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# WELCOME

TO

# ORACLE

## SNAPSHOT STANDBY DATABASE

# AGENDA

-  DataGuard – Introduction
-  Snapshot Standby - Introduction
-  Convert Physical standby to Snapshot standby
-  Convert Snapshot standby to Physical standby
-  Data Guard Broker – Introduction
-  Convert Physical standby to Snapshot standby [using DGMGRL]
-  Convert Snapshot standby to Physical standby [using DGMGRL]

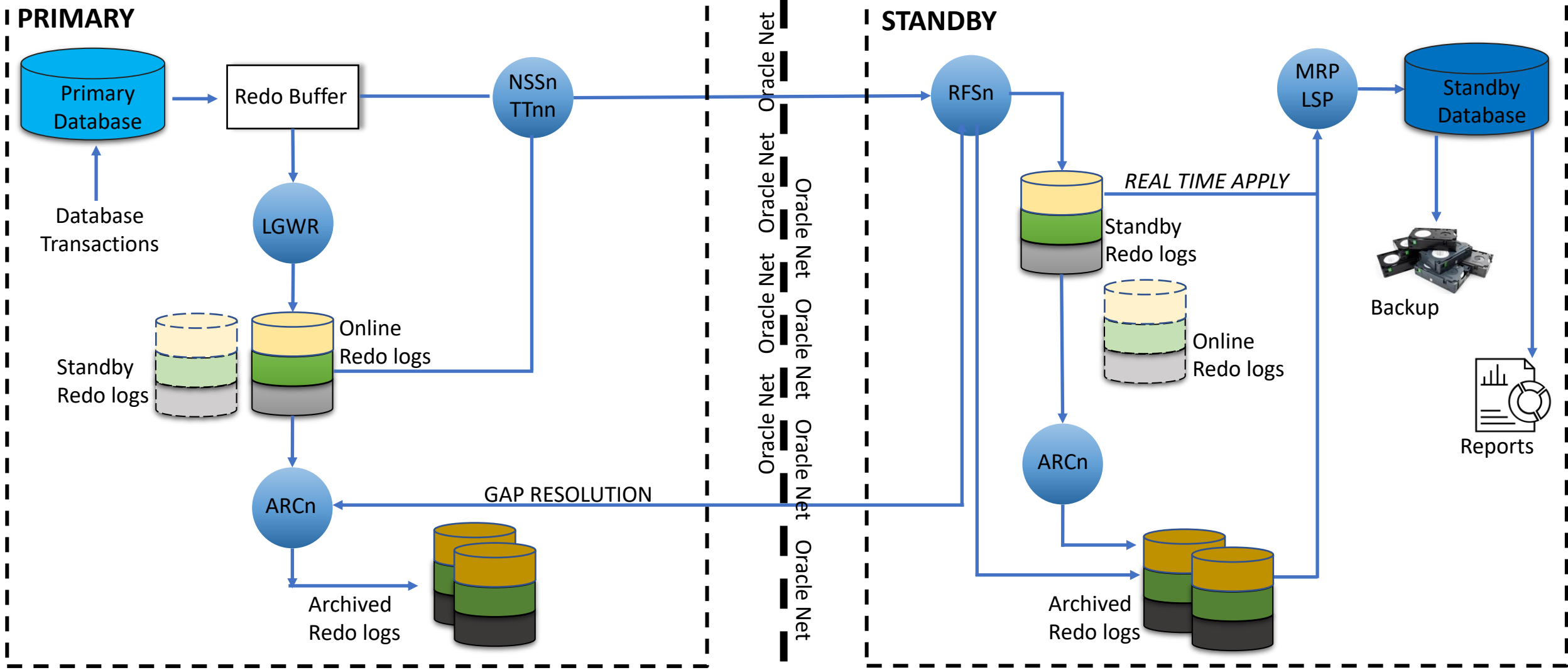
# INTRODUCTION

TO

# ORACLE DATAGUARD



- Oracle Data Guard is a feature that was introduced in Oracle Database 10g.
- In Data Guard, there is a *primary database* and one or more *standby databases* that are constantly kept in sync with the primary database that prevents loss of data.
- Oracle Data Guard ensures *high availability, data protection, and disaster recovery* for enterprise data.
- Data Guard provides a comprehensive set of services that create, maintain, manage, and monitor one or more standby databases to enable production Oracle databases to *survive disasters and data corruptions*.
- Data Guard maintains these standby databases as transactionally consistent copies of the production database.
- If the production database becomes unavailable because of a planned or an unplanned outage, Data Guard can *switch any standby database to the production role*, minimizing the downtime associated with the outage.
- With Data Guard, production database performance can be improved by offloading resource-intensive backup and reporting operations to standby systems.



