4.1.25 / 3807
The Power Of Combining Backup To Disk And Tape With HP Data Protector 5.5

HP WORLD 2004
Solutions and Technology Conference & Expo

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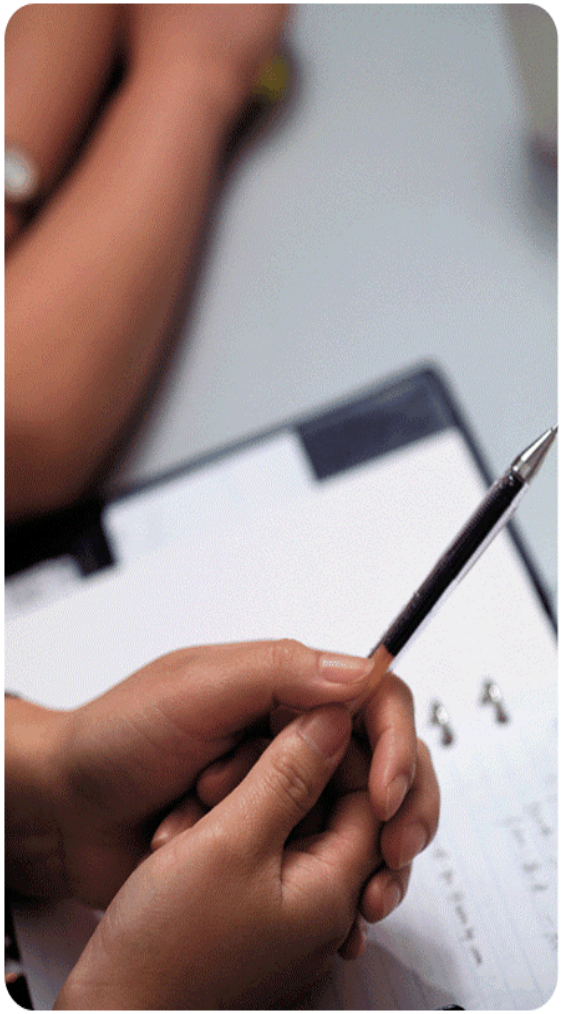
Agenda



- Administrator's pain points
- Backup to disk pros and cons
- Advanced backup to disk with Virtual Tape on disk
- Replication based backup & recovery
  - Replication technologies
  - Disk array based
  - Windows 2003 based
- Seamless integration of disk & tape
- Bare metal recovery from disk
- Outlook: intelligent backup to disk
- Summary

Administrator's pain points

- store more for less
  - data volume growth
  - Pressure to reduce TCO
- Fast and reliable disaster recovery of entire server and site
- single mailbox / single mail / single file restore
- 24 x 7 availability
- legal or corporate retention policies

