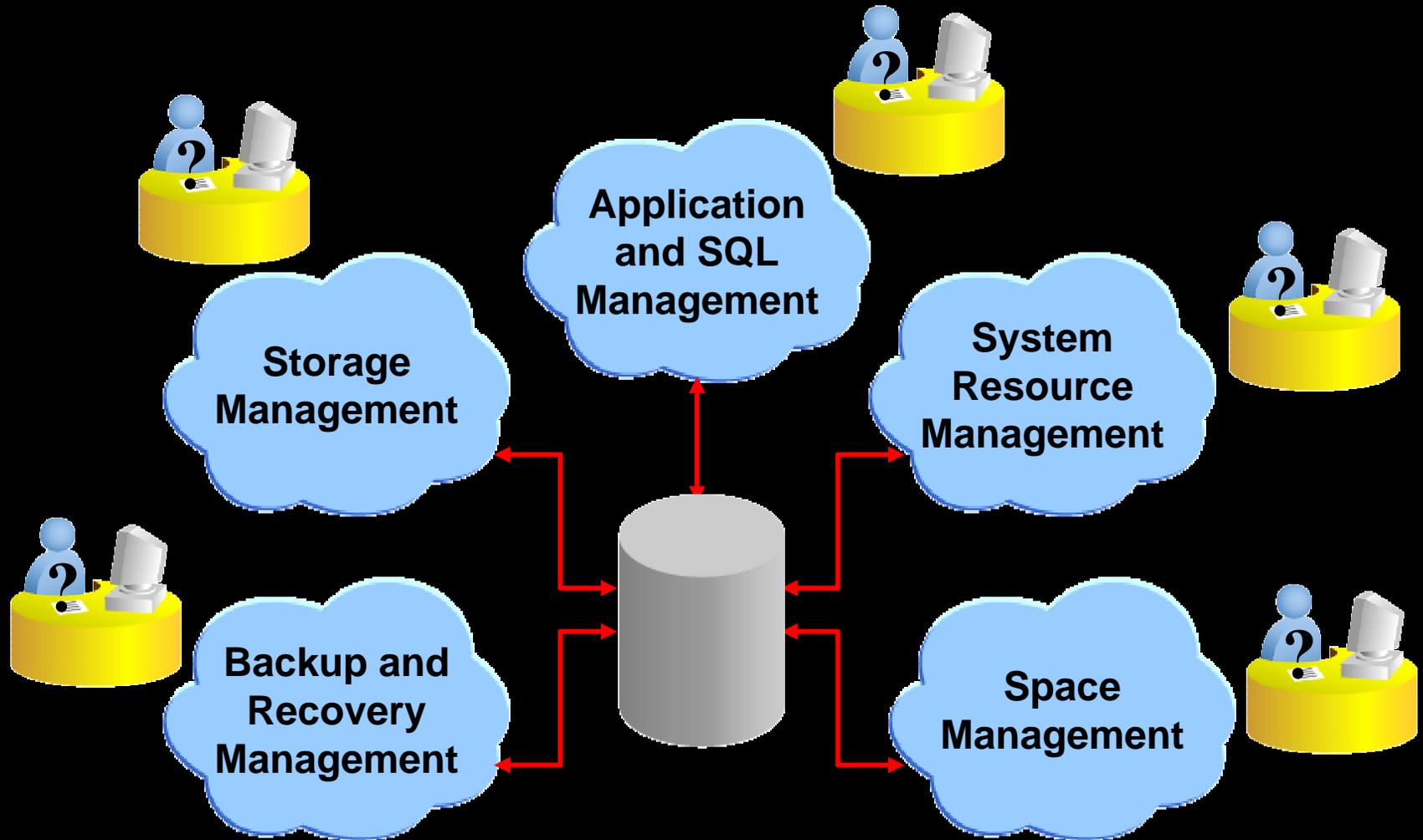


- Original imp will be supported forever to allow loading of V5 – V9i dump files
- Original exp will ship at least in 10g, but may not support all new functionality.
- 9i exp may be used for downgrades from 10g
- Original and Data Pump dump file formats are not compatible

How DBAs Spend Their Time?



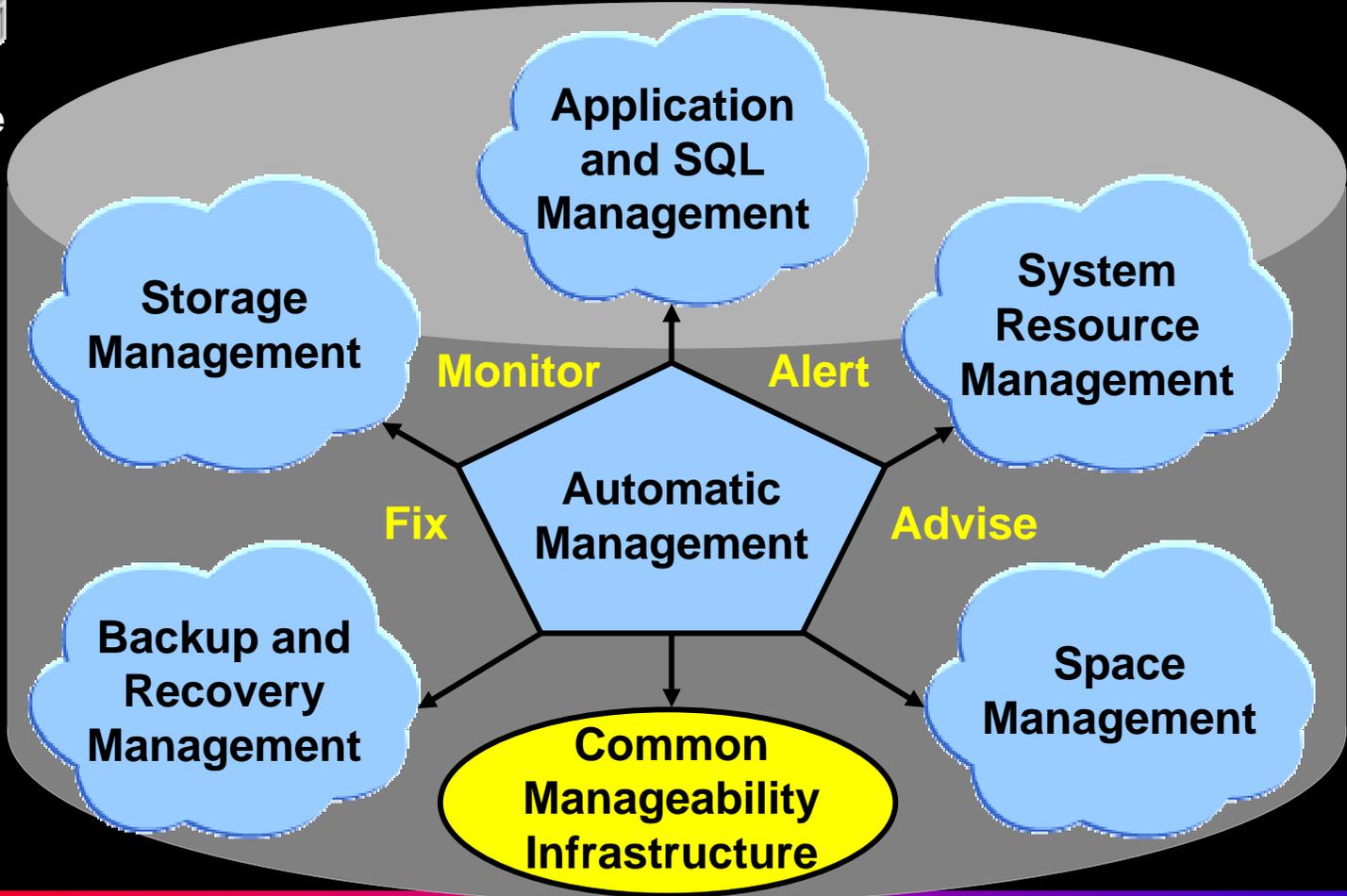
Database Management Challenges



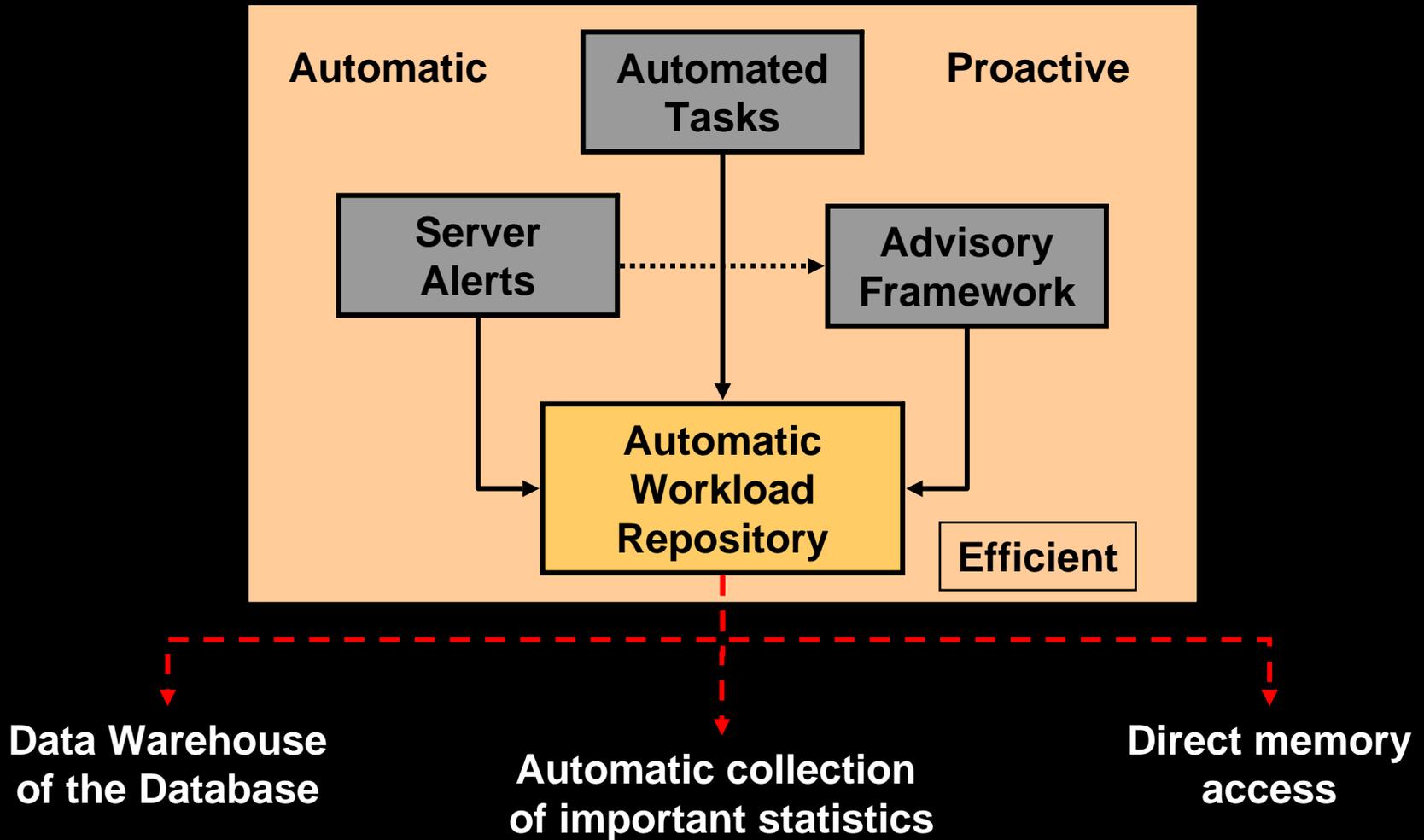
Solution: Self-Managing Database



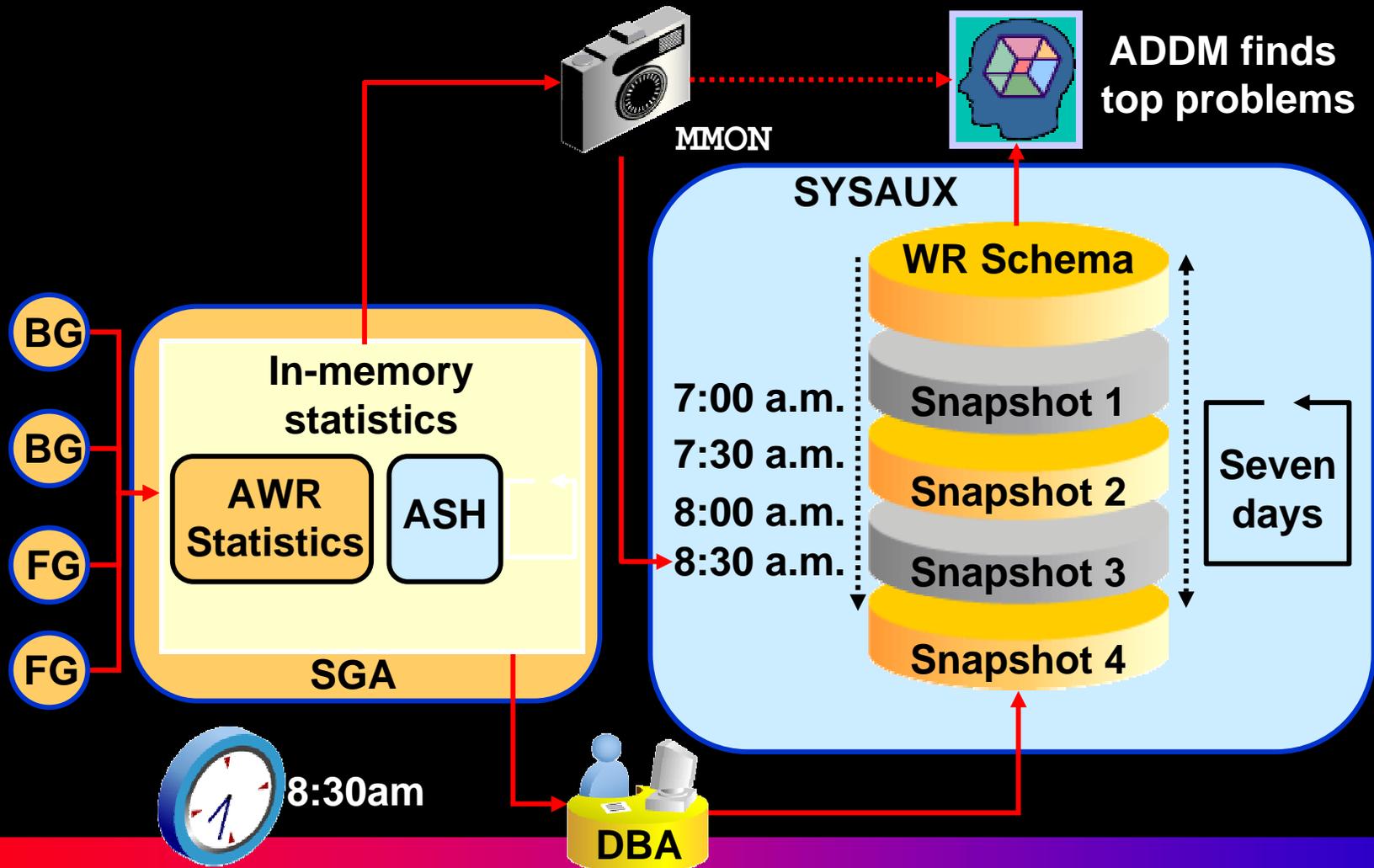
Enterprise
Manager
Database
Console



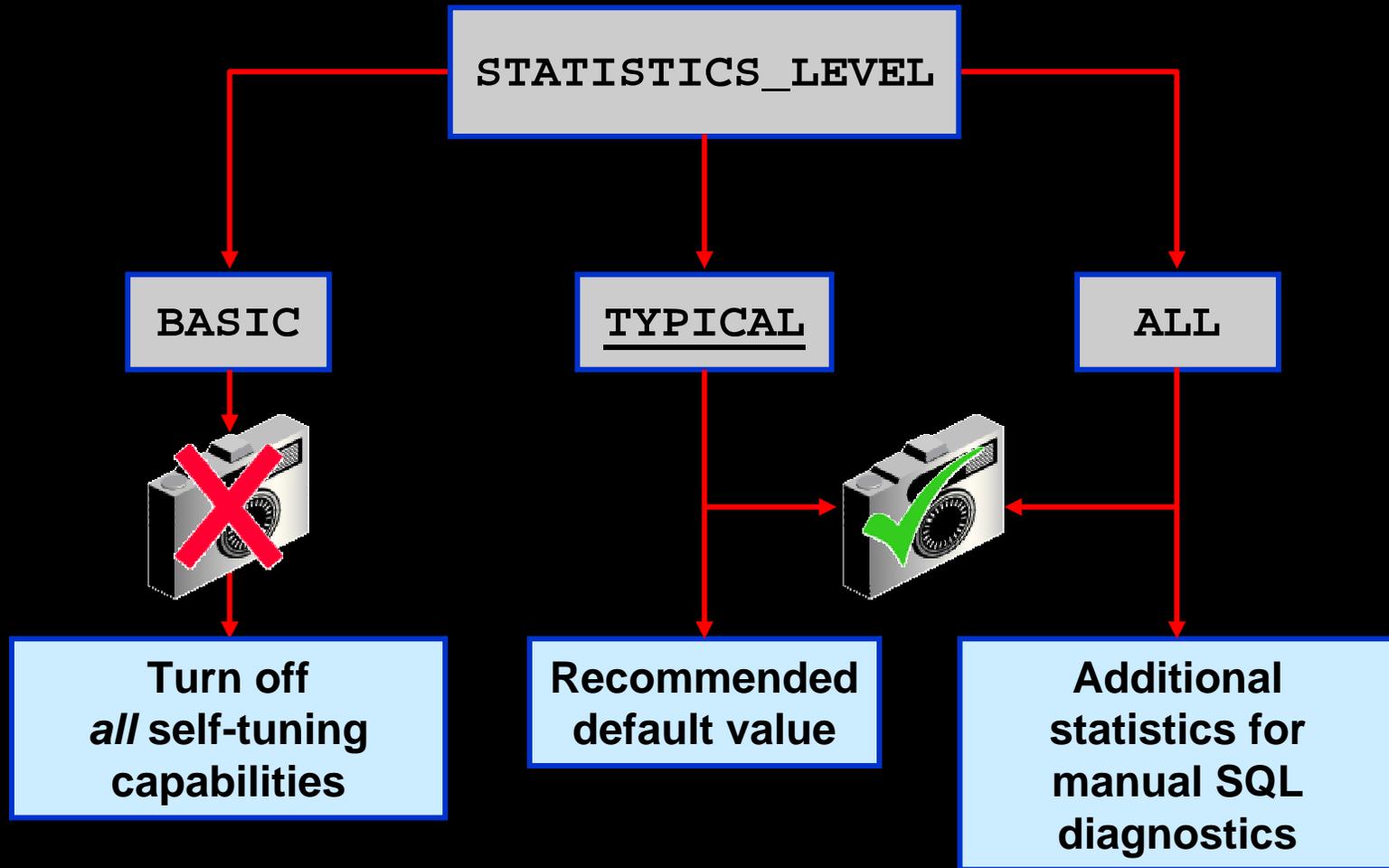
Common Manageability Infrastructure: Automatic Workload Repository



Automatic Workload Repository



Statistics Level



Configuring The Workload Repository

The screenshot shows the Oracle Enterprise Manager interface. At the top, the Oracle logo and 'Enterprise Manager' are displayed. Navigation tabs include Home, Targets, Configuration, Alerts, and Management System. A breadcrumb trail shows: Hosts > Databases > Application Servers > Web Applications > Groups > All Targets > my_test_dbgrp. The current page is titled 'Workload Repository' and shows it was collected from a target on Apr 4, 2003 at 3:37:24 AM. Under the 'General' section, the following settings are listed: Snapshot Retention (days) is 7, Snapshot Interval (minutes) is 30, Collection Level is TYPICAL, and Next Snapshot Capture Time is Apr 4, 2003 4:00:28 AM. An 'Edit' button is highlighted with a red box. The 'Snapshots' section shows: Number of Snapshots is 164, Number of Baselines is 2, Latest Snapshot Time is Apr 4, 2003 3:30:28 AM, and Earliest Snapshot Time is Mar 31, 2003 5:58:31 PM.

ORACLE
Enterprise Manager

Setup Preferences He

Home Targets Configuration Alerts Management System

Hosts Databases Application Servers Web Applications Groups All Targets my_test_dbgrp

Host: dsunrdf03.us.oracle.com > Database: mgmt10i > Workload Repository

Workload Repository

Collected From Target **Apr 4, 2003 3:37:24 AM**

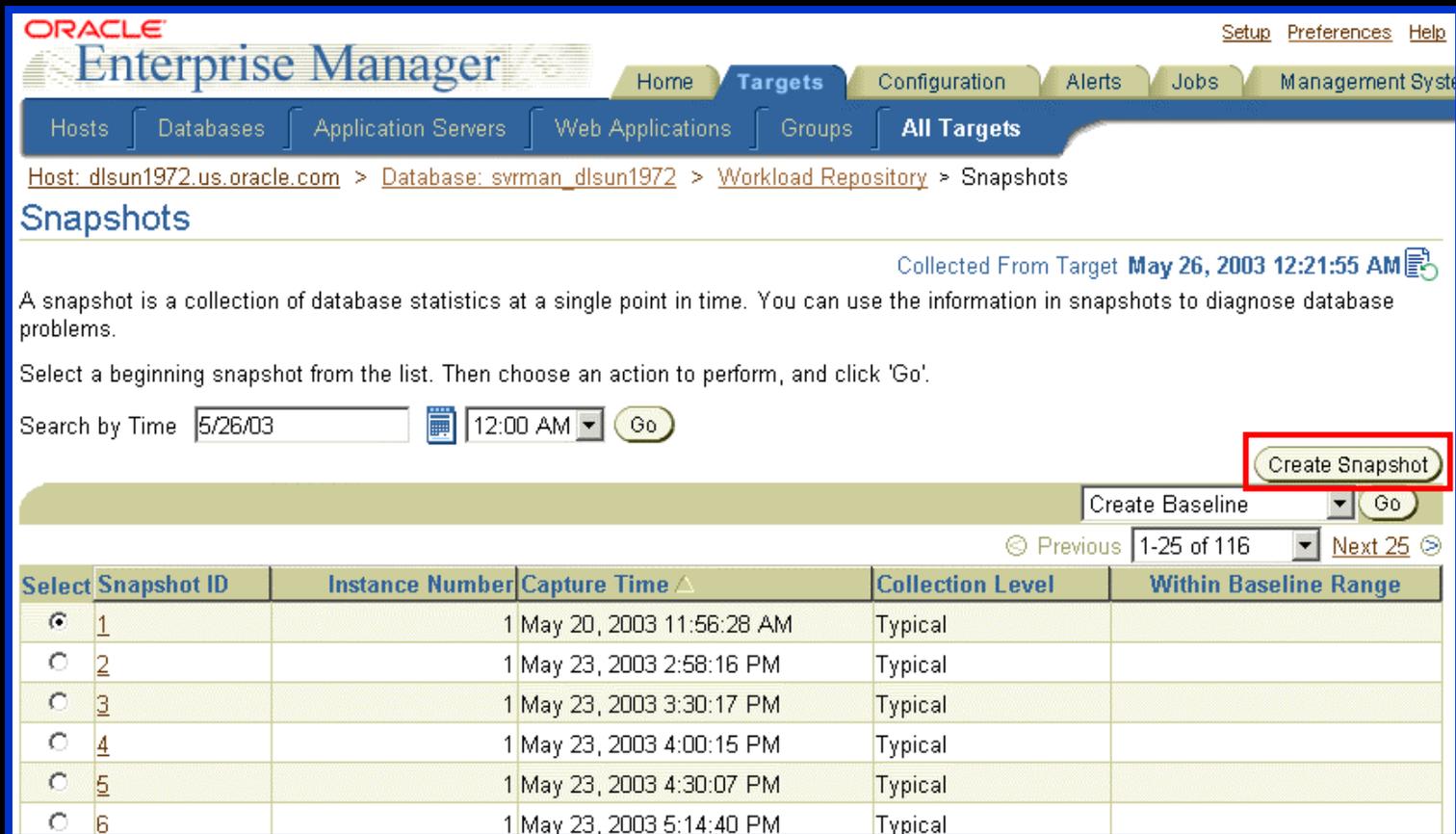
General

Snapshot Retention (days) **7**
Snapshot Interval (minutes) **30**
Collection Level **TYPICAL**
Next Snapshot Capture Time **Apr 4, 2003 4:00:28 AM**

Snapshots

Number of Snapshots **164**
Number of Baselines **2**
Latest Snapshot Time **Apr 4, 2003 3:30:28 AM**
Earliest Snapshot Time **Mar 31, 2003 5:58:31 PM**

Manually Creating Snapshots



ORACLE Enterprise Manager Setup Preferences Help

Home **Targets** Configuration Alerts Jobs Management System

Hosts Databases Application Servers Web Applications Groups **All Targets**

Host: [dlsun1972.us.oracle.com](#) > Database: [svrman_dlsun1972](#) > [Workload Repository](#) > Snapshots

Snapshots

Collected From Target **May 26, 2003 12:21:55 AM**

A snapshot is a collection of database statistics at a single point in time. You can use the information in snapshots to diagnose database problems.

Select a beginning snapshot from the list. Then choose an action to perform, and click 'Go'.

