Oracle Database 10g: Managing the Self-Managing Database

הדר פיים

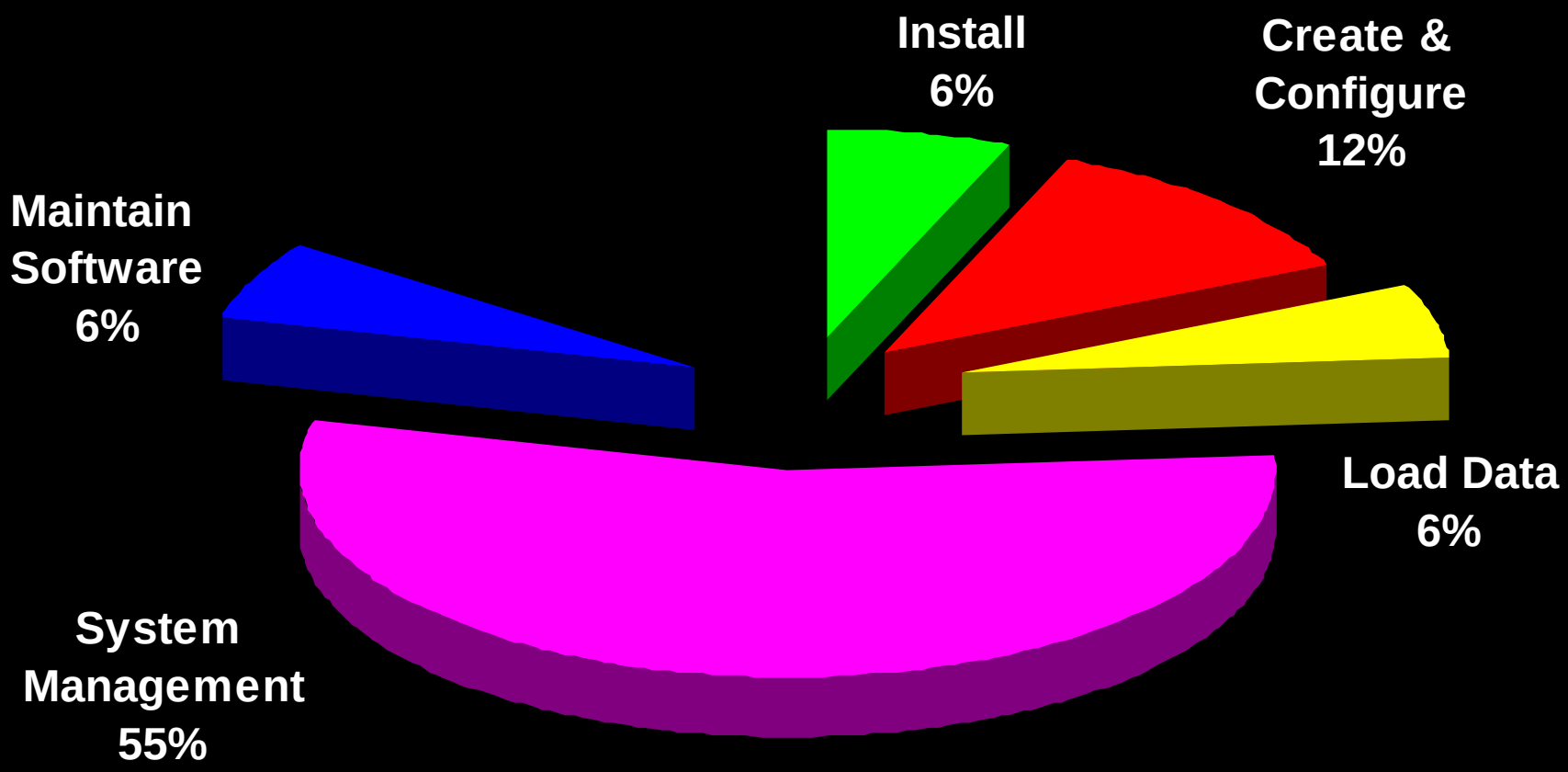
יונתן טולדנו

Certified Oracle 10g Technician

Oracle Training Center

מכללת הי-טק

How DBAs Spend Their Time?



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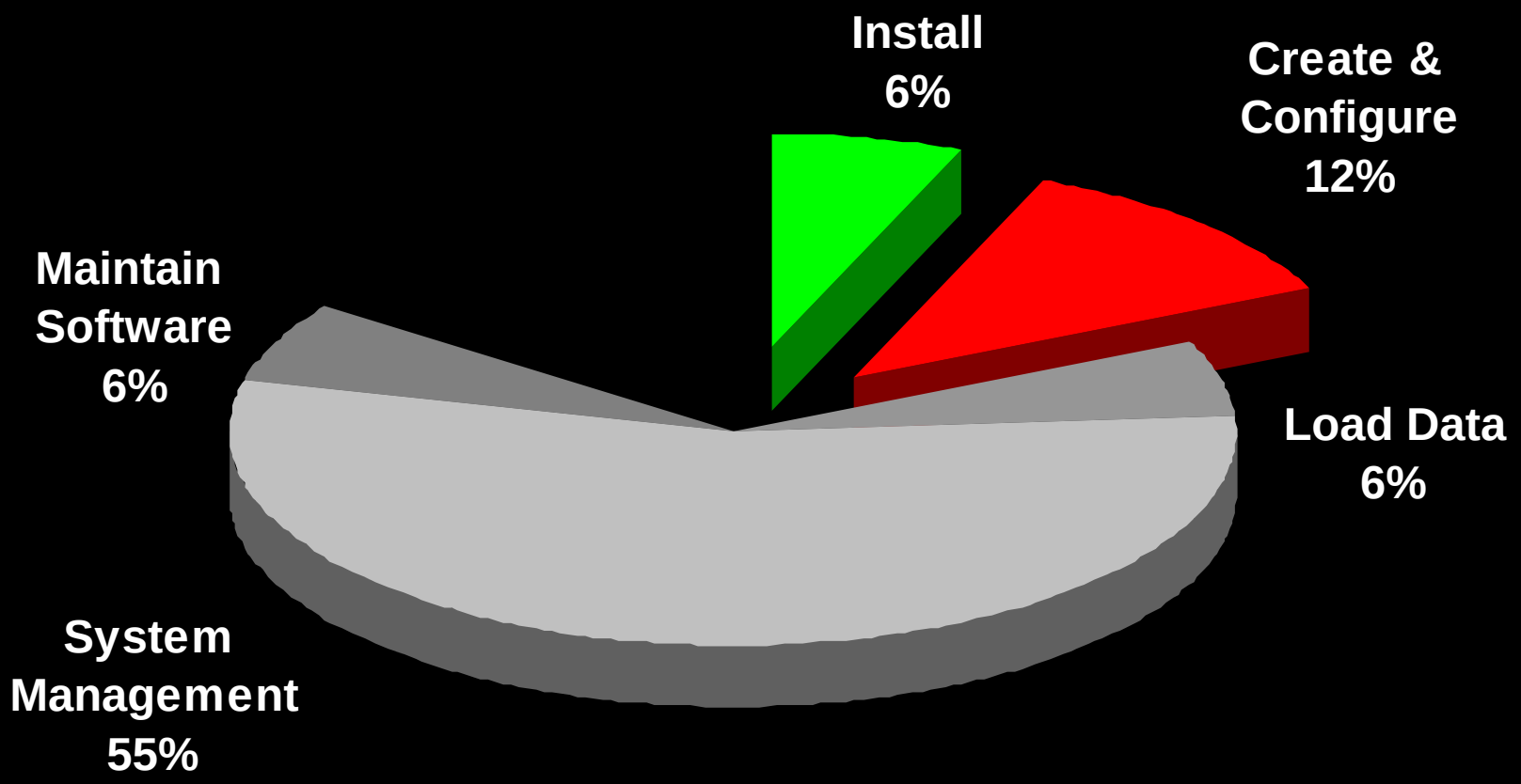


Software Installation

- 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

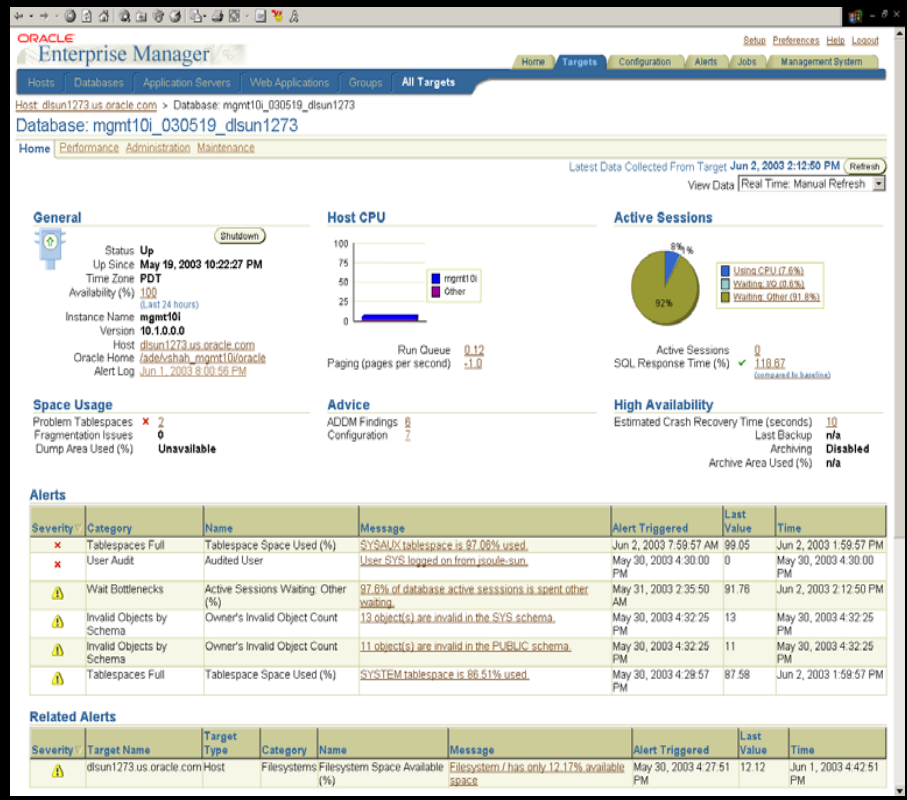
- compatible
- processes
- sessions
- pga_aggregate_target
- nls_language
- nls_territory
- db_domain
- shared_servers
- instance_number
- cluster_database
- db_block_size
- sga_target
- control_files
- db_name
- db_recovery_file_dest
- remote_listener
- db_recovery_file_dest_size
- db_create_online_log_dest_n
- 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



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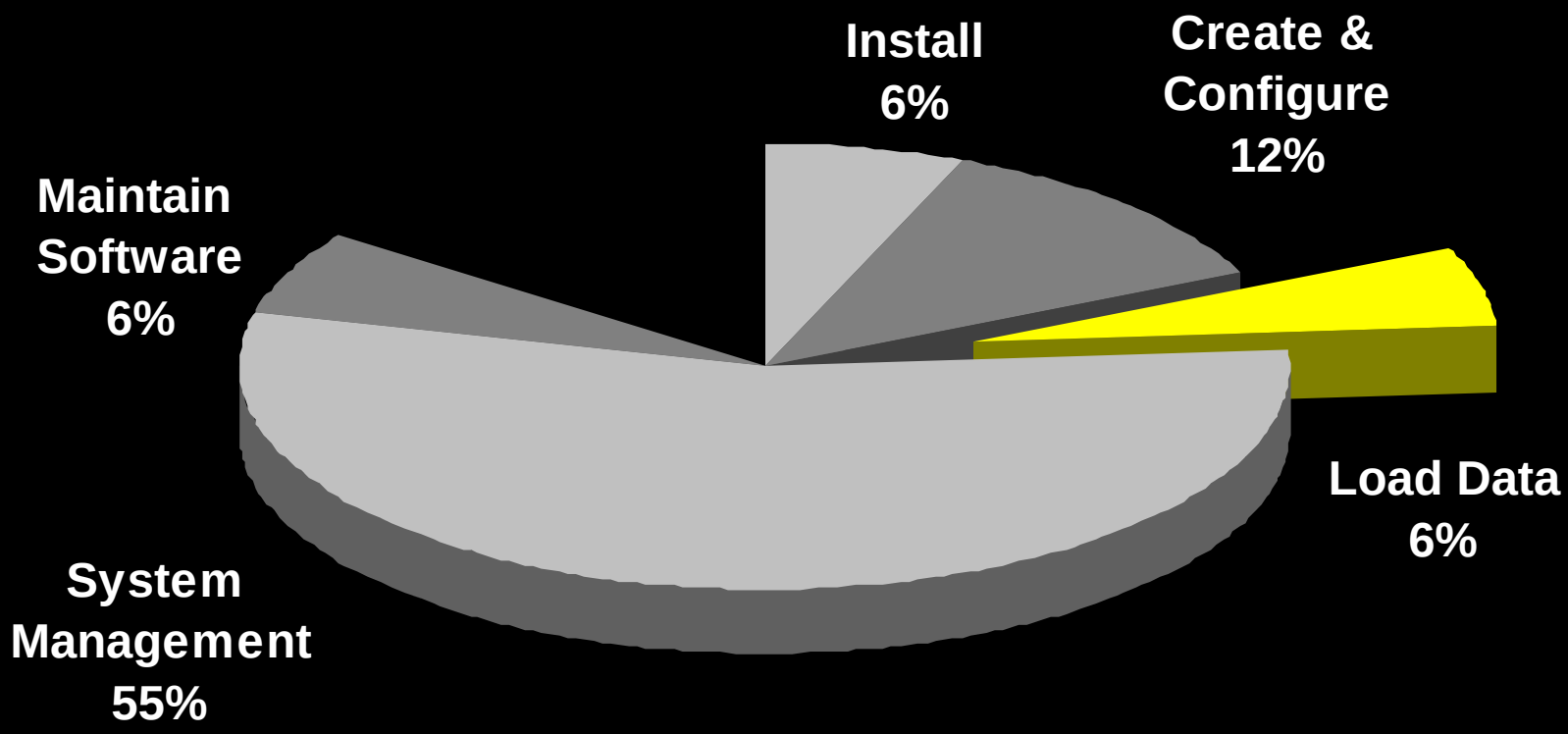

Data Pump: What is it?

- 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.

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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

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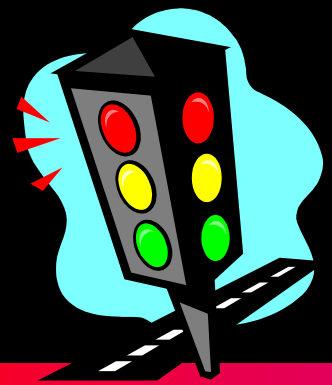
Features: Checkpoint / Restart

- 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



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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 Selec

- 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’, …)’ “

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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

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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 9***i*** and 10***g***
- Callable!

