

Alternative Backup Methods For HP-UX Environments Today and Tomorrow

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Agenda

- VERITAS Software Overview
- Storage Trends
- Alternative Backup Methods
- Questions and Answers

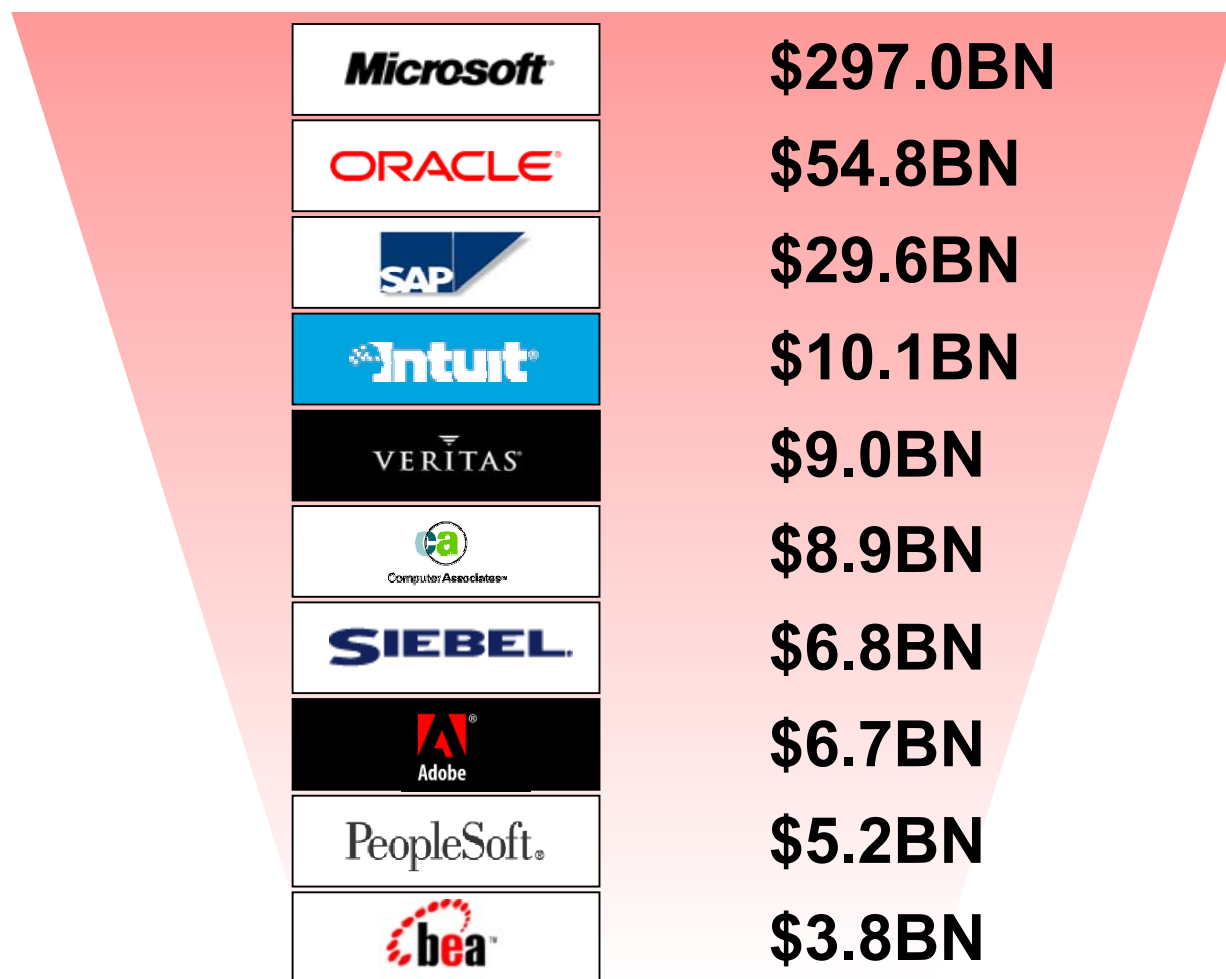
VERITAS Software

VERITAS Software

- World's largest storage software company
 - \$1.5BN Revenues
 - 5700 Employees
 - 36 Countries
 - 54% Five Year CAGR
- 86% of Fortune 500 use VERITAS Software



Most Valuable Software Companies



* Market Capitalization, July 2002

VERITAS: Listed as an Enterprise Backup Leader

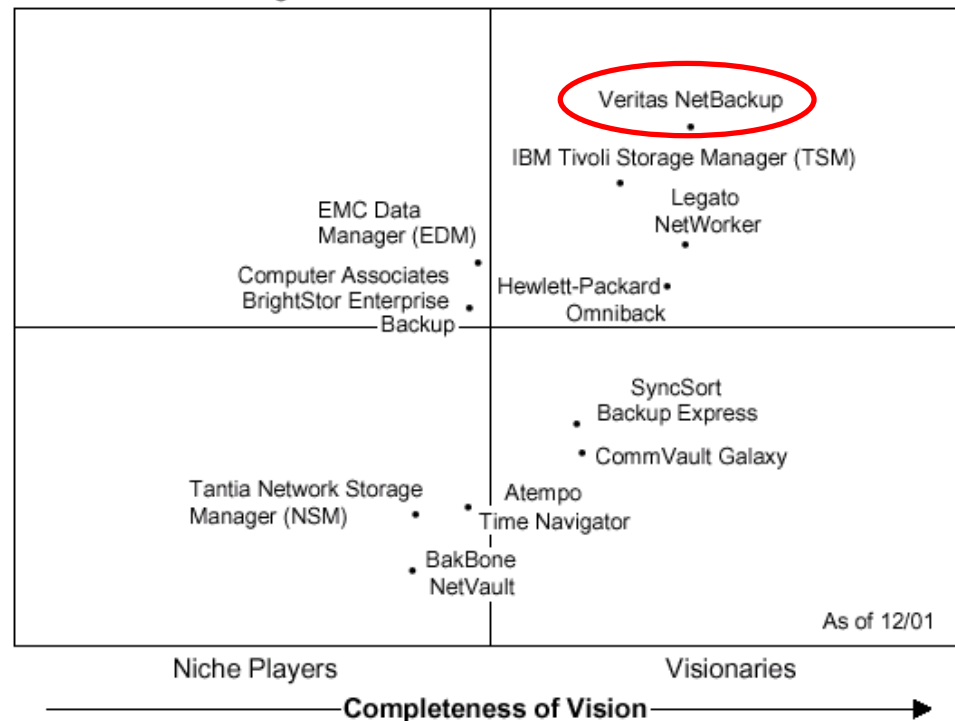
Enterprise Backup/Restore Magic Quadrant

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Source: Gartner Research Note: "Enterprise Backup/Restore Market: Magic Quadrant," S. Zaffos, C. DiCenzo, R. Paquet, 21 December 2001

Ability to Execute

Figure 1
Enterprise Backup/Restore Magic Quadrant



Source: Gartner Research

VERITAS/HP Relationship

- Long Standing Partnership
 - HP is a VERITAS strategic partner
 - HP's Online JFS is the Veritas File System
 - HP-UX 11i bundles Veritas Volume Manager
 - HP resells VERITAS solutions
 - HP delivers support on VERITAS solutions through Integrated Services & Support Agreement
- VERITAS Support for HP Technology
 - ServerFree, FlashBackup, BLIB, and Shared Storage Option on HP-UX
 - NetBackup Array Integration Option for HP SureStore E Disk Array XP Family – Integration with SureStore E Business Copy XP

Storage Trends

Trends in Data Protection

- Annual data growth is 100-400%
 - More than half of all data resides in databases
 - Not just more data...more *files*
- What backup window?
 - 24 by forever applications
 - Downtime means lost revenue - *or worse*
- Greater emphasis on disaster recovery
 - Need enforceable offsite procedures
- Staffing cannot keep up
 - Need centralized control for consistency
 - Interfaces must be intuitive and foolproof

Direct Cost of Downtime

Downtime	Retailer	Financial
14 days	Incalculable	Incalculable
182 hours (8 days)	\$9.75M	\$3B
127 hours	\$6.8M	\$2B
73 hours	\$3.9M	\$1.2B
36 hours	\$1.95M	\$567M
3.5 hours	\$195K	\$58M

Source: Meta Group, June 12, 2001

NOTE: Adding indirect costs causes business damage to accelerate as the outage increases in duration.