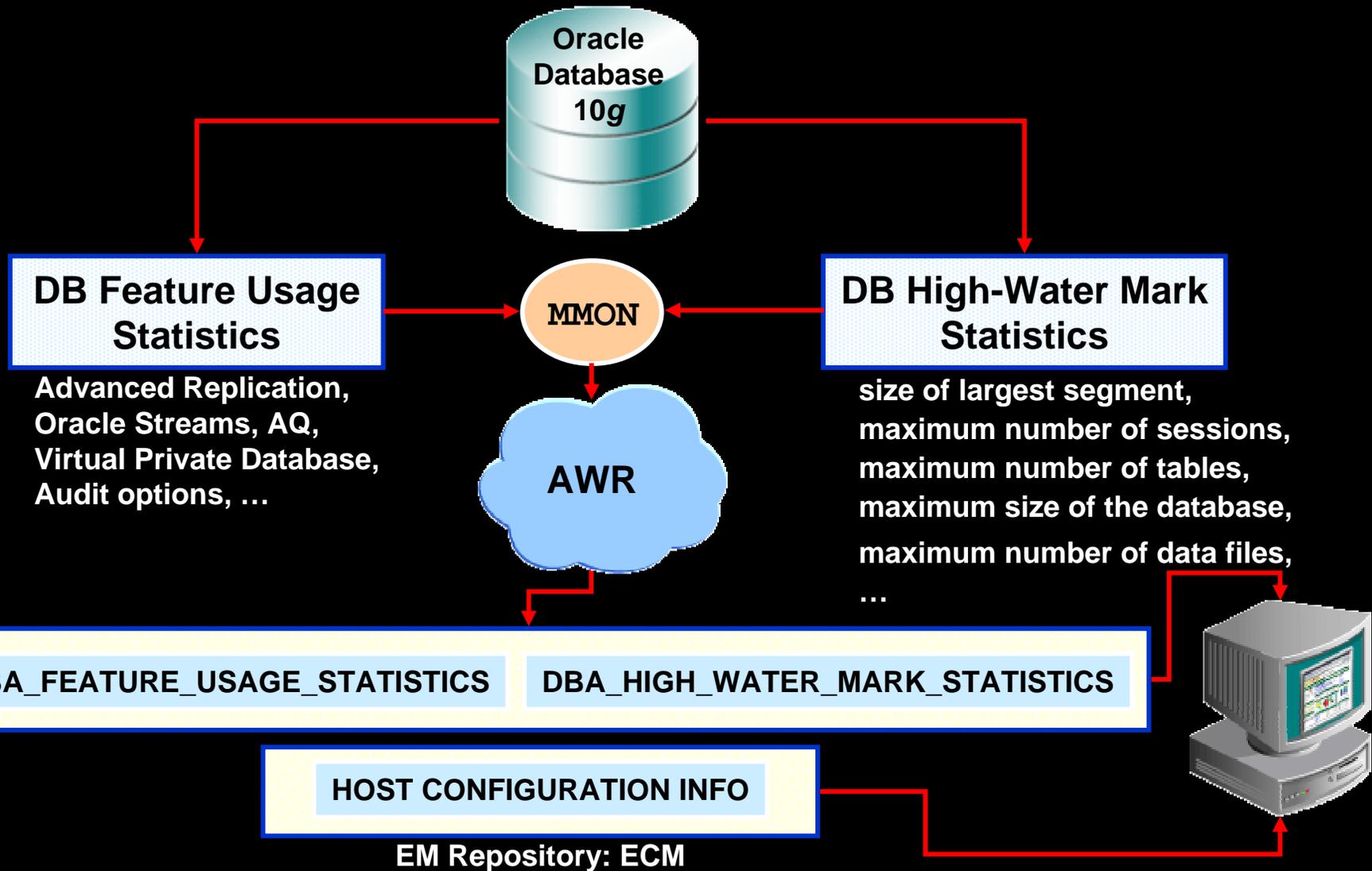
Search by Time

Create Baseline

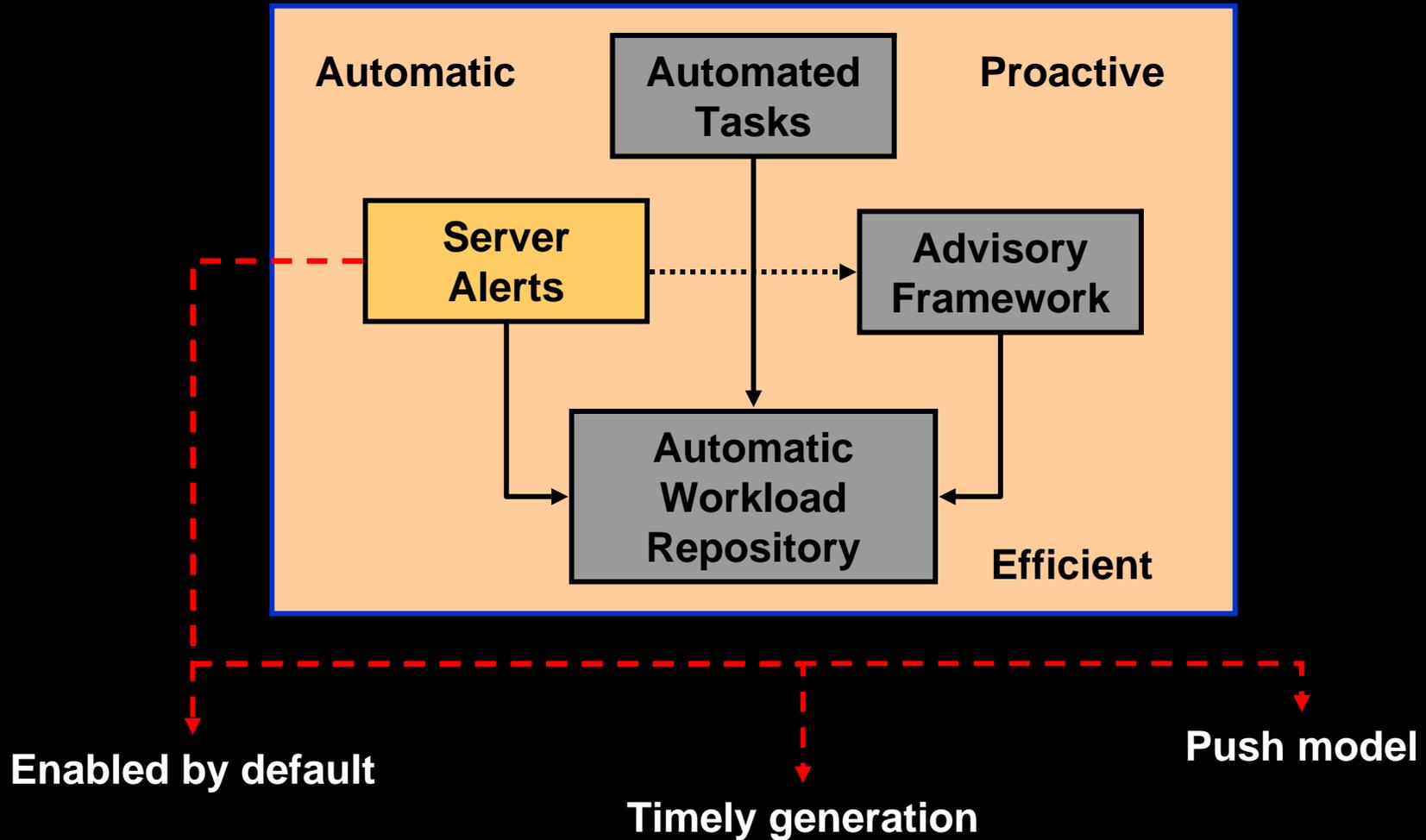
Previous 1-25 of 116 Next 25

Select	Snapshot ID	Instance Number	Capture Time	Collection Level	Within Baseline Range
<input checked="" type="radio"/>	1	1	May 20, 2003 11:56:28 AM	Typical	
<input type="radio"/>	2	1	May 23, 2003 2:58:16 PM	Typical	
<input type="radio"/>	3	1	May 23, 2003 3:30:17 PM	Typical	
<input type="radio"/>	4	1	May 23, 2003 4:00:15 PM	Typical	
<input type="radio"/>	5	1	May 23, 2003 4:30:07 PM	Typical	
<input type="radio"/>	6	1	May 23, 2003 5:14:40 PM	Typical	

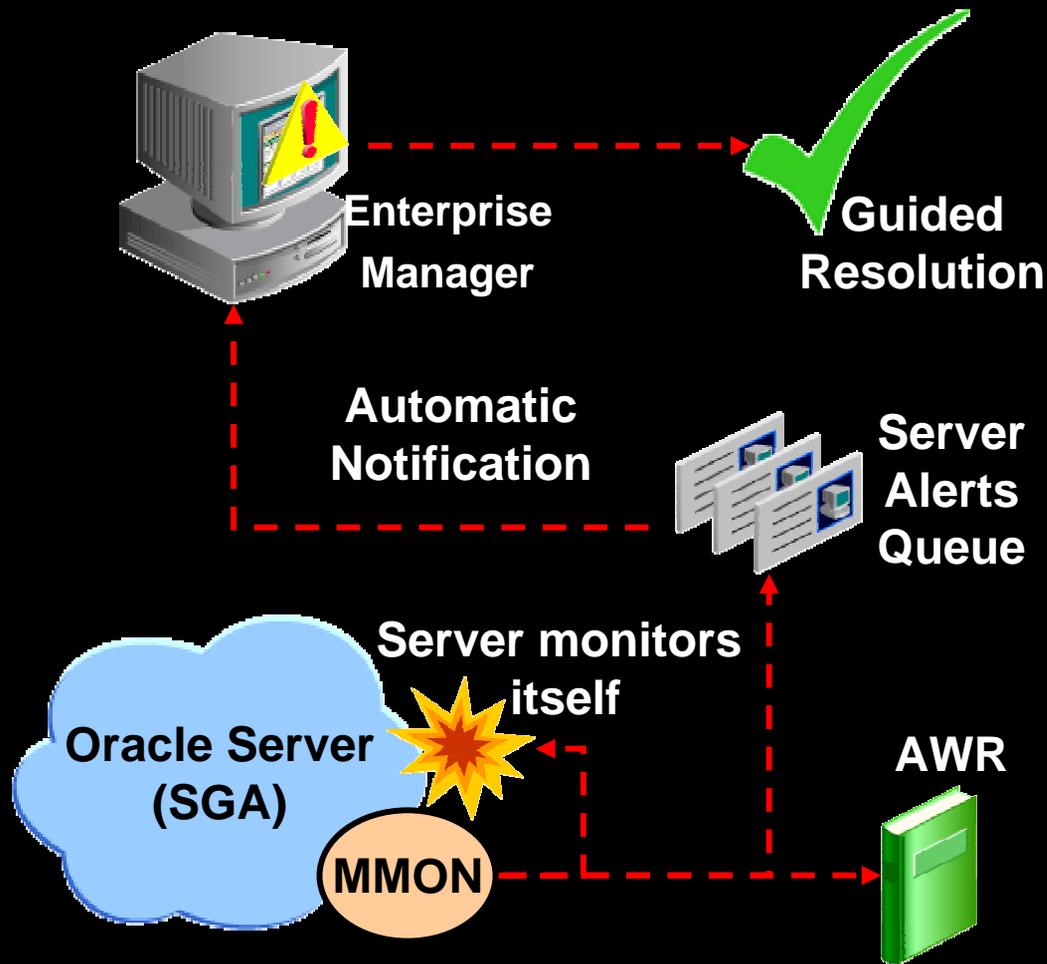
Database Feature Usage Metric Collection



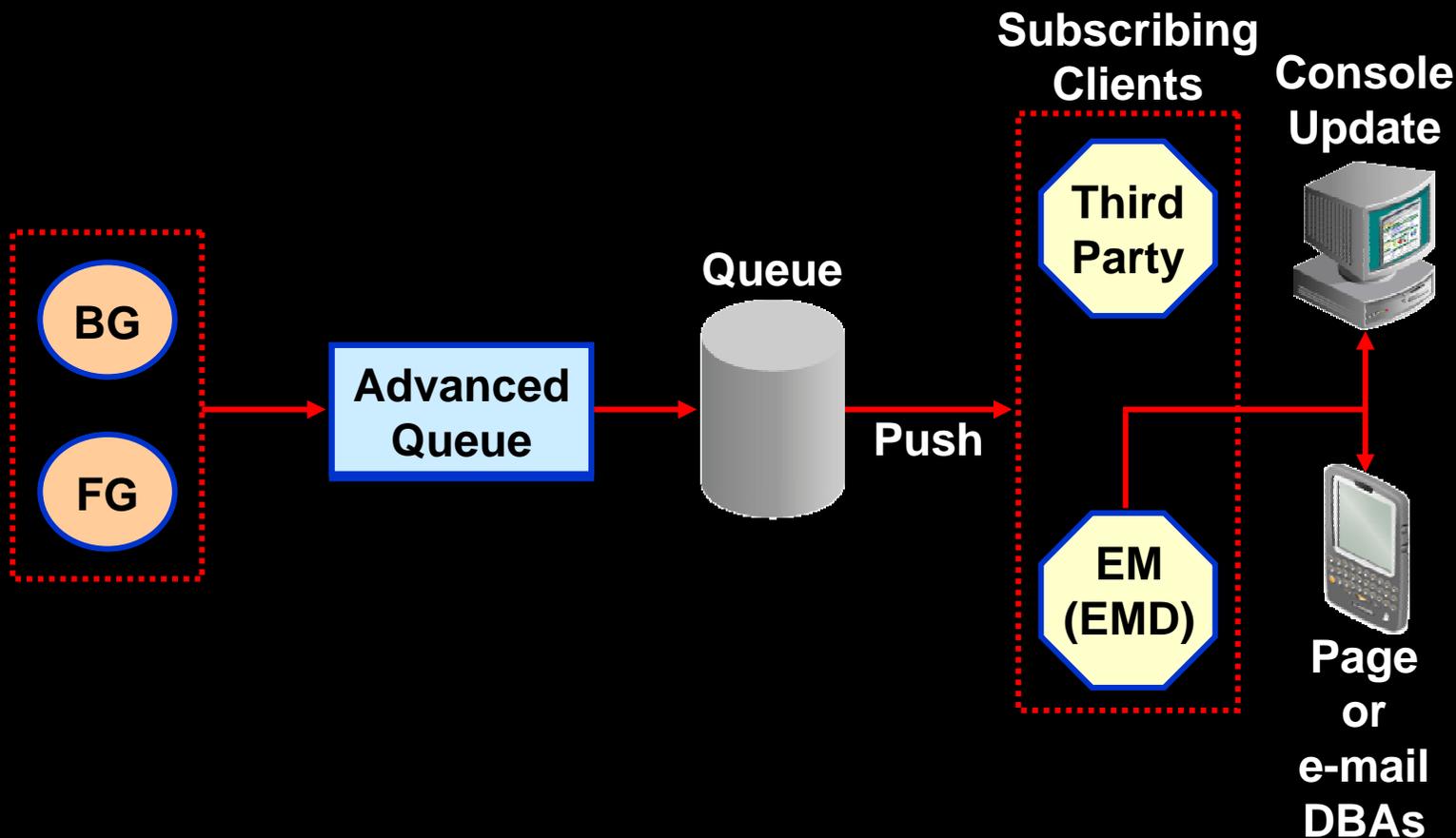
Common Manageability Infrastructure: Server Alerts



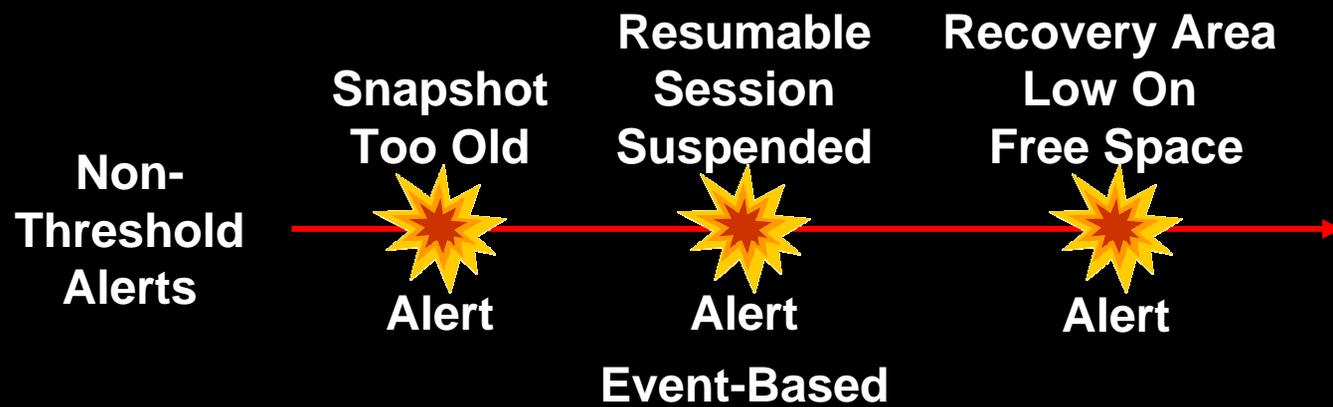
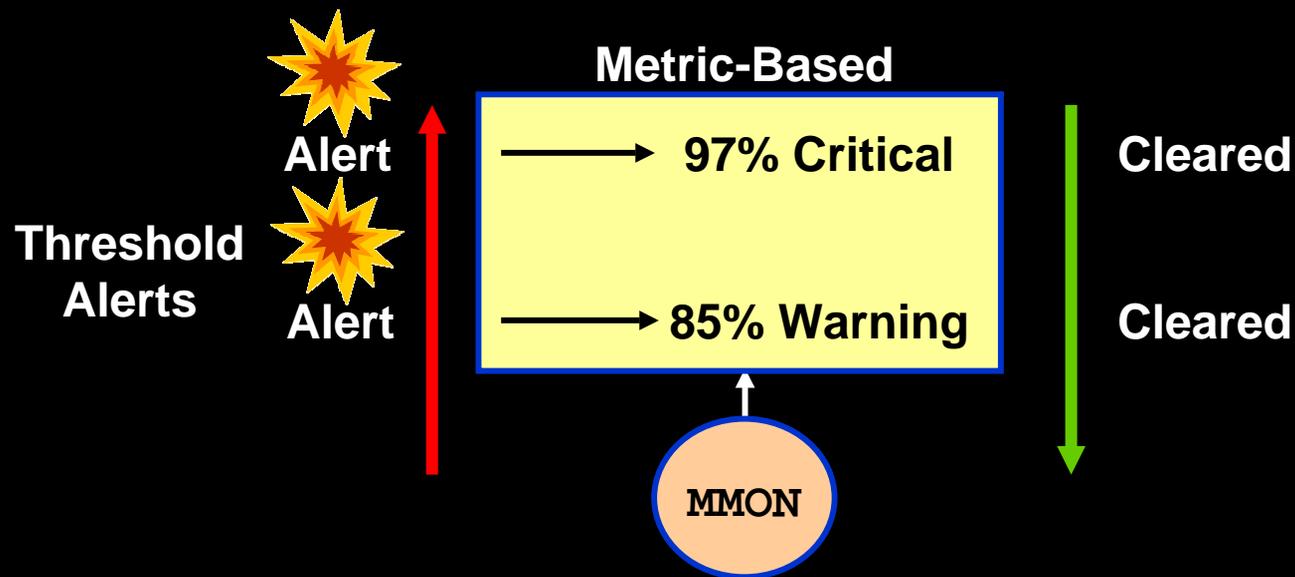
Server Alerts



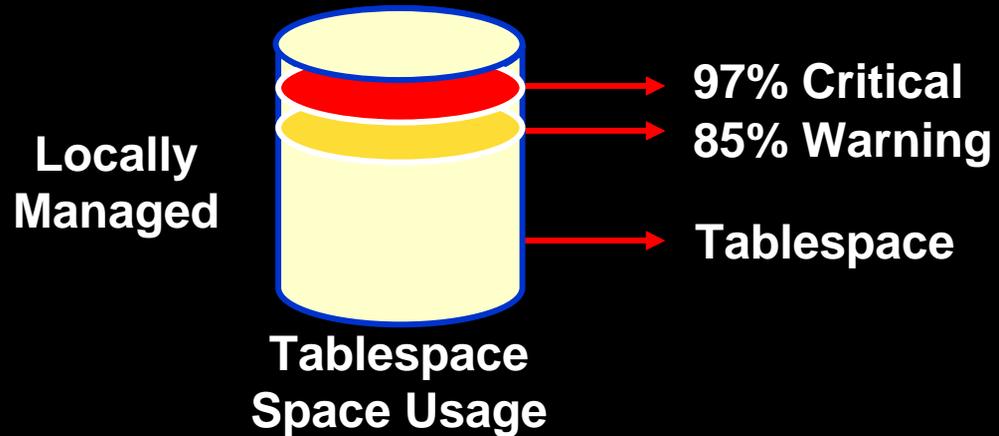
Server Alerts Delivery Process



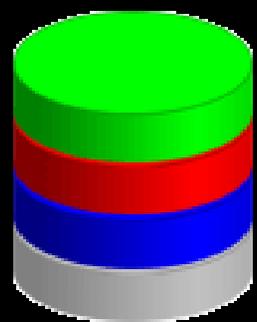
Server-Generated Alert Types



Out-of-the-box Alerts



Resumable
Session
Suspended



Recovery Area
Low On
Free Space



Snapshot
Too Old

EM Interface to Alerts

Oracle Enterprise Manager (SYSMAN) - Database: mgmt10i_030530_dsunrdf03 - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Links EM - SGA EM - SQL

Address http://dsunrap22:7777/em/console/database/instance/sitemap?target=mgmt10i_030530_dsunrdf03&ctxType=Databases&type=oracle_database&event=doLoad

Database: mgmt10i_030530_dsunrdf03

Home Performance Administration Maintenance

Latest Data Collected From Target Jun 4, 2003 10:45:29 AM Refresh

View Data Real Time: Manual Refresh

General

Shutdown

Status **Up**

Up Since **Jun 3, 2003 3:47:11 PM**

Time Zone **PDT**

Availability (%) **99.22**
(Last 24 hours)

Instance Name **mgmt10i**

Version **10.1.0.0.0**

Host **dsunrdf03.us.oracle.com**

Oracle Home **/ade/oracle_mgmt10i/oracle**

Alert Log **Jun 3, 2003 3:49:04 PM**

Host CPU

Run Queue **3.22**

Paging (pages per second) **0.14**

Active Sessions

Active Sessions **0**

SQL Response Time (%) **105.49**
(compared to baseline)

Space Usage

Problem Tablespaces **1**

Fragmentation Issues **0**

Dump Area Used (%) **73**

Advice

ADDM Findings **3**

Configuration **8**

High Availability

Estimated Crash Recovery Time (seconds) **31**

Last Backup **n/a**

Archiving **Disabled**

Archive Area Used (%) **n/a**

Alerts

Severity	Category	Name	Message	Alert Triggered	Last Value	Time
x	Tablespaces Full	Tablespace Space Used (%)	TBS_1 tablespace is 99.8% used.	Jun 2, 2003 12:19:14 PM	1.22	Jun 4, 2003 10:30:20 AM
!	Response Time	Response Time (s) per Call	Response time per call is 0.38 seconds. Click here to see the latest ADDM analysis.	Jun 3, 2003 5:56:08 PM	0.12	Jun 4, 2003 10:45:07 AM

Setting Alert Thresholds

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Enterprise Manager

Setup Preferences Help Logout

Home Targets Configuration Alerts Jobs Management System

Databases Hosts Application Servers Web Applications Groups All Targets

Database: svrman_dlsun1972 > Edit Metric Thresholds

svrman_dlsun1972: Edit Metric Thresholds

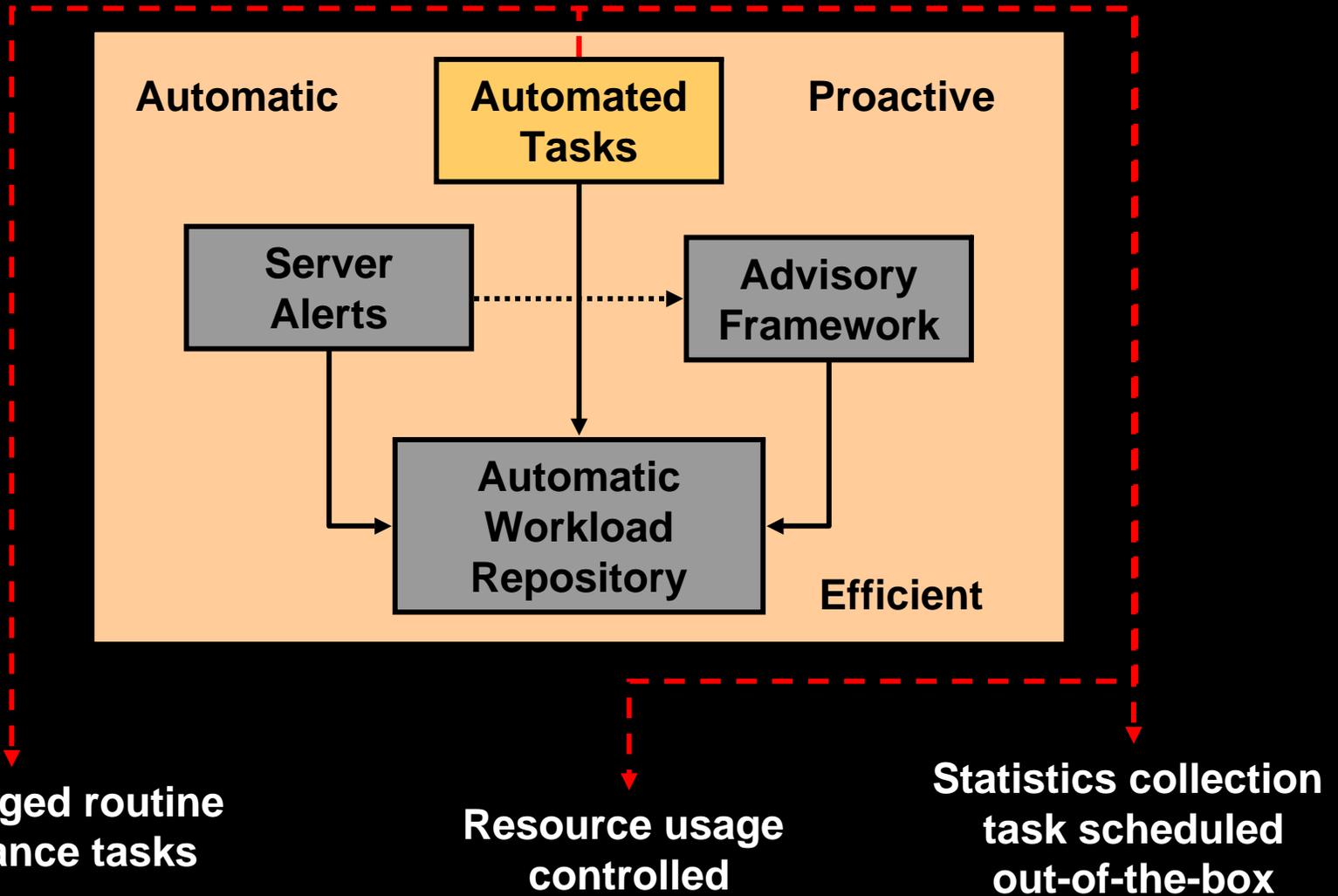
Use these metrics to monitor conditions as they reach their critical and warning thresholds. Alerts are generated when thresholds are reached. Change the thresholds as required.