Large Internet Company

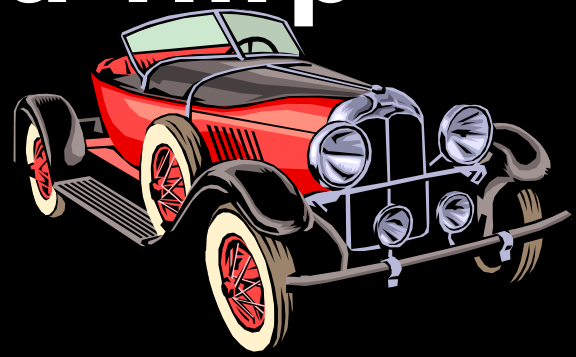
2 Fact Tables: 16.2M rows, 2 Gb

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

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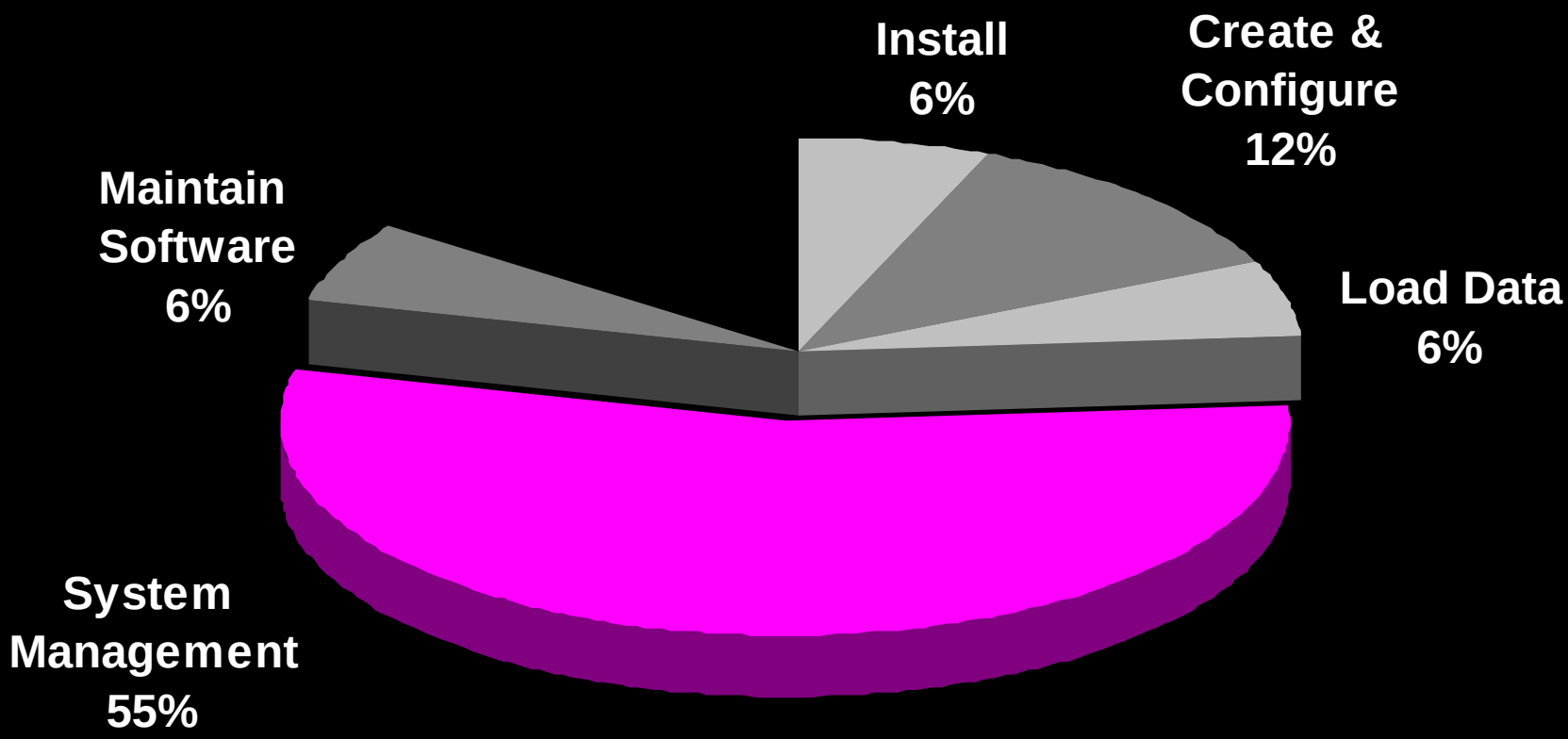

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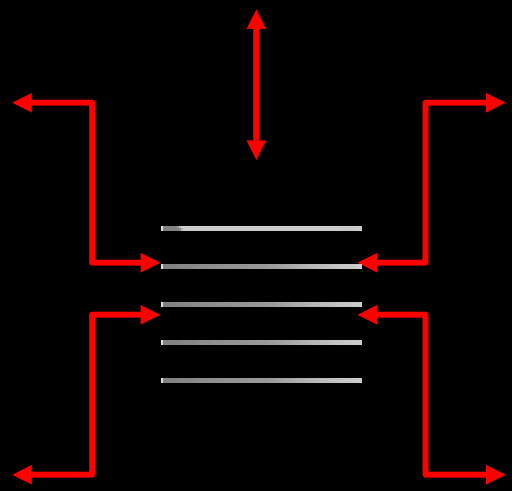
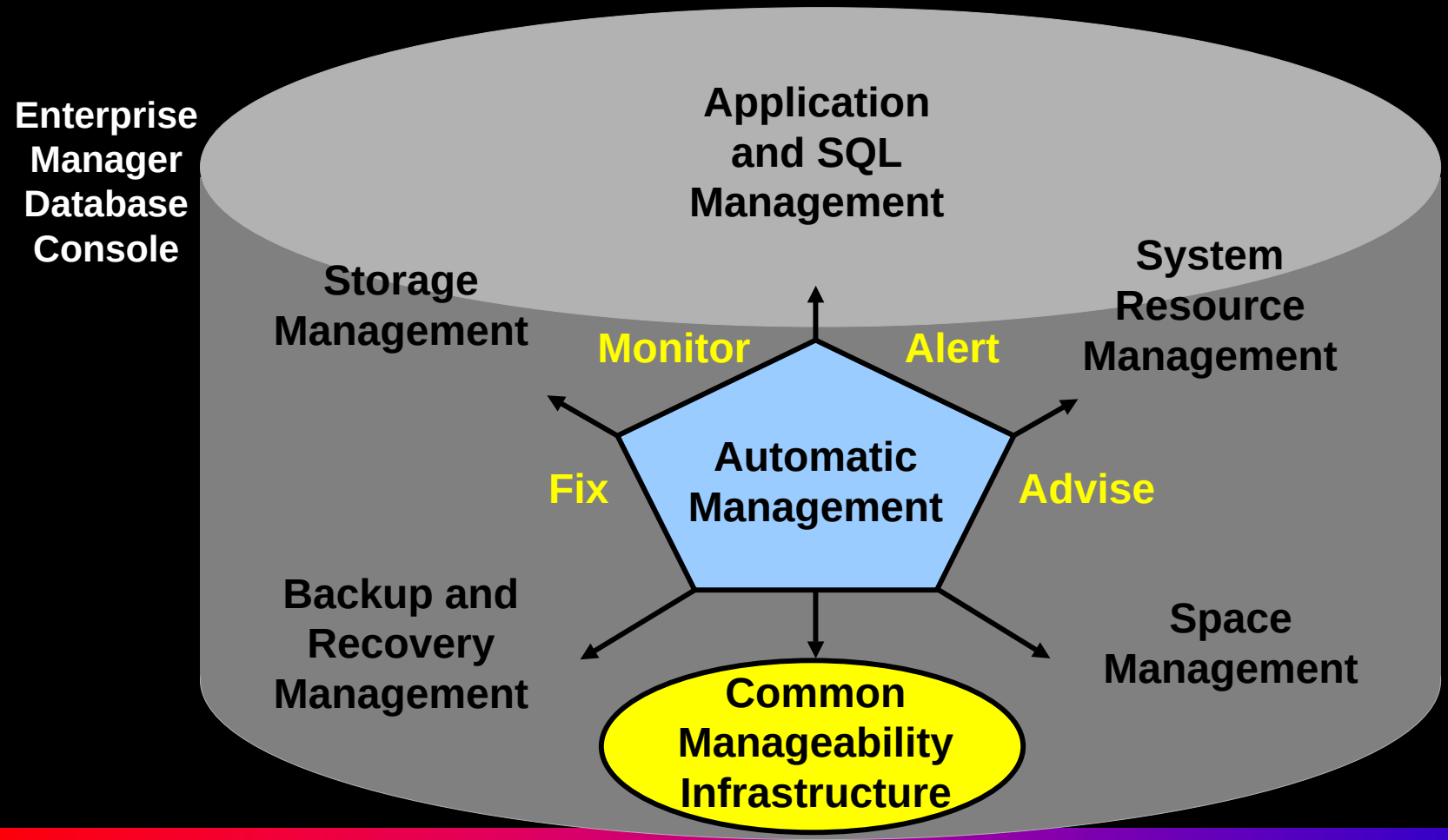
Database Management Challenges



Solution: Self-Managing Database



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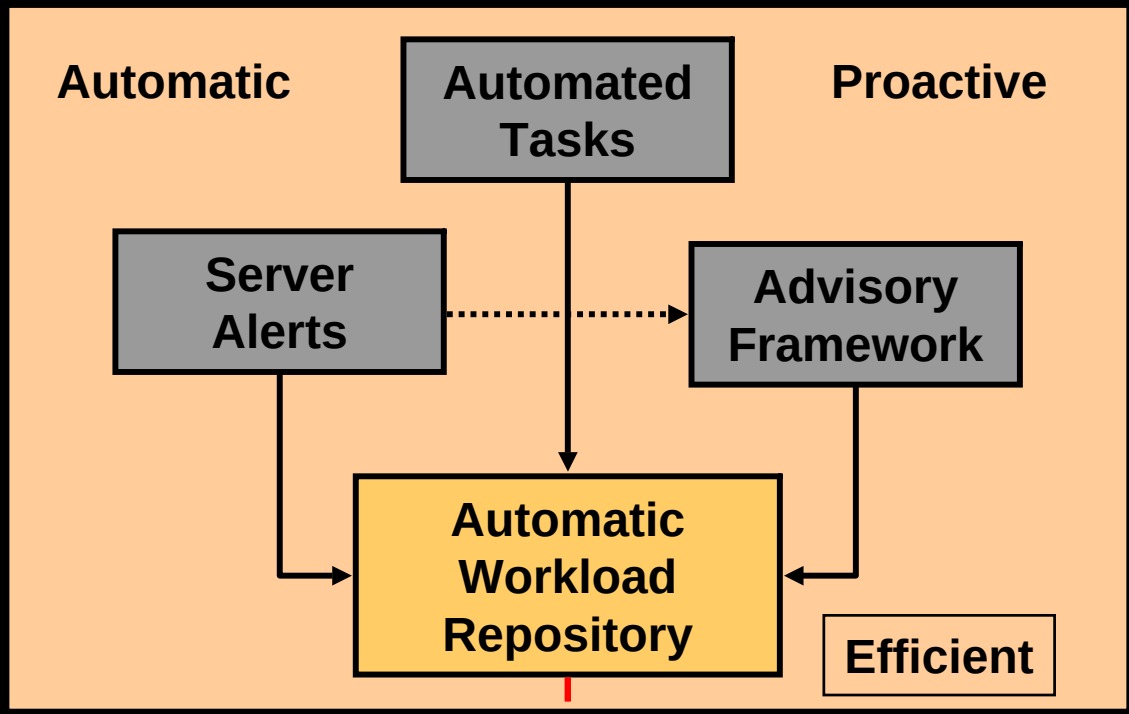
Common Manageability Infrastructure: Automatic Workload Repository



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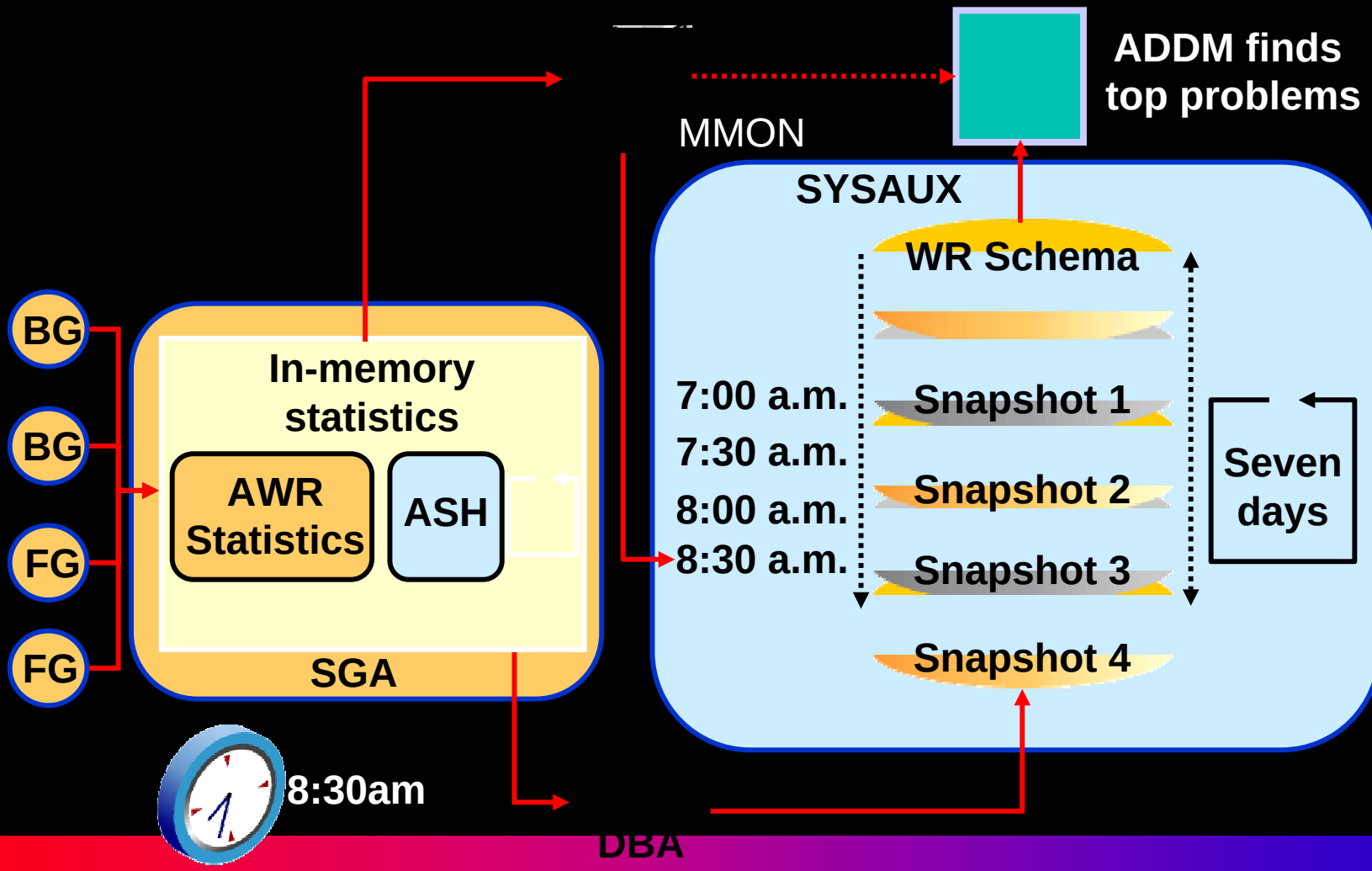
Automatic Workload Repository