The Solution: Alternative Backup Methods

Alternative Backup Methods

- SAN/NAS
 - Being implemented by many IT departments today
- Alternative Backup Methods
 - Frozen Image/Snapshot (hardware & software based)
 - ServerFree Backup
- Disaster Recovery
 - Vault recovery techniques

SAN/NAS

SAN Backup

- Enables “LAN-free” backup over a SAN
- Lowered backup TCO
- For all leading UNIX and Windows platforms
- Wizard-based hardware configuration
- Supports wide range of Fibre Channel components
 - Not limited solely to Fibre Channel



SNIA
Storage Networking Industry Association

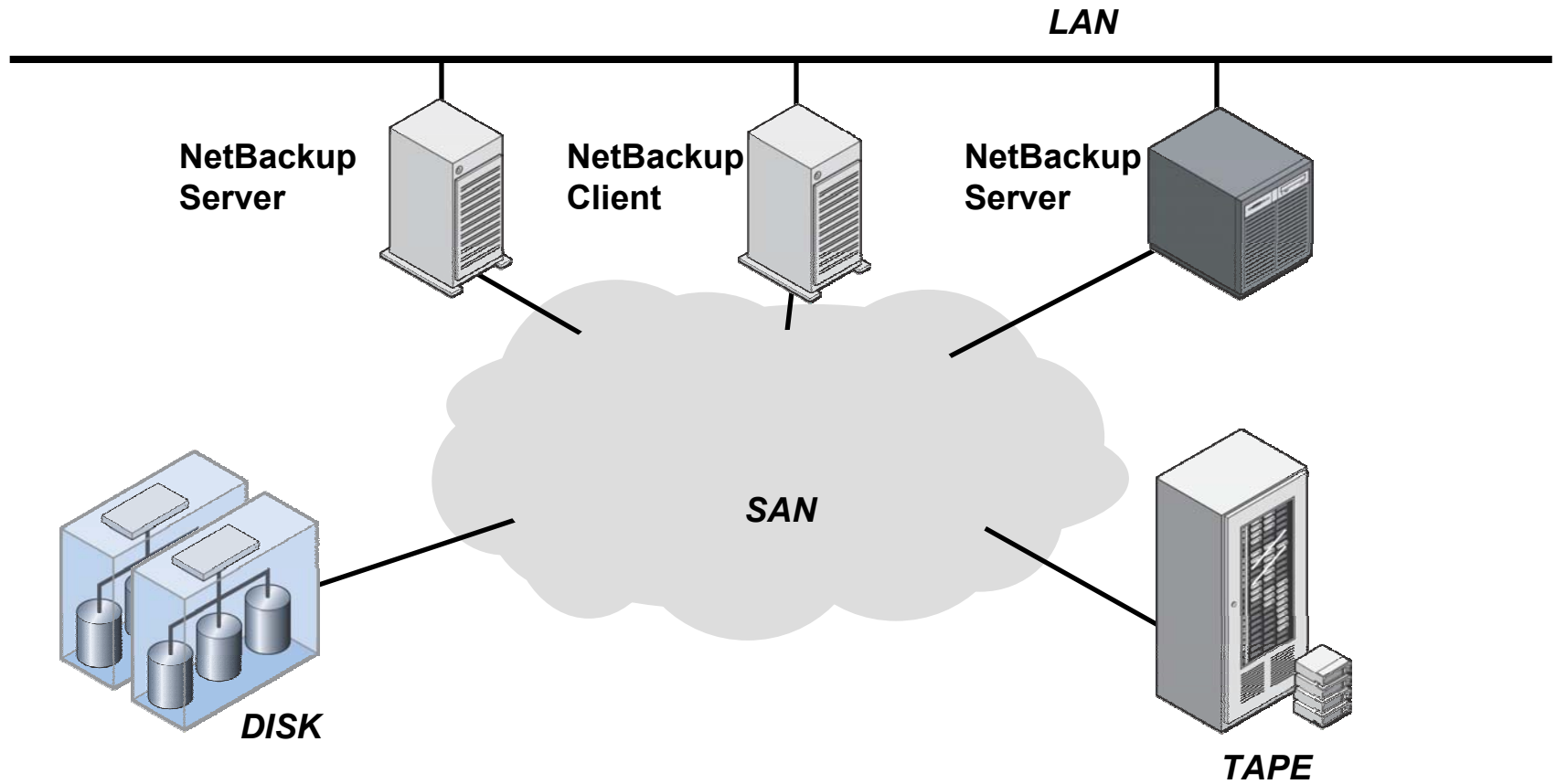


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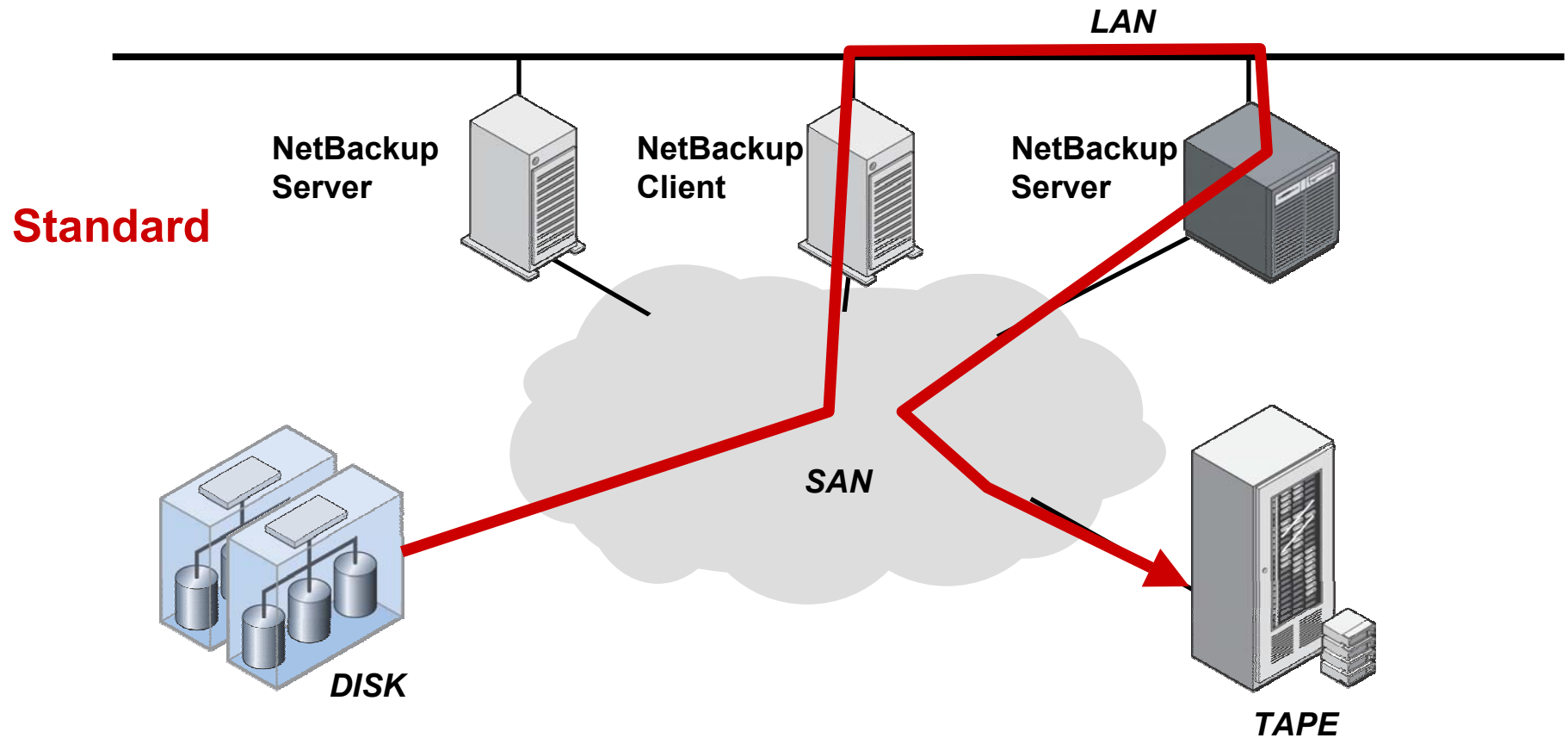


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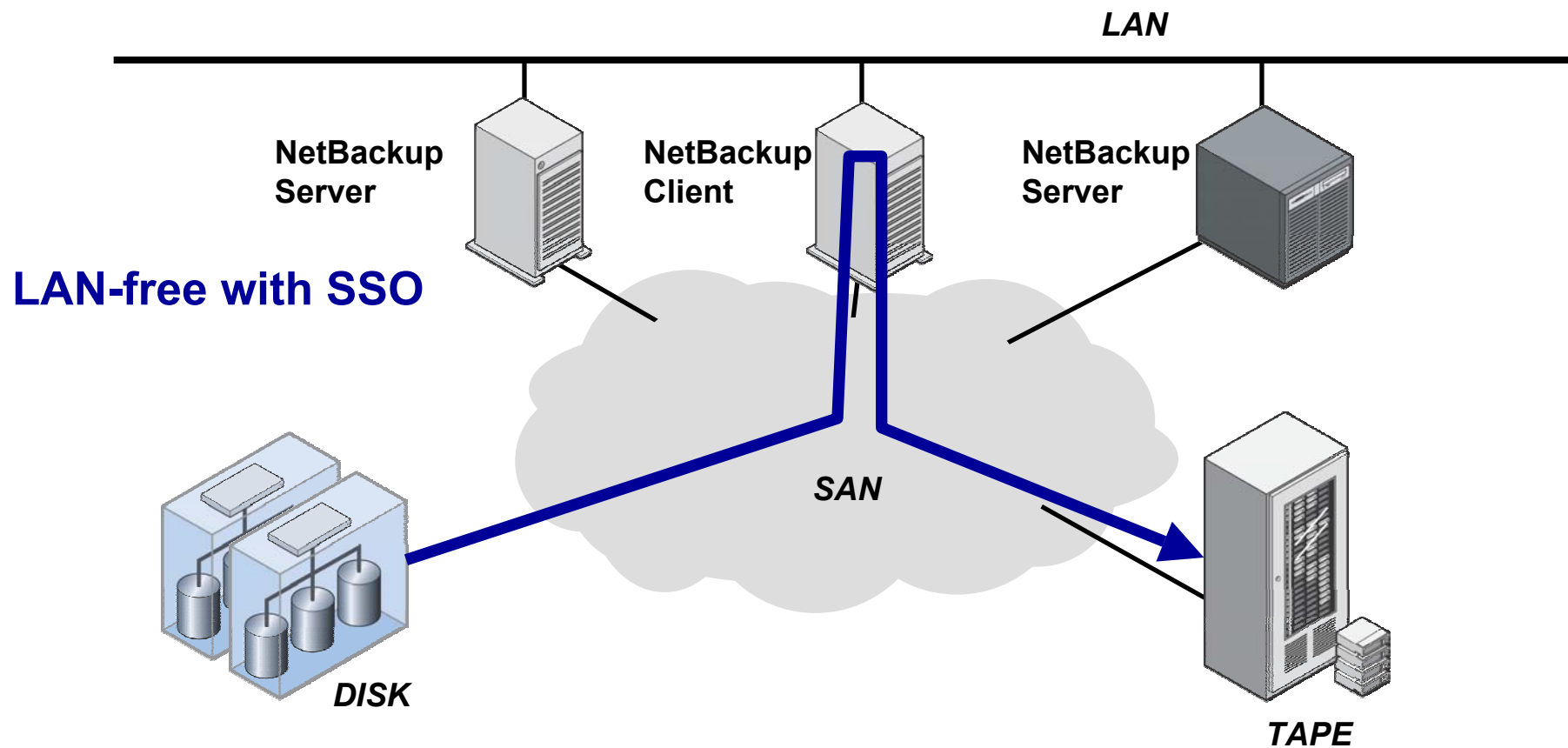
SAN Support



