

# Data Guard Protection Modes

## **Maximum Protection**

1. No data loss
2. Redo has to be written to both Primary redo logs and standby redo logs (of atleast one standby database) before transaction commits
3. Primary database shuts down if redo stream is prevented to write at standby redo logs of atleast one standby database
4. Configure standby redo logs on at least one standby database
5. Attribute to use in log\_archive\_dest\_n : LGWR, SYNC and AFFIRM for at least one standby DB

## **Maximum Availability**

1. Redo has to be written to both Primary redo logs and standby redo logs (of atleast one standby database) before transaction commits
2. If redo stream is prevented to write at standby redo logs of at least one standby database then Primary database does not shuts down unlike Maximum protection mode, instead primary database operates in Maximum Performance mode.
4. Primary database automatically resumes to operate in maximum availability mode once all gaps are resolved.
5. Configure standby redo logs on at least one standby database
6. Attribute to use in log\_archive\_dest\_n : LGWR, SYNC and AFFIRM for at least one standby DB

## **Maximum Performance**

1. Default mode
2. Asynchronous redo data is written to at least one standby database
3. Attributes on log\_archive\_dest\_n to set either LGWR and ASYNC or ARCH for standby DB destination

## **LGWR SYNC and ASYNC in Oracle Dataguard**

Oracle Data Guard redo log transport offers synchronous log transport mode (LogXptMode = 'SYNC') or asynchronous log transport mode (LogXptMode = 'ASYNC'). The difference is all about when the COMMIT happens .

1. LogXptMode = ('SYNC'): As the name implies, SYNC mode synchronizes the primary with the standby database and all DML on the primary server will NOT be committed until the logs have been successfully transported to the standby servers. The synchronous log transport mode is required for the Maximum Protection and Maximum Availability data protection modes.

- LogXptMode = ('ASYNC'): Conversely, asynchronous mode (ASYNC) allows updates (DML) to be committed on the primary server before the log file arrives on the standby servers. The asynchronous log transport mode is required for the Maximum Performance data protection mode.

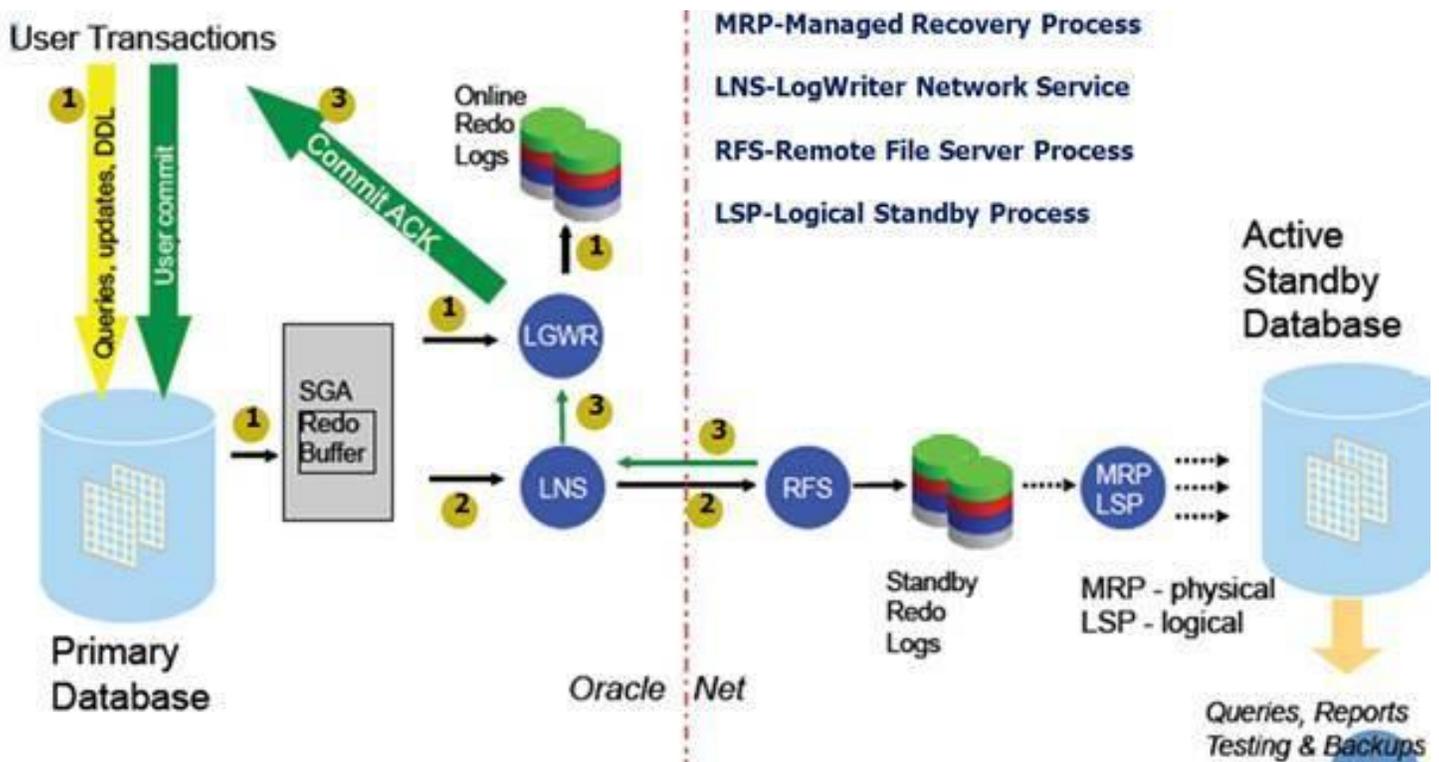
As you know, for every committed transaction at the primary database, Oracle generates and writes records to a local online log file.