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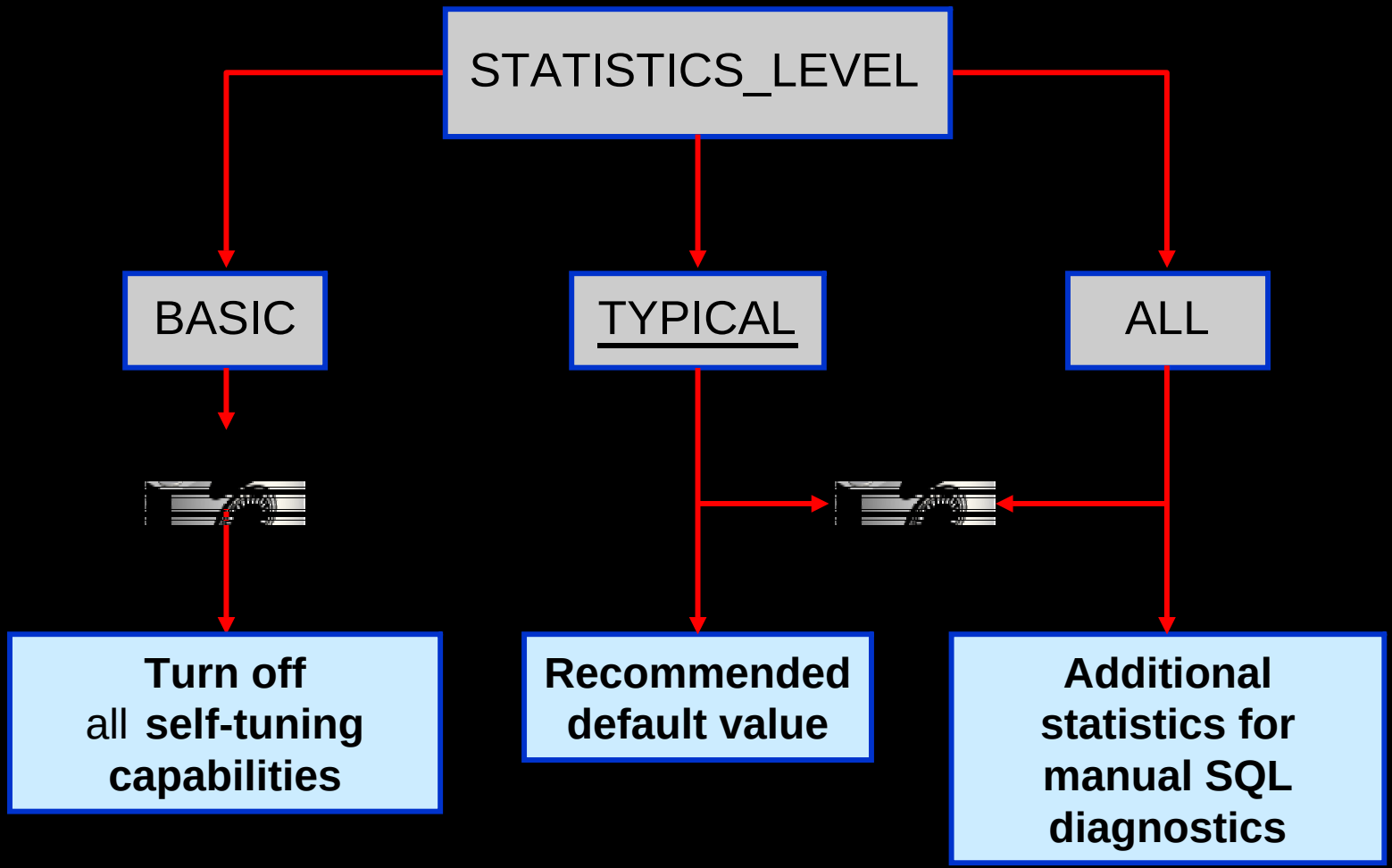
Statistics Level



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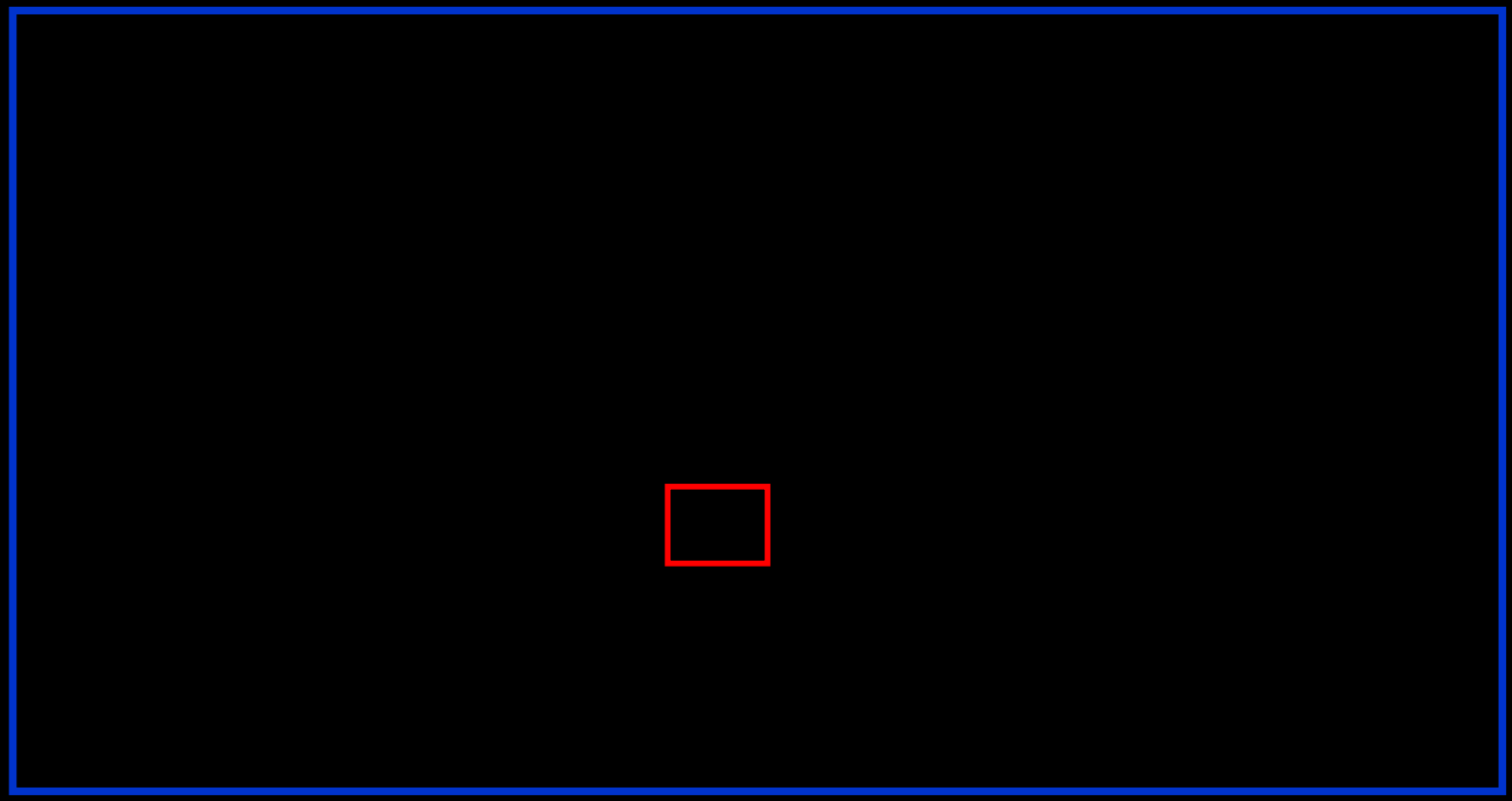
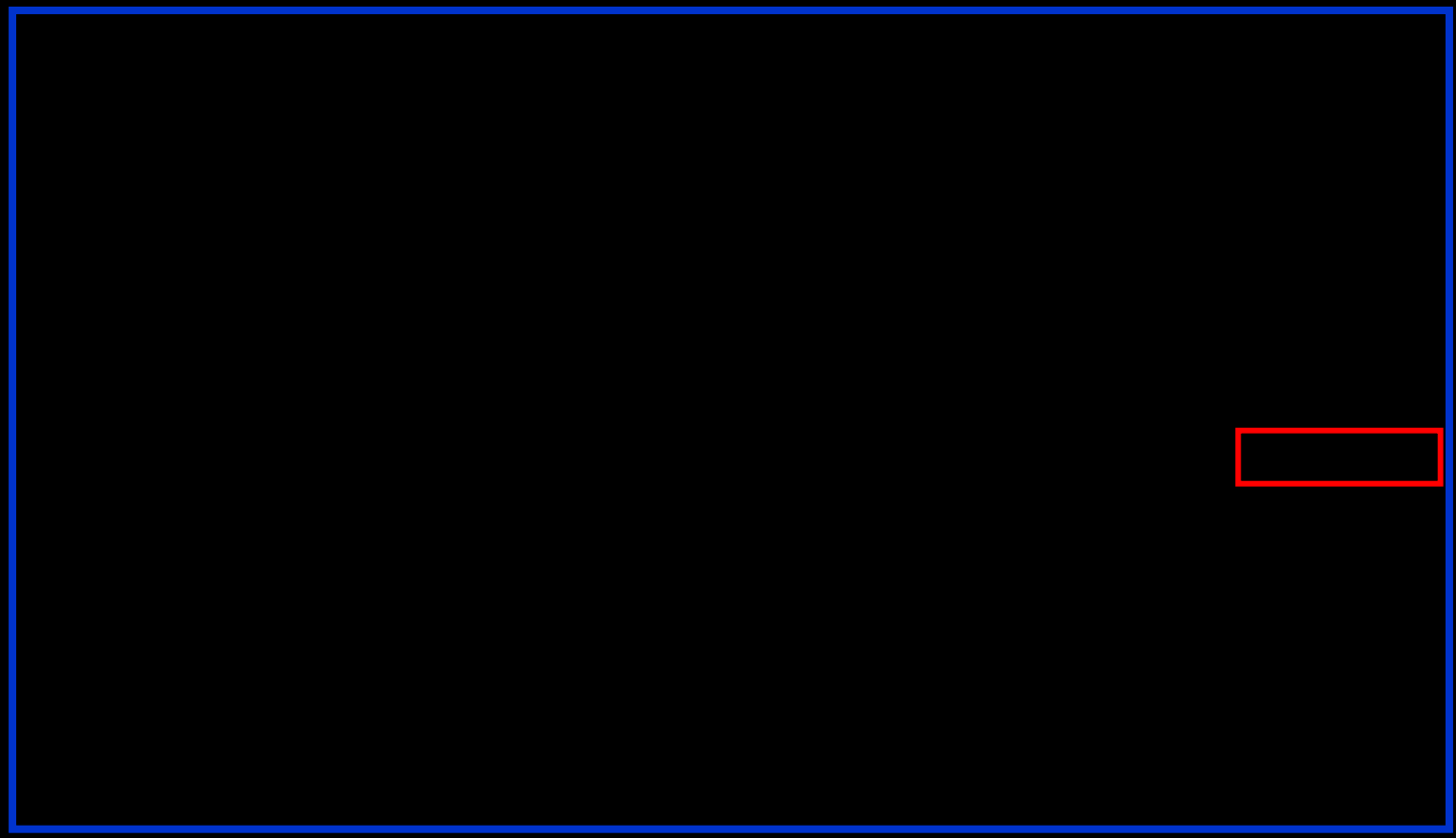
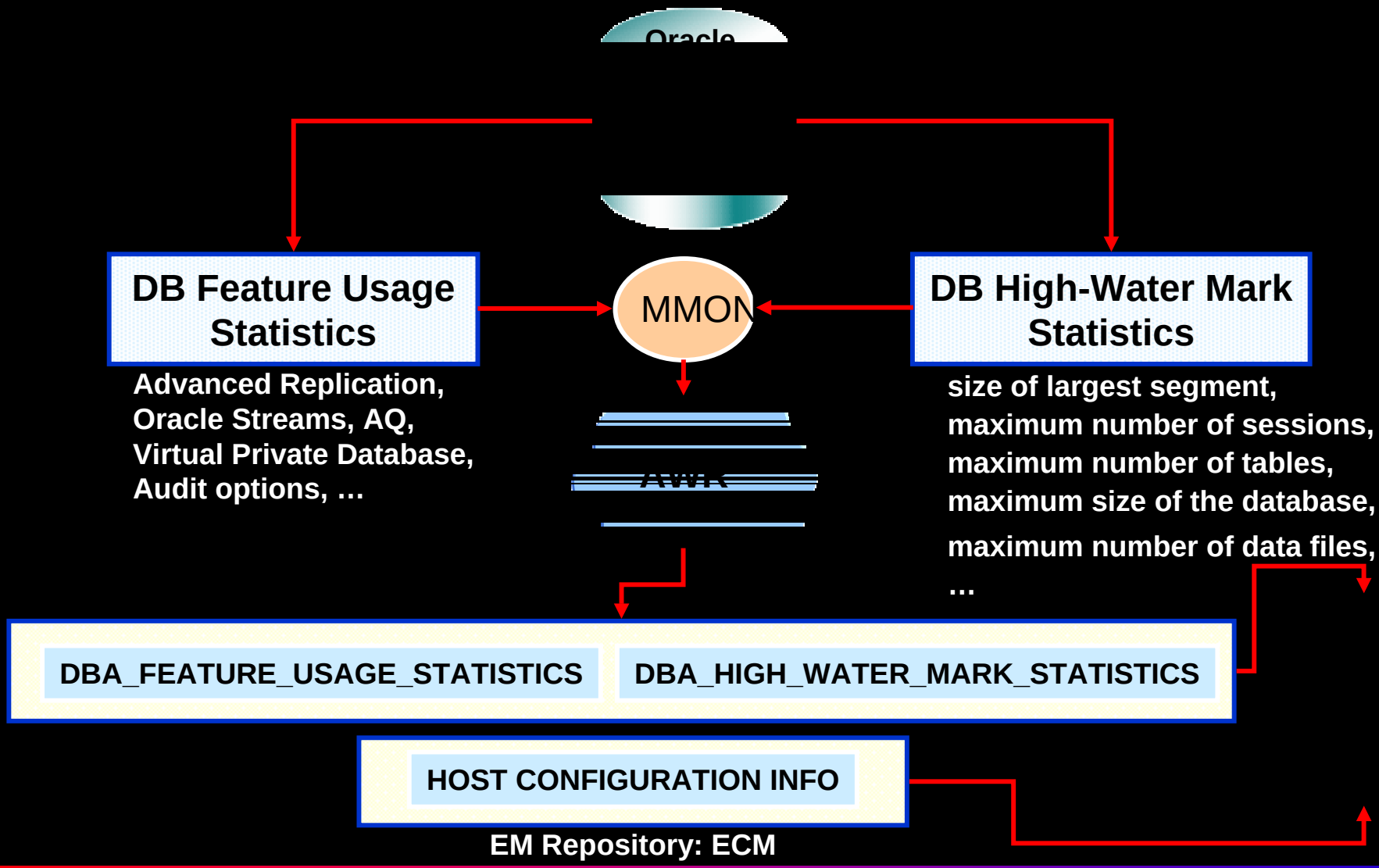
Configuring The Workload Repository



