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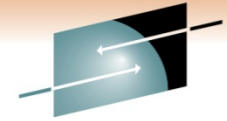
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Virtual Tape Reducing Cost and Increasing Reliability in Mainframe Environments

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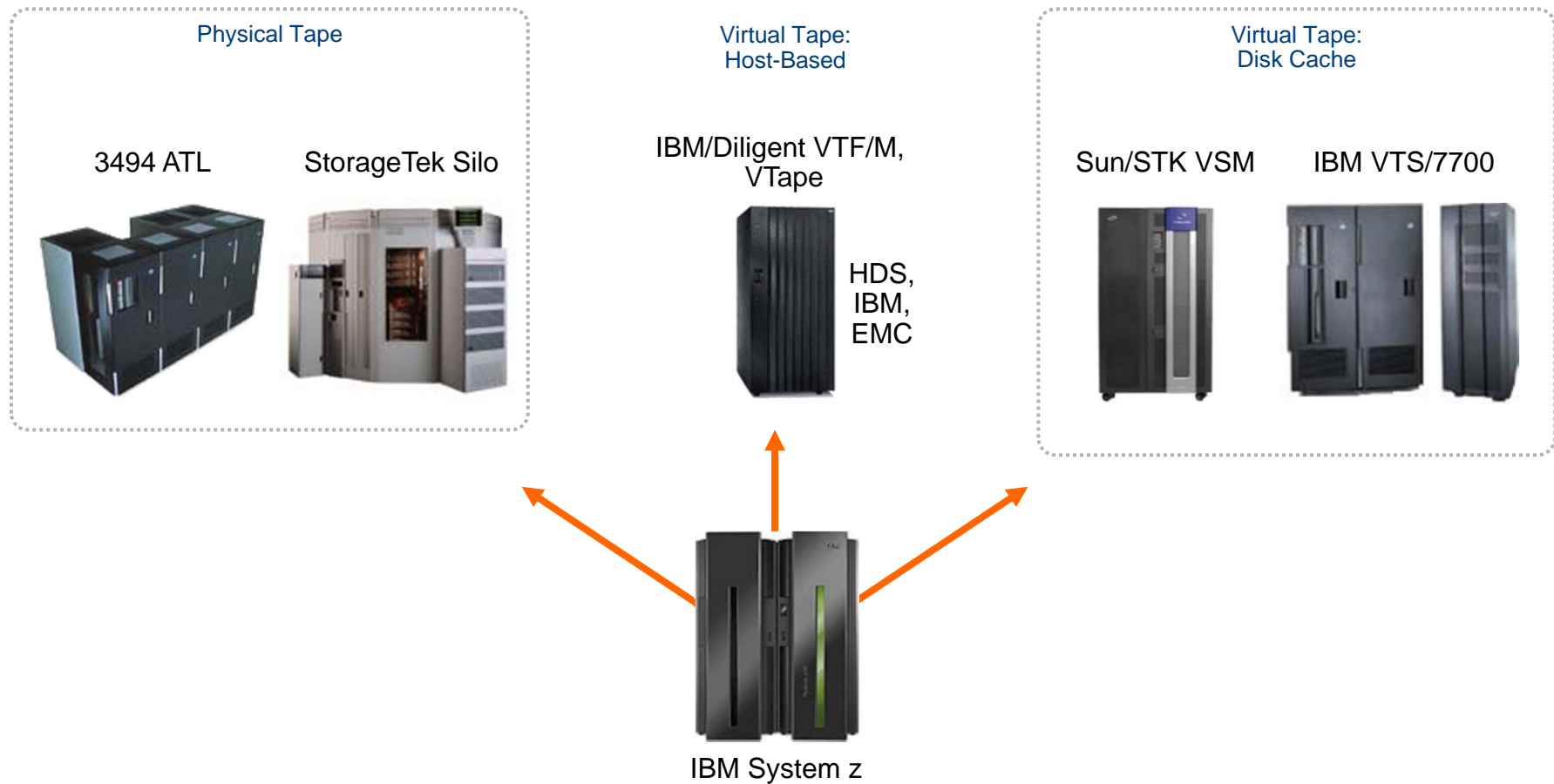
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Traditional Mainframe Tape Approaches



