

# ORACLE DATAGUARD DEEP DIVE - II





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# **ORACLE** DATAGUARD

## INTRODUCTION





## **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. Then, 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.



#### **ORACLE DATAGUARD - ARCHITECTURE** SOLUTIONS





# **ORACLE** DATAGUARD

## PROTECTION MODES





## Data Guard - Protection Mode

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## **Maximum Availability**

This protection mode provides the highest level of data protection that is possible without compromising the availability of a primary database. Under normal operations, transactions do not commit until all redo data needed to recover those transactions has been written to the online redo log AND based on user configuration, one of the following is true:

- Redo has been received at the standby, I/O to the standby redo log has been initiated, and acknowledgement sent back to primary
- Redo has been received and written to standby redo log at the standby and acknowledgement sent back to primary

If the primary does not receive acknowledgement from at least one synchronized standby, then 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.

If the primary database fails, then this mode ensures no data loss occurs provided there is at least one synchronized standby in the Oracle Data Guard configuration.

Transactions on the primary are considered protected as soon as Oracle Data Guard has written the redo data to persistent storage in a standby redo log file. Once that is done, acknowledgment is quickly made back to the primary database so that it can proceed to the next transaction. This minimizes the impact of synchronous transport on primary database throughput and response time. To fully benefit from complete Oracle Data Guard validation at the standby database, be sure to operate in real-time apply mode so that redo changes are applied to the standby database as fast as they are received. Oracle Data Guard signals any corruptions that are detected so that immediate corrective action can be taken.



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## **ORACLE DATAGUARD – MAX AVAILABILITY**

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#### Performance Versus Protection in Maximum Availability Mode

When you use Maximum Availability mode, it is important to understand the possible results of using the <u>LOG\_ARCHIVE\_DEST\_n</u> attributes SYNC/AFFIRM versus SYNC/NOAFFIRM (FastSync) so that you can make the choice best suited to your needs.

When a transport is performed using **SYNC/AFFIRM**, the primary performs write operations and waits for acknowledgment that the redo has been transmitted synchronously to the physical standby and written to disk. A SYNC/AFFIRM transport provides an additional protection benefit at the expense of a performance impact caused by the time required to complete the I/O to the standby redo log.

When a transport is performed using **SYNC/NOAFFIRM**, the primary performs write operations and waits only for acknowledgement that the data has been received on the standby, not that it has been written to disk. The SYNC/NOAFFIRM transport can provide a performance benefit at the expense of potential exposure to data loss in a special case of multiple simultaneous failures.

With those definitions in mind, suppose you experience a catastrophic failure at the primary site at the same time that power is lost at the standby site. Whether data is lost depends on the transport mode being used. In the case of SYNC/AFFIRM, in which there is a *check to confirm that data is written to disk on the standby*, there would be no data loss because the data would be available on the standby when the system was recovered. In the case of SYNC/NOAFFIRM, in which there is *no check that data has been written to disk on the standby*, there may be some data loss.





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## **ORACLE DATAGUARD – SYNC/AFFIRM**



## SCHOLAR ORACLE DATAGUARD - SYNC/NOAFFIRM



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## Maximum Performance

This protection mode provides the highest level of data protection that is possible without affecting the performance of a primary database.

This is accomplished by allowing transactions to commit as soon as all redo data generated by those transactions has been written to the online log.

Redo data is also written to one or more standby databases, but this is done asynchronously with respect to transaction commitment, so primary database performance is unaffected by the time required to transmit redo data and receive acknowledgment from a standby database.

This protection mode offers slightly less data protection than maximum availability mode and has minimal impact on primary database performance.

This is the default protection mode.



## **ORACLE DATAGUARD** – MAX PERFORMANCE



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## **ORACLE DATAGUARD** – MAX PROTECTION

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## **Maximum Protection**

Maximum protection is similar to maximum availability but provides an additional level of data protection in the event of multiple failure events.

Unlike maximum availability, which allows the primary to continue processing if it is unable to receive acknowledgement from a standby database, maximum protection shuts the primary database down rather than allowing it to continue processing transactions that are unprotected.

Because this data protection mode prioritizes data protection over primary database availability, Oracle recommends that a minimum of two standby databases be used to protect a primary database that runs in maximum protection mode to prevent a single standby database failure from causing the primary database to shut down.



## SCHOLAR ORACLE DATAGUARD - MAX PROTECTION



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# ORACLE DATAGUARD

## MAX PERFORMANCE TO MAX AVAILABILITY





## **REDO TRANSPORT ATTRIBUTES**

Maximum Availability	Maximum Performance	<b>Maximum Protection</b>
AFFIRM	NOAFFIRM	AFFIRM
SYNC	ASYNC	SYNC



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## **ORACLE DATAGUARD** – Change Mode

#### MAX PERFORMANCE to either MAX AVAILABILITY or MAX PROTECTION

**Requirements :** 

- Standby database must have standby logs configured.
- The *LOG\_ARCHIVE\_DEST\_N* init parameter must include the redo transport attributes as listed in the previous slide.
- Check *DB\_UNIQUE\_NAME* init parameter is set properly on primary and standby.
- Check *LOG\_ARCHIVE\_CONFIG* init parameter is set properly on primary and standby.
  - SQL>ALTER SYSTEM SET LOG\_ARCHIVE\_CONFIG='DG\_CONFIG=(orcl,orcldr)';
- Set data protection mode
  - SQL>ALTER DATABASE SET STANDBY DATABASE TO MAXIMIZE {AVAILABILITY | PERFORMANCE | PROTECTION};
- Check new protection mode
  - SQL> SELECT PROTECTION\_MODE FROM V\$DATABASE;