Manually Creating Snapshots



Database Feature Usage Metric Collection



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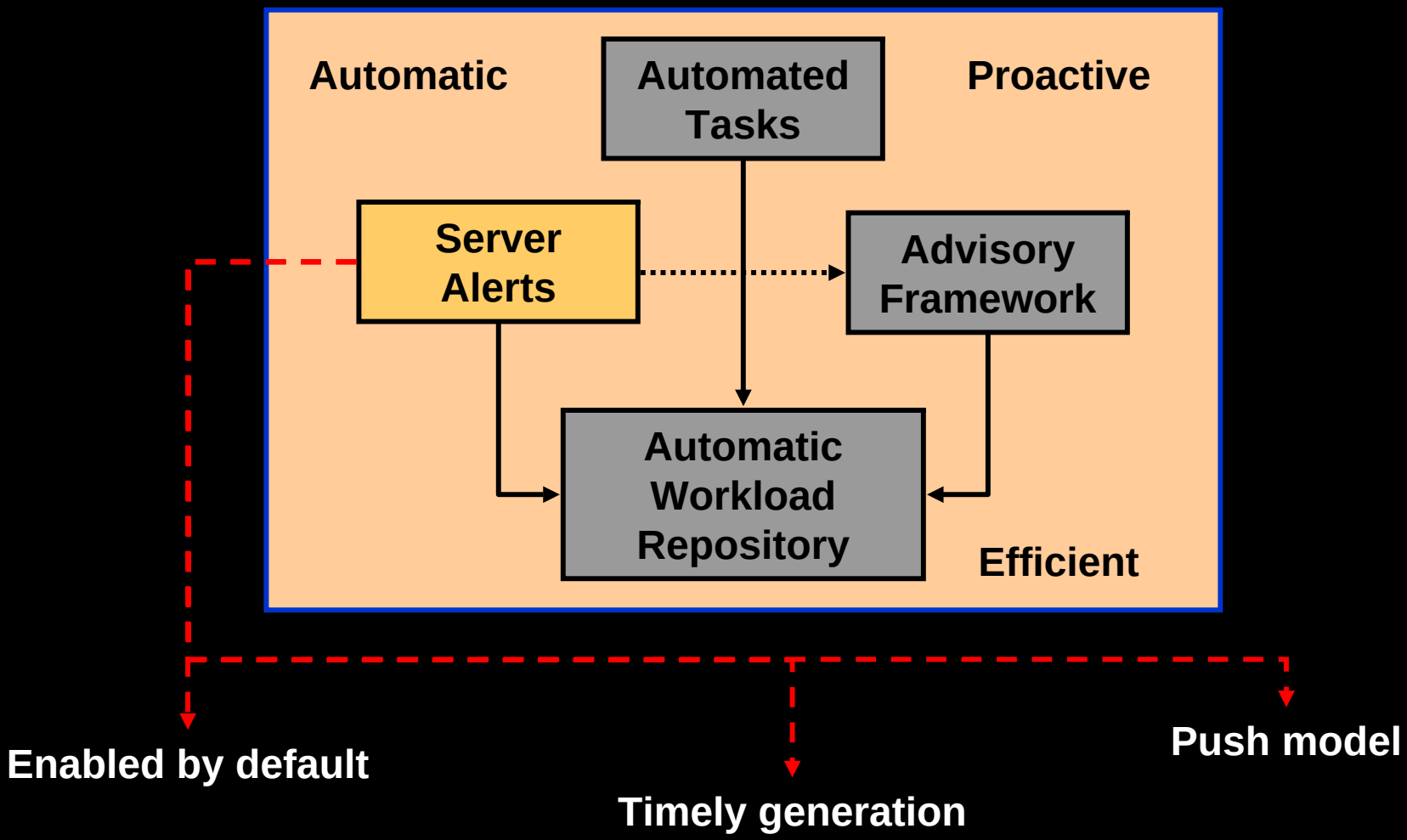
Common Manageability Infrastructure: Server Alerts



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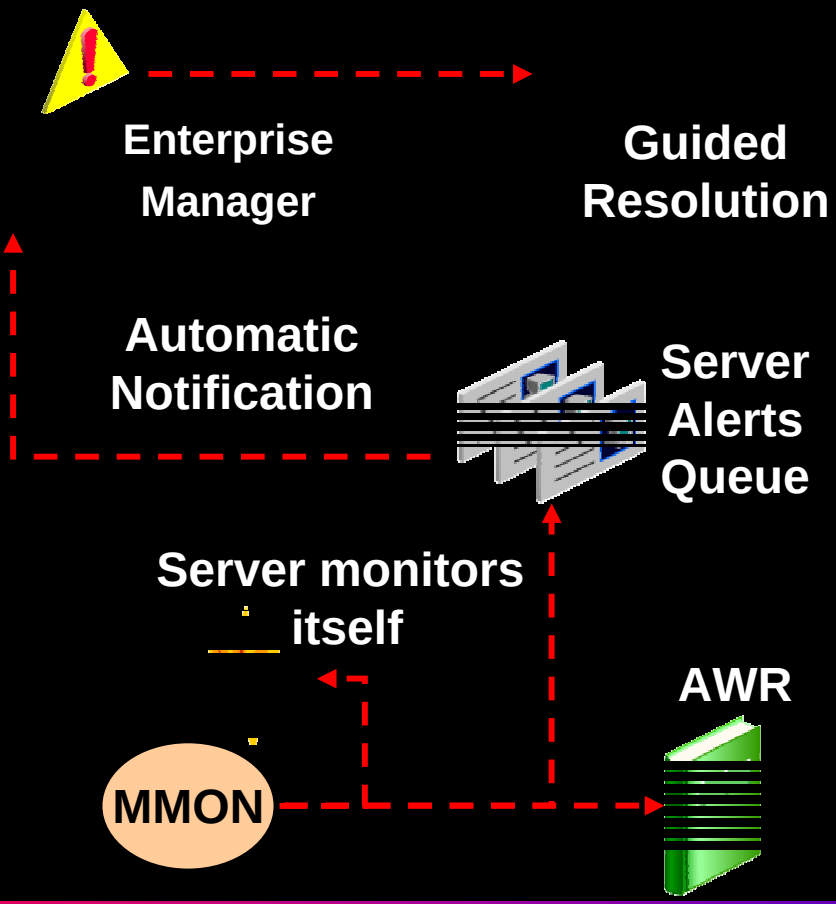
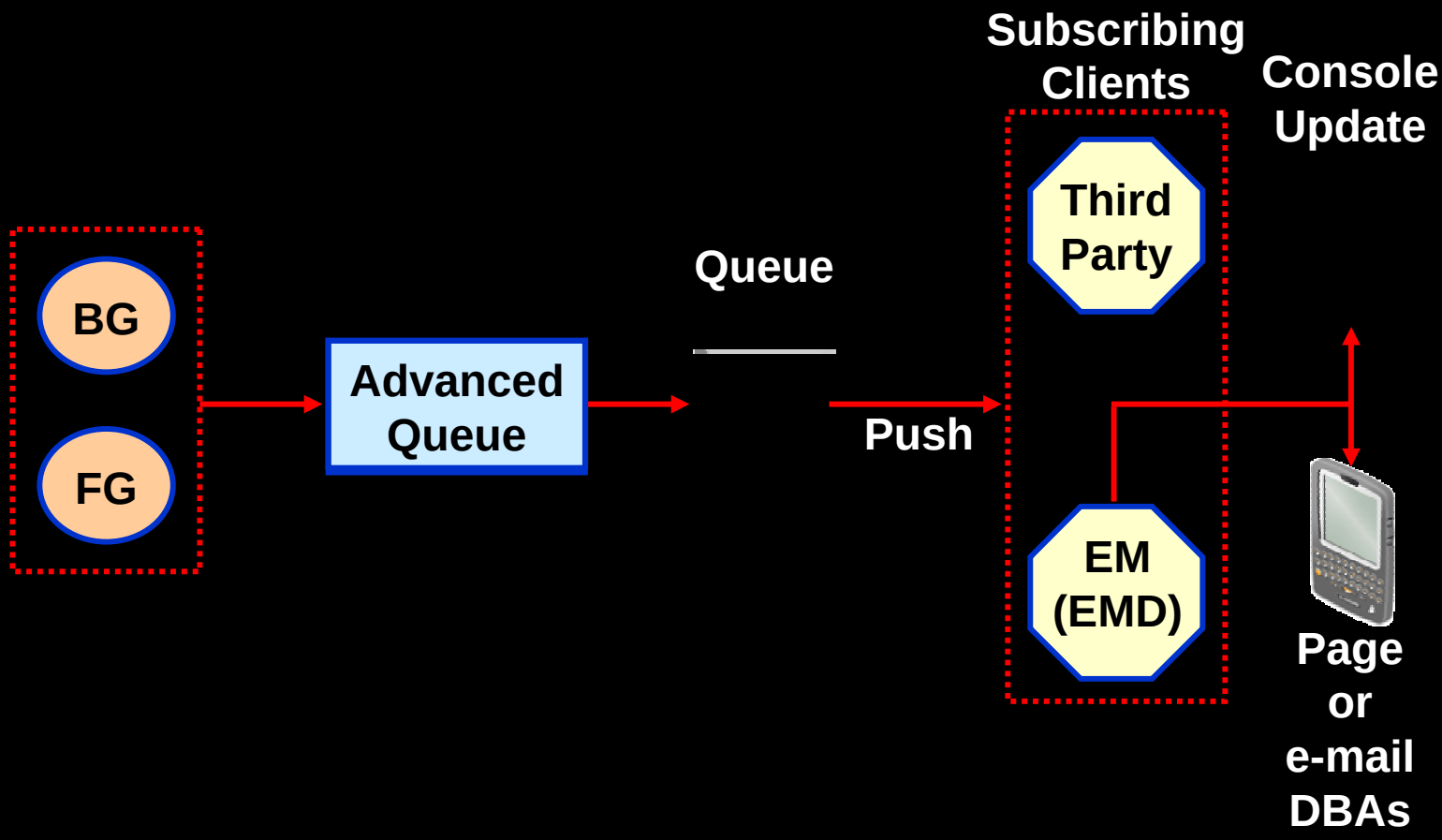
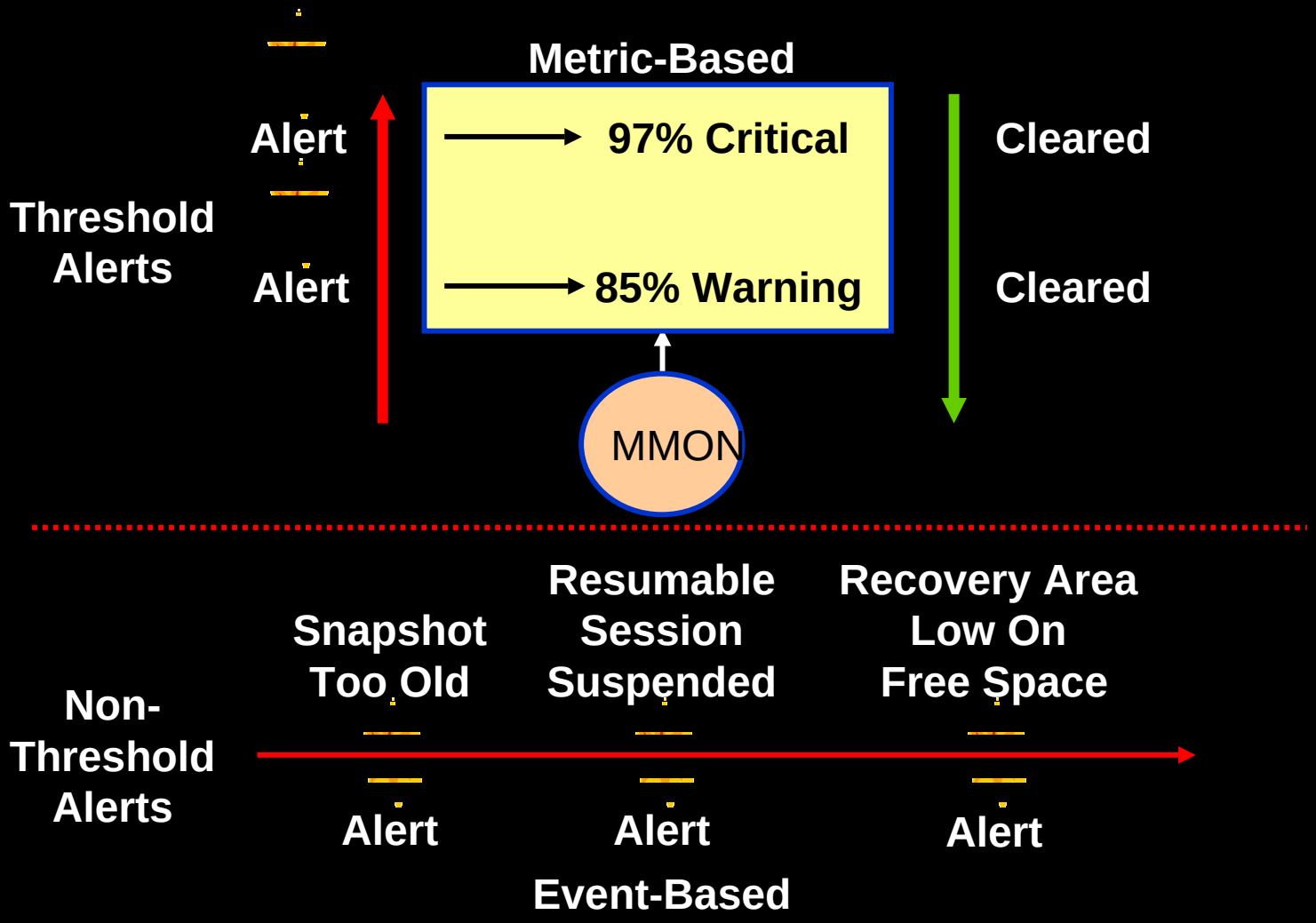
Server Alerts



