ORACLE

Oracle Database Multitenant

Workshop

24th July 2023

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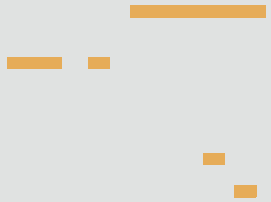
Core/Converged Database Specialist group



Safe harbor statement

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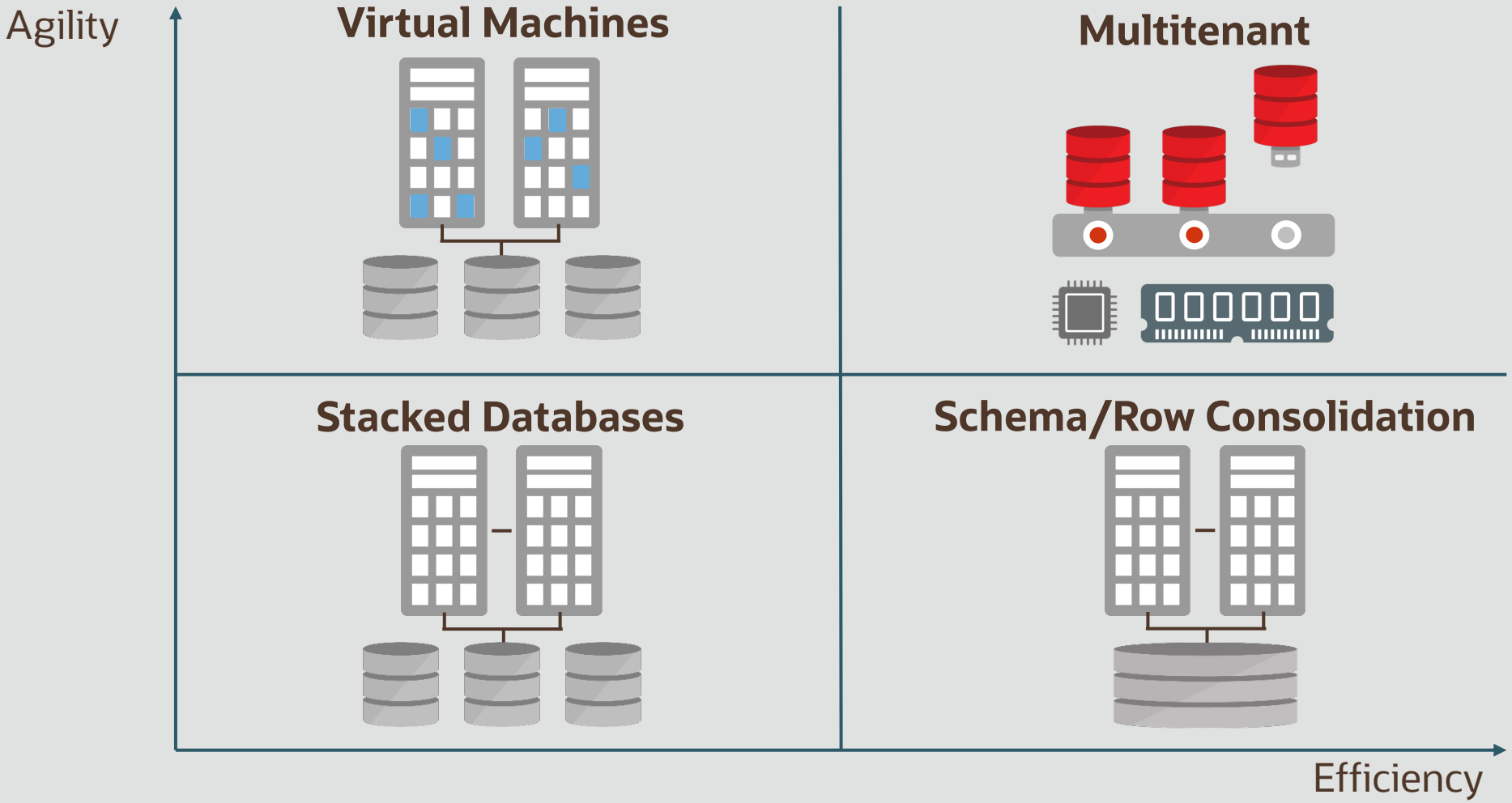
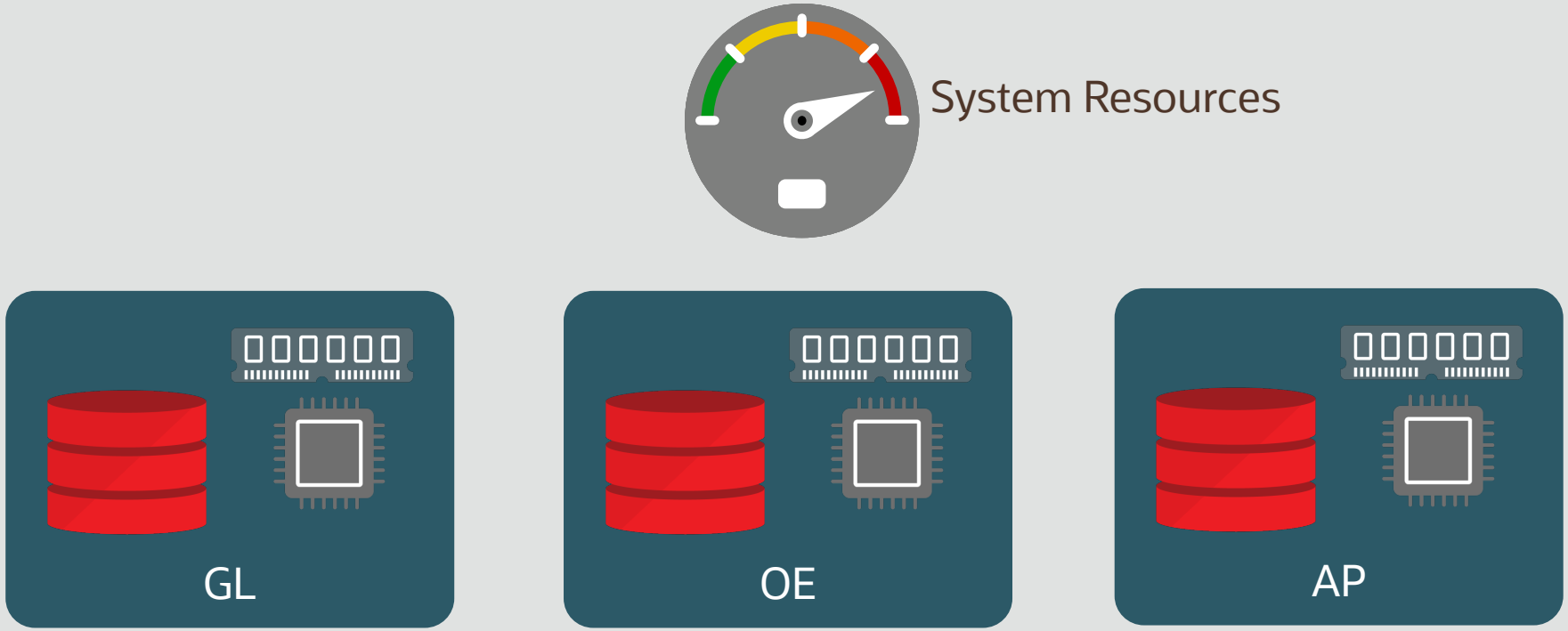
The development, release, timing, and pricing of any features or functionality described for Oracle's products may change and remains at the sole discretion of Oracle Corporation.