Typical Mainframe Use Cases for Tape

Backup

- 3390 DASD Volume Dumps
- Fixed Size Volumes
 - 3, 9, 27, 54 GBs
 - Innovation Data Processing – FDR
 - IBM – DSS

HSM Migration

- Migrates (Moves) data between storage classes
- Manages Primary DASD Space
- High Write / Read Requirements

Data Archive

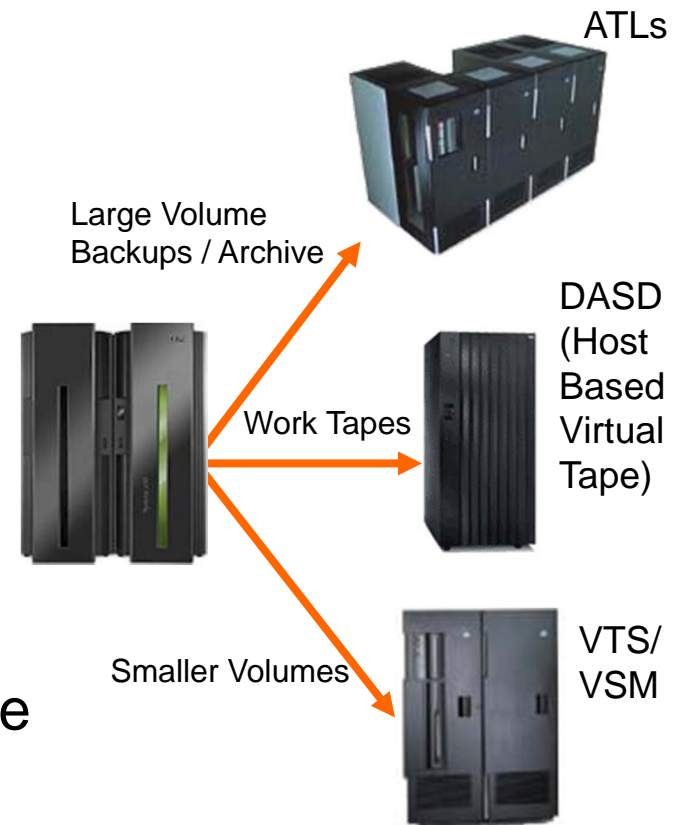
- Data Objects Moving from Disk to Tape
- Often Highly Variable Data
- May Have Short Term (30 Day) Read Requirements
- Data Compliance Requirements
- Leading Archive Applications on z/OS
 - Mobius ViewDirect
 - IBM ImagePlus

Work Tapes

- Extremely Short Retention (Temporary Files)
- High Write / Read Requirements
- Example: Syncsort Work Files

Challenges / Objectives

- Mapping the Correct Use Case to the Right Solution in Order to:
 - Reduce Tape Costs
 - Reduce Personnel Costs
 - Improve Reliability/Speed
 - Reduce Batch Windows
 - Eliminate Tape Data Loss
 - Implement DR Strategy
 - Data Accessibility Across Enterprise