Server Alerts Delivery Process

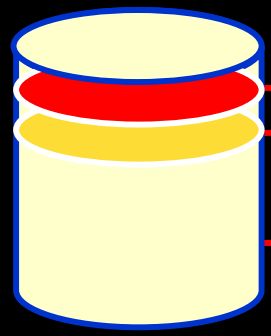


Server-Generated Alert Types



Out-of-the-box Alerts

Locally Managed

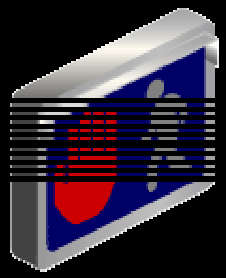


97% Critical

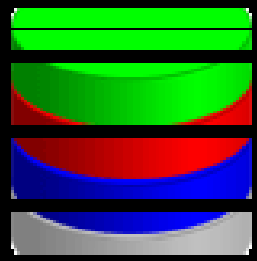
85% Warning

Tablespace

Tablespace Space Usage



Resumable Session Suspended



Recovery Area Low On Free Space

Snapshot Too Old

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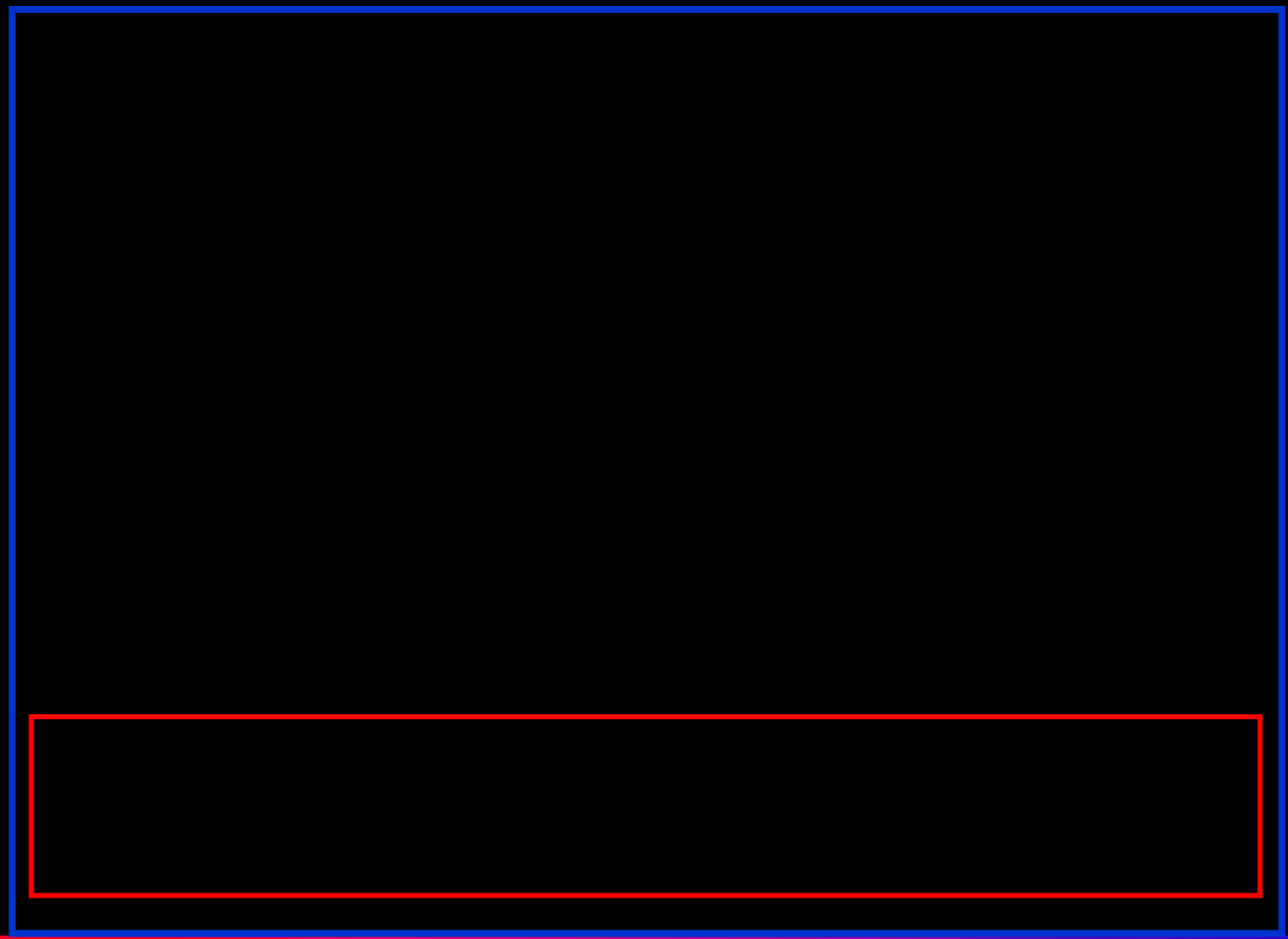
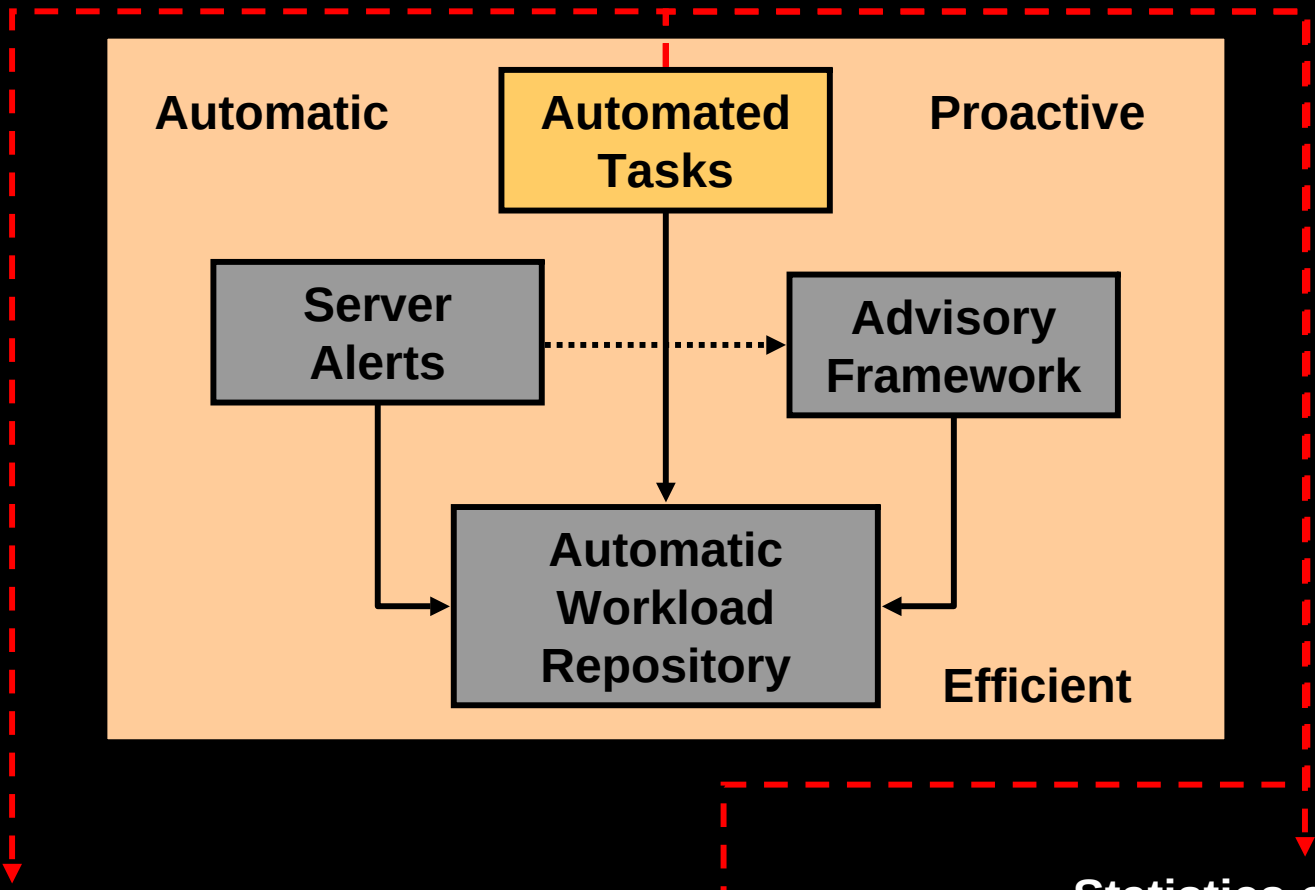
EM Interface to Alerts



Setting Alert Thresholds

Common Manageability Infrastructure: Automated Tasks



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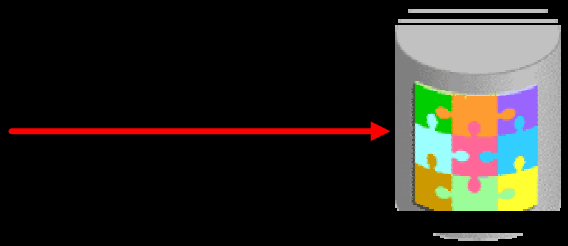
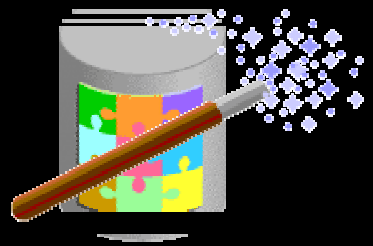
Automatic Optimizer Statistics Collection



DBA tracks and gathers statistics

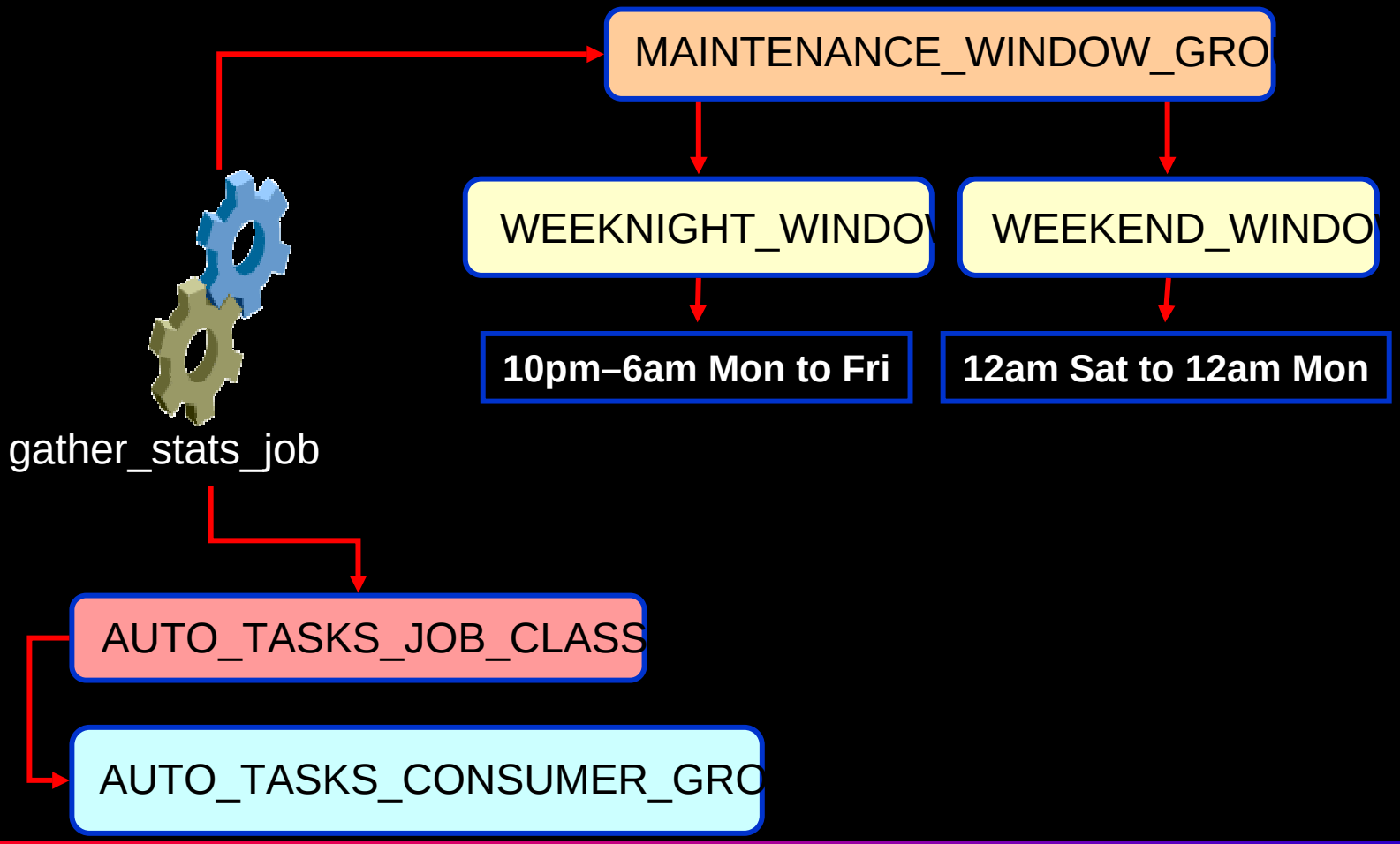


Automatic statistics collection

Resolves two issues

- Targets right objects
- Determines right samples

Gather Statistics Job



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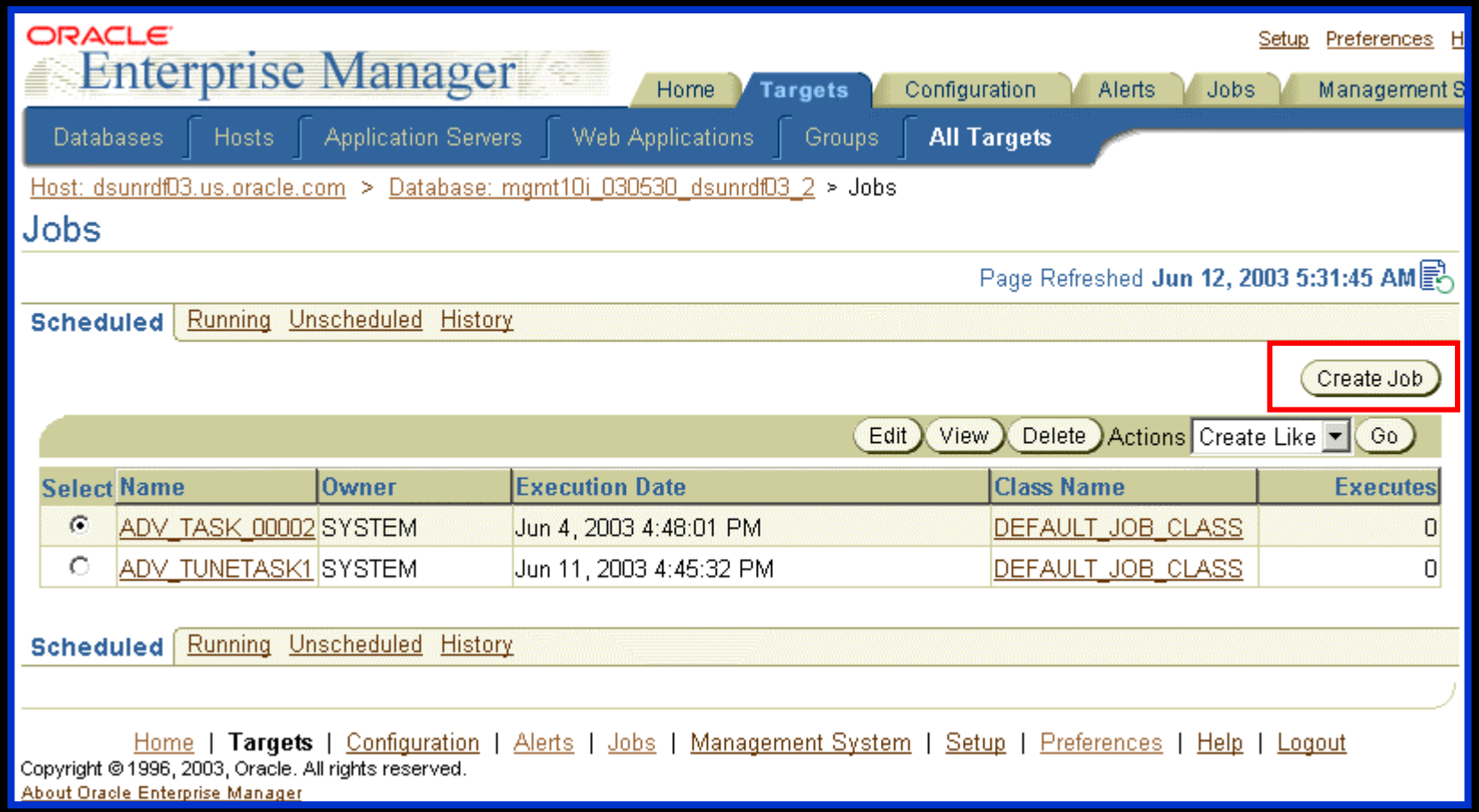
Adding New Tasks Using EM