#### Protection Mode on Primary Database

SQL> @	dbinfo2				
NAME	OPEN_MODE	DB_UNIQNAM	DB_ROLE	PROTECTION_MODE	SWITCH_ST
ORCL	READ WRITE	orcl	PRIMARY	MAXIMUM PERFORMANCE	TO STANDBY

#### Protection Mode on Standby Database

SQL>	@dbinfo					
NAME	OPEN_MODE	DB_UNIQNAM	DB_ROLE		PROTECTION_MODE	SWITCH_ST
ORCL	MOUNTED	orcldr	PHYSICAL	STANDBY	MAXIMUM PERFORMANCE	NOT ALLOWED

<u>tomaxavail</u>





#### Online Redo Logs & Standby Redo Logs(SRL) at Primary Database

SYS@ORCL 20-SEP-21>select group#,bytes/1024/1024 from v\$log	; SYS@ORCL 20-SEP-21>select group#,bytes/1024/1024 from v\$standby_log;
GROUP# BYTES/1024/1024	GROUP# BYTES/1024/1024
1 200 2 200 3 200	4 200 5 200 6 200

If standby redo logs are not configured on the primary database then we need to create them.

ALTER DATABASE ADD STANDBY LOGFILE GROUP 7 SIZE 200M;

ALTER DATABASE DROP STANDBY LOGFILE GROUP 6;

These standby redo logs on Primary database will be used only when switchover is initiated.



## SCHOLAR ORACLE DATAGUARD - Change Mode

Online redo logs & Standby redo logs at Standby Database

SQL> @	dbinfo				
NAME	OPEN_MODE	DB_UNIQNAM	DB_ROLE	PROTECTION_MODE	SWITCH_ST
ORCL	MOUNTED	orcldr	PHYSICAL STAND	BY MAXIMUM PERFORMANCE	NOT ALLOWED
SQL> se	elect group	#,bytes/1024	4/1024 from v\$	log;	
GR	OUP# BYTES/	1024/1024			
	1 3 2	200 200 200			
SQL> se	elect group	#,bytes/1024	4/1024 from v\$	standby_log;	
GR	OUP# BYTES/	1024/1024			
	4 5 6	200 200 200			

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Make sure that both primary database and standby database are in SYNC





Back to slide

As the current the redo transmission parameter in primary database is set to ASYNCHRONOUS mode.

SQL> show parameter log_archive_dest_2		SYS@ORCL 20-SEP-21>show parameter log_archive_dest_2			
		NAME	ТҮРЕ	VALUE	
NAME	ТҮРЕ	VALUE	log_archive_dest_2	string	service="orcldr", ASYNC NOAFFI
log_archive_dest_2	string	<pre>service=orcldr async valid_for =(online_logfiles,primary_role ) db_unique_name=orcldr</pre>			<pre>n=disable max_failure=0 max_co n=disable max_failure=0 max_co nnections=1 reopen=300 db_uniq ue_name="orcldr" net_timeout=3 0, valid_for=(online_logfile,a ll_roles)</pre>
Example : 1			Example : 2		

Configure the redo transmission parameter in primary database to use SYNCHRONOUS mode.

SQL> show parameter dest_2		
NAME	ТҮРЕ	VALUE
log_archive_dest_2	string	<pre>service=orcldr LGWR AFFIRM SYNC valid_tor=(online_logtiles, primary_role) db_unique_name=orcldr</pre>





Change the protection mode on the Primary Database

```
SQL> alter database set standby database to maximize availability;
Database altered.
SQL> alter database open;
Database altered.
SQL> select status,instance_name,database_role,protection_mode from v$database,v$instance;
STATUS INSTANCE_NAME DATABASE_ROLE PROTECTION_MODE
OPEN orcl PRIMARY MAXIMUM AVAILABILITY
```



## SCHOLAR ORACLE DATAGUARD - Change Mode

#### <u>New Protection Mode</u> at Primary database and Standby database

SQL> sele STATUS	ect status,ir INSTANCE	nstance_name, E_NAME DAT	database_ro ABASE_ROLE	ole,protec PROTEC	tion_mode TION_MODE	from v\$databa	se,v\$instance;
OPEN	orcl	PRI	MARY	MAXIMU	JM AVAILABI	LITY	
SQL> @d	lbinfo						
NAME	OPEN_MODE	DB_UNIQNAM	DB_ROLE		PROTECTI	ON_MODE	SWITCH_ST
ORCL	MOUNTED	orcldr	PHYSICAL	STANDBY	MAXIMUM	AVAILABILITY	NOT ALLOWED

tomaxper



SQL>



# ORACLE DATAGUARD BROKER INTRODUCTION



## **ORACLE DATAGUARD BROKER**

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:

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- 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.



