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Mastering Oracle Performance, High Availability, Manageability

Disaster Recovery with Oracle Data Guard 10gR2

Martin Decker, January 2009

Overview

Definitions

- High Availability, Disaster Recovery, Maximum Availability Architecture (MAA)

Data Guard 10g

- Protection & Transport Modes
- Switchover/Failover
- Monitoring
- Tuning

Data Guard 11g New Features

Definitions

High Availability

- No Downtimes during Service-Times (e.g. Mo-Fr)
 - 99 % \equiv 438,3 min/month, 7,3 hrs/month or 87,66 hrs/year
 - 99,9 % \equiv 43,8 min/month or 8,76 hrs/year
 - 99,99 % \equiv 4,38 min/month or 52,6 min/year
 - 99,999 % \equiv 26,3 sec/month or 5,26 min/year

Disaster Recovery

- Fast Recovery after Failure of data center

Oracle High Availability

Oracle Real Application Cluster (incl. Stretch-Cluster)

- Shared Storage
- datafile corruption => Downtime and time-consuming restore.

Oracle Data Guard

- Switchover/Failover at Primary Failure
- Switchover/Failover within seconds/minutes

Oracle Maximum Availability Architecture (MAA)

Oracle Maximum Availability Architecture (MAA) is an Oracle best practices blueprint based on proven Oracle high-availability technologies and recommendations

- HA app server
- connect to current primary (automatically)
- Real Application Clusters (RAC) against instance crashes
- DataGuard against Site/Storage failures
- Redundant RAC Interconnect
- Dedicated Network between Primary & Standby

Oracle Data Guard

Management via

- SQL*Plus
- Oracle Enterprise Manager
- dgmgri

Oracle Data Guard

Transport Modes

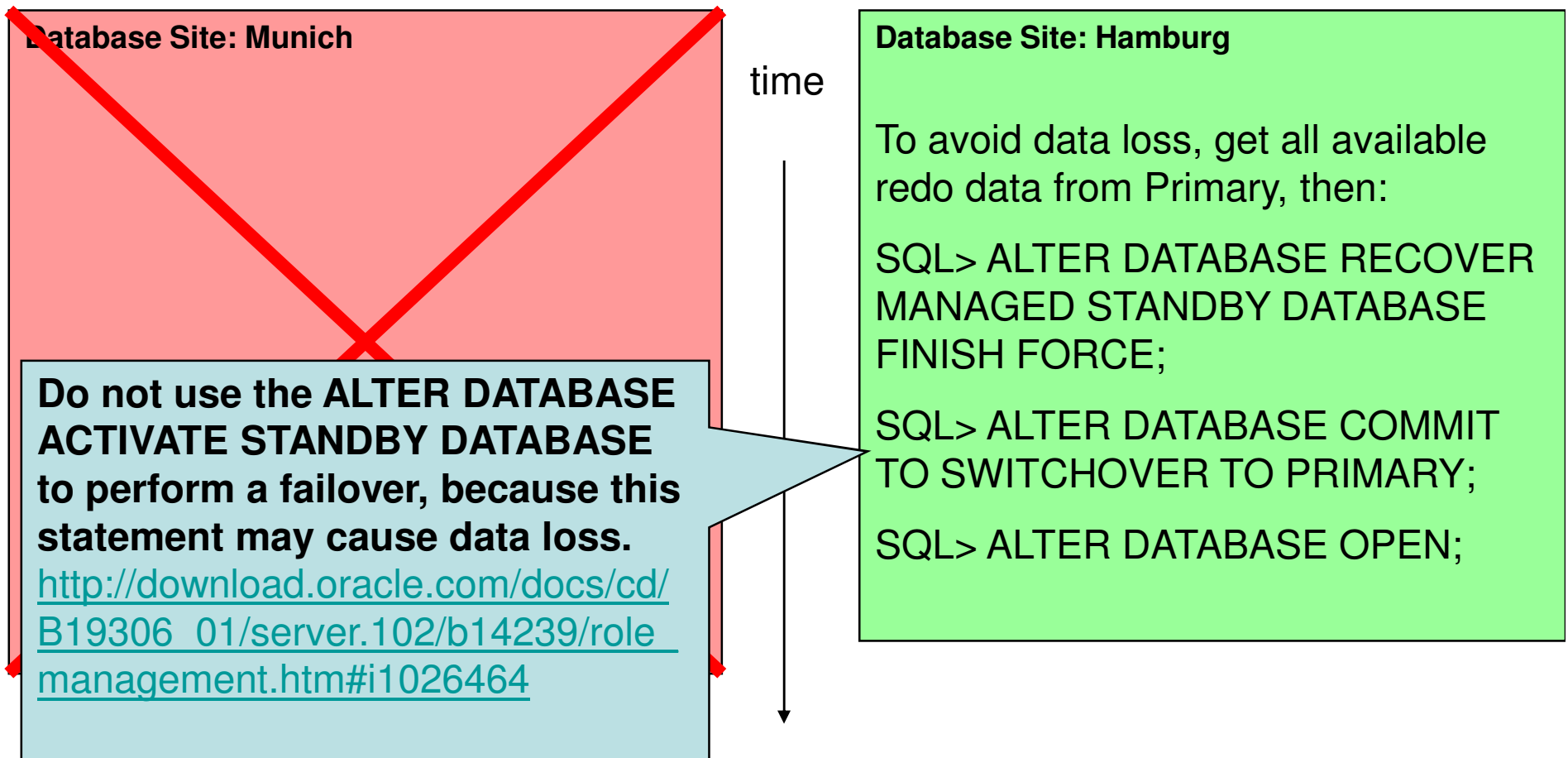
- ARCH
- LGWR ASYNC (improved in 10.2)
- LGWR SYNC