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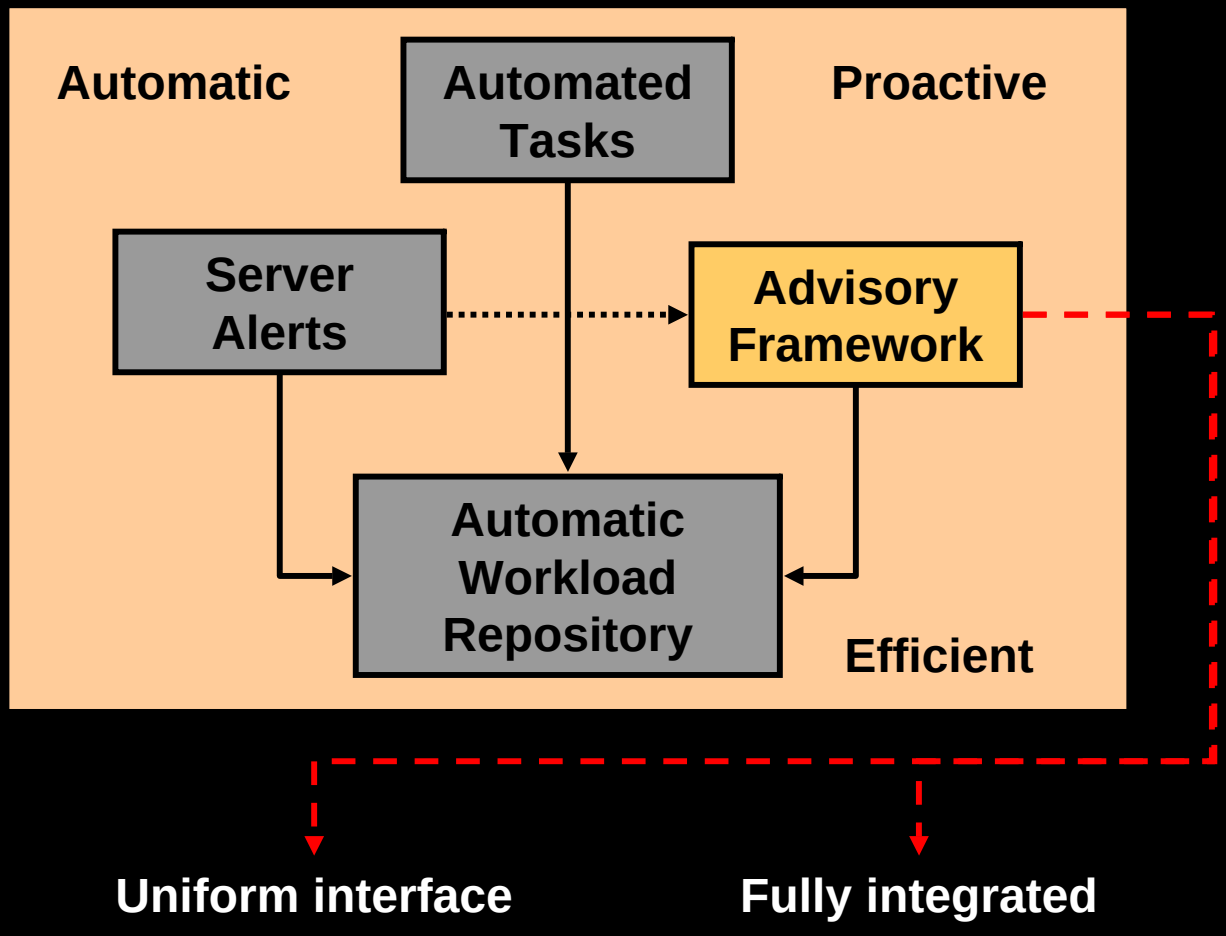
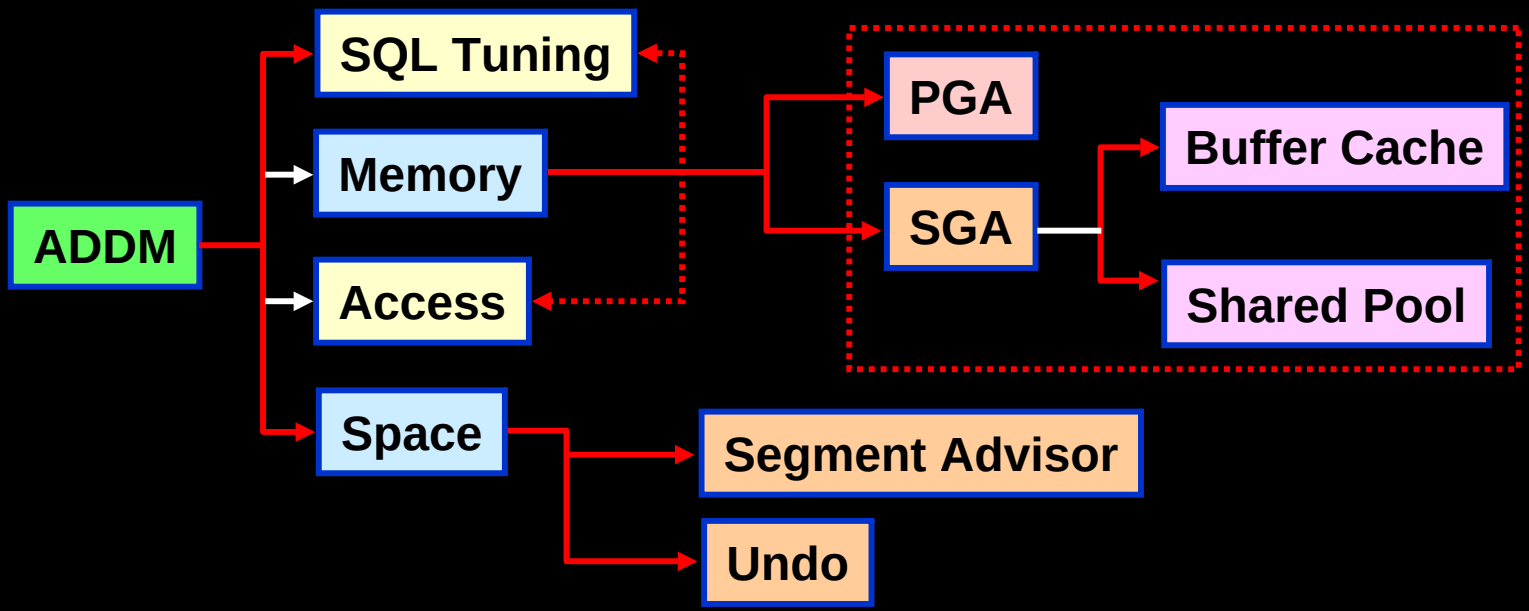
Common Manageability Infrastructure: Advisory Framework



Advisory Framework



Common data source

Seamless integration

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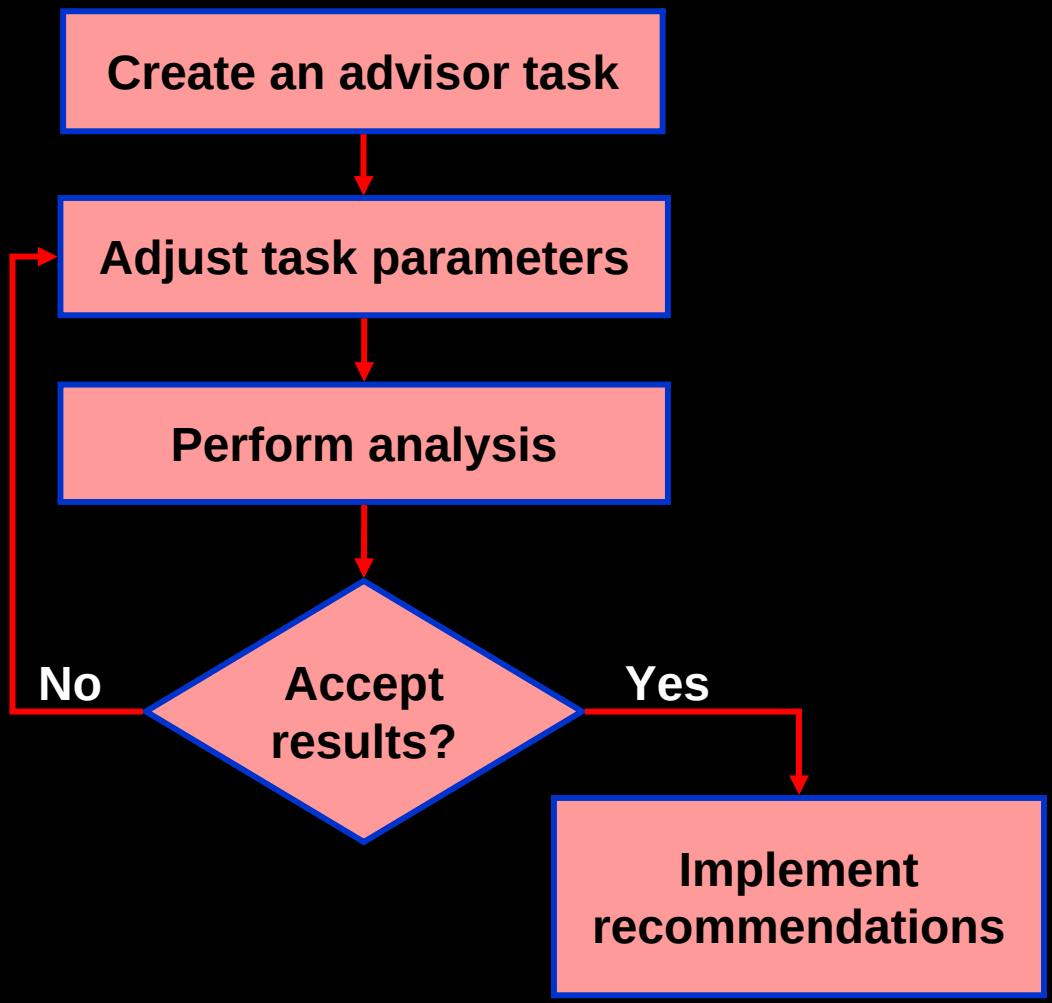
Guided Tuning Session

Enterprise Manager Database Console



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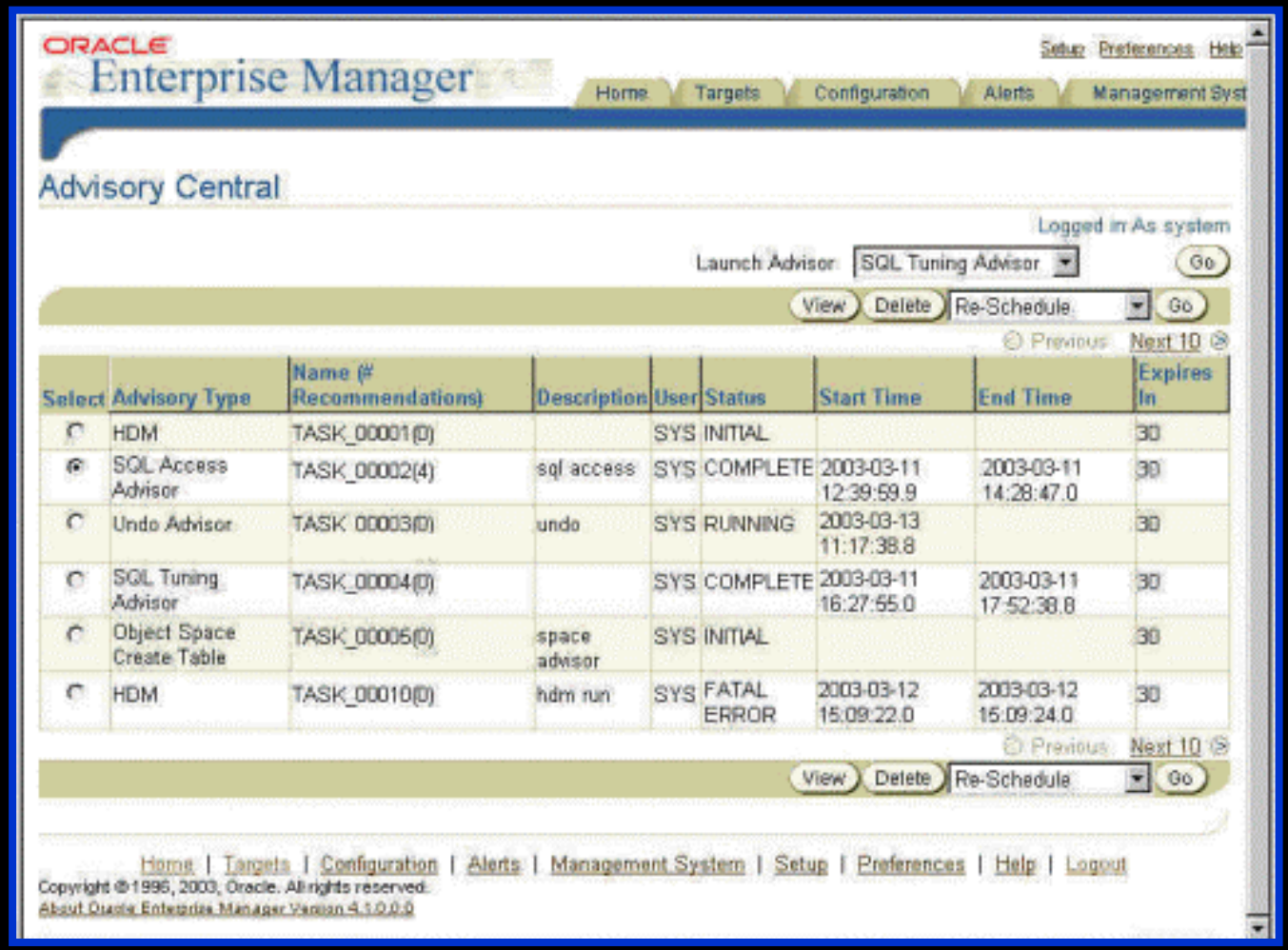
Advisory Central



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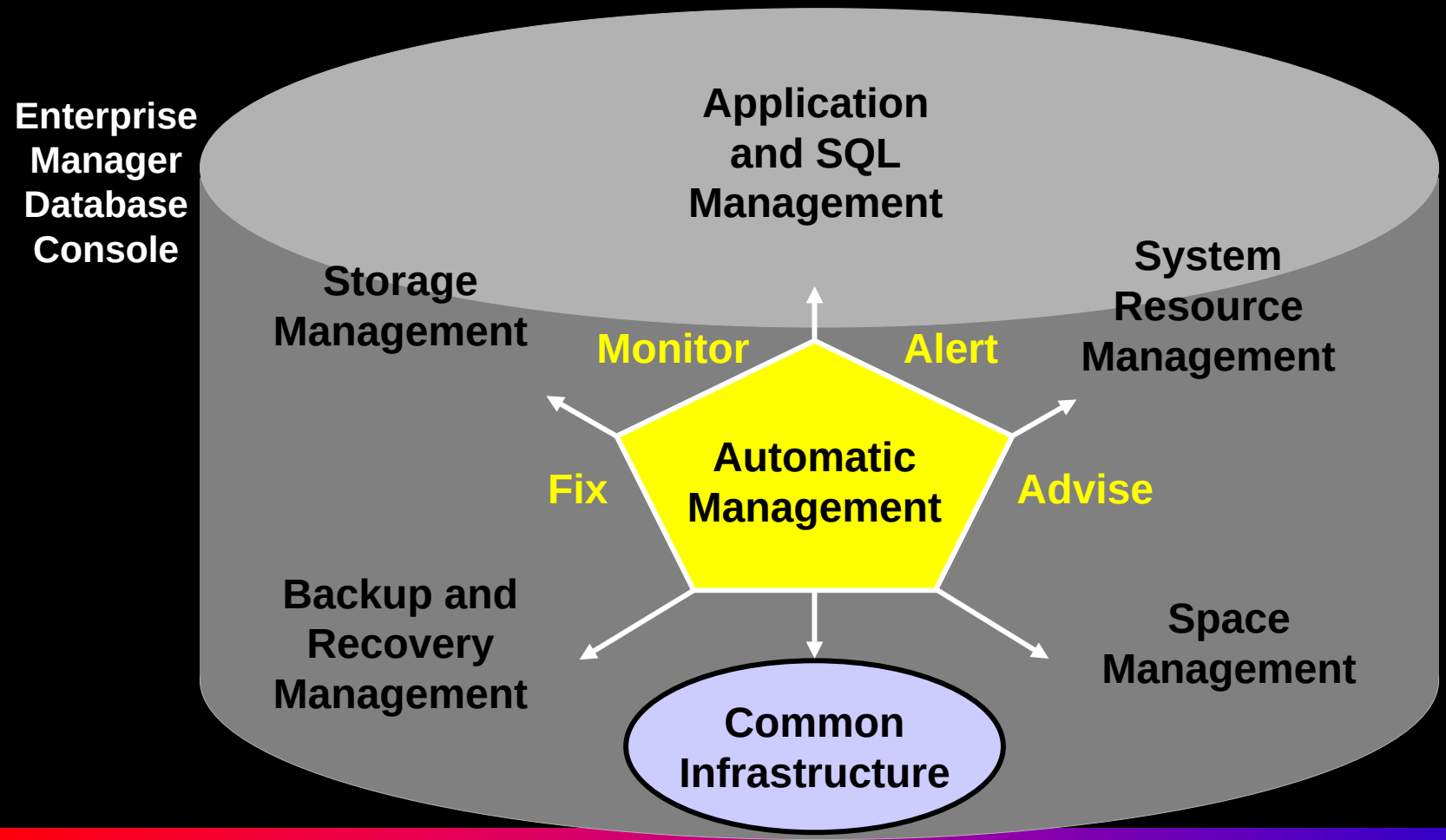
Solution: Self-Managing Database