## OLAR ORACLE DGBROKER - ARCHITECTURE



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# ORACLE DATAGUARD BROKER CONFIGURATION



## ORACLE DATAGUARD BROKER - Config

ENVIRONMENT	PRIMARY SERVER	STANDBY SERVER	
IP ADDRESS	192.168.56.103	192.168.56.102	
SERVER NAME	shoaibmac1.localdomain	shoaibmac2.localdomain	
DATABASE VERSION	12.2.0.1	12.2.0.1	
DATABASE NAME	ORCL	ORCL	
DB UNIQUE NAME	ORCL	ORCLDR	
FILE SYSTEM	NON ASM	NON ASM	
LISTENER NAME	LISTENER_PRIMARY	LISTENER_STANDBY	
LISTENER PORT	1524	1524	

\* Prerequisites : standby database must be configured before dgbroker configuration





Invoke DataGuard Broker [DGMGRL] and Connect to database

```
[oracle@shoaibmac1 ~]$ dgmgrl / as sysdba
DGMGRL for Linux: Release 12.2.0.1.0 - Production on Sat Oct 2 08:51:33 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.
DGMGRI >
DGMGRL>
DGMGRL> show configuration
ORA-16525: The Oracle Data Guard broker is not yet available.
Configuration details cannot be determined by DGMGRL
DGMGRL>
```



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## **ORACLE DATAGUARD BROKER - Config**

#### Check dg\_broker\_start parameter value on Primary and Standby database

SYS@orcl	02-OCT-21>@dbinfo			
NAME	OPEN_MODE	DATABASE_ROLE	SWITCHOVER_STATUS	
ORCL	READ WRITE	PRIMARY	TO STANDBY	
SYS@orcl	02-OCT-21>show parame	eter dg_broker_sta	rt	
NAME		ТҮРЕ	VALUE	
dg_broker_start boolean FALSE SYS@orcl 02-0CT-21>				
PRIMARY D	ATABASE			

SQL> @dbinfo			
NAME OPEN_MODE DB_UNIQNAM	1 DB_ROLE	PROTECTION_MODE	SWITCH_ST
ORCL MOUNTED orcldr	PHYSICAL STANDBY	MAXIMUM PERFORMANCE	NOT ALLOWED
SQL> show parameter dg_broke	er_start		
NAME	ТҮРЕ	VALUE	
dg_broker_start SQL>	boolean	FALSE	
STANDBY DATABASE			



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#### Check for Archive GAP on Primary and Standby database

SYS@orcl	02-OCT-21>@dbinfo	
NAME	OPEN_MODE	DATABASE_ROLE SWITCHOVER_STATUS
ORCL	READ WRITE	PRIMARY TO STANDBY
SYS@orcl	02-0CT-21>@max	
MAX(SEQUE	NCE#)	
	518	
PRIMARY DATA	BASE	SQL> @dbinfo
		NAME OPEN_MODE DB_UNIQNAM DB_ROLE PROTECTION_MODE SWITCH_ST
		ORCL MOUNTED orcldr PHYSICAL STANDBY MAXIMUM PERFORMANCE NOT ALLOWED
		SQL> @max
		MAX(SEQUENCE#)
	STANDBY D	DATABASE 518
Pleas	anton.CA.USA	www.scholaritinc.com

#### Listener File on Primary Database

```
[oracle@shoaibmac1 admin]$ cat listener.ora
LISTENER PRIMARY =
  (DESCRIPTION LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = shoaibmac1.localdomain)(PORT = 1524))
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1524))
SID LIST LISTENER PRIMARY =
  (SID LIST =
    (SID DESC =
      (GLOBAL DBNAME = orcl)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcl)
    (SID DESC =
      (GLOBAL DBNAME = orcldr)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcldr)
ADR BASE LISTENER PRIMARY = /u01/app/oracle
[oracle@shoaibmac1 admin]$
     oracle@shoaibmac1:/u01/app/oracle...
 -9
```

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#### Edit Listener File for DG BROKER on Primary Database

```
[oracle@shoaibmac1 admin]$ cat listener.ora
LISTENER PRIMARY =
 (DESCRIPTION LIST =
   (DESCRIPTION =
     (ADDRESS = (PROTOCOL = TCP)(HOST = shoaibmac1.localdomain)(PORT = 1524))
   (DESCRIPTION =
     (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1524))
 )
SID LIST LISTENER PRIMARY =
 (SID LIST =
   (SID DESC =
     (GLOBAL DBNAME = orcl)
     (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
     (SID NAME = orcl)
   (SID DESC =
     (GLOBAL DBNAME = orcldr)
     (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
     (SID NAME = orcldr)
    (SID DESC =
     (GLOBAL DBNAME = orcl dgmgrl)
     (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
     (SID NAME = orcl)
   (SID DESC =
     (GLOBAL DBNAME = orcldr dgmgrl)
     (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
     (SID NAME = orcldr)
ADR BASE LISTENER PRIMARY = /u01/app/oracle
[oracle@shoaibmac1 admin]$
    oracle@shoaibmac1:/u01/app/oracle..
ъ.
```

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#### **RELOAD** Listener on Primary Database

