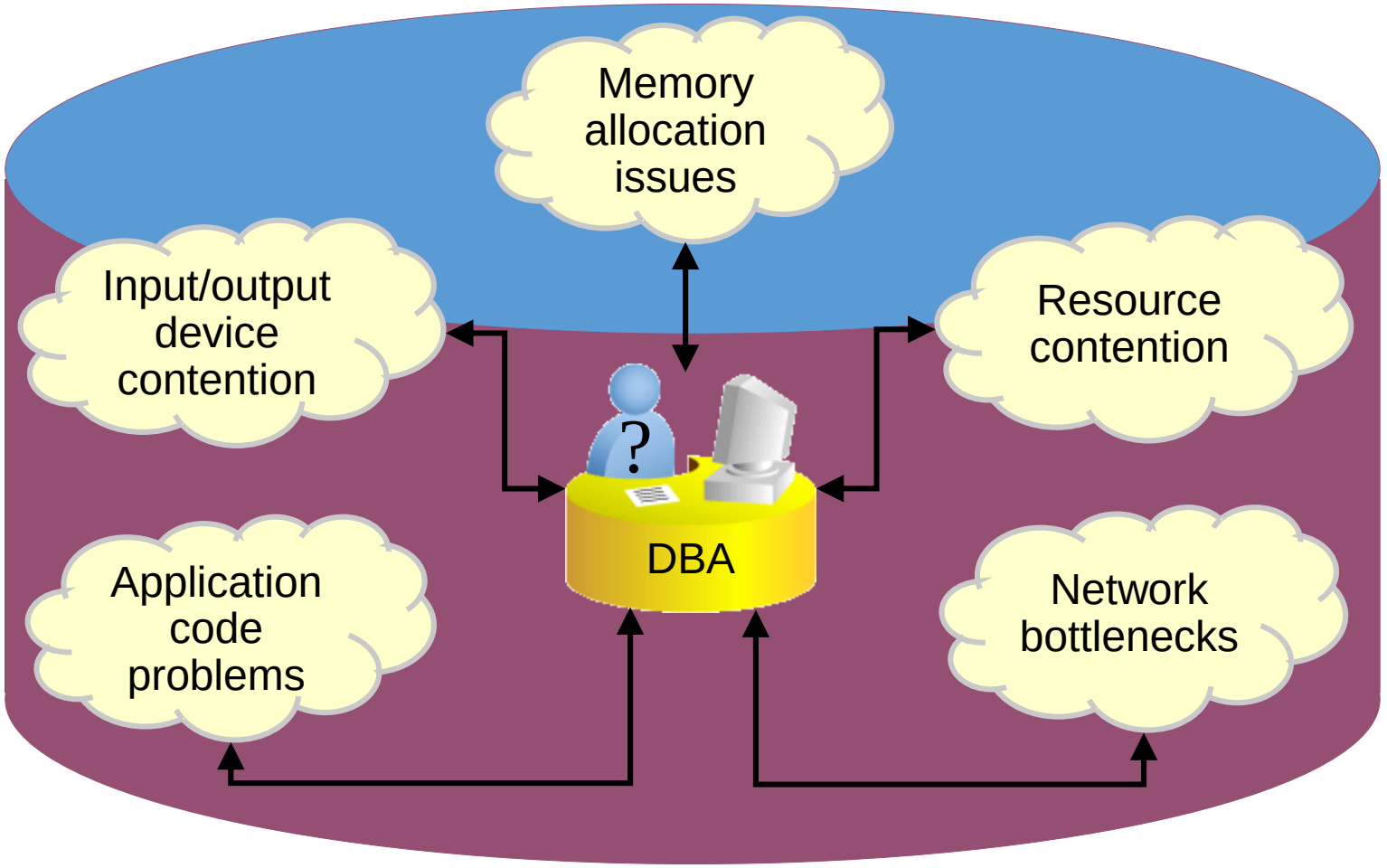
Monitoring and Tuning Database Performance

Objectives

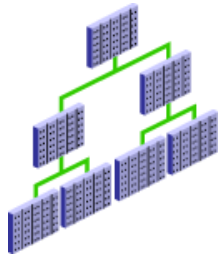
- After completing this lesson, you should be able to:
  - Describe the activities that you perform to manage database performance
  - Use Enterprise Manager Database Express and performance views to monitor database instance performance
  - Describe the Oracle performance tuning methodology
  - Describe the server statistics and metrics that are collected by the Oracle Database server
  - Configure and monitor memory components for optimal performance

