The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle’s products remains at the sole discretion of Oracle.
Oracle Active Data Guard: What’s Really Under the Hood?

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Software Dev. Director  
Oracle

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Sr. Assoc/Lead DB Architect  
Discover Financial Services
Agenda

- Active Data Guard
  - What is it and what is included?
  - What can you do with it?
    - Oracle E-Business Suite Reports and Active Data Guard
- A customer view of Active Data Guard
  - Marvin Melville of Discover Financial Services
- Active Data Guard technology
  - Maintaining query consistency while applying redo
  - Setting a Standby Data Lag Service Level Agreement
  - Query Performance Tuning
  - How well do you know your Active Standby?
- Active Data Guard in action
Active Data Guard

What is it?

- The ability to use your Physical Standby for much more than just High Availability or Disaster Recovery!
Active Data Guard
What is Included?

- But wait! There’s more!

Real-time Query - Now with Lag Control and DML Redirect
Continuous Redo Shipment and Apply
Automobile Block Repair
Fast Incremental backups

Production Database

Active Standby Database
Active Data Guard
What can you do with it?

• Read Only applications just work – No Brainer!
• If you have an application that does 100% reads then it will work transparently with Active Data Guard!
Active Data Guard 11g Release 2
Scale Read Performance

- Support for up to 30 active standby databases
Active Data Guard
What about packaged applications?

- **Oracle Business Intelligence Enterprise Edition**
  - Use a Primary connection pool for all DML

- **Oracle Top Link** applications
  - Uses Read Only Service - Additional Connection Pool

- **Siebel CRM** – A Work In Progress
  - Automatically directs writes primary – reads to standby.
  - Will use the Real-Time query lag feature.
    - If lag is exceeded reads go back to primary transparently
PeopleSoft Enterprise

- **PeopleTools 8.51** works with Active Data Guard.
  - PSQUERY, TREE Viewer, XMLP Viewer, SES Feeds Generation and Reader, and QAS
  - Offload Read-mostly batch programs

E-Business Suite and Active Data Guard

• The basic challenge to offloading EBS reporting:
  – An Active Data Guard standby is read-only
  – Logging into EBS, managing concurrent requests both require writes

• The core of the solution:
  – New ADG database triggers to redirect minimal required read/write activity back to the primary
  – FND layer to enable the solution
  – Parallel Concurrent Processing to configure and manage the report executions
The starting point:
- Available as a patch on top of R12.1.3
- Oracle Database 11.1.0.7 or 11.2.0.1
- Only ReportWriter programs will be supported
- Reports must have been run previously on primary, and marked as ‘runnable’ on standby
E-Business Suite and Active Data Guard

• How many Oracle Reports?
  – Approximately 137 OracleReports were tested. 72 were successfully executed on Active Data Guard
  – Of the 13 longest running OracleReports in Oracle’s usage of E-Business Suite, 9 ran successfully on Active Data Guard!

• Now, how about a demo? (Thanks to Andrew Huda)
A Customer Viewpoint
Marvin Melville
Senior Associate
Lead Database Architect
Discover Financial Services
Discover Financial Services

Active Data Guard – Increasing ROI
Data Guard Experiences

GOOD AT
• Rock solid inexpensive way to provide DR without the use of often expensive disk replication solutions.
• No limitation on distance between sites.
• No limitation on data types.
• Can be used in conjunction with compression and encryption.

POSSIBILITIES
• Could not use the DR site for reporting unless redo apply was stopped.
• Lost scalability and return on investment opportunities with DR hardware.
Requirements

• Address potential production impact of Reporting and AdHoc queries.
• Increase ROI stream of DR assets.
• Create DR fast incremental backups.
Active Data Guard Experiences

- Simple to deploy.
- Recoup capital investment or disaster recovery through more efficient use of hardware.
- Impact of Ad/Hoc queries isolated.
- Business Technology teams able to troubleshoot data issues in real time without impact to online portal.
- Larger run window for reporting jobs\feeds.
- Read only database services change is transparent to application.
Reporting\Ad-Hoc Query Offloading

