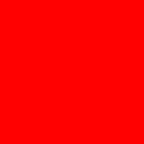


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The following is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not 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.



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Oracle Active Data Guard: What's Really Under the Hood?

Larry M. Carpenter
Distinguished Product Mgr.
Oracle

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Software Dev. Director
Oracle

Marvin Melville
Sr. Assoc/Lead DB Architect
Discover Financial Services

Agenda

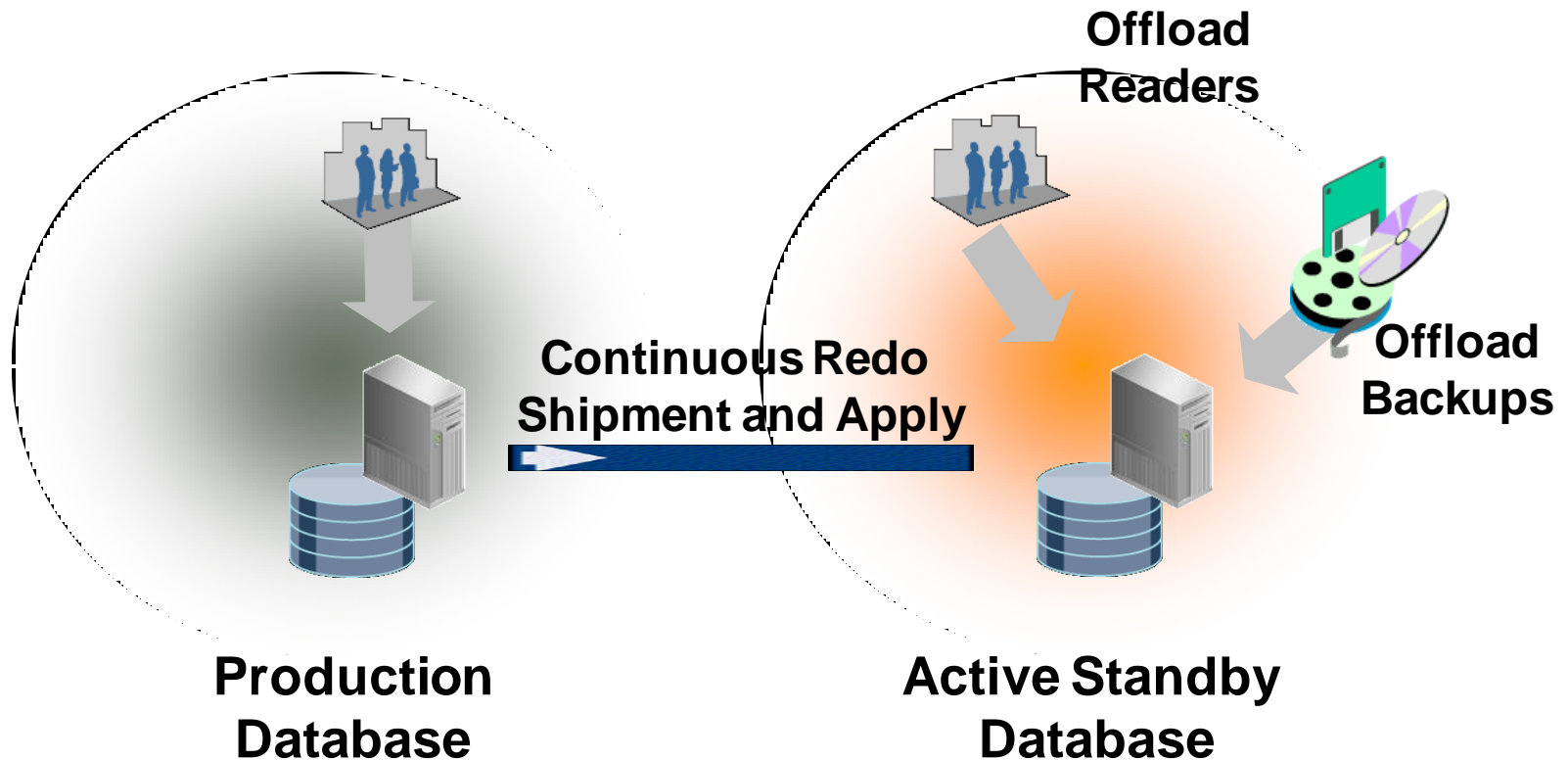
- Active Data Guard
 - What is it and what is included?
 - What can you do with it?
 - Oracle E-Business Suite Reports and Active Data Guard
- A customer view of Active Data Guard
 - Marvin Melville of Discover Financial Services
- Active Data Guard technology
 - Maintaining query consistency while applying 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?

