

Oracle (Active) Data Guard 19c

Best Practices for a Selection of New Features

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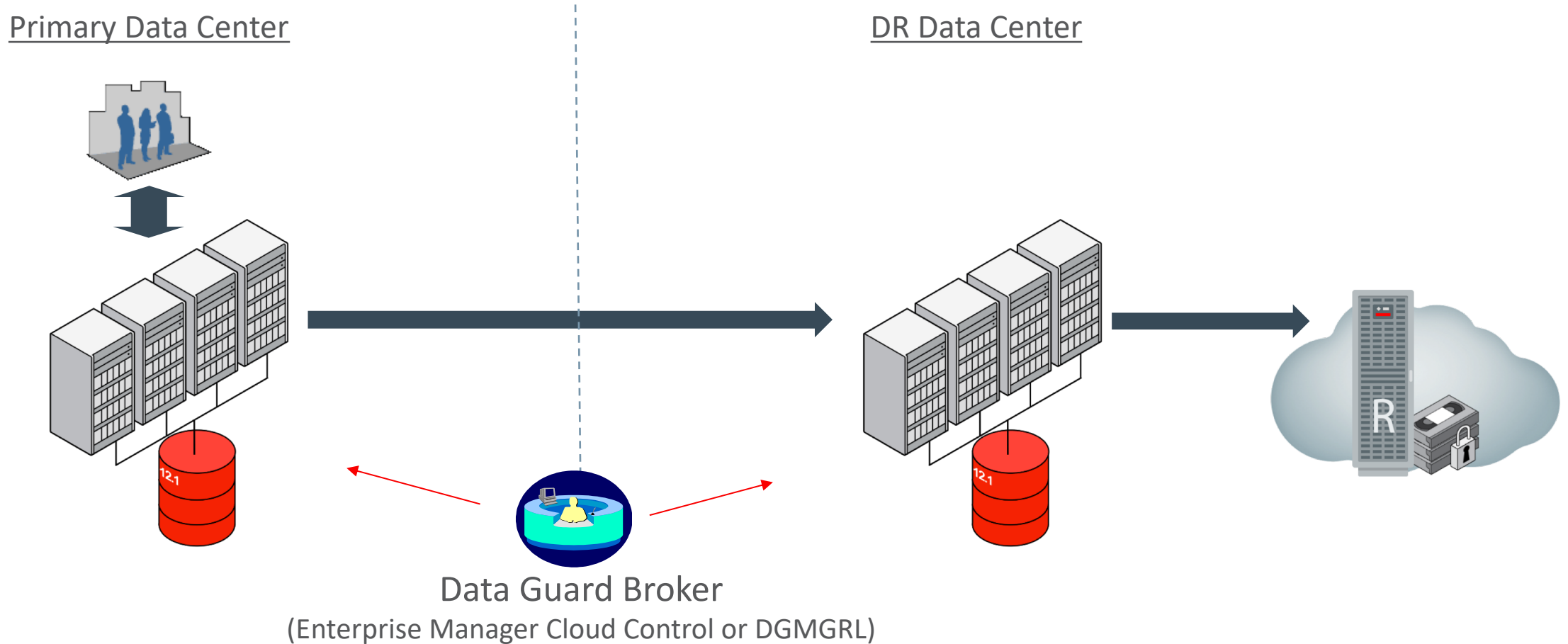