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.

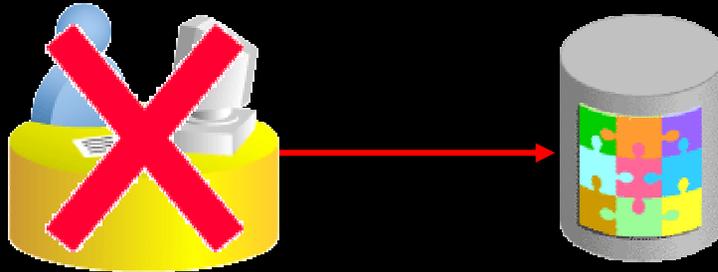
Related Link [Response to Target Down](#)

Select Metric	Comparison Operator	Warning Threshold	Critical Threshold	Response Actions
Active Sessions Waiting: I/O (%)	>	75		
Active Sessions Waiting: Other (%)	>	75		
<input checked="" type="radio"/> Archive Area Used (%)	>	70	80	
<input type="radio"/> Archiver Hung Alert Log Error	Contains		ORA-	
Archiver Hung Alert Log Error Status	>		0	
<input type="radio"/> Audited User	=		SYS	
<input type="radio"/> Blocking Session Count	>		0	
Broken Job Count	>		0	
Buffer Cache Hit (%)	<			

Common Manageability Infrastructure: Automated Tasks



Automatic Optimizer Statistics Collection



DBA tracks and gathers statistics



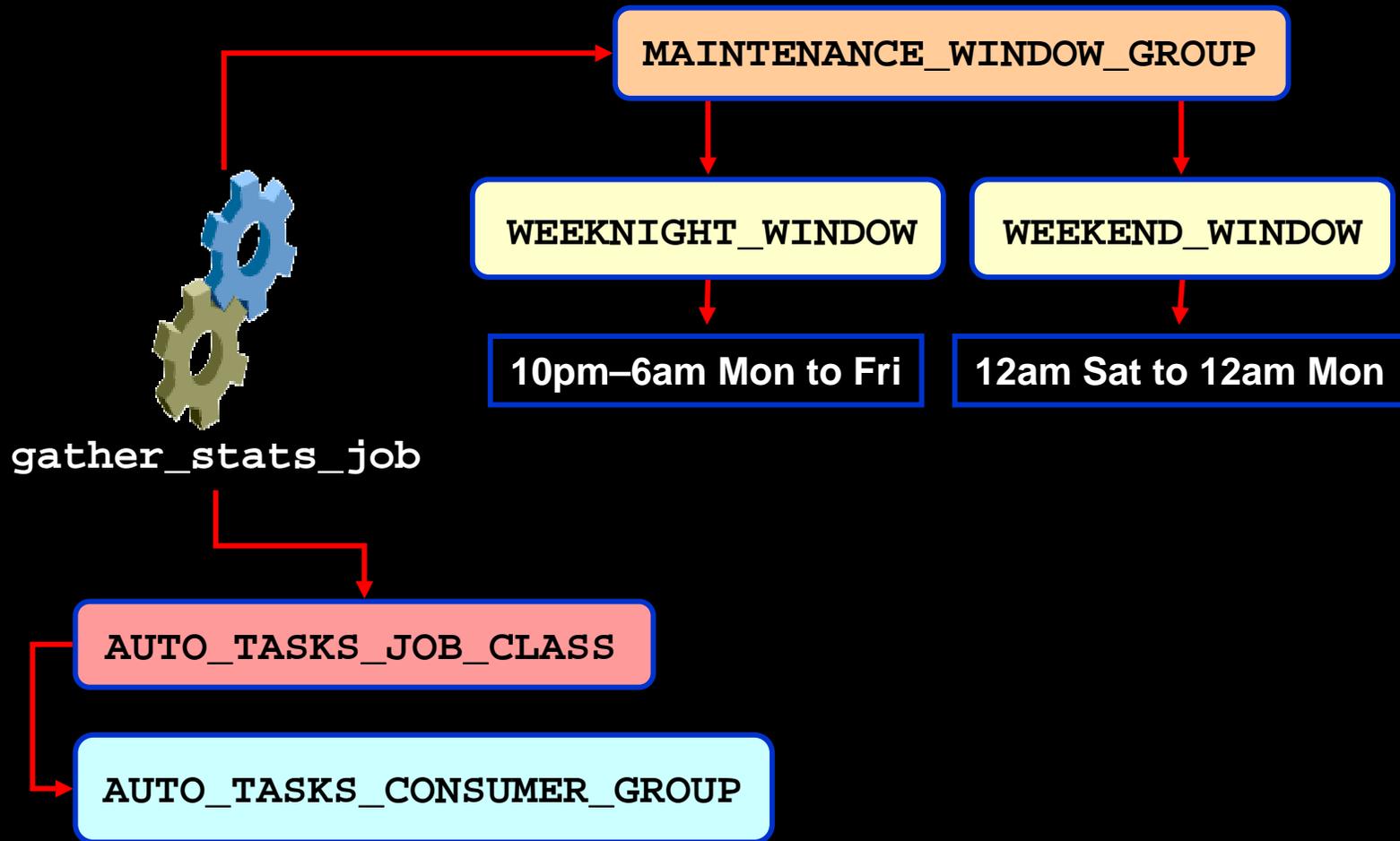
Automatic statistics collection

Resolves two issues

Targets right objects

Determines right samples

Gather Statistics Job



Adding New Tasks Using EM

The screenshot shows the Oracle Enterprise Manager interface. At the top, the Oracle logo and 'Enterprise Manager' text are visible. Navigation tabs include Home, Targets, Configuration, Alerts, Jobs, and Management System. A secondary navigation bar contains Databases, Hosts, Application Servers, Web Applications, Groups, and All Targets. The breadcrumb path is: Host: dsunrdf03.us.oracle.com > Database: mgmt10i_030530_dsunrdf03_2 > Jobs. The page title is 'Jobs' and it shows 'Page Refreshed Jun 12, 2003 5:31:45 AM'. There are tabs for 'Scheduled', 'Running', 'Unscheduled', and 'History'. A 'Create Job' button is highlighted with a red box. Below this is a table with columns: Select, Name, Owner, Execution Date, Class Name, and Executes. The table contains two rows: ADV_TASK_00002 and ADV_TUNETASK1. At the bottom, there are navigation links: Home | Targets | Configuration | Alerts | Jobs | Management System | Setup | Preferences | Help | Logout. Copyright information is provided at the very bottom.

ORACLE
Enterprise Manager

Setup Preferences H

Home Targets Configuration Alerts Jobs Management S

Databases Hosts Application Servers Web Applications Groups All Targets

Host: dsunrdf03.us.oracle.com > Database: mgmt10i_030530_dsunrdf03_2 > Jobs

Jobs

Page Refreshed Jun 12, 2003 5:31:45 AM

Scheduled Running Unscheduled History

Create Job

Edit View Delete Actions Create Like Go

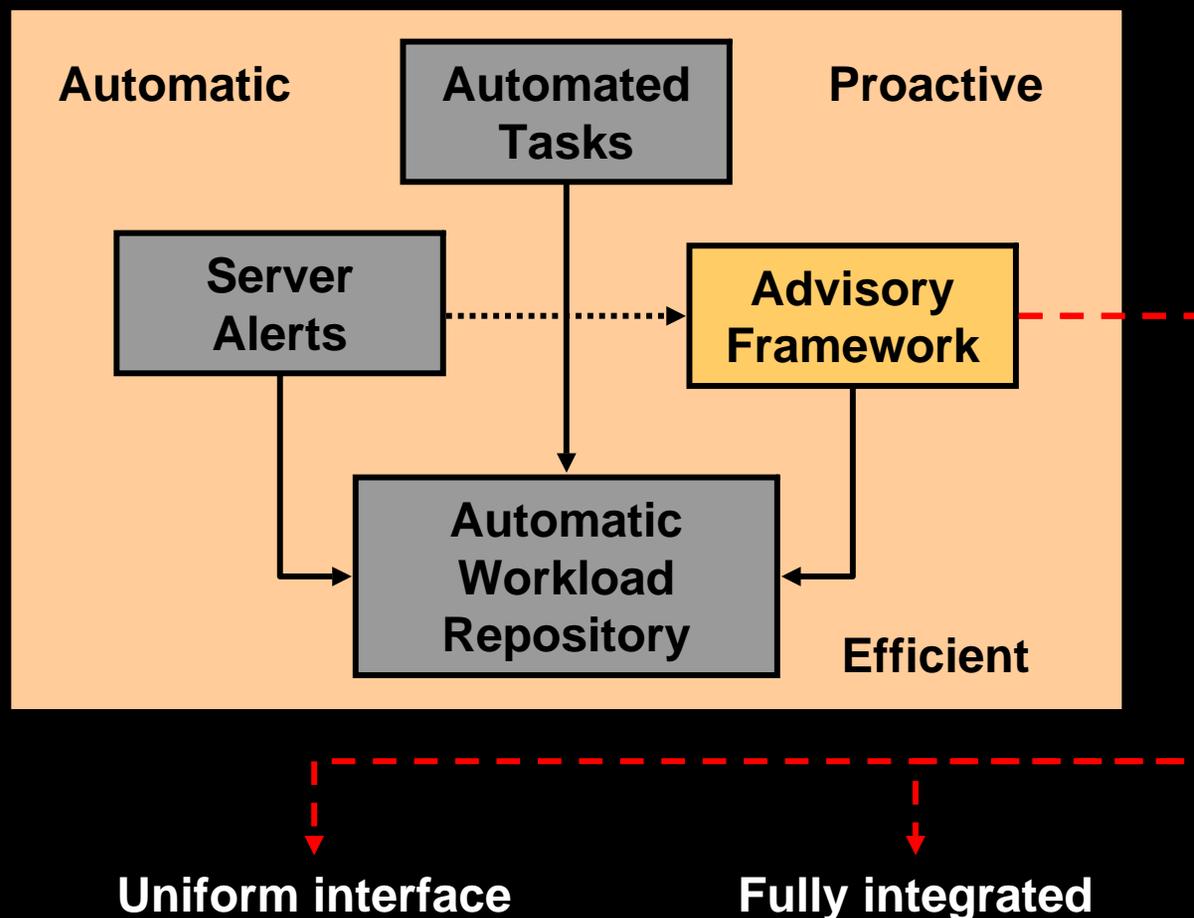
Select	Name	Owner	Execution Date	Class Name	Executes
<input checked="" type="radio"/>	ADV_TASK_00002	SYSTEM	Jun 4, 2003 4:48:01 PM	DEFAULT_JOB_CLASS	0
<input type="radio"/>	ADV_TUNETASK1	SYSTEM	Jun 11, 2003 4:45:32 PM	DEFAULT_JOB_CLASS	0

Scheduled Running Unscheduled History

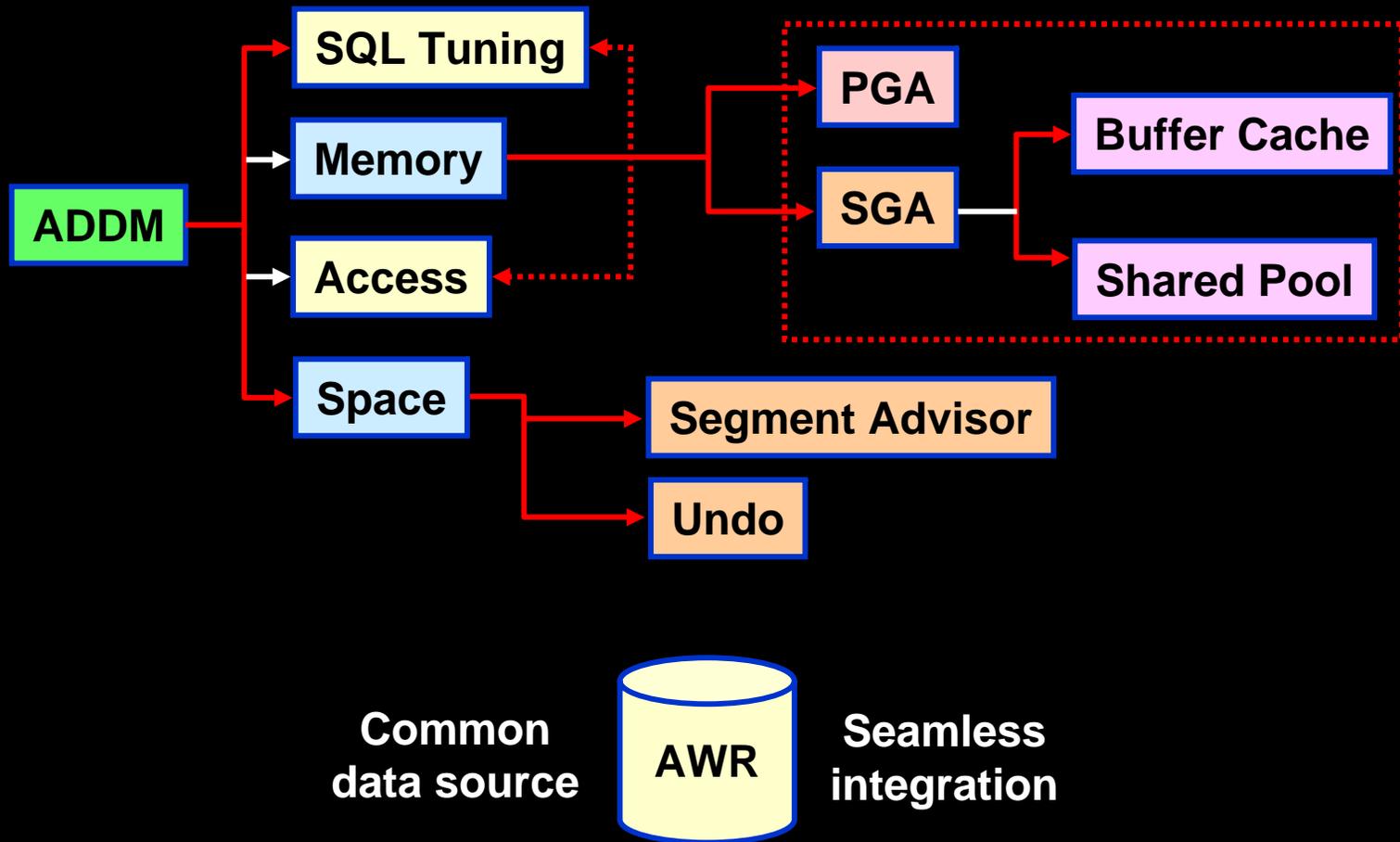
Home | **Targets** | Configuration | Alerts | Jobs | Management System | Setup | Preferences | Help | Logout

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About Oracle Enterprise Manager

Common Manageability Infrastructure: Advisory Framework



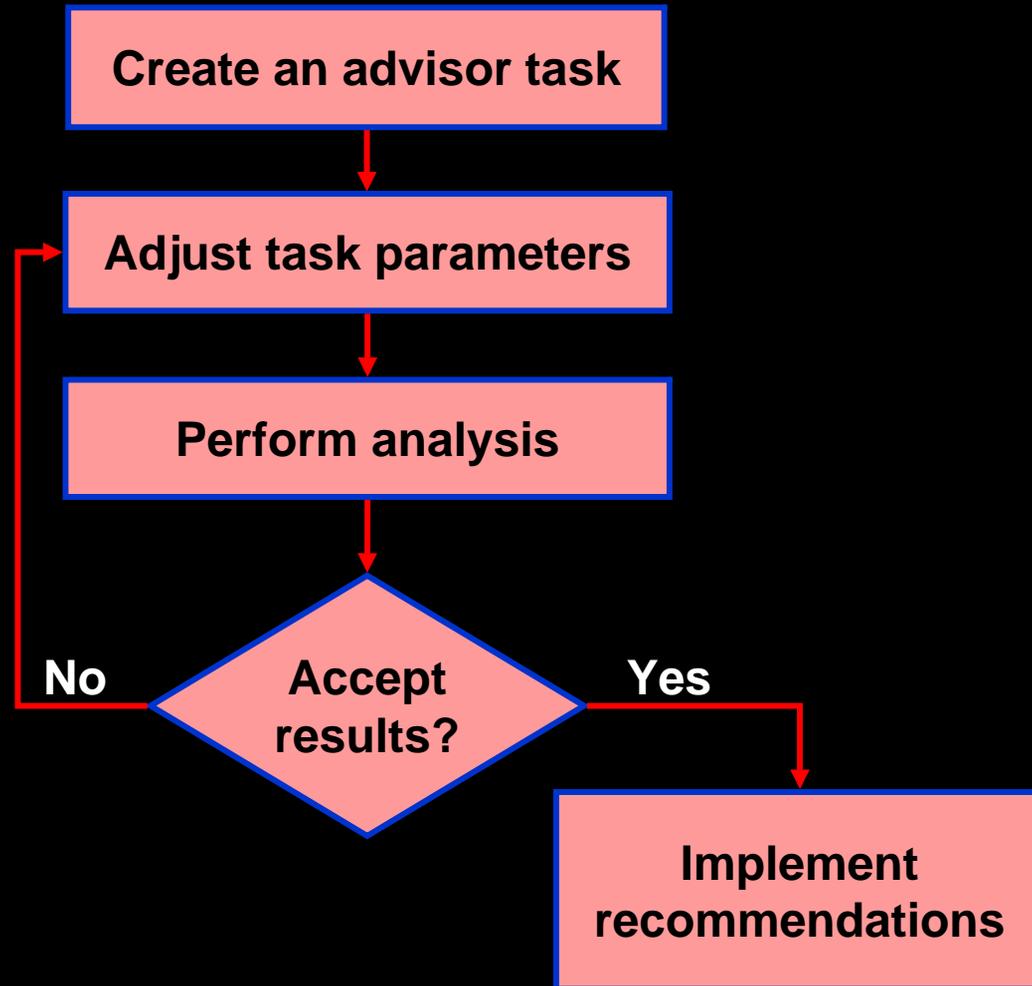
Advisory Framework



Guided Tuning Session



Enterprise
Manager
Database
Console



Advisory Central

The screenshot displays the Oracle Enterprise Manager interface for the Advisory Central section. The page title is "Advisory Central" and it shows the user is logged in as "system". A "Launch Advisor" dropdown menu is set to "SQL Tuning Advisor". Below this, there are buttons for "View", "Delete", and "Re-Schedule" with a "Go" button. A table lists several advisory tasks with columns for Select, Advisory Type, Name (# Recommendations), Description, User, Status, Start Time, End Time, and Expires In. The table contains six rows of data. At the bottom of the table, there are navigation buttons for "Previous" and "Next 10" and another set of "View", "Delete", "Re-Schedule", and "Go" buttons. The footer includes navigation links for Home, Targets, Configuration, Alerts, Management System, Setup, Preferences, Help, and Logout, along with copyright information for Oracle and the version number 9.3.0.0.0.

ORACLE
Enterprise Manager
Home Targets Configuration Alerts Management Syst

Advisory Central
Logged in As system
Launch Advisor: SQL Tuning Advisor Go
View Delete Re-Schedule Go
Previous Next 10

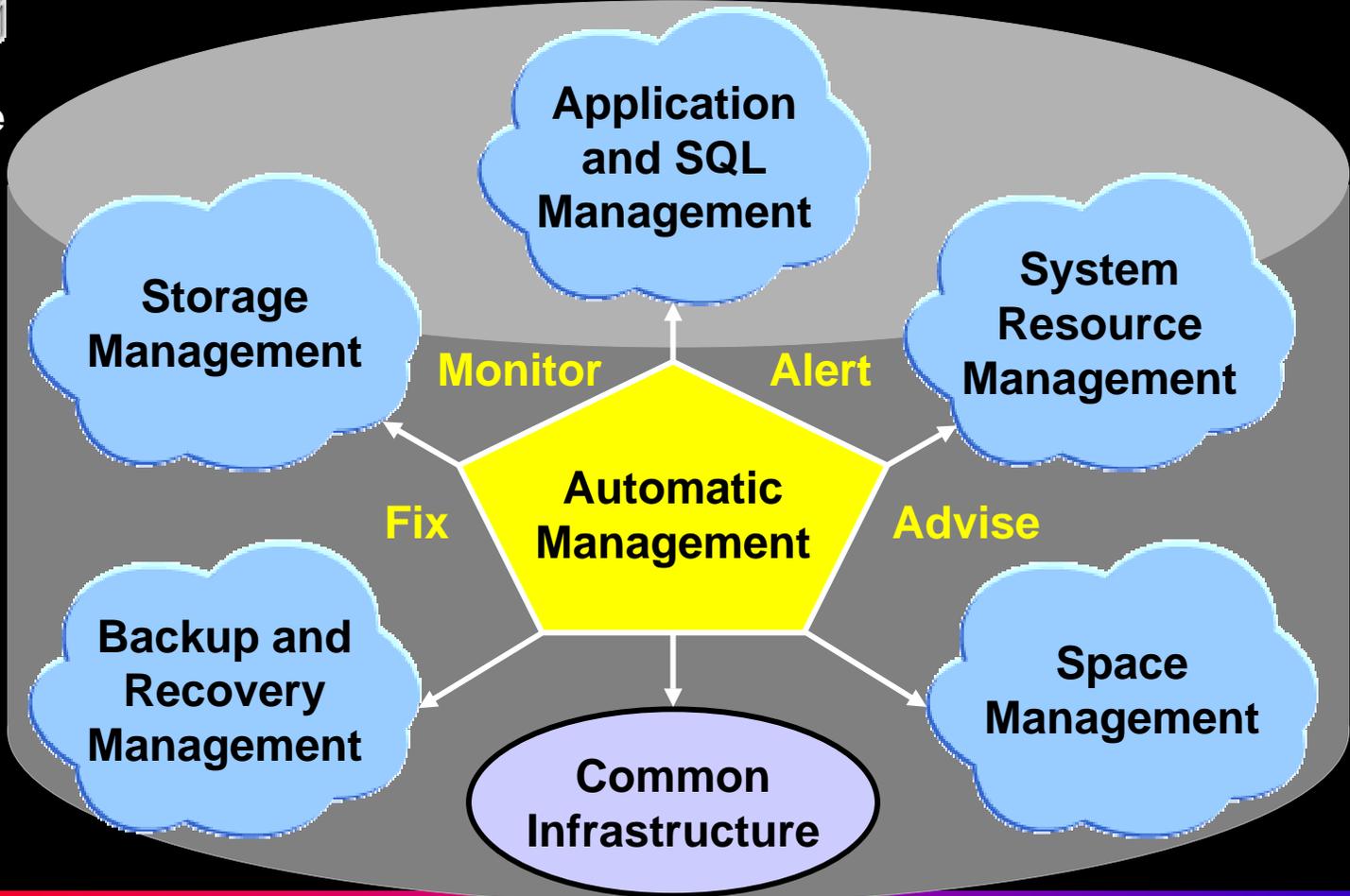
Select	Advisory Type	Name (# Recommendations)	Description	User	Status	Start Time	End Time	Expires In
<input type="radio"/>	HDM	TASK_00001(0)		SYS	INITIAL			30
<input checked="" type="radio"/>	SQL Access Advisor	TASK_00002(4)	sql access	SYS	COMPLETE	2003-03-11 12:39:59.9	2003-03-11 14:28:47.0	30
<input type="radio"/>	Undo Advisor	TASK_00003(0)	undo	SYS	RUNNING	2003-03-13 11:17:38.8		30
<input type="radio"/>	SQL Tuning Advisor	TASK_00004(0)		SYS	COMPLETE	2003-03-11 16:27:55.0	2003-03-11 17:52:38.8	30
<input type="radio"/>	Object Space Create Table	TASK_00005(0)	space advisor	SYS	INITIAL			30
<input type="radio"/>	HDM	TASK_00010(0)	hdm run	SYS	FATAL ERROR	2003-03-12 15:09:22.0	2003-03-12 15:09:24.0	30