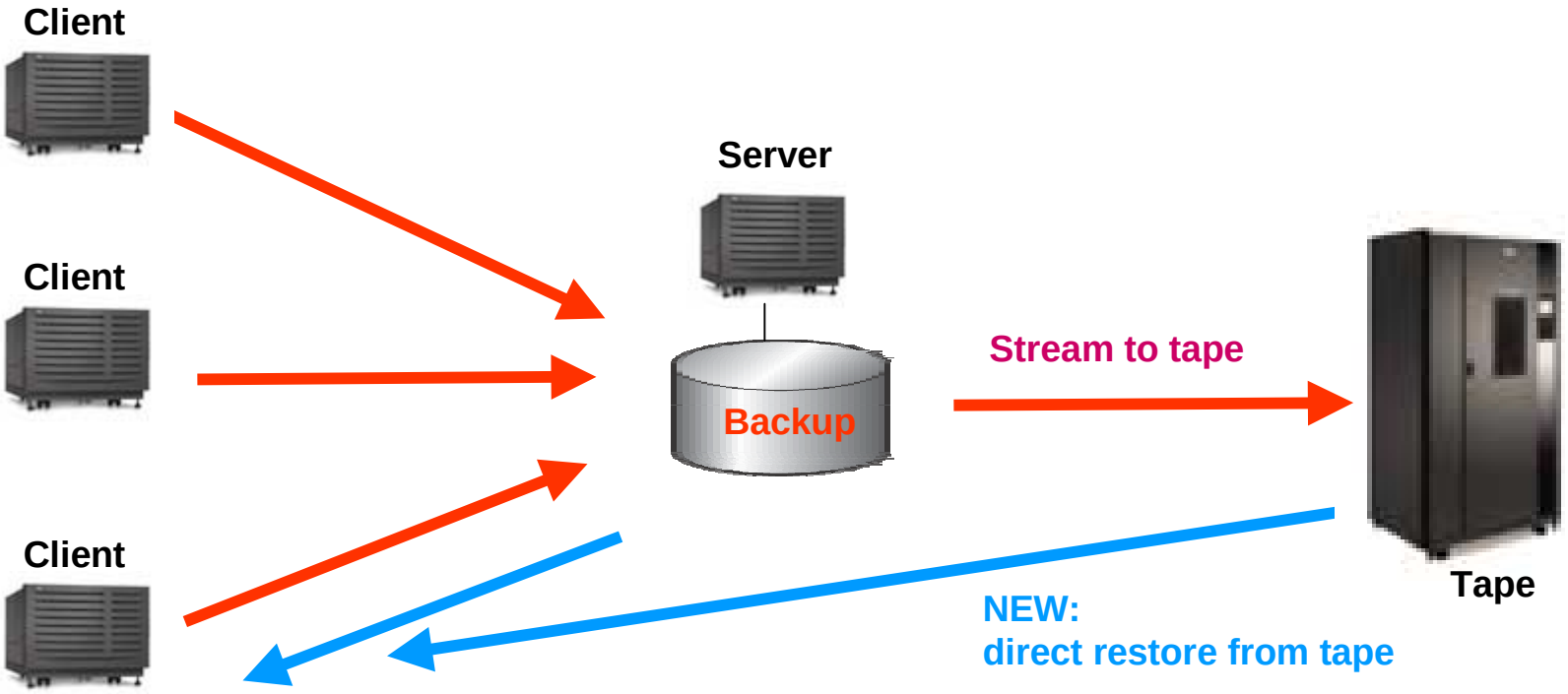
Why backup to disk?

- Fast random access allowing:
  - Fast single file / single mail restore
  - Space efficient backup
    - Snapshots
    - Content Addressed Storage
  - Instant Recovery
    - Switching for recovery instead of moving the data
  - Faster restore of backup chains (full & differential / incremental)
  - Better resource sharing
  - Easier full content search
- No tape streaming problems
- Ideal for RAID 5
- Easy to detect disk failures
- It's hard to steal a disk

Backup to disk disadvantages compared to tape

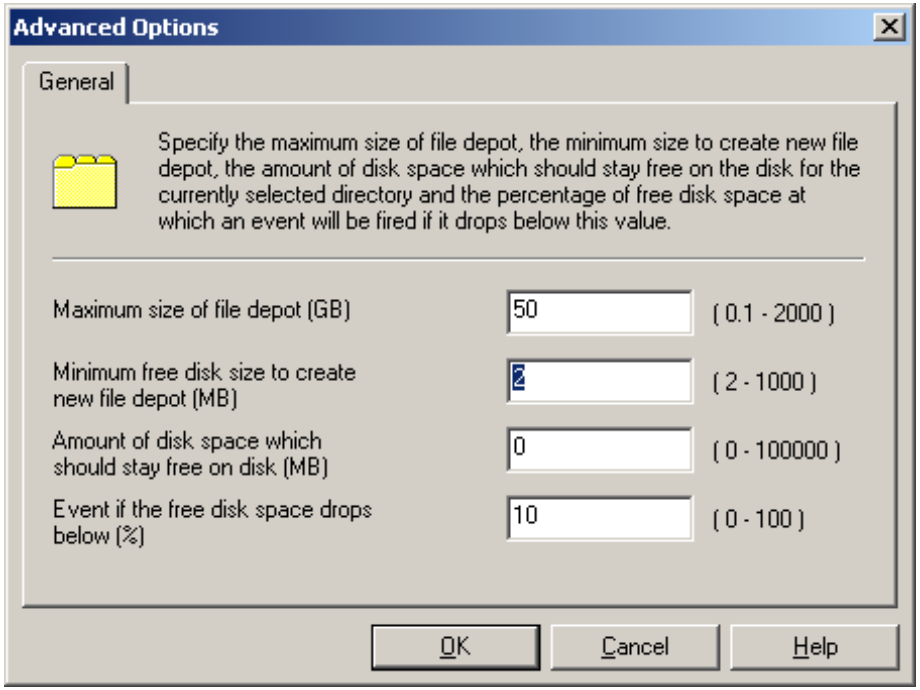
- Bad price performance ratio for sequential read/write
- Remote replication to a safe place might be quite expensive
- Not virus resistant
  - E.g. Windows to Windows backup, better Windows to Linux
- Most disks are not designed to be moved
- High power consumption
- Low MTBF (Mean Time Between Failure)
  - ATA: 3 years with 80% idle time
  - SCSI: 3 years, no idle time
- No hardware compression build in