Performance Management Activities



Performance Planning Considerations

System Architecture Investment



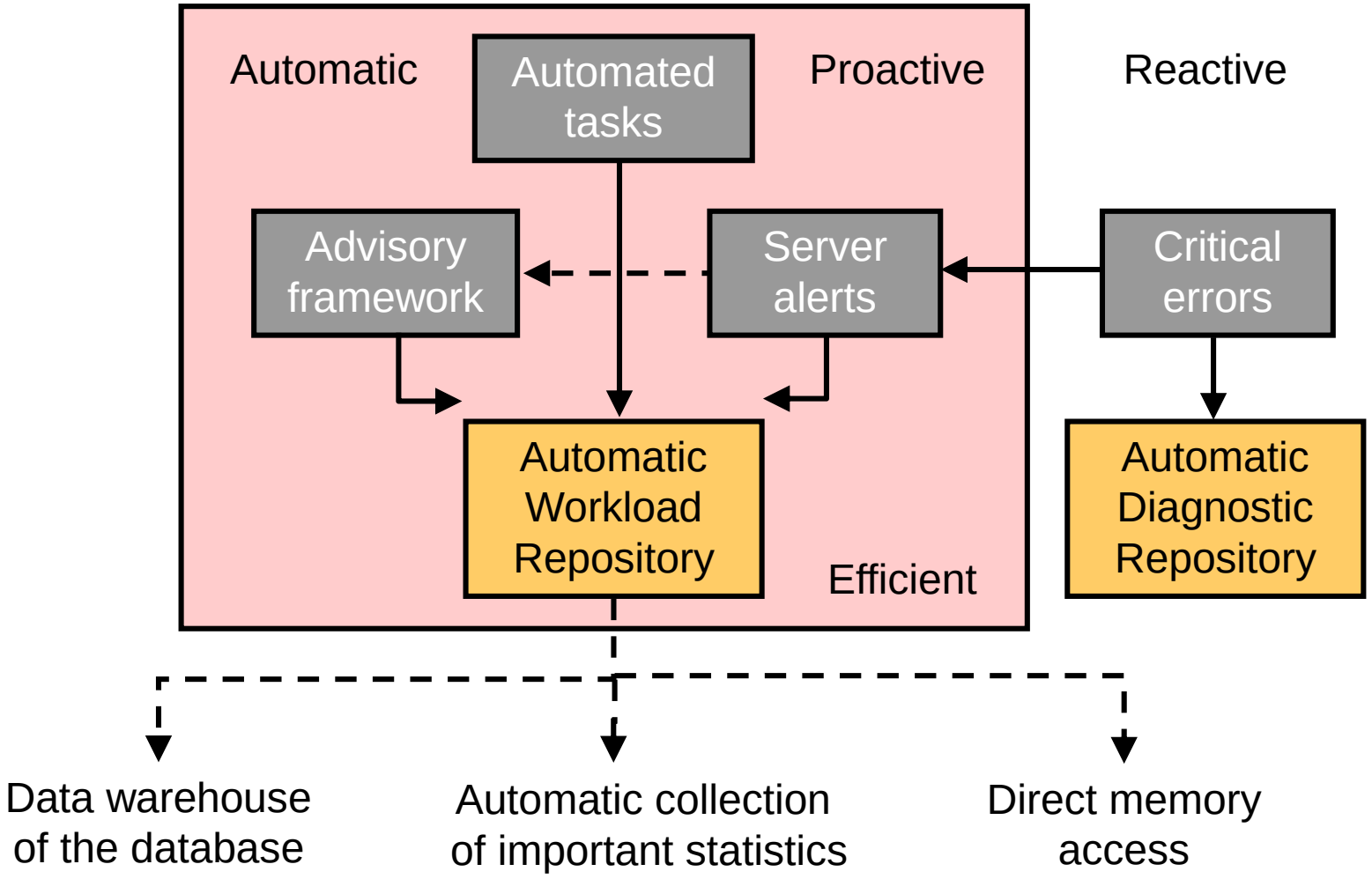
Application Design Principles

Scalability

Workload Testing

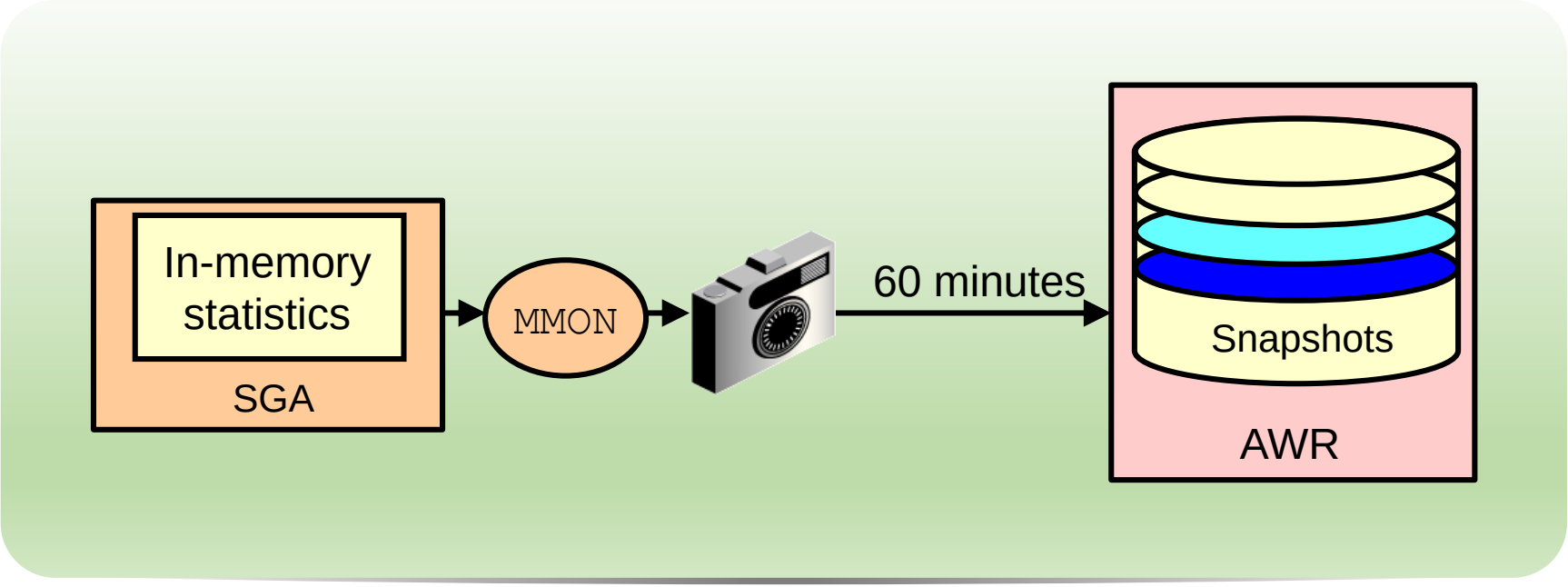
New Application Deployment

Database Maintenance



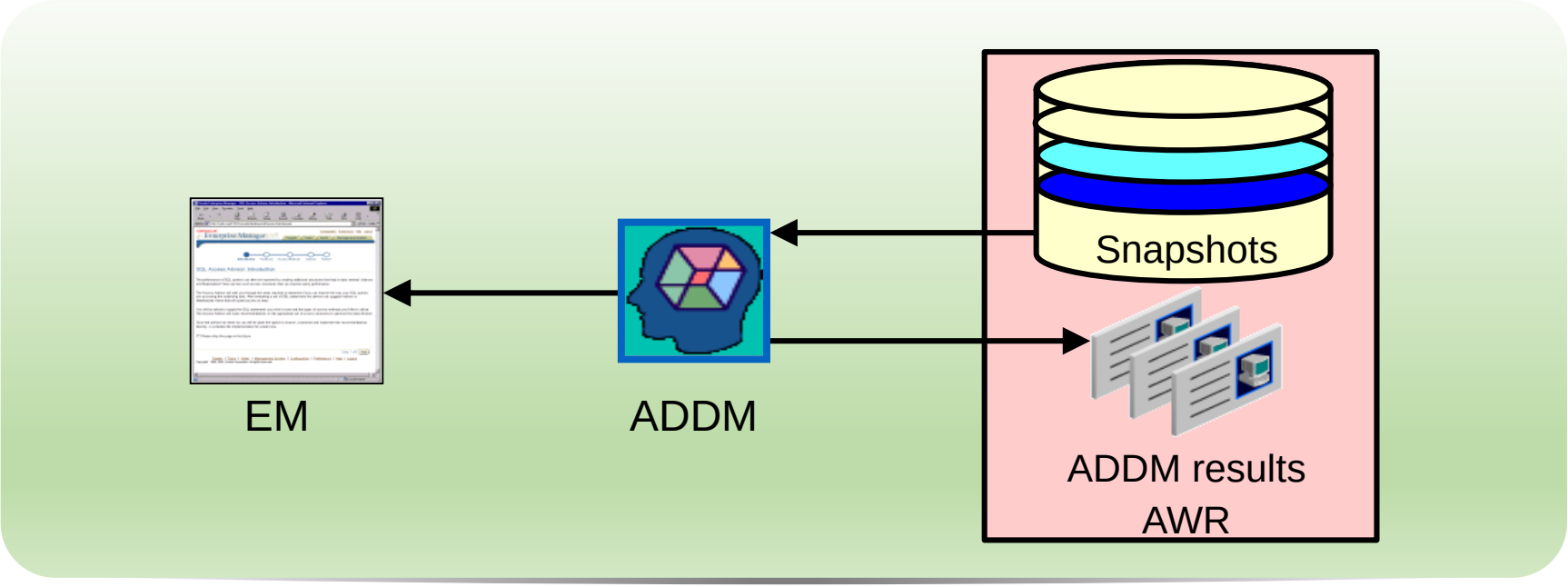
Automatic Workload Repository (AWR)

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

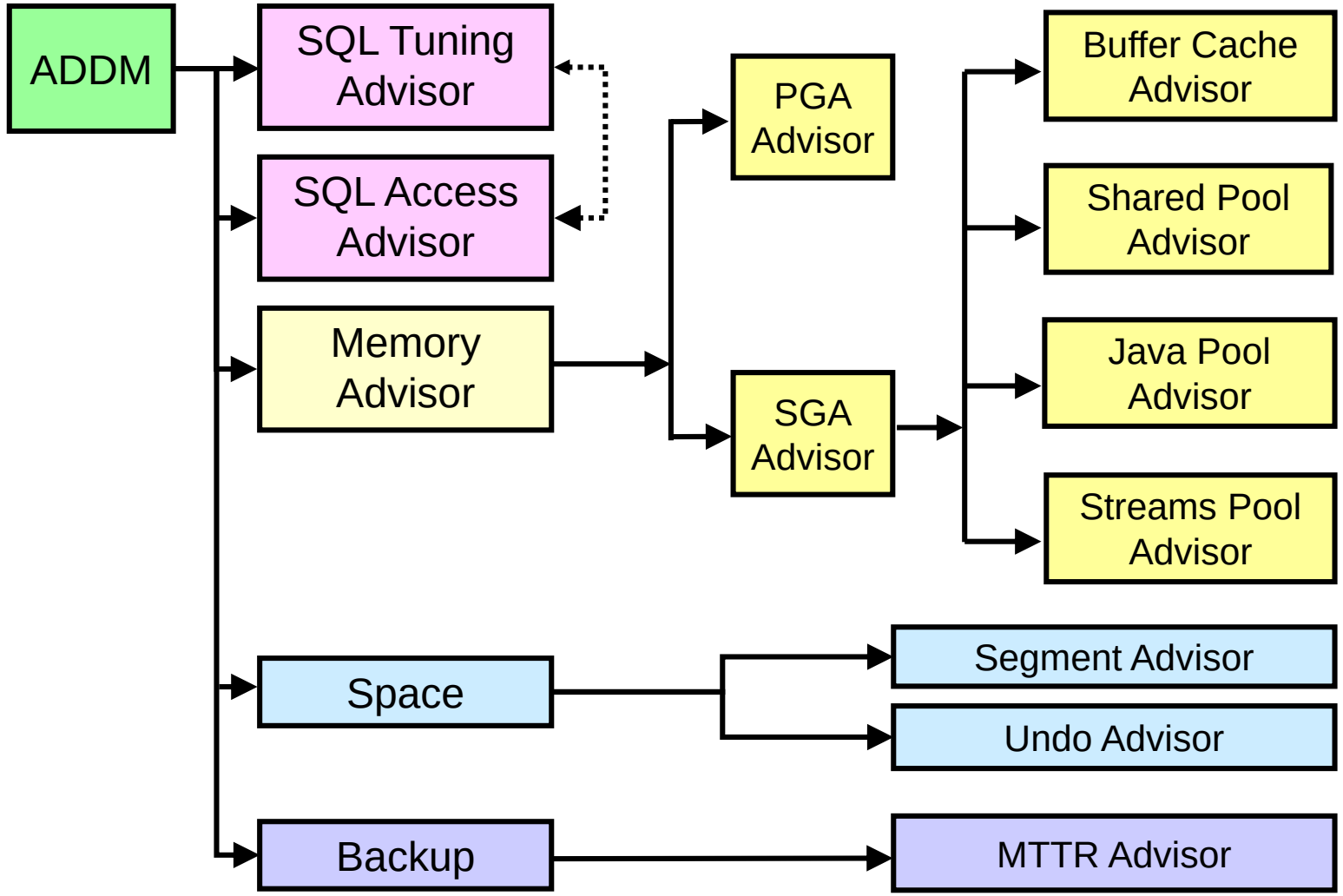


Automatic Database Diagnostic Monitor (ADDM)