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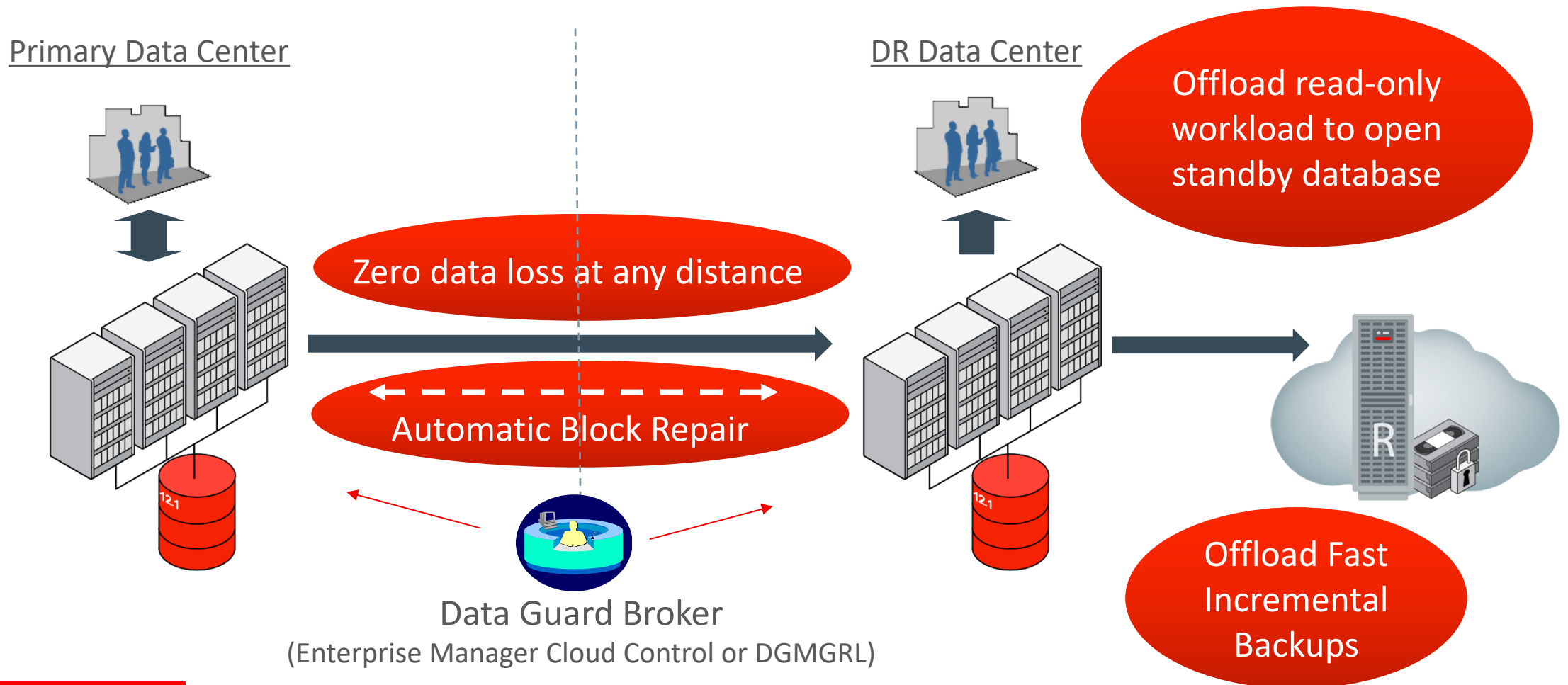
Data Guard: Real-time Data Protection and Availability