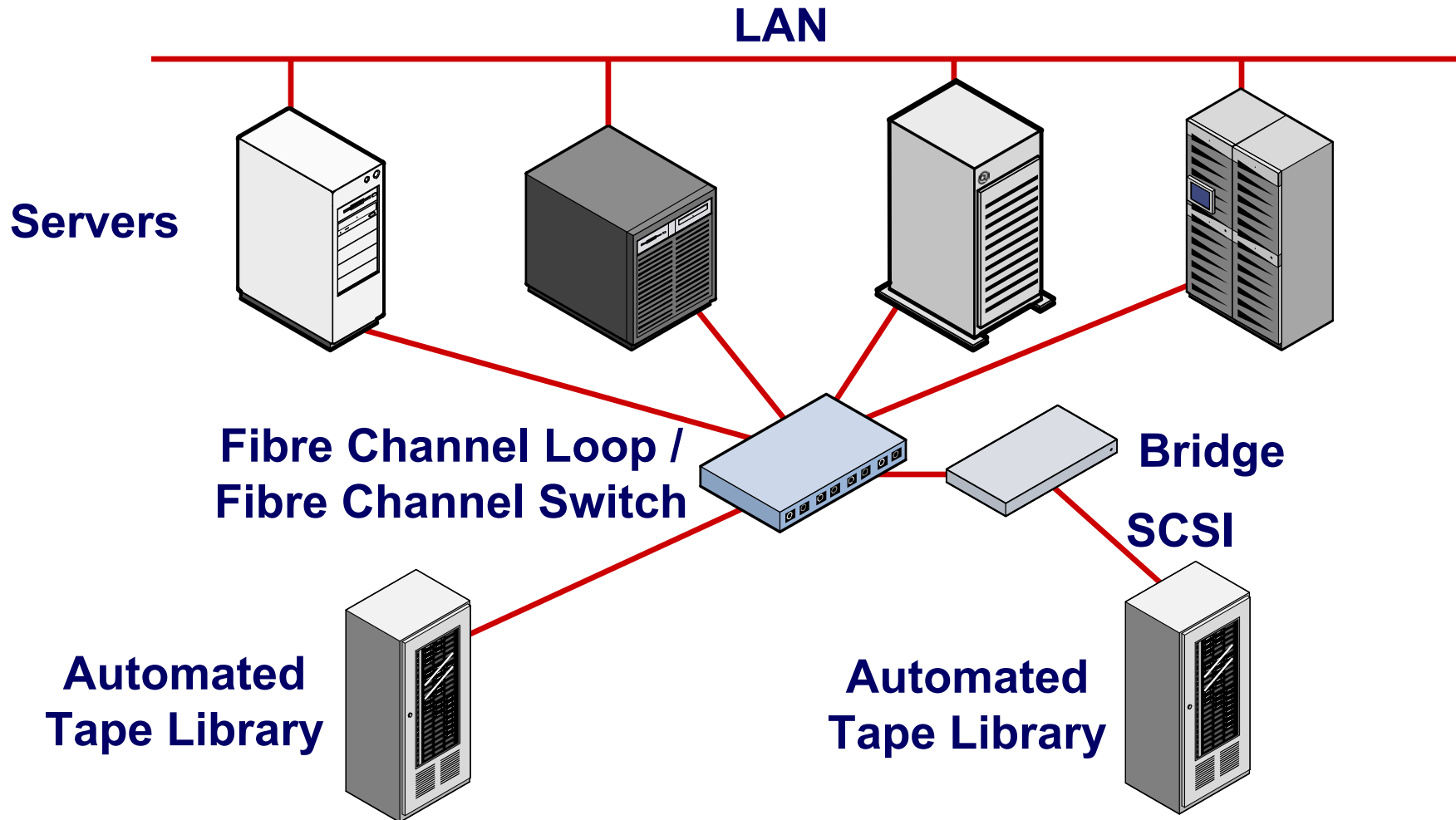
SAN Support



SAN Support

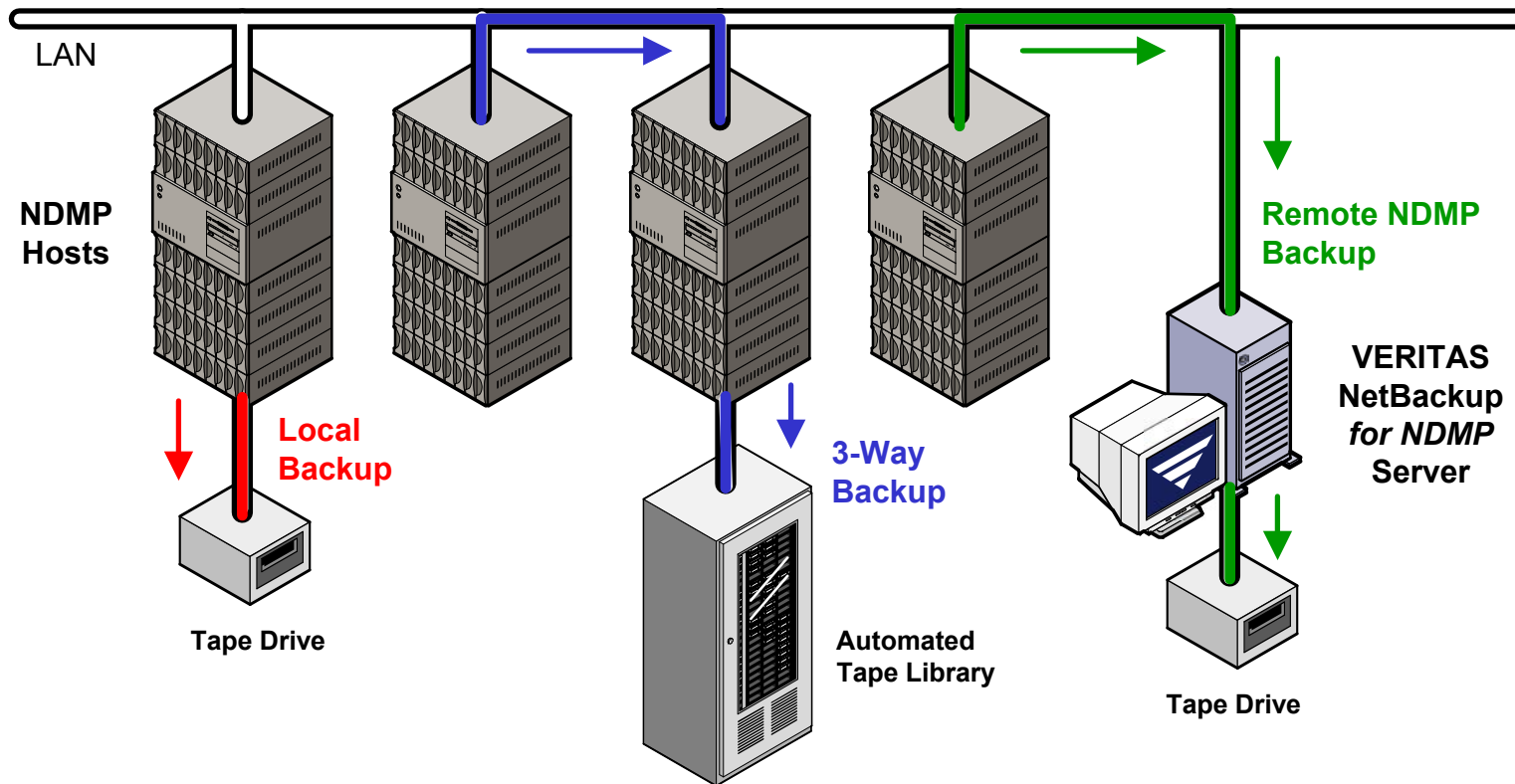


Dynamic Drive Sharing in a SAN



Network Attached Storage

- Flexible Architecture
- Advanced Database Integration
- Redirected Restores
- Broad Platform & Protocol Support