- Runs after each AWR snapshot
- Monitors the instance; detects bottlenecks
- Stores results in the AWR



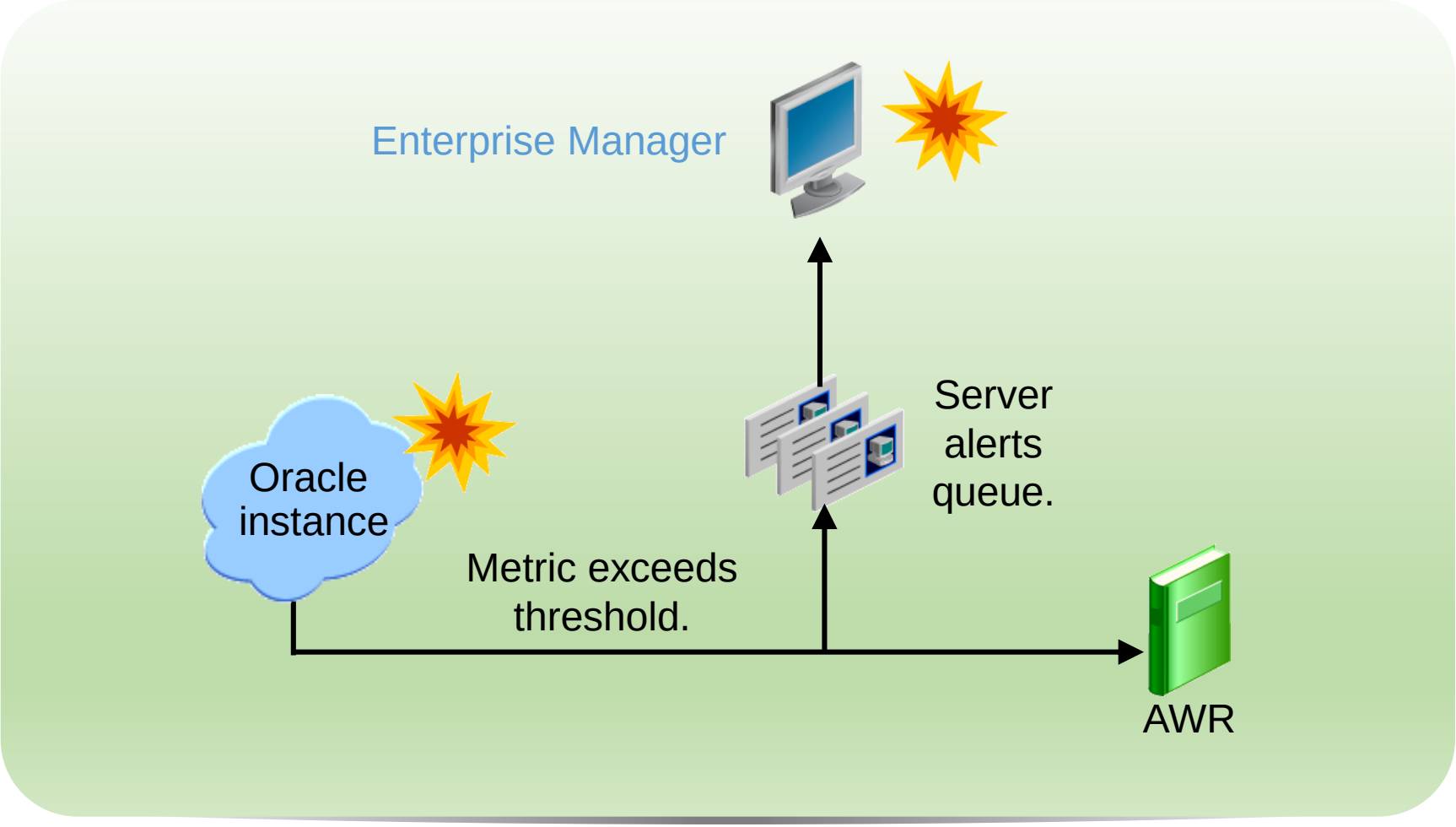
Advisory Framework



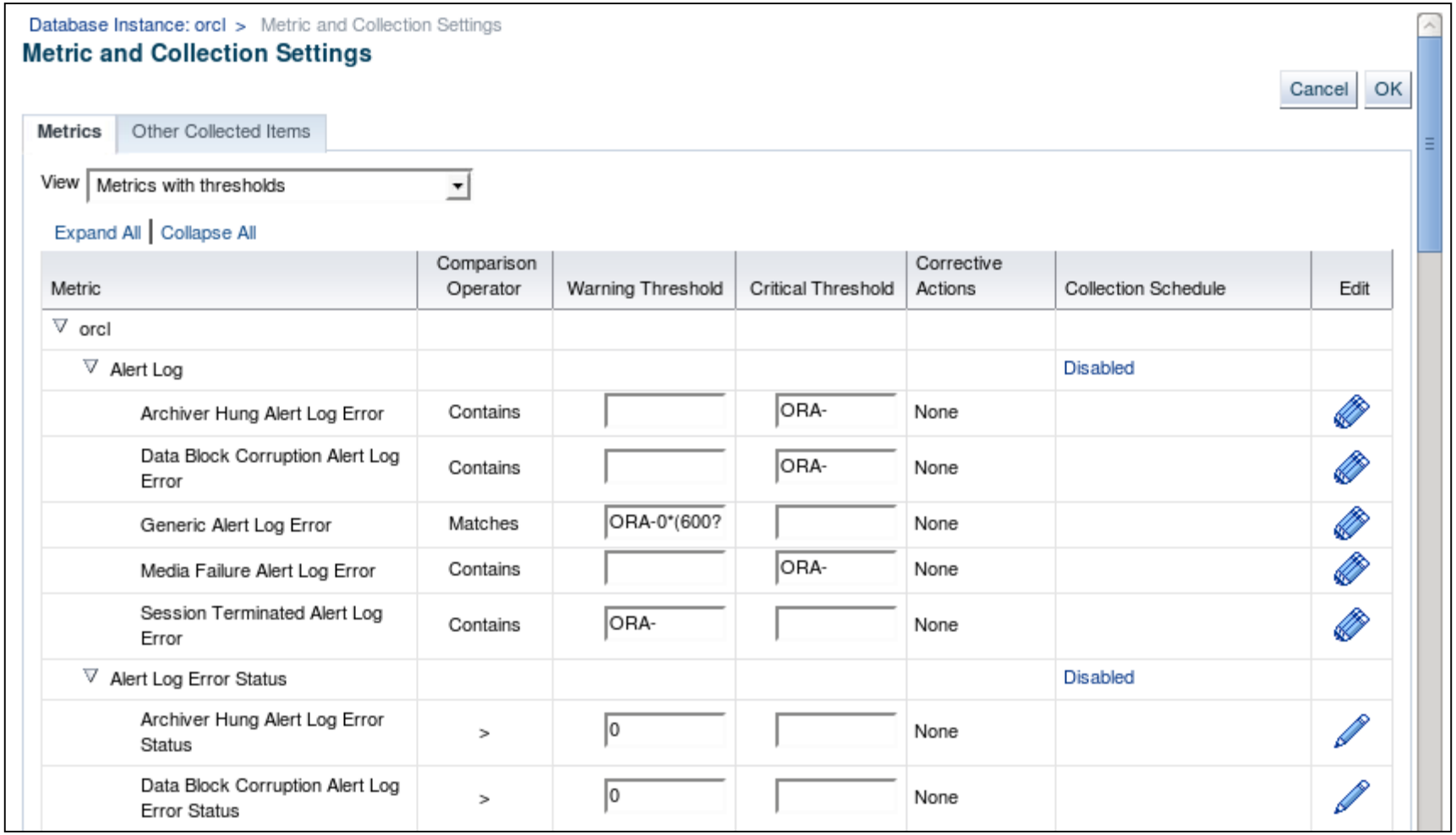
Automated Maintenance Tasks

- Autotask maintenance process:
  1. Maintenance window opens.
  2. Autotask background process schedules jobs.
  3. Scheduler initiates jobs.
  4. Resource Manager limits the impact of Autotask jobs.
- Default Autotask maintenance jobs:
  - Gathering optimizer statistics
  - Automatic Segment Advisor
  - Automatic SQL Advisor