Previous Next 10
View Delete Re-Schedule Go
Home | Targets | Configuration | Alerts | Management System | Setup | Preferences | Help | Logout
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About Oracle Enterprise Manager Version 9.3.0.0.0

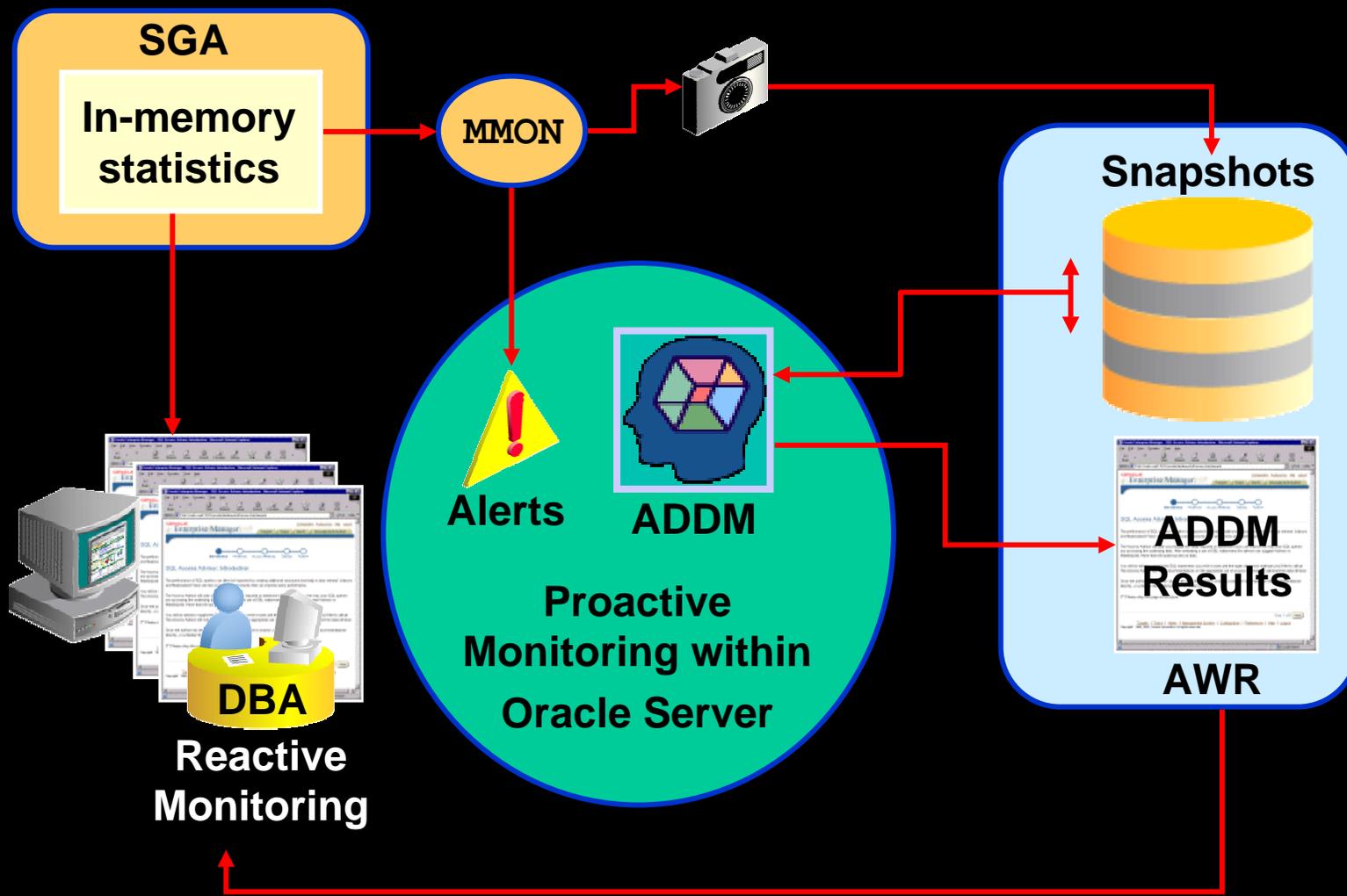
Solution: Self-Managing Database



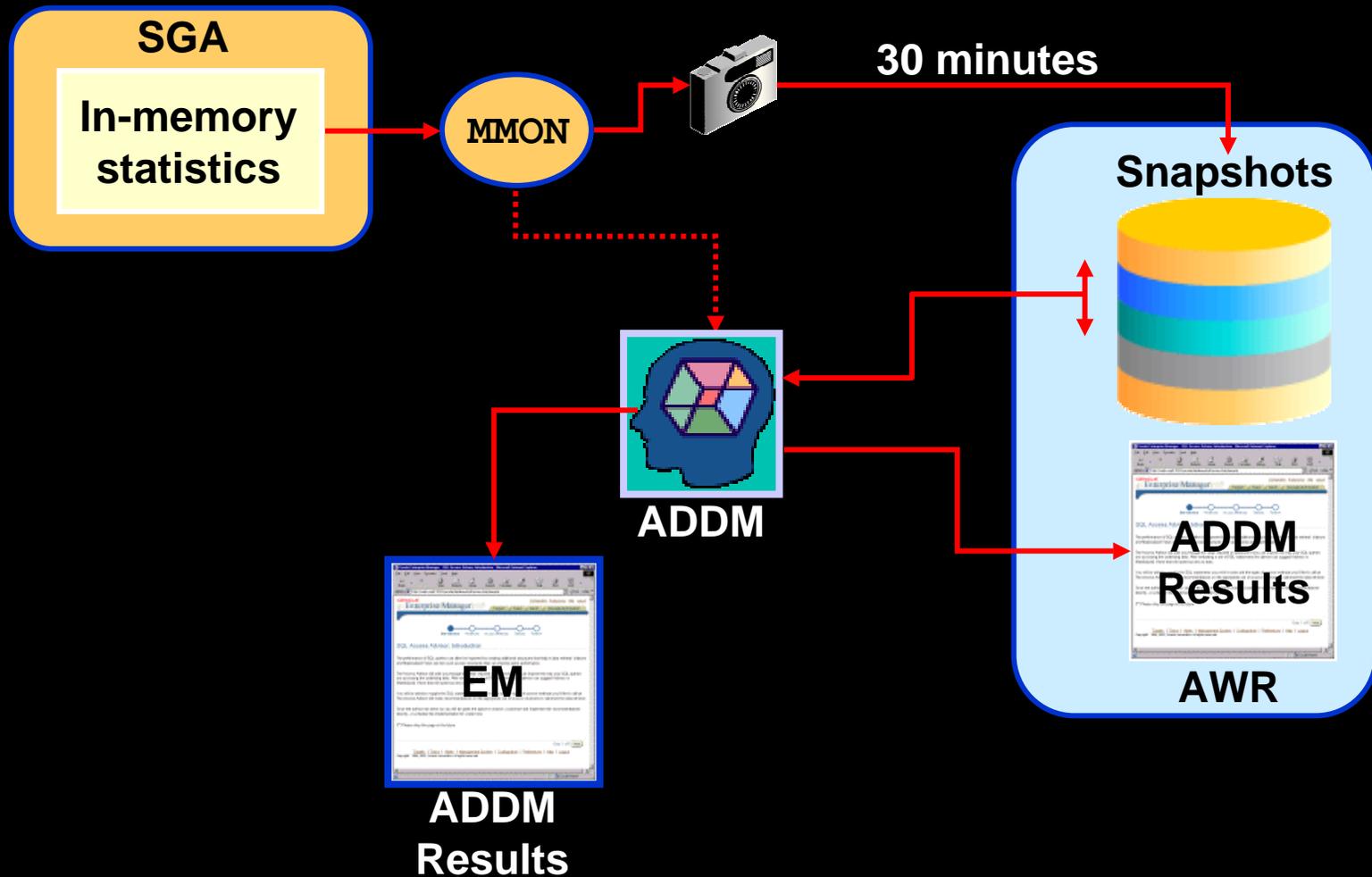
Enterprise
Manager
Database
Console



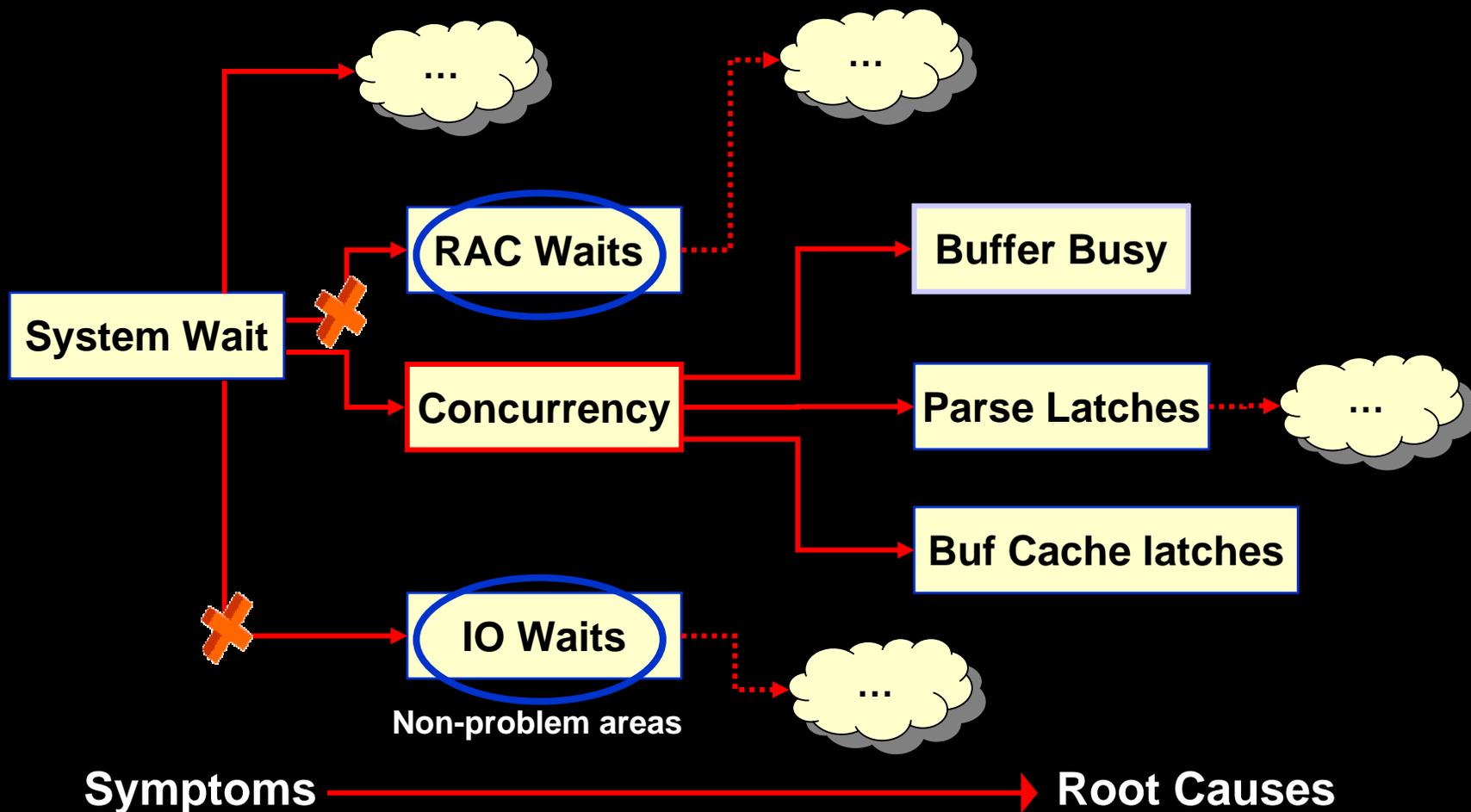
Performance Monitoring Solutions



ADDM Performance Monitoring



ADDM Problem Classification System



Accessing ADDM Advice

Database: [svrman_dlsun1972](#)

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

Latest Data Collected From Target **Jun 10, 2003 8:04:27 PM** [Refresh](#)

View Data [Real Time: Manual Refresh](#)

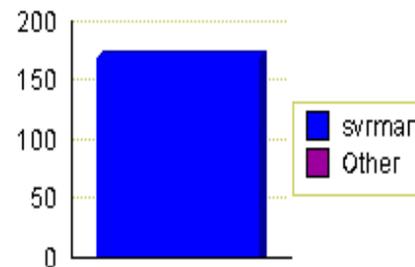
General



[Shutdown](#)

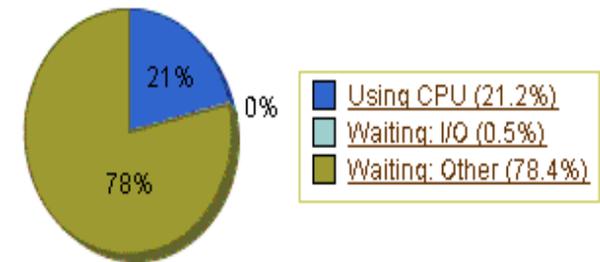
Status **Up**
Up Since **Jun 10, 2003 6:41:28 PM**
Time Zone **PDT**
Availability (%) **85.44**
(Last 24 hours)
Instance Name **svrman**
Version **10.1.0.0.0**
Host [dlsun1972.us.oracle.com](#)
Oracle Home [/ade/sxkumar_svrman/oracle](#)
Alert Log [Jun 10, 2003 6:34:07 PM](#)

Host CPU



Run Queue **10.05**
Paging (pages per second) **-1.0**

Active Sessions



Active Sessions **7**
SQL Response Time (%) **1,444.93**
(compared to baseline)

Space Usage

Problem Tablespaces **0**
Fragmentation Issues **0**
Dump Area Used (%) **78**

Advice

ADDM Findings **2**
Configuration **0**

High Availability

Instance Recovery Time (seconds) **69**
Last Backup **n/a**
Archiving **Enabled**
Archive Area Used (%) **78**

ADDM Recommendations

Host: usunrdi20 > Database: mgmt10i_usunrdi20 > Advisor Central > ADDM Task > ADDM Finding Details

ADDM Finding Details

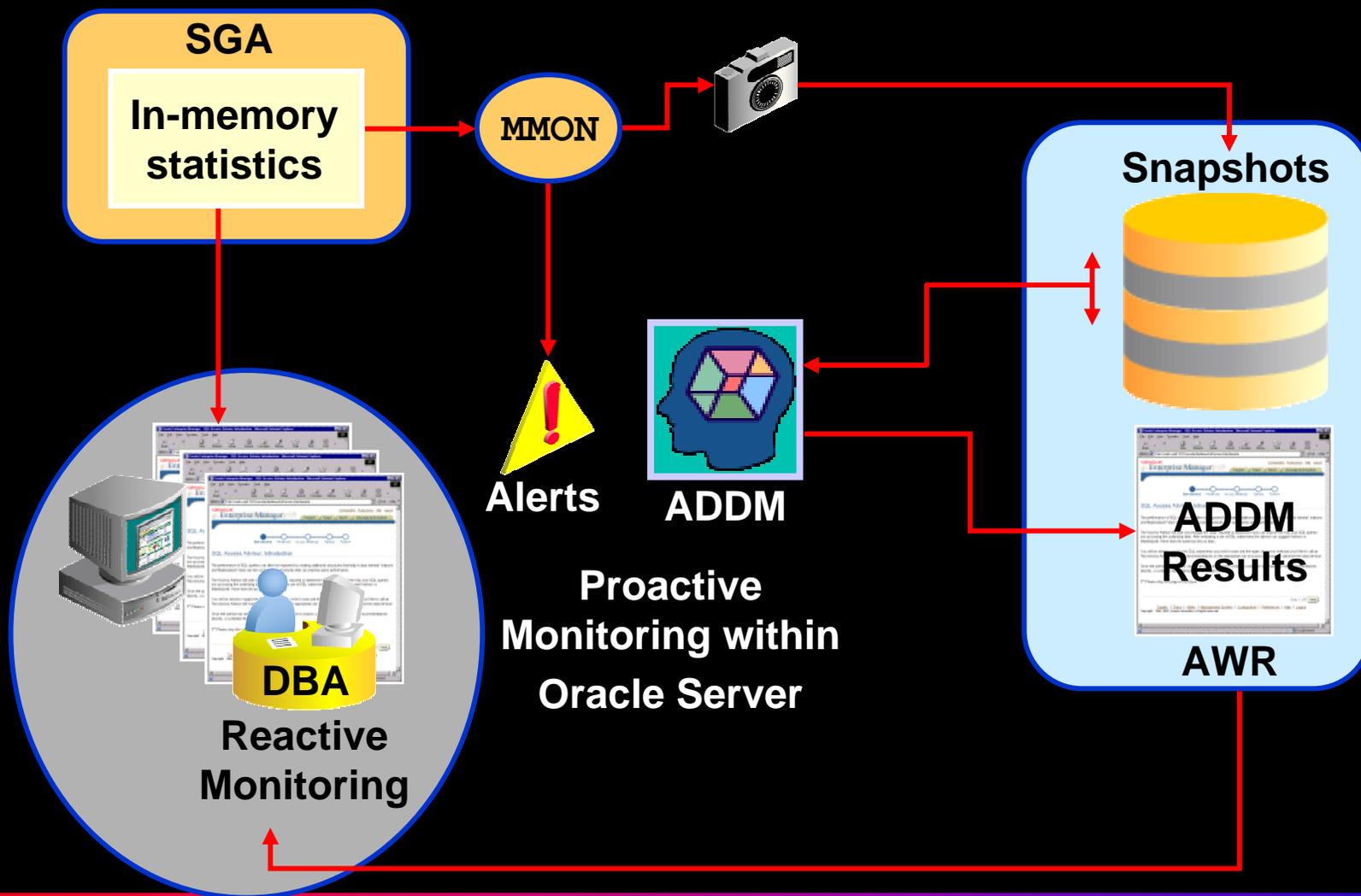
Analysis Start Time Jun 10, 2003 9:30:30 AM
Analysis Duration (minutes) 29.75
Finding Read and write contention on database blocks was consuming significant database time.
Database Time (minutes) 274.16
Impact (minutes) 98.23
Impact (%) 35.83

Recommendations

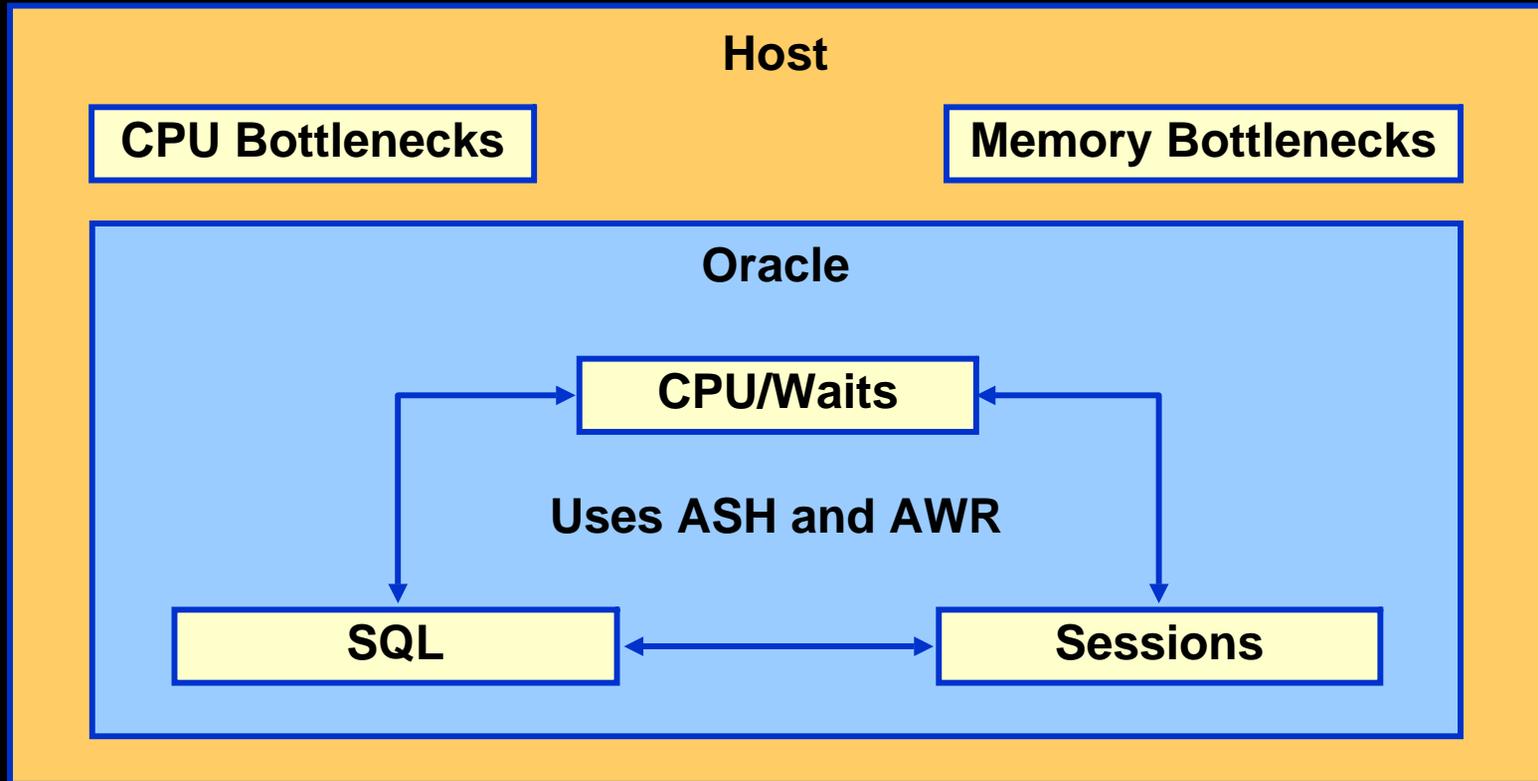
[Show All Details](#) | [Hide All Details](#)

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".	

Performance Monitoring Solutions



Performance Management Approach



Database Performance Page

Host: dlsun1972.us.oracle.com > Database: svrman_dlsun1972

Logged in As system

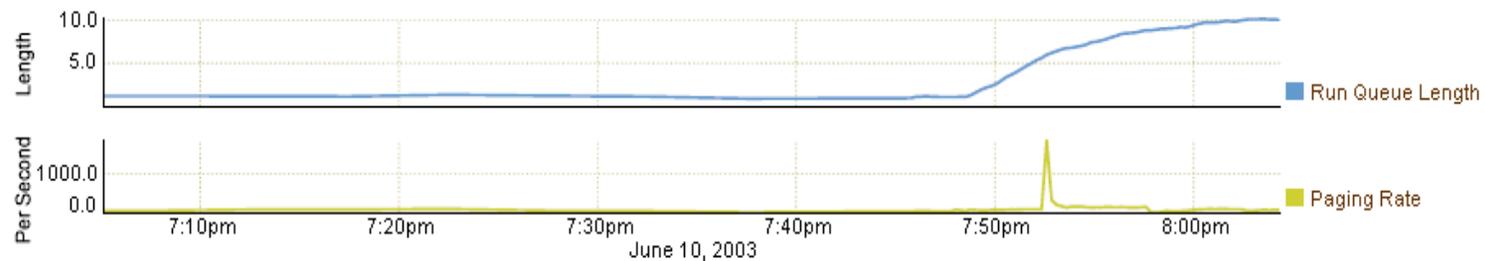
Database: svrman_dlsun1972

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

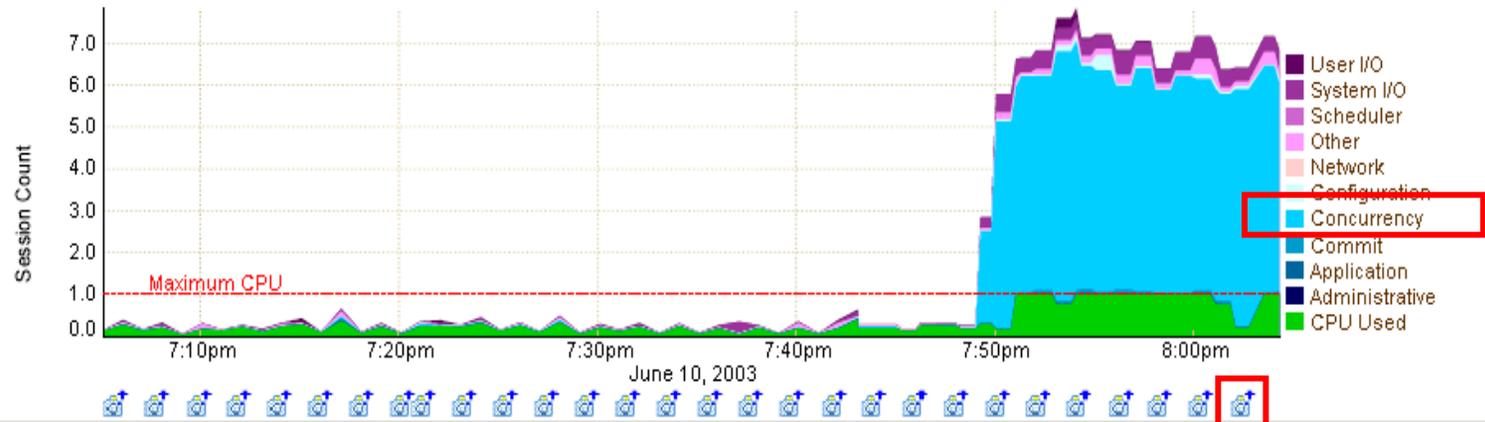
Click on an area of a graph or legend to get more detail.