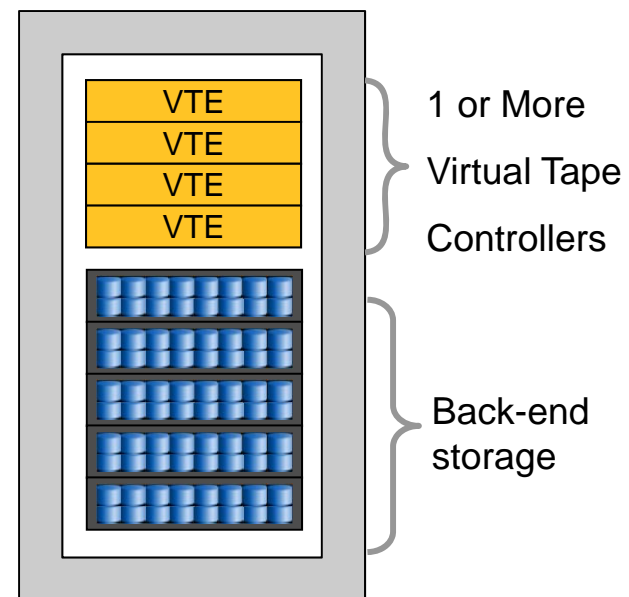
Virtual Tape On Disk Solutions

- Tape On Disk Offers Opportunity to Save Costs and Increase Reliability
 - Not tape stacking, but landing on disk
 - High performance read and write
 - Leveraging low-cost SATA II technology
 - Unmatched remote replication capability
 - Support for data deduplication
 - Capable of supporting all tape use cases



What is Virtual Tape on Disk?

- Tape-on-Disk has no back-end tape library.
- Tape volume (VOLSER) images are permanently stored on disk.
- There are two key components:
 - Virtual Tape Emulation (VTE) Controllers
 - Open-Systems Storage
- VTEs provide mainframe attachment and tape device emulations
- Back-End storage leverages high-capacity storage (1 & 2 TB SATA II) disks and RAID to store and protect the data



Benefits of Virtual Tape on Disk

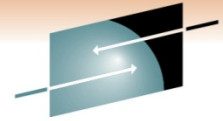
- Reduced Operational Costs
- Improved Application Processing
- Improved DR Replication Capabilities
- Reduced Storage Capacity using Data Deduplication

Reduced Operational Costs

- Reduced Environmentals
 - Less Floor Space
 - Less A/C
 - Less Power Consumption
 - Elimination of Cartridges
- Reduced Maintenance Costs
 - No Robotic Arms!
- Shorter Backup Processing Windows
 - Faster Mounts
 - Flexible Device Configurations



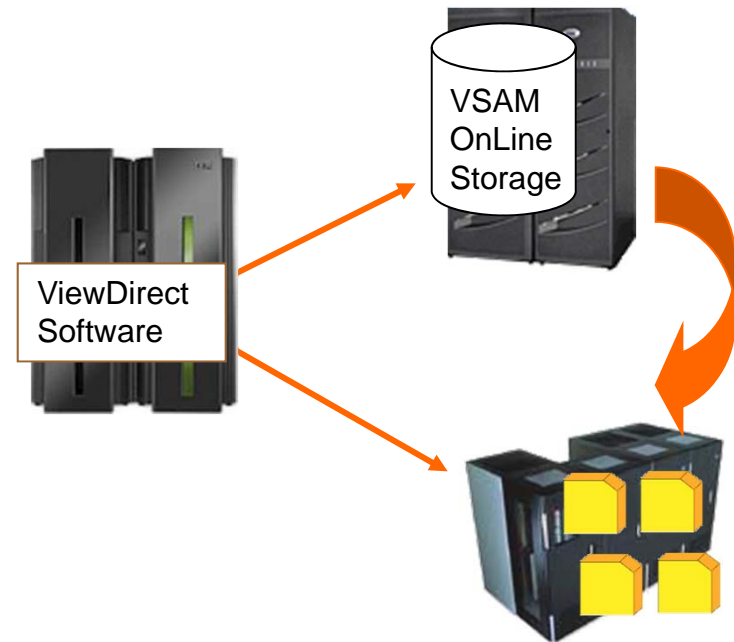
Improved Application Processing - Mobius



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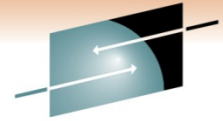
Traditional Mobius ViewDirect Operational Environment

