Paradigm Shifts in How Tape is Viewed and Being Used on the Mainframe

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Conventional Outlook

![Diagram showing tiered storage hierarchy]

**Tier 1**: Primary storage
- Enterprise class disk
- High-performance applications
- Mission-critical/OLTP and database
- Mirroring and replication
- Synchronous and asynchronous (remote)
- CDP

**Tier 2**: Secondary storage
- SATA disk and virtual tape
- Fixed content, backup/recovery, reference data
- Point-in-time, snapshot

**Tier 3**: Long-term retention
- Fixed content
- Audio, video, medical, government regulations
- Tape libraries, deep archive
- Offsite

**Average days since creation**
- 0 days
- 30+ days
- 90+ days
- 1+ years
- Forever

**Recovery Time Objective (RTO)**
- Milliseconds
- Seconds
- Minutes
- Hours
- Days

**Key components**
- Policy engine
- Data mover
- (remastering)

**Amount of data**
- Probability of reuse
- Value of data

*Source: Horison Information Strategies*
Mainframe Tape Use Cases

**BACKUP**
- 3390 DASD volume dumps
  - Fixed size volumes
  - 3, 9, 27, and 54 GB
- z/OS leading backup applications
  - FDR—Innovation Data Processing
  - DSS—IBM

**SPACE MGMT**
- IBM HSM
- CA-Disk (DMS/OS)
- FDR/ABR
- Migrates data between different storage classes
- Meant to conserve DASD usage

**DATA ARCHIVE**
- Fixed content data
  - Check images, etc.
  - Variable data
- z/OS leading archive applications
  - ASG-ViewDirect
  - IBM ImagePlus
  - IBM OnDemand
  - $AVRS

**WORK TAPES**
- Short retention—temporary tapes
- High read/write requirements
- Transaction log files
- SMF data files
- Large sequential files
Realities Affecting How Tape is Used

• Older data is not less valuable
• Access to older data can be critical to business operations
• 75~90 second access of older data is unacceptable
• Recoverability is just as important
• DR compliance is paramount
• Some data requires same recoverability as DASD
• Data Loss is not an option
Customer Workload Trends

- True synchronous replication
- Remote vaulting
- Faster backup (smaller windows)
- Tight SLAs
- Avoid data movement through mainframe
- Non-proprietary
- Data deduplication
- No data loss

- Eliminate ML1 costs
- No data loss
- Eliminate host CPU cycles for compression
- ML2 with ML1 performance
- Consistent high performance on recalls

- Unpredictable access patterns
- Performance oriented recalls
- Must be accessible (online) always
- Active archive versus inactive
- Need better integration with applications
- No data loss

- Reduce CPU overhead
- Reduce elapsed time (e.g., sorts)
- Reduce batch windows
- Tight SLAs
- Log files key to recovery
Today’s Disk Based Virtual Tape Can Help

• Sub-Second Mount Times
• High-Performance I/O
• Deduplicating Storage
• Data Encryption at Rest
• Guaranteed Replication
• Synchronous Replication
Data Deduplication

- Virtual tape On disk is the mechanism for bringing data deduplication to the mainframe
- As the mainframe writes data to the virtual tape the storage performs deduplication on the data
- Reducing local and DR storage footprints
- Reduces the data sent across DR Links
- Repetitive backup data will achieve the highest benefit from this technology
  - Daily FDR / DSS Dumps of static DASD volumes
Data Encryption with Key Management

- Primary site drives encrypt data before writing to the library
- Data is encrypted at rest
- Data remains encrypted while in flight during replication
- Key manager can also be replicated
- Remote DR site has full access to VOLSERs in the library as long as the key manager can be accessed
- Allow for corporate wide key management (mainframe and open-systems)
Guaranteed Replication

- Guaranteed Replication (GR) Insures Individual VOLSERs Have Been Replicated to the DR Site
- Rewind Unload Requests are not acknowledged until the VOLSER has been replicated
- Providing superior recovery of data
Synchronous Replication

- In region DR sites rely on synchronous replication of DASD
- Historically tape has been asynchronously replicated
- Leading to inconsistency between tape and DASD at the DR Site
- Synchronous replication of tape can now insure tape and DASD are consistent
- Eliminating potential data loss for space management and data archive applications
Improved Application Processing - ViewDirect

**Traditional ASG ViewDirect Operational Environment**

- Reports captured from systems output queues are stored online in VSAM datasets
- Daily migration copies newly captured reports to tape
- Data is initially left on disk to support online query from ViewDirect
- Disk resident data provides sub-second response to ViewDirect
- Data is eventually deleted from disk to reduce on-line storage requirements
- Once it is deleted queries of “offline” tape data can take 45 seconds or more from an automated tape silo
Improved Application Processing - ViewDirect

**ASG ViewDirect Operational Environment with Virtual Tape on Disk**

- Using a virtual tape on disk solution provides significant cost savings and benefit
  - Access to reports can be accomplished as quickly as from DASD
  - Customer service levels remain constant
  - Online data can be deleted as soon as migration is complete
  - Allowing DASD to be repurposed to other applications
Improved Application Processing - HSM

- **ML1**
  - Fast access times on virtual tape on disk can reduce or eliminate the need for ML1 storage

- **ML2**
  - Virtual tape improves HSM ML2 recalls by eliminating drive contention and arm movement
  - But placing ML2 on traditional virtual tape systems results in the need to perform both logical (HSM) and physical (VTS) volume recycles
  - Virtual tape on disk can provide sub-second recall capability and eliminate the need for physical recycles
Software Leverages Capabilities of the Hardware

- Recognizing the capabilities of newer disk-based VTLs
- Providing
  - Improved Performance
  - Migration Services
  - High-Availability
  - Management Reporting
Summary

• Mainframe tape is NOT JUST Backup!
• Tape systems must satisfy a variety of requirements
  • Performance
  • Increasing Capacities
  • High-Availability
  • Quick Recovery
  • Data Consistency with DASD
• Today’s disk-based Virtual Tape Libraries (VTLs) can help
  • Quick mounts and random data access
  • Guaranteed Replication
  • Data Encryption at Rest
  • Data Deduplication
  • Multi-Site and/or Synchronous Replication
  • Software that Leverages the hardware
Thank You!