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# ORACLE

# SNAPSHOT STANDBY

# DATABASE



In Oracle 10g Oracle gave us two types of standby databases

- Physical Standby database
- Logical Standby database

In Oracle 11g Oracle introduced two more types of standby databases

- ADG (Active Data Guard)
- Snapshot standby database

In Oracle Active Data Guard - Standby databases can be opened in read only mode with ongoing recovery, and we use it for reporting purposes.

While In Snapshot standby a updatable database version is created out of the standby database.

In snapshot standby database redo are received and archived, but not applied. The redo data received from the primary database are applied after a snapshot standby database is converted back into a physical standby database.

A snapshot standby can be created from

Enterprise Manager,

The Data Guard Broker command-line interface (DGMGRL) or

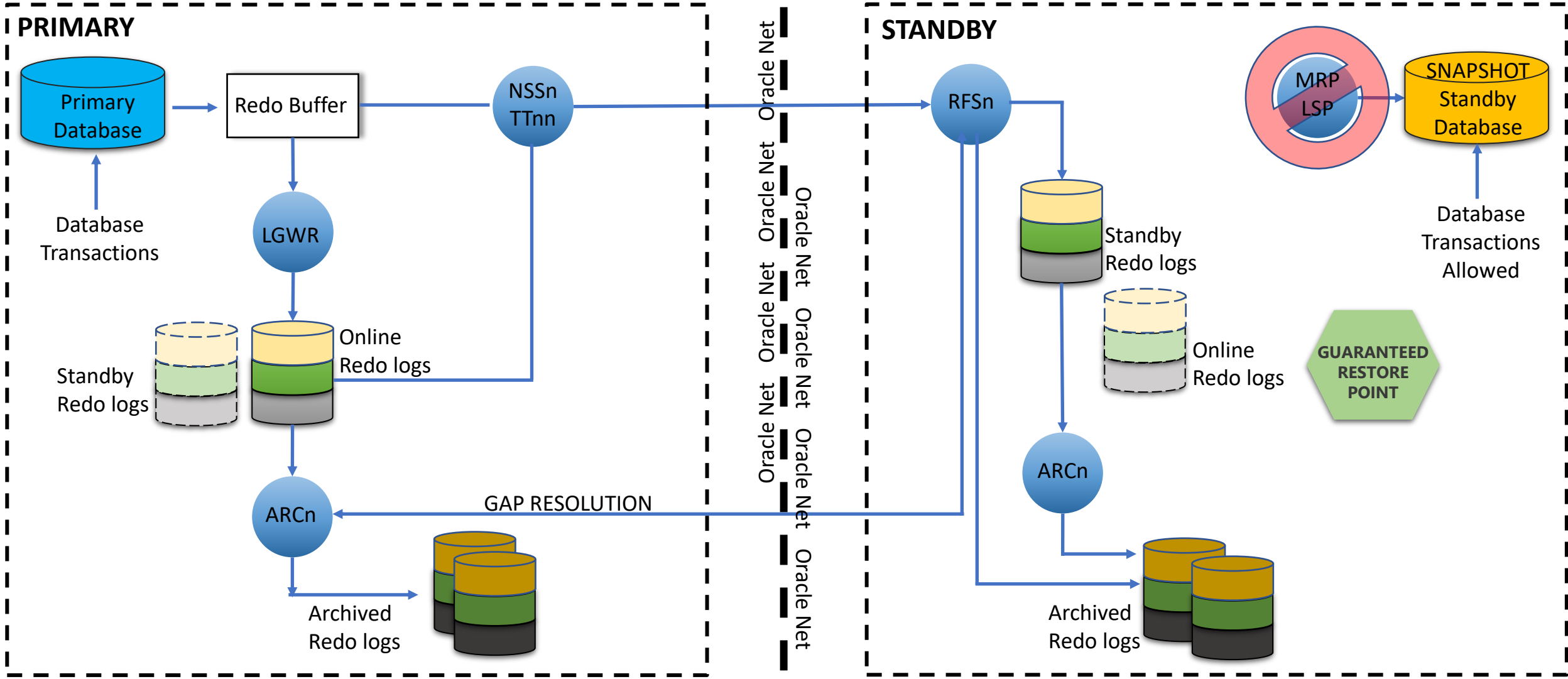
SQL\*Plus.

Whenever a physical standby database is converted into a snapshot standby database, a guaranteed restore point is automatically created.

When snapshot standby database is converted to physical standby, during this stage oracle flashbacks to the restore point that was created earlier and all the transactions which were done in standby database while it was open in READ WRITE mode will be flushed out.

