



Enterprise Backup Architecture

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- 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 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



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



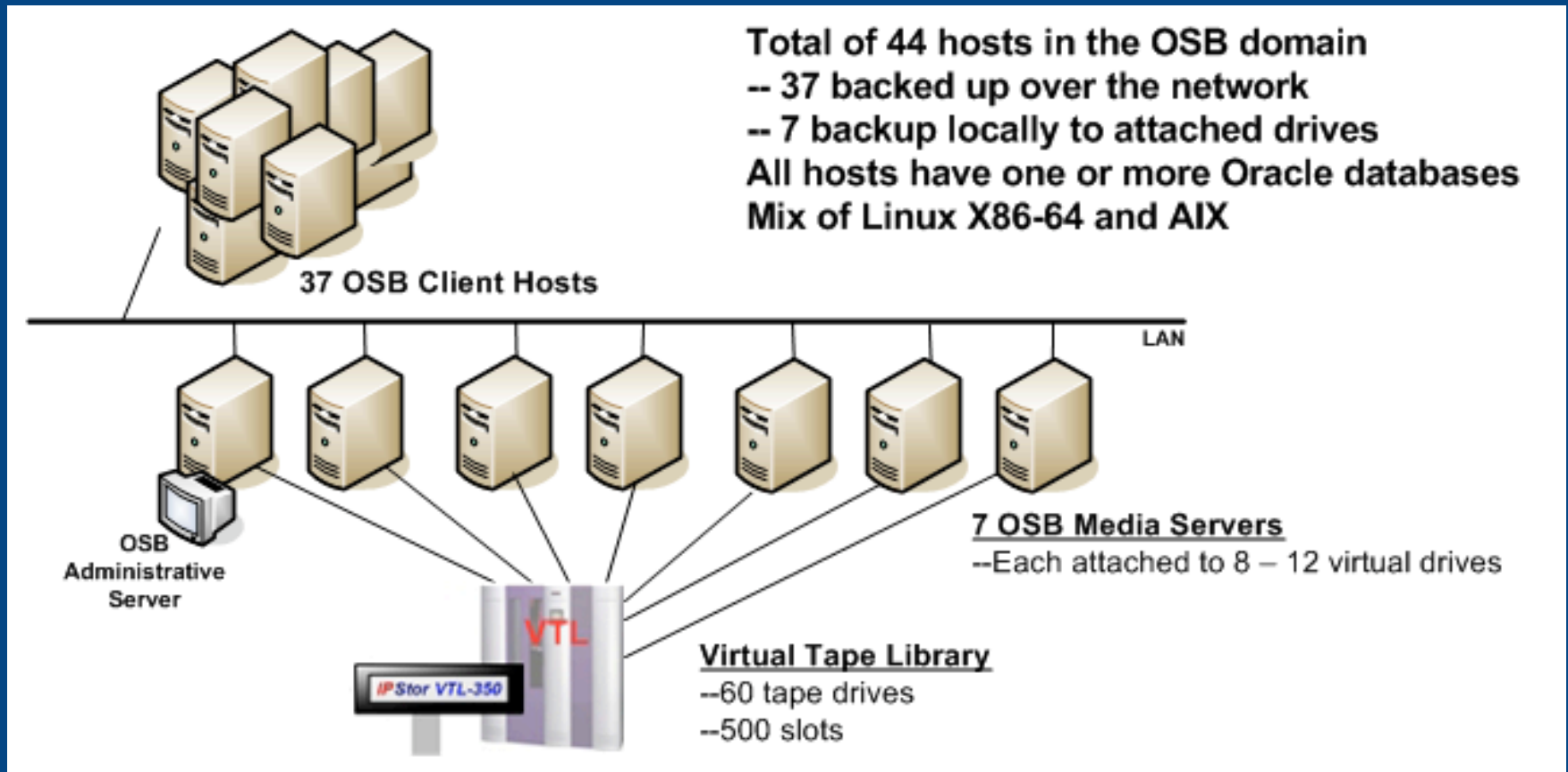
Infrastructure Changes

- 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



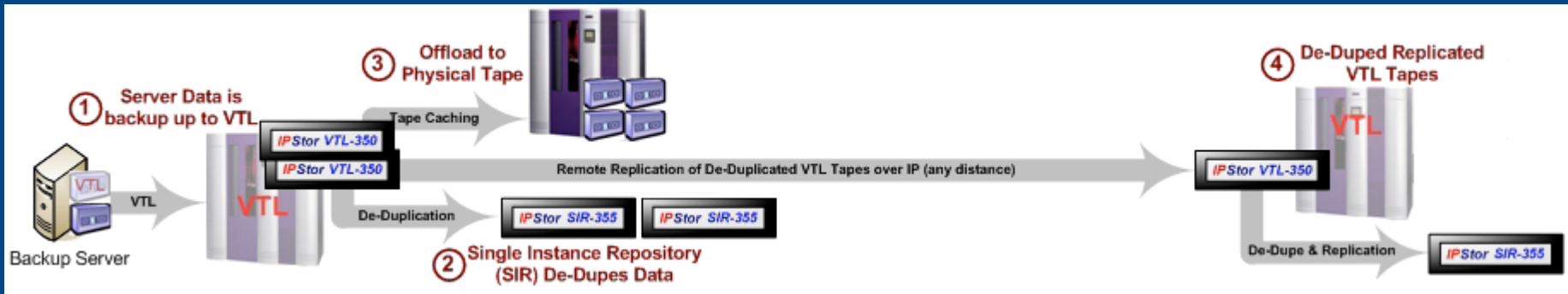
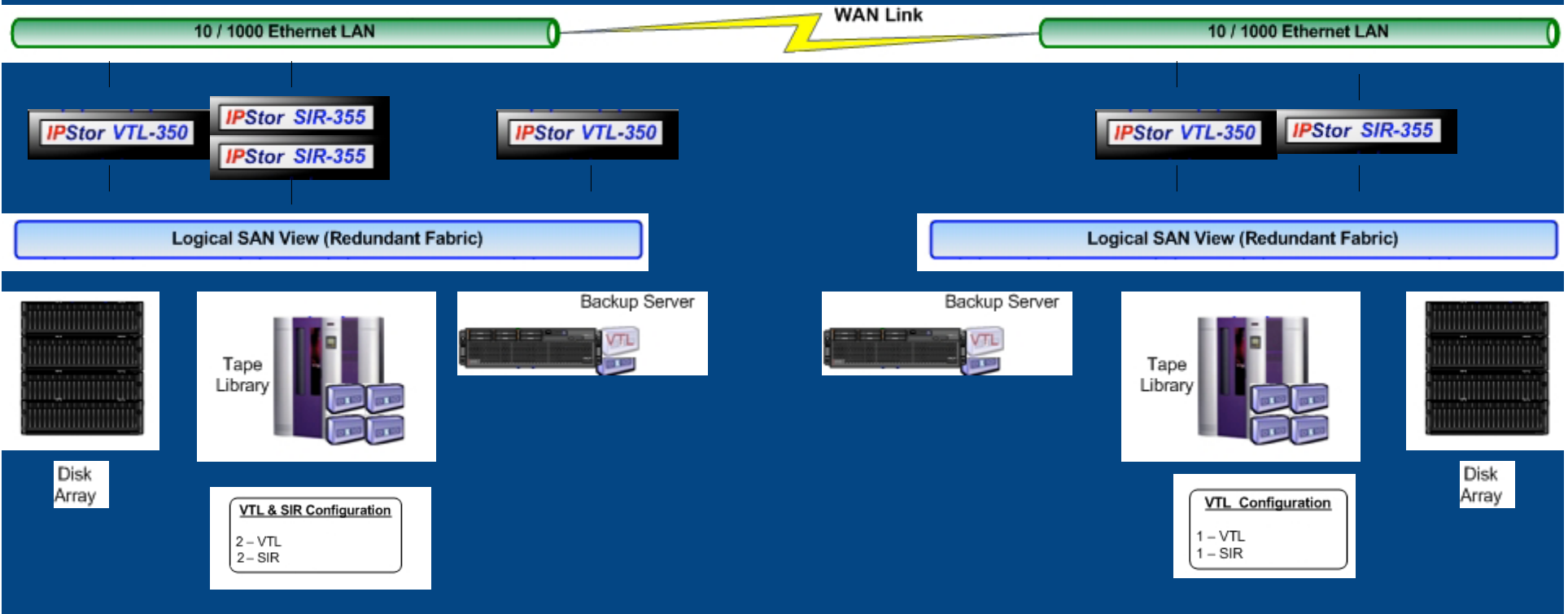


- OSB catalog backed up daily
 - Mirrored via hardware to the business continuity site
 - Utilize pre-defined OSB-Catalog-MF media family
- OSB media families and tape labeling
 - One for dev/test and one for production
 - Pre-label virtual tapes with media family
- Retention policy
 - Time managed vs content managed
- VTL Capacity
 - 500 virtual tape slots capacity
 - 300 dev/test
 - 200 production

Virtual Tape Library Architecture

Data Center

DR Site





- 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



- 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