Server-Generated Alerts



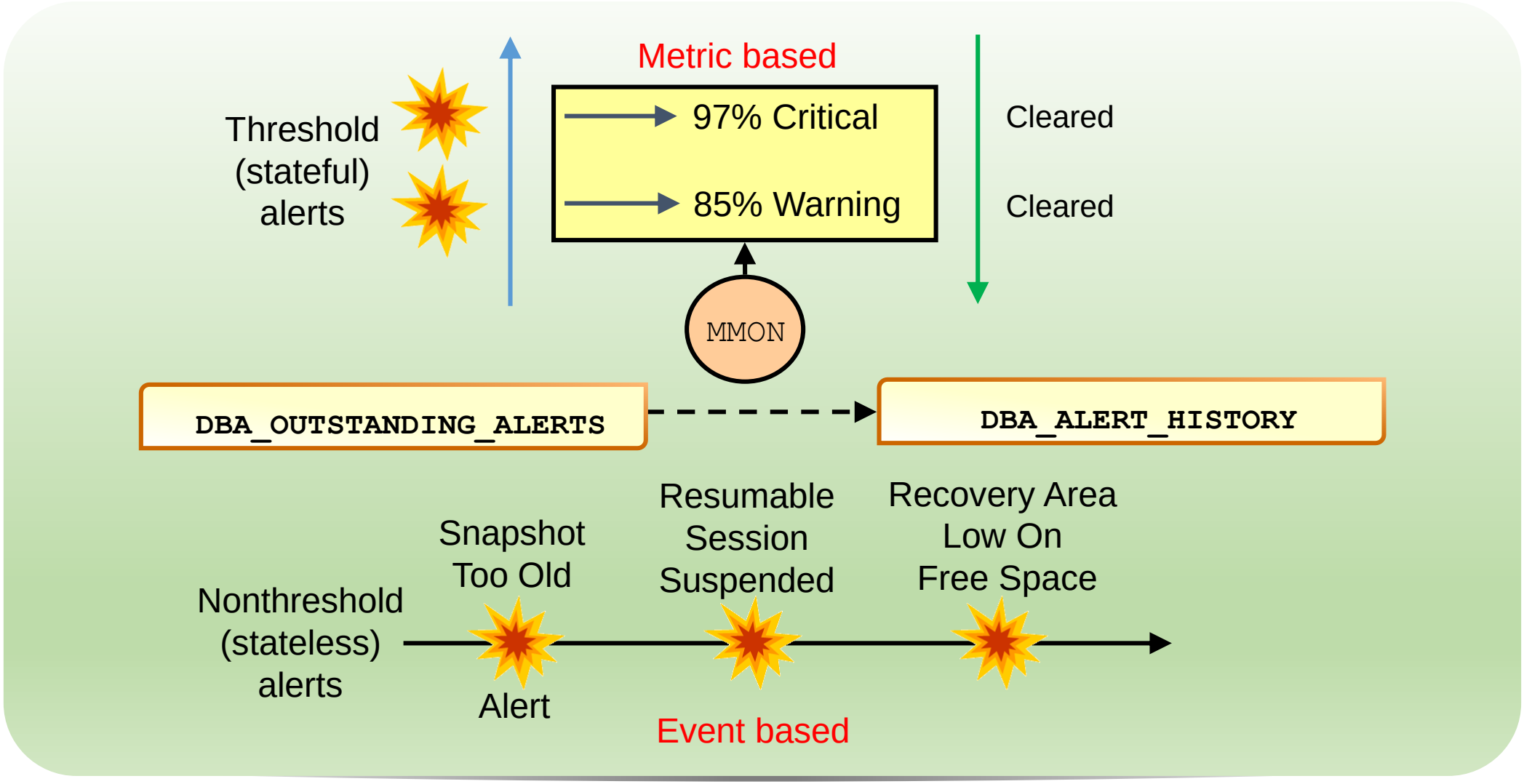
Setting Metric Thresholds



Reacting to Alerts

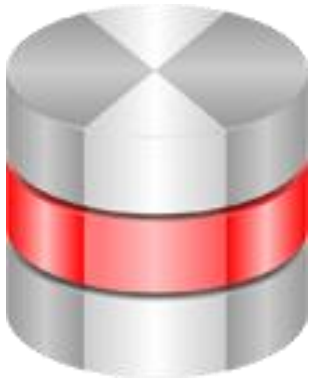
- If necessary, you should gather more input (for example, by running ADDM or another advisor).
- Investigate critical errors.
- Take corrective measures.
- Acknowledge alerts that are not automatically cleared.

Alert Types and Clearing Alerts



Database Server Statistics and Metrics

- Cumulative statistics:
  - Wait events with time information
  - Time model



Metrics: Statistic rates

Sampled statistics:

- Active session history
- Statistics by session, SQL, and service
- Other dimensions

Performance Monitoring

- Enterprise Manager Database Express
- Enterprise Manager Cloud Control
- Performance 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