The only requirement to have the snapshot standby is that FRA (Flash Recovery Area) must be configured on physical standby database.

It is not necessary to have flashback enabled.



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# ORACLE SNAPSHOT STANDBY

PHYSICAL STANDBY TO SNAPSHOT STANDBY

## Database Role on Primary Database

```
SYS@orcl 16-OCT-21>@dbinfo
```

NAME	OPEN_MODE	DB_UNIQNAM	DB_ROLE	PROTECTION_MODE	SWITCH_ST
ORCL	READ WRITE	orcl	PRIMARY	MAXIMUM PERFORMANCE	TO STANDBY

```
SYS@orcl 16-OCT-21>
```

2. Primary

## Database Role on Standby Database

```
SQL> @dbinfo
```

NAME	OPEN_MODE	DB_UNIQNAM	DB_ROLE	PROTECTION_MODE	SWITCH_ST
ORCL	READ ONLY WITH APPLY	orcldr	PHYSICAL STANDBY	MAXIMUM PERFORMANCE	NOT ALLOWED

```
SQL>
```

3. Standby



## Archive Sequence on Primary Database

```
SYS@orcl 16-OCT-21>select thread#,max(sequence#) from v$archived_log group by thread#;
```

```
  THREAD#  MAX(SEQUENCE#)  
-----  
         1             746
```

```
SYS@orcl 16-OCT-21>|
```

2. Primary

## Archive Sequence on Standby Database

```
SQL> select thread#,max(sequence#) from v$archived_log group by thread#;
```

```
  THREAD#  MAX(SEQUENCE#)  
-----  
         1             746
```

```
SQL> @mrp
```

PROCESS	STATUS	SEQUENCE#
ARCH	CLOSING	746
DGRD	ALLOCATED	0
DGRD	ALLOCATED	0
ARCH	CONNECTED	0
ARCH	CONNECTED	0
ARCH	CLOSING	745
ARCH	CONNECTED	0
RFS	IDLE	747
RFS	IDLE	0
RFS	IDLE	0
MRP0	APPLYING_LOG	747

```
11 rows selected.
```

```
SQL> |
```

3. Standby

## FLASHBACK Status and DB\_RECOVERY\_FILE\_DEST\* on Primary Database

```
SYS@orcl 16-OCT-21>select flashback_on from v$database;

FLASHBACK_ON
-----
NO

SYS@orcl 16-OCT-21>show parameter db_recovery_file_dest

NAME                                 TYPE        VALUE
-----
db_recovery_file_dest                string      /u01/app/oracle/fast_recovery_area/orcl
db_recovery_file_dest_size           big integer 8016M
SYS@orcl 16-OCT-21>
```

2. Primary

## FLASHBACK Status and DB\_RECOVERY\_FILE\_DEST\* on Standby Database

```
SQL> select flashback_on from v$database;

FLASHBACK_ON
-----
NO


SQL> show parameter db_recovery_file_dest

NAME                                 TYPE        VALUE
-----
db_recovery_file_dest                string      /u01/app/oracle/fast_recovery_area/orcl
db_recovery_file_dest_size           big integer 8016M
SQL>
```

3. Standby

## Stop the MRP process on Standby Database

```
SQL> alter database recover managed standby database cancel;  
Database altered.  
  
SQL> @mrp  
  
PROCESS      STATUS          SEQUENCE#  
-----  
ARCH         CLOSING         746  
DGRD         ALLOCATED       0  
DGRD         ALLOCATED       0  
ARCH         CONNECTED       0  
ARCH         CONNECTED       0  
ARCH         CLOSING         745  
ARCH         CONNECTED       0  
RFS          IDLE            747  
RFS          IDLE            0  
RFS          IDLE            0  
  
10 rows selected.  
  
SQL> █
```

 3. Standby

## Shut & Open the Standby Database in mount mode

```
SQL> shut immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL>
SQL> startup mount
ORACLE instance started.

Total System Global Area  524288000 bytes
Fixed Size                 8622624 bytes
Variable Size             436211168 bytes
Database Buffers          75497472 bytes
Redo Buffers               3956736 bytes
Database mounted.
SQL> █
```

 3. Standby

## Convert to Snapshot standby and Open the Database

```
SQL> alter database recover managed standby database cancel;  
Database altered.  
SQL> alter database convert to snapshot standby;  
Database altered.  
SQL> alter database open;  
Database altered.  
SQL> █
```