[oracle@shoaibmac1 admin]	<pre>\$ lsnrctl reload LISTENER_PRIMARY</pre>	
LSNRCTL for Linux: Versio	n 12.2.0.1.0 - Production on 13-SE	P-2021 20:46:08
Copyright (c) 1991, 2016, Oracle. All rights reserved.		
Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=shoaibmac1.localdomain)(PORT=1524))) The command completed successfully [oracle@shoaibmac1 admin]\$ lsnrctl status LISTENER_PRIMARY		
LSNRCTL for Linux: Versio	n 12.2.0.1.0 - Production on 13-SE	P-2021 20:46:15
Copyright (c) 1991, 2016,	Oracle. All rights reserved.	
Connecting to (DESCRIPTIO STATUS of the LISTENER	N=(ADDRESS=(PROTOCOL=TCP)(HOST=sho	aibmac1.localdomain)(PORT=1524)))
Alias Version Start Date Uptime Trace Level Security SNMP Listener Parameter File Listening Endpoints Summa (DESCRIPTION=(ADDRESS=() (DESCRIPTION=(ADDRESS=() Services Summary Service "orcl" has 1 inst	LISTENER PRIMARY TNSLSNR for Linux: Version 12.2.0 13-SEP-2021 18:36:48 0 days 2 hr. 9 min. 27 sec off ON: Local OS Authentication OFF /u01/app/oracle/product/12.2.0.1/0 /u01/app/oracle/diag/tnslsnr/shoa: ry PROTOCOL=tcp)(HOST=shoaibmac1)(POR PROTOCOL=ipc)(KEY=EXTPROC1524))) ance(s).	.1.0 - Production db_1/network/admin/listener.ora ibmac1/listener_primary/alert/log.xml T=1524)))
<pre>Service "orcl" has 1 instance(s). Instance "orcl". status UNKNOWN, has 1 handler(s) for this service Service "orcl dgmgrl" has 1 instance(s). Instance "orcldr" has 1 instance(s). Service "orcldr" has 1 instance(s). Instance "orcldr", status UNKNOWN, has 1 handler(s) for this service Service "orcldr", status UNKNOWN, has 1 handler(s) for this service Service "orcldr", status UNKNOWN, has 1 handler(s) for this service Service "orcldr", status UNKNOWN, has 1 handler(s) for this service Service "orcldr dgmgrl" has 1 instance(s). Instance "orcldr", status UNKNOWN, has 1 handler(s) for this service The command completed successfully [oracle@shoaibmac1 admin]\$</pre>		

🗗 📄 oracle@shoaibmac1:/u01/app/oracle...

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#### Listener File on Standby Database

```
[oracle@shoaibmac2 ~]$ cd $ORACLE HOME/network/admin
[oracle@shoaibmac2 admin]$ cat listener.ora
LISTENER STANDBY =
  (DESCRIPTION LIST =
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP)(HOST = shoaibmac2.localdomain)(PORT = 1524))
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1524))
SID LIST LISTENER STANDBY =
  (SID LIST =
    (SID DESC =
      (GLOBAL DBNAME = orcl)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcl)
    (SID DESC =
      (GLOBAL DBNAME = orcldr)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcldr)
ADR BASE LISTENER STANDBY = /u01/app/oracle
 -0-
     oracle@shoaibmac2:/u01/app/oracle...
```



#### Edit Listener File for DG BROKER on Standby Database

```
[oracle@shoaibmac2_admin]$ cat listener.ora
LISTENER STANDBY =
  (DESCRIPTION LIST
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = TCP) (HOST = shoaibmac2.localdomain)(PORT = 1524))
    (DESCRIPTION =
      (ADDRESS = (PROTOCOL = IPC)(KEY = EXTPROC1524))
SID LIST LISTENER STANDBY =
 (SID LIST =
   (SID DESC =
      (GLOBAL DBNAME = orcl)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcl)
    (SID DESC =
      (GLOBAL DBNAME = orcldr)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcldr)
    (SID DESC =
      (GLOBAL DBNANE = orcl dgmgrl)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcl)
    (SID DESC =
      (GLOBAL DBNANE = orcldr dgmgrl)
      (ORACLE HOME = /u01/app/oracle/product/12.2.0.1/db 1)
      (SID NAME = orcldr)
ADR BASE LISTENER STANDBY = /u01/app/oracle
[oracle@shoaibmac2 admin]$
 oracle@shoaibmac2:/u01/app/oracle...
```

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## **ORACLE DATAGUARD BROKER - Config**

## **RELOAD** Listener on Standby Database

[oracle@shoaibmac2 admin]\$ lsnrctl reload LISTENER\_STANDBY

LSNRCTL for Linux: Version 12.2.0.1.0 - Production on 13-SEP-2021 20:45:04

Copyright (c) 1991, 2016, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=shoaibmac2.localdomain)(PORT=1524))) The command completed successfully [oracle@shoaibmac2 admin]\$ lsnrctl status LISTENER\_STANDBY

LSNRCTL for Linux: Version 12.2.0.1.0 - Production on 13-SEP-2021 20:45:12

Copyright (c) 1991, 2016, Oracle. All rights reserved.