Included with Oracle Database Enterprise Edition



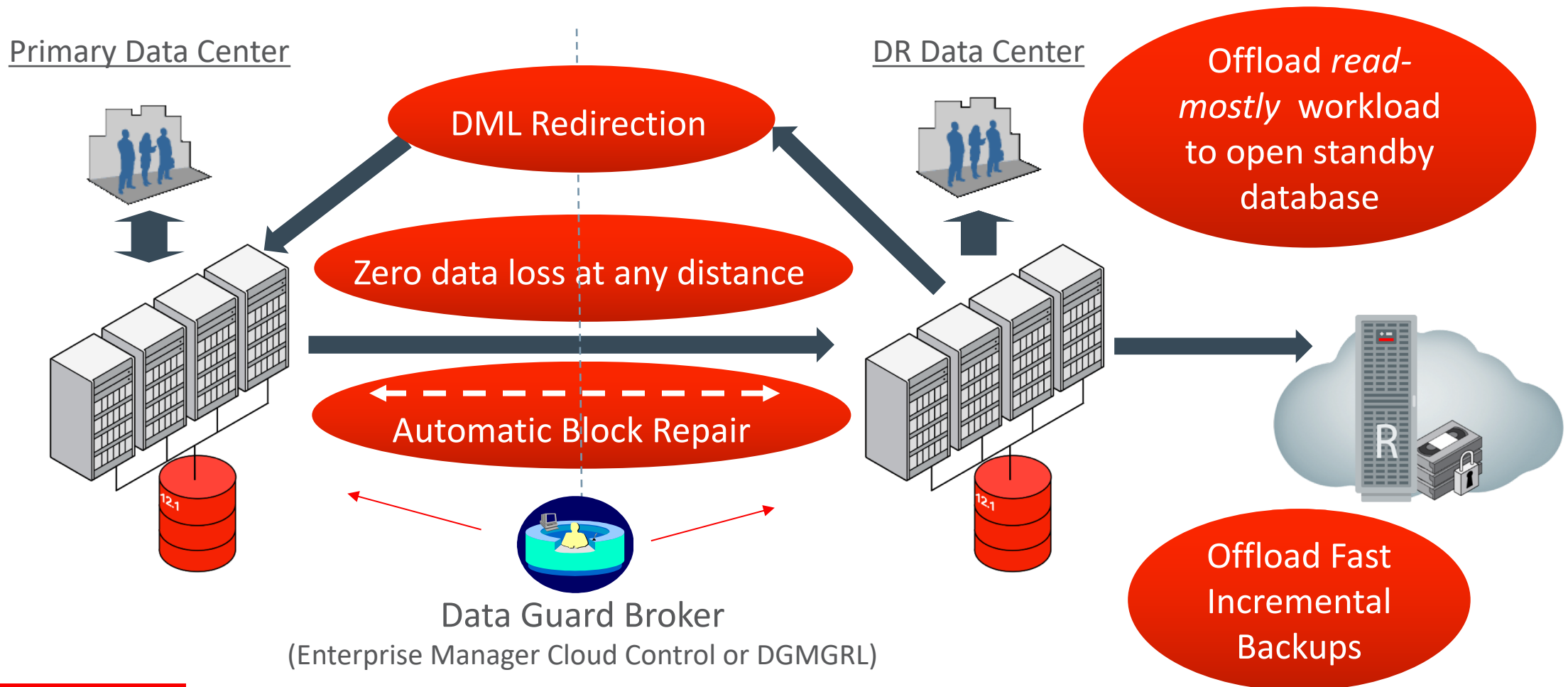
Active Data Guard: Advanced Capabilities

A licensable option to the Oracle Database Enterprise Edition



Active Data Guard: Advanced Capabilities

Getting most of your Active Data Guard DR site



Tunable Automatic Outage Resolution

- Data Guard maintains internal mechanisms that detect and correct issues with its redo transport and gap resolution processes
 - In case of network or disk I/O problems, these mechanisms prevent those processes from hanging and causing unnecessarily long gaps
- Use the following parameters to influence the outage resolution:
 - `DATA_GUARD_MAX_IO_TIME`
 - Sets the maximum number of seconds that can elapse before a process is considered hung while performing reads, writes, and status operations.
 - `DATA_GUARD_MAX_LONGIO_TIME`
 - Sets the maximum number of seconds as above, but for operations such as open and close