View Data

Host



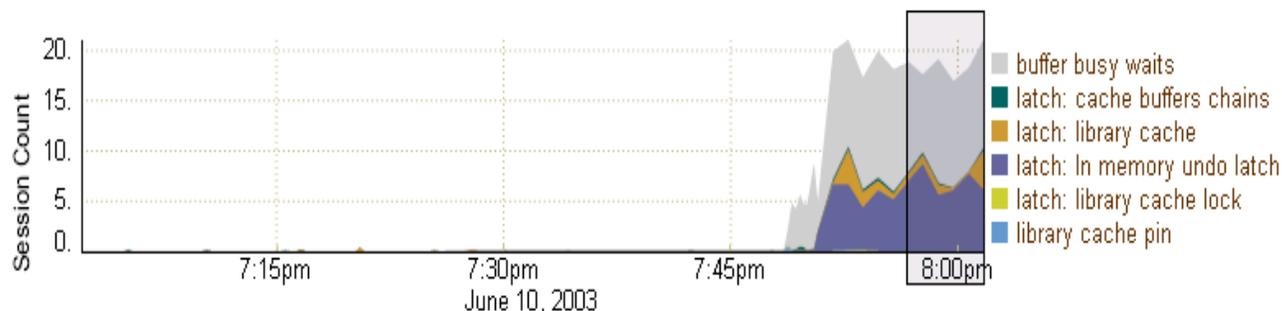
Active Sessions: Waiting and Working



Concurrency Wait Class: Drill Down

Active Sessions Waiting: Concurrency

Active Sessions Waiting

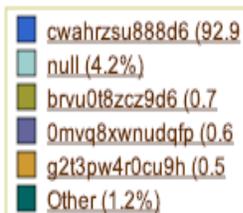
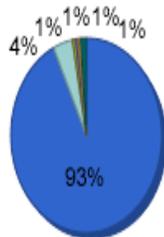


TIP Drag the shaded box to change the time period for the detail section below.

Overview **Top SQL** Top Sessions

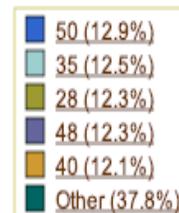
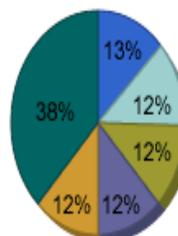
Top SQL by Wait Count %

Total Sample Count: 1385



Top Sessions by Wait Count %

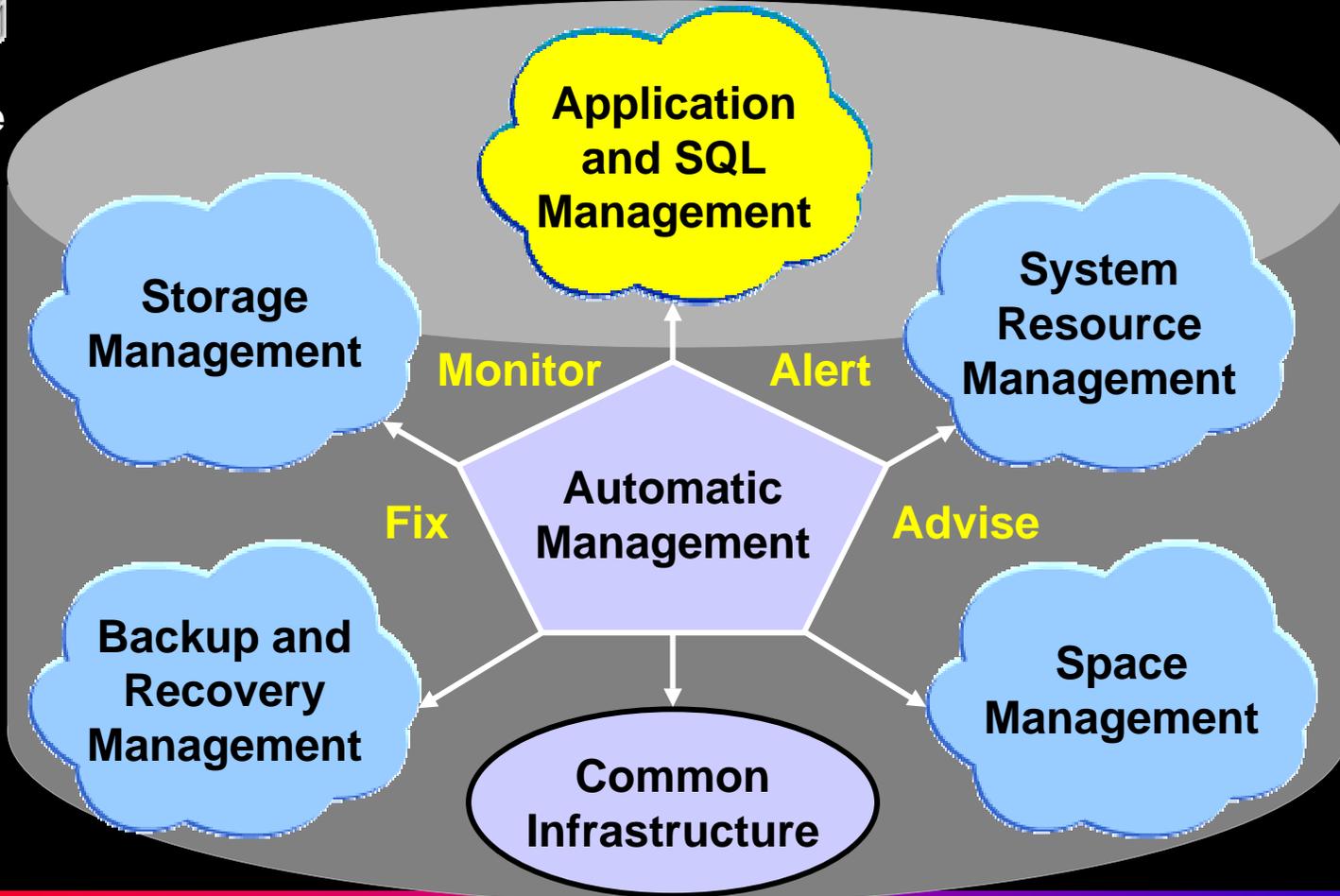
Total Sample Count: 1385



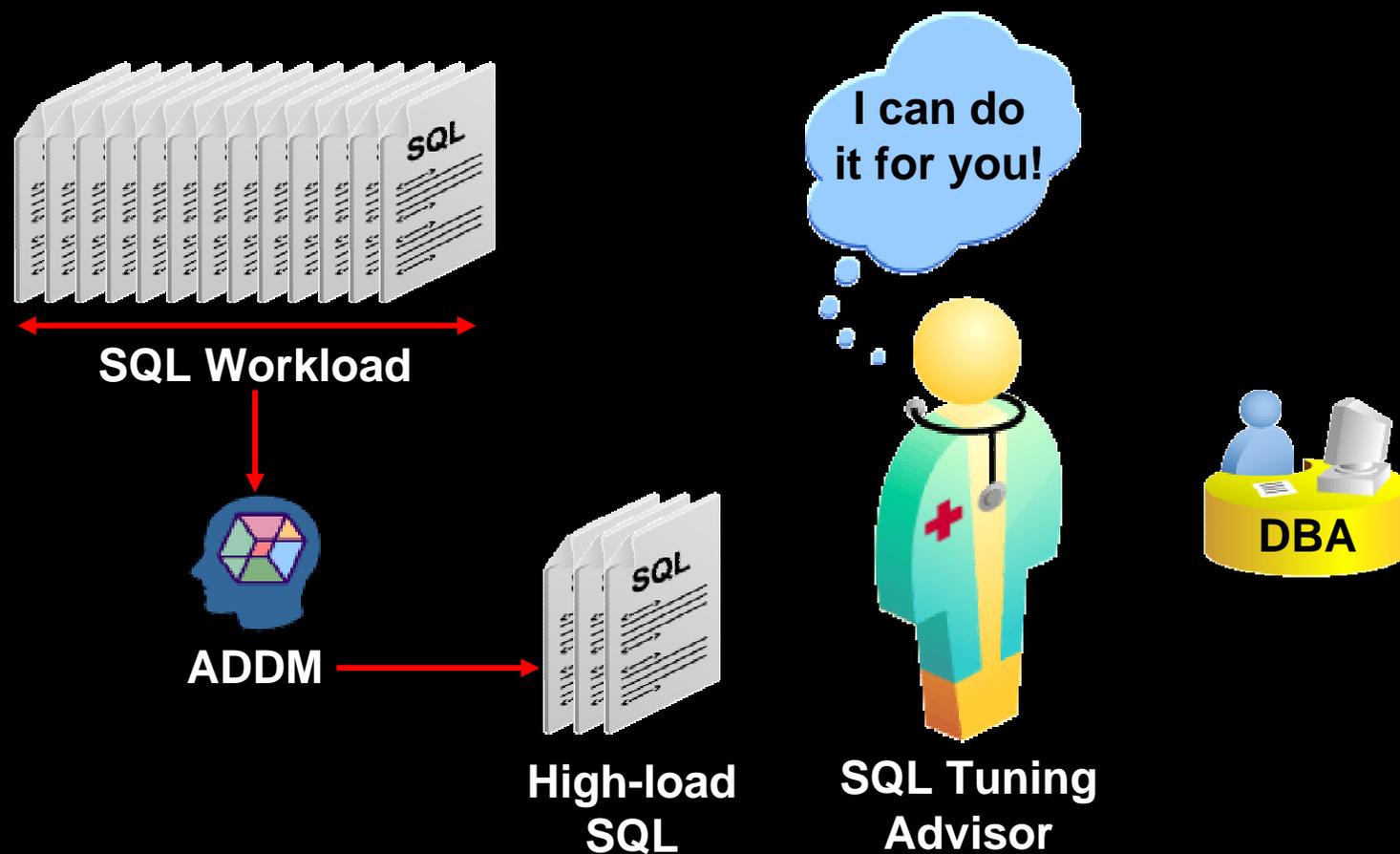
Solution: Self-Managing Database



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Console

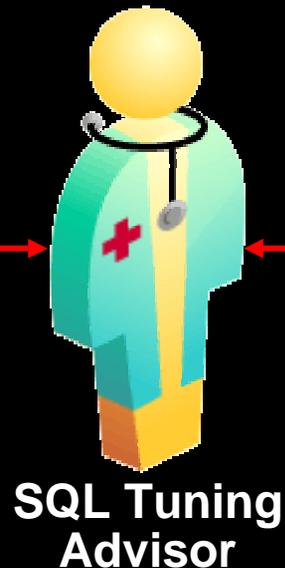
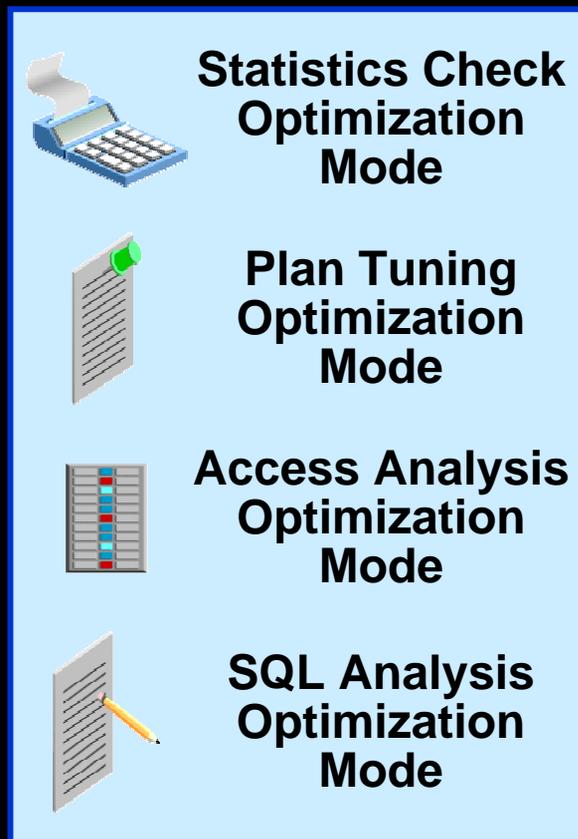


Automate the SQL Tuning Process

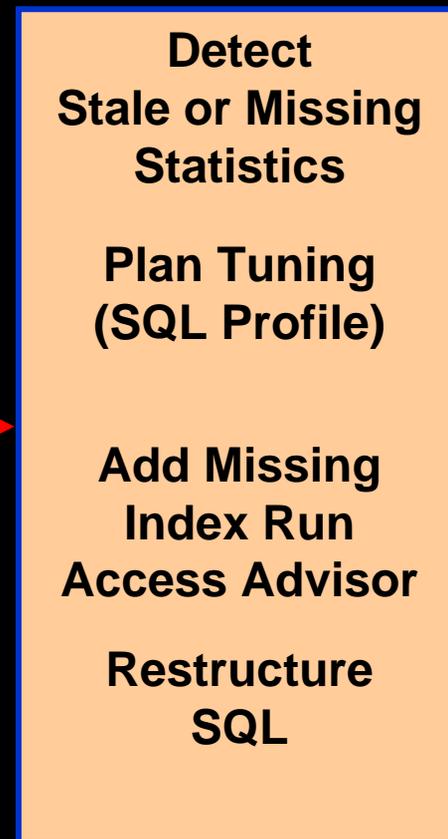


SQL Tuning Advisor Overview

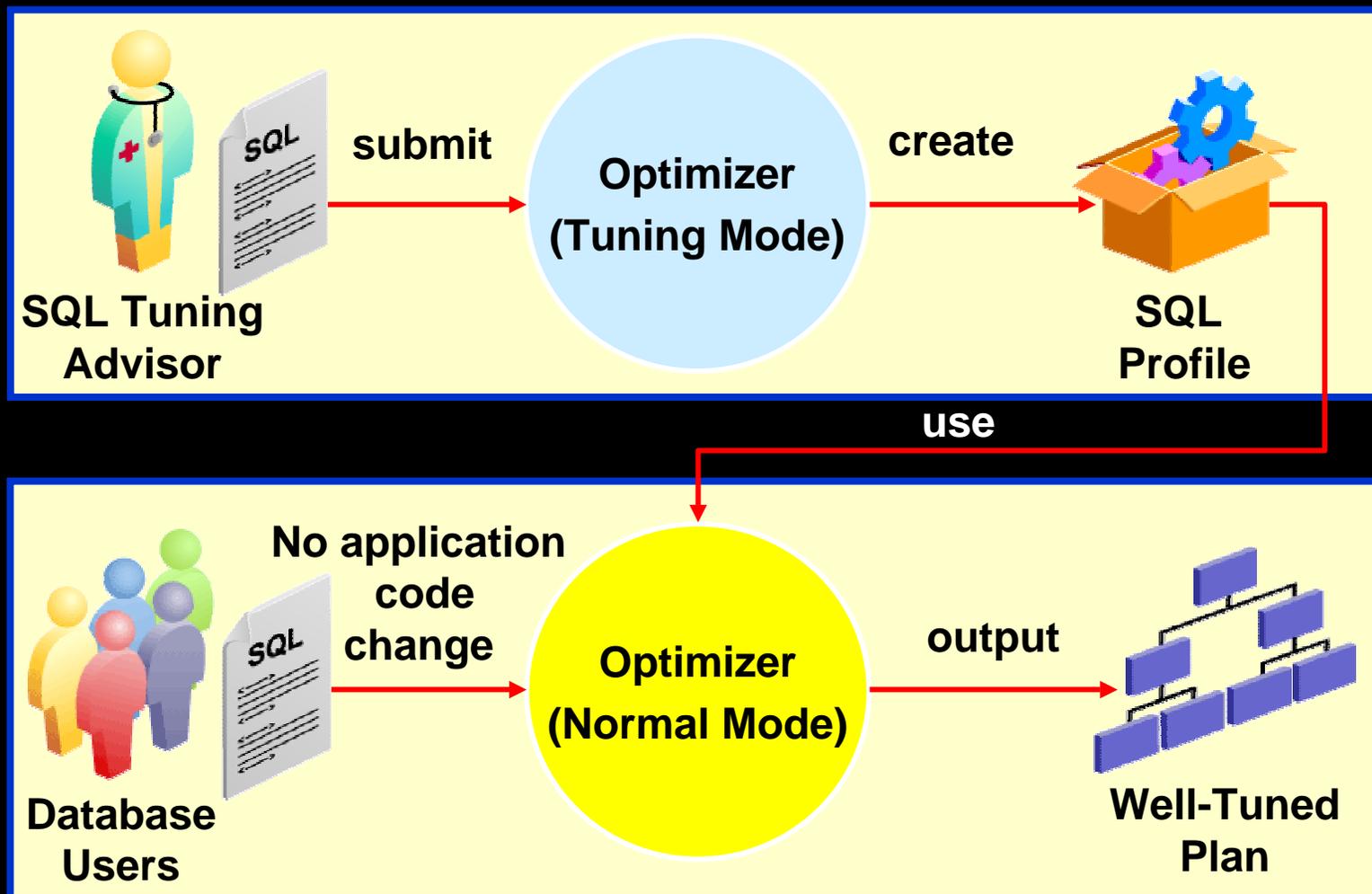
Automatic Tuning Optimizer



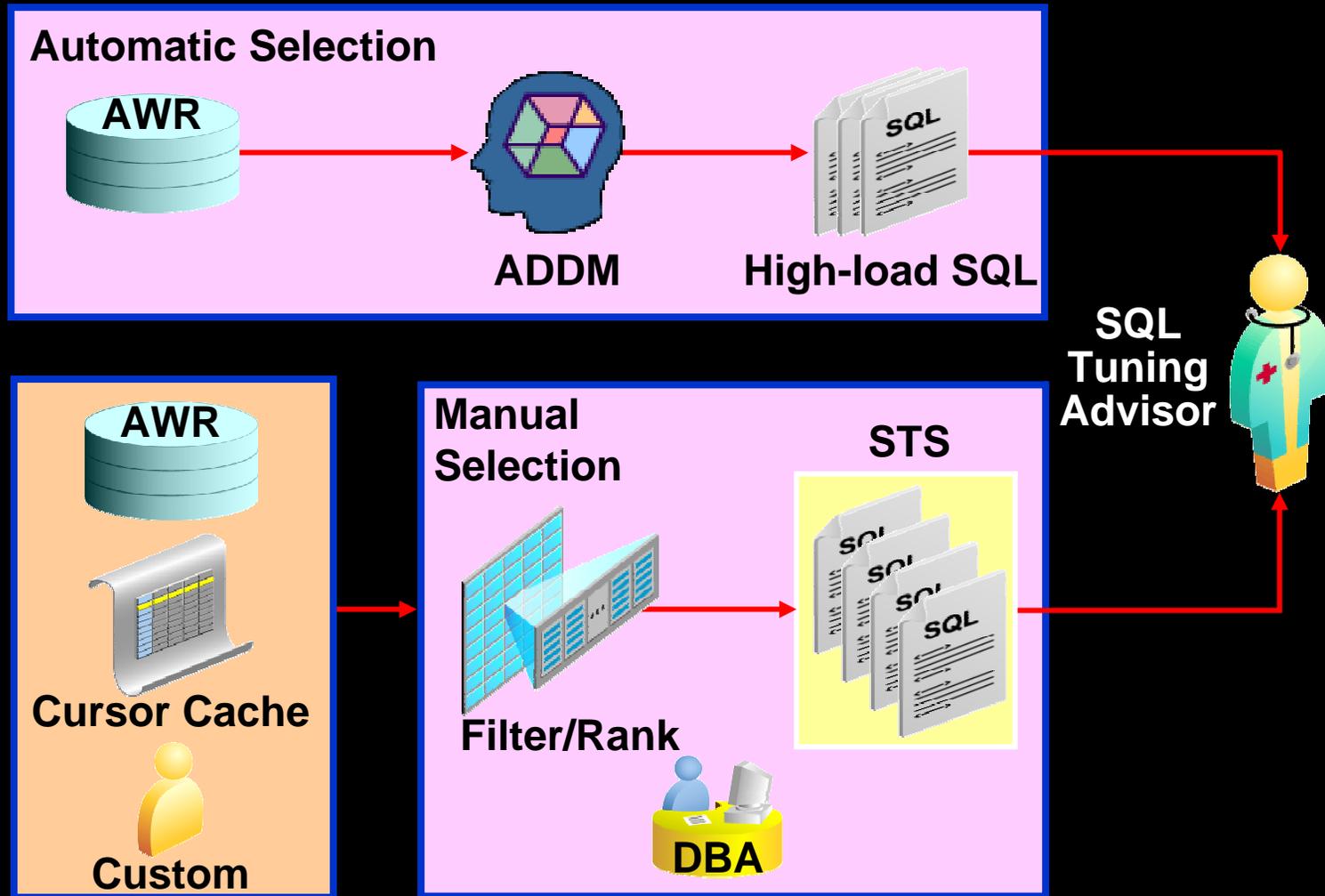
Comprehensive SQL Tuning



Plan Tuning Flow



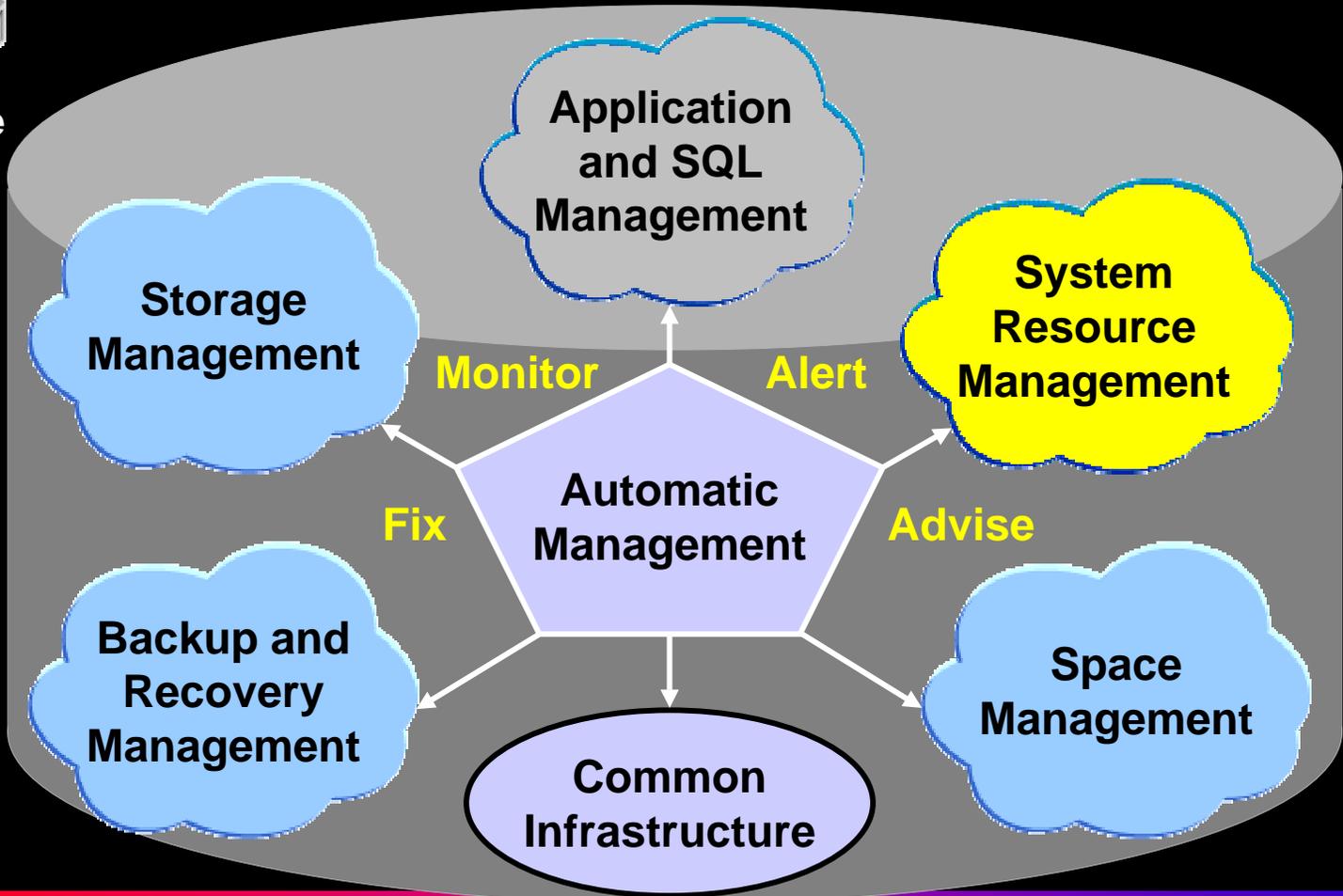
SQL Tuning Advisor Usage Model



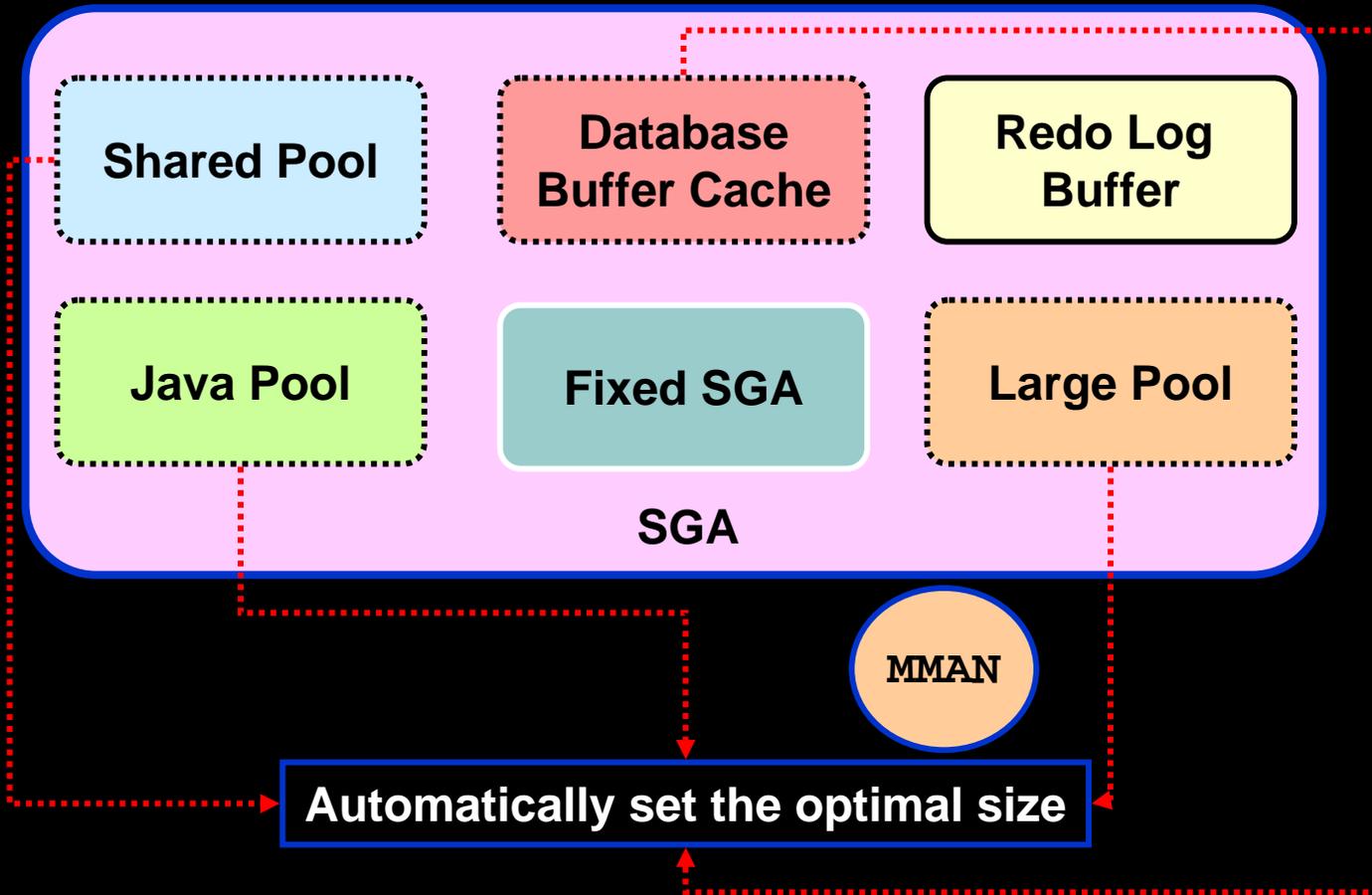
Solution: Self-Managing Database



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Manager
Database
Console



Overview of Automatic Shared Memory Management



Benefits of Automatic Shared Memory Management

DB_CACHE_SIZE
SHARED_POOL_SIZE
LARGE_POOL_SIZE
JAVA_POOL_SIZE



Total SGA size



SGA_TARGET

Using EM to Configure Automatic Shared Memory Management

ORACLE
Enterprise Manager

Setup Preferences Help Logout

Home Targets Configuration Alerts Jobs Management System

Databases Production Hosts Application Servers Web Applications Groups All Targets