Connecting to (DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=shoaibmac2.localdomain)(PORT=1524))) STATUS of the LISTENER

Alias	I TETENER STANDRY
Version	TNSISNE for Linux, Version 12.2.0.1.0 - Production
Start Date	13-SEP-2021 18:33:23
Untime	A days 2 br 11 min 49 sec
Trace Level	off
Security	ON: Local OS Authentication
SNMP	0FF
Listener Parameter File Listener Log File	/u01/app/oracle/product/12.2.0.1/db_1/network/admin/listener.ora /u01/app/oracle/diag/tnslsnr/shoaibmac2/listener standby/alert/log.xml
Listening Endpoints Summa (DESCRIPTION=(ADDRESS=( (DESCRIPTION=(ADDRESS=(	ry PROTOCOL=tcp)(HOST=shoaibmac2)(PORT=1524))) PROTOCOL=ipc) <del>(KEY=EXTPROC1524)))</del>
Services Summary	
Service "orcl" has 1 inst	ance(s).
Instance "orcl", status	UNKNOWN, has 1 handler(s) for this service
Service "orcl_dgmgrl" has	1 instance(s).
Instance "orcl", status Service "orcldr" has 1 inst	UNKNOWN, has 1 handler(s) for this service stance(s).
Instance "orcldr", stat	us UNKNOWN, has 1 handler(s) for this service
Service "orcldr_dgmgrl" h	as 1 instance(s).
The command completed suc [oracle@shoaibmac2 admin]	us unknown, has i handler(s) for this service cessfully \$

oracle@shoaibmac2:/u01/app/oracle...



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## **ORACLE DATAGUARD BROKER - Config**

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#### dg\_broker\_config file on Primary Database

SYS@orcl 13-SEP-21>show parameter dg	g_broker			
NAME	TYPE	VALUE		Before broker configuration is
dg_broker_config_file1 string /u01/app/oracle/product/12.2.0		enabled, <b>dg_broker_config</b> file is		
dg_broker_config_file2 string /u01/app/oracle/product/12.2.0				
dg_broker_start SYS@orcl 13-SEP-21>	boolean	FALSE		
SYS@orcl 13-SEP-21>!ls -lrth /u01/ap ls: cannot access /u01/app/oracle/pr	op/oracle/ roduct/12.	product/12.2.0.1/db_1/dbs/drlorcl 2.0.1/db_1/dbs/drlorcl.dat: No su	.dat ch file or directory	
SYS@orcl 13-SEP-21>				
oracle@shoaibmac1:~	5	SYS@ORCL 21-SEP-21>show para	meter dg_broker_	
		IAME	ТҮРЕ	VALUE
	Ğ	lg_broker_config_file1	string	/u01/app/oracle/product/12.2.0
	d	lg_broker_config_file2	string	.1/db_1/dbs/driorcl.dat /u01/app/oracle/product/12.2.0
	9	lg_broker_start	boolean	.1/db_1/dbs/dr2orcl.dat TRUE
After broker configuration is enabled, <b>dg_broker_config</b> file is visible		SYS@ORCL 21-SEP-21> SYS@ORCL 21-SEP-21>!ls -lrth -rw-r 1 oracle oinstal SYS@ORCL 21-SEP-21>	/u01/app/oracle/p l 12K Sep 15 20:34	roduct/12.2.0.1/db_1/dbs/dr1orcl.dat /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr1orcl.dat



## **ORACLE DATAGUARD BROKER - Config**

#### ALTER dg\_broker\_start parameter value on Primary and Standby database

# SYS@orcl 02-0CT-21><br/>SYS@orcl 02-0CT-21>alter system set dg\_broker\_start=TRUE;System altered.SYS@orcl 02-0CT-21>show parameter dg\_broker\_startNAMETYPEVALUEdg\_broker\_startbooleanSYS@orcl 02-0CT-21>

PRIMARY DATABASE

QL> alter system set dg_broker_start=TRUE;				
Gystem altered.				
SQL> show parameter dg_broker_start				
NAME	ТҮРЕ	VALUE		
dg_broker_start SQL>	boolean	TRUE		

STANDBY DATABASE



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Invoke DataGuard Broker [DGMGRL] and Connect to database

```
[oracle@shoaibmac1 ~]$ dgmgrl / as sysdba
DGMGRL for Linux: Release 12.2.0.1.0 - Production on Sat Oct 2 10:09:41 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
ORA-16532: Oracle Data Guard broker configuration does not exist
Configuration details cannot be determined by DGMGRL
DGMGRL>
```



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## **ORACLE DATAGUARD BROKER - Config**

#### Add Primary database configuration [on primary side]

```
[oracle@shoaibmac1 ~]$ dgmgrl / as sysdba
DGMGRL for Linux: Release 12.2.0.1.0 - Production on Sat Oct 2 10:25:50 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> create configuration 'orcl_dg' as primary database is 'orcl' connect identifier is orcl;
Configuration "orcl dg" created with primary database "orcl"
DGMGRL>
DGMGRL> show configuration
Configuration - orcl dg
  Protection Mode: MaxPerformance
  Members:
  orcl - Primary database
Fast-Start Failover: DISABLED
Configuration Status:
DISABLED
DGMGRL>
```



#### Add Standby database configuration [on primary side]

```
[oracle@shoaibmac1 ~]$ dgmgrl / as sysdba
DGMGRL for Linux: Release 12.2.0.1.0 - Production on Sat Oct 2 10:34:35 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> add database orcldr as connect identifier is orcldr;
Database "orcldr" added
DGMGRL>
DGMGRL> show configuration
Configuration - orcl dg
  Protection Mode: MaxPerformance
  Members:
  orcl - Primary database
    orcldr - Physical standby database
Fast-Start Failover: DISABLED
Configuration Status:
DISABLED
DGMGRL>
```



#### SCHOLAR IT SOLUTIONS

## **ORACLE DATAGUARD BROKER - Config**

#### Add Standby database configuration - Error

DGMGRL> add database orcldr as connect identifier is orcldr; Error: ORA-16698: member has a LOG\_ARCHIVE\_DEST\_n parameter with SERVICE attribute set