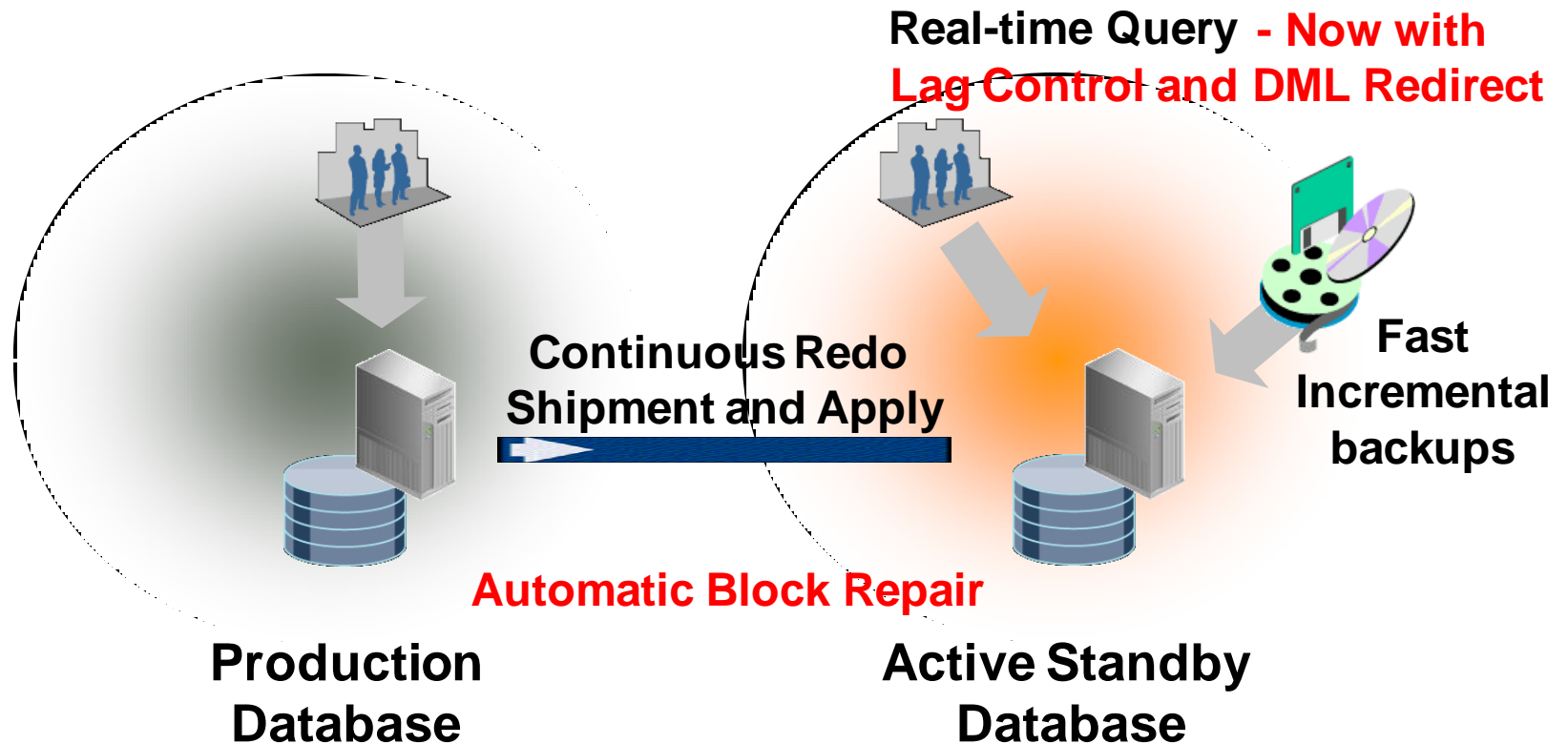
- The ability to use your Physical Standby for much more than just High Availability or Disaster Recovery!



Active Data Guard

What is Included?

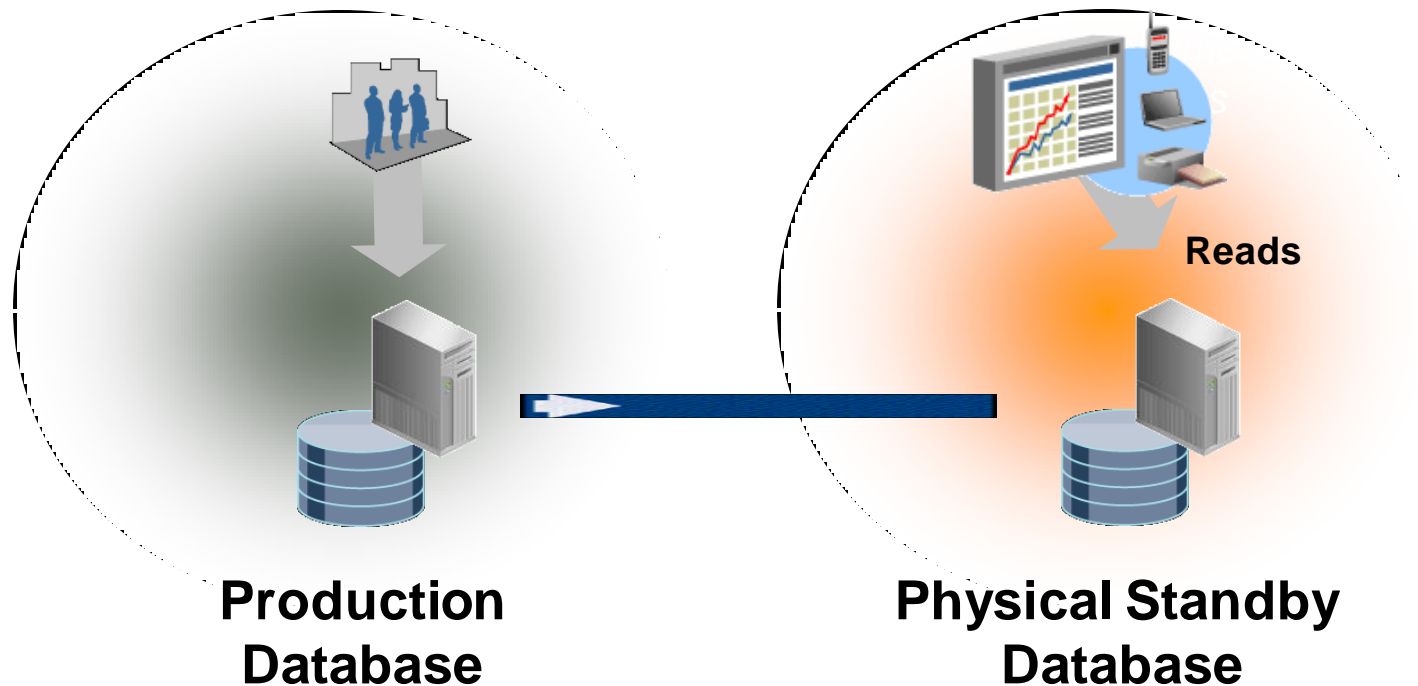
- But wait! There's more!



