Lessons Learned Migrating a Major Application to Exadata v2

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Complex integration of capital markets trading data

- Hundreds of ETLs, Thousands of tables
- 10K+ ETL executions per day, many highly complex
- Near real-time SLAs
- ODS with data sharing for entire line of business
- Several web applications, each with multiple hundreds of users, doing reporting and analytic queries
- Business, not traditional BI, SLAs for availability and recovery
Disclaimers

- All content is the opinion of the author, not my employer
- No endorsements are intended. All products mentioned are considered favorably by the author!
Some Oracle Context You should Read

- Master Note (Doc ID 1187674.1)
  - Database Machine and Storage Server
- Best Practices Master Note (Doc ID 757552.1)
  - Performance, Migration, Backup Recovery
- Best Practices (Doc ID 1067527.1)
  - Database Machine Setup/Configuration
- Supported Versions (Doc ID 888828.1)
  - Database Machine running Storage Server Software 11g Release 2 (11.2)
Key Issue: mixed workload. Obvious candidates are Teradata, DB2, Netezza, Oracle for ODS and a column database for DW.

General concern: migration from Oracle entails time/cost and risk. Application is highly tuned to Oracle physical design.

Teradata concern: too small a use case for their sweet spot.

DB2 concern: migration, organizational issues, and new support issues.

Netezza: recovery model, fact/fact joins, mixed workload, tuning, LOB support.

New column database for reporting: organizational risk and current ODS I/O bottlenecks.

No other POCs were done! We chose Exadata based on migration risk avoidance.
Exadata Justification for the Application

- Migrating from Oracle to another platform migration entails significant schedule risk
- Scaling Oracle ourselves is not justified by cost / risk / technology stack (but may be less painful in terms of corporate architecture)
- Potential loss of business capability and likely miss of critical SLAs if we do not scale adequately
- Current gaps in corporate SAN engineering to support VLDB (and 100TB applications)
We created a small copy of the app in Oracle 11g and tested for functional gaps

No issues were raised

- despite some of our stack (Informatica v8.1) not being certified for 11g)
Key issues are time to migrate and disk space requirements and complexity.

We rejected RMAN Oracle 10g single instance → Exadata
- Requires migration to 11g, ASM, RAC… too many steps.

We chose to use exports:
- data pump (network) for almost everything
- export classic for large LOB tables

Be careful about considering ASM storage as a file copy target – there are limitations.
Exadata Target State Architecture

Primar

IIS, .NET files
Java files
MQ, WMB files
Cognos files
Informatica files

DR

IIS, .NET files
Java files
MQ, WMB files
Cognos files
Informatica files

EMC SRDF Synchronous Replication

Oracle Physical Dataguard (TCP/IP)
Some major bugs encountered:

- **9356344** High CPU utilization of orarootagent.bin process with CRS-2409
- **9338087** ASM AND DATABASE HANG – CONNECT: OSSNET: CONNECTION FAILED TO SERVER, RESULT=5
- **9324531** ORA-00600: internal error code

These are now part of the current Exadata Oracle release
Performance Tuning

- Most due to SQL optimization differences between Oracle 10g and 11g
- ~40,000 SQL statements in app
  68 statements identified as substantially slower
  
  37 considered non-SLA relevant and ignored
  31 important SQL statements with significant SLA impact
  - 26 resolved using profiles
  - 3 resolved using hints
  - 2 resolved by query rewrite

- optimizer_use_sql_plan_baselines?
- Note that most statements improved in performance, and improved in proportion to how much work/time they took
RAC Tuning

- Our DBAs, based on prior RAC strategies, initially partitioned the app to segregate load and prevent potential lock/block overhead.
- After tuning, we determined there was no gain, and all load was allowed across all nodes.
  - Your mileage may vary.
Support Model

- Really complex to implement in our enterprise
  - Disruptive technology requires change in strategy for many stakeholders, especially infrastructure support groups
- Include time in your plan to allow for the transition
- Include ALL stakeholders in your planning
Application Design Futures Based on Exadata

- Application changes, such as reducing our real time ETL SLAs by 2/3s
- Index removal
  - We will experiment and remove many “for purpose” indexes
  - Incremental strategy with sufficient testing required
- ILM using Hybrid Columnar Compression
- Reducing duplication of data between operational and reporting requirements
- Likely BI (read-only reporting) against disaster recovery site using Active Data Guard
Questions?