Failed. DGMGRL>

The fix is to disable any log\_archive\_dest\_n parameter (excluding log\_archive\_dest\_1)

SYS@orcl 02-OCT-21>show parameter lo	og_archive_de	st_2			
NAME	ТҮРЕ	VALUE			
log_archive_dest_2	string	service=orcl =(online_log ) db_unique	dr ASYNC valid_for files,primary_role name=orcldr		
log_archive_dest_20	string	, ab_ancdao_			
SYS@orcl 02-OCT-21>alter system set log_archive_dest_2='';					
System altered.					
SYS@orcl 02-OCT-21>show parameter log_archive_dest_2					
NAME	т	YPE	VALUE		
log_archive_dest_2	s	tring			
PRIMARY DATABASE					

SQL> show parameter log_archive_dest_2					
NAME	ТҮРЕ	VALUE			
log_archive_dest_2	string	service=orcl A online_logfile db_unique_name	SYNC valid_for=( s,primary_role) =orcl		
log_archive_dest_20	string				
SQL> alter system set log_archive_dest_2='';					
System altered.					
SQL> show parameter log_archive_dest_2					
NAME		ТҮРЕ	VALUE		
log_archive_dest_2					
STANDBY DATABASE					



## **ORACLE DATAGUARD BROKER - Config**

1	DGMGRL> show database verbose 'orcl Database - orcl Role: PRIMARY Intended State: OFFLINE Instance(s): orcl	<u>- * ;</u>		
	Properties:	- (and)		
	ObserverConnectIdentifier	= ''		
	LogXptMode	= 'ASYNC'		
	RedoRoutes	= ''	DGMGRL> show database	verbose 'orcl':
	DelayMins			,
	Binding	= 'optional'		
	MaxFallure	- 11	Databasa anal	
	ReopenSecs	= '300'	Database - orci	
	NetTimeout	= '30'		
	RedoCompression	= 'DISABLE'		
	LogShipping	= '0N'	Bole	DRIMARY
	PreferredApplyInstance	= ''	Note:	FILTERICE
	ApplyInstancelimeout	= '0'	Intended State:	OFFL TNF
	Transport anthreshold	= '30'		
	TransportDisconnectedThreshold	= '30'	Instance(s):	
	ApplyParallel	= 'AUTO'	1	
	ApplyInstances	= '0'	OFCL	
	StandbyFileManagement	= 'AUTO'		
	ArchiveLagTarget	= '0'		
	LogArchiveMaxProcesses	= '4'		
	DataGuardSyncl atency	= '1'		
	DbEileNameConvert	= '/u01/app/oracle/oradata/orcldr. /u01/app/oracle/oradata/o	re]'	
	LooFileNameConvert	= '/u01/app/oracle/oradata/orcldr, /u01/app/oracle/oradata/o	rcl'	
	FastStartFailoverTarget	= ''		
	InconsistentProperties	= '(monitor)'		
	InconsistentLogXptProps	= '(monitor)'		
	SendQEntries	= '(monitor)'		
	Reculentries	= (monitor)		
	PreferredObserverHosts	= ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( ( (		
	StaticConnectIdentifier	= '(DESCRIPTION=(ADDRESS=(PROTOCOL=TCP)(HOST=shoaibmac1.loca	ldomain)(PORT=1524))(CONNECT DATA=(SERVICE NAME=o	rcl DG
1	MGRL)(INSTANCE_NAME=orcl)(SERVER=DE	DICATED)))'		-
	StandbyArchiveLocation	= 'USE_DB_RECOVERY_FILE_DEST'		
	AlternateLocation	= ''		
	LogArchiveFormat	= '0'		
	TopWaitEvents	= %(_%_%_%).(U) = '(monitor)'		
ang	ropila cueventa			
)115	Log file locations: (Failed to retrieve log file lo	cations.)		
	Database Status: DISABLED			