Alternative Backup Methods

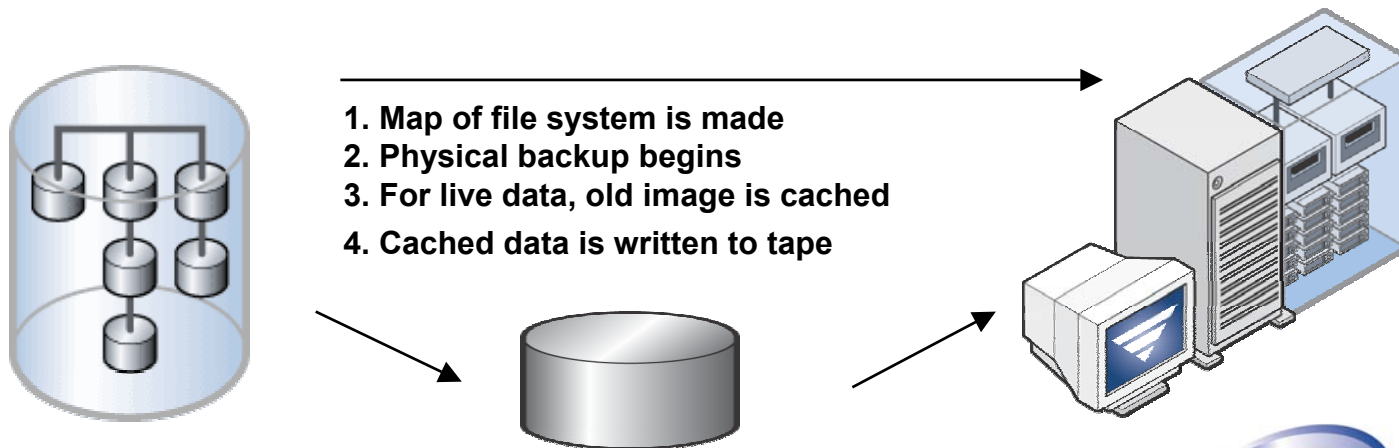
Frozen Image/Snapshot

- **Software**
 - FlashBackup
 - Copy-on-Write
 - Block-Level Incremental Backup for Oracle
 - Backup and storage checkpoints
- **ServerFree Backup**
 - NetBackup ServerFree Agent
 - NetBackup ServerFree for Oracle
 - HP Direct Backup
- **Hardware**
 - Split-mirror backup for HP SureStore E Disk Array XP Family
 - Integration with SureStore E Business Copy XP
 - HP Zero downtime backup

FlashBackup

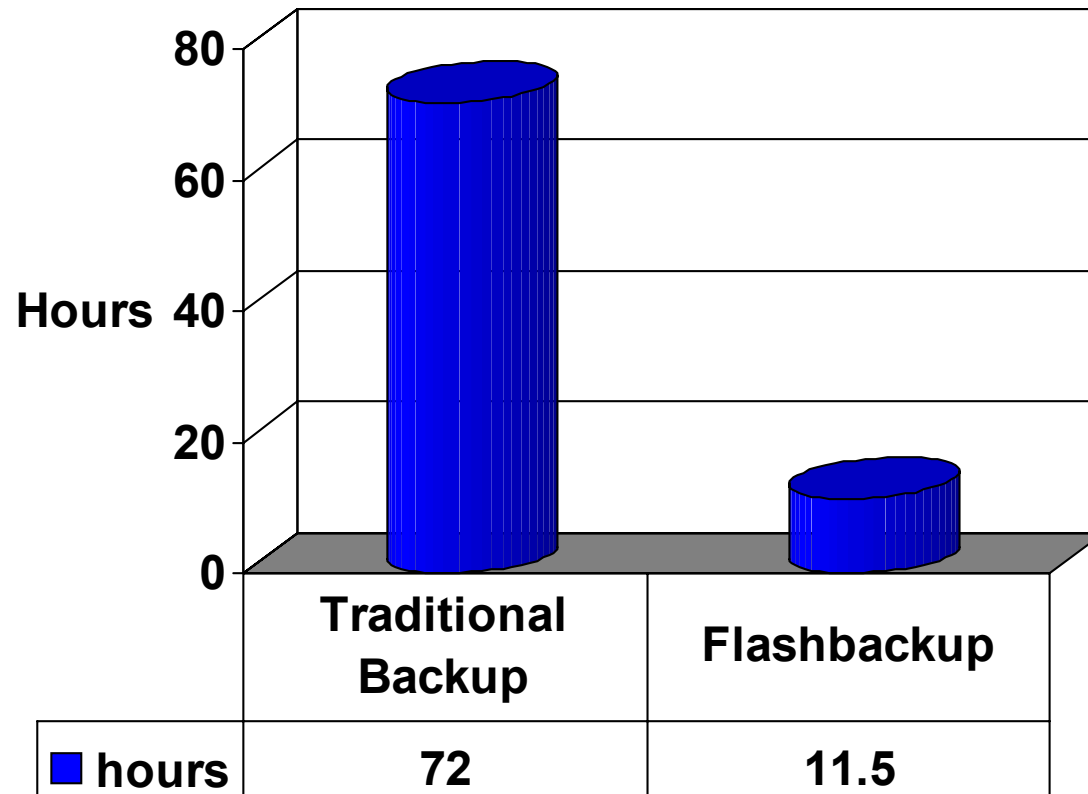
FlashBackup

- Online *snapshot* file level backup
 - More cost effective and granular than hardware-based solutions
 - Full or incremental backup of live file system
 - Physical backup, light backup footprint
 - Ideal for backing up thousands or millions of small files
 - Supports UFS, Online JFS or VERITAS File System (VxFS)
 - Restore individual files or directories, remote or local file system
 - Supported on HP-UX and Solaris



Backup Flexibility

Flashbackup Performance



89 GB filesystem

5.4 million files

Source: Entertainment Industry Customer

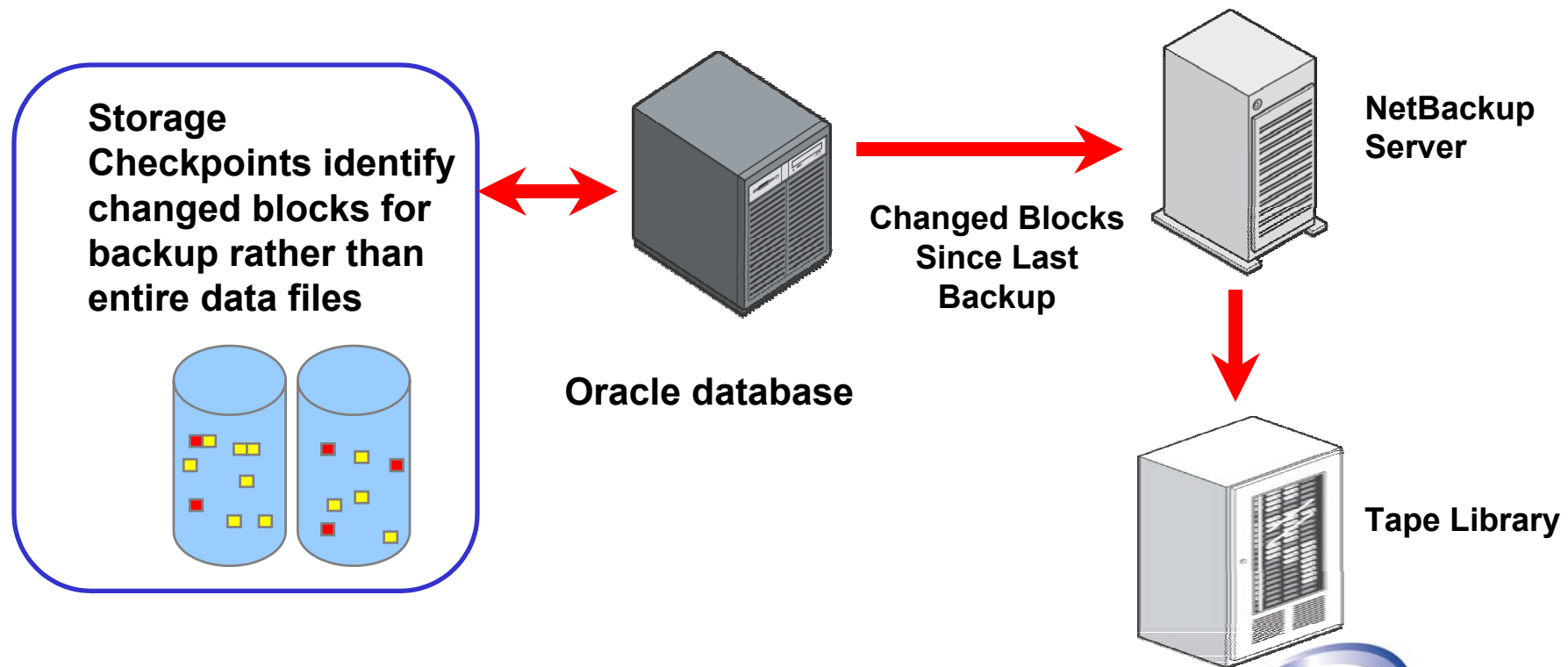
Advanced Block-Level Incremental Backup

Block-Level Incremental Backup for Oracle

- Software based snapshot backup
 - Zero downtime Oracle backup for HP-UX and Solaris
 - Removes the backup workload from Oracle
 - Removes the I/O overhead from Oracle
 - No learning curve (utilizes RMAN and RMAN Proxy Copy)
 - Uses File System Storage Checkpoints
 - Data is processed from the checkpoints, and not the file system