Active Data Guard

What can you do with it?

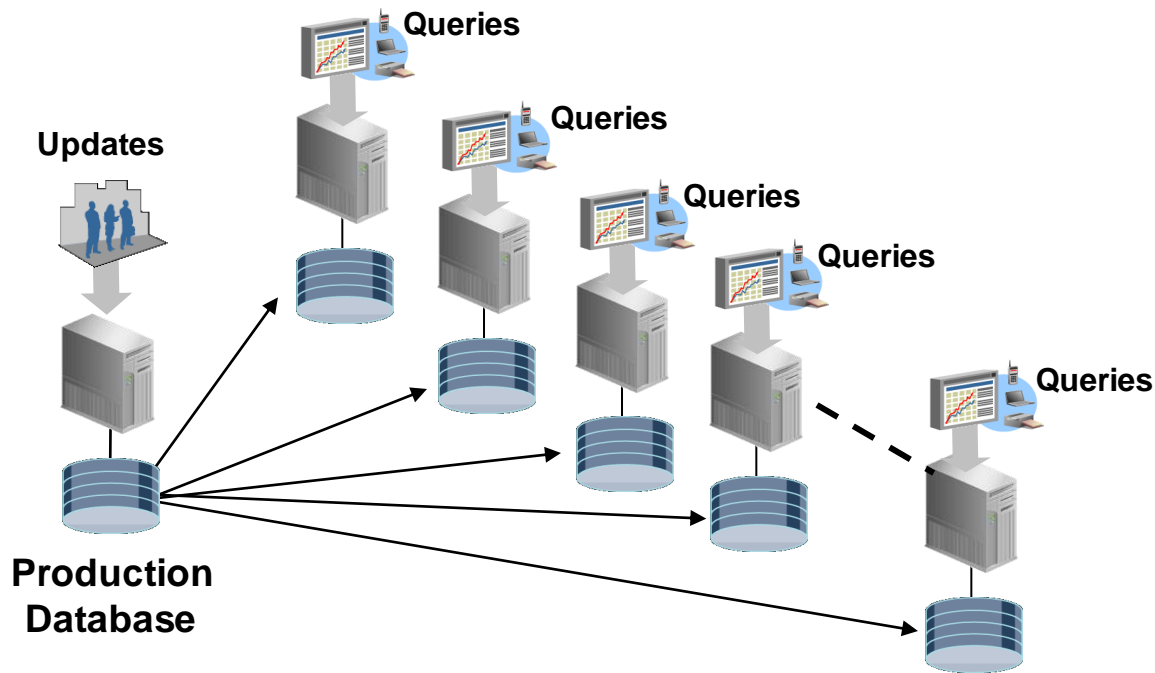
- Read Only applications just work – No Brainer!
- If you have an application that does 100% reads then it will work transparently with Active Data Guard!