Data Guard and Flashback

Standbys automatically follow the primary after a RESETLOGS operation

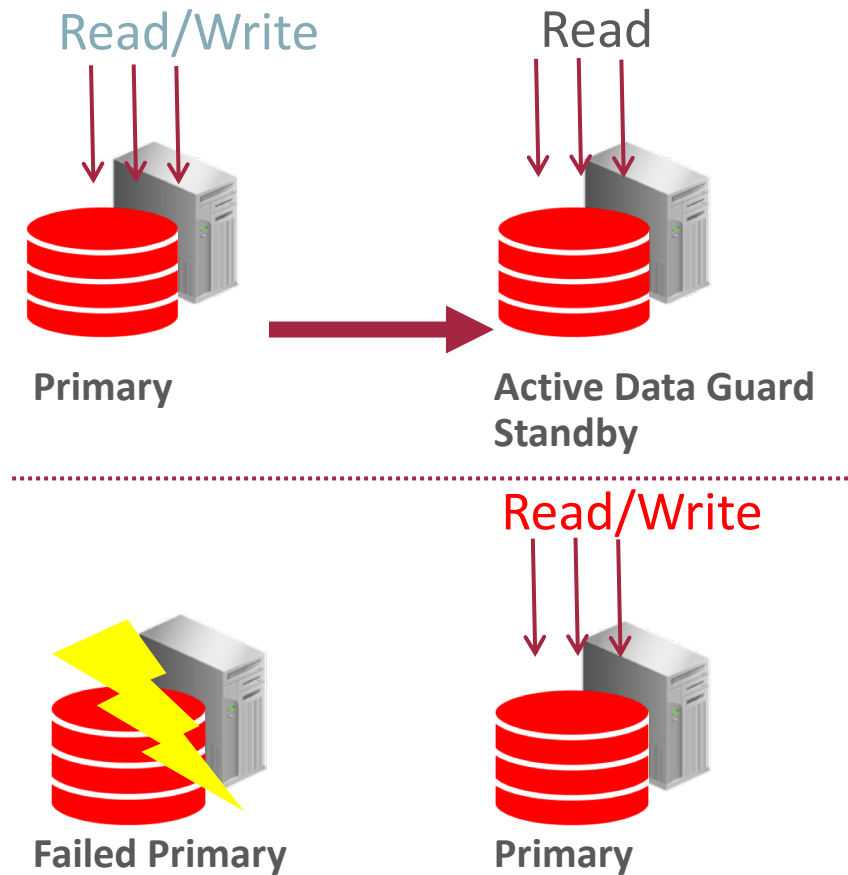
- Today, after a flashback database and subsequent “resetlogs” operation has been performed on the primary, the standby database will follow the new incarnation, assuming the user first performs the same flashback operation on the standbys.
- With Oracle Database 19c, flashback operations are propagated to the standbys automatically
 - Requires that the standbys are configured for flashback database and in MOUNT state first
 - Standbys must have the same or larger setting for `DB_FLASHBACK_RETENTION_TARGET`

Data Guard and Flashback

Restore Points automatically propagate from the primary to the standbys

- Today, restore points are set on each Data Guard database individually
 - Requires multiple operations if the same restore point across the configuration is desired
- With Oracle Database 19c,
the primary restore points are automatically created on each standby
 - Identified by a prefix to the name of “PRI_”