Disk

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

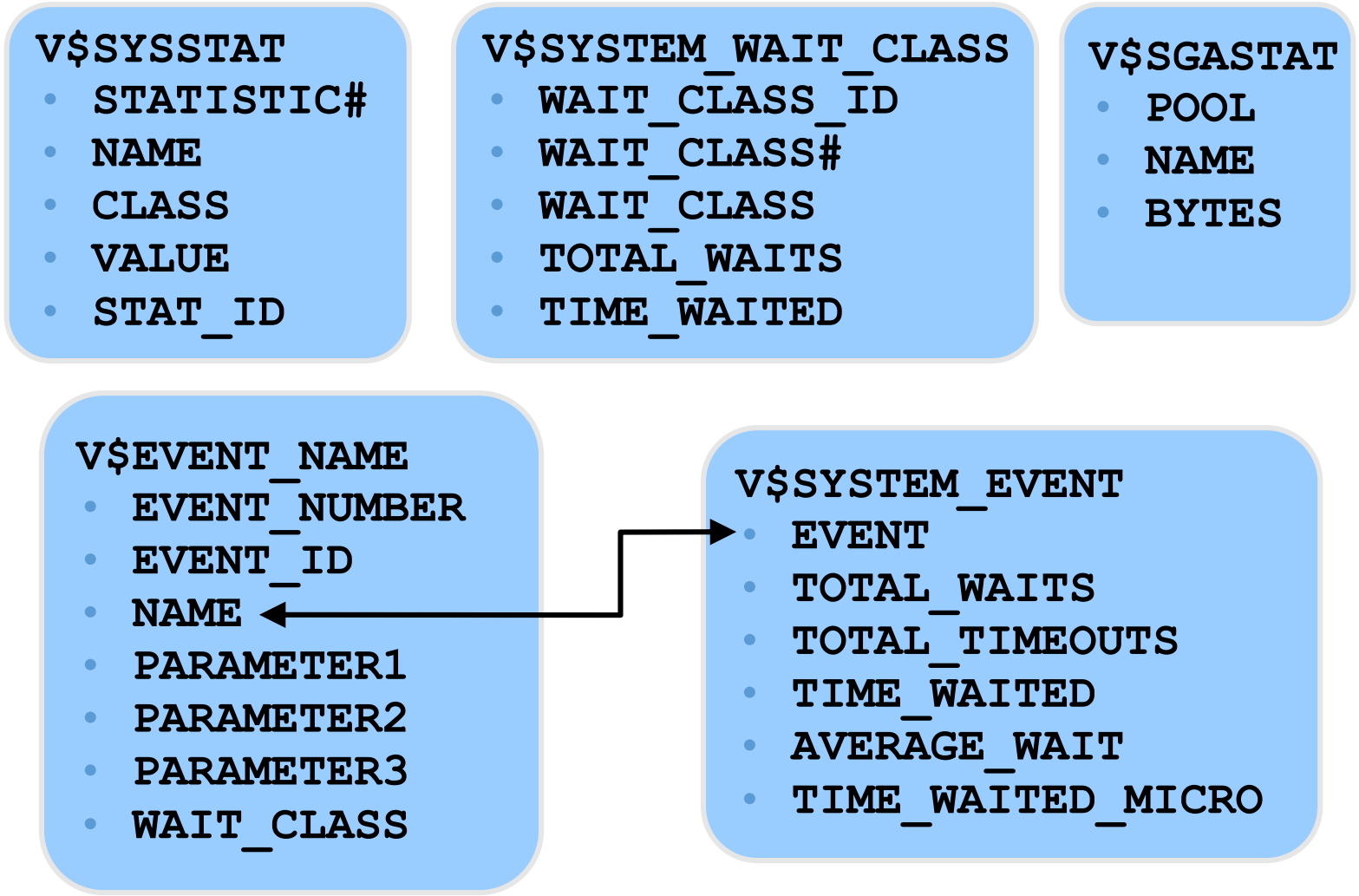
Memory

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

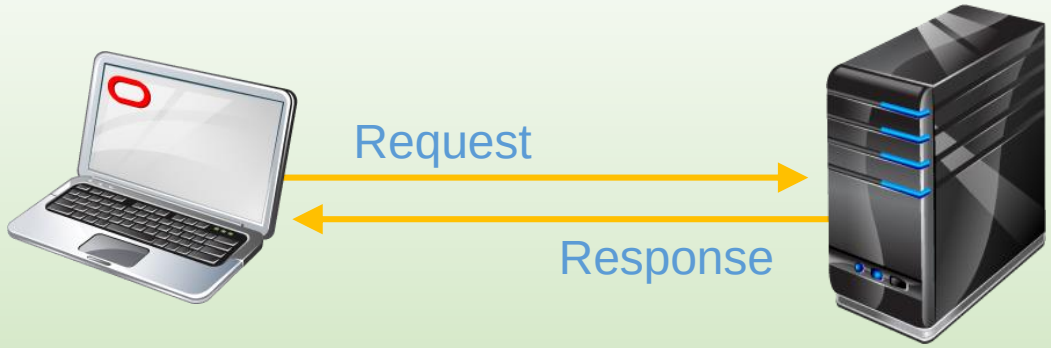
Contention

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

Viewing Statistics Information



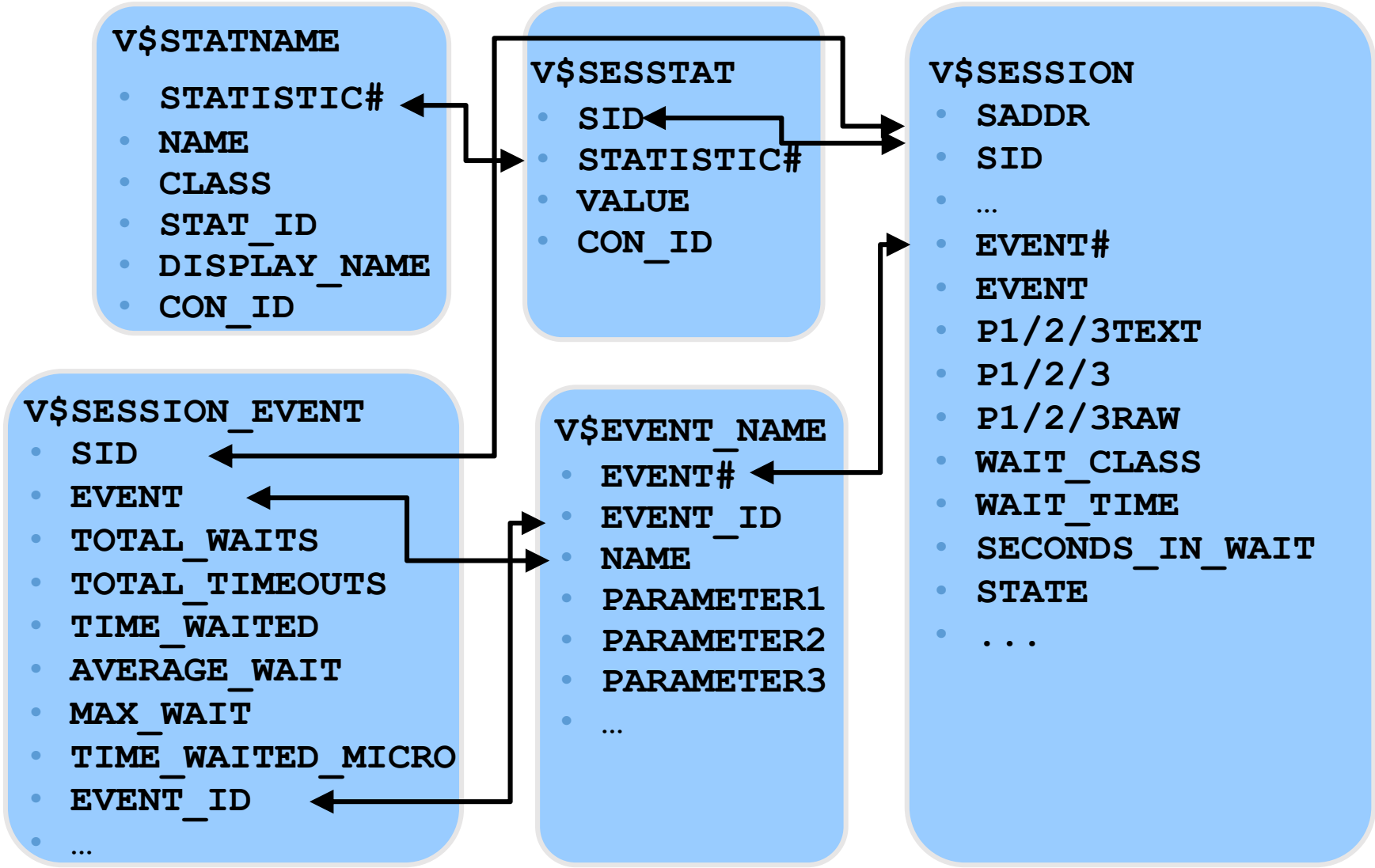
Monitoring Wait Events



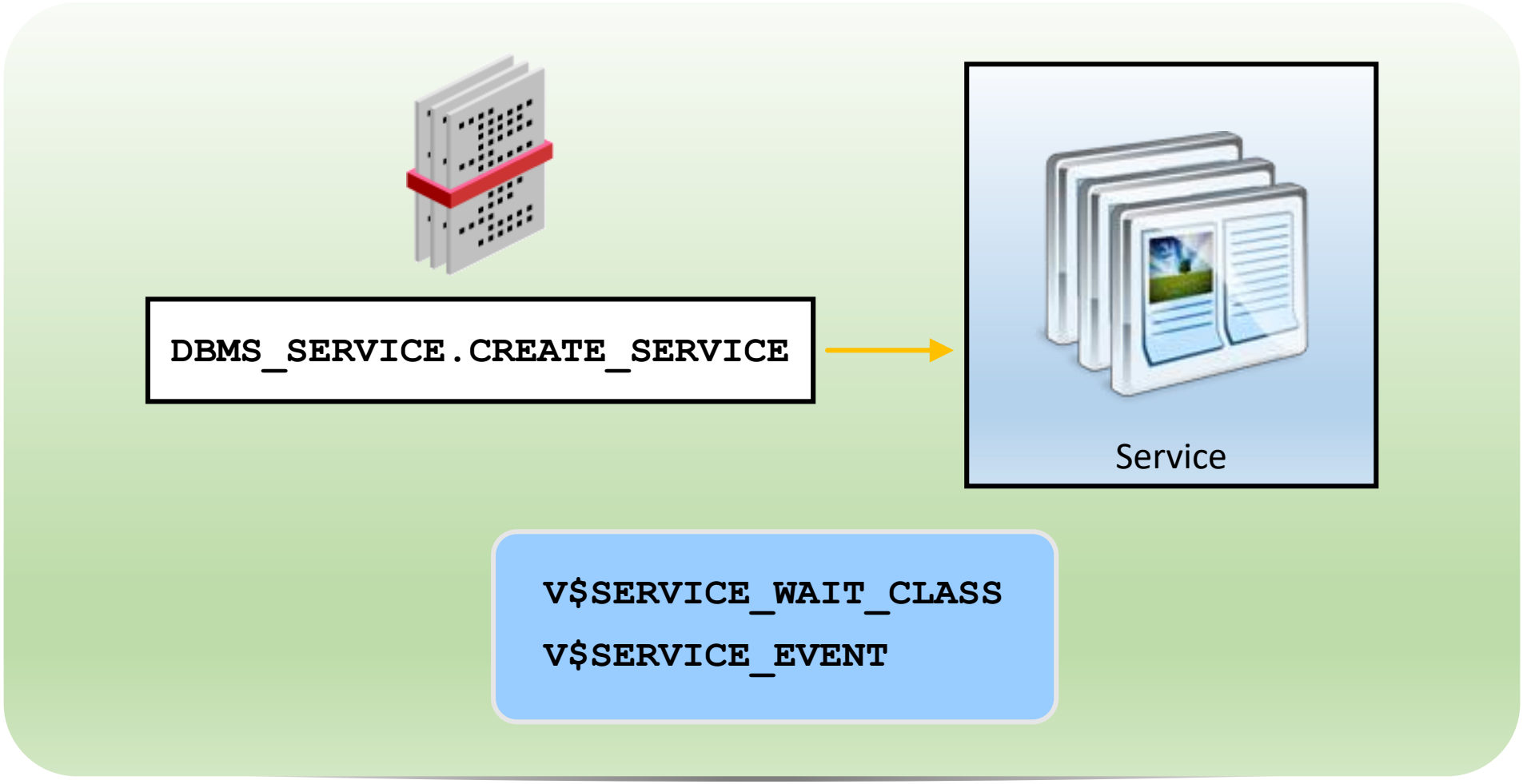
Wait events: Statistics indicating the server process had to wait for an event to complete