Active Data Guard 11g Release 2

Scale Read Performance

- Support for up to 30 active standby databases



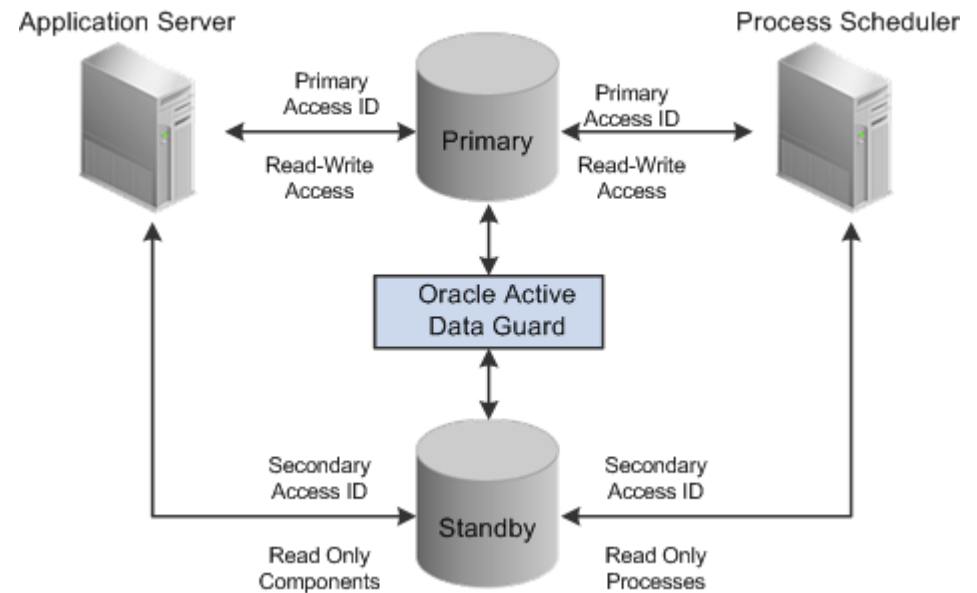
Active Data Guard

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



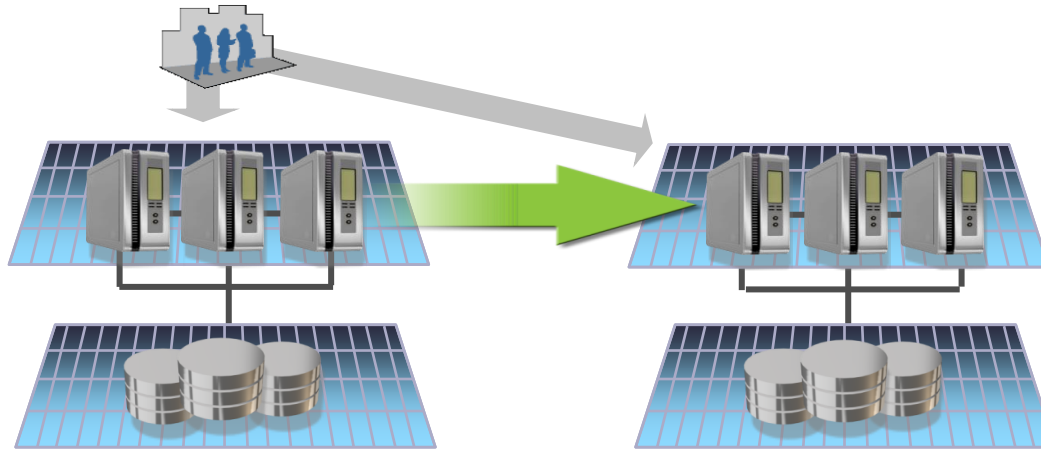
http://download.oracle.com/docs/cd/E18083_01/pt851pbr0/eng/psbooks/tadm/book.htm?File=tadm/htm/tadm13.htm#H4064

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

E-Business Suite and Active Data Guard

- 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

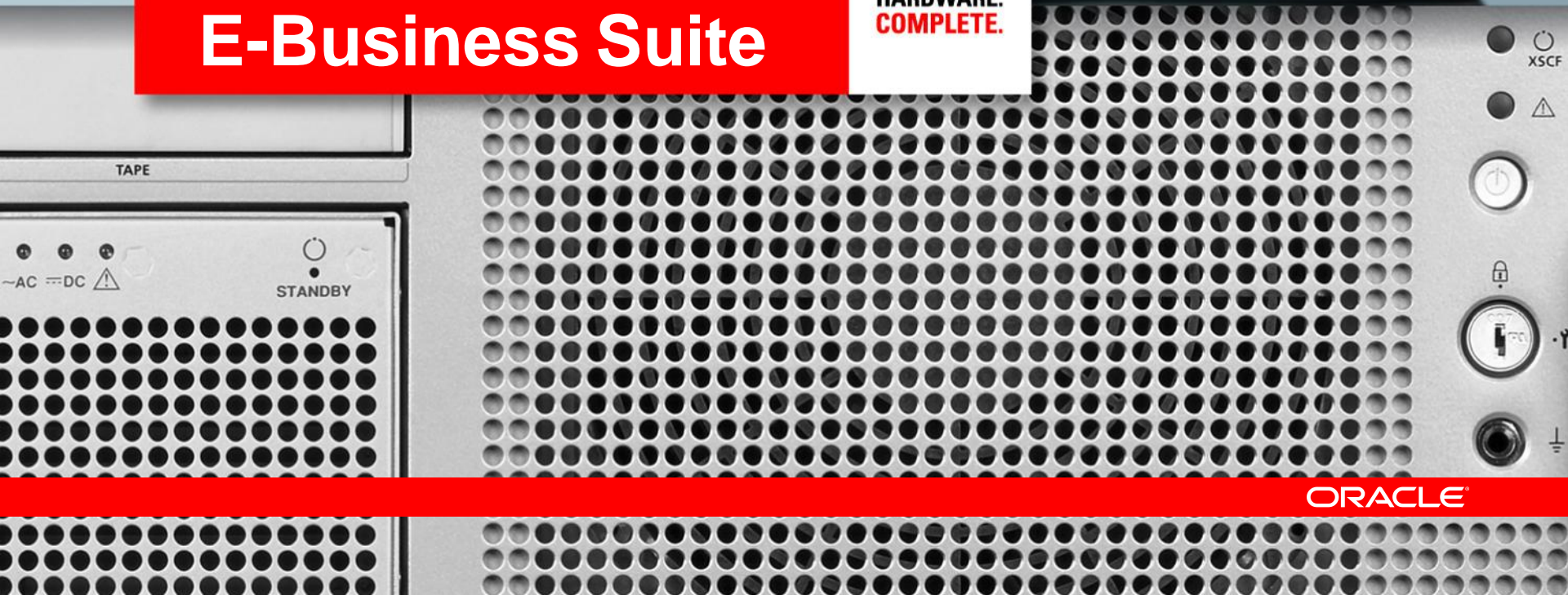
- How many Oracle Reports?
 - Approximately 137 OracleReports were tested. 72 were successfully executed on Active Data Guard
 - Of the 13 longest running OracleReports in Oracle's usage of E-Business Suite, 9 ran successfully on Active Data Guard!
- Now, how about a demo? (Thanks to Andrew Huda)



