

**Implementing Data Guard and  
Automated Storage  
Management on a VLDB  
System**

# Introduction

- Working on Oracle systems since 7.1.6
  - Front end developer
  - Back end developer
  - DBA
- Employed by Arbinet

# Agenda

- Project Goals
- Data Guard
- Automatic Storage Management
- Migration methodology
- RMAN
- Questions

# Project Goals

- Increase availability/survivability
  - Geographically remote site
- Reduce cost
  - Drop Veritas Storage Foundation
- Remove backups from primary
  - Local standby

# Environment

- Hardware
  - IBM p570 AIX 5.3
  - SAN
  - Hitachi USP storage array
- Software
  - Oracle 10.2 Production
  - Oracle 11.1 ASM
  - Veritas Storage Foundation
- Two instances
  - 2.3 and 3.0 TB

# Data Guard

- High availability
- Standby databases
  - Physical
  - Logical

QuickTime™ and a  
decompressor  
are needed to see this picture.

# Automatic Storage Management

- Simple storage management interface
- Performance of raw - manageability of file system
- Reduce workload of SA and DBA
  - SA: present LUN
  - DBA: Add LUN to disk group
    - No more file system space management!
- Replace Veritas Storage Foundation

# Areas of Concern

- Data Guard
  - Performance
  - Role transition time
  - Application redirection
- ASM
  - Performance
  - Stability
  - Dynamic Multi-Pathing
  - Recoverability

# Areas of Concern (cont)

- RMAN

- Restore of ASM based instance to file system
- Management of archive logs

# Migration Methodology

- Best Practices for Minimal Downtime Migration to ASM Oracle 10g Release 2
  - Prepare the source database
  - Instantiate standby database in ASM
  - Enable Data Guard
  - Switch Primary to ASM

# Prepare ASM instance

- Use dbca to create +ASM instance

**Add Disks**

Disk Group Name:

Redundancy

High  Normal  External

Select Member Disks

Show Candidates  Show All  Show Members

<input type="checkbox"/>	Disk Path	Header Status	ASM Name	Failure Group	Size (MB)
<input type="checkbox"/>	/dev/rhdisk66	CANDIDATE			0
<input type="checkbox"/>	/dev/rhdisk75	CANDIDATE			0
<input type="checkbox"/>	/dev/rhdisk76	CANDIDATE			0
<input type="checkbox"/>	/dev/rhdisk77	CANDIDATE			0
<input type="checkbox"/>	/dev/rhdisk78	CANDIDATE			0
<input type="checkbox"/>	/dev/rhdisk79	CANDIDATE			0
<input type="checkbox"/>	/dev/rhdisk80	CANDIDATE			0
<input type="checkbox"/>	/dev/rhdisk81	CANDIDATE			0

Note: If you don't see disks which you believe should be available, you may need to change the disk discovery path.

# Prepare ASM instance

Using the ASM Disk Groups page you can view and manage existing disk groups. You can choose to create a new disk group or add disks to an existing disk group.



## Available Disk Groups

Select	Disk Group Name	Size (MB)	Free (MB)	Redundancy	State
<input checked="" type="radio"/>	RAT1_DATA	3808034	3807885	EXTERN	MOUNTED
<input type="radio"/>	RAT1_FLASH	784007	454002	EXTERN	MOUNTED
<input type="radio"/>	TDB1_DATA	2576023	437469	EXTERN	MOUNTED
<input type="radio"/>	TDB1_FLASH	336003	184558	EXTERN	MOUNTED

Note: Free (MB) reflects the free space available by taking mirroring into account.

[Create New](#) [Add Disks](#) [Mount](#) [Mount All](#)

[Cancel](#)

[Help](#)

[< Back](#)

[Next >](#)

[Finish](#)

# Prepare the source database

- RMAN backup for standby
  - SA created 4TB LUN, mounted on /migration

```
RMAN> run { allocate channel t1 type disk MAXPIECESIZE 1990M  
format '/migration/db1_%F';  
backup database include current controlfile for standby;}
```

```
SQL> create pfile from spfile;
```

Copy init.ora to standby server.

# Prepare the source database

- Edit init.ora
  - Remove CONTROL\_FILES
  - Add DB\_CREATE\_FILE\_DEST
    - '+TDB1+DATA'
  - Add DB\_RECOVERY\_FILE\_DEST
    - '+TDB1\_FLASH'
  - Add db\_RECOVERY\_FILE\_DEST\_SIZE
  - Add FAL\_SERVER
  - Add FAL\_CLIENT

# Prepare the source database

```
#####  
# Dg parameters  
#####  
db_recovery_file_dest_size=328Gdb_  
recovery_file_dest='+TDB1_FLASH'  
db_create_file_dest='+TDB1_DATA'  
db_unique_name=STGTDB1A  
LOG_ARCHIVE_CONFIG='DG_CONFIG=(STGTDB1A,STGTDB1B)'  
LOG_ARCHIVE_DEST_1='LOCATION=/u07/TDB1/archive  
VALID_FOR=(ALL_LOGFILES,ALL_ROLES) DB_UNIQUE_NAME=STGTDB1A'  
LOG_ARCHIVE_DEST_2='SERVICE=STGTDB1B  
VALID_FOR=(ONLINE_LOGFILES,PRIMARY_ROLE) DB_UNIQUE_NAME=STGTDB1B'  
LOG_ARCHIVE_DEST_STATE_1=ENABLE  
LOG_ARCHIVE_DEST_STATE_2=DEFER  
# SPECIFIC TO STANDBY ROLE  
STANDBY_FILE_MANAGEMENT=AUTO  
STANDBY_ARCHIVE_DEST='/u07/TDB1/archive'  
FAL_SERVER=STGTDB1A  
FAL_CLIENT=STGTDB1B
```