V$EVENT_NAME

Monitoring Sessions



Monitoring Services



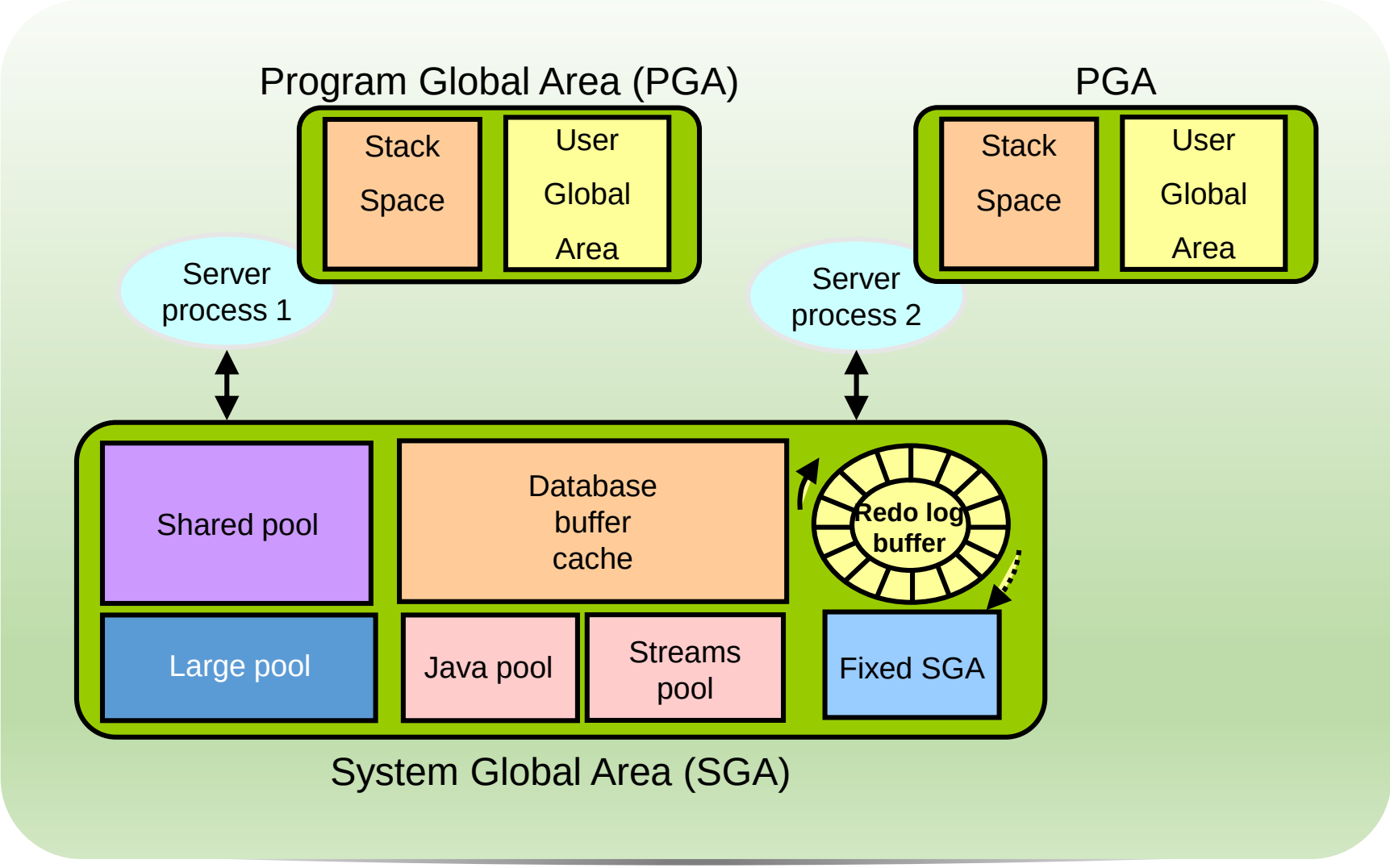
Performance Tuning Methodology

System Health and OS Statistics

Top Down Approach:
Design
Application
Database Instance

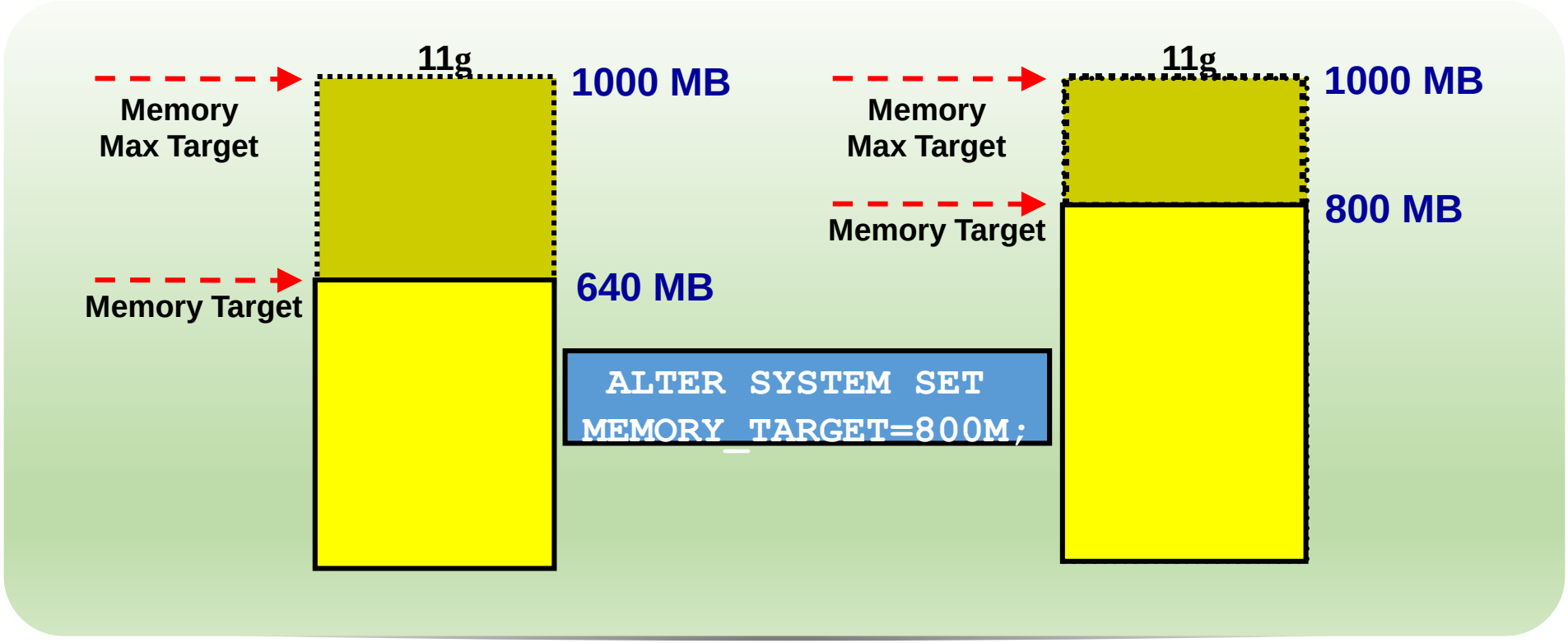
Tune Areas with Greatest Benefit

Managing Memory Components



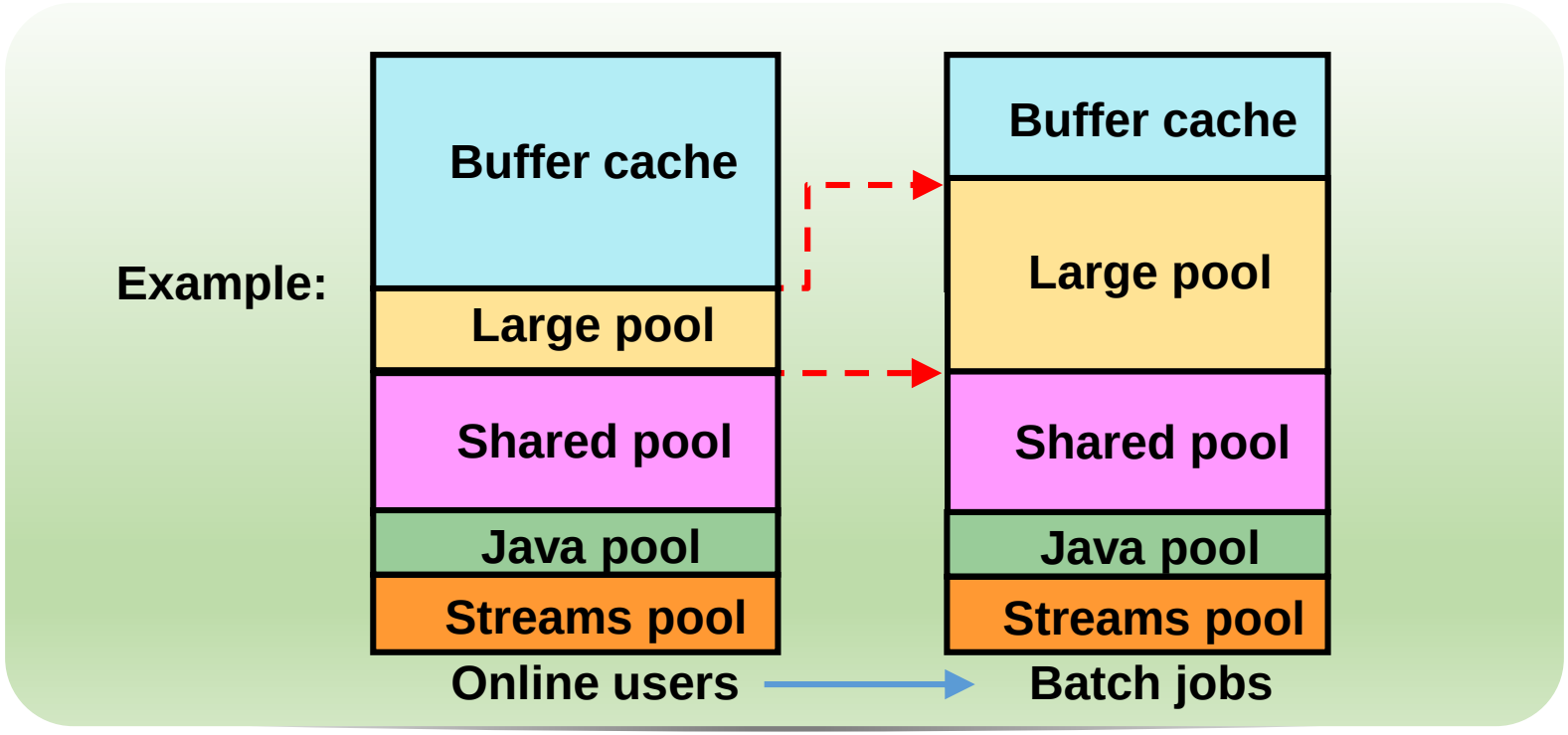
