Oracle dataguard

Quick reference notes of terminology explanations and useful commands

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Oracle Dataguard

The main uses of standby database:

1. High availability
2. Data protection
3. Disaster recovery
4. For taking backup
5. Reporting

Types of standby databases

Type of standby database	Description
Physical Standby	• Exact block -for-block copy of primary database. • Maintained using REDO-APPLY
Logical Standby	• Convert the data received from primary into SQL statements and execute the SQL statements in the standby database. (LSP process applies the redo) • Maintained using SQL-APPLY
Snapshot Standby	• A fully updatable standby database converted from physical standby database.
Cascaded Standby	• A standby database receives its redo from another standby database to reduce the load on the primary system.
Active Data guard	• Physical standby can be opened in read only mode while the redo from primary is getting applied. • Reporting queries can be offloaded to standby database to avoid load in the production system. • RMAN backups also can be taken from standby database.
Transient Logical Standby	• It allows a rolling database upgrade by converting physical standby database temporarily to logical standby database.

Redo transport services

Type	Description
Synchronous Redo Transport	• Zero data loss approach • Changes at the primary side are committed only when LGWR receives the confirmation from LNS that the changes have been written to the standby database as well.
Asynchronous Redo Transport	• There is no "Zero Data Loss" approach in this redo transport method! • Unlike Synchronous Redo Transport, LGWR background process does not expect validation from LNS background process.

Apply Services

Type	Description
Real-time apply	• It uses in physical standby database. • Apply services can apply the changes to the standby database as it is received, without waiting for standby redo log files to be archived.
SQL apply	• It converts the redo data into SQL and apply it on the logical standby database.

Role Transitions

| Type	Description
Switchover	• Allows the primary database to change its role with a standby database. • There is no data loss during a switchover.
Failover	• Changes a standby database to the role of primary database in response to primary database failure • Chances of data loss if the database running on MAXIMUM performance protection mode. • If flashback is enabled on the primary, it can be reinstated as standby database once the reason for the failure is corrected.

Affirm and No affirm

Type	Description
Affirm	It ensures that the redos are written to the disks in standby side.
Noaffirm	It ensures that redos are received in one of the standby sides.

Protection Modes

Maximum Protection	Maximum Availability	Maximum Protection
SYNC/LGWR	SYNC/LGWR	ASYNC/LGWR/ARCH
Primary database needs to write redo to at least one of the standby databases and acknowledge. Otherwise, primary will be shut down.	It provides highest level of protection of data without compromising availability of database. If the primary database cannot write its redo stream to at least one synchronized standby database, it operates as if it were in maximum performance mode to preserve primary database availability until it is again able to write its redo stream to a synchronized standby database.	As its name says it provides maximum level of data protection that a database can have without compromising performance of database. This is default Protection mode in Dataguard.
Zero data loss is guaranteed	Zero data loss in normal operation but not guaranteed	Minimal data loss in a normal operation.

Flow diagram of physical standby database:
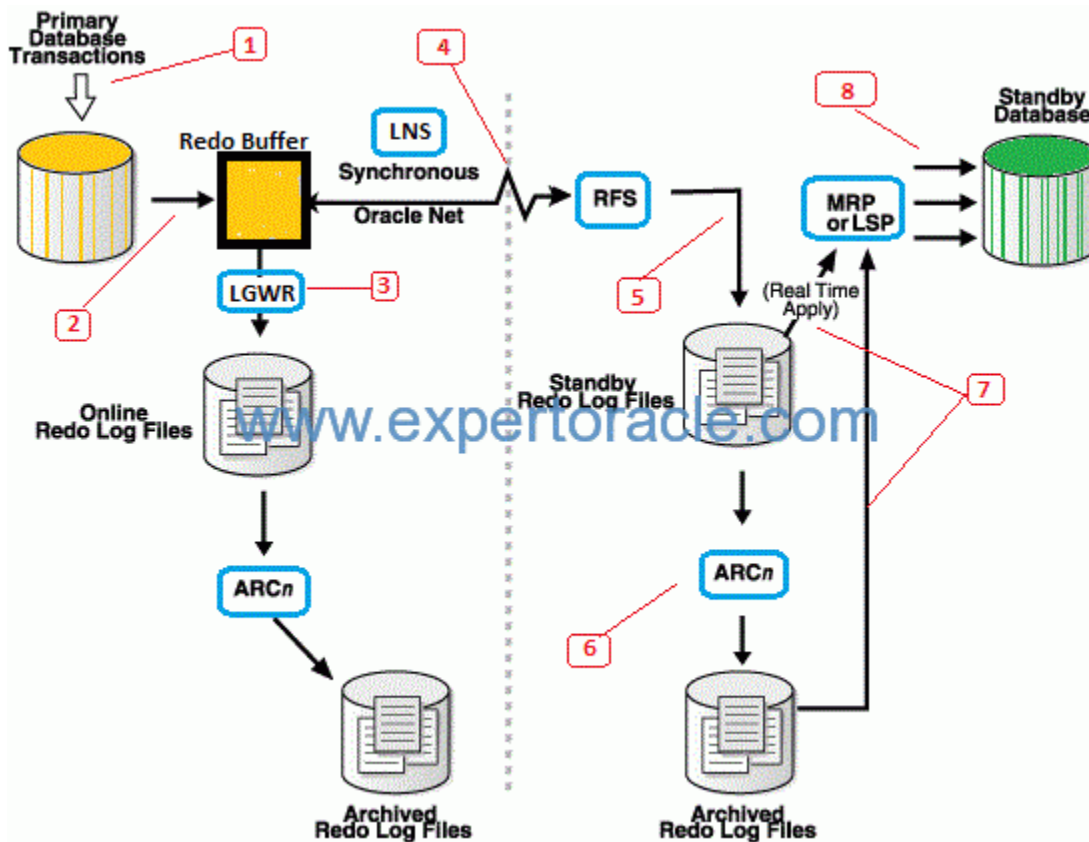
PHYSICAL STANDBY DATABASE RELATED PROCESSES