Advanced Backup to Disk (Virtual Tape) Disk Staging Example



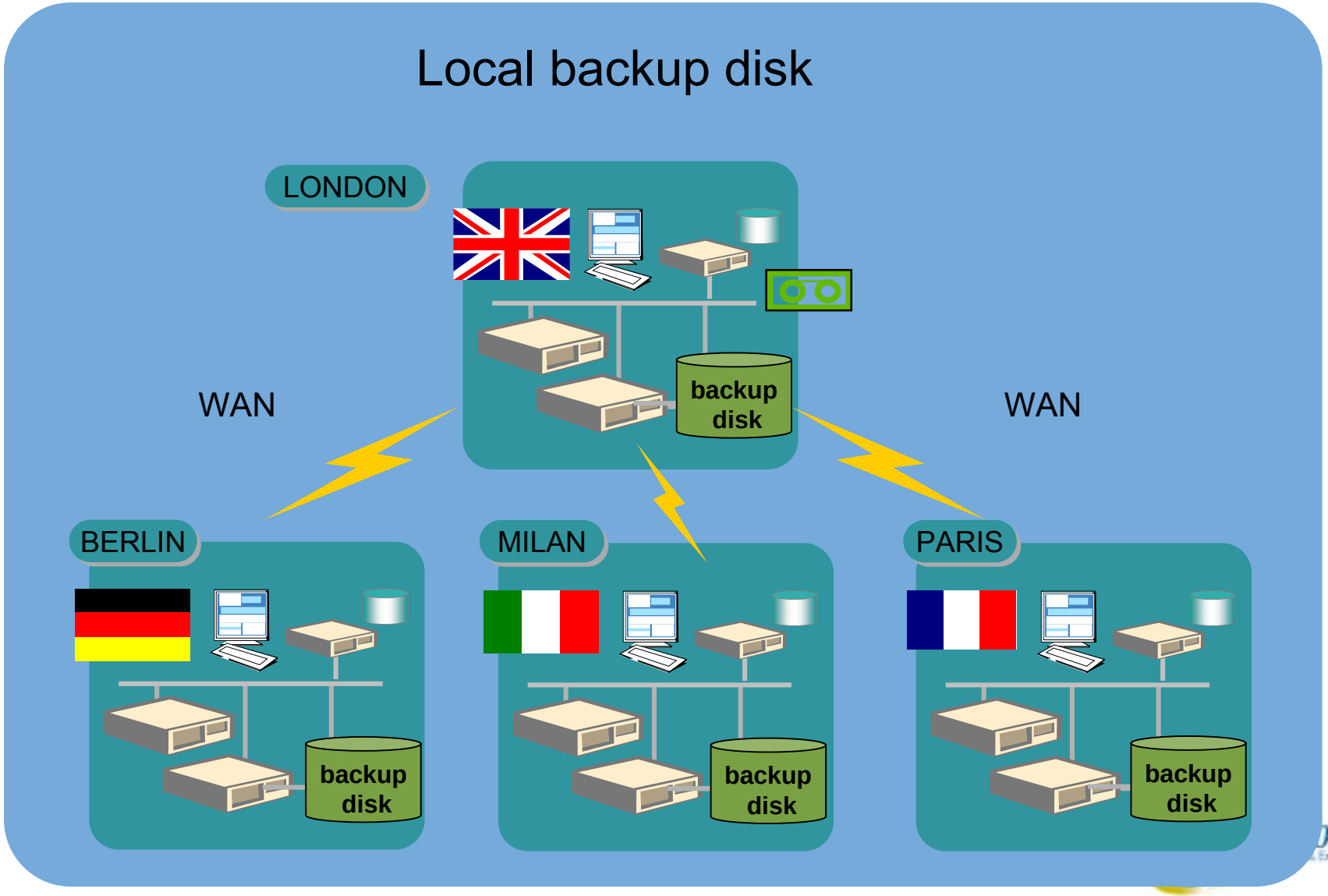
Advanced Backup to Disk - Disk Staging

- Features
  - Automatically selects file from disk stage, if available
  - Single file restore directly from tape, if not on disk
  - Automatic space management
    - Space creation
    - Retention management -> automatic space re-use