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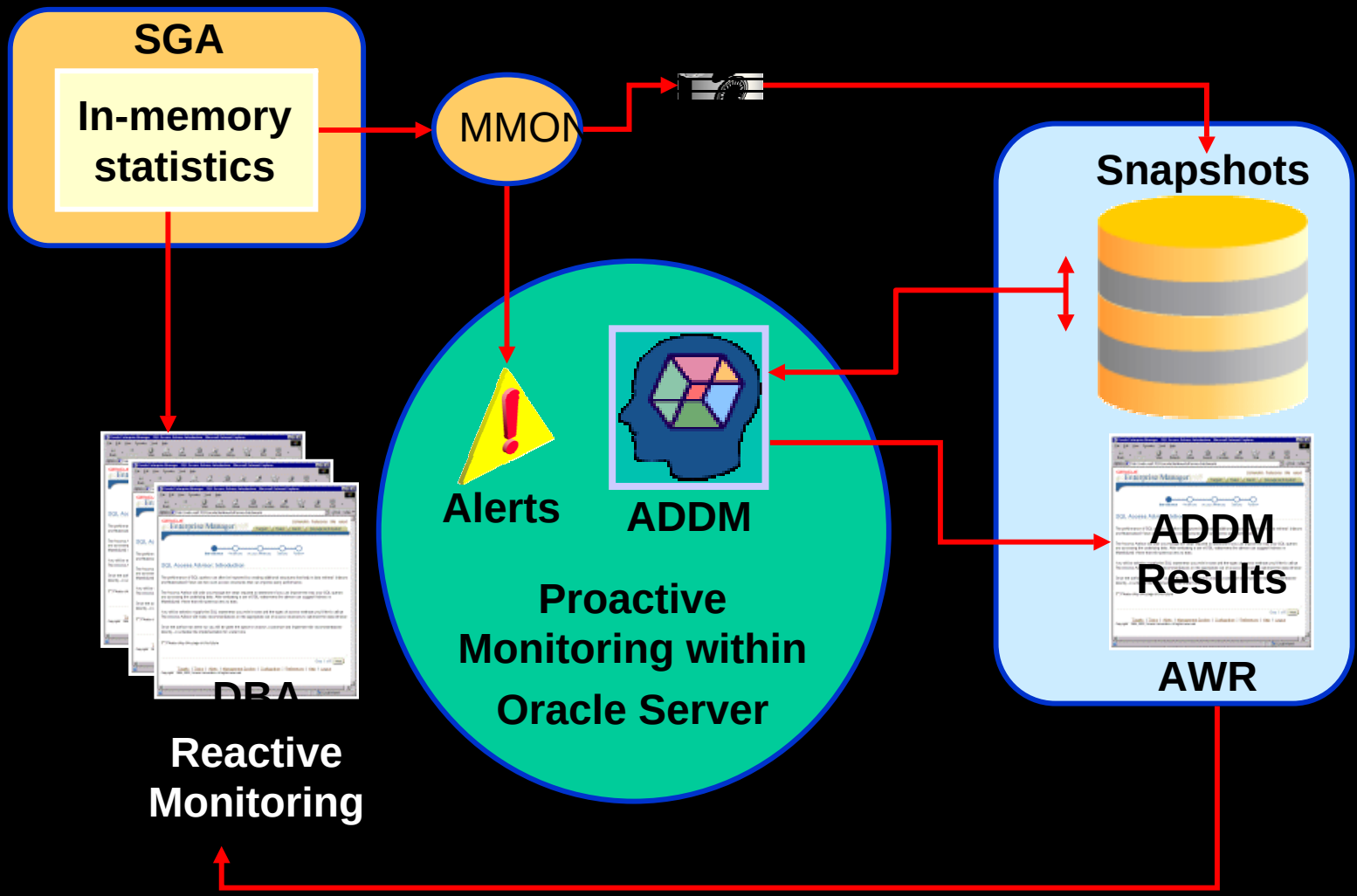
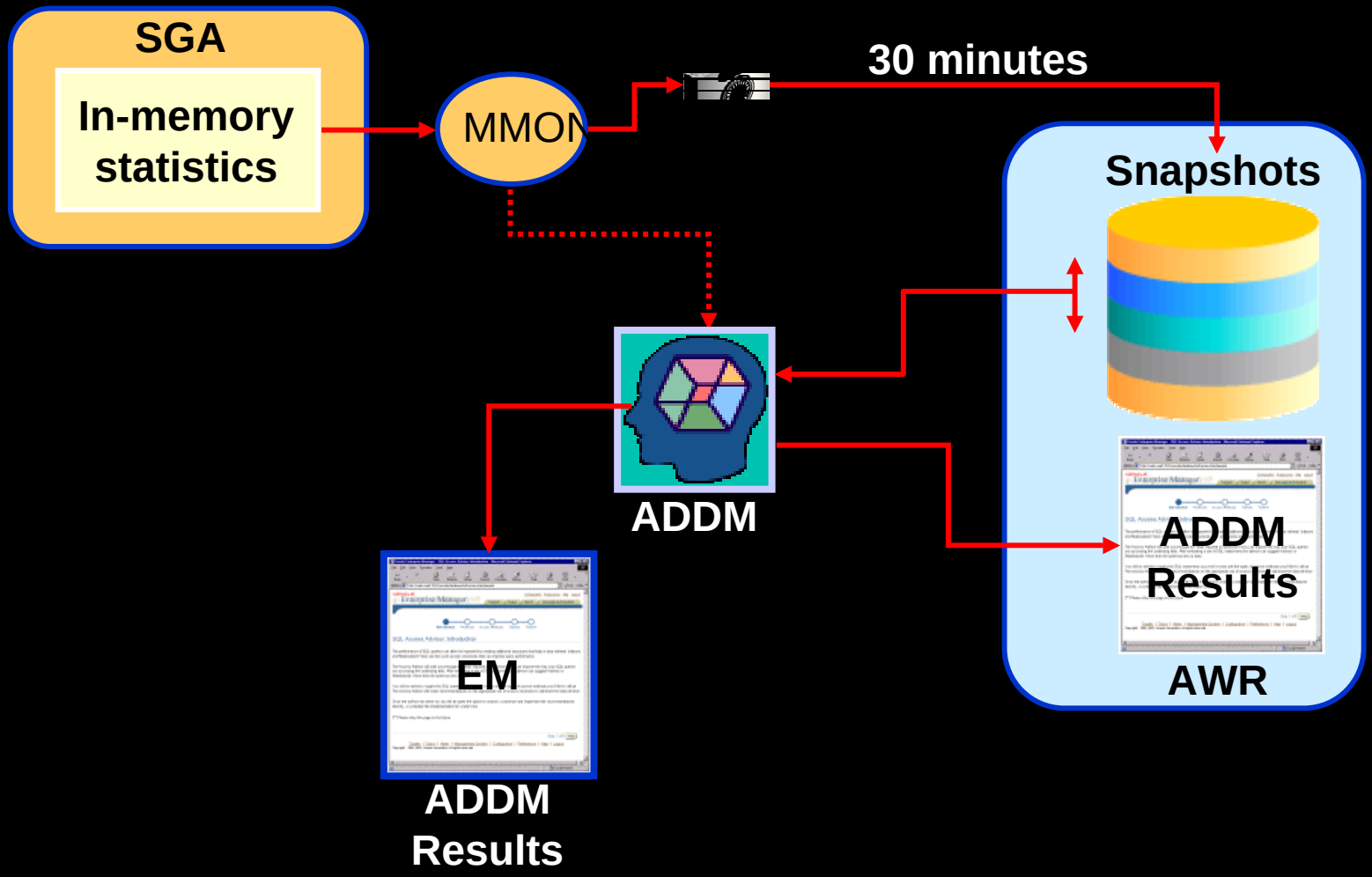
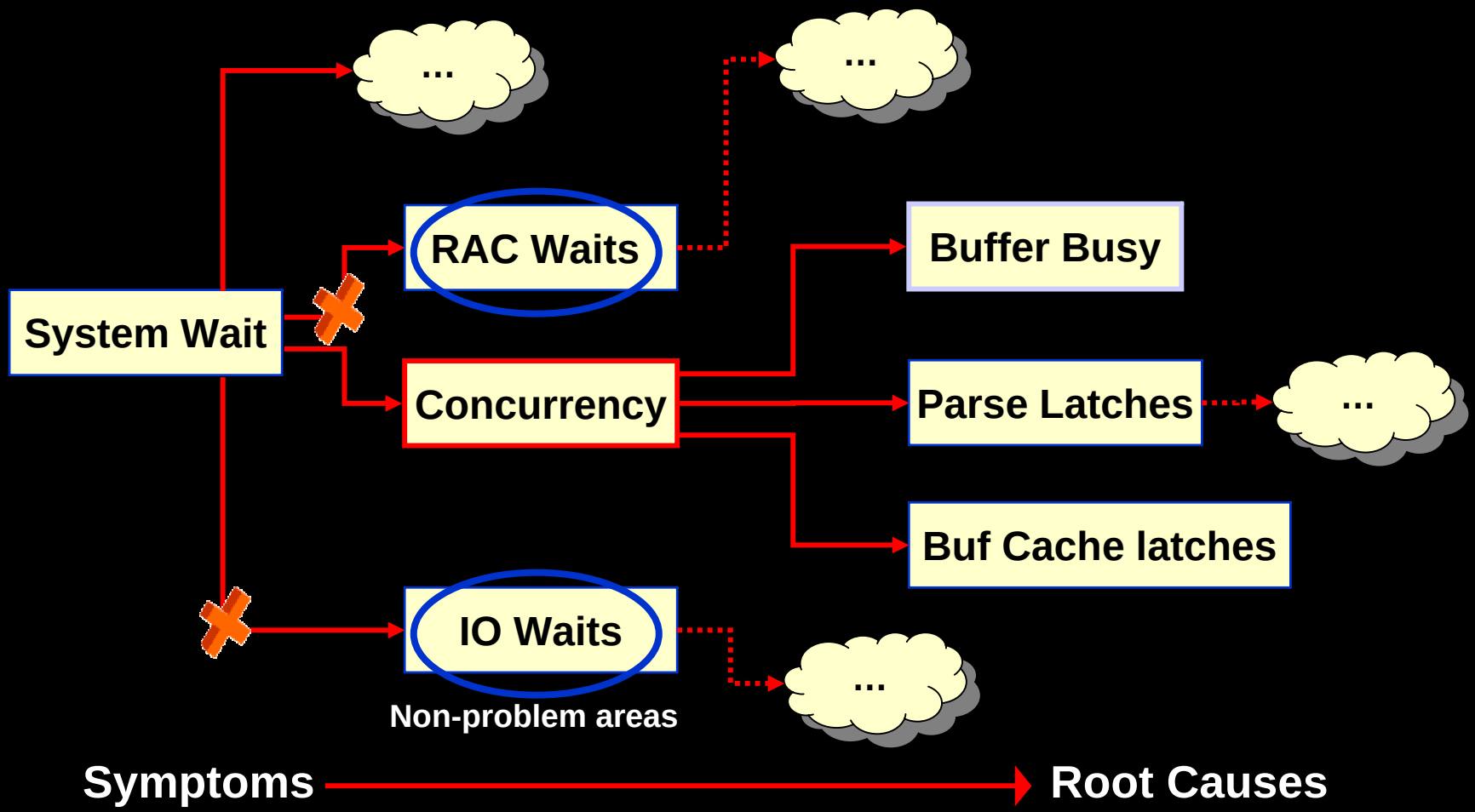
Performance Monitoring Solutions



ADDM Performance Monitoring



ADDM Problem Classification System



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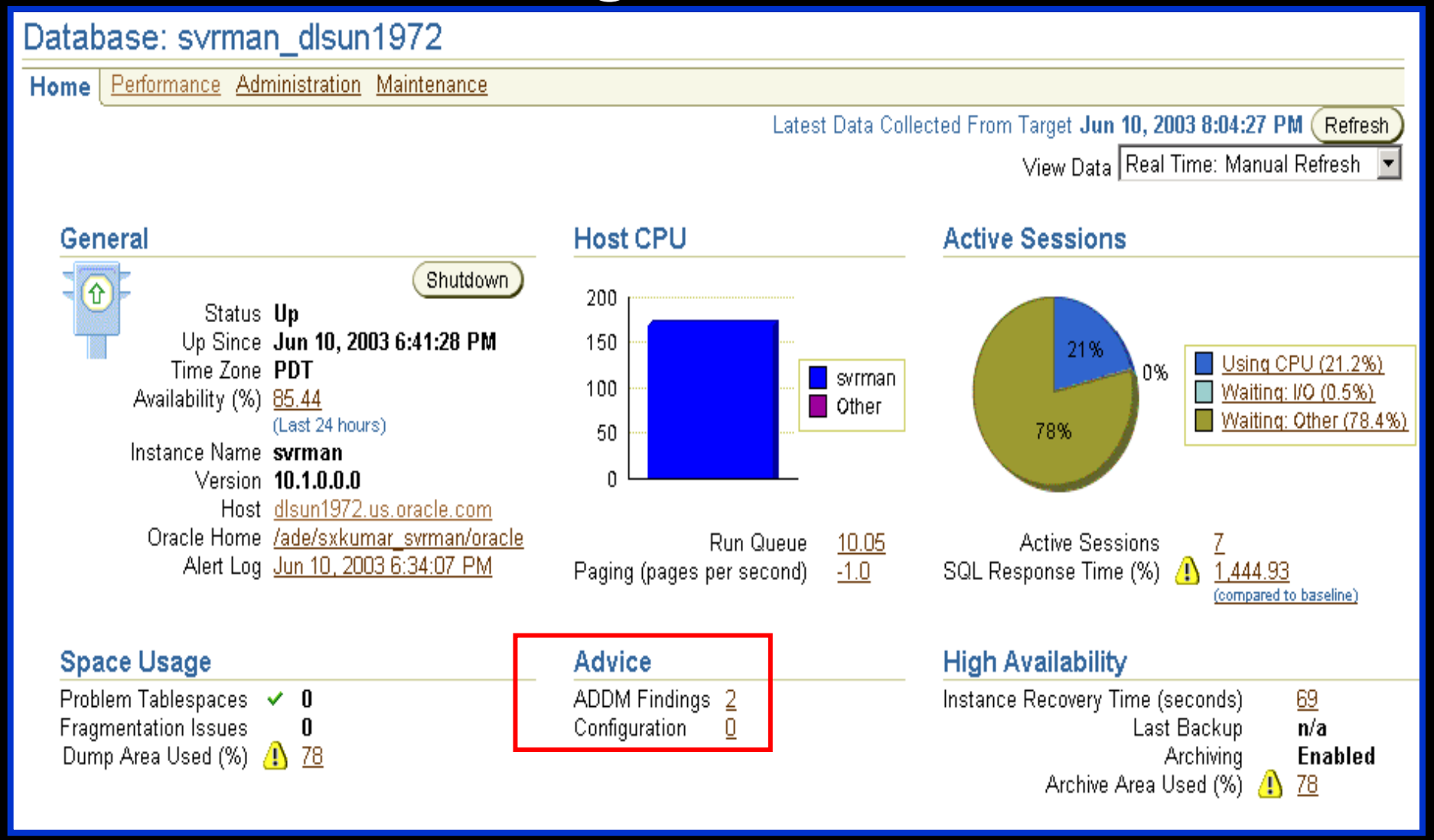
Accessing ADDM Advice