If you choose REAL TIME redo apply, Data Guard transport services transmit the redo directly from the primary database log buffer to the standby database(s) where it is written to a standby redo log file locally.

This is highly efficient, it bypasses all IO generating processes. All redo travel in memory structures of database.

This method offers two types of replication methods: synchronous and asynchronous.

### **SYNCHRONOUS REDO TRANSPORT (SYNC) STORY (ZERO DATA LOSS)**



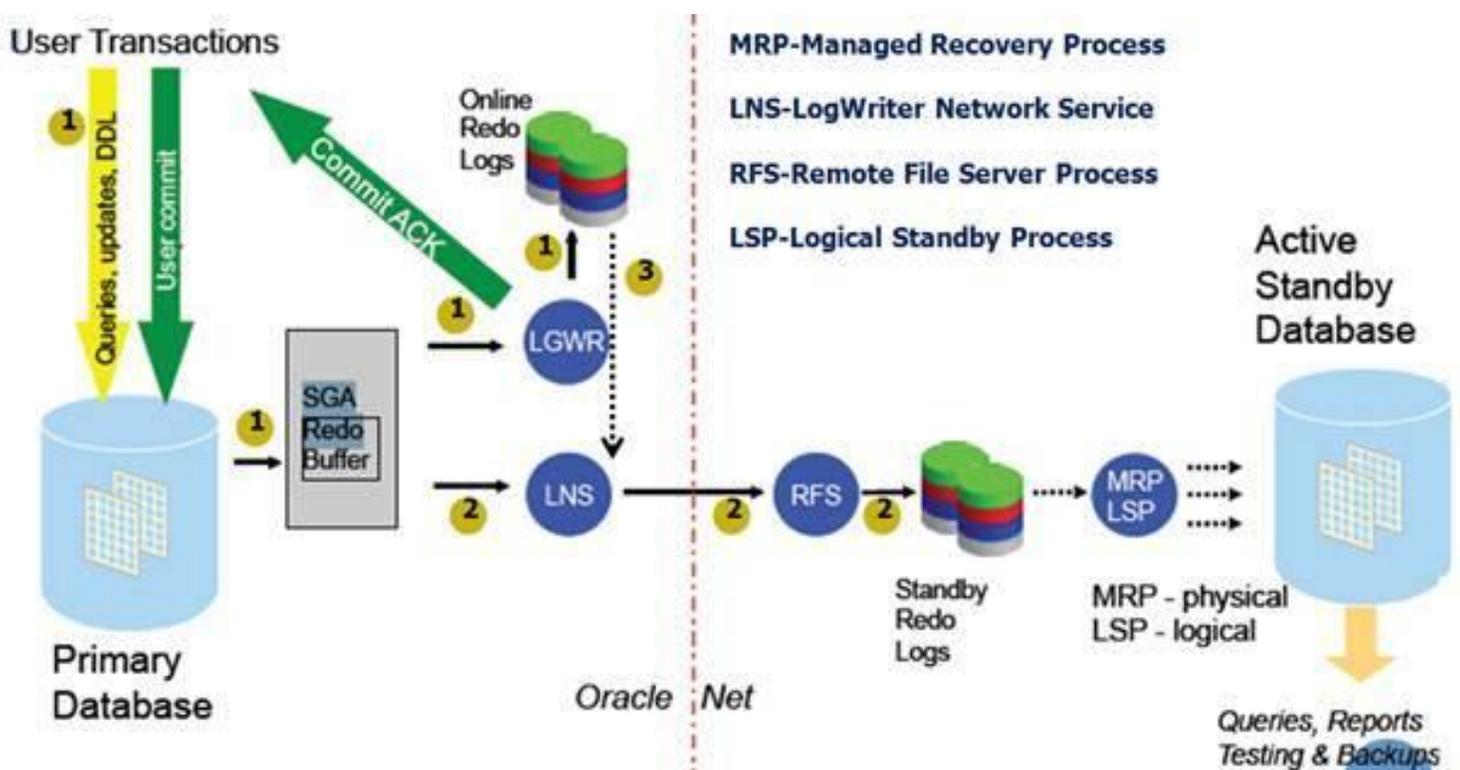
Process flow;