  - Restores & backups in parallel
  - GUI Wizard for creation
  - Disk array independent



- Use cases
  - Continuous backup of transaction log files
    - tape drives not in start/stop mode.
  - Backup of slow clients without multiplexing
  - Resource sharing
  - Tape-less branch office backup

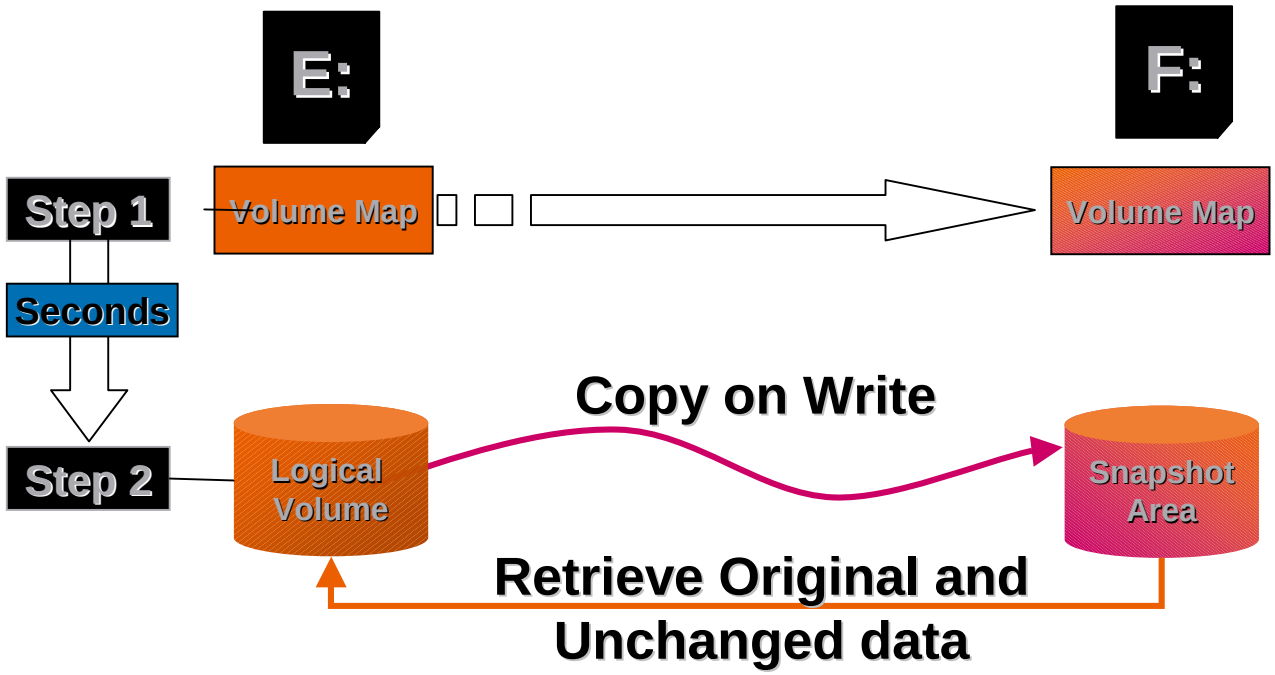
Advanced Backup to Disk
- Backup remote branches



