Enterprise Backup Architecture

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CSX Corporation Overview

- CSX Corporation is a transportation company providing rail, intermodal and rail-to-truck transload services
- Over $11 billion in annual operating revenue, employing 30,000+ employees
- Owns largest rail network in the eastern United States
- One of the nation’s largest coast-to-coast intermodal transportation providers linking customers to railroads via trucks and terminals
- CSX Technology, a CSX Corporation business unit, provides a wide range of information technology applications and support services
Oracle Database Infrastructure

• Oracle databases provide the backbone for mission critical train movement, customer service, and data warehouse decision support applications

• Using advanced Oracle Database options and features

• Large number of Oracle databases at Version 10gR2
  - 350 Oracle Databases version 10.2.0.4.0
  - 120 Production databases with 17TB
  - 230 Test / Development databases with 15TB

• Hosted primarily on commodity Intel-based servers
Challenges - Backup Infrastructure

**Business Drivers**

- Increase tape device resource utilization
- Reduce overall backup footprint by eliminating redundancy
- Eliminate shipping of tapes between data center and business continuity site
- Implement an automated backup infrastructure at our business continuity site for sustained operations
- Reduce backup infrastructure costs
Infrastructure Changes

- Utilize a Virtual Tape Library (VTL) as primary backup target versus physical tape device
- Deploy Oracle Secure Backup (OSB) for Oracle database backup/restore
- Leverage RMAN binary compression of backup set
• Oracle databases are backed up to a Virtual Tape Library (VTL) using Oracle Secure Backup (OSB) and Recovery Manager (RMAN)

• Backup Strategy
  – Archive log mode for all production databases
  – Incremental backups for databases > 200Gb in size
  – Nightly full backups for all other production
  – RMAN binary compression for all backups

• Metrics
  – Approx 12 TB backed per week / 1.7TB per day compressed
  – Backup compression ratios averages between 4 - 7 times

• Production database backups are replicated by the VTL to business continuity site daily
Oracle Secure Backup Domain

Total of 44 hosts in the OSB domain
-- 37 backed up over the network
-- 7 backup locally to attached drives
All hosts have one or more Oracle databases
Mix of Linux X86-64 and AIX

37 OSB Client Hosts

OSB Administrative Server

7 OSB Media Servers
-- Each attached to 8 – 12 virtual drives

Virtual Tape Library
-- 60 tape drives
-- 500 slots
**OSB: Configuration Details**

- **OSB catalog backed up daily**
  - Mirrored via hardware to the business continuity site
  - Utilize pre-defined OSB-Catalog-MF media family

- **OSB media families and tape labeling**
  - One for dev/test and one for production
  - Pre-label virtual tapes with media family

- **Retention policy**
  - Time managed vs content managed

- **VTL Capacity**
  - 500 virtual tape slots capacity
  - 300 dev/test
  - 200 production
• **Backup Infrastructure**
  - Similar hardware / network as primary Data Center
  - VTL dedicated to OSB / 500 tapes / 12 virtual drives
  - OSB admin/media server / hardware mirrored

• **Configure OSB Infrastructure**
  - Update OSB configuration with any device changes
  - Replicated volumes moved to the OSB VTL slots
  - Evoke OSB inventory of the VTL library to recognize the replicated volumes

• **Recover server OS and file systems**

• **Recover Databases using OSB and RMAN**

October 23, 2009
Migrated to Oracle Secure Backup for data protection of Oracle databases to VTL

Virtual tape library partitioning allows improved device utilization

Reduced backup footprint

Automated transition to business continuity site in event of disaster
Why Oracle Secure Backup?

- Who better to backup up the Oracle database than Oracle?
- DBAs manage Oracle database backup / recovery from end-to-end
- Single technical support contact --- Oracle
- Highly integrated with RMAN for maximum backup performance to tape --- or in our case virtual tape
- Cost effective data protection for our environment