- The user initiates a transaction. This transaction is written to a redo buffer. When the user commit the transaction then the LGWR process writes it redo log file.
- LNS (logwriter Network Service) reports to RFS (Remote File Service) committed redo. RFS writes to standby redo log file. If we use physical standby, the MRP (Managed Recovery Process) will apply to standby database . In Logical Standby this is made by LSP (Logical Standby Process) .

3. RFS sends information to LNS that data is processed successfully. LNS transmits this information to LGWR . Finally, commit information is send to the user that initiated the transaction (transaction) .

Data transfer is ensured by the synchronous redo transfer. But there is a disadvantage. If a network failure occurs between production database (Primary) and the standby database or Primary database cannot access to the standby database then the primary database will hang until standby response. In other words, the primary database can not serve. To avoid such situation, I think the most logical one to use "NET\_TIMEOUT" parameter. With this parameter you can determine the timeout period. In case of an outage, Primary waits until the timeout period and will continue to serve when timeout period expires. Default value of this parameter in 10g is 180s and in 11g is 30s

### **ASYNCHRONOUS REDO TRANSPORT (ASYNC) STORY (MAXIMUM PERFORMANCE)**



1. The user initiates a transaction. This transaction is written to a redo buffer. When the user commit the transaction then the LGWR process writes it redo log file.
2. LNS (logwriter Network Service) reports to RFS (Remote File Service) committed redo. RFS writes to standby redo log file. If we use physical standby, the MRP (Managed Recovery Process) will apply to standby database . In Logical Standby this is made by LSP (Logical Standby Process) .
3. Once Redo Buffer is recycled, LNS automatically reads redo log files and begins to send redo from log files.

RFS doesn't send information to LNS that data is processed successfully.

The most common used process architecture. Asynchronous redo transfer does not guarantee zero data loss. The system has recovered with minimal data loss.

You can use these options at PRIMARY DATABASE's configuration :

```
LOG_ARCHIVE_DEST_2='SERVICE=MYSTANDBY LGWR ASYNC  
VALID_FOR=(ONLINE_LOGFILES,PRIMARY_ROLE) DB_UNIQUE_NAME=MYUNIQUENAME'
```

So, DATA GUARD doesn't need to wait local log files to be written on anymore. This eliminates the round-trip time required for I/O to complete at the standby database.