Replication based backups

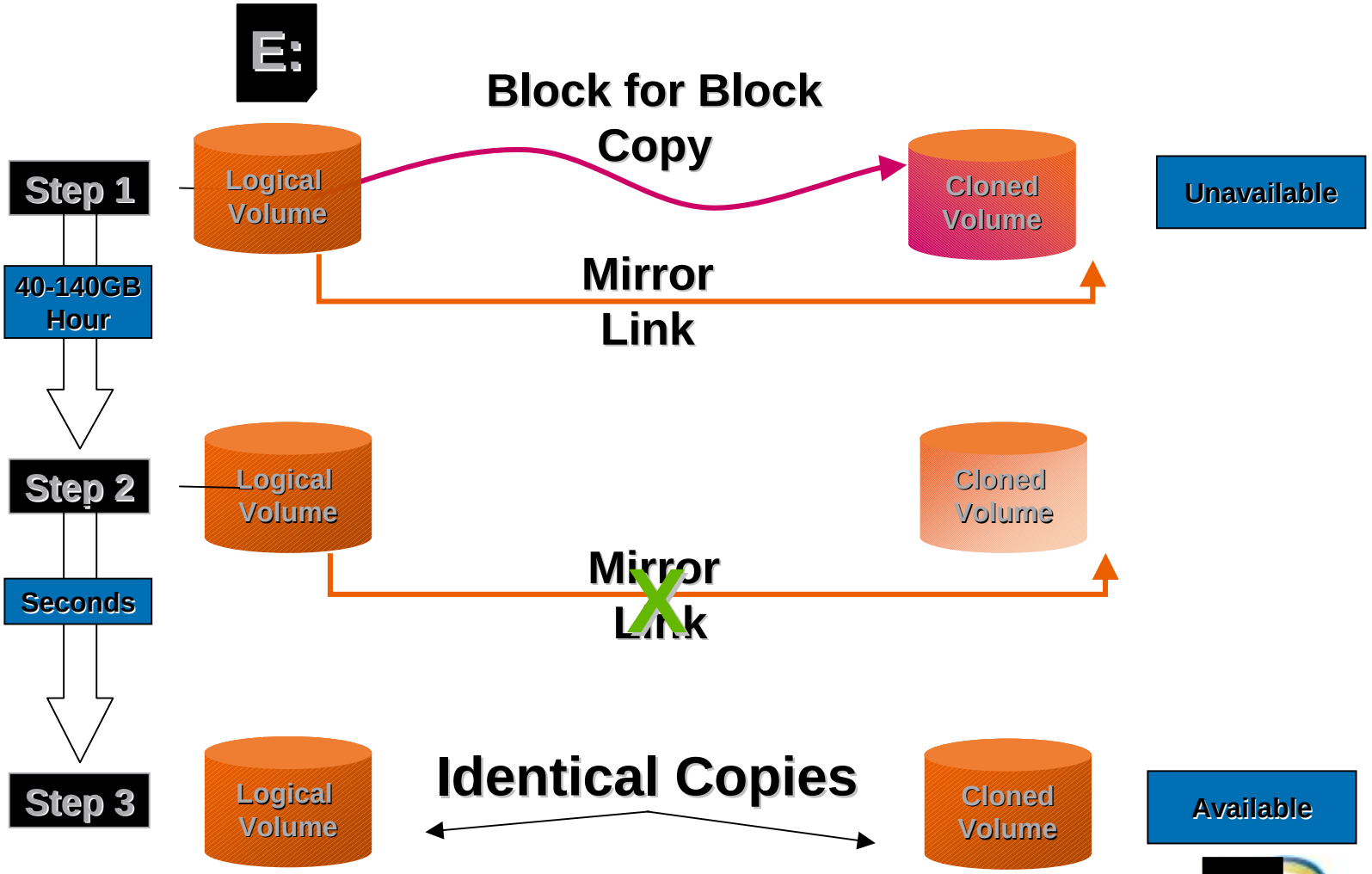
- Known in the industry as
  - Snapshots
    - Space efficient
    - Space consuming
  - Mirrors/Clones
  - SnapClones
- Appears static, even though the original data is changing
- Can be done at the file system level or LUN level in external arrays