- 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



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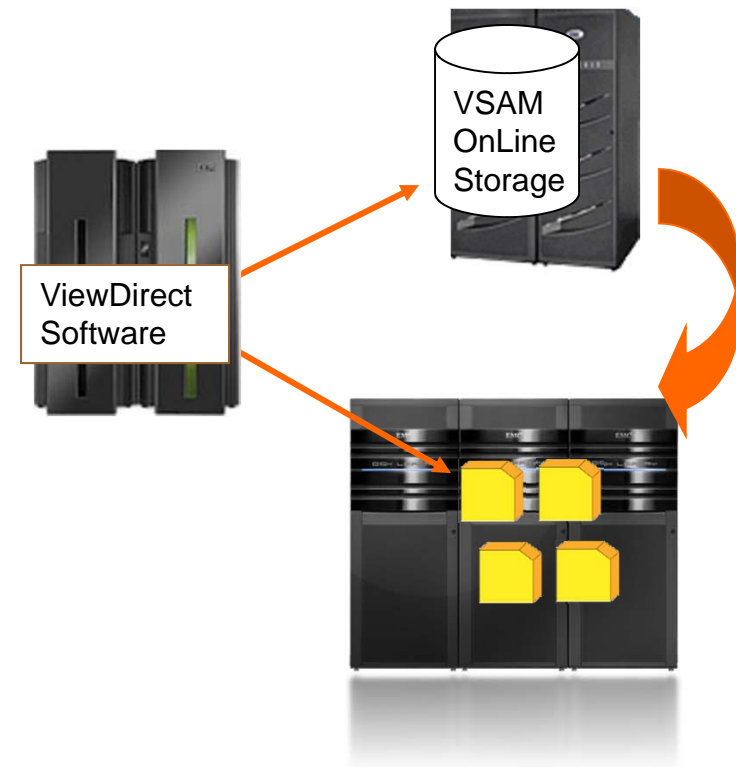
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Mobius ViewDirect Operational Environment with Virtual Tape on Disk