- Active Data Guard
- Reporting\AdHoc Query
- Application Server Connections

APP RPTG\BATCH

Primary DB

Secondary DB
Read Only Transaction Load Balancing

APP Servers

Active Data Guard
Read Only Transactions
Read/Write Transactions

Client Side Load Balancing

Primary DB
Secondary DB
Lessons Learned

• Define SLA for read only transactions.
• Define Enterprise Manger beacon tests for read only DR site.
• Use triggers and DB role to manage cluster services during role transitions.
• Use Data Guard Broker.
• Do configure Oracle client side load balancing.
Active Data Guard Technology
Maintain Query Consistency while Applying Redo

- **No compromising on ACID properties**
  - No dirty reads: only committed changes visible
  - Repeatable reads: SET TRANSACTION READ ONLY

- Query on Standby must yield identical results to Primary at a given System Change Number (SCN)

- Extends Oracle’s Consistent Read (CR) technology
  - Undo is applied to data to produce consistent snapshot

- Metadata caches are synchronized at a Query SCN
  - Data dictionary caches updated after package invalidation
Setting a Standby Data Lag Service Level Agreement

- Data Guard minimizes Data Lag “out-of-the-box”
  - Write and ship redo in parallel, defer apply until write
  - Handles skewed activity on Primary RAC instances
- How many seconds is the Standby lagging NOW?
  - Accurate measurement is critical for accurate SLA
  - Apply Lag + Transport Lag = Data Lag
  - Timestamps: redo written, redo delivered, redo applied
- Each session can specify its own Data Lag SLA
- Zero Data Lag SLA is supported with SYNC transport
Active Data Guard Query Performance Tuning

- Standby Statspack (Note 454848.1)
- SQL Tuning Sets (STS) for Standby Queries
  - Build STS using SQL Trace or Statspack
- SQL Details Active Report for Execution Plan
- SQL Performance Analyzer (SPA) *
  - Use Standby to test changes intended for the Primary
  - SPA Trial execution on Standby for pre and post change
  - Trial results can be written to Primary or a third database
- In-Memory Active Session History (ASH) *

* New in 11.2.0.2
How well do you know your Active Standby?

- All Datatypes supported (XML, LOB, ADT, etc.)
- Additional TEMPFILES can be created for sorts
- Cursor-duration temporary table transformations: WITH clause sub-query factoring, GROUPING SET
- DML redirection to Primary using a public, connected user database link
- Flashback Query: SELECT … AS OF <SCN>
- Event 3177: track read-write SQL modules that will fail on Active Standby (Note 1206774.1)
Active Data Guard In Action
Demos

- Thanks to Jonghyun Lee
  - Setting up and using a query lag SLA
  - Configuring and using DML Redirection
  - Using Standby Statspak
  - Using Data Pump to extract from Active Data Guard

- Thanks to Hubert Sun
  - Utilizing Automatic Block Repair
Active Data Guard
Query Lag SLA

Demo! Demo! Demo!
Active Data Guard
DML Redirection

Demo!
Demo!
Demo!
Active Data Guard Stats/DataPump
Active Data Guard
Auto Block Repair
Active Data Guard

In Conclusion
### Monday, 20 Sep – Moscone South *

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<td>Five Key HA Innovations, Rm 103</td>
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<td>GoldenGate Strategy &amp; Roadmap, Moscone West, Rm 3020</td>
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<td>Minimal Downtime Upgrades, Rm 306</td>
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### Demos Moscone West DEMOGrounds

- **Monday & Tuesday** 9:45a - 5:30p; **Wednesday** 9:00a - 4:00p
  - Maximum Availability Architecture (MAA)
  - Oracle Active Data Guard
  - Oracle Secure Backup
  - Oracle Recovery Manager & Flashback
  - Oracle GoldenGate
  - Oracle Real Application Clusters
  - Oracle Automatic Storage Management

### Hands-on Labs Marriott Marquis, Salon 10 / 11

- **Monday**, Sep 20, 12:30 pm - 1:30 pm Oracle Active Data Guard
- **Tuesday**, Sep 21, 5:00 pm - 6:00 pm Oracle Active Data Guard

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*All session rooms are at Moscone South unless otherwise noted*

*After Oracle OpenWorld, visit*

Remember

- Active Data Guard is…
  - High Availability
  - Disaster Recovery
  - Data Protection
  - High Performance
  - No Restrictions
  - High Return On Investment
  - No Holds Barred!

- Thank you!!!
SOFTWARE. HARDWARE. COMPLETE.
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