 3. Standby



## Check the New Database Role on Standby Database

```
SQL> SELECT NAME,OPEN_MODE,INSTANCE_NAME,DB_UNIQUE_NAME "DB_UNIQNAME",DATABASE_ROLE "DB_ROLE",PROTECTION_MODE,SWITCHOVER_STATUS "SWITCH__STATUS" FROM V$DATABASE,V$INSTANCE;
```

NAME	OPEN_MODE	INSTANCE_NAME	DB_UNIQNAM	DB_ROLE	PROTECTION_MODE	SWITCH__STATUS
ORCL	READ WRITE	orcldr	orcldr	SNAPSHOT STANDBY	MAXIMUM PERFORMANCE	NOT ALLOWED

```
SQL> █
```

📌 3. Standby

```
SELECT NAME,OPEN_MODE,INSTANCE_NAME,DB_UNIQUE_NAME "DB_UNIQNAME",DATABASE_ROLE "DB_ROLE",PROTECTION_MODE,SWITCHOVER_STATUS "SWITCH__STATUS" FROM V$DATABASE,V$INSTANCE;
```

## RESTORE POINT STATUS on Standby Database

```
SQL> col name for a50  
SQL> select NAME,GUARANTEE_FLASHBACK_DATABASE from v$restore_point;
```

NAME	GUA
SNAPSHOT_STANDBY_REQUIRED_10/16/2021 22:04:19	YES

```
SQL> █
```

📌 3. Standby

# ORACLE SNAPSHOT STANDBY

TABLE CREATION TESTING

## Create New User on Snapshot Standby Database

```
SQL>
SQL> create user shoaib identified by shoaib default tablespace users temporary tablespace temp;
User created.

SQL> grant connect, resource to shoaib;
Grant succeeded.

SQL> alter user shoaib quota unlimited on users;
User altered.

SQL> conn shoaib/shoaib
Connected.
SQL>
SQL> show user
USER is "SHOAIB"
SQL>
```

## Create New Table, Insert Rows in Snapshot Standby Database

```
SQL> create table snapshot_test (name varchar2(50));
Table created.
SQL> insert into snapshot_test values ('shoaib ansari');
1 row created.
SQL> insert into snapshot_test values ('vinod siram');
1 row created.
SQL> insert into snapshot_test values ('scholar IT solutions');
1 row created.
SQL> commit;
Commit complete.
SQL> select * from snapshot_test;

NAME
-----
shoaib ansari
vinod siram
scholar IT solutions
```

# ORACLE SNAPSHOT STANDBY

SNAPSHOT STANDBY TO PHYSICAL STANDBY



Check Archive Sequence on Primary Database – here we can make more switches on the primary side

```
SYS@orcl 16-OCT-21>@max
  THREAD# MAX(SEQUENCE#)
-----
         1          747
SYS@orcl 16-OCT-21>
2. Primary
```

Check Archive Sequence on Standby Database – those switches must come here with applied status

```
SQL> conn / as sysdba
Connected.
SQL> select thread#,max(sequence#) from v$archived_log group by thread#;
  THREAD# MAX(SEQUENCE#)
-----
         1          747
SQL>
3. Standby
```

## Check MRP running status on Standby Database

```
SQL> select thread#,max(sequence#) from v$archived_log group by thread#;
```

THREAD#	MAX(SEQUENCE#)
1	747

```
SQL> select process,status,sequence# from v$managed_standby;
```

PROCESS	STATUS	SEQUENCE#
ARCH	CONNECTED	0
DGRD	ALLOCATED	0
DGRD	ALLOCATED	0
ARCH	CONNECTED	0
ARCH	CLOSING	747
ARCH	CONNECTED	0
ARCH	CONNECTED	0
DGRD	ALLOCATED	0
RFS	IDLE	0
RFS	IDLE	748

```
10 rows selected.
```

```
SQL> █
```

3. Standby

## Shut & Open the Standby Database in mount mode

```
SQL> shut immediate
Database closed.
Database dismounted.
ORACLE instance shut down.
SQL> startup mount
ORACLE instance started.

Total System Global Area  524288000 bytes
Fixed Size                  8622624 bytes
Variable Size              436211168 bytes
Database Buffers           75497472 bytes
Redo Buffers                3956736 bytes
Database mounted.
SQL> █
```

 3. Standby

## Convert Snapshot standby to Physical standby

```
SQL> !ps -ef|grep -v grep |grep -i mrp
SQL> alter database convert to physical standby;
Database altered.
SQL> █
```

 3. Standby

## Shut and Open the Standby Database

```
SQL> shut immediate
ORA-01109: database not open

Database dismounted.
ORACLE instance shut down.
SQL> startup
ORACLE instance started.

Total System Global Area  524288000 bytes
Fixed Size                  8622624 bytes
Variable Size             436211168 bytes
Database Buffers          75497472 bytes
Redo Buffers                3956736 bytes
Database mounted.
Database opened.
SQL> █
```