Comparing Database Consolidation Architectures



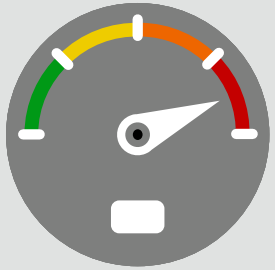
Classical Oracle Database Architecture

Requires memory, processes and database files

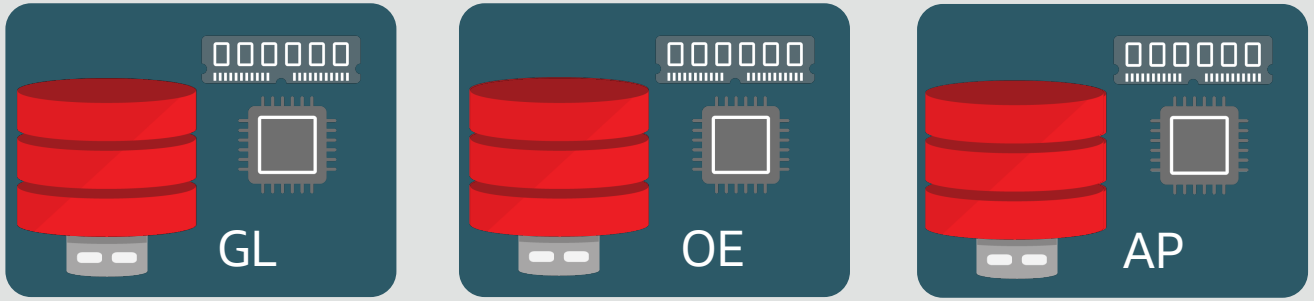


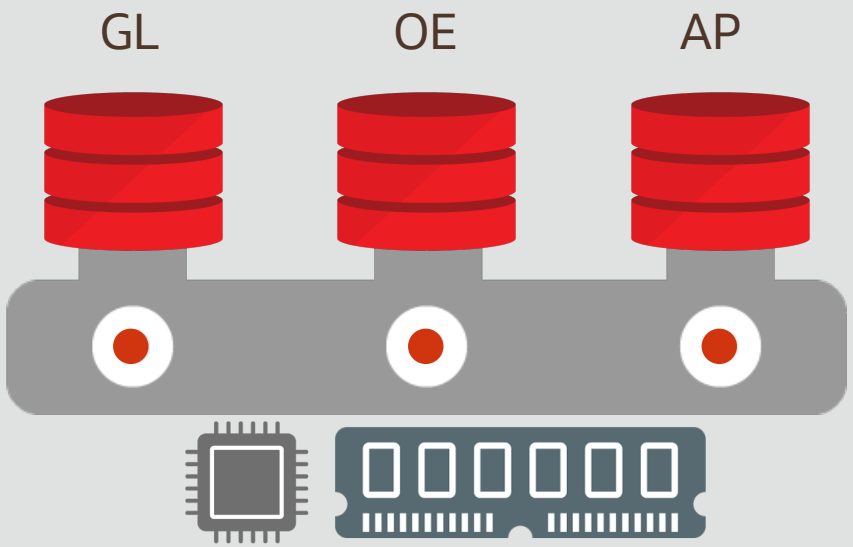
Multitenant Architecture

Memory and processes required at container level only



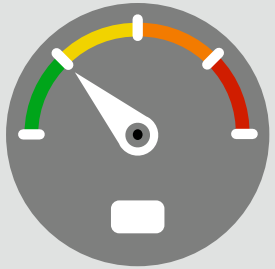
System Resources



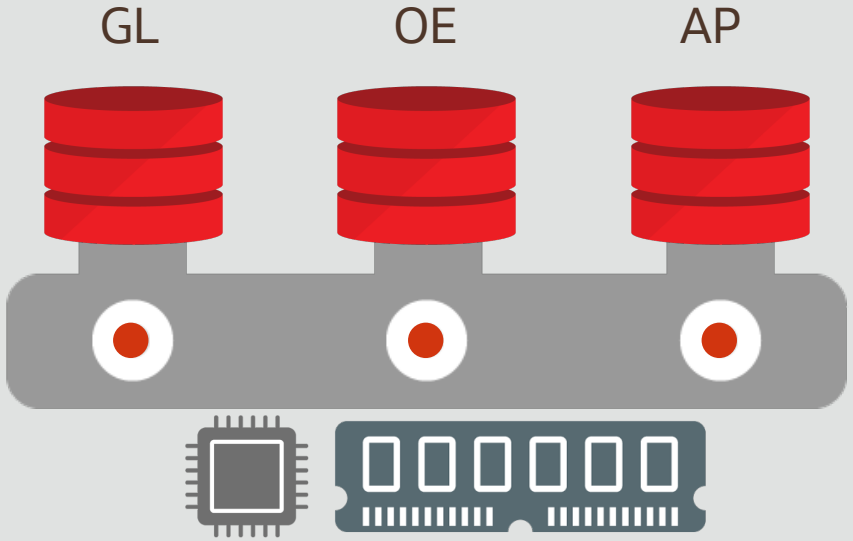


Multitenant Architecture

More efficient utilization of system resources



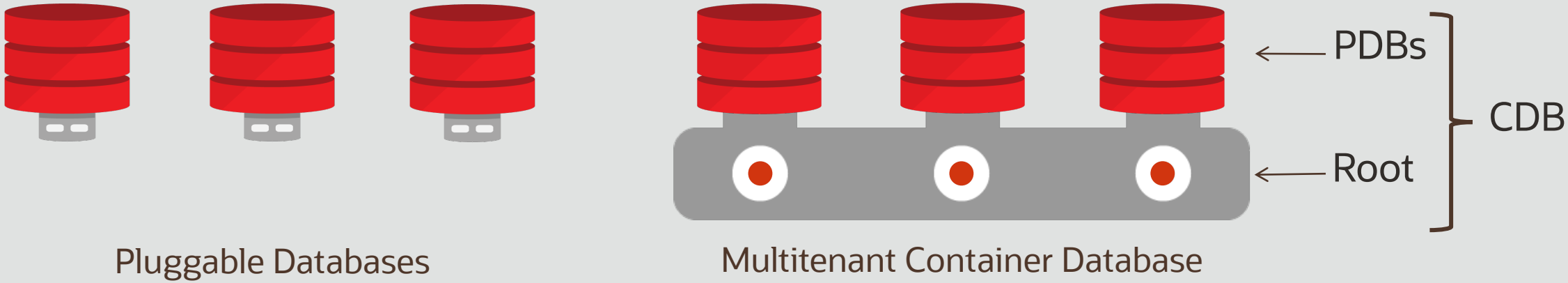
System Resources



Multitenant Architecture

Components of a Multitenant Container Database (CDB)