Preserve Buffer Cache During Role Change

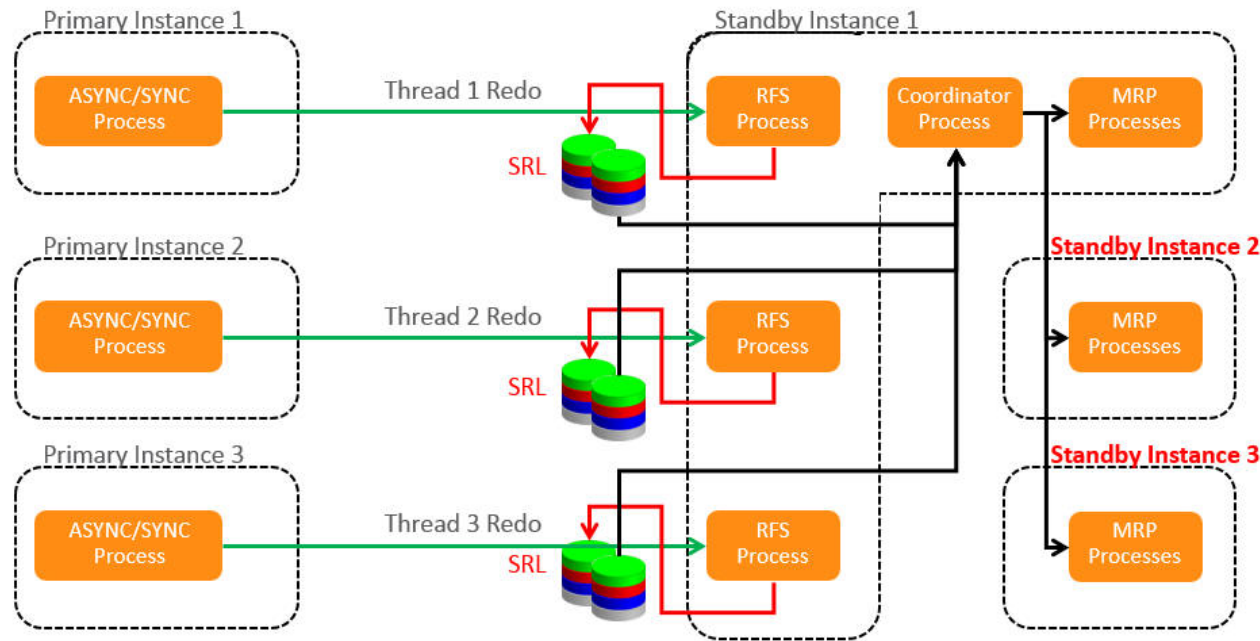


- The database buffer cache state is preserved on an ADG standby during a role change.
- Automatically enabled
 - Configure services so that users can stay connected on a service that is valid in both `PHYSICAL_STANDBY` and `PRIMARY` roles.
- Supported versions:
 - Oracle Database 18c – Single Instance
 - Oracle Database 19c – Oracle RAC Support

Multi-Instance Redo Apply Enhancements

Parallel redo log apply on Oracle RAC standby

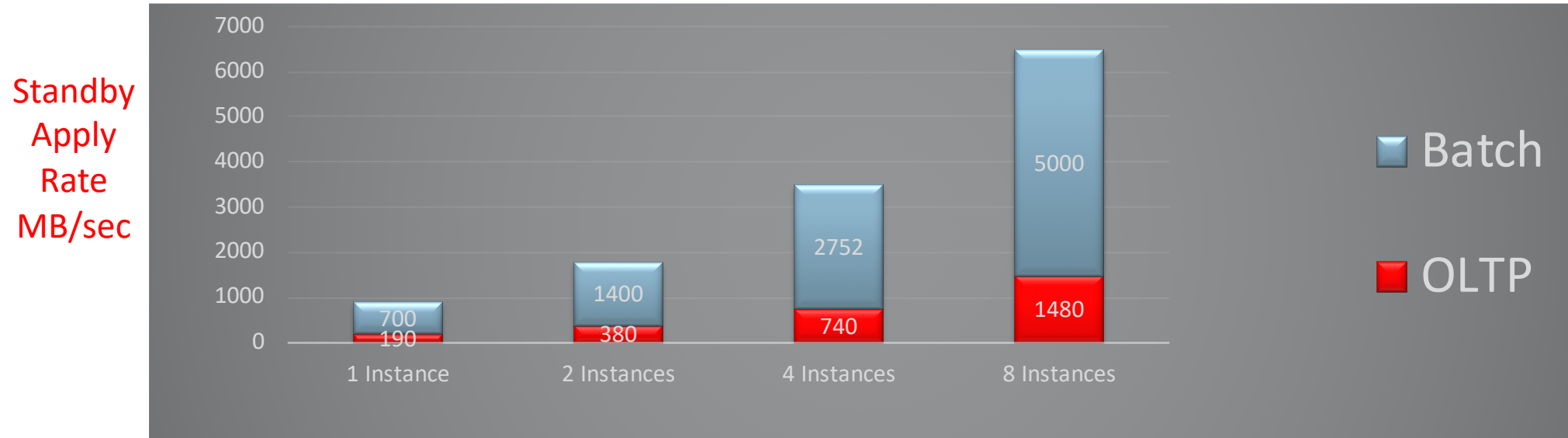
- Supported versions:
 - Introduced with Oracle Database 12c Rel. 2
 - Oracle Database 18c added support for Block Change Tracking enabled (ADG feature)
 - Oracle Database 19c supports the In Memory Column Store (IMCS)