Demo!
Demo!
Demo!

Active Data Guard E-Business Suite

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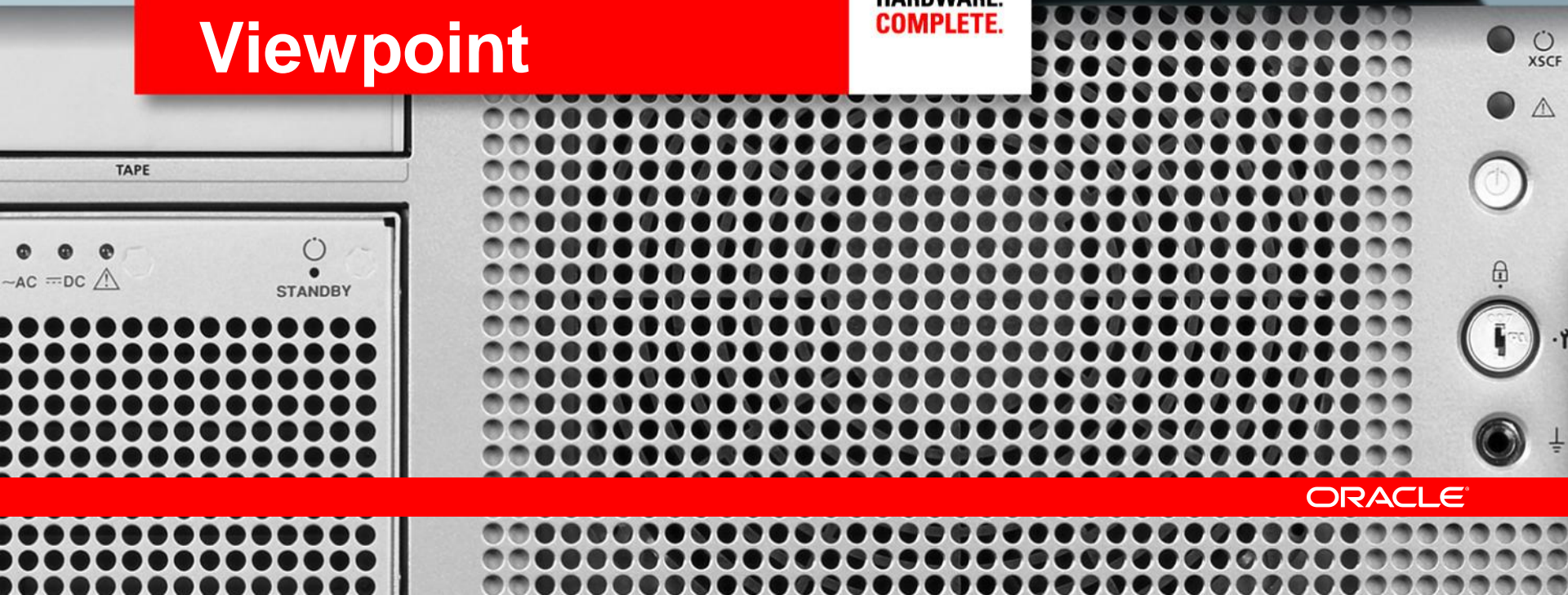


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A Customer Viewpoint

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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