- Up to 4k PDBs per CDB

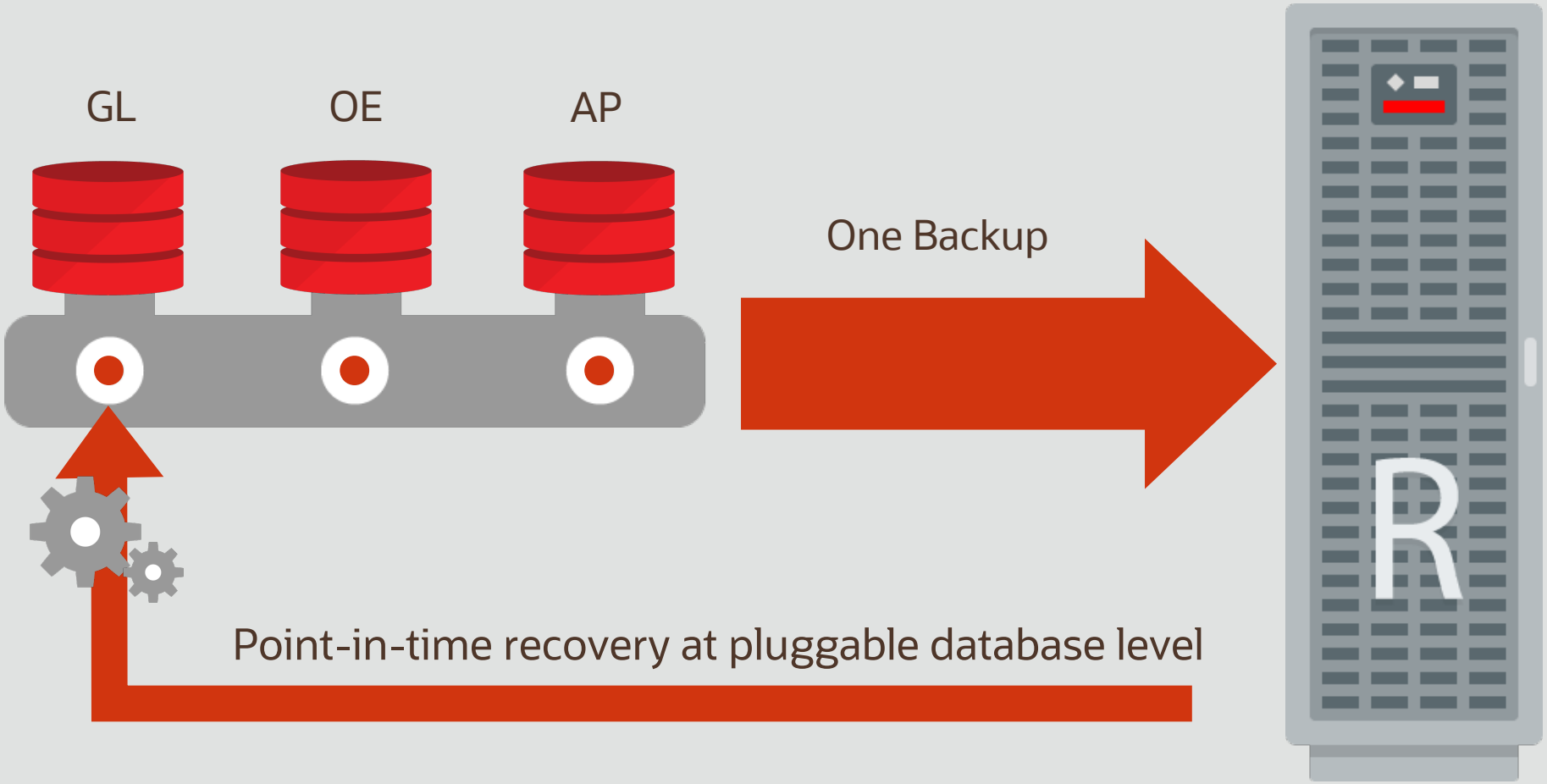


Pluggable Databases

Multitenant Container Database

Manage Many Databases as One

Backup databases as one; recover at pluggable database Level

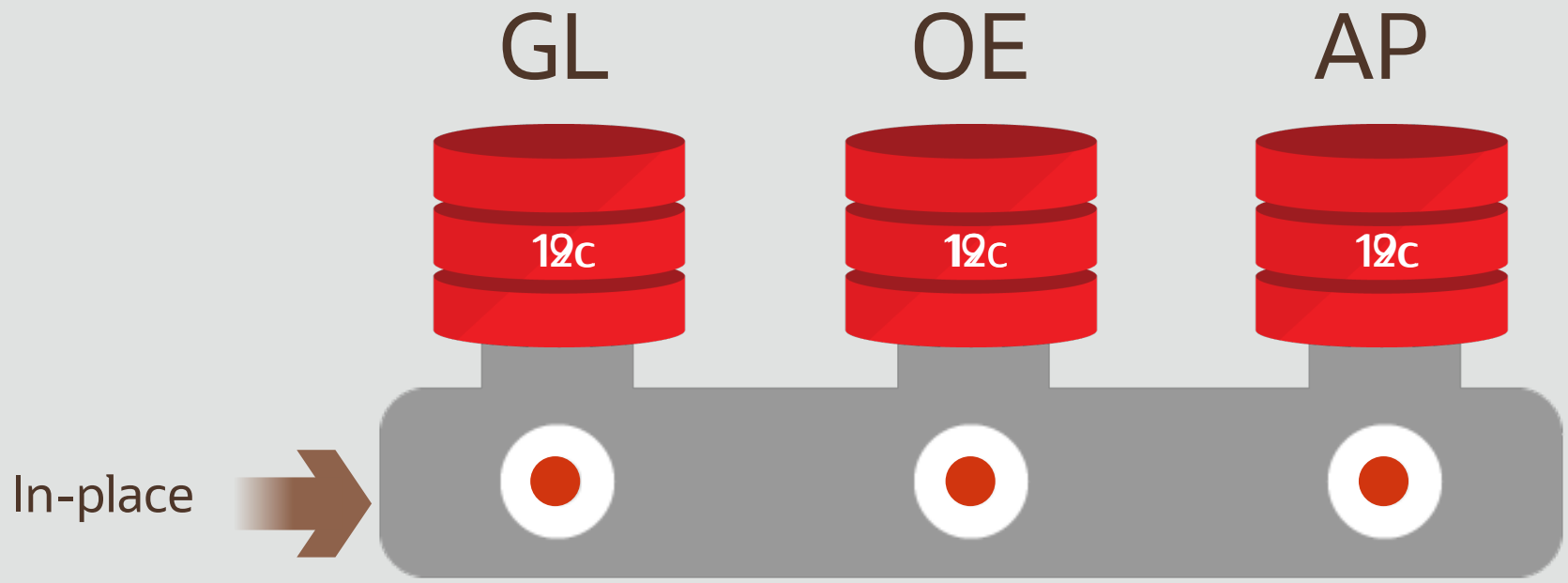


Manage Many Databases as One with Multitenant

One standby database covers all pluggable databases

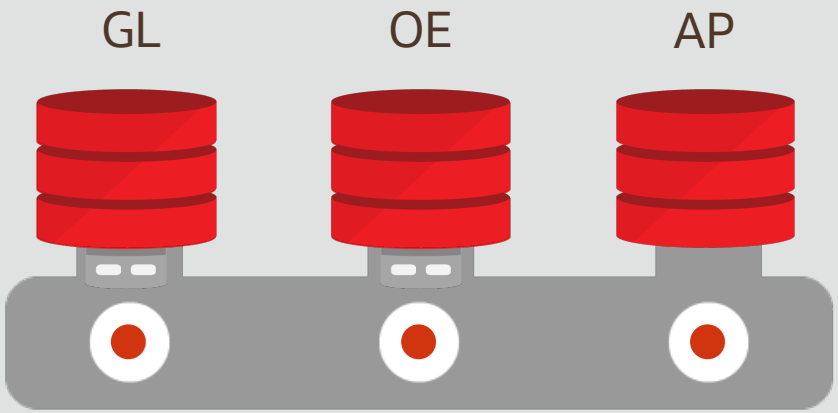
Simplified Patching and Upgrades

Apply changes once, all pluggable databases updated

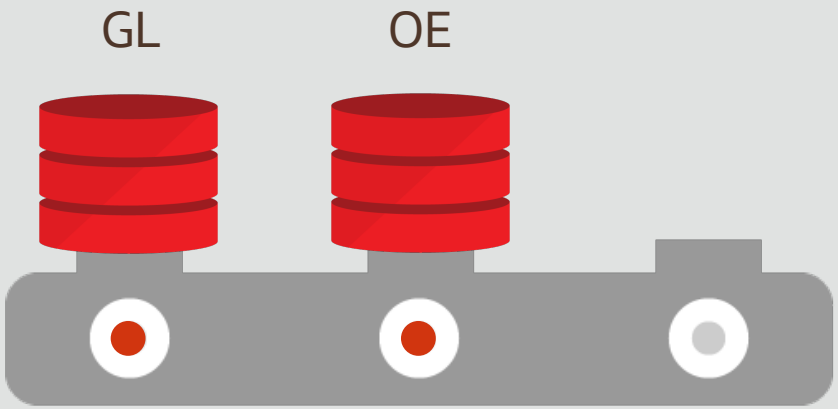


Simplified Patching and Upgrades