 3. Standby



## Check the Database Role on Standby Database

```
SQL> col name for a6
SQL> SELECT NAME,OPEN_MODE,INSTANCE_NAME,DB_UNIQUE_NAME "DB_UNIQNAME",DATABASE_ROLE "DB_ROLE",PROTECTION_MODE,SW
ITCHOVER_STATUS "SWITCH__STATUS" FROM V$DATABASE,V$INSTANCE;
```

NAME	OPEN_MODE	INSTANCE_NAME	DB_UNIQNAM	DB_ROLE	PROTECTION_MODE	SWITCH__STATUS
ORCL	READ ONLY WITH APPLY	orcldr	orcldr	PHYSICAL STANDBY	MAXIMUM PERFORMANCE	NOT ALLOWED

```
SQL> █
```

3. Standby

## Start the MRP process on Standby Database

```
SQL> !ps -ef|grep -v grep |grep -i mrp
oracle      7490      1  0 22:44 ?          00:00:01 ora_mrp0_orcldr

SQL> @mrp

PROCESS      STATUS          SEQUENCE#
-----
ARCH         CONNECTED       0
DGRD         ALLOCATED       0
DGRD         ALLOCATED       0
ARCH         CONNECTED       0
ARCH         CLOSING         750
ARCH         CONNECTED       0
ARCH         CONNECTED       0
RFS          IDLE            0
RFS          IDLE            751
MRP0         APPLYING_LOG    751

10 rows selected.

SQL> █
```

3. Standby

## Check the Status of the table created in Snapshot Standby Database

```
SQL> col name for a6
SQL> SELECT NAME,OPEN_MODE,INSTANCE_NAME,DB_UNIQUE_NAME "DB_UNIQNAME",DATABASE_ROLE "DB_ROLE",PROTECTION_MODE,SW
ITCHOVER_STATUS "SWITCH__STATUS" FROM V$DATABASE,V$INSTANCE;
```

NAME	OPEN_MODE	INSTANCE_NAME	DB_UNIQNAM	DB_ROLE	PROTECTION_MODE	SWITCH__STATUS
ORCL	READ ONLY WITH APPLY	orcldr	orcldr	PHYSICAL STANDBY	MAXIMUM PERFORMANCE	NOT ALLOWED

```
SQL> select * from shoaib.snapshot_test;
select * from shoaib.snapshot_test
                *
ERROR at line 1:
ORA-00942: table or view does not exist
```

```
SQL> █
```