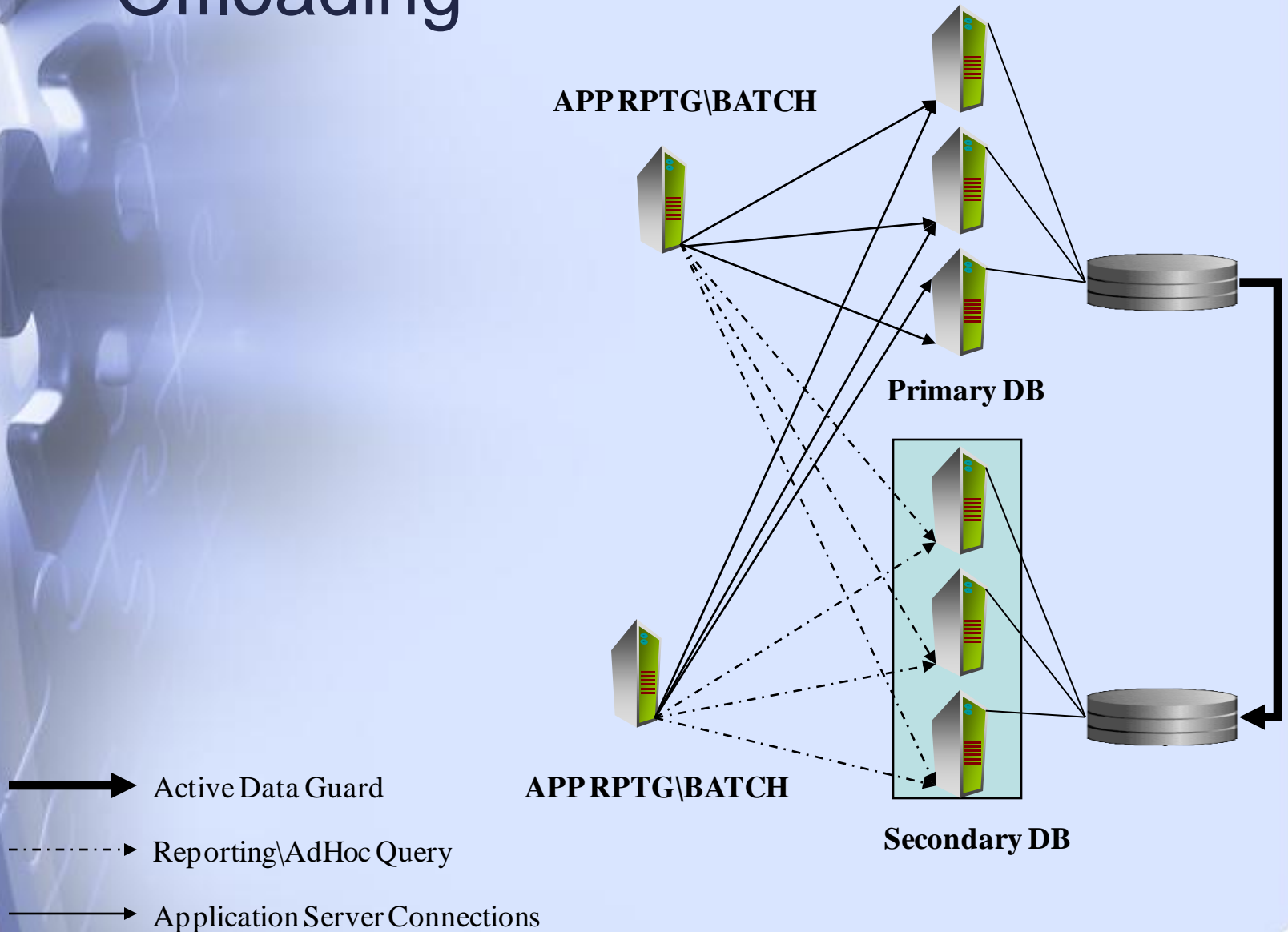
- Address potential production impact of Reporting and AdHoc queries.
- Increase ROI stream of DR assets.
- Create DR fast incremental backups.



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

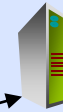
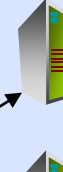


Read Only Transaction Load Balancing

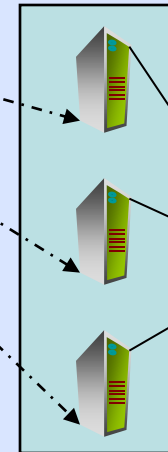
APP Servers



APP Servers

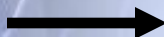
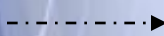