Block-Level Incremental Backup For Oracle

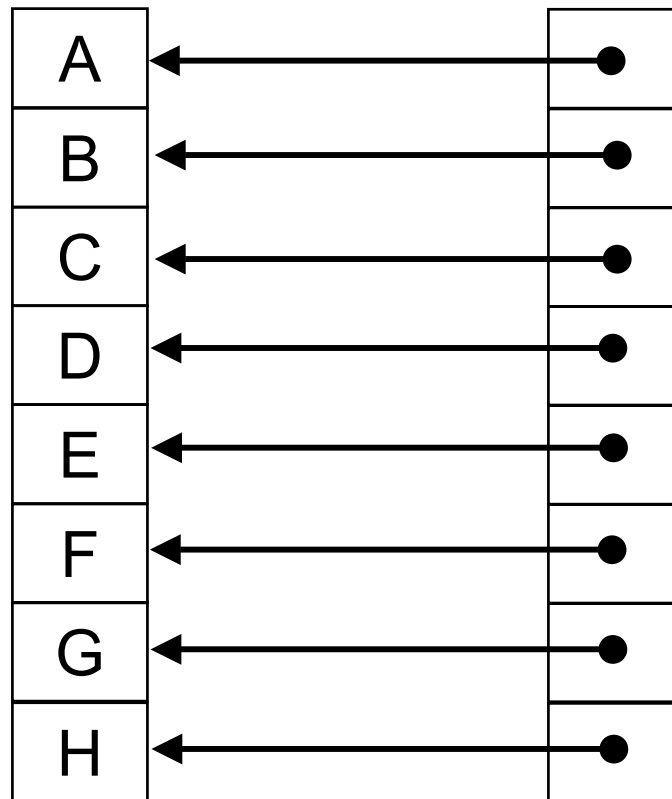
- Online Snapshot Block-Level Incremental Backup
- Backup of only changed Oracle blocks from the storage checkpoints reduces elapsed time for backup
- Oracle database remains online and backup impact is minimal



Storage Checkpoint: An Example

When a Storage Checkpoint is first taken:

/oradata Storage Checkpoint



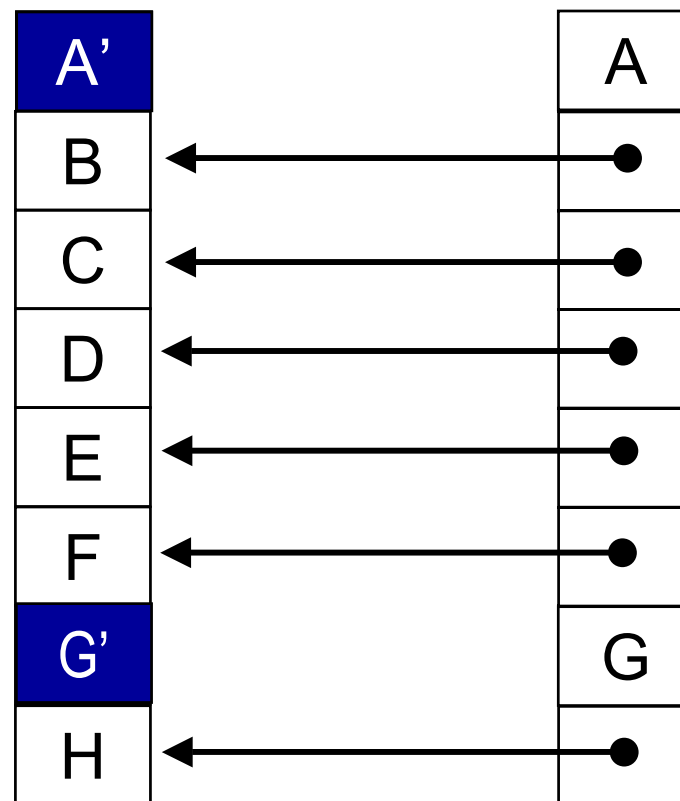
- ▼ No data is copied to the Storage Checkpoint
- ▼ Created in seconds
- ▼ Presents the point-in-time image of /oradata by finding data from the primary file system, /oradata

Storage Checkpoint: An Example

Maintains changed data blocks as primary file system is being updated

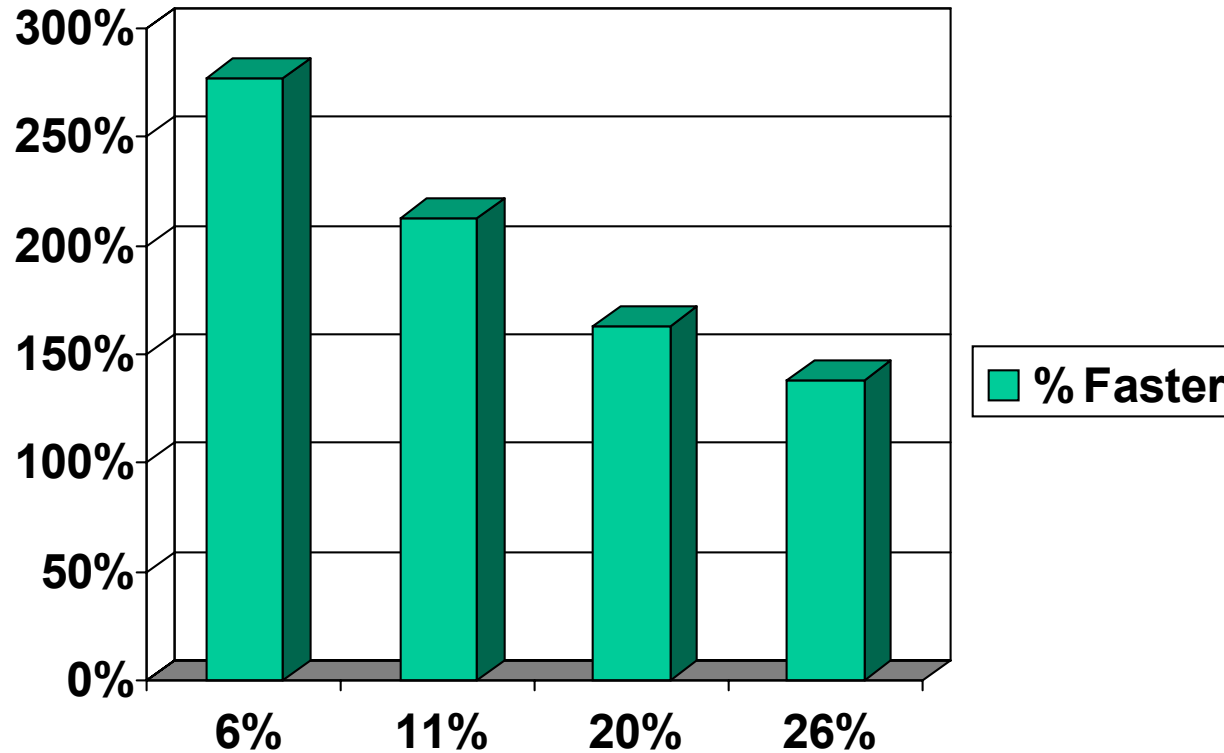
/oradata

Storage Checkpoint



- ▼ Copy-on-write mechanism first copies the before-image to the Storage Checkpoint and then updates the data block in the primary file system
- ▼ Mountable and writable
- ▼ Copy-on-write in place until the next Storage Checkpoint created or the Checkpoint is removed

BLI Agent- Customer Impact



Oracle Database Change

ServerFree Backup

ServerFree Backup

- SAN Third Party Copy (3PC)
 - NetBackup ServerFree Agent
 - “Server less” backup for HP-UX and Solaris
 - Three step direct disk to tape data movement
 - Removes the backup workload from the application server
 - Utilizes 3PC data movers imbedded in leading SAN devices
 - Chaparral Intelligent Storage Routers
 - Crossroads storage routers
 - ADIC Gateway
 - NetBackup Media Server Support
 - NetBackup for Oracle ServerFree Agent
 - Full integration with Recovery Manager (RMAN)
 - No Oracle overhead