3. Standby

# ORACLE

## DATAGUARD BROKER

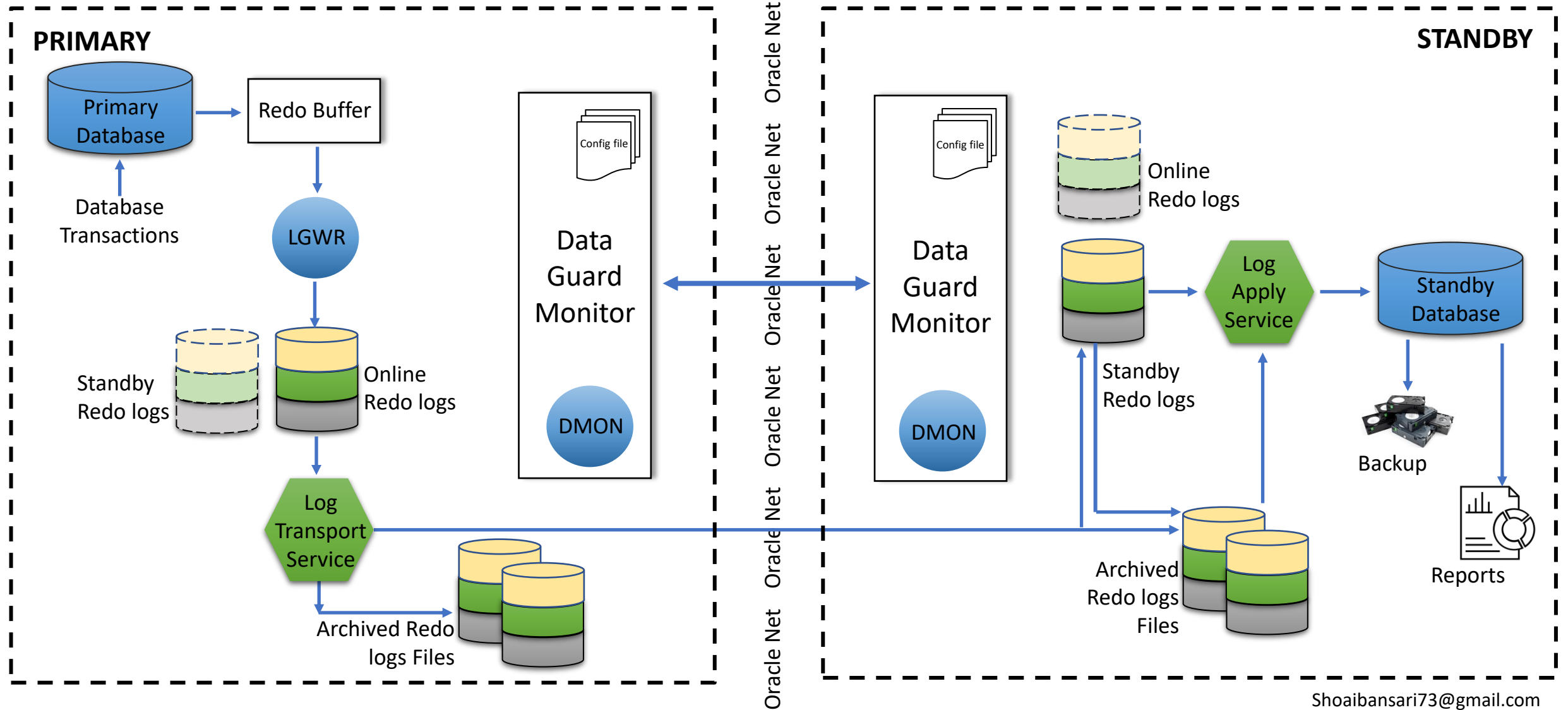
### INTRODUCTION

The Oracle Data Guard Broker logically binds primary database and standby databases within a **broker configuration** and manage and monitor them together as one unit. We can manage a broker configuration using either **Oracle Enterprise Manager Cloud Control (Cloud Control)** or the **Oracle Data Guard command-line interface DGMGRL**.

The Data Guard Broker is used to performs the following activities:

- Creates Data Guard configuration which includes one primary, one or more standby databases, redo transport service, and log apply service.
- Manages **Protection Mode** (Maximum Performance, Maximum Availability, Maximum Protection) for the broker configuration.
- Invokes **Switchover** or **Failover** with a single command.
- **Monitors the status** of the entire configuration, **captures diagnostic** information, **reports statistics** such as the Redo Apply rate and the redo generation rate.
- Assesses whether a database is ready to become a primary.





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# ORACLE SNAPSHOT STANDBY

PHYSICAL STANDBY TO SNAPSHOT STANDBY

USING DGMGRL

## Primary and Standby status from DGMGRL

```
[oracle@shoaibmac1 ~]$ dgmgrl / as sysdba
DGMGRL for Linux: Release 12.2.0.1.0 - Production on Sat Oct 16 22:54:24 2021

Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved.

Welcome to DGMGRL, type "help" for information.
Connected to "orcl"
Connected as SYSDBA.
DGMGRL>
DGMGRL> show configuration

Configuration - orcl_dg

Protection Mode: MaxPerformance
Members:
  orcl - Primary database
  orcldr - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS (status updated 28 seconds ago)

DGMGRL> █
```

2. Primary

Convert the physical standby database to a snapshot standby database using DGMGRL

```
DGMGRL> convert database 'orcldr' to snapshot standby;  
Converting database "orcldr" to a Snapshot Standby database, please wait...  
Database "orcldr" converted successfully  
DGMGRL>  
DGMGRL> █
```

 2. Primary

Verify Primary and Standby status after conversion from DGMGRL

```
DGMGRL> show configuration

Configuration - orcl_dg

Protection Mode: MaxPerformance
Members:
orcl - Primary database
orcldr - Snapshot standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS (status updated 48 seconds ago)

DGMGRL> █
```

2. Primary

Before & After Flashback status on snapshot standby database.

```
SQL> select flashback_on from v$database;
```

```
FLASHBACK_ON
```

```
-----  
NO
```

3. Standby

```
SQL> select flashback_on from v$database;
```

```
FLASHBACK_ON
```

```
-----  
RESTORE POINT ONLY
```

```
SQL>
```

```
SQL>
```

3. Standby

# ORACLE SNAPSHOT STANDBY

TABLE CREATION TESTING



## Verifying redo shipment while updating the snapshot database

```
SQL> select status,sequence#,block# from v$managed_standby;
```