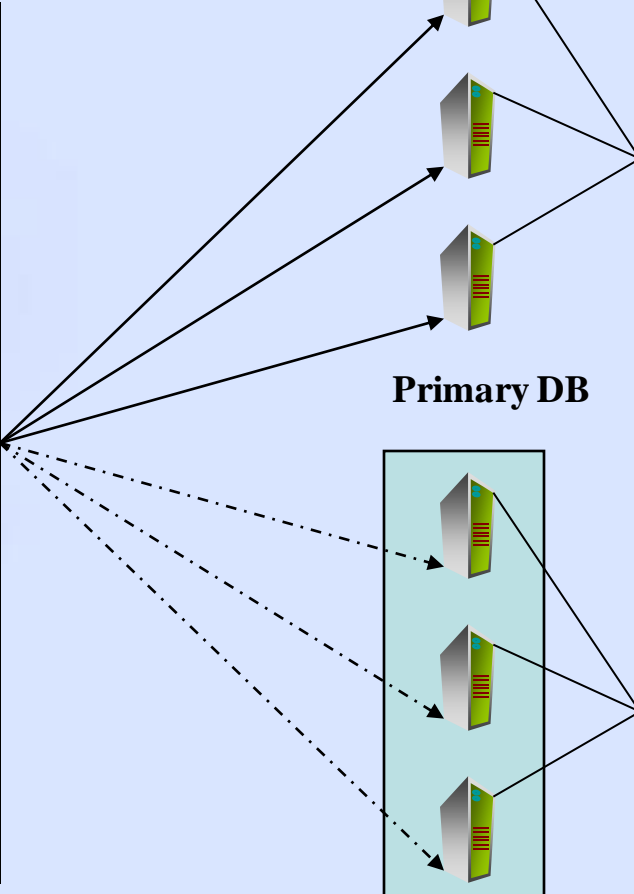
Primary DB



Secondary DB



-  Active Data Guard
-  Read Only Transactions
-  Read/Write Transactions



Lessons Learned

- Define SLA for read only transactions.
- Define Enterprise Manager 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

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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

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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

Demo!
Demo!
Demo!



Active Data Guard Query Lag SLA

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Demo!
Demo!
Demo!



Active Data Guard DML Redirection

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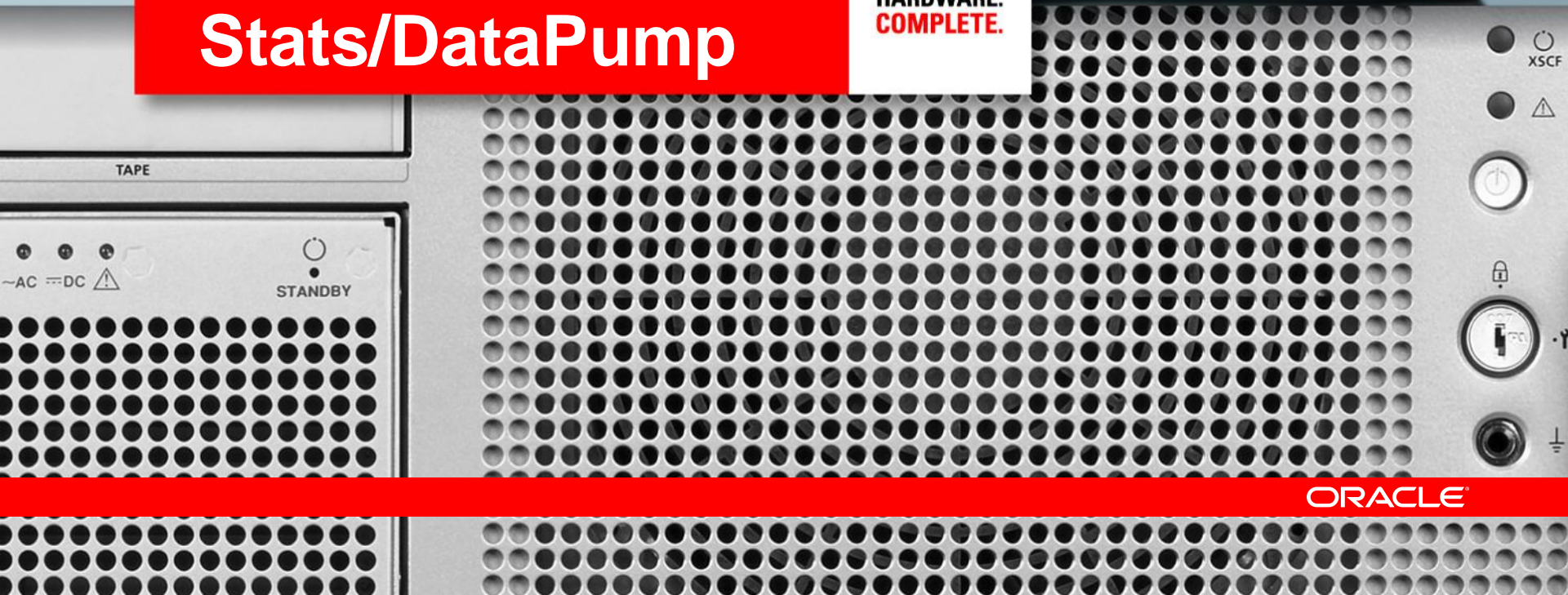


Demo!
Demo!
Demo!



Active Data Guard Stats/DataPump

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Demo!
Demo!
Demo!