Protection Modes

- Maximum Protection
(LGWR, SYNC, AFFIRM, Standby Redo Logs)
- Maximum Availability
(LGWR, SYNC, AFFIRM, Standby Redo Logs)
- Maximum Performance (LGWR oder ARCH)

Physical Standby Failover

Roles before: Munich failed, Hamburg Standby Role



Roles afterwards: Munich failed, Hamburg Primary Role

Oracle Data Guard Monitoring

- Transport Lag (in sec)
- Apply Lag (in sec)

All Metrics

Collected From Target **Jan 8, 2009 12:32:20 PM CET** 

[Expand All](#) | [Collapse All](#)

Metrics	Thresholds	Collection Schedule	Upload Interval	Last Upload
▼ STDBY				
▼ Data Guard Fast-Start Failover	Some	Every 5 Minutes	On Alert	Dec 20, 2008 5:02:19 PM
Fast-Start Failover Occurred	Set			
Fast-Start Failover SCN	Not Set			
Fast-Start Failover Status	Not Set			
Fast-Start Failover Time	Not Set			
▼ Data Guard Fast-Start Failover Observer	All	Every 5 Minutes	On Alert	Nov 25, 2008 12:00:38 PM
Observer Status	Set			
▼ Data Guard Performance	Some	Every 5 Minutes	Every Collection	Jan 8, 2009 1:12:53 PM
Apply Lag (seconds)	Set			
Estimated Failover Time (seconds)	Not Set			
Redo Apply Rate (KB/second)	Not Set			
Transport Lag (seconds)	Not Set			