Host: dsunrd103.us.oracle.com > Database: mgmt10i_030530_dsunrd103 > Memory Parameters

⚠ You are not logged on with SYSDBA privilege. Only controls for dynamic parameters are editable

Memory Parameters

Collected From Target June 4, 2003 10:11:51 AM PDT Refresh

SGA PGA

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

Automatic Shared Memory Management **Disabled**

Shared Pool	<input type="text" value="208"/>	MB	<input type="button" value="Advice"/>
Buffer Cache	<input type="text" value="16"/>	MB	<input type="button" value="Advice"/>
Large Pool	<input type="text" value="0"/>	B	
Java Pool	<input type="text" value="16"/>	MB	

Other (MB) 1
Total SGA (MB) 241.231

Shared Pool (86.7%)
Buffer Cache (6.7%)
Large Pool (0%)
Java Pool (6.7%)

Maximum SGA Size

The Maximum SGA Size specifies how much memory is allocated when the database starts up. If you specify the Maximum SGA Size, you can later dynamically change SGA component sizes (provided the total SGA size does not exceed the Maximum SGA Size).

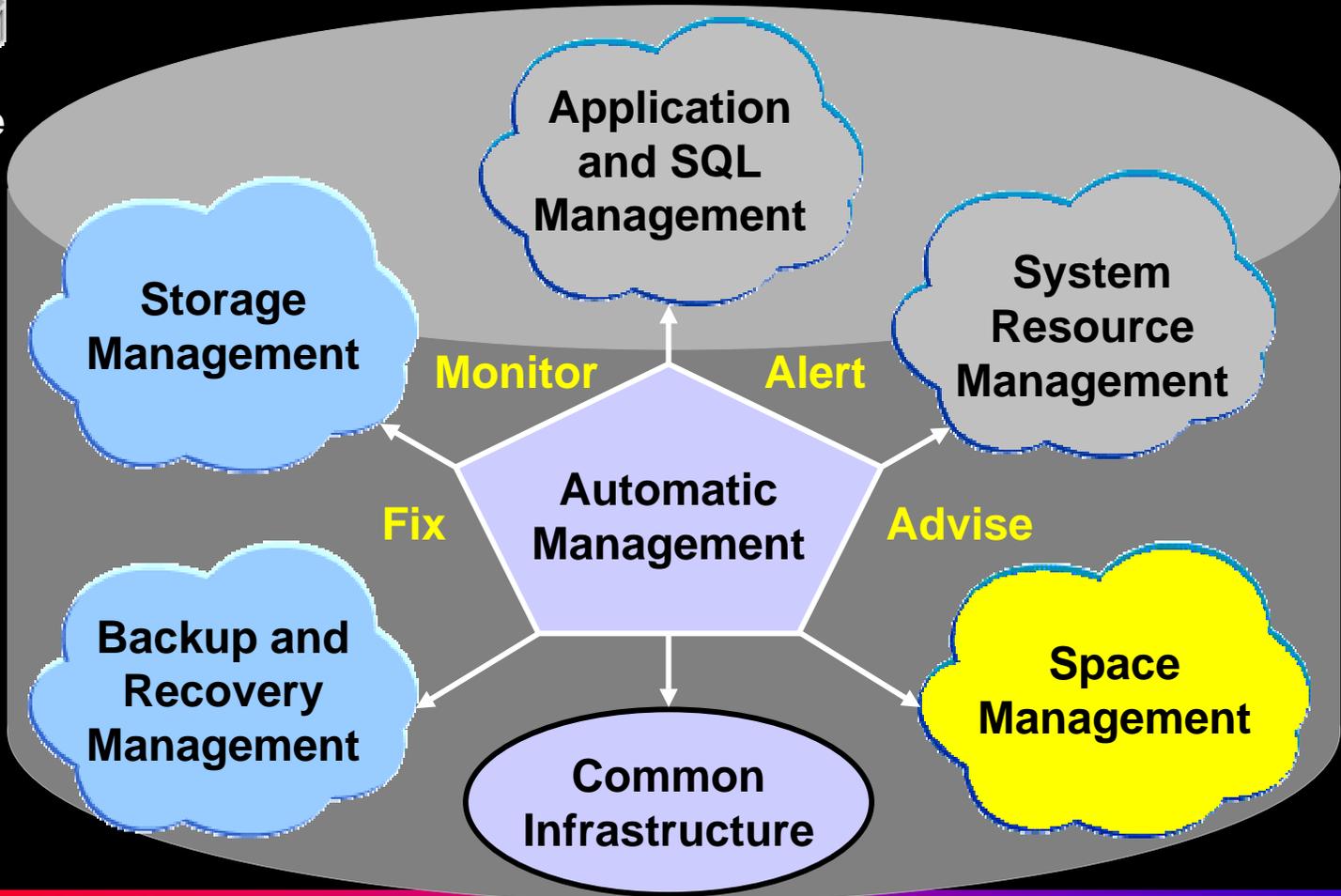
Maximum SGA Size* (MB)

SGA PGA

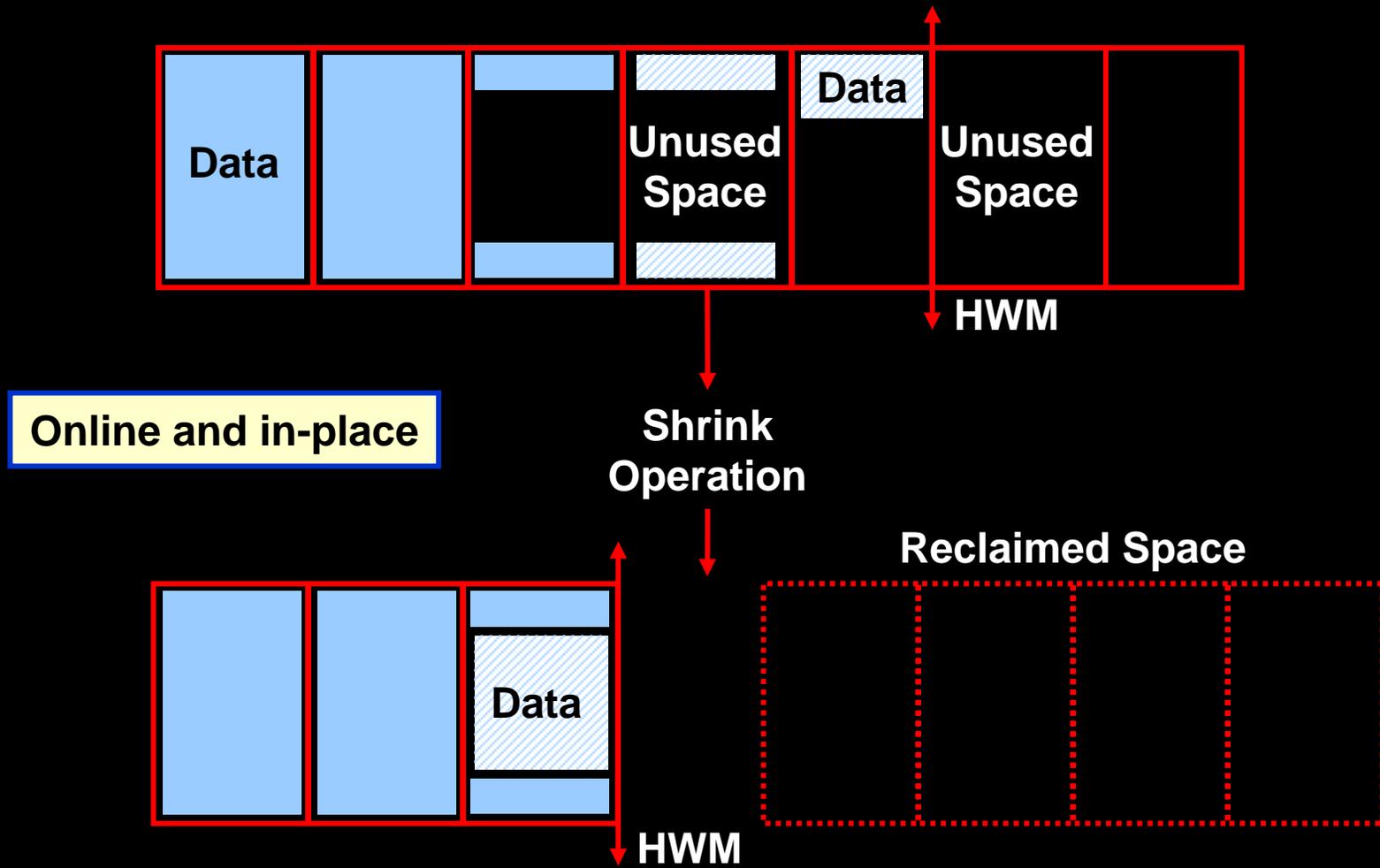
Solution: Self-Managing Database



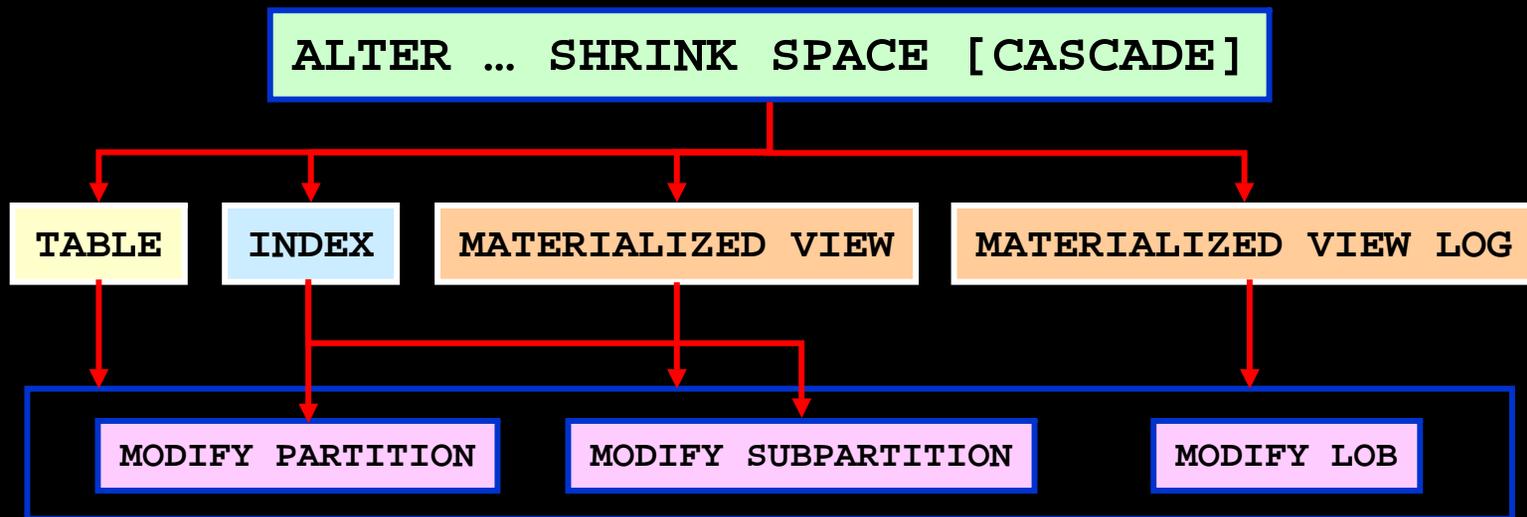
Enterprise
Manager
Database
Console



Segment Shrink Overview



How Can I Shrink Segments?



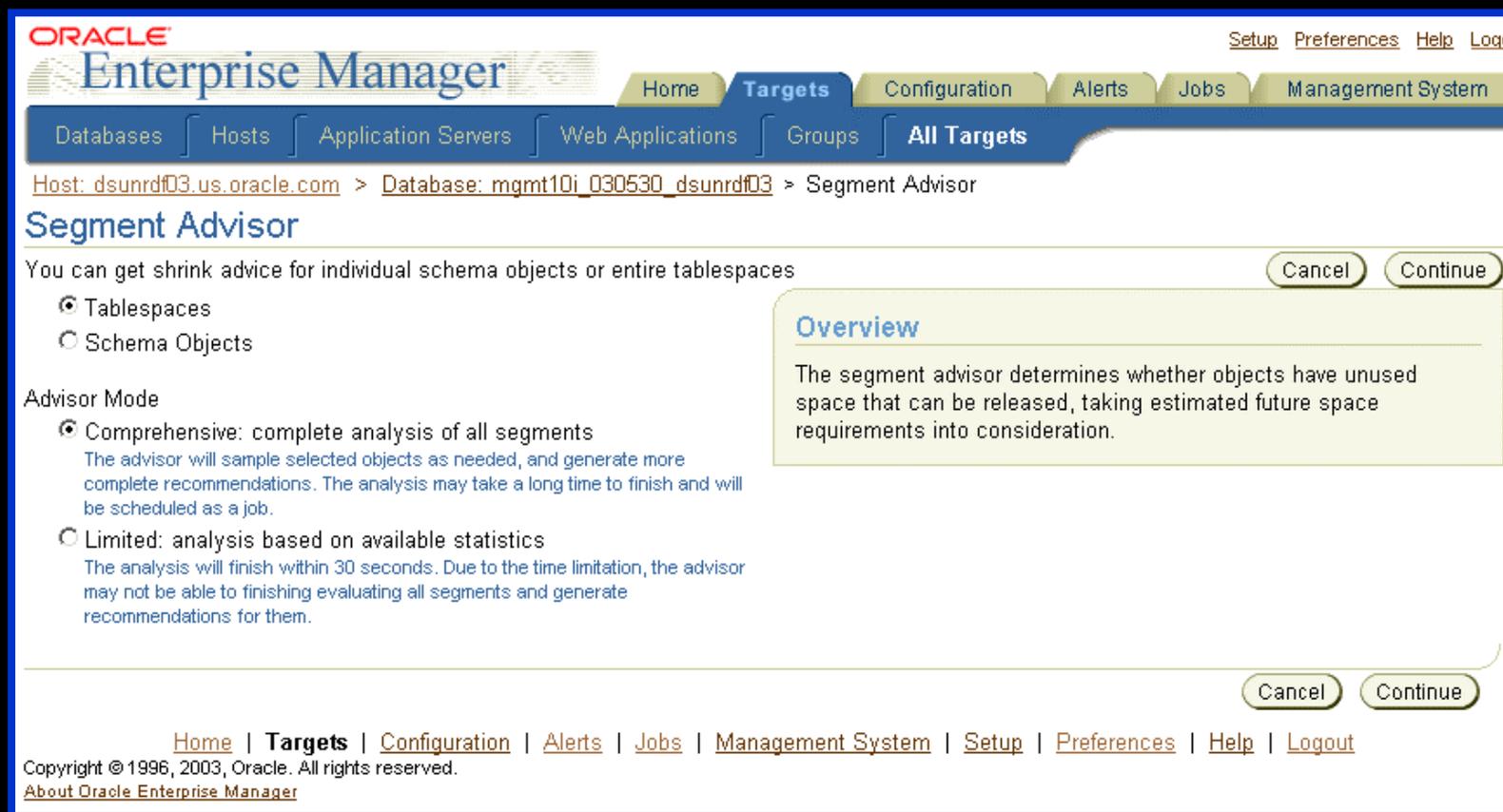
```
ALTER TABLE employees ENABLE ROW MOVEMENT;
```

①

```
ALTER TABLE employees SHRINK SPACE CASCADE;
```

②

Segment Advisor



The screenshot shows the Oracle Enterprise Manager interface for the Segment Advisor. The top navigation bar includes links for Setup, Preferences, Help, and Logout. Below this is a breadcrumb trail: Home > Targets > Configuration > Alerts > Jobs > Management System. A secondary navigation bar contains links for Databases, Hosts, Application Servers, Web Applications, Groups, and All Targets. The main content area is titled "Segment Advisor" and includes a breadcrumb trail: Host: dsunrdf03.us.oracle.com > Database: mgmt10i_030530_dsunrdf03 > Segment Advisor. The main text reads: "You can get shrink advice for individual schema objects or entire tablespaces" with "Cancel" and "Continue" buttons. Below this are two radio button options: "Tablespaces" (selected) and "Schema Objects". Under "Advisor Mode", there are two radio button options: "Comprehensive: complete analysis of all segments" (selected) and "Limited: analysis based on available statistics". The "Comprehensive" option includes a sub-description: "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." The "Limited" option includes a sub-description: "The analysis will finish within 30 seconds. Due to the time limitation, the advisor may not be able to finishing evaluating all segments and generate recommendations for them." To the right of these options is an "Overview" box with the text: "The segment advisor determines whether objects have unused space that can be released, taking estimated future space requirements into consideration." At the bottom of the main content area are "Cancel" and "Continue" buttons. The footer contains a navigation bar with links: Home | Targets | Configuration | Alerts | Jobs | Management System | Setup | Preferences | Help | Logout. Below the navigation bar is the copyright notice: "Copyright © 1996, 2003, Oracle. All rights reserved." and a link: "About Oracle Enterprise Manager".

ORACLE
Enterprise Manager

Setup Preferences Help Logout

Home Targets Configuration Alerts Jobs Management System

Databases Hosts Application Servers Web Applications Groups All Targets

Host: dsunrdf03.us.oracle.com > Database: mgmt10i_030530_dsunrdf03 > Segment Advisor

Segment Advisor

You can get shrink advice for individual schema objects or entire tablespaces Cancel Continue

Tablespaces
 Schema Objects

Advisor Mode

Comprehensive: complete analysis of all segments
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.

Limited: analysis based on available statistics
The analysis will finish within 30 seconds. Due to the time limitation, the advisor may not be able to finishing evaluating all segments and generate recommendations for them.

Overview

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

Cancel Continue

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

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[About Oracle Enterprise Manager](#)

Growth Trend Report

Oracle Enterprise Manager - Space Usage Page - Microsoft Internet Explorer

Address: http://dlsun1972.us.oracle.com:1820/em/console/database/schema/table?target=demo&type=oracle_database&cancelURL=/em/console/database/databaseObjectsSearch%3Ffeve

Links: Aria, Customize Links, DB2 CBT, DB2 Universal Database, FilesOnline, Hotmail, EM 4.0 Demo, 10i EM Demo, Standalone EM, ISIS Tickets

Dependent Segments

Select	Schema	Segment Name	Type	Tablespace
<input checked="" type="radio"/>	HR	COUNTRIES	TABLE	
<input type="radio"/>	HR	COUNTRY_C_ID_PK	INDEX	EXAMPLE
<input type="radio"/>	SH	COUNTRIES_PK	INDEX	EXAMPLE

TIP Select a segment and click the 'Refresh' button to see the Space Usage Trend.

Space Usage Trend

From 6/3/03 To 6/11/03 Refresh

Date	MB Allocated	MB Used	Projected
2 April 2003	45	5	5
3	45	8	8
4	45	12	12
5	45	18	18
6	45	25	25
7	45	32	32
8	45	38	38
9	45	42	42
10	45	44	44
11	45	46	46
12	45	47	47
13	45	48	48

TIP Putting in a future date will generate a prediction for the space usage on that date. Getting the Space Usage Trend is a time consuming operation and could take a while.

General Constraints Segments Storage Options IOT Properties

Show SQL Revert Apply

Database | Setup | Preferences | Help | Logout

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Done Local intranet

Segment Resource Estimation

Oracle Enterprise Manager - Table General - Microsoft Internet Explorer

Address: http://dsunrap22:7777/em/console/database/schema/table?target=svrman_dlsun1972&type=oracle_database&cancelURL=/em/console/database/databaseObjectsSearch%3FlastEvent%3Dcreate%26event%3D...

Links: Aria, Customize Links, DB2 CBT, DB2 Universal Database, FilesOnline, Hotmail, EM 4.0 Demo, 10i EM Demo, Stalone EM, ISIS Tickets, Network Request, Oracle Email Prefs

ORACLE Enterprise Manager

Home Targets Configuration Alerts Jobs Management System

Databases Hosts Application Servers Web Applications Groups All Targets

Host: dlsun1972.us.oracle.com > Database: svrman_dlsun1972 > Tables > Create Table

Create Table

Show SQL Cancel OK

General Constraints Storage Options Partitions

* Name Employee

Schema HR

Tablespace <Default>

Organization Standard, Heap Organize

Estimate Table Size

Define Using Column Specification

Set Default LOB Attributes

Insert Abstract Data Type Column Advanced Attributes Delete

Select	Name	Data Type	Size	Scale	Not NULL	Default Value
<input checked="" type="radio"/>	Empname	VARCHAR2	60		<input checked="" type="checkbox"/>	
<input type="radio"/>	Empid	NUMBER	15		<input checked="" type="checkbox"/>	
<input type="radio"/>	Dept	NUMBER	10		<input checked="" type="checkbox"/>	
<input type="radio"/>	Salary	NUMBER	25		<input checked="" type="checkbox"/>	
<input type="radio"/>	Managerl	VARCHAR2	60		<input type="checkbox"/>	

Add 5 Table Columns

TIP Only table columns with a data type of BLOB, CLOB, NCLOB and TableType have advanced attributes.