## Log file locations are not visible

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SOLUTIONS

## **ORACLE DATAGUARD BROKER - Config**

	DGMGRL> show database verbose 'orcldr';	
	Database - orcldr	
	Role: PHYSICAL STANDBY Intended State: OFFLINE Transport Lag: (unknown) Apoly Lag: (unknown)	
	Average Apply Rate: (unknown) Active Apply Rate: (unknown) Maximum Apply Rate: (unknown) Real Time Query: OFF	DGMGRL> show database verbose 'orcldr';
	Instance(s): orcldr	Database - orcldr
	Properties: DGConnectIdentifier = 'orcldr' ObserverConnectIdentifier = ' LogXptMode = 'ASYNC' RedoRoutes = ' DelayMins = '0' Binding = 'optional' MaxFailure = '0' MaxConnections = '1' ReopenSecs = '300' NetTimeout = '30' RedoCompression = 'DISABLE' LogShipping = 'ON' PreferredApplyInstance = '' ApplyInstanceTimeout = '0' ApplyInstanceTimeout = '0' ApplyInstanceTimeout = '30' TransportDisconnectedThreshold = '30' TransportDisconnectedThreshold = '30' ApplyParallel = 'AUTO' ApplyParallel = 'AUTO' ApplyInstances = '0'	Role:PHYSICAL STANDBYIntended State:OFFLINETransport Lag:(unknown)Apply Lag:(unknown)Average Apply Rate:(unknown)Active Apply Rate:(unknown)Maximum Apply Rate:(unknown)Real Time Query:OFFInstance(s):orcldr
Log file locations are not visible	LugarchiveMinSuccedDest = 3 LugarchiveMinSuccedDest = '1' DataGuardSyncLatency = '0' DbFileNameConvert = '/u01/app/oracle/oradata/orcl/, /u01/app/oracle/or FastStartFailoverTarget = '' InconsistentProperties = '(monitor)' InconsistentProperties = '(monitor)' SendQEntries = '(monitor)' LogXptStatus = '(monitor)' RecvQEntries = '(monitor)' PreferredObserverHosts = '' StaticConnectIdentifier = 'OESCRIPTION=(ADORESS=(PROTOCOL=TCP)(HOST=shoaibu DGMGRL)(INSTAWCE NAME=orcldr)(SERVER=DEDICATED)))' StandbyArchiveLocation = 'USE_DB_RECOVERY_FILE_DEST' AlternateLocation = '' LogArchiveFormat = '%t_%s_%r.dbf' TopWaitEvents = '(monitor)' Log file locations: (Failed to retrieve log file locations.)	radata/orcldr/' mac2.localdomain)(PORT=1524))(CONNECT_DATA=(SERVICE_NAME=orcldr_

SOLUTIONS

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#### Enable Dataguard Broker Configuration [on primary side]





#### Enable Dataguard Broker Configuration [on primary side]

DGMGRL>	enable databa	se 'orcldr';			
DGMGRL>	show database	'orcldr';			
Database	e - orcldr				
Role:	lad Ctata.	PHYSICAL STA	ANDBY		
Transp	bed State: port Lag:	0 seconds (c	computed 0	seconds	ago)
Apply Averag	Lag: ge Apply Rate:	0 seconds (c 1.00 KByte/s	computed 0	seconds	ago)
Real i	Time Query:	OFF			
orcl	ldr				
Database	e Status:				
SUCCESS					
DGMGRL>					





# **ORACLE** DATAGUARD

## MAX PERFORMANCE TO MAX AVAILABILITY

## using DGBROKER





What is the current primary database protection mode?

```
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 41 seconds ago)
DGMGRL>
```



## ORACLE DATAGUARD BROKER – Change Mode

Lets change the protection mode on the primary database

DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXPROTECTION; Error: ORA-16651: upgrade to maximum protection mode not possible Failed.

It Failed ... Because ...

you can't go directly from MaxPerformance mode to MaxProtection. You have to go through the intermediary MaxAvailability.

DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXAVAILABILITY; Error: ORA-16627: operation disallowed since no member would remain to support protection mode Failed. DGMGRL>

It Failed too ...

As initial configuration (MaxPerformance), the redo transport was configured to the ASYNC value, which is obviously not compatible with the MaxProtection mode. One can easily verify it in next slide.



## SCHOLAR ORACLE DATAGUARD BROKER – Change Mode

To move the database to MAXPROTECTION or MAXAVAILABILITY Log transport mode must be configured as SYNC

DGMGRL> DGMGRL> show database verbose 'orcl	';
Database - orcl	
Role: Intended State: Instance(s): orcl	
Properties: DGConnectIdentifier ObserverConnectIdentifier LogXptMode RedoRoutes DelayMins Binding MaxFailure MaxConnections ReopenSecs NetTimeout RedoCompression LogShipping PreferredApplyInstance ApplyInstanceTimeout ApplyLagThreshold TransportLagThreshold	<pre>= 'orcl' = 'ASYNC' = '0' = 'optional' = '0' = '1' = '300' = '30' = 'DISABLE' = '0N' = '' = '0' = '30' = '30' = '30'</pre>
TransportDisconnectedThreshold ApplyParallel ApplyInstances	= '30' = 'AUTO' = '0'

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DGMGRL> DGMGRL> show database verbose 'orcldr';					
Database - orcldr					
Role: Intended State: Transport Lag: Apply Lag: Average Apply Rate: Active Apply Rate: Maximum Apply Rate: Real Time Query: Instance(s): orcldr	PHYSICAL STANDBY APPLY-ON 0 seconds (computed 1 second ago) 0 seconds (computed 1 second ago) 2.00 KByte/s 1.38 MByte/s 1.42 MByte/s OFF				
Properties:					
ObconverCopportIde	er = orctor				
LogXptMode	= 'ASYNC'				
RedoRoutes	= ''				
DelayMins	= '0'				
Binding	= 'optional'				
MaxFailure	= '0'				
MaxConnections	= '1'				
Reopensecs	= '300'				
RedoCompression	= 30 = 'DTSABLE'				
LogShipping	= '0N'				
PreferredApplyInst	ance = ''				



## **ORACLE** DATAGUARD BROKER – Change Mode

**Configure Log transport mode as SYNC** 

DGMGRL> EDIT DATABASE 'orcl' SET PROPERTY 'LogXptMode'='SYNC'; Property "LogXptMode" updated DGMGRL>

DGMGRL> EDIT DATABASE 'orcldr' SET PROPERTY 'LogXptMode'='SYNC'; Property "LogXptMode" updated DGMGRL>