Multi-Instance Redo Apply Performance

Lower Latency Active Data Guard Standby Databases

- Utilizes all RAC nodes on the Standby database to parallelize recovery
- OLTP workload on Exadata show great scalability



Extend the Footprint of Active Data Guard Applications

Creating **Private** Temporary Tables on Active Data Guard

- Private (Local) Temporary Tables on an Active Data Guard standby database
 - Are stored in memory on the standby
 - Visible only to the session that created it
 - Dropped at the end of a transaction or session

Extend the Footprint of Active Data Guard Applications

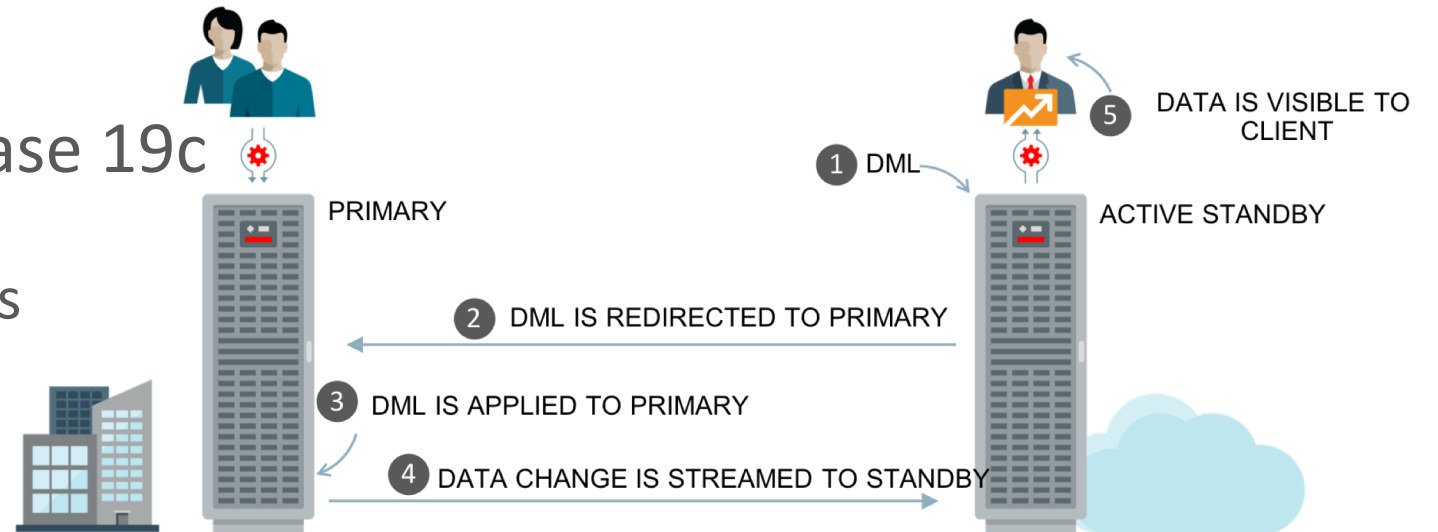
Creating **Global** Temporary Tables on Active Data Guard

- Global Temporary Tables (GTT) on an Active Data Guard standby database
 - Are Enabled by setting parameter “`_enable_proxy_adg_redirect=TRUE`” and appropriate connectivity parameters using `log_archive_dest_x`
 - Requires Standby to be caught up, with Real Time Apply running
 - Create the GTT on the primary over an internal link
 - Wait for the GTT redo to be replicated and applied to the Active Data Guard standby
 - Return control to the user
- Supported with Oracle Database 18c