Automatic Memory Management

- With Automatic Memory Management, the database server can size the SGA and PGA automatically according to your workload.

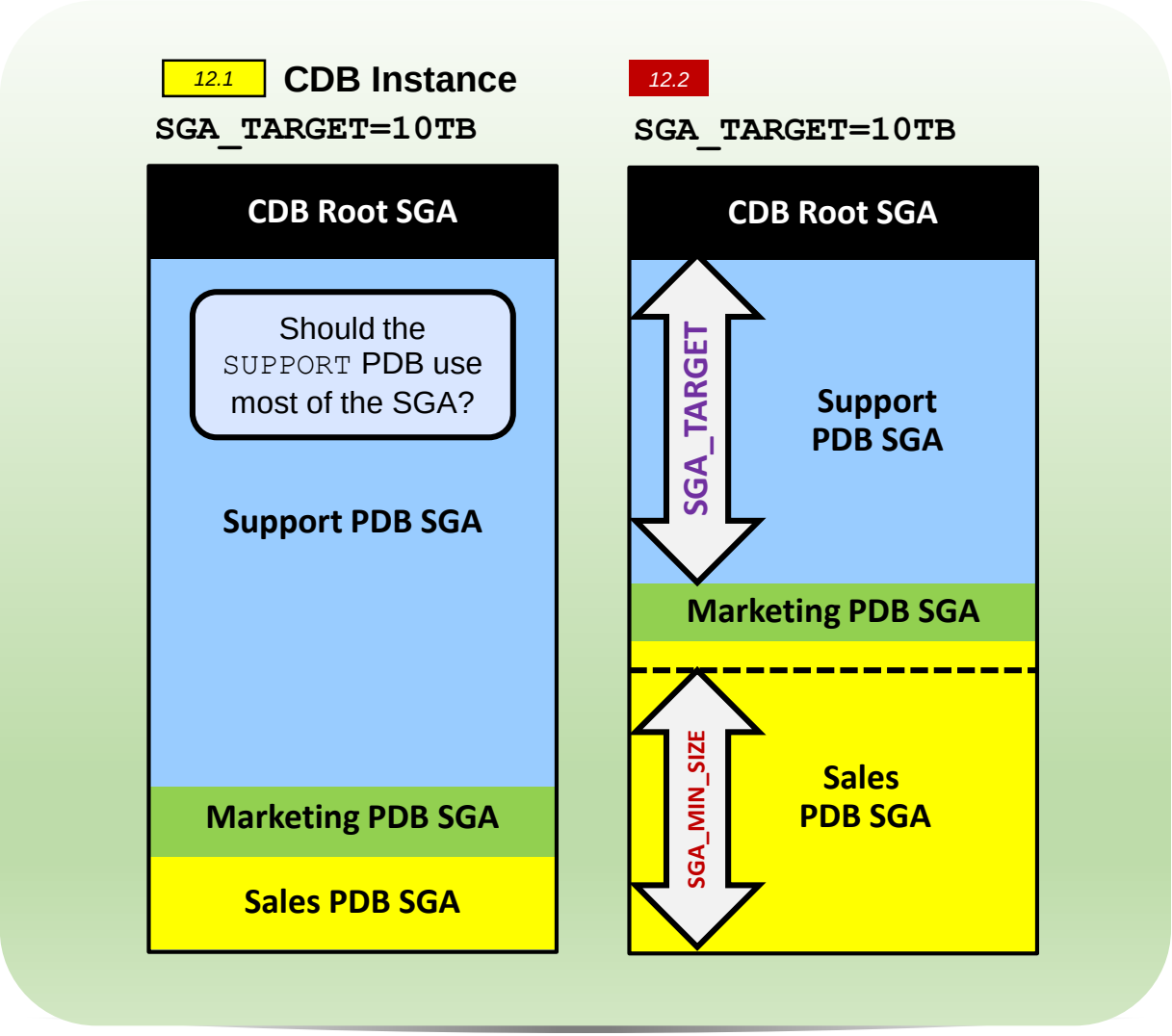


Automatic Shared Memory Management

- Automatically adapts to workload changes
- Maximizes memory utilization
- Helps eliminate out-of-memory errors