Oracle Data Guard Monitoring

Apply Lag (seconds): Last 24 hours

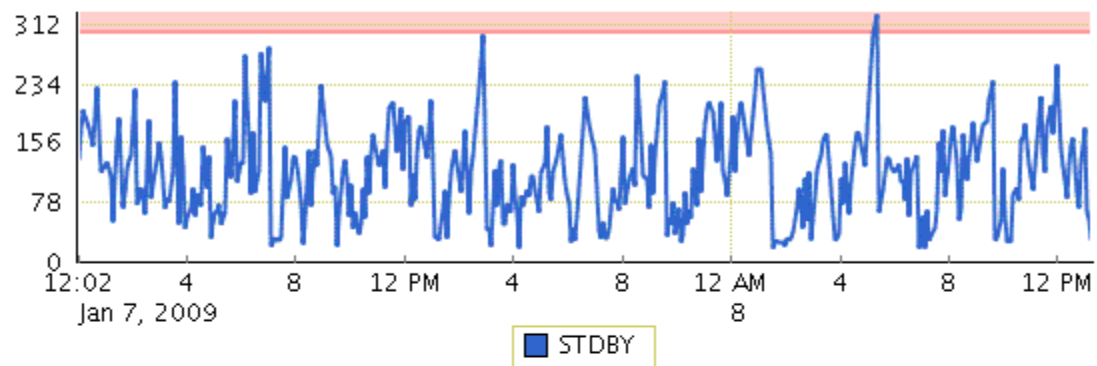
Last Updated Jan 8, 2009 1:12:53 PM CET

View Data

Statistics

Last Known Value **29**
 Average Value **112.93**
 High Value **328**
 Low Value **18**
 Warning Threshold **Not Defined**
 Critical Threshold **300**
 Occurrences Before Alert **1**
 Corrective Action **None**

Metric Value



Alert History

Comment for Most Recent Alert

Severity	Timestamp ▾	Message	Last Comment	Details
✓	Jan 8, 2009 5:27:53 AM	The standby database is approximately 67 seconds behind the primary database.		-
✗	Jan 8, 2009 5:12:53 AM	The standby database is approximately 301 seconds behind the primary database.		-

Oracle Data Guard Monitoring

```
SELECT
SUM(DECODE(name, 'apply finish time', value, 0)) FOT,
SUM(DECODE(name, 'apply lag', value, 0)) LAG,
SUM(DECODE(name, 'transport lag', value, 0)) PDL
from
(
    SELECT name,
           extract(day from p.val) * 86400 +
           extract(hour from p.val) * 3600 +
           extract(minute from p.val) * 60 +
           extract(second from p.val) value
    from
    (
        SELECT name, to_dsinterval(value) val from v$dataguard_stats
    ) p
)
```

[Source](#): Oracle Enterprise Manager – Grid Control

Oracle Data Guard Tuning

TCP Send/Receive Buffers

- Formula: $3 * \text{BDP (Bandwidth Delay Product)}$
- $3 * (1 \text{ GBit/sec} * \mathbf{0.8 \text{ ms}}$ Round Trip Time)
- $3 * (125,000,000 \text{ Bytes / sec} * 0,0008 \text{ sec}) = 300,000$ Bytes
- Multiple of SDU => 327670 Bytes.

SDU=32767

http://www.oracle.com/technology/deploy/availability/pdf/MAA_WP_10gR2_DataGuardNetworkBestPractices.pdf

Oracle Data Guard 10g/11g – New Features

- 10g:

- Realtime Apply,
- Open Read Write, then manual Flashback to before Open

- 11g:

- Realtime-query (read-only) capability of physical Standby while applying redo
- Snapshot standby
 - DB open in read/write mode, Receives redo, but does not apply redo while being open read/write.
- Statspack on primary for read-only standby performance management (MetaLink 454848.1)

References

- MAA: <http://www.oracle.com/technology/deploy/availability/htdocs/maa.htm>
- Oracle® Database High Availability Best Practices 10g Release 2 (10.2):
http://download.oracle.com/docs/cd/B19306_01/server.102/b25159/toc.htm
- Oracle® Data Guard Concepts and Administration 10g Release 2 (10.2):
http://download.oracle.com/docs/cd/B19306_01/server.102/b14239/toc.htm
- Blog: <http://www.ora-solutions.net/web/category/oracle-database/data-guard/>
- Papers: <http://www.ora-solutions.net/web/papers/>

Q & A