Snapshot
- Build in VSS, HP EVA, HP VA, …

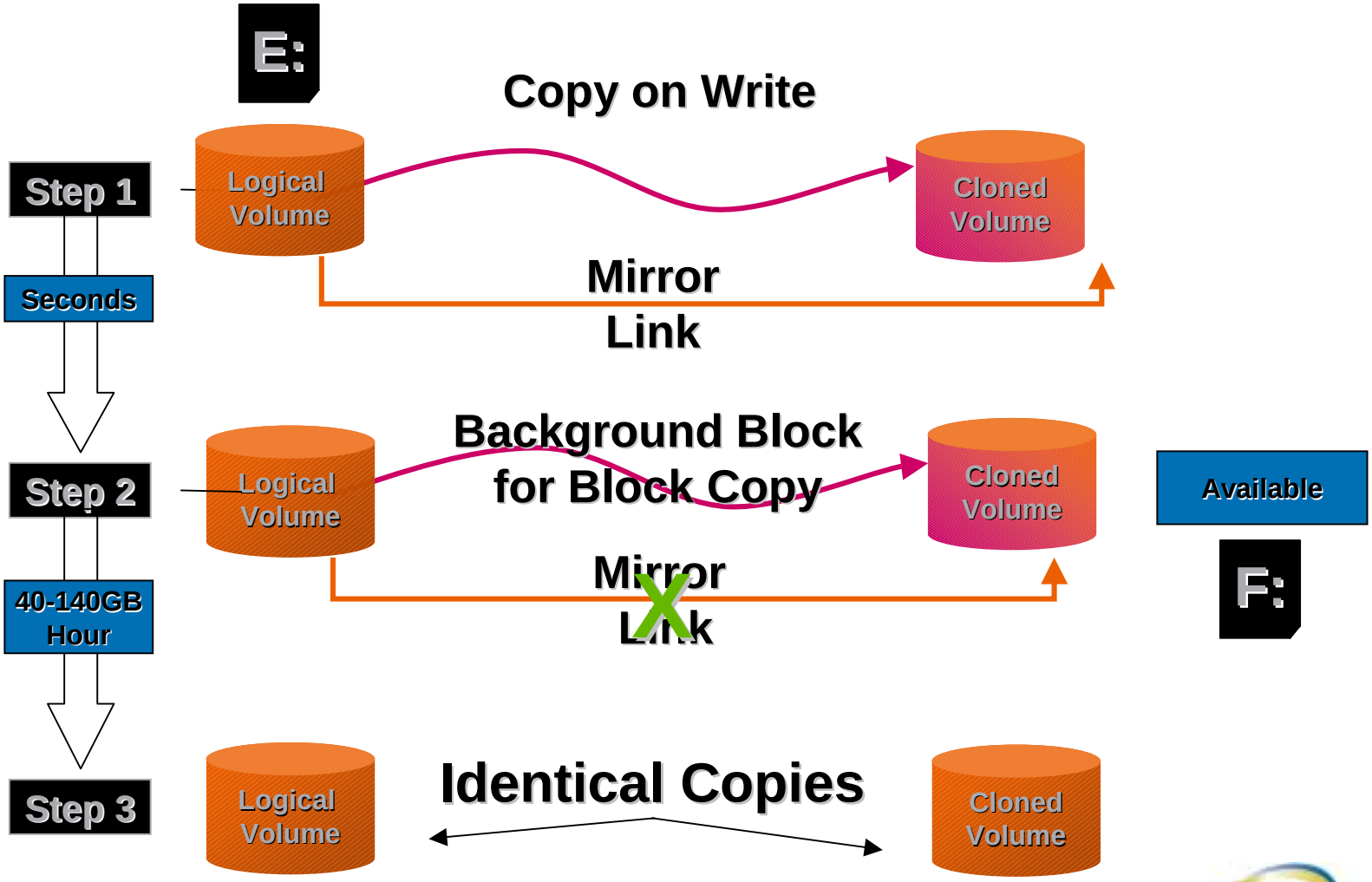


the result is an identical logical copy within seconds