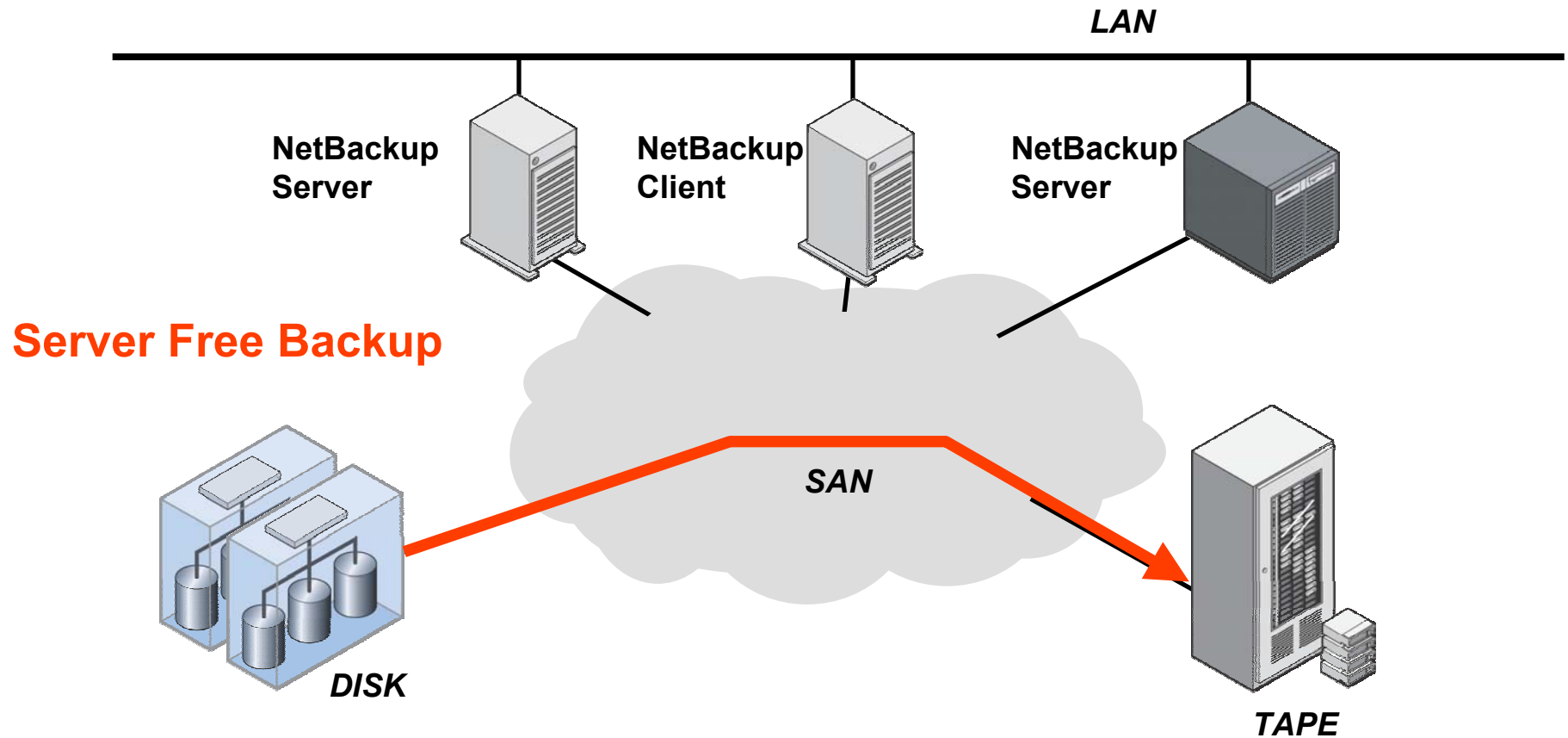
ServerFree Backup

- Step 1: Data Snapshot
 - RMAN puts the datafiles into backup mode
 - Create frozen image
 - Software Based
 - NetBackup ServerFree Agent
 - Hardware Based (Split Mirror)
 - HP BusinessCopy
 - EMC TimeFinder
 - Hitachi ShadowImage
 - RMAN takes the datafiles out of backup mode

ServerFree Backup

- Step 2: Logical Disk Object Mapping
 - Blockmap is created
 - Mapping logical (files) to physical (SCSI blocks)
 - Device relative mapping of files -> file system -> volume -> partition -> SCSI-blocks
- Step 3: Data Movement
 - Off host backup
 - Third-party copy device with Extended SCSI Command
 - NetBackup Media Server

ServerFree Backup



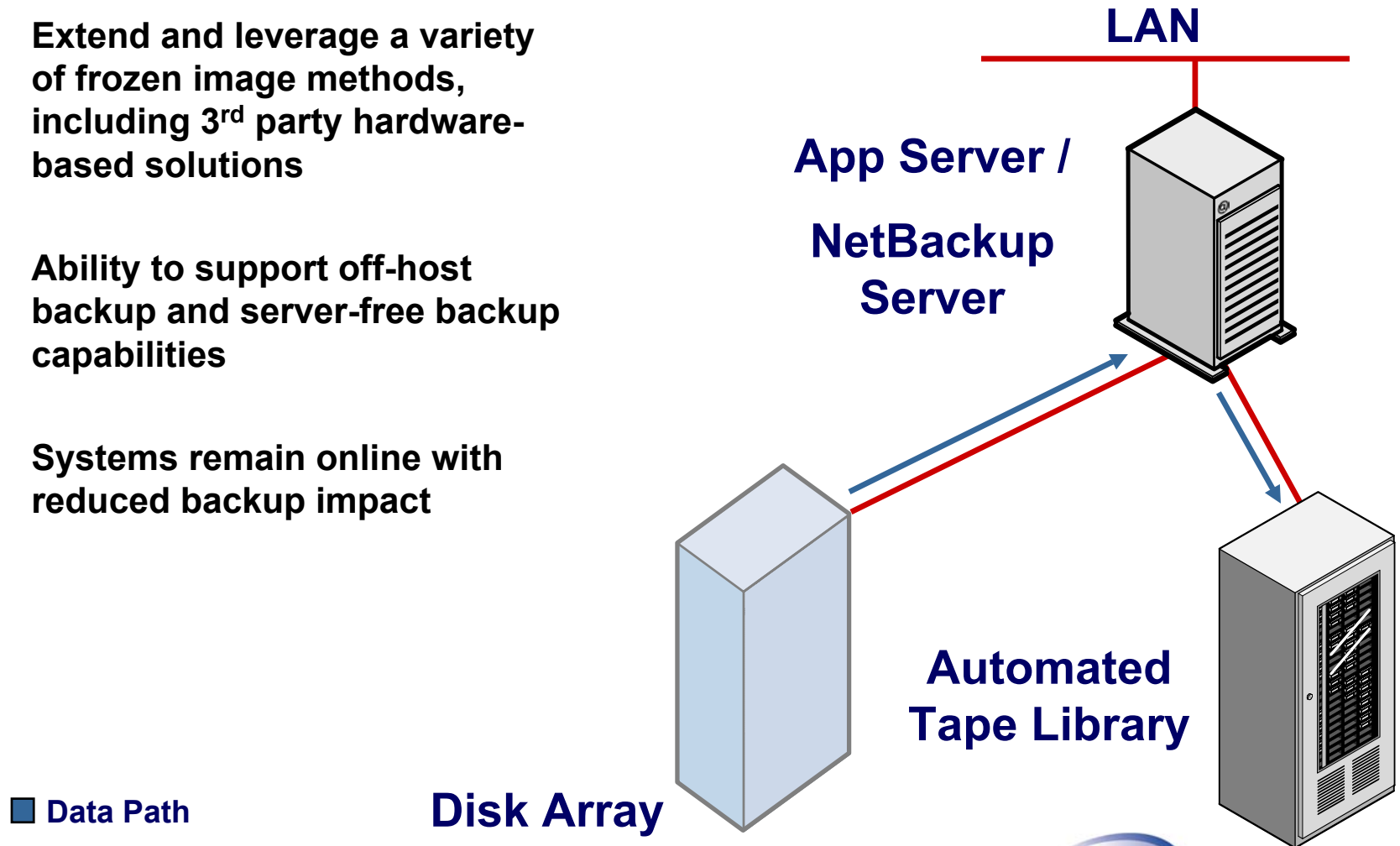
Hardware Based Snapshot

Hardware Based Snapshot

- Split-Mirror Backup and Recovery
 - Provides hardware based split mirror backup and recovery
 - Utilizes snapshot technologies
 - Provides File System and Raw Partition backup support
 - Delivers online Oracle backup via a dedicated backup network
 - Uninterrupted Oracle backup with no impact on the primary server or LAN infrastructure
 - Array Support
 - HP SureStore Business Copy XP, EMC TimeFinder, HDS ShadowImage
 - HP-UX and Solaris

Hardware Based Snapshot

- Extend and leverage a variety of frozen image methods, including 3rd party hardware-based solutions
- Ability to support off-host backup and server-free backup capabilities
- Systems remain online with reduced backup impact