STATUS	SEQUENCE#	BLOCK#
CONNECTED	0	0
ALLOCATED	0	0
ALLOCATED	0	0
CLOSING	751	63488
CLOSING	750	1
CONNECTED	0	0
CONNECTED	0	0
ALLOCATED	0	0
IDLE	0	0
IDLE	752	33019

```
10 rows selected.
```

```
SQL> select status,sequence#,block# from v$managed_standby where client_process='LGWR';
```

STATUS	SEQUENCE#	BLOCK#
IDLE	752	33056

```
SQL> select status,sequence#,block# from v$managed_standby where client_process='LGWR';
```

STATUS	SEQUENCE#	BLOCK#
IDLE	752	33120

```
SQL>
```

3. Standby

## Create New User on Snapshot Standby Database

```
SQL> create user shoaib identified by shoaib default tablespace users temporary tablespace temp;  
User created.  
  
SQL> grant connect, resource to shoaib;  
  
Grant succeeded.  
  
SQL> alter user shoaib quota unlimited on users;  
User altered.
```

 3. Standby

## Insert Rows & Commit on the snapshot standby database

```
SQL> create table shoaib.snapshot_test (name varchar2(50));
Table created.

SQL> insert into shoaib.snapshot_test values ('shoaib ansari');
1 row created.

SQL> insert into shoaib.snapshot_test values ('vinod siram');
1 row created.

SQL> insert into shoaib.snapshot_test values ('scholar IT solutions');
1 row created.

SQL> commit;
Commit complete.

SQL> select * from shoaib.snapshot_test;

NAME
-----
shoaib ansari
vinod siram
scholar IT solutions

SQL> █
```

3. Standby

# ORACLE SNAPSHOT STANDBY

SNAPSHOT STANDBY TO PHYSICAL STANDBY


USING DGMGRL

## Converting the Snapshot Standby Database to a Physical Standby Database

```
[oracle@shoaibmac1 ~]$ dgmgrl sys/oracle@orcl as sysdba
DGMGRL for Linux: Release 12.2.0.1.0 - Production on Sat Oct 16 23:34:08 2021

Copyright (c) 1982, 2017, Oracle and/or its affiliates. All rights reserved.

Welcome to DGMGRL, type "help" for information.
Connected to "orcl"
Connected as SYSDBA.
DGMGRL> convert database 'orcldr' to physical standby;
Converting database "orcldr" to a Physical Standby database, please wait...
Operation requires shut down of instance "orcldr" on database "orcldr"
Shutting down instance "orcldr"...
Connected to "orcldr"
Database closed.
Database dismounted.
ORACLE instance shut down.
Operation requires start up of instance "orcldr" on database "orcldr"
Starting instance "orcldr"...
ORACLE instance started.
Database mounted.
Connected to "orcldr"
Continuing to convert database "orcldr" ...
Database "orcldr" converted successfully
DGMGRL> █
```

 2. Primary

## Verify Primary and Standby status after conversion from DGMGRL

```
DGMGRL> show configuration

Configuration - orcl_dg

Protection Mode: MaxPerformance
Members:
orcl   - Primary database
orcldr - Physical standby database

Fast-Start Failover: DISABLED

Configuration Status:
SUCCESS (status updated 22 seconds ago)

DGMGRL> █
```

2. Primary



## Check the Status of the table created in Snapshot Standby Database

```
SQL> SELECT NAME,OPEN_MODE,INSTANCE_NAME,DB_UNIQUE_NAME "DB_UNIQUE_NAME",DATABASE_ROLE "DB_ROLE",PROTECTION_MODE,SWITCHOVER_STATUS "SWITCH_STATUS" FROM V$DATABASE,V$INSTANCE;
```

NAME	OPEN_MODE	INSTANCE_NAME	DB_UNIQUE_NAME
DB_ROLE	PROTECTION_MODE	SWITCH_STATUS	
ORCL	READ ONLY	orcl	orcl
PHYSICAL STANDBY	MAXIMUM PERFORMANCE		NOT ALLOWED

```
SQL> select * from shoaib.snapshot_test;
select * from shoaib.snapshot_test
                *
ERROR at line 1:
ORA-00942: table or view does not exist
```

```
SQL> █
```

Stop and Start the MRP process on the physical standby database.

```
DGMGRL> show database orcldr

Database - orcldr

Role:                PHYSICAL STANDBY
Intended State:      APPLY-ON
Transport Lag:       0 seconds (computed 1 second ago)
Apply Lag:           0 seconds (computed 1 second ago)
Average Apply Rate: 122.00 KByte/s
Real Time Query:     ON
Instance(s):         orcldr

Database Status:
SUCCESS

DGMGRL> edit database 'orcldr' SET STATE='APPLY-OFF';
Succeeded.
DGMGRL>
```