On the Primary Database:

LGWR : The log writer process flushes log buffers from the SGA to Online Redo Log files.

LNS : The LogWriter Network Service (LNS) reads the redo being flushed from the redo buffers by the LGWR and sends the redo over network to the standby database.

ARCH : The archiver processes archive the ORL files to archive log files.

On the Standby Database:

RFS : The main objective of the Remote File Server process is to perform a network receive of redo transmitted from the primary site and then writes the network buffer (redo data) to the standby redo log (SRL) files.

ARCH : The archive processes on the standby site perform the same functions performed on the primary site, except that on the standby site, an ARCH process generates archived log files from the SRLs.

MRP: The managed recovery process coordinates media recovery management.

Configuration of dataguard broker

Dataguard broker provides a unified method to perform dataguard administration, switchover, failover.

Dataguard broker keeps the information in a flat file, where redundant copies of the file are kept in each database in the dataguard configuration.

DG_BROKER_CONFIG_FILE_1 and DG_BROKER_CONFIG_FILE_2 are the parameters controls the location of the configuration files.

Step 1: Configuration:

On the primary side

alter system set dg_broker_config_file_1=

alter system set dg_broker_config_file_2=

alter system set dg_broker_start=true scope=both;

alter system set local_listener="";

On the standby side

alter system set dg_broker_config_file_1=

alter system set dg_broker_config_file_2=

alter system set dg_broker_start=true scope=both;

alter system set local_listener="";

Step2:Verify the TNS between prod and standby

Step3: Login to DGMGRL and check the configuration

- dgmgrl
- connect sys/password@tns_prod
- connect sys/password@tns_stby
- show configuration
- prod: create configuration 'PROD' as primary database is 'PROD_DB' connect identifier is 'tns_prod'; [Make sure log_Archive_dest_2 parameter is empty]
- standby: add database 'DR' as connect identifier is 'DR';
- show configuration
- enable configuration

Switchover and switchback using DGMGRL

switchover to DR;

convert database 'DR' to snapshot standby;

convert database 'DR' to physical standby;

Useful commands to show configuration of dataguard and individual database

show configuration

show configuration verbose

show database 'PRIM'

show database verbose 'PRIM'

validate database 'PRIM'

validate database verbose 'PRIM'

show database 'PRIM' sendQentries

show database 'DR' recvQentries

validate network configuration for all;

Edit database properties

edit database 'DR' set state='APPLY-OFF';

edit database 'DR' set state='TRANSPORT-OFF';

edit database 'DR' set state='APPLY-ON';

edit database 'DR' set state='TRANSPORT-ON';

Changing protection mode from max performance to max availability

DGMGRL> EDIT DATABASE 'chennai' SET PROPERTY 'LogXptMode'='SYNC';

DGMGRL> EDIT DATABASE 'delhi' SET PROPERTY 'LogXptMode'='SYNC';

DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXAVAILABILITY;

Enabling the fast-start failover

- Protection mode should be max availability
- DGMGRL> enable fast_start failover;
- DGMGRL> show fast_start failover;
- Start observer or nohup dgmgrl sys/oracle@orcl "start observer file='/home/oracle/fsfo.dat'" -logfile $HOME/observer.log &