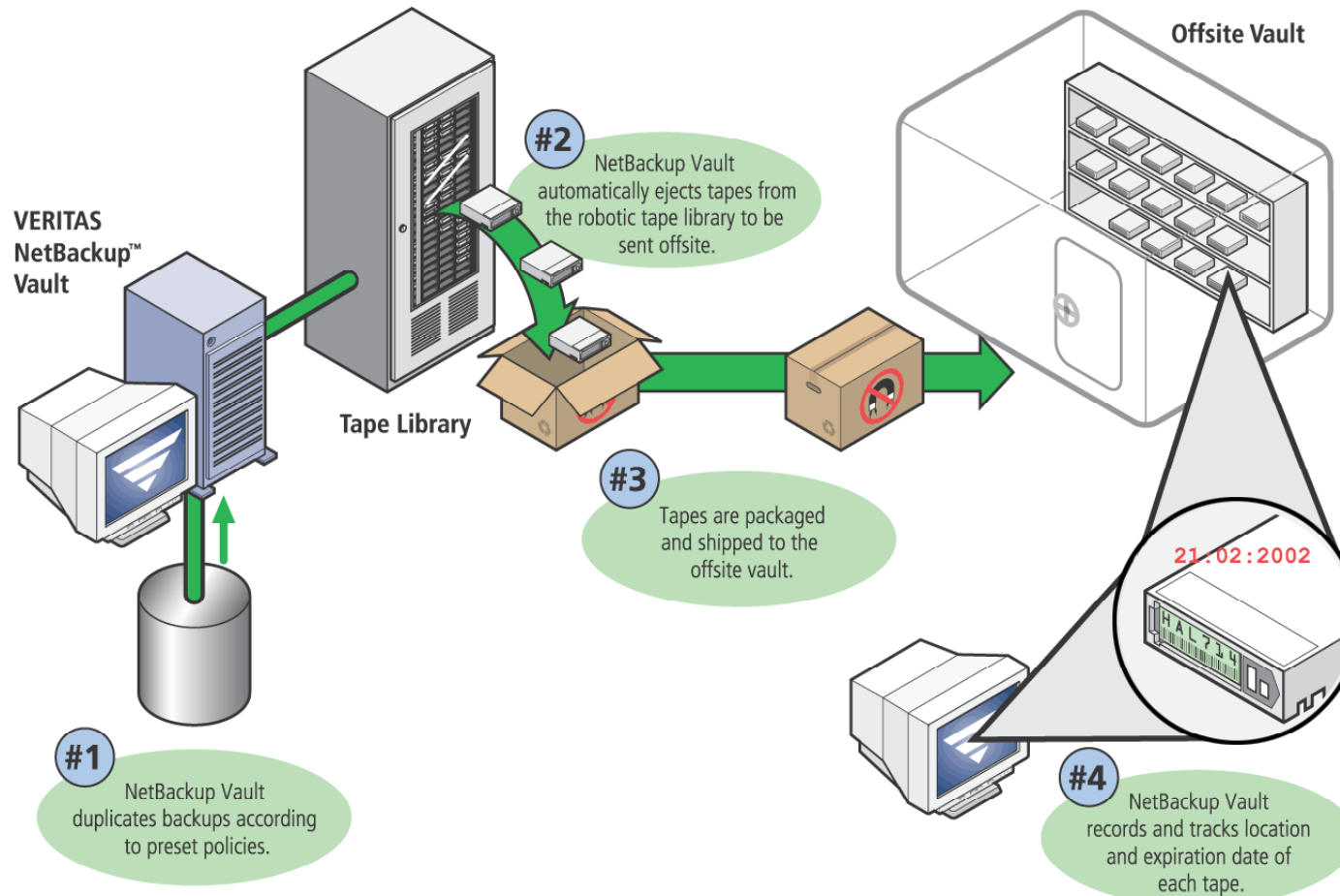
Disaster Recovery

Disaster Recovery and Vault

Challenges of Vaulting	Technology Resolves By
Bookkeeping headache	✓ Identifying which tapes should be sent offsite and returned onsite
Error-prone manual process	✓ Automatically ejecting tapes for operators
Difficult to duplicate tapes	✓ Policies automate tape duplication and retention
Coordination with offsite vendor	✓ Pick list reports tell the vendor which tapes require transport

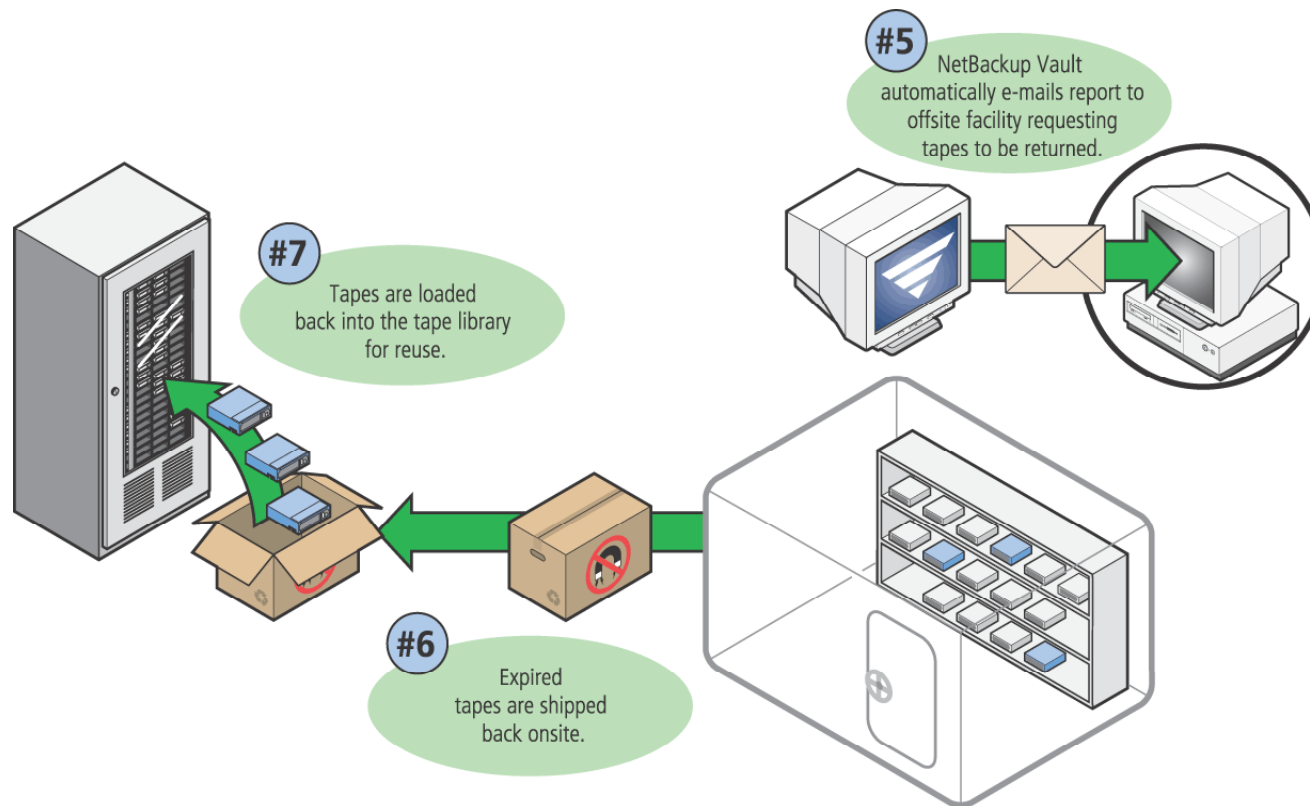
Disaster Recovery and Vault

Sending tapes to the vault



Disaster Recovery and Vault

Returning tapes from the vault



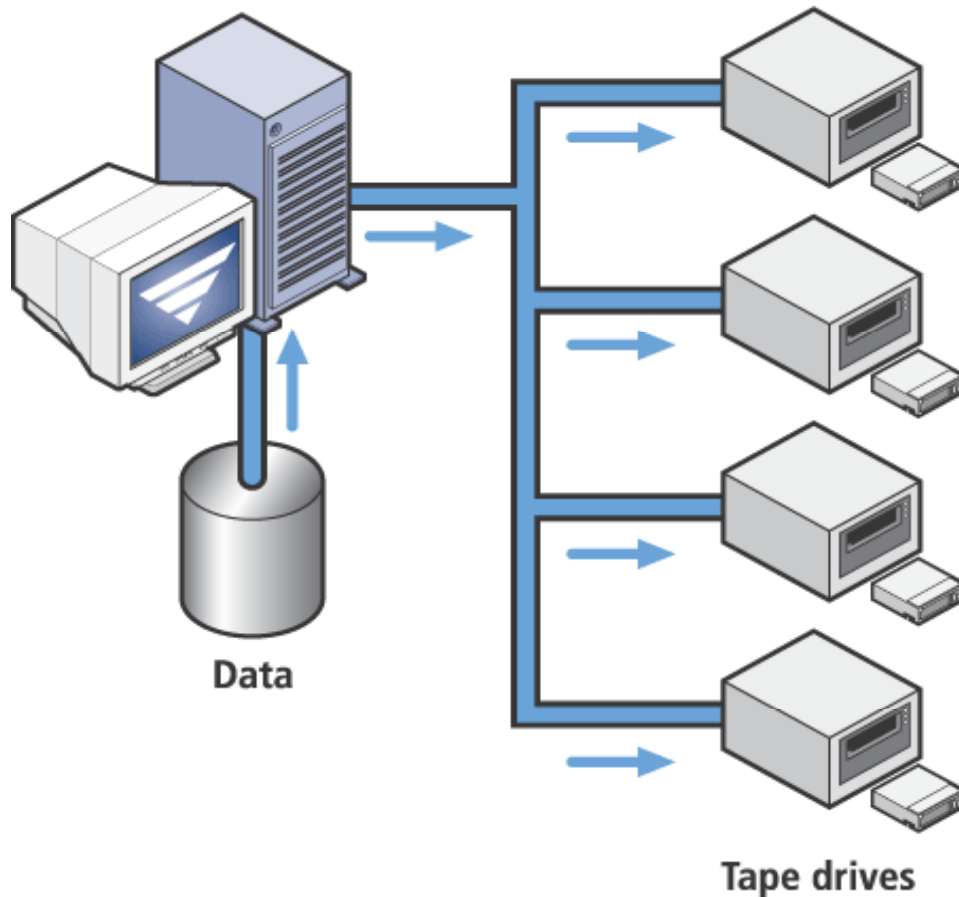
Disaster Recovery and Vault

Vaulting Made Easy

- Automated off-site tape rotation
 - Pick list printing
 - Automatic tape ejection
- GUI front end
- Activity monitor
 - Monitor
 - Kill
 - Restart
- E-mail notification
- Integrated scheduler