2. Primary

```
DGMGRL> show database orcldr

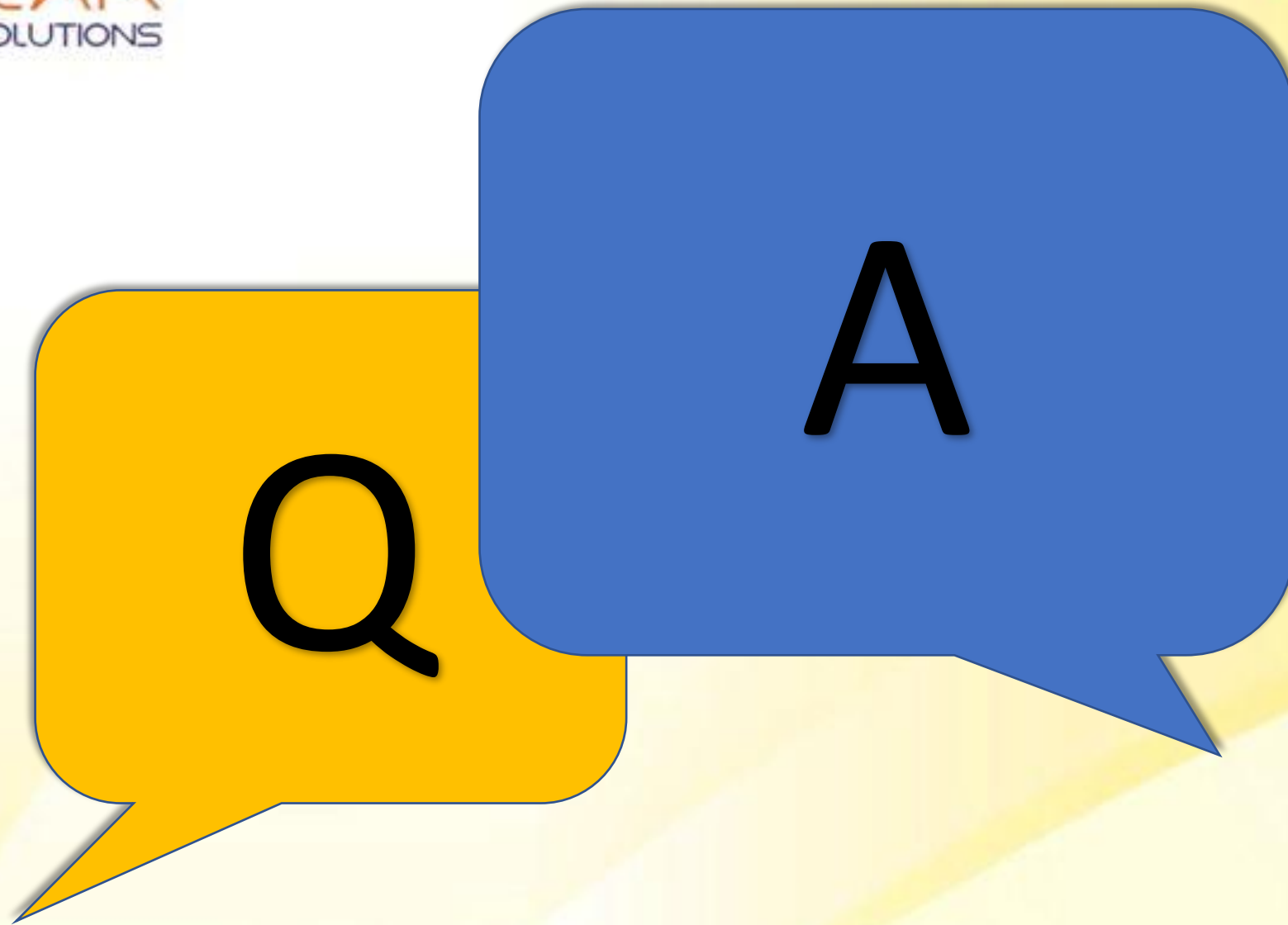
Database - orcldr

Role:                PHYSICAL STANDBY
Intended State:      APPLY-OFF
Transport Lag:       0 seconds (computed 1 second ago)
Apply Lag:           4 minutes 49 seconds (computed 1 second ago)
Average Apply Rate: (unknown)
Real Time Query:     OFF
Instance(s):         orcldr

Database Status:
SUCCESS

DGMGRL> edit database 'orcldr' SET STATE='APPLY-ON';
Succeeded.
DGMGRL>
```

2. Primary



THANKS !!