# Prepare the source database

- Create orapwd file
- Add tnsnames.ora entries for primary and standby service names

## Instantiate standby database in ASM

```
SQL> create spfile from pfile;
```

```
SQL> startup force nomount;
```

```
RMAN> connect target
```

```
sys/<password>@<source database>
```

```
RMAN> connect auxiliary /
```

```
RMAN> duplicate target database for standby;
```

# Enable Data Guard

- Primary

```
log_archive_dest_1='LOCATION=+RAT1_FLASH  
VALID_FOR=(ALL_LOGFILES,ALL_ROLES )  
DB_UNIQUE_NAME=STGRAT1B'
```

```
log_archive_dest_2='service="(DESCRIPTION=(ADDRESS_  
LIST=(ADDRESS=(PROTOCOL=tcp)(HOST=va-  
iperf01)(PORT=1521)))(CONNECT_DATA=(SERVICE_NA  
ME=STGRAT1A_XPT)(INSTANCE_NAME=STGRAT1)(SE  
RVER=dedicated))"' LGWR ASYNC NOAFFIRM  
delay=0 OPTIONAL max_failure=0 max_connections=1  
reopen=300 db_unique_name="STGRAT1A" register  
net_timeout=180 valid_for=(online_logfile,primary_role)'
```

```
log_archive_dest_state_2='ENABLE'
```

- Alter system set log\_archive\_dest\_2='ENABLE'

# Enable Data Guard

- Standby

- Start real time recovery

```
RECOVER MANAGED STANDBY DATABASE  
USING CURRENT LOGFILE DISCONNECT  
FROM SESSION;
```

# Checking Data Guard

- Tail alert log on primary and standby
- On primary
  - Alter system archive log current;
- Observe log file transport and apply in alert logs

RFS[7]: Assigned to RFS process 729124

RFS[7]: Identified database type as 'physical standby'

RFS[7]: Successfully opened standby log 7:

'+TDB1\_DATA/stgtdb1b/onlinelog/group\_7.268.689622223'

Mon Jun 15 18:08:14 2009

Recovery of Online Redo Log: Thread 1 Group 7 Seq 22 Reading mem 0

Mem# 0: +TDB1\_DATA/stgtdb1b/onlinelog/group\_7.268.689622223

Mem# 1: +TDB1\_FLASH/stgtdb1b/onlinelog/group\_7.553.689622227

Media Recovery Waiting for thread 1 sequence 23

# RMAN standby backup

- Backup control file on primary
- Backup datafiles and archive logs on standby
- Alter system set  
“\_log\_deletion\_policy”=‘ALL’ scope=spfile;
- RMAN> configure archivelog deletion policy to applied on standby;

# Testing

- Data Guard
  - Determine redo generation rate
    - 190 Mbps (mean + two standard deviations)
    - Gig E network sufficient
  - Lag time (from OEM)
    - Transport lag: 0 - 7 seconds
    - Apply lag: 3 - 15 seconds
  - Role transition
    - Five minutes
  - Application redirection
    - Approximately one minute

# Testing

- ASM
  - Performance
    - No difference in I/O wait O/S or Oracle
  - Stability
    - QA/Dev instances ASM based for six months
  - Dynamic Multi-pathing
    - No data loss when paths downed or cable unplugged
  - Recoverability
    - Asmcmd backup and restore worked
    - Open question
      - Possible problem with SAN mirroring/splitting

# Testing

- RMAN

- Management of archive logs
  - Primary archive logs deleted when ‘\_log\_deletion\_policy’ set and RMAN archive log deletion parameters configured
- ASM to FS restore works

```
set newname for datafile 1 to '/u02/oradata/system.dbf';  
<snip>  
set newname for datafile 440 to '/u02/oradata/ts_em_data';  
restore database;  
switch datafile all;  
recover database;  
alter database open resetlogs;
```

# References

- Data Guard
  - Oracle Data Guard Concepts and Administration, 10g Release 2
  - Oracle Data Guard Broker, 10g Release 2
  - Note 219344.1 - Usage, Benefits and Limitations of Standby Redo Logs (SRL)

# References

- ASM
  - <http://www.oracle.com/technology/products/database/asm/index.html>
  - Doc ID 332180.1 ASMCMD
  - Oracle Database Utilities 10g Release 2 (10.2) - Chapter 20 ASM Command-Line Utility (ASMCMD)
  - *Oracle Automatic Storage Management*  
Nitin Vengurlekar et al

# RMAN References

- RMAN\_Dataguard\_10g\_wp.pdf
- Doc ID: 331924.1 RMAN backups in Max Performance/Max Availability Data Guard Environment ■

# Additional references

- MAA

- Maximum Availability Architecture on OTN  
<http://www.oracle.com/technology/deploy/availability/htdocs/maa.htm>

- Questions