Flexible choice when patching & upgrading databases

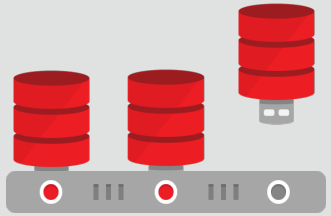


Original Container Database 19.3



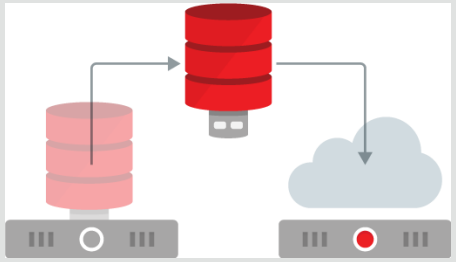
Upgraded Container Database 19.4

Multitenant



- Container managed database virtualization
- Manage Many as one
  - Patching, Backup, Security, Online Cloning, Online Relocation
- Software as Service
  - Shared metadata, Data location transparency

New in 12.2, 18c, 19c



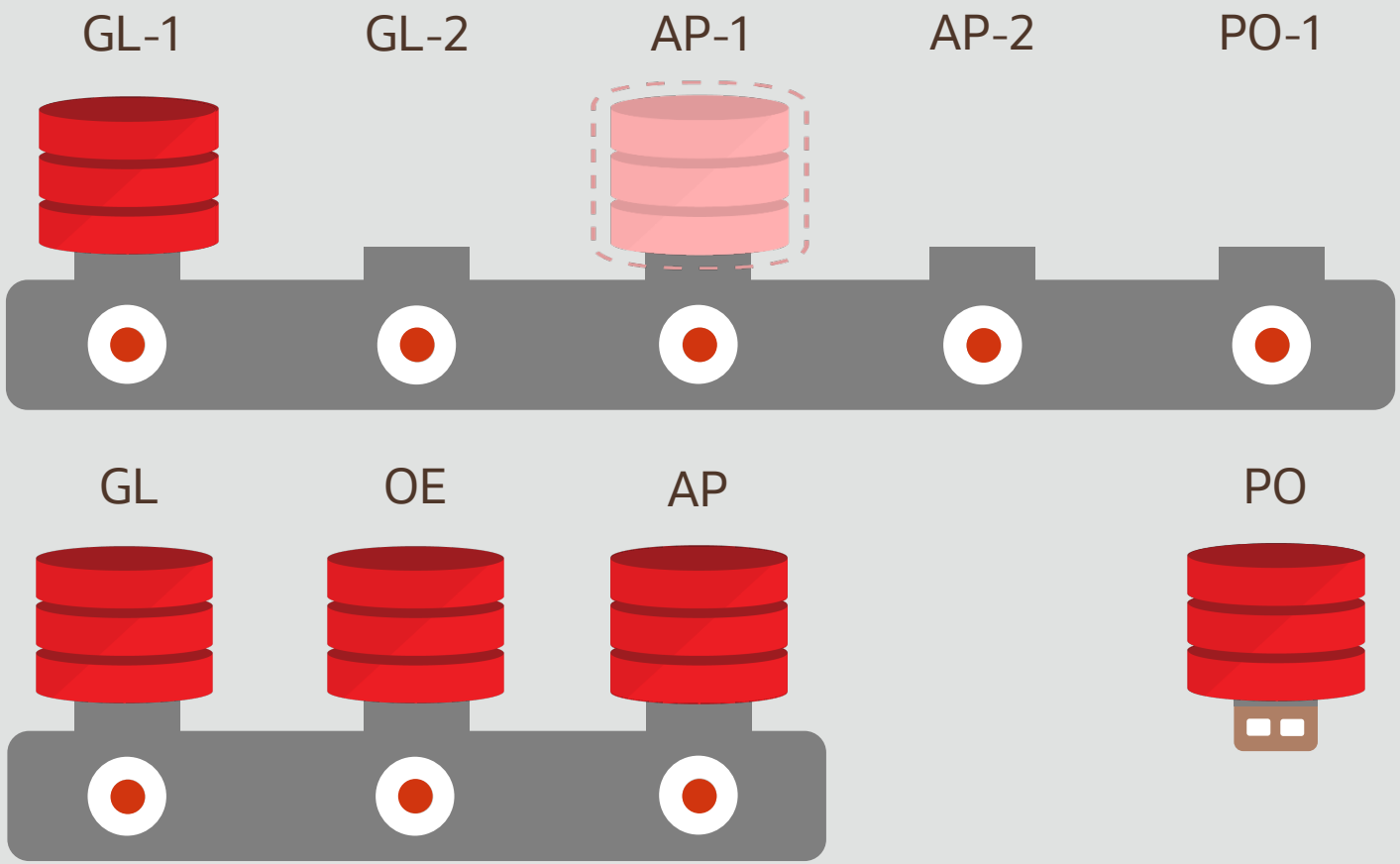
- 12.2
  - Online cloning & relocation
  - Incremental refresh of test/dev master
  - Application containers
- 18c
  - Transportable backups
  - Snapshot carousel
  - Refreshable PDB switchover
- 19c
  - RAT and ADDM at PDB level

Application Container

- Application Container comprises
  - Application Root (Master)
  - Application PDBs (for each Tenant)
  - Application Seed (for provisioning)
- PDBs share application objects
  - Code, metadata and data
- Further simplifies management
  - Apply updates to application container
  - Sync tenant PDBs from central master
- Suitable for all applications
  - SaaS, franchise, divisional, etc.