Mirror = Clone
- HP XP, EMC Symmetrix, …

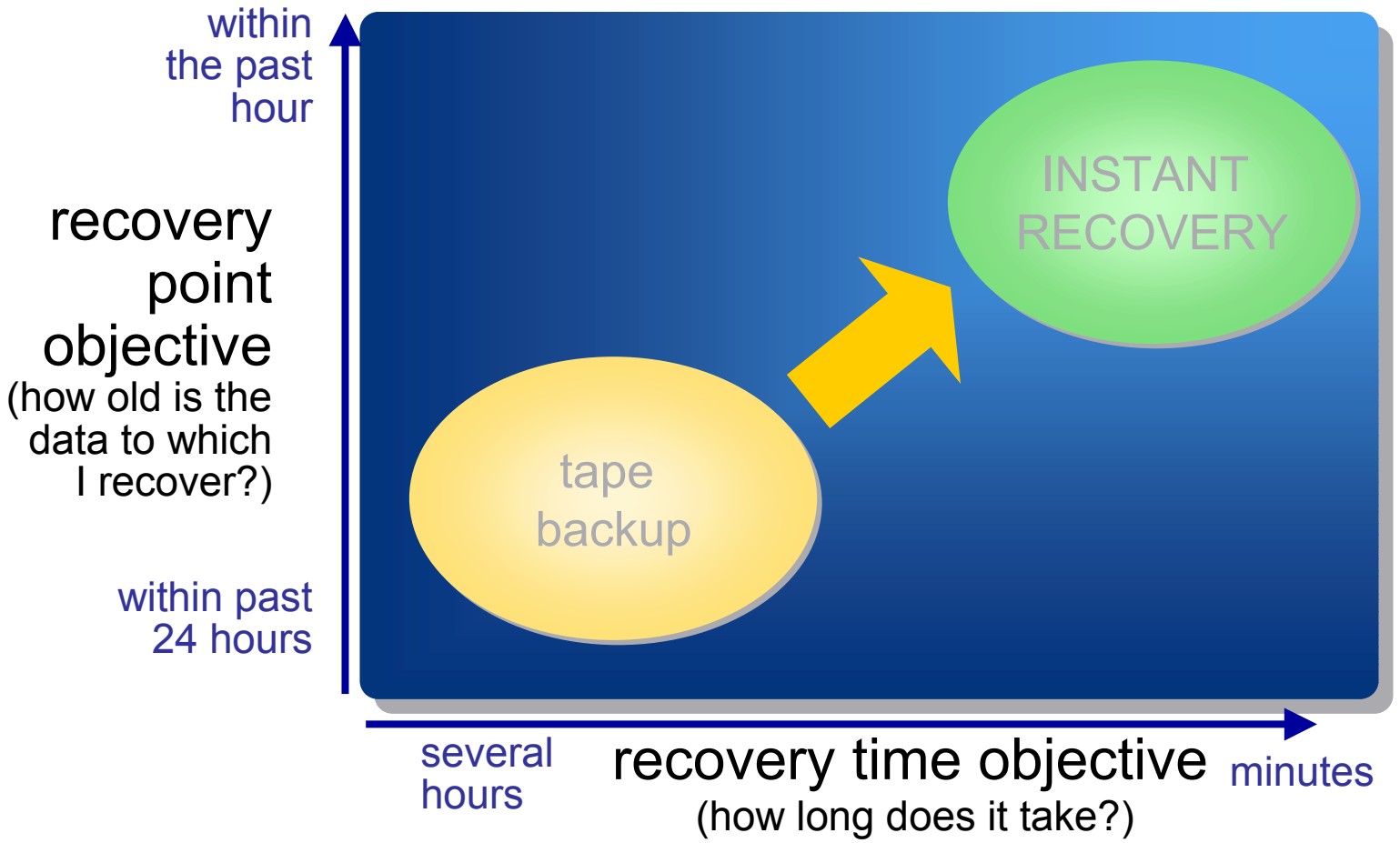


SnapClone - HP EVA