General Constraints Storage Options Partitions

Show SQL Cancel OK

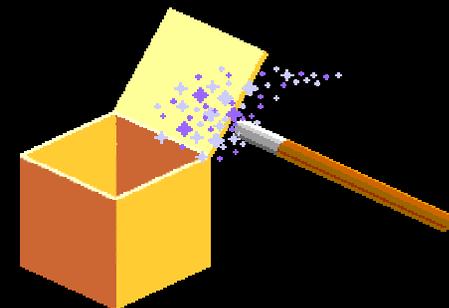
Home Targets Configuration Alerts Jobs Management System Setup Preferences Help Logout

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About Oracle Enterprise Manager

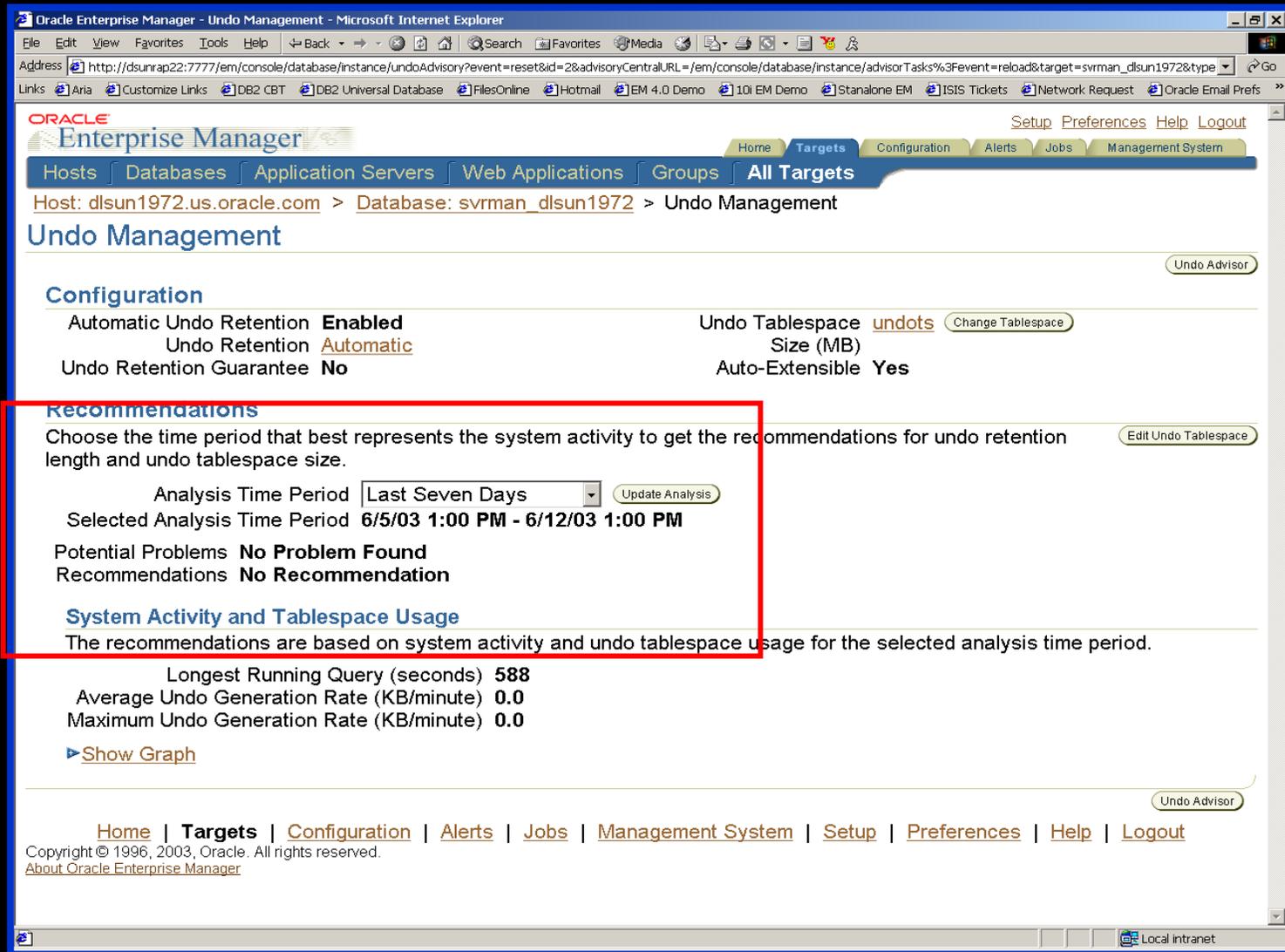
Local intranet

Automatic Undo Retention Tuning

- Proactive tuning
 - Undo retention is tuned for longest-running query.
 - Query duration information is collected every 30 seconds.
- Reactive tuning
 - Undo retention is gradually lowered under space pressure.
 - Oldest unexpired extents are used first.
- Enabled by default



Undo Advisor



The screenshot shows the Oracle Enterprise Manager interface for Undo Management. The browser title is "Oracle Enterprise Manager - Undo Management - Microsoft Internet Explorer". The address bar shows the URL: http://dsunrap22:7777/em/console/database/instance/undoAdvisory?event=reset&id=2&advisoryCentralURL=/em/console/database/instance/advisorTasks%3Fevent=reload&target=svrman_dlsun1972&type. The page has a navigation bar with "Home", "Targets", "Configuration", "Alerts", "Jobs", and "Management System". Below the navigation bar, the breadcrumb path is "Host: dlsun1972.us.oracle.com > Database: svrman_dlsun1972 > Undo Management". The main heading is "Undo Management".

Configuration

- Automatic Undo Retention: **Enabled**
- Undo Retention: **Automatic**
- Undo Retention Guarantee: **No**
- Undo Tablespace: **undots** (Change Tablespace)
- Size (MB):
- Auto-Extensible: **Yes**

Recommendations

Choose the time period that best represents the system activity to get the recommendations for undo retention length and undo tablespace size. (Edit Undo Tablespace)

Analysis Time Period: **Last Seven Days** (Update Analysis)

Selected Analysis Time Period: **6/5/03 1:00 PM - 6/12/03 1:00 PM**

Potential Problems: **No Problem Found**

Recommendations: **No Recommendation**

System Activity and Tablespace Usage

The recommendations are based on system activity and undo tablespace usage for the selected analysis time period.

- Longest Running Query (seconds): **588**
- Average Undo Generation Rate (KB/minute): **0.0**
- Maximum Undo Generation Rate (KB/minute): **0.0**

[Show Graph](#)

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

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[About Oracle Enterprise Manager](#)

Redo Logfile Size Advisor

ORACLE Enterprise Manager

Setup Preferences Help Logout

Home Targets Configuration Alerts Jobs Management System

Hosts Databases Application Servers Web Applications Groups All Targets

Host: dsunrdf03 > Database: mgmt10i DB > Redo Log Groups

Logged in As system

Update Message
The recommended optimal redolog file size is 49 MB.

Redo Log Groups

Search

Name

Example: Entering Test will return all items beginning with upper case TEST, i.e. TEST_A, except for Java Source and Java Class which use case sensitive searches. Use double quotes to preserve case and embed wildcards(%).

Results

Actions

Select	Group	Status	# of Members	Archived	Size (KB)	Sequence	First Change#
<input checked="" type="radio"/>	1	Inactive	1	No	25600	94	182565932
<input type="radio"/>	2	Current	1	No	25600	95	182611380

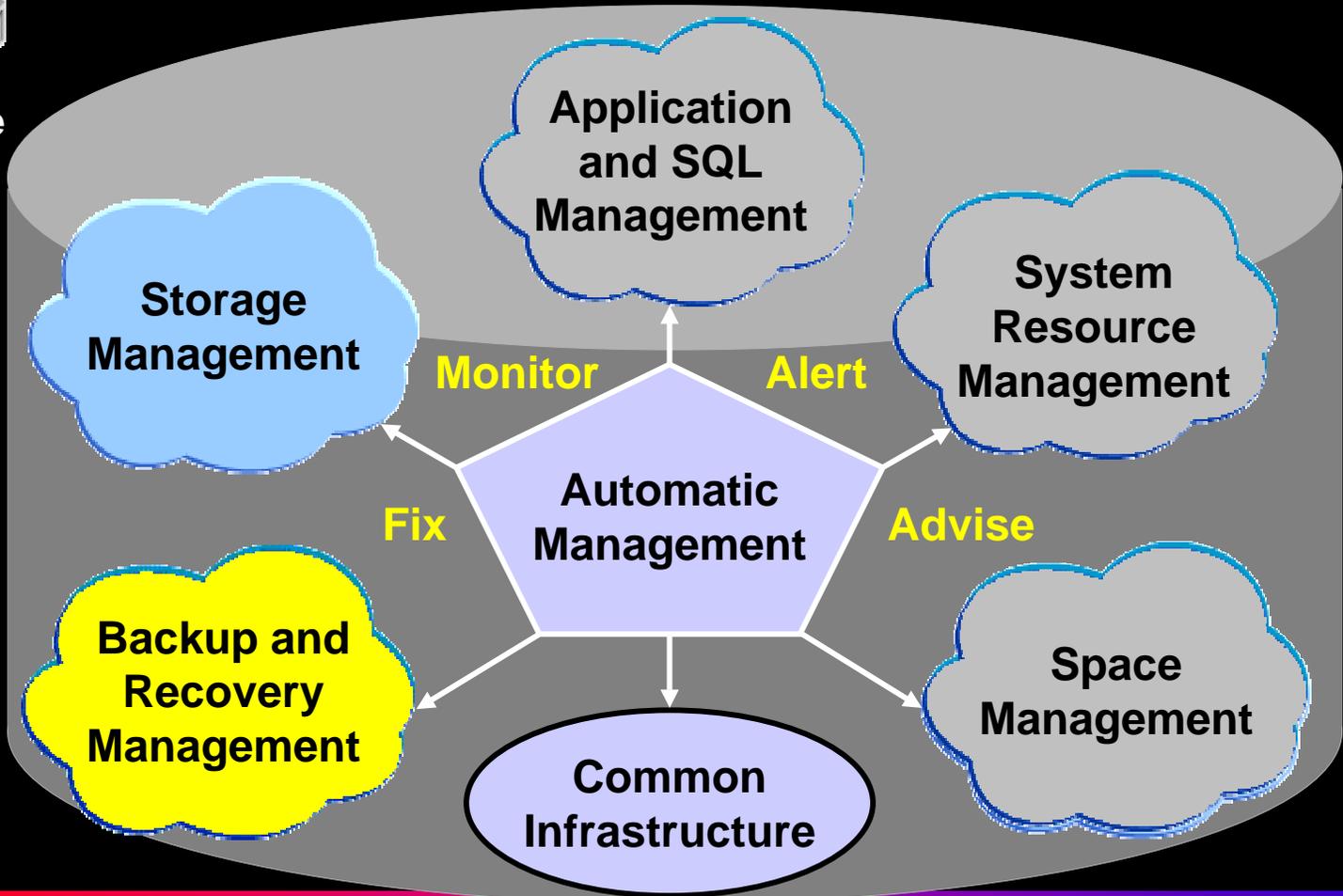
Home | Targets | Configuration | Alerts | Jobs | Management System | Setup | Preferences | Help | Logout

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[About Oracle Enterprise Manager](#)

Solution: Self-Managing Database



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Automatic Backup (DBCA Setup)

Database Configuration Assistant, Step 6 of 11 : Oracle Managed Files

Using Oracle Managed File locations will greatly simplify the administration of the database. Oracle will automatically create and delete database files as needed under specified Database and Flash Recovery areas.

Use Database Area for all database files

Database Area: Browse...

It is recommended that online redo logs and controlfiles be written to multiple locations spread across different disks to provide greater fault tolerance.

Multiplex Redo logs and Controlfiles...

Use Flash Recovery Area for all backup and recovery files

Oracle recommends that the database files and recovery files be located on physically different disks for data protection and performance.

Flash Recovery Area: Browse...

Flash Recovery Area Size: M Bytes

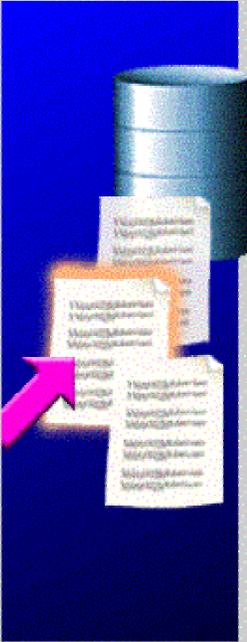
Enable Archive Log Mode Edit Archive Mode Parameters...

Enable Backup

Backup Start Time: AM PM

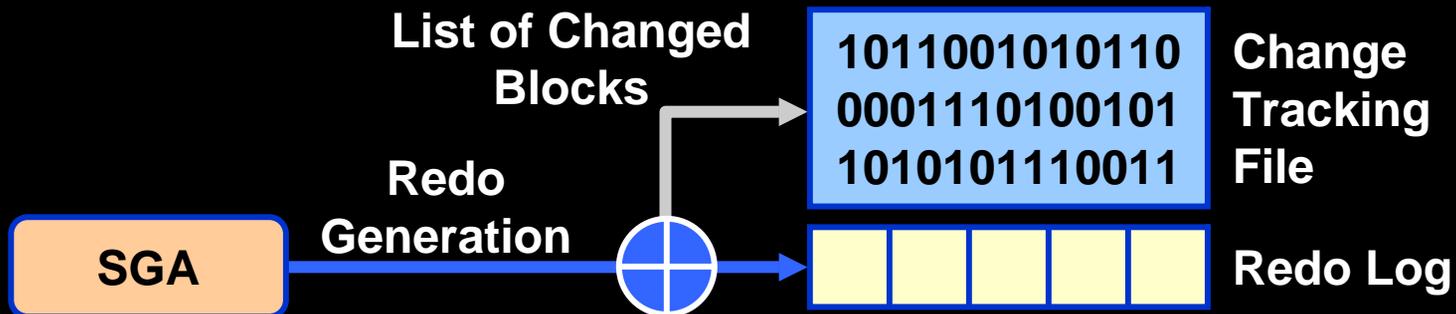
File Location Variables...

Cancel Help < Back Next > Finish



Optimized Incremental Backup

- Optimizes incremental backups
 - Tracks which blocks have changed since last backup
- Oracle Database 10^g has integrated change tracking.
 - New Change Tracking File is introduced.
 - Changed blocks are tracked as redo is generated.
 - Database backup automatically uses changed block list.



Defining Flash Recovery Area

10 USE_DB_RECOVERY_FILE_DEST 0 VALID Local

TIP It is recommended that archive log files be written to multiple locations spread across the different disks.
 TIP You can specify up to 10 archive log destinations.

Flash Recovery Area

It is highly recommended to use flash recovery area to automate your disk backup management.

Flash Recovery Area Location

Flash Recovery Area Size

Flash Recovery Area Size must be set when the location is set

Enable flashback logging for fast database point-in-time recovery*

The flash recovery area must be set to enable flashback logging. Using flashback logs, you may recover your entire database to a prior point-in-time without restoring files. Flashback is the preferred point-in-time recovery method in the recovery wizard when appropriate.

Specify how far back you wish to flash the database in the future

Flashback Retention Time

Current size of the flashback logs n/a

Lowest SCN in the flashback data n/a

Time of the lowest SCN in the flashback data n/a

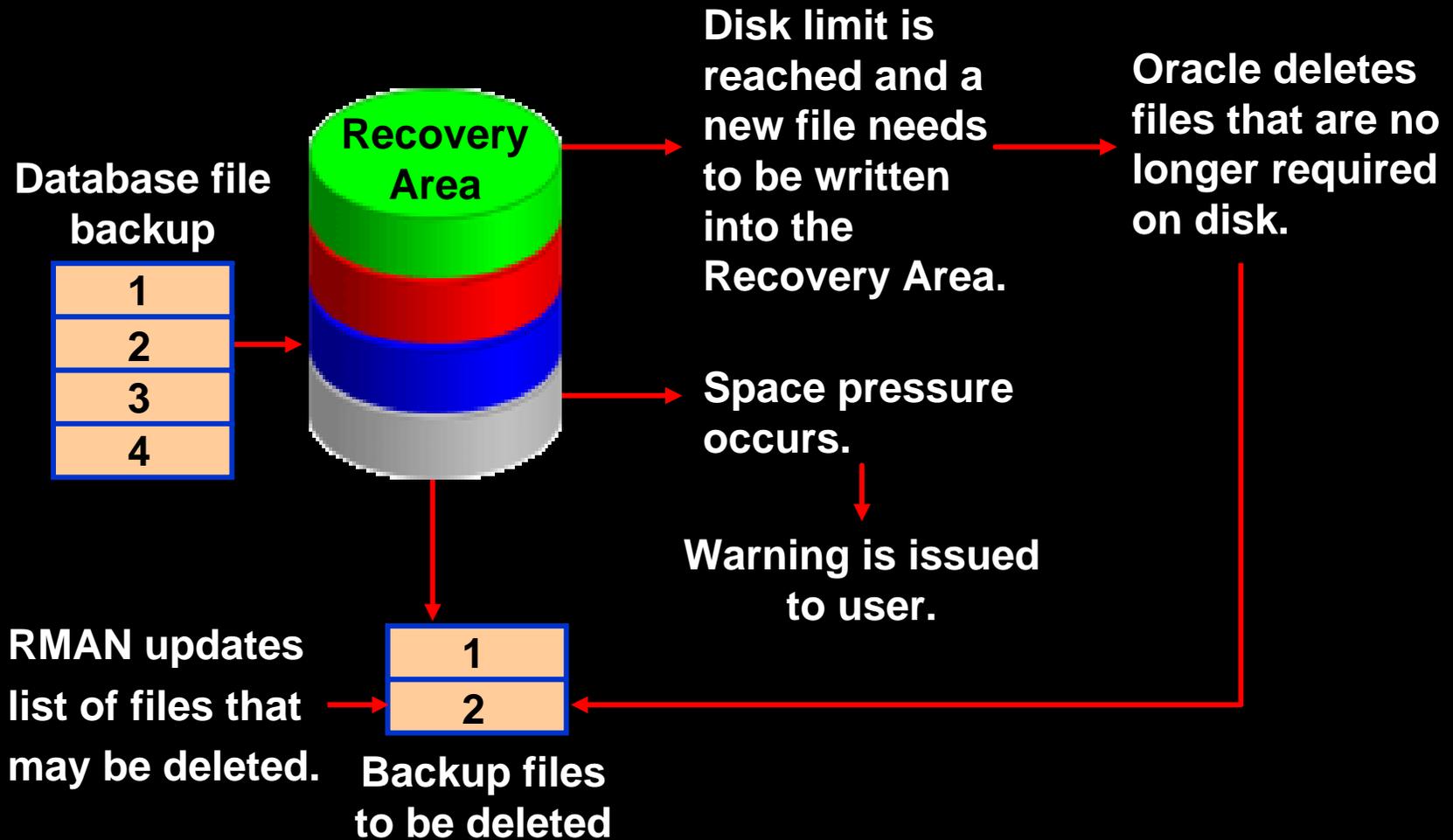
TIP * indicates controls, if changed, must restart database to invoke.

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

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Done Local intranet

Flash Recovery Area Space Management



Suggested Strategy

Backup: Review - Microsoft Internet Explorer

Address: http://dlsun2099.us.oracle.com:1820/em/console/database/rec/backup?target=database&type=oracle_database

Links: [Customize Links](#) [Files Online](#) [Free AOL & Unlimited Internet](#) [Free Hotmail](#) [My Oracle](#) [Network Request](#) [Oracle CRM](#) [Oracle Email](#) [SE Software Archive](#)

Setup Schedule **Review**

Backup: Review

Cancel Back Step 3 of 3 Submit Job

Database **database**
Backup Strategy **Oracle-suggested**
Storage Type **Disk**

Daily Backup **A full database copy will be taken during the first backup. After that an incremental backup to disk will be taken everyday. The backups on disk will be retained so that you can always perform a full database recovery or a point-in-time recovery to any time within the past 1 day.**

Settings

Flash Recovery Area **/private/oracle/app/oracle/backups**

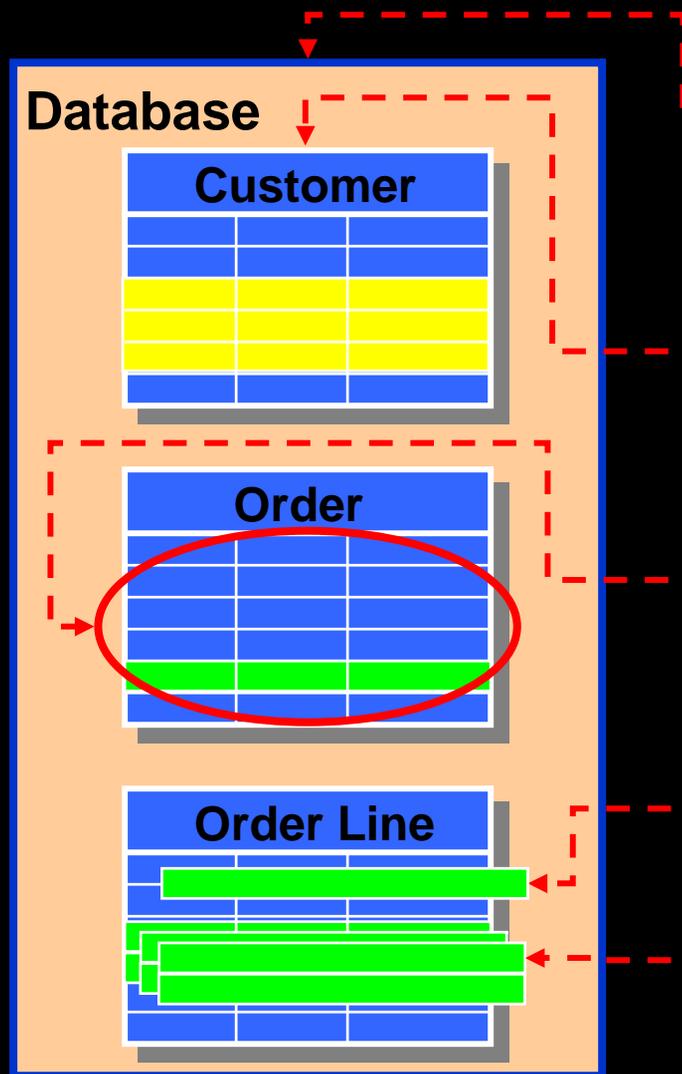
RMAN Script

Daily Script:

```
run {
allocate channel oem_disk_backup device type disk;
recover copy of database with tag 'ORA$OEM_LEVEL_0';
backup incremental level 1 cumulative copies=1 for recover of copy with tag 'ORA$OEM_LEVEL_0'
database;
}
```

Done Local intranet

Flashback Error Correction

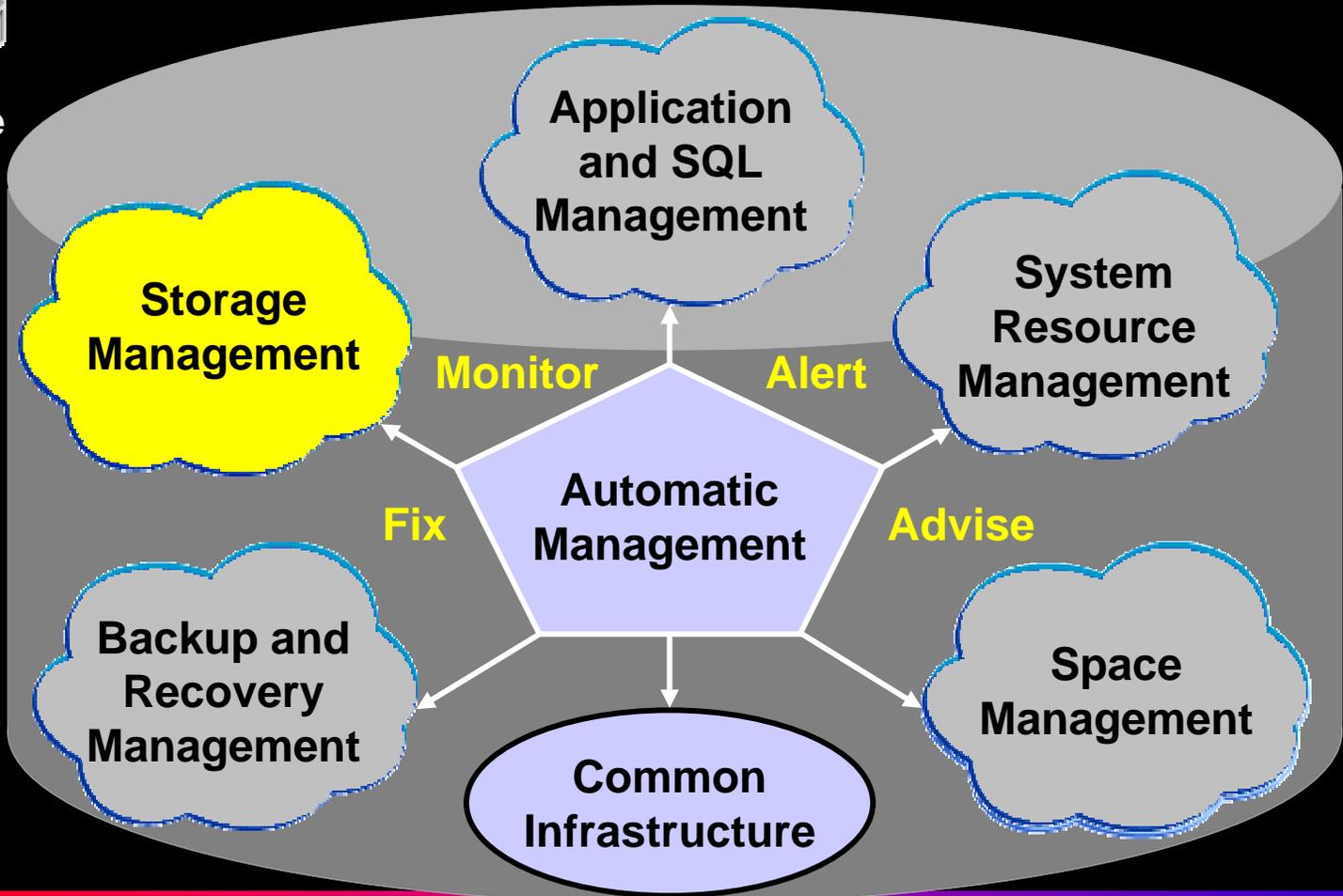


- **Flashback Database**
 - Restore database to time
 - Uses flashback logs
- **Flashback Drop**
 - Restore dropped table
 - Uses recycle bin
- **Flashback Table**
 - Restore all rows in table to time
 - Uses UNDO in database
- **Flashback Transaction Query**
 - Query a committed Txn
- **Flashback Versions Query**
 - Query changes to rows over time

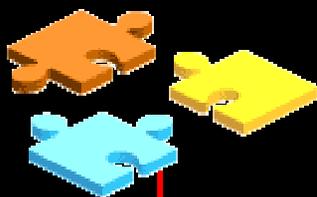
Solution: Self-Managing Database



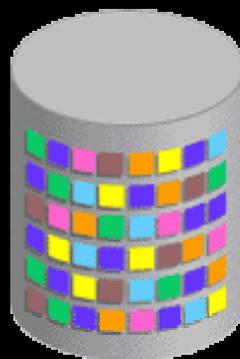
Enterprise
Manager
Database
Console



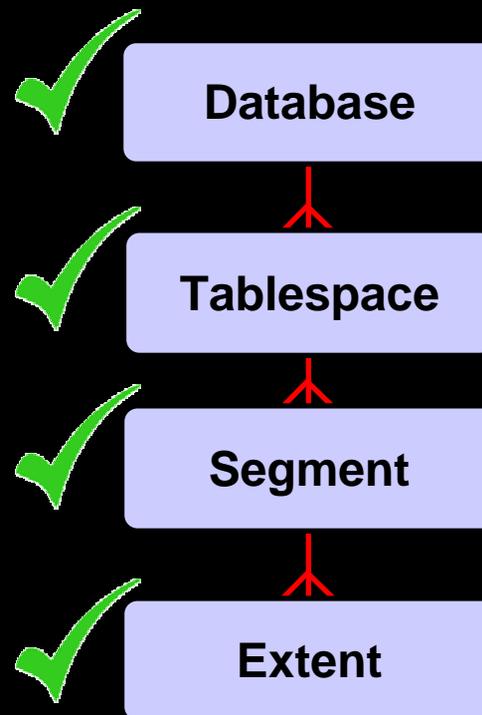
What Is Automatic Storage Management



ASM manages Oracle files.

