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Oracle 10g on Solaris to Oracle RAC 11gR2 on Linux Upgrade

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Image courtesy of Mammoth-WEBCO, Inc.

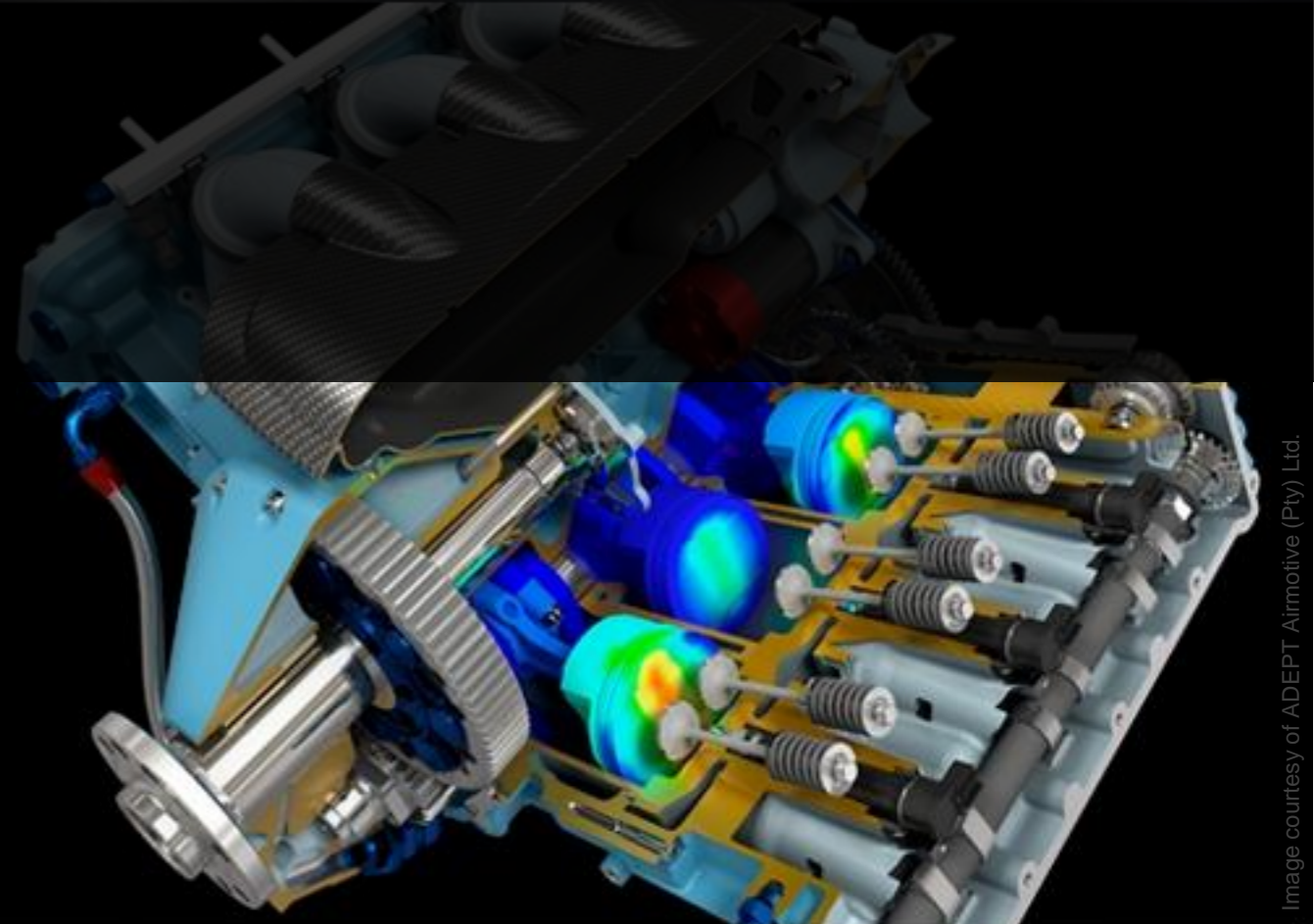


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What We Did

Physical standalone servers



- 2 Sun SunFire VX240
- 3 Sun SunFire VX440
- Independent storage
- Multiple versions of Oracle



- 3 Dell R710
- Shared storage
- Single version

How We Did It...