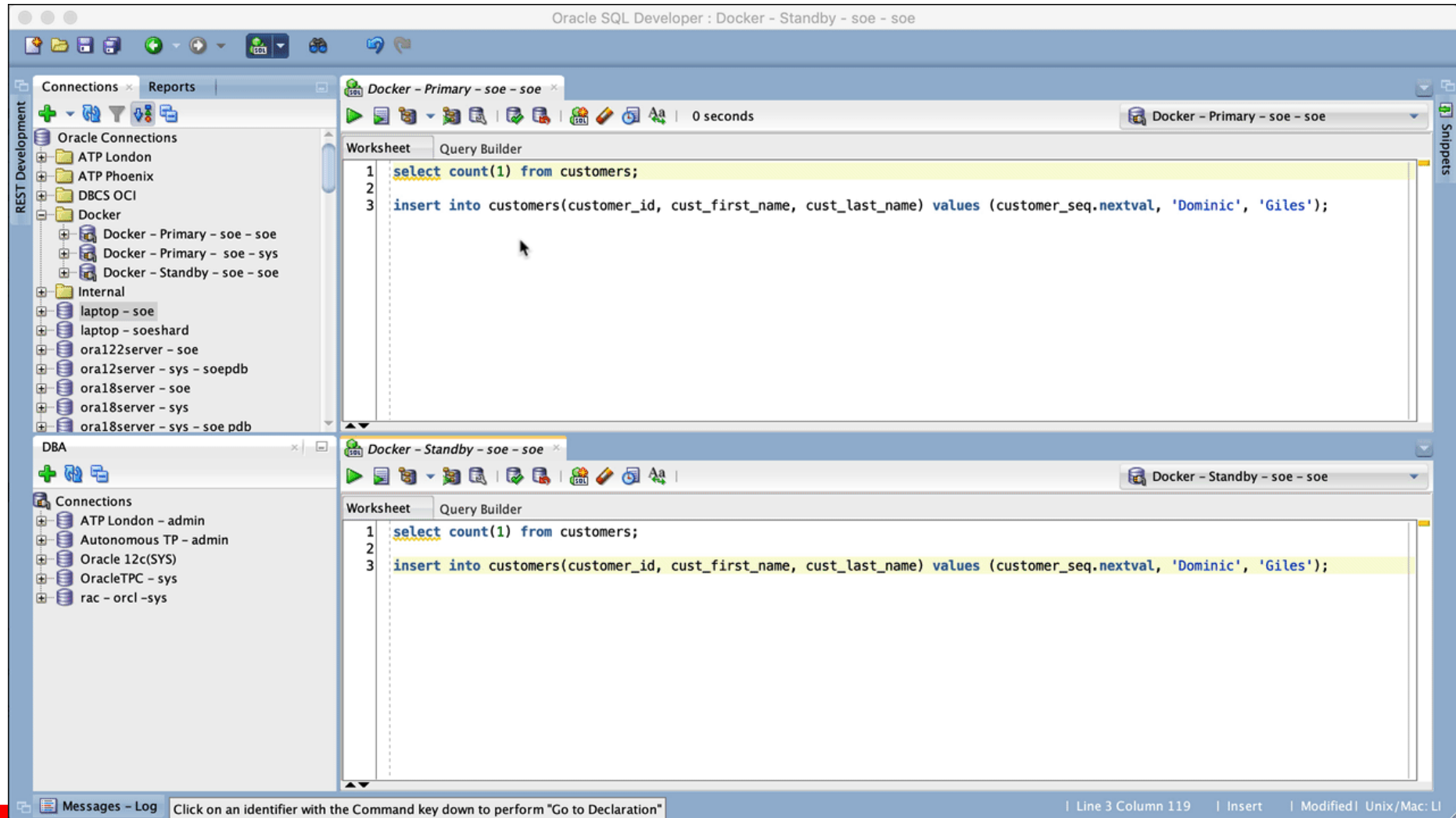
Extend the Footprint of Active Data Guard Applications

Support for DML Re-direction

- DML Re-direction is automatically performed from an Active Data Guard standby to the primary without compromising ACID
 - New documented parameter `ADG_REDIRECT_DML` controls DML Redirection
 - New `alter session ADG_REDIRECT_DML` allows for per-session override
 - New `ADG_REDIRECT_PLSQL` commands
- Supported with Oracle Database 19c
 - Targeted for “Read-Mostly, Occasional Updates” applications