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ADDM Recommendations

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

ADDM Finding Details

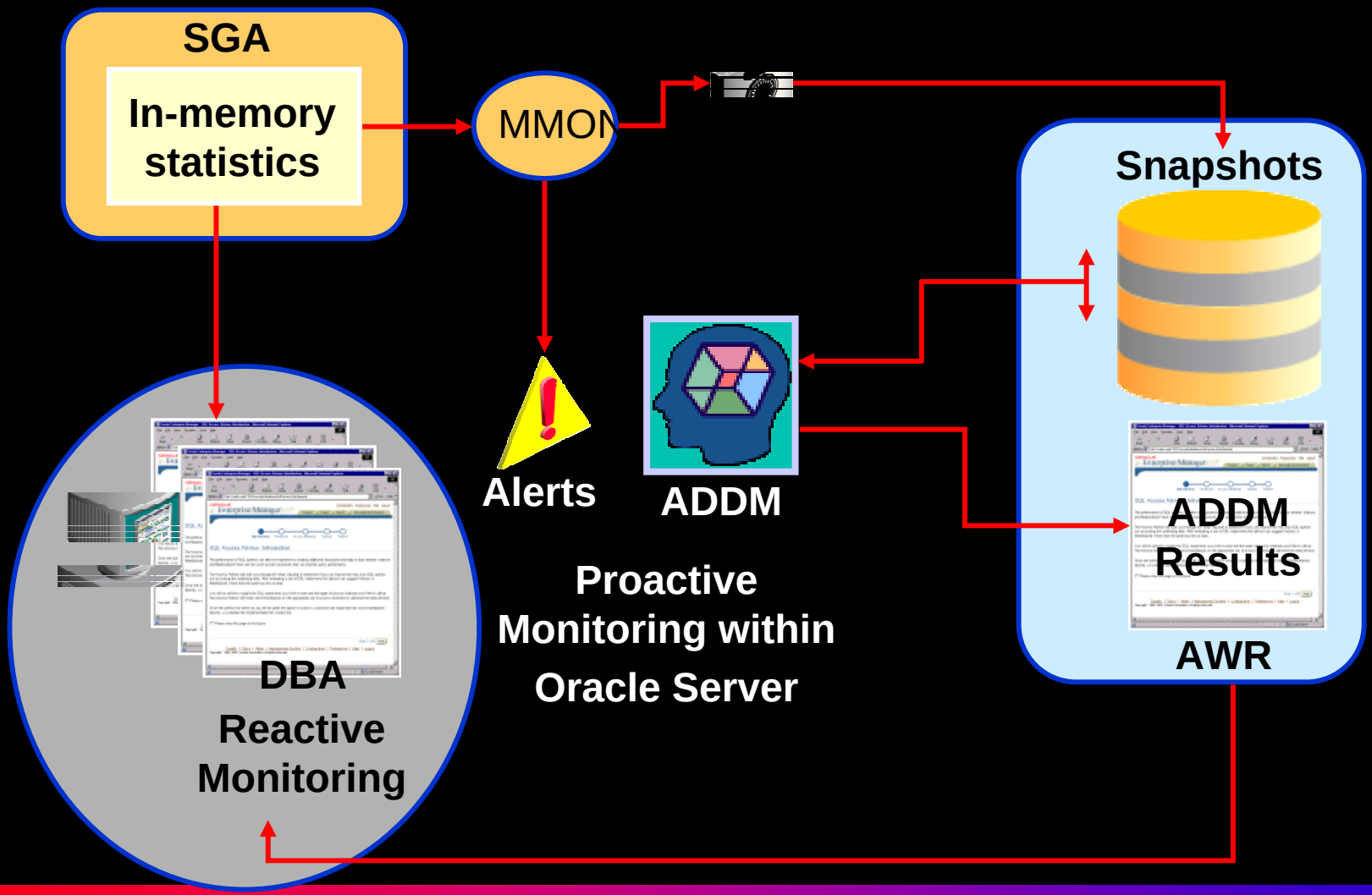
Analysis Start Time	**Jun 10, 2003 9:30:30 AM**
Analysis Duration (minutes)	**29.75**
Finding	**Read and write contention on database blocks was consuming significant database time.**
Database Time (minutes)	**274.16**
Impact (minutes)	**98.23**
Impact (%)	**35.83**

Recommendations

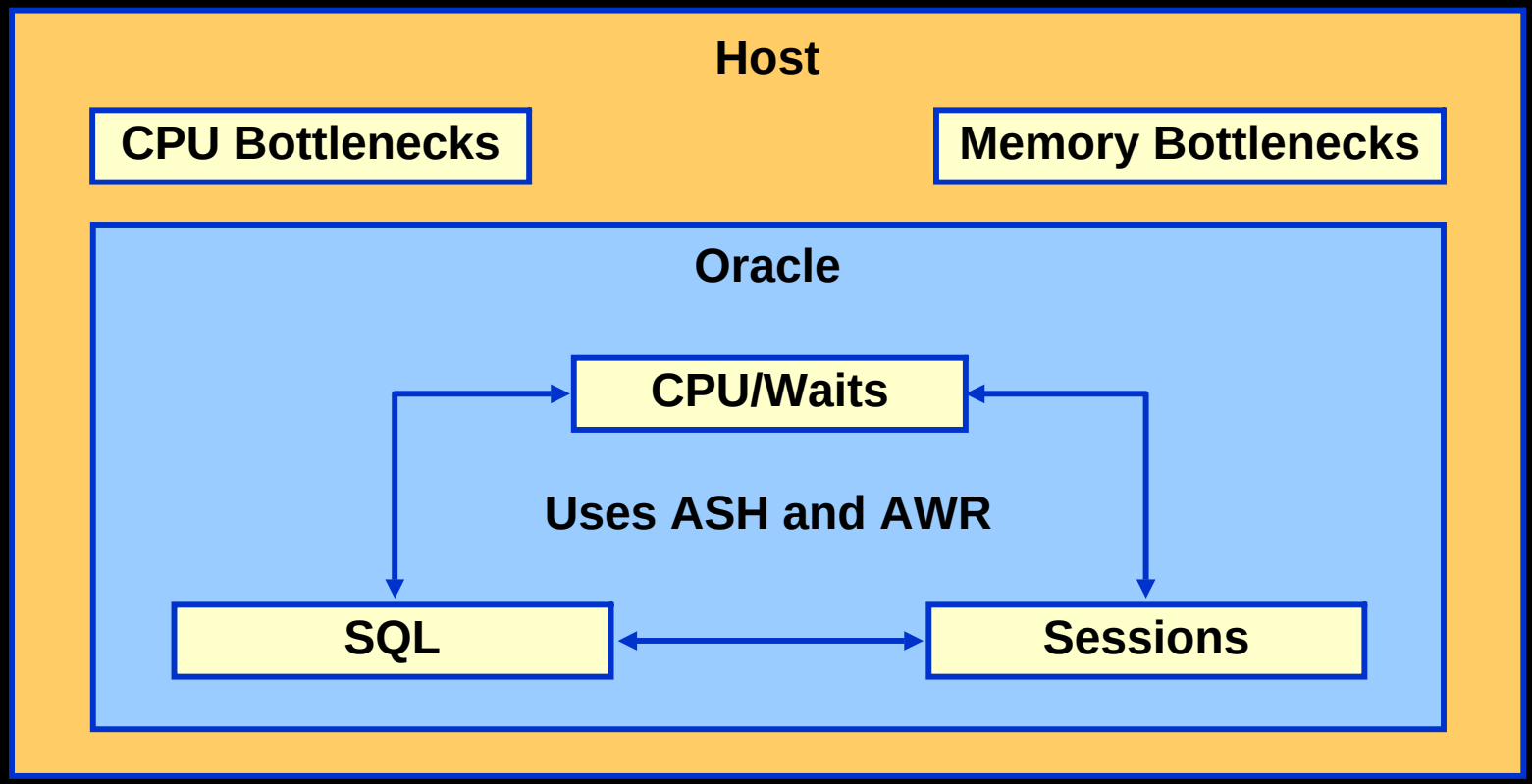
Show All Details | Hide All Details

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



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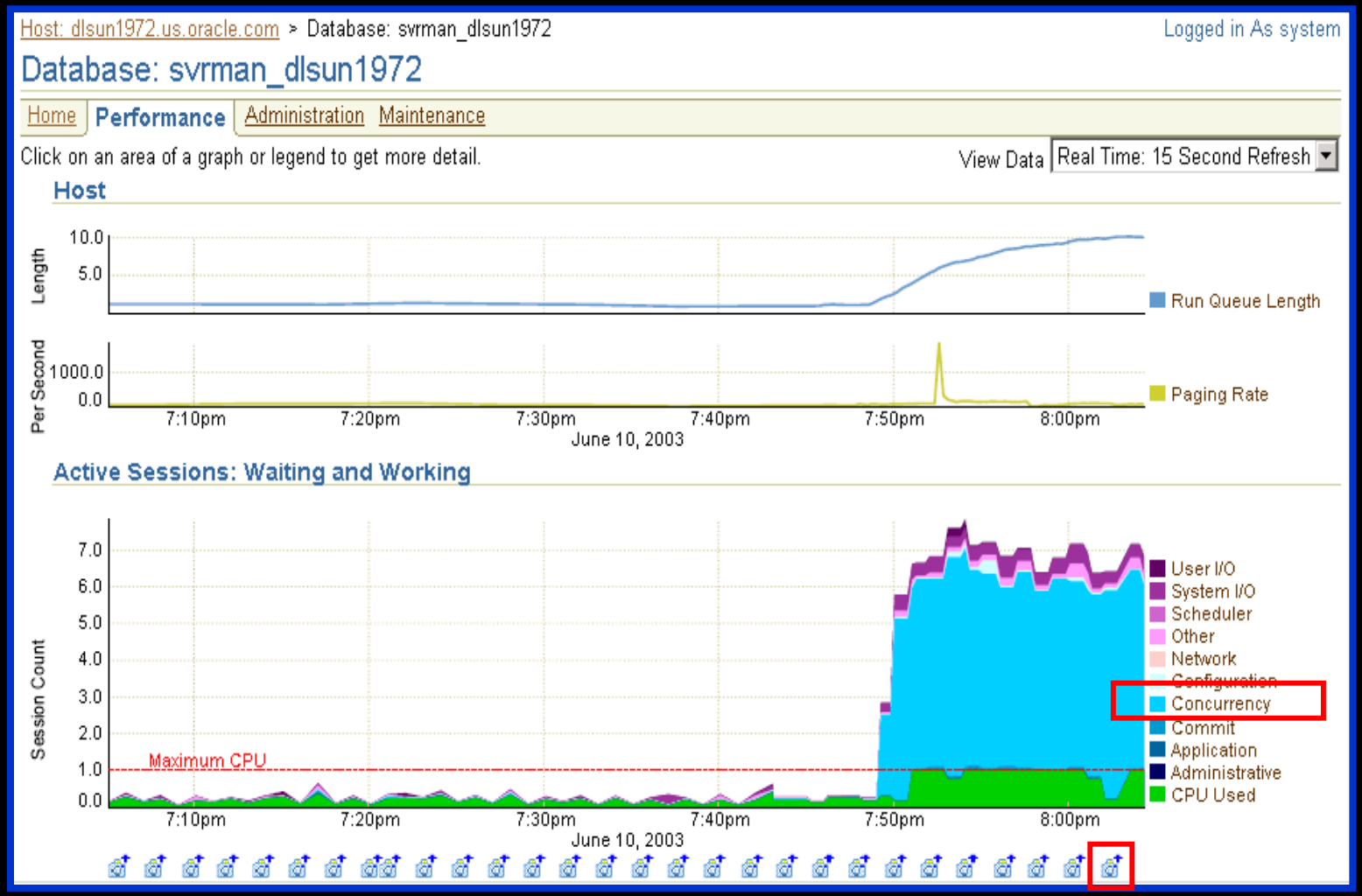
Database Performance Page



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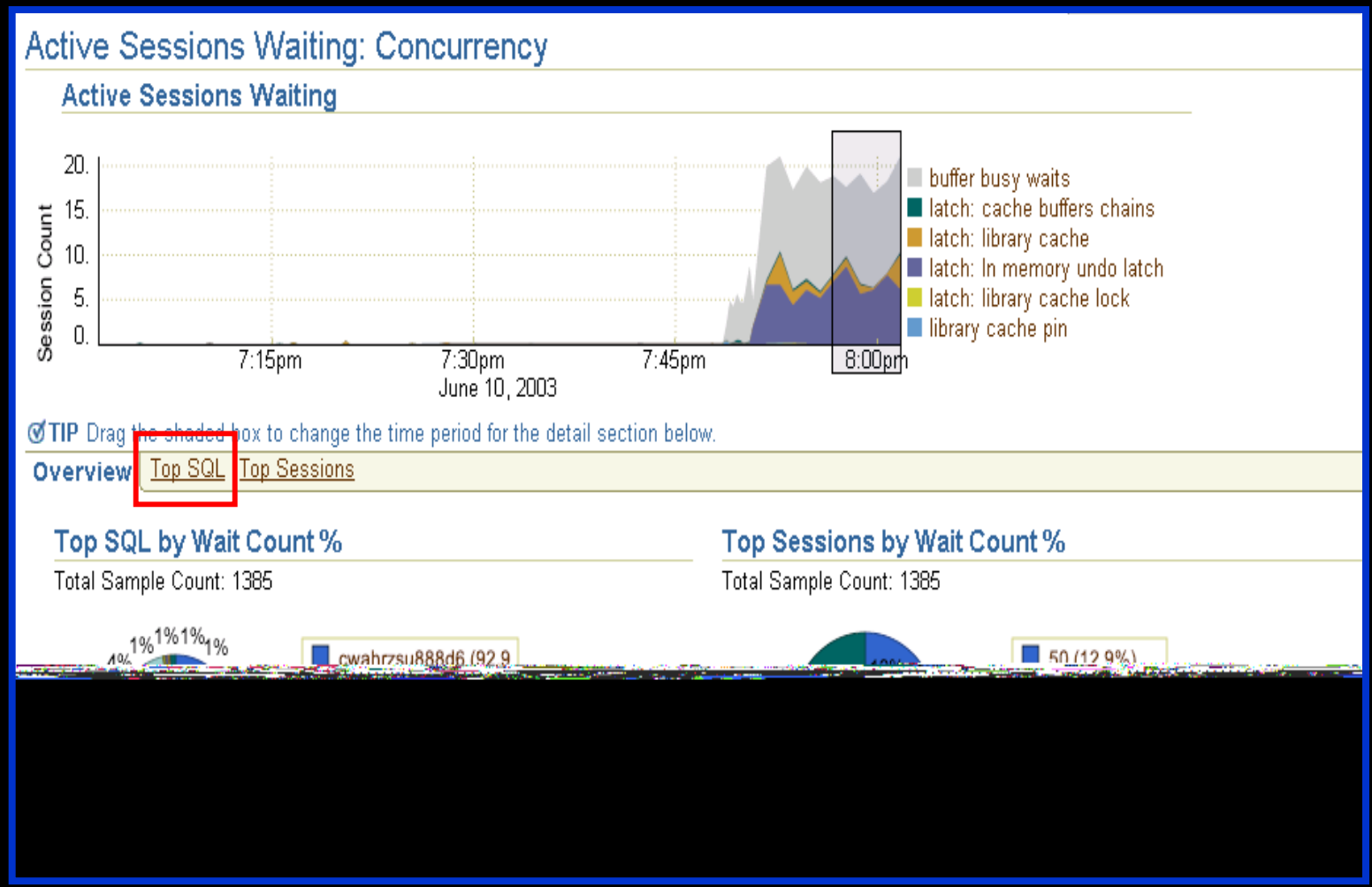
Concurrency Wait Class: Drill Down



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