Inline Tape Copy

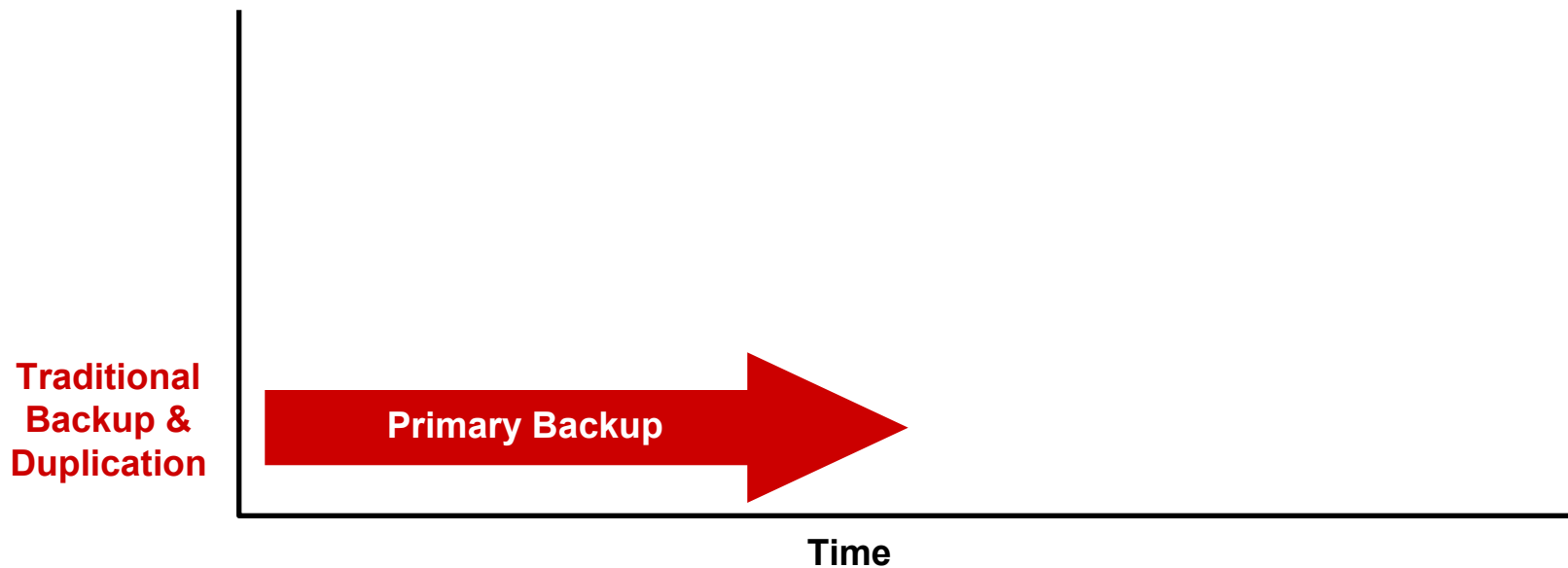
VERITAS NetBackup Vault



- Four copies can be created simultaneously
- Set different retention periods

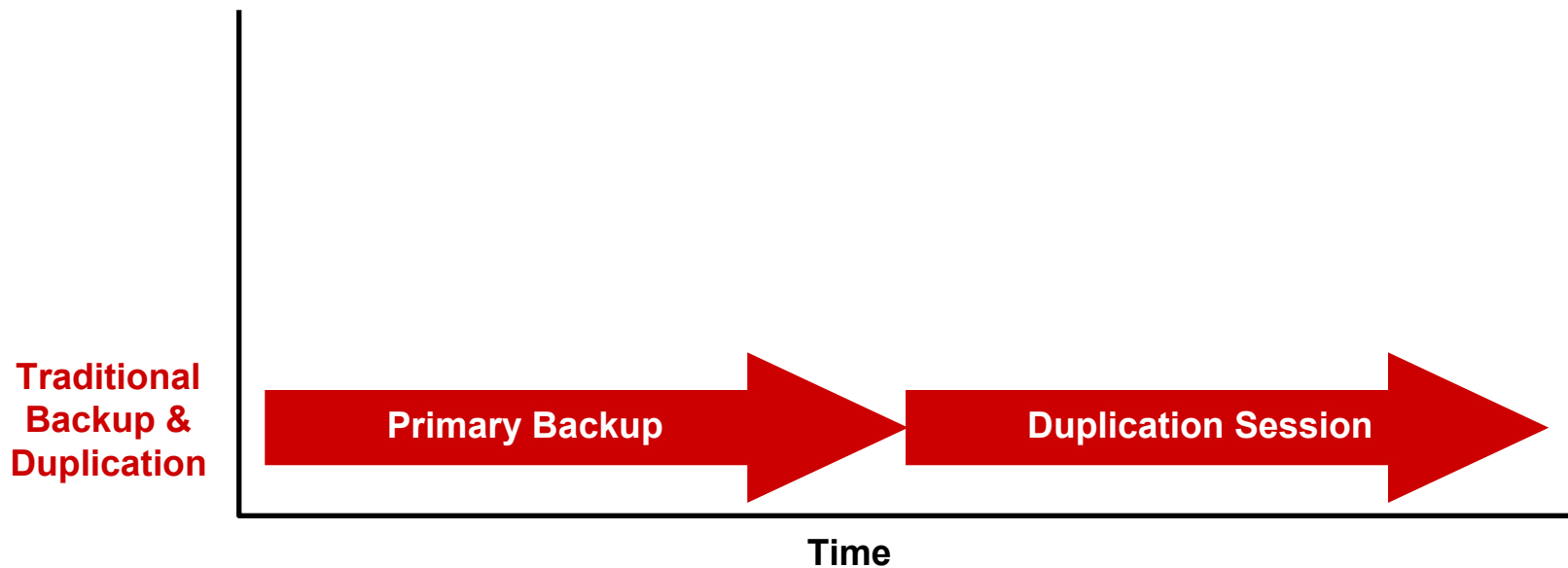
Inline Tape Copy

- Backup Window
 - Without duplicate copies
 - Normal time to complete



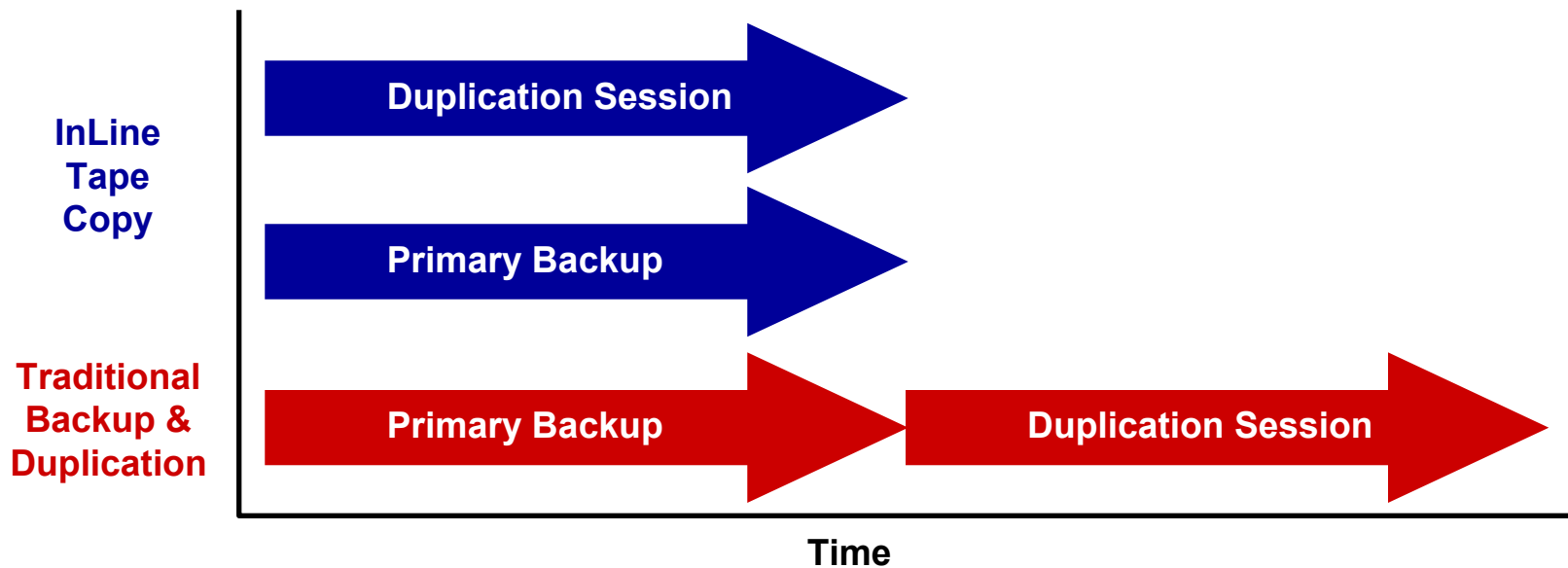
Inline Tape Copy

- Backup Window
 - With duplicate copies (without Inline Tape Copy)
 - Double time to complete



Inline Tape Copy

- Backup Window
 - With duplicate copies (with Inline Tape Copy)
 - Normal time to complete



Summary

- SAN/NAS
 - LAN Free backup and recovery
 - Cost, expertise required
- Alternative Backup Methods
 - Frozen Image/Snapshot
 - ServerFree Backup
- Disaster Recovery
 - Vault recovery techniques
- VERITAS/HP Relationship
 - The established leaders in storage

QUESTIONS & ANSWERS