- 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

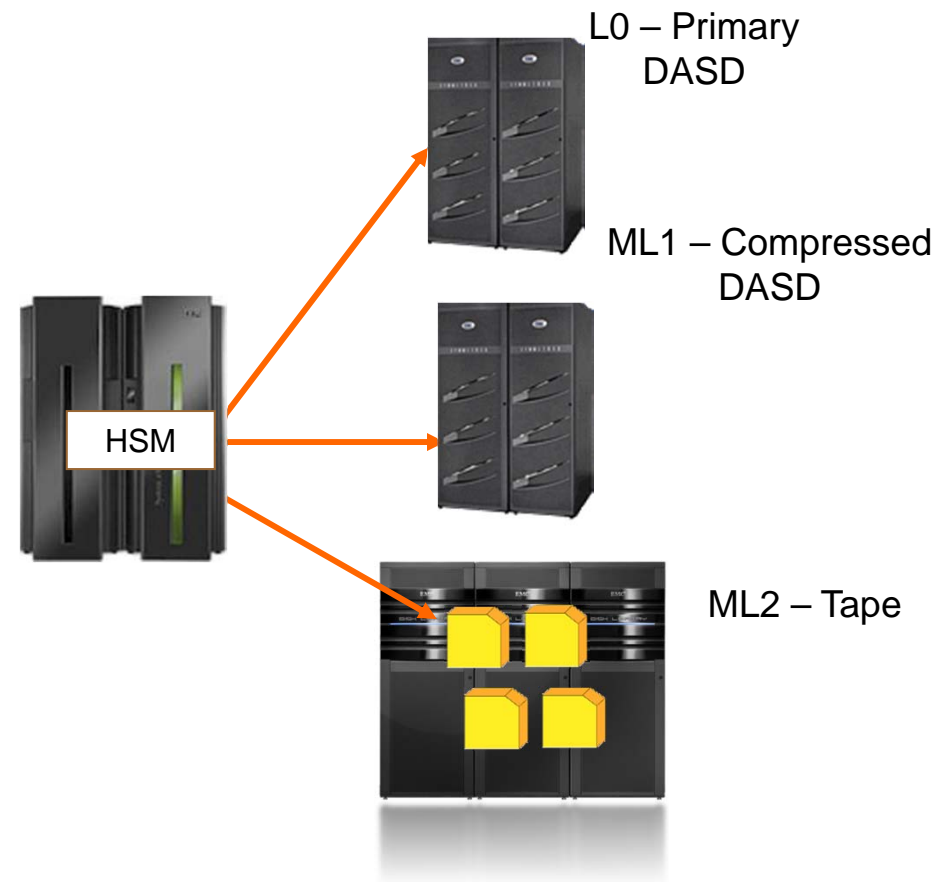


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Improved Application Processing - HSM

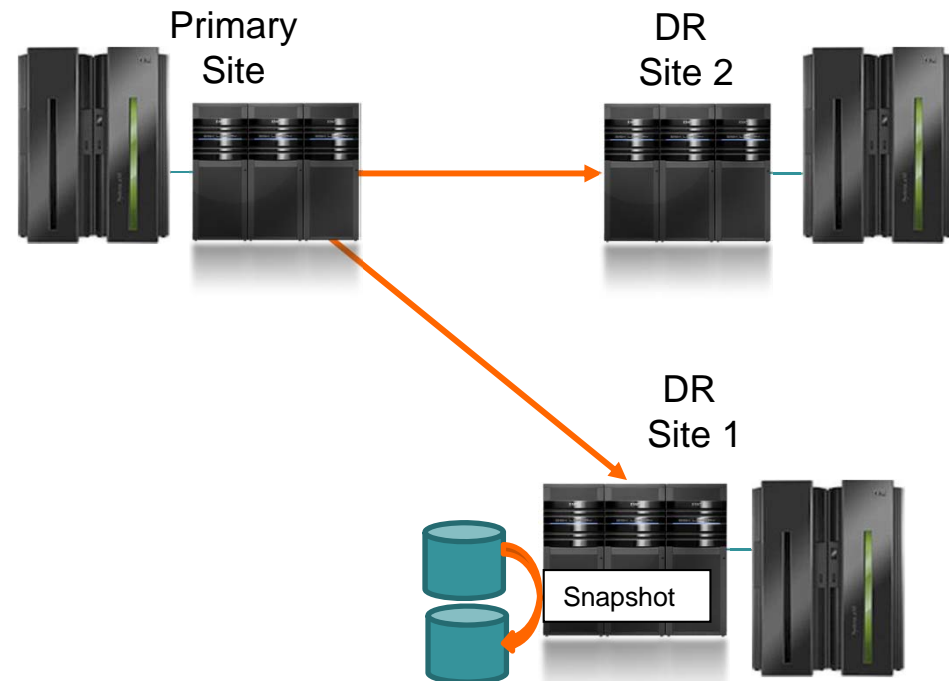


- **ML1**
 - Fast access times on virtual tape on disk can reduce or eliminate the need for ML1 storage
- **ML2**
 - Virtual tape improves HSM ML2 recalls by eliminating arm movement
 - But placing ML2 on traditional virtual tape systems results in the need to perform both logical (HSM) and physical (VTS) volume recycles
 - Virtual tape on disk can provide sub-second recall capability and eliminate the need for physical recycles