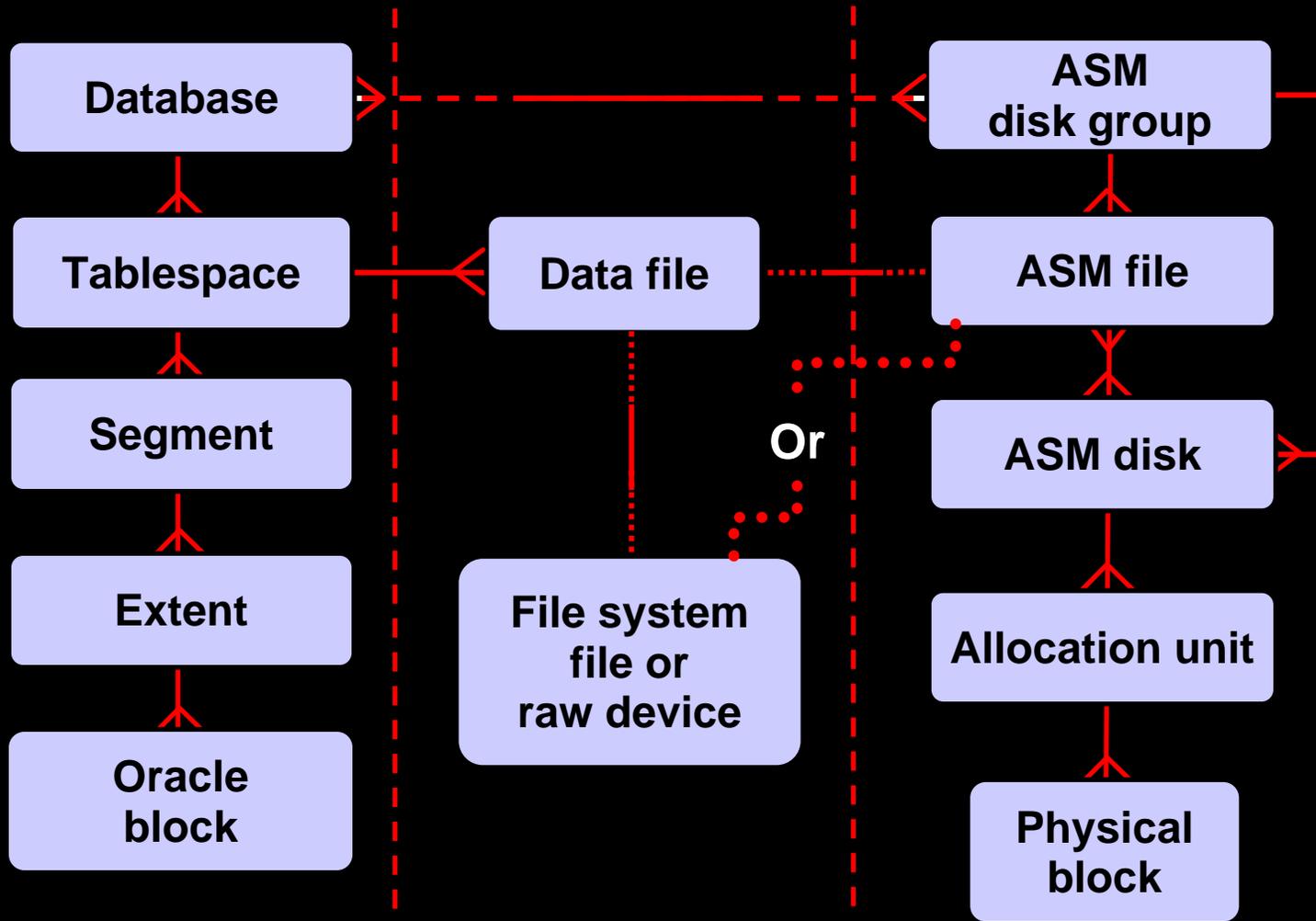


ASM solves management problems of Oracle databases.



ASM does *not* replace existing concepts.

Hierarchy



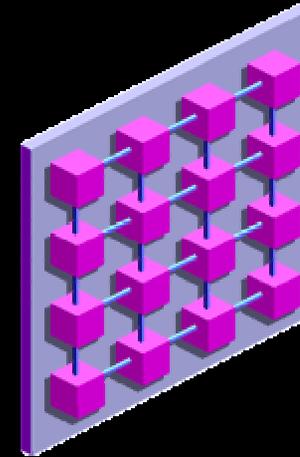
ASM Benefits



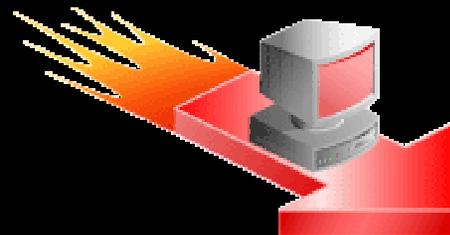
**Reduces the cost
of managing storage**



**Reduces
administration
complexity**



**Supports
RAC**

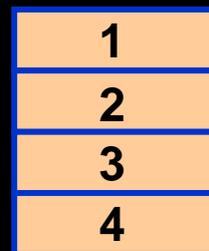


**Improves
performance,
scalability,
and reliability**

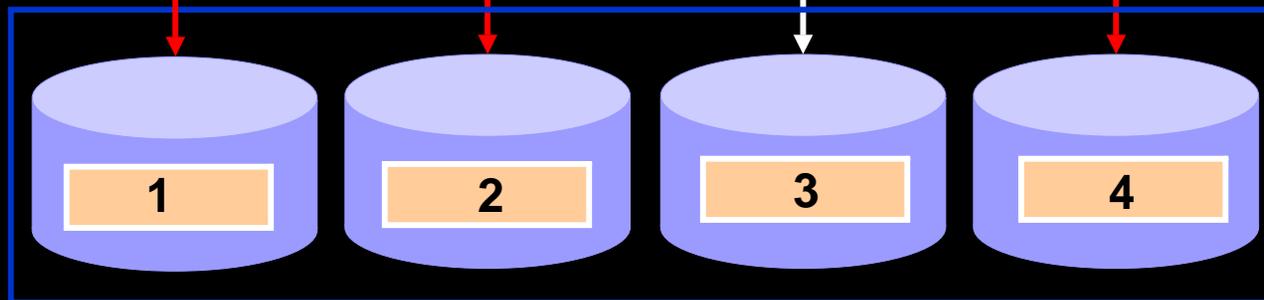
ASM Files

```
CREATE TABLESPACE sample DATAFILE '+dgroupA';
```

Database file

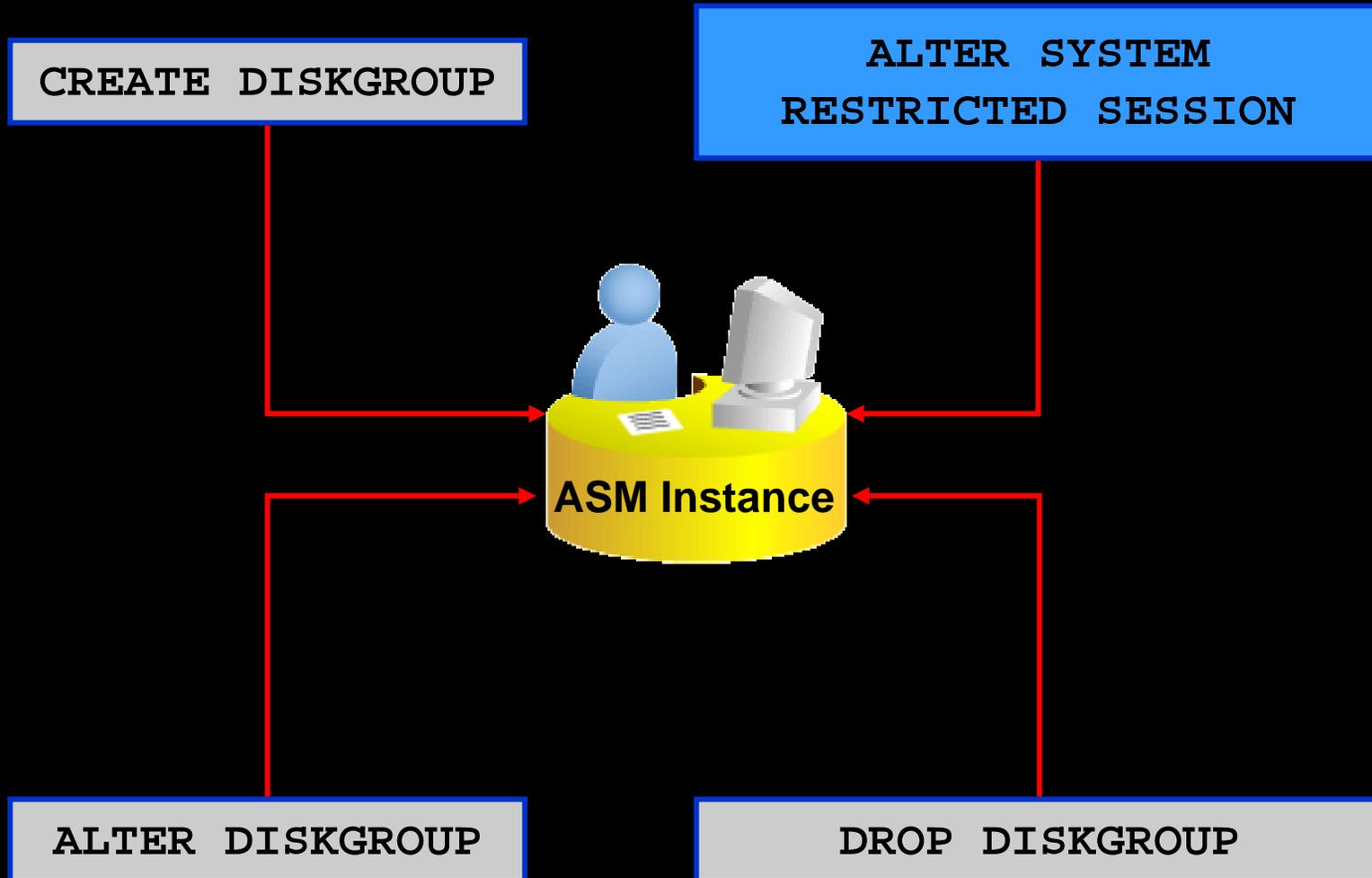


Automatic
ASM file
creation



ASM file automatically spread inside disk group dgroupA

SQL Statements Issued to ASM Instances



Enterprise Manager and ASM

ORACLE Enterprise Manager Setup Preferences Help Logout

Home **Targets** Configuration Alerts Management System

Hosts Databases Application Servers Web Applications Groups **All Targets**

Oracle Storage Manager: OSM

Home Performance Administration Configuration

Data Retrieved January 30, 2003 4:05:42 AM EST

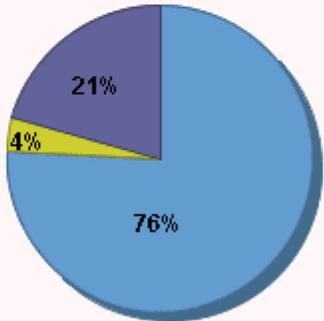
General



[Change Status](#)

Current Status **Up**
 Up Since **Jan 29, 2003 10:06:12 AM**
 Availability (%) **100%**
(Last 24 hours)
 Instance Name **+OSM**
 Version **10.1.0.0.0**
 Host spanchum-sun.us.oracle.com
 Oracle Home [/ade/spanchum_osm/oracle](http://ade/spanchum_osm/oracle)
 Latest Alert Log Entry  [No ORA- errors](#)

DiskGroup Usage (in MB)



System (1,894)	76%
Free (89)	4%
OSMDB (517)	21%

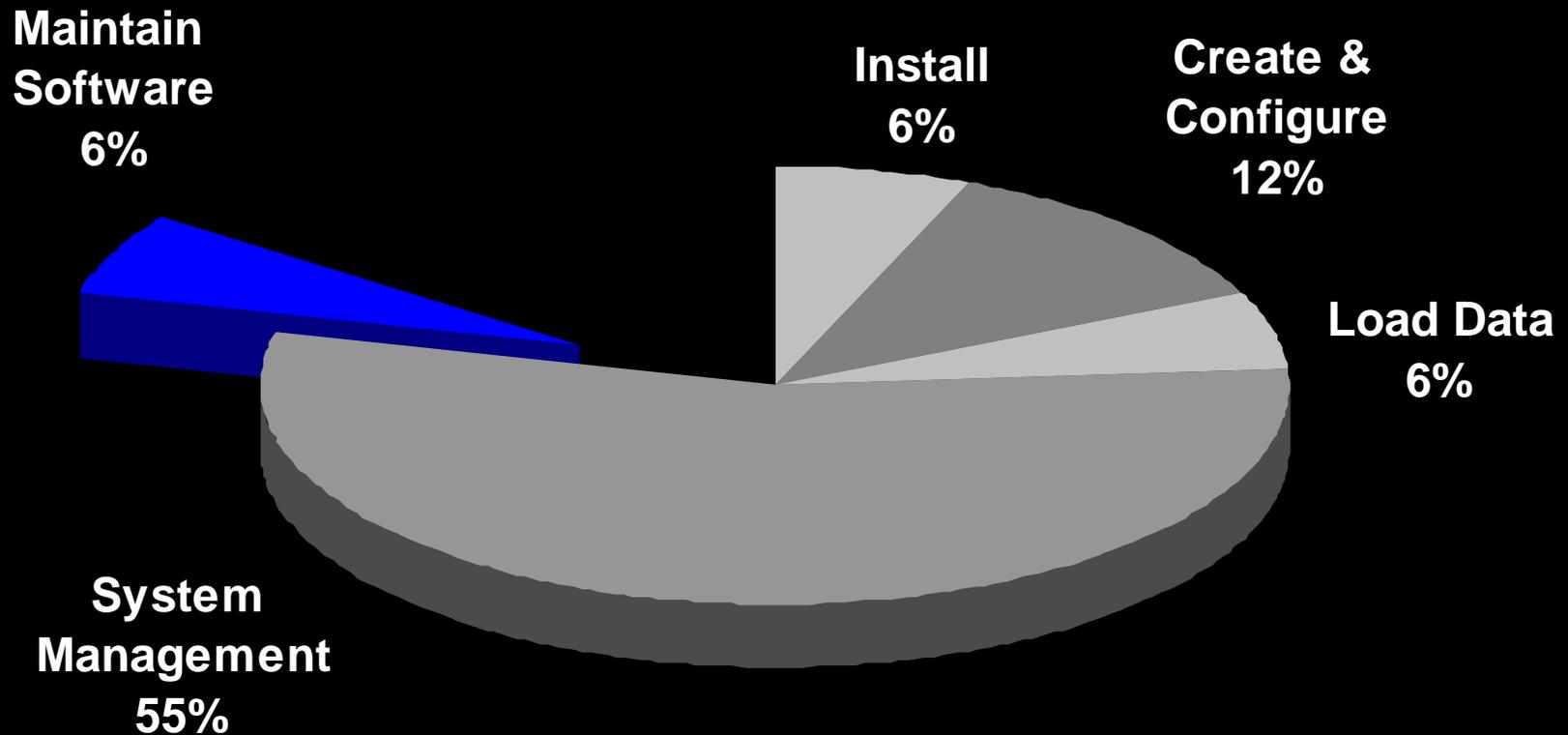
Serviced Databases

Database Name	DiskGroup(s)	Total (in MB)	Availability	Alerts
OSMDB	DATA	517	Not Monitored	Not Monitored

Summary

- Oracle Database 10^g's self-management capabilities work out-of-the-box.
- Customization of Oracle Database 10^g's self-management capabilities can be done through Enterprise Manager.
- Oracle Database 10^g is a self-managing database which reduces administration overhead and enables DBAs to become proactive strategists.

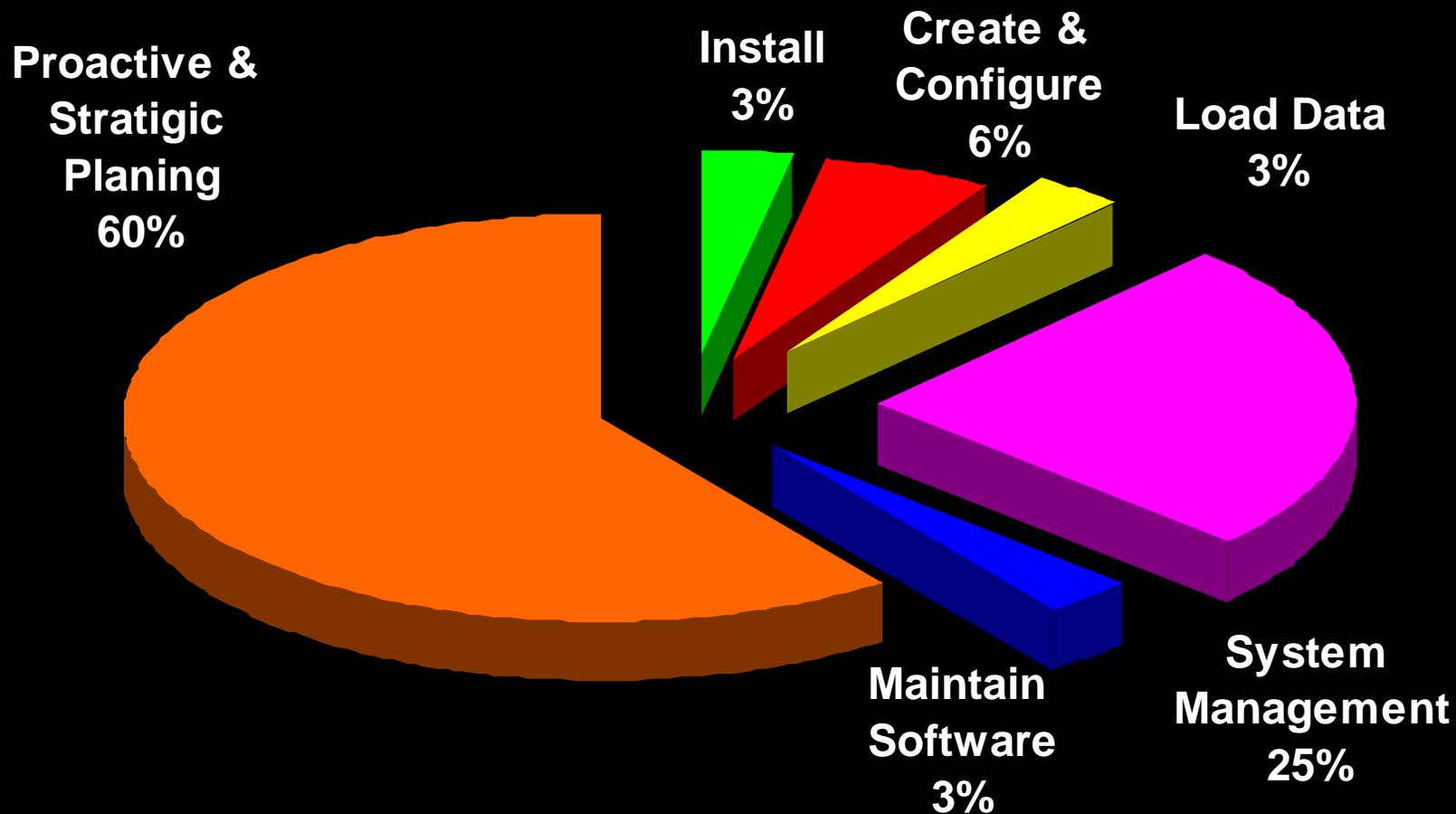
How DBAs Spend Their Time?



Enterprise Configuration Management



How Oracle Database 10^g DBAs Spend Their Time



Oracle Database 10g

Simplified Creation & Configuration

Fast Lightweight Install



1/2 COST

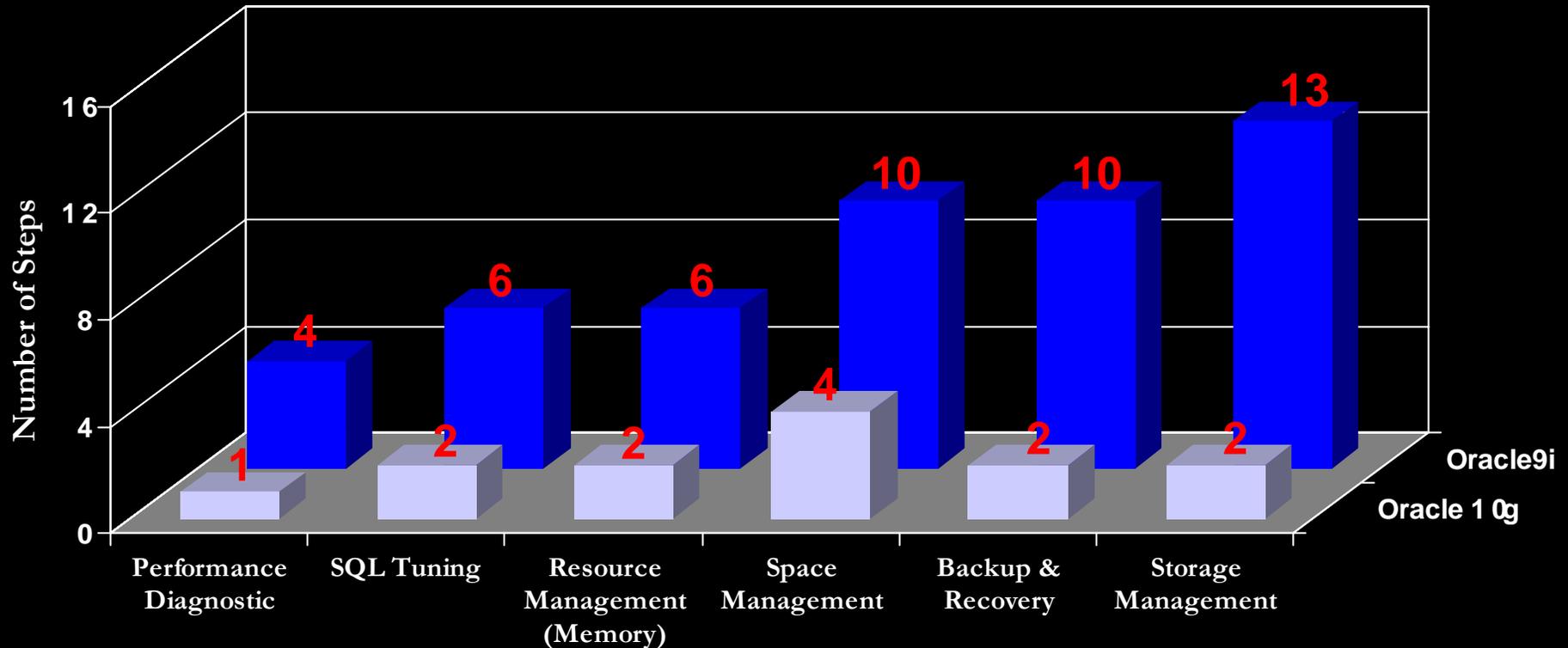
Efficient Data Load



Enterprise Configuration Management

Self-Managing Database

Oracle 10g : Twice as Manageable as Oracle9i



Result Summary

Oracle 10g required 44% less time and 47% fewer steps than Oracle9i.

What Does It Mean to You?

DBA of the Future Does **MORE**

- **MORE** sleep at nights!
- **MORE** weekends off!
- **MORE** databases
- **MORE** applications: OLTP, DW, OCS, iAS
- **MORE** users, larger databases
- **MORE** mission-critical applications
- **MORE** proactive and strategic
- **MORE** important and valuable!

LESS Cost for Businesses

For customers

- Less Administration Cost
- Less Capital Expenditure
- Less Failures

For Application ISV Partners

- Less Deployment Cost
- Less Development Cost
- Less Support Cost

Summary

- Oracle Database 10^g's self-management capabilities work out-of-the-box.
- Customization of Oracle Database 10^g's self-management capabilities can be done through Enterprise Manager.
- Oracle Database 10^g is a self-managing database which reduces administration overhead and enables DBAs to become proactive strategists.

FIN

Thank You

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