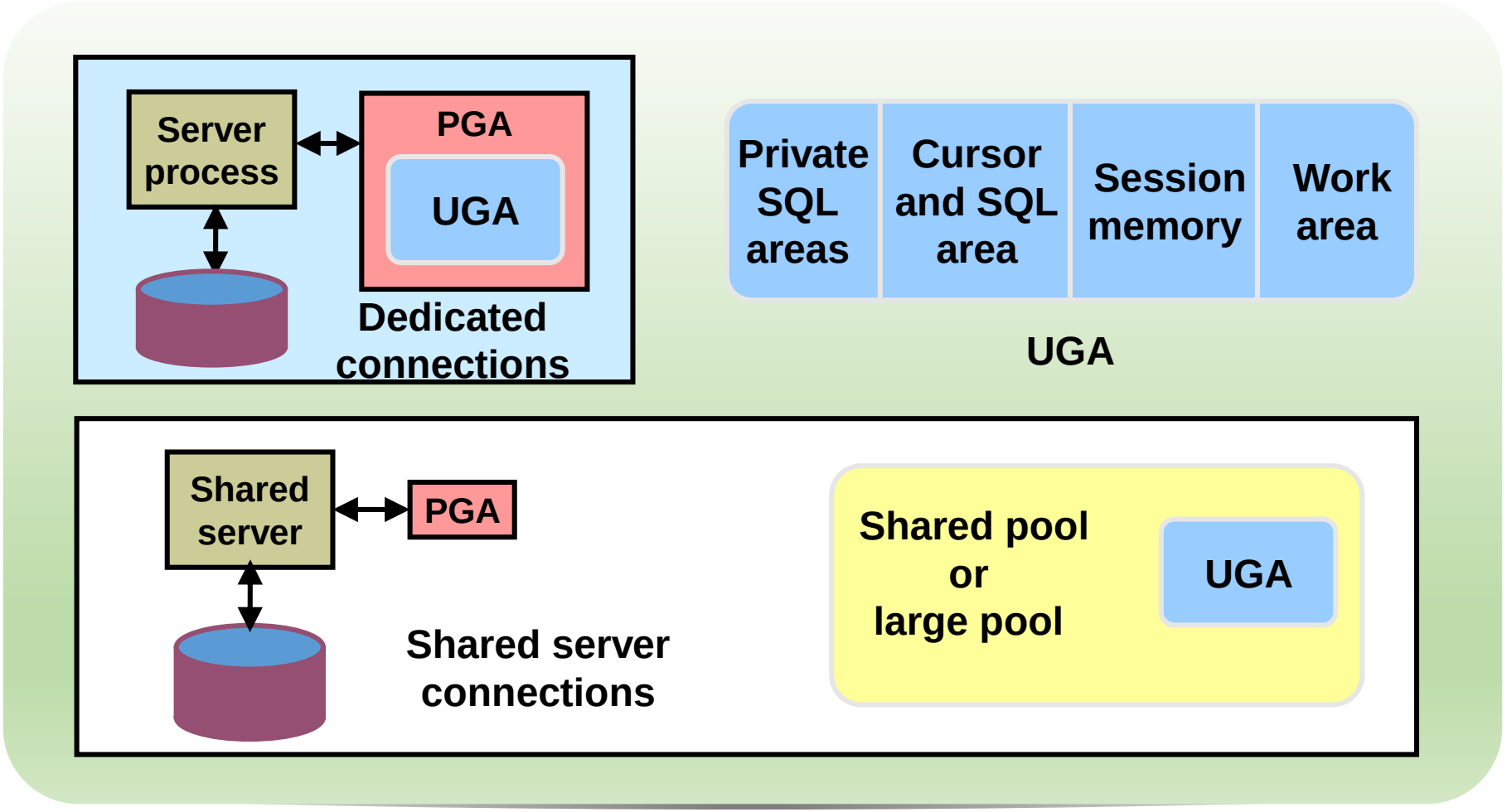


Managing the SGA for PDBs



- **SGA_TARGET** set at PDB level enforces a hard limit for the PDB's SGA.
- **SGA_TARGET** at PDB level provides more SGA for other containers.
- **SGA_MIN_SIZE** set for a PDB guarantees SGA space for the PDB.
- Parameters at PDB level:
  - **DB_CACHE_SIZE**
  - **SHARED_POOL_SIZE**
- PDB minimums cannot be > 50% of memory

Managing the Program Global Area (PGA)



Automatic PGA memory management is enabled by default.

Managing the PGA for PDBs

Instance `PGA_AGGREGATE_LIMIT`

- No more PGA can be allocated.
- Calls or sessions of the largest PGA users are terminated.

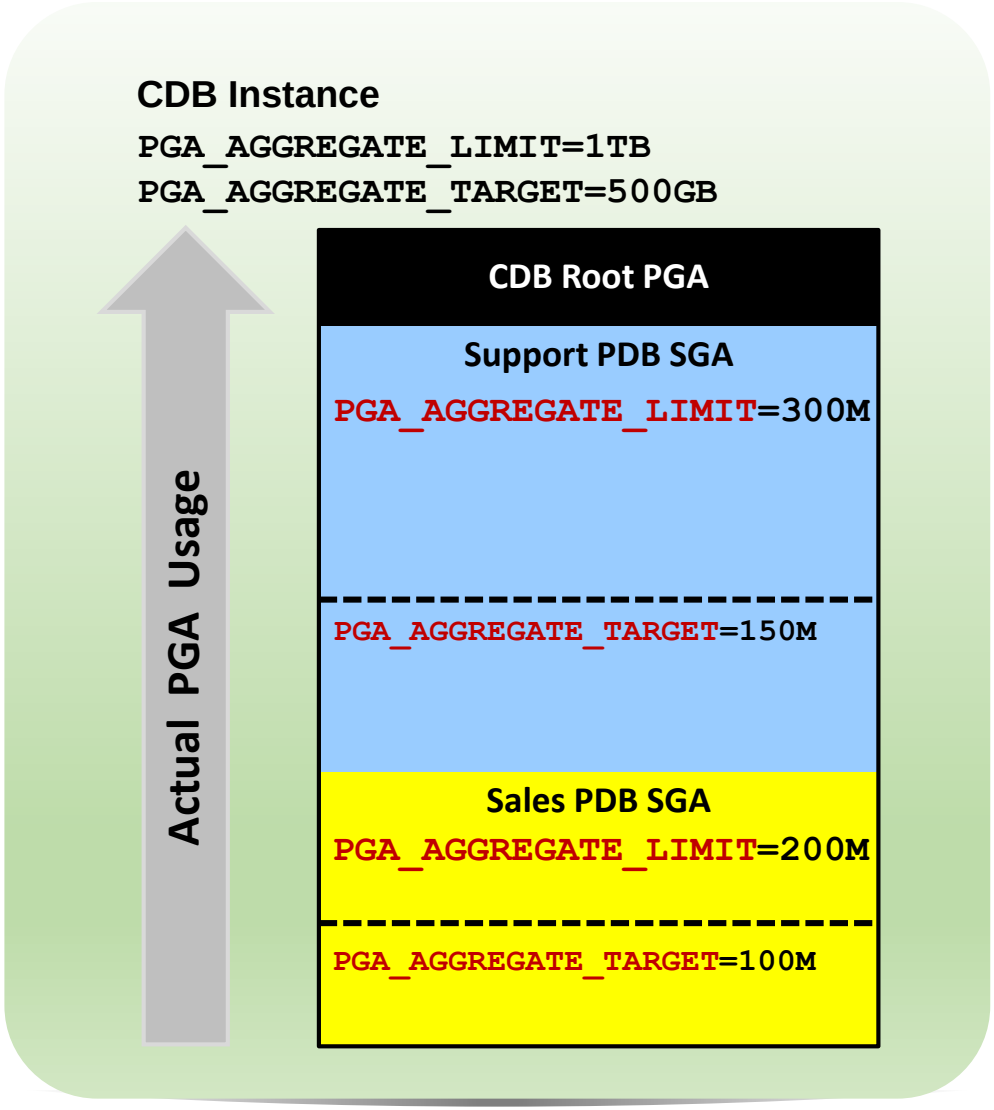
Instance `PGA_AGGREGATE_TARGET`

- All sessions must use TEMP rather than PGA.

PDB `PGA_AGGREGATE_LIMIT`

PDB `PGA_AGGREGATE_TARGET`

- These parameters set the same behavior at the PDB level.



Summary

- In this lesson, you should have learned how to:
  - Describe the activities that you perform to manage database performance
  - Use performance views and tools to monitor database instance performance
  - Describe the Oracle performance tuning methodology
  - Describe statistics and metrics that are collected by the Oracle Database server
  - Configure and monitor memory components for optimal performance

Practice 20: Overview

- 20-1: Managing Performance
- 20-2: Resolving Lock Conflicts