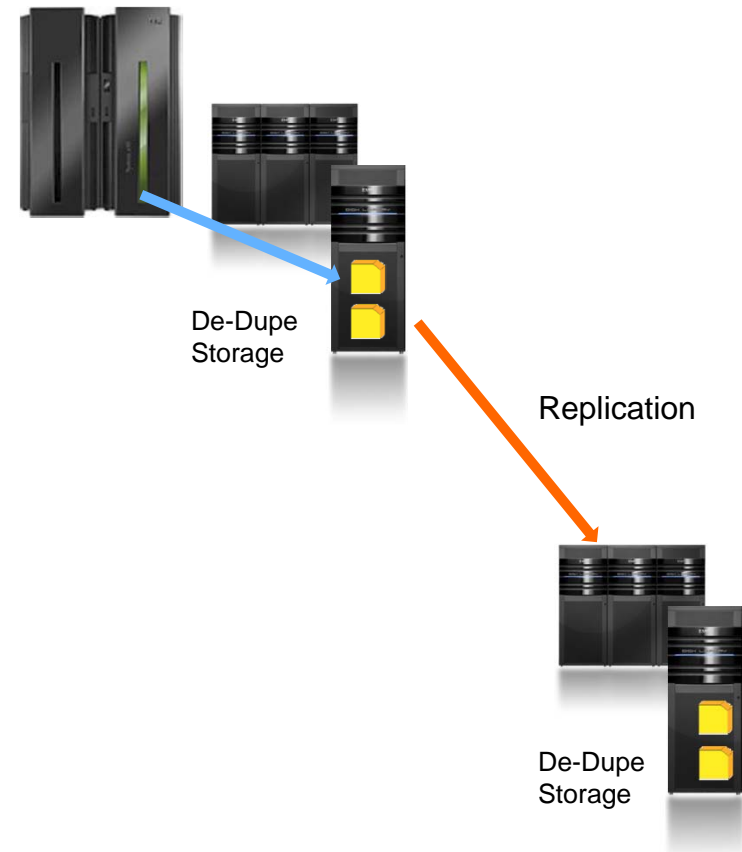
DR Replication

- Virtual tape provides 1 to many replication
- Disaster recovery testing does not require interruption of replication
- Snapshot capabilities provide copies of the library for the DR test
- Once testing is complete snapshots are deleted
- All sites remain in sync throughout the test period
- No need for replication to catch up



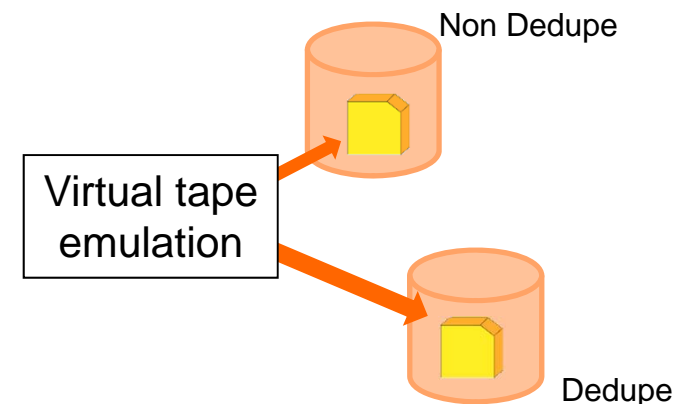
Data Deduplication

- 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
- Deduplication 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 Deduplication – Continued

- Products are now available offering both dedupe and non-dedupe storage behind the same virtual tape emulation (VTE) controller
- Mainframe tape storage pools direct individual tapes to the most appropriate place
- Cost savings are achieved by sharing the same virtual tape devices

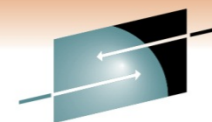


How Does One Get Started?

- Start with a comprehensive tape study
- Answering the following questions:
 - What are the maximum throughput requirements?
 - How much data is to be stored?
 - What are the key applications?
 - Backup
 - Archive
 - Work (syncsort, etc).
 - HSM
 - What are the DR Requirements?
- Match your specific use cases to the storage you are implementing

Summary

- Not all tape systems are good at all things.
- The key to achieving cost reduction and increasing reliability is matching the appropriate tape use cases to the appropriate storage.
- Virtual Tape on Disk solutions provide alternatives which:
 - Reduce Operational Costs
 - Provide Advanced DR Replication Capabilities
 - Improve Application Performance
 - Minimize Storage using Data Deduplication
- To be successful you must:
 - Understand the characteristics of your applications and data
 - Design your solution to satisfy those characteristics



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Thank You!

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