Active Data Guard Auto Block Repair

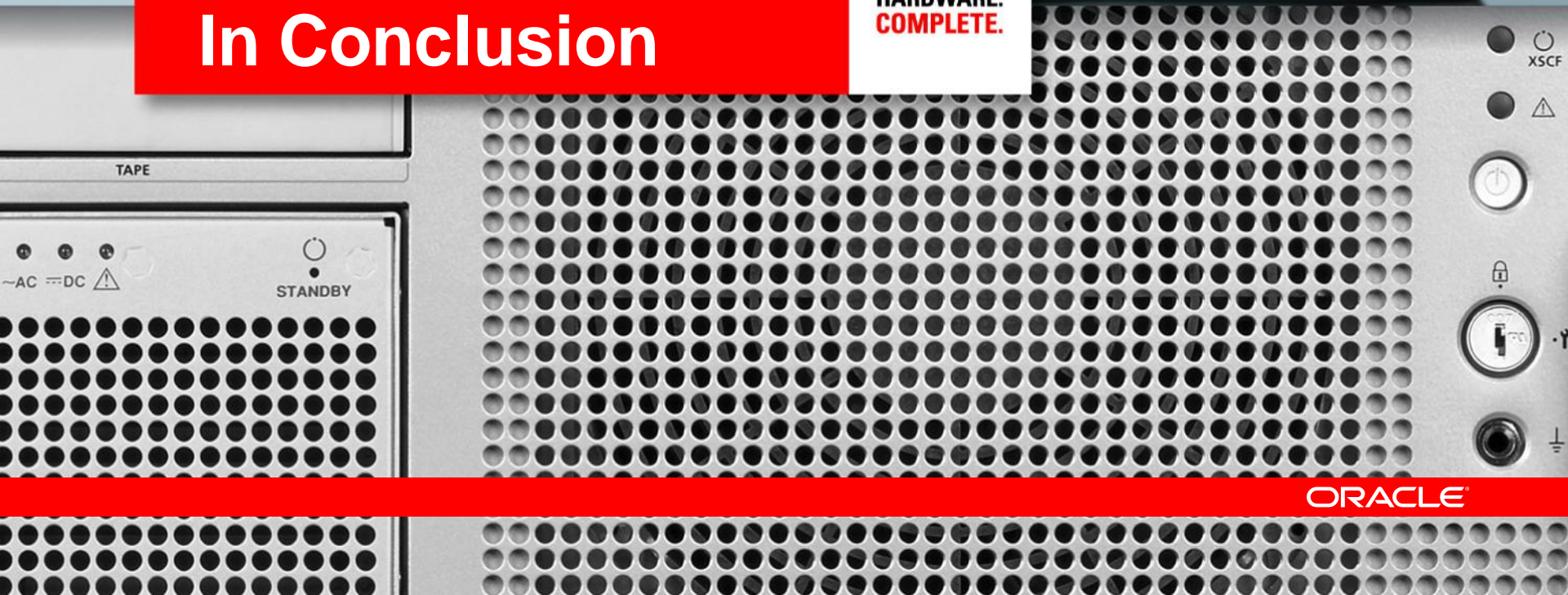
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Active Data Guard In Conclusion

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Key HA Sessions, Labs, & Demos by Oracle Development

Monday, 20 Sep – Moscone South *

- 3:30p** Extreme Consolidation with RAC One Node, Rm 308
- 4:00p** Edition-Based Redefinition, Hotel Nikko, Monterey I / II
- 5:00p** Five Key HA Innovations, Rm 103
- 5:00p** GoldenGate Strategy & Roadmap, Moscone West, Rm 3020

Tuesday, 21 Sep – Moscone South *

- 11:00a** App Failover with Data Guard, Rm 300
- 12:30p** Oracle Data Centers & Oracle Secure Backup, Rm 300
- 2:00p** ASM Cluster File System, Rm 308
- 2:00p** Exadata: OLTP, Warehousing, Consolidation, Rm 103
- 3:30p** Deep Dive into OLTP Table Compression, Rm 104
- 3:30p** MAA for E-Business Suite R12.1, Moscone West, Rm 2020
- 5:00p** Instant DR by Deploying on Amazon Cloud, Rm 300

Wednesday, 22 Sep – Moscone South *

- 11:30a** RMAN Best Practices, Rm 103
- 11:30a** Database & Exadata Smart Flash Cache, Rm 307
- 11:30a** Configure Oracle Grid Infrastructure, Rm 308
- 1:00p** Top HA Best Practices, Rm 103
- 1:00p** Exadata Backup/Recovery Best Practices, Rm 103
- 4:45p** GoldenGate Architecture, Hotel Nikko, Peninsula

Thursday, 23 Sep – Moscone South *

- 10:30a** Active Data Guard Under the Hood, Rm 103
- 1:30p Minimal Downtime Upgrades, Rm 306**
- 3:00p DR for Database Machine, Rm 103**

Demos Moscone West DEMOGrounds

Mon & Tue 9:45a - 5:30p; Wed 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

* All session rooms are at Moscone South unless otherwise noted

* After Oracle OpenWorld, visit
<http://www.oracle.com/goto/availability>



Oracle Data Guard 11g Handbook

ORACLE® 11g
DATABASE

Undocumented Best Practices and Real-World Techniques

Larry Carpenter

Joe Meeks
Charles Kim
Bill Burke

Sonya Carothers
Joydip Kundu
Michael Smith
Nitin Vengurlekar

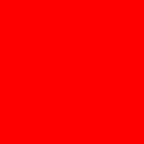
Foreword by Tom Kyte of asktom.oracle.com



Remember

- Active Data Guard is...
 - High Availability
 - Disaster Recovery
 - Data Protection
 - High Performance
 - No Restrictions
 - High Return On Investment
 - No Holds Barred!
 - **Thank you!!!**

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