Active Data Guard DML Redirect – Demo



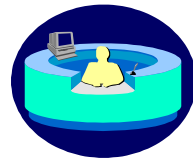
Active Data Guard Security Enhancements

- Automatically update passwd file on standby databases
 - Changing Admin password on primary automatically updates standby database
- Standby-first encryption
 - Can encrypt tablespaces on standby first, switchover, then encrypt on the old primary
- New DG redo authentication protocol - uses SSL certificate for 'redo_transport_user'
- Track login failures across all databases in a Data Guard configuration. Logins anywhere will be denied when the max login count is reached



Control Login-Attempts on Active Data Guard

- The ADG_ACCOUNT_INFO_TRACKING parameter extends the control of user account security information and reaction
 - ‘LOCAL’ (default value) continues to enforce the existing behavior
 - Maintains local copy of users account information in the standby's in-memory view
 - Login failures are only tracked locally on a per database basis
 - Logins are denied when the failure maximum is reached
 - ‘GLOBAL’ triggers the new, secure behavior
 - Maintains a single global copy of users account information across all Data Guard databases
 - Login failures across all databases in the Data Guard configuration count towards the maximum count
 - Logins anywhere will be denied when the count is reached



Data Guard Broker

(Enterprise Manager Cloud Control or DGMGRL)

SET TRACE_LEVEL USER|SUPPORT

- Replaces the DEBUG qualifier in Oracle Database 18c starting with 19c
 - More expandable in future, if new levels are necessary
 - 'USER' is the default
- SHOW ALL changes to display the TRACE_LEVEL instead of DEBUG

```
DGMGRL> show all;  
trace_level           USER  
echo                  OFF  
time                  OFF  
observerconfigfile = observer.ora
```

Fast-Start Failover (FSFO): Observe-Only Mode

- Test fast-start failover without impacting the production database
 - *Determine* when a failover or other interaction would have occurred during normal production processing
 - *Discover* what circumstances would cause an automatic failover to occur
 - *Tune* FSFO properties more precisely
 - *Easier justify* using Fast-Start Failover s to reduce the recovery time for failovers

```
DGMGRL> ENABLE FAST_START FAILOVER OBSERVE ONLY;  
Enabled in Observe-Only mode.  
DGMGRL>
```

SHOW CONFIGURATION LAG

- Conveniently view lag information for all members

```
DGMGRL> SHOW CONFIGURATION LAG;
Configuration - HA_Config
  Protection Mode: MaxPerformance
  Members:
    boston - Primary database
      chicago - Physical standby database
        Transport Lag:      0 seconds (computed 1 second ago)
        Apply Lag:          0 seconds (computed 1 second ago)
    newyork - Physical standby database
      Transport Lag:      0 seconds (computed 1 second ago)
      Apply Lag:          0 seconds (computed 1 second ago)
Fast-Start Failover: DISABLED
Configuration Status:
SUCCESS
```

SET FAST_START FAILOVER TARGET [NOWAIT]

- Today, if the current target fails, the Observer moves to the next target
 - Moving the target back to a previous standby requires disabling and enabling FSFO
- Starting with Oracle Database 19c, users can execute the SET FAST_START FAILOVER TARGET command
 - Disabling and enabling FSFO will not be required

```
DGMGRL> SET FAST_START FAILOVER TARGET TO boston;  
Waiting for Fast-Start Failover target to change to "boston"...  
Succeeded.
```

```
DGMGRL> SET FAST_START FAILOVER TARGET TO boston NOWAIT ;  
Succeeded.
```

Export and Import the Broker Metadata File

- Users will be able to save a Broker readable copy of the configuration file
- Allows a lost Broker configuration to be rebuilt without having to have all individual commands used at the start and during configuration lifetime

```
DGMGRL> EXPORT CONFIGURATION TO 'meta.xml' ;
```

```
Succeeded.
```

```
DGMGRL>
```

```
DGMGRL> IMPORT CONFIGURATION FROM 'meta.xml' ;
```

```
Succeeded. Run ENABLE CONFIGURATION to enable the imported configuration.
```

```
DGMGRL>
```