Multitenant for Provisioning

Fast cloning of PDBs

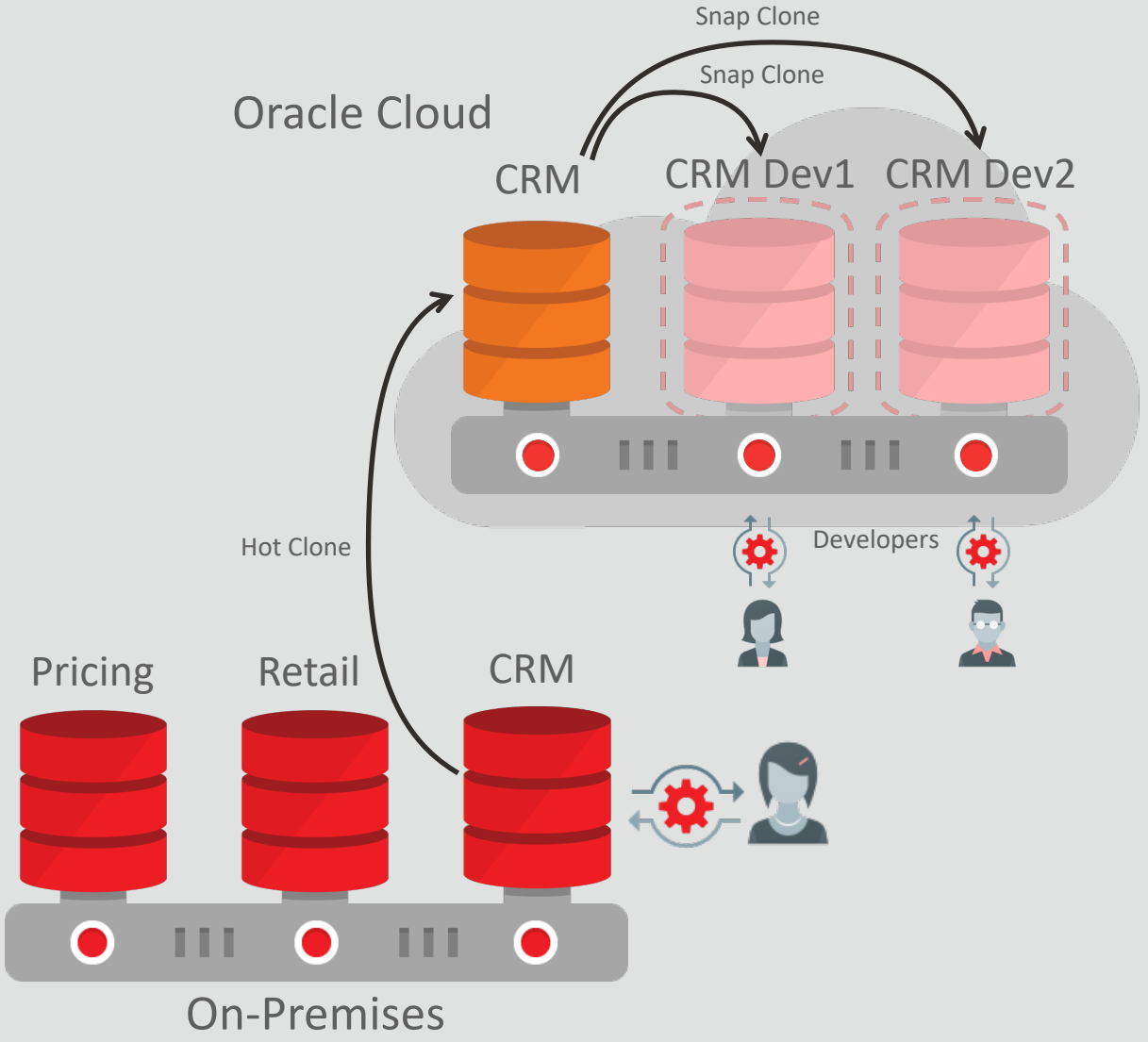


- PDBs can be cloned from within the same CDB
- PDBs can be cloned from remote CDBs
- PDBs can be cloned from non-CDBs
- Thinly provision *snapshot* clones in seconds