Challenges/Goals

- Move ~15TB of data 90 miles to new datacenter
- Upgrade to Oracle 11gR2
- Cross-platform upgrade
- Increase performance
- Minimal downtime
- Simplify landscape
- No data loss



Multiple Upgrade Methods

Database Upgrade Assistant (DBUA)

- GUI (Wizard) interface
- Easiest upgrade
- Medium downtime

Data Guard (MAA method)

- Scripts
- Most complex
- Least downtime

Manual Upgrade

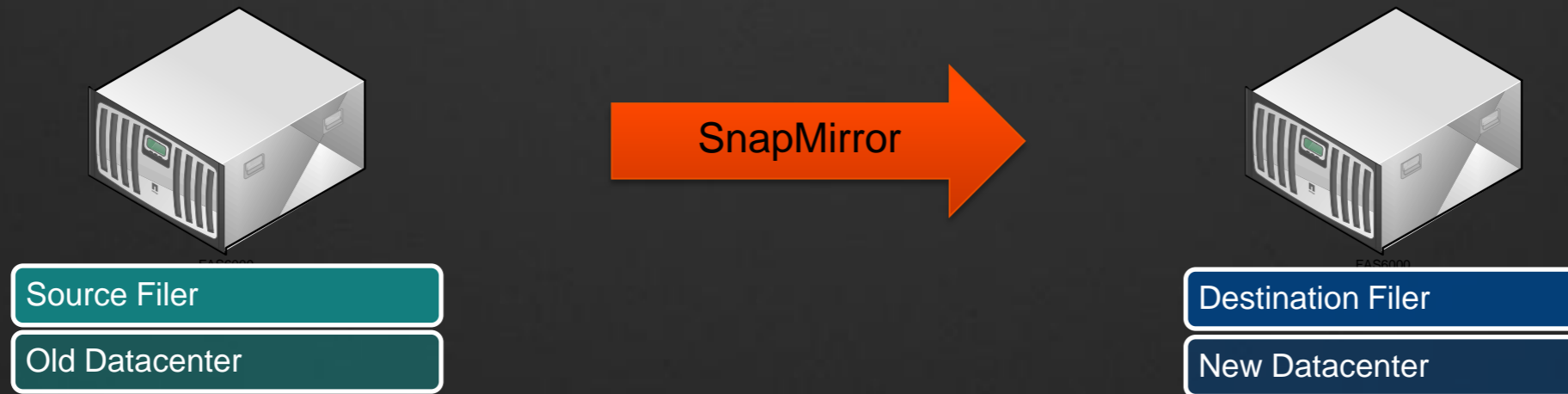
- Scripts
- Time consuming
- Medium downtime

Export/Import

- Scripts
- Allows data defragmentation
- Cross-Platform
- Longest downtime

Data Movement

- NetApp SnapMirror technology



- Leverage dedicated backup 1Gbps circuit between DCs



Export/Import Upgrade

- New 3 node Cluster
- Dell R710
- Redhat Linux 5.3
- 11gR2 RAC



- Transitional Server
- Sun V440
- Solaris 10
- 11gR1 Non-RAC



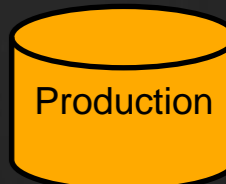
Final 11gR2 ASM Storage



- Temporary location
- Holds export dump files
- Import from this location



- Receives Snapshot from source
- VERITAS file system

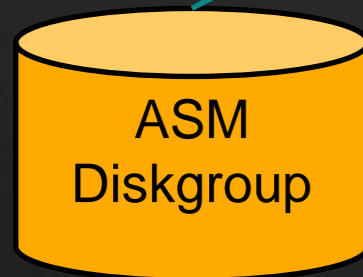


Export/Import Timings

- New 3 node Cluster
- Dell R710
- Redhat Linux 5.3
- 11gR2 RAC



- Transitional Server
- Sun V440
- Solaris 10
- 11gR1 Non-RAC



- 56 hours import (P8)
- 5.4TB final db size
- 32% reduction (compressed)