> DGMGRL> DGMGRL> show database 'orcl' LogXptMode LogXptMode = 'SYNC' DGMGRL> DGMGRL> show database 'orcldr' LogXptMode LogXptMode = 'SYNC' DGMGRL> DGMGRL>



Finally !! the protection mode changed on the primary database

```
DGMGRL>
DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXAVAILABILITY;
Succeeded.
DGMGRL>
DGMGRL>
DGMGRL> EDIT CONFIGURATION SET PROTECTION MODE AS MAXPROTECTION;
Succeeded.
DGMGRL>
```





# ORACLE

# DATAGUARD BROKER DE-CONFIGURATION





Remove broker configuration

```
[oracle@shoaibmac1 ~]$ dgmgrl / as sysdba
DGMGRL for Linux: Release 12.2.0.1.0 - Production on Sat Oct 2 16:13:58 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> remove configuration;
Removed configuration
DGMGRL>
DGMGRL> show configuration;
ORA-16532: Oracle Data Guard broker configuration does not exist
Configuration details cannot be determined by DGMGRL
DGMGRL>
```





## ALTER **dg\_broker\_start** parameter value on Primary database

SYS@orcl 02-OCT-21>@dbinfo					
NAME	OPEN_MODE	DATABASE_ROLE	SWITCHOVER_STATUS		
ORCL	READ WRITE	PRIMARY	NOT ALLOWED		
SYS@orcl (	92-0CT-21>show parame	ter dg_broker			
NAME		ТҮРЕ	VALUE		
dg_broker_	_config_file1	string	/u01/app/oracle/product/12.2.0		
dg_broker_config_file2		string	/u01/app/oracle/product/12.2.0		
dg_broker_start		boolean	TRUE		
SYS@orcl (	92-0CT-21> 92-0CT-21>alter system	m set dg_broker_st	tart=f <mark>alse</mark> scope=both;		
System alt	tered.				
SYS@orcl (	SYS@orcl 02-OCT-21>show parameter dg_broker_start				
NAME		ТҮРЕ	VALUE		
dg_brokerSYS@orcl (	_start 02-0CT-21>	boolean	FALSE		





## ALTER dg\_broker\_start parameter value on Standby database

SQL> @dbinfo				
NAME OPEN_MODE DB_UNIQ	NAM DB_ROLE	PROTECTION_MODE	SWITCH_ST	
ORCL MOUNTED orcldr	PHYSICAL STAND	BY MAXIMUM PERFORMAN	ICE NOT ALLOWED	
SQL> show parameter dg_broker				
NAME	ТҮРЕ	VALUE		
dg_broker_config_file1	string	/u01/app/oracl	.e/product/12.2.0	
dg_broker_config_file2		/u01/app/oracl	/u01/app/oracle/product/12.2.0	
dg_broker_start	boolea	n TRUE	2010 tul.uat	
SQL> SQL> alter system set dg_broker_start=false scope=both;				
System altered.				
SQL> show parameter dg_broker_start				
NAME	ТҮРЕ	VALUE		
dg_broker_start SQL>	boolea	n FALSE		





#### Archive Destination pointing to standby database is removed

SYS@orcl 02-OCT-21>set lines 300 SYS@orcl 02-OCT-21>col destination for a30 SYS@orcl 02-OCT-21>select dest_id,destinat	0 tion,status from v\$archive_dest where target='STANDBY';
DEST_ID DESTINATION	STATUS
2 orcldr	VALID
SYS@orcl 02-OCT-21>	

SYS@orcl 02-0CT-21>set lines 300 SYS@orcl 02-0CT-21>col destination for a30 SYS@orcl 02-0CT-21>select dest\_id,destination,status from v\$archive\_dest where target='STANDBY'; no rows selected SYS@orcl 02-0CT-21>



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## **ORACLE DATAGUARD BROKER – De Config**

#### Remove broker configuration file on Primary database

SYS@orcl 02-OCT-21>col value fo col name for a30 select name , value from v\$para SYS@orcl 02-OCT-21>SYS@orcl 02 NAME	or a60 ameter where name like '%dg_broker%'; -OCT-21> VALUE
dg_broker_start dg_broker_config_file1 dg_broker_config_file2	FALSE /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr1orcl.dat /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr2orcl.dat
SYS@orcl 02-0CT-21> SYS@orcl 02-0CT-21>!mv /u01/ap	p/oracle/product/12.2.0.1/db_1/dbs/dr1orcl.dat /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr1orcl.dat_old
SYS@orcl 02-OCT-21>!mv /u01/ap	p/oracle/product/12.2.0.1/db_1/dbs/dr2orcl.dat /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr2orcl.dat_old
SYS@orcl 02-OCT-21>	



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## **ORACLE DATAGUARD BROKER – De Config**

#### Remove broker configuration file on Standby database

SQL> col value for a60 SQL> col name for a30 SQL> select name , value from v <mark>\$parameter</mark> where name like '%dg_broker%';		
NAME	VALUE	
dg_broker_start dg_broker_config_file1 dg_broker_config_file2	FALSE /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr1orcldr.dat /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr2orcldr.dat	
SQL> !mv /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr1orcldr.dat /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr1orcldr.dat_old		
SQL> !mv /u01/app/oracle/produc	ct/12.2.0.1/db_1/dbs/dr2orcldr.dat /u01/app/oracle/product/12.2.0.1/db_1/dbs/dr2orcldr.dat_old	
SQL>		









# THANKS !!