PDB Hot Clone

PDB Hot Clone

Online test master instantiation



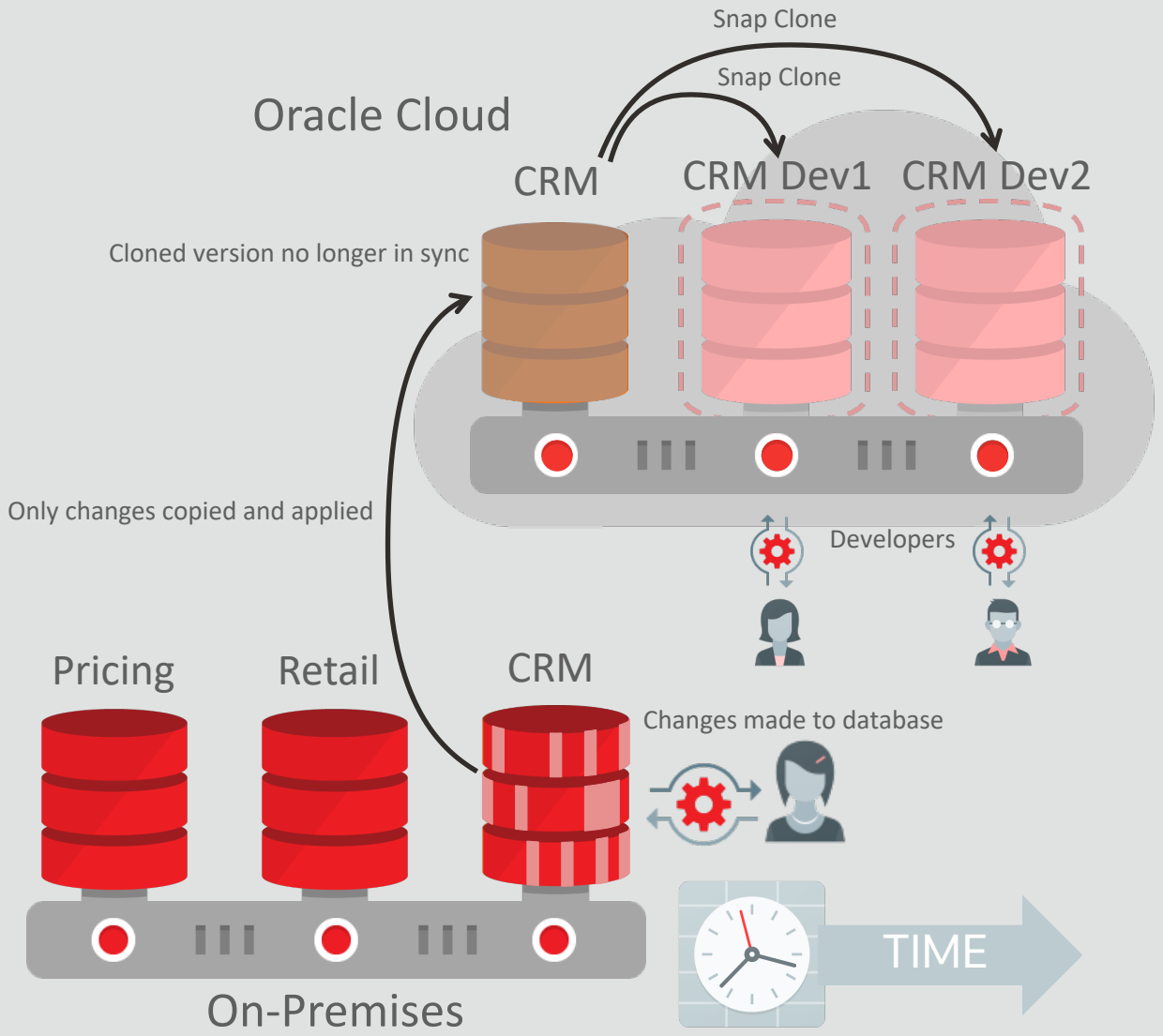
Refreshable PDB

PDB Hot Clone

- Online test master instantiation

Refreshable PDB

- Incremental refresh of clone with latest data



Online PDB Relocation

PDB Hot Clone

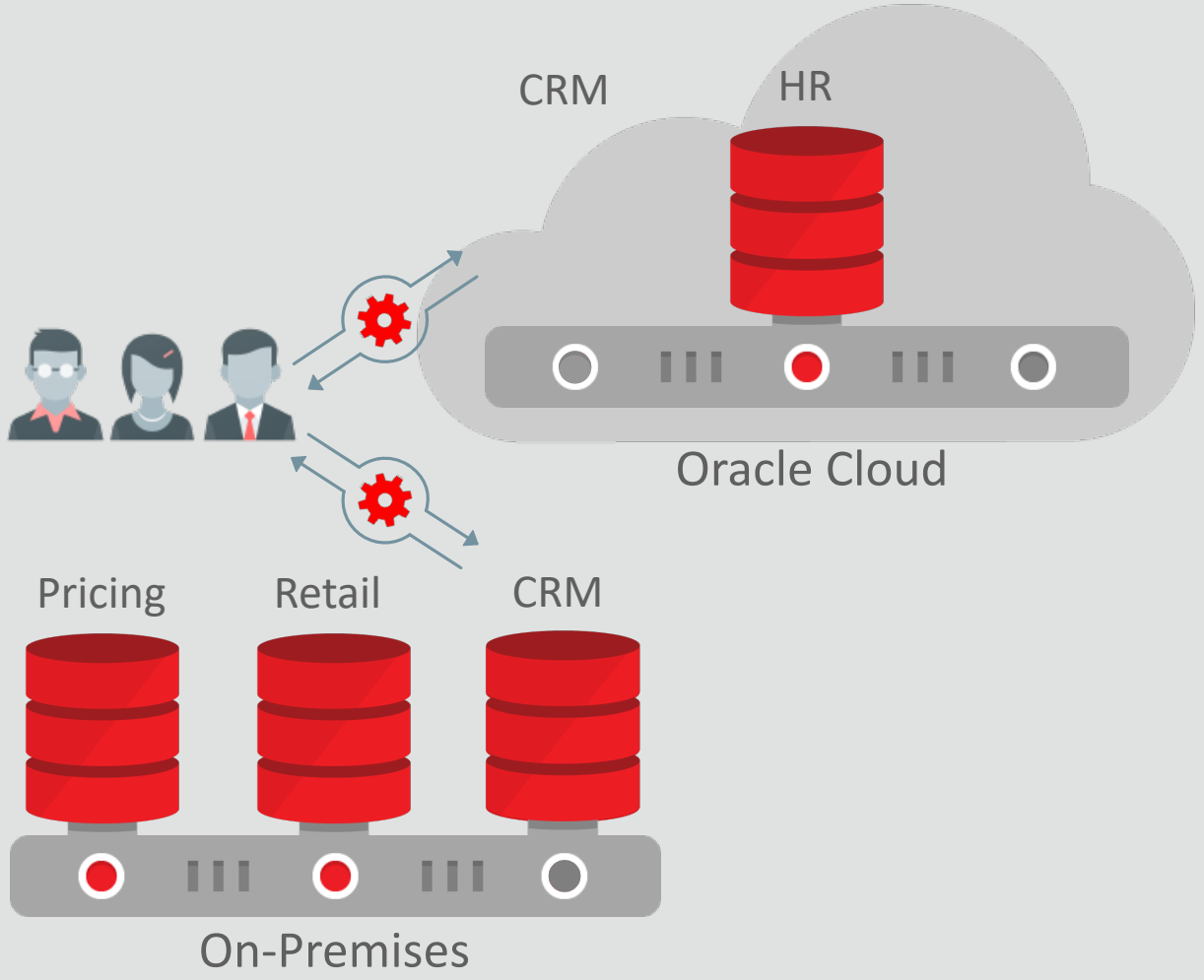
- Online test master instantiation

Refreshable PDB

- Incremental refresh of clone with latest data

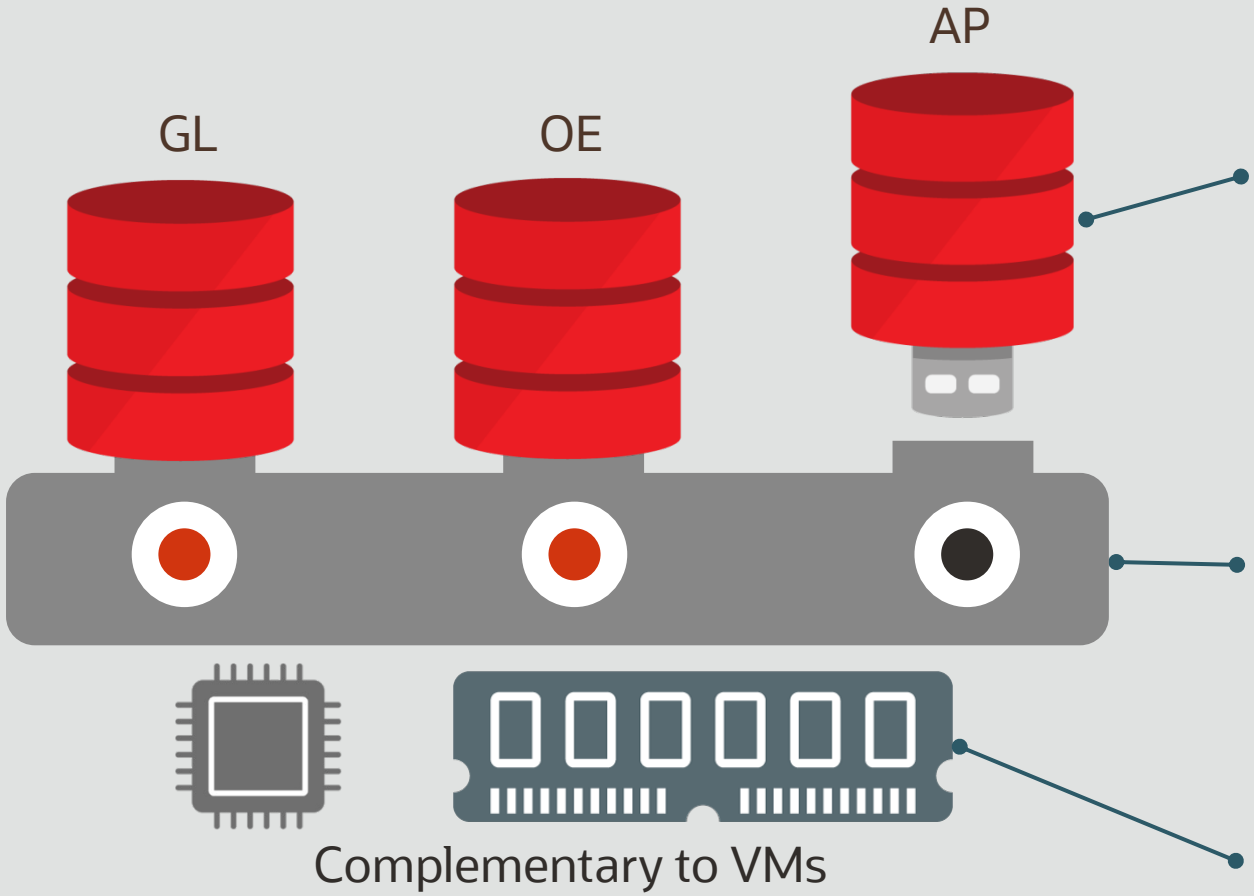
Online PDB Relocation

- Relocate with no downtime



Advantages of Multitenant Architecture

Isolation and agility with economies of scale



Self-contained PDB for each application

- Applications run unchanged
- Rapid provisioning (via clones)
- Portability (via pluggability)

Common operations performed at CDB level

- Manage many as one (upgrade, HA, backup)
- Granular control when appropriate

Shared memory and background processes

- More applications per server

CPU Resource Shares & Limits (PDBs)

- Upper & Lower Bounds
  - SHARE is low bound (relative fraction of CPU available)
  - LIMIT is the upper bound (percentage of CPU available)
- Shares are Relative to Other Databases
  - Database #1 Share = 10, Limit = 30%
  - Database #2 Share = 50, Limit = 90%
  - Total shares = 60
  - Database #1 gets 16% guaranteed (10/60)
  - Database #2 gets 83% guaranteed (50/60)
- Re-factor shares when adding or removing databases
  - Setting the LIMIT allows room to add databases
  - Consider implications for the example shown above!

Thank you!