- 4.2TB dump size
- 19 hours export (P8)



8TB source db size



Maximizing Export/Import Performance

- DataPump instead of original export/import
- Fast storage drives, preferably Fiber Channel 15K RPM
- Parallelism

```
expdp system directory=data_pump_dir dumpfile=cpidprd1_%U.dmp  
logfile=cpidprd1_cpi_exp.log schemas=cpi parallel=8
```

```
impdp system parfile=cpidprd1_imp.par
```

```
directory=data_pump_dir  
dumpfile= cpidprd2_cip%U.dmp  
logfile=cipdprd2_imp.log  
schemas=cip  
remap_tablespace=data:data01  
remap_tablespace=data_dds:data01  
parallel=8  
job_name=alan_cip_imp_schema01
```

Migration Time

Task	Time
SnapMirror replication	2 days
Export	19 hours (source READ ONLY)
Import	56 hours (source READ ONLY)

- During the export/import process source database remained online in READ ONLY mode until the new database was live
- Once live the increased processing power allowed for quick catch-up of 3 day backlog

Previous Configuration

- Five Solaris servers, (3) Sunfire V440, (2) V420
- Various memory configurations 4, 8 and 16GB
- Solaris 9 and Solaris 10
- VERITAS File Systems
- Multiple storage appliances (EMC and NetApp)
- Oracle 9i and 11gR1
- Oracle Partitioning (11gR1 databases)
- Oracle Compression (11gR1 databases)



Final Configuration

- Three Dell R710s
 - 64Gb RAM
 - Two Quad-core 2.8GHz processors
- Redhat Linux 5.3 (2.6.18-128 kernel)
- Dedicated NetApp FAS3160 Cluster
- Oracle 11gR2 Real Application Clusters
- Oracle 11gR2 Enterprise Edition
- Oracle 11gR2 Automatic Storage Management
- Oracle Advanced Compression
- Oracle Partitioning



Benefits Realized

Reduced Cost

- Replacing expensive hardware with commodity

Reduced Complexity

- Oracle RAC 11gR2
- Standard architecture

Increased Scalability

- Oracle RAC 11gR2
- Workload Management
- Services

Increased Performance

- Oracle ASM, RAC & RDBMS 11gR2
- Cheaper/faster hardware
- 10x improvement in I/O response time using ASM
- 3x application response improvement
- 2.5x application load capacity
- Better PQ memory management

Reduced Storage

- Oracle Advanced Compression 11gR2
- 32% reduction in storage

Reduced Downtime

- Oracle RAC 11gR2
- Service failover
- Ability to patch CRS with no DB downtime

Increased Availability

- Oracle RAC 11gR2
- Multiple nodes
- Service failover

Increased Manageability

- Oracle RAC & RDBMS 11gR2
- Global AWR
- Improved CRSCTL and SRVCTL commands
- ASMCMD (Command Line for ASM)
- OCR + Voting disk both in ASM

Lessons Learned

- Test, test, test (test)
- Apply the most recent PSU available
- Not all features are appropriate (test)
- Involve all engineering and application teams early, including Storage, Network and Server Administrators, not just DBAs
- Engage Professional Support Services if needed

Next Steps

- Consolidate databases
 - 5 databases => 1
 - Schemas instead of databases
 - RAC services
- Improve memory and CPU resource allocation
- Further simplify landscape
- 11.2.0.2 (11gR2 Patchset 2)
 - Bug fixes
 - Improved PQ statement queuing
 - Memory stress protection feature

Recommended Resources

- Oracle 11gR2 Upgrade Companion (Note 785351.1)
- Oracle 11gR2 Upgrade Guide
 - <http://awill.us/9APJXe>
- Oracle 11gR2 Installation Guides
 - <http://awill.us/a64s4W>
- Oracle Support Upgrade Advisor (Note 250.1)
- Oracle MAA Best Practices Portal
 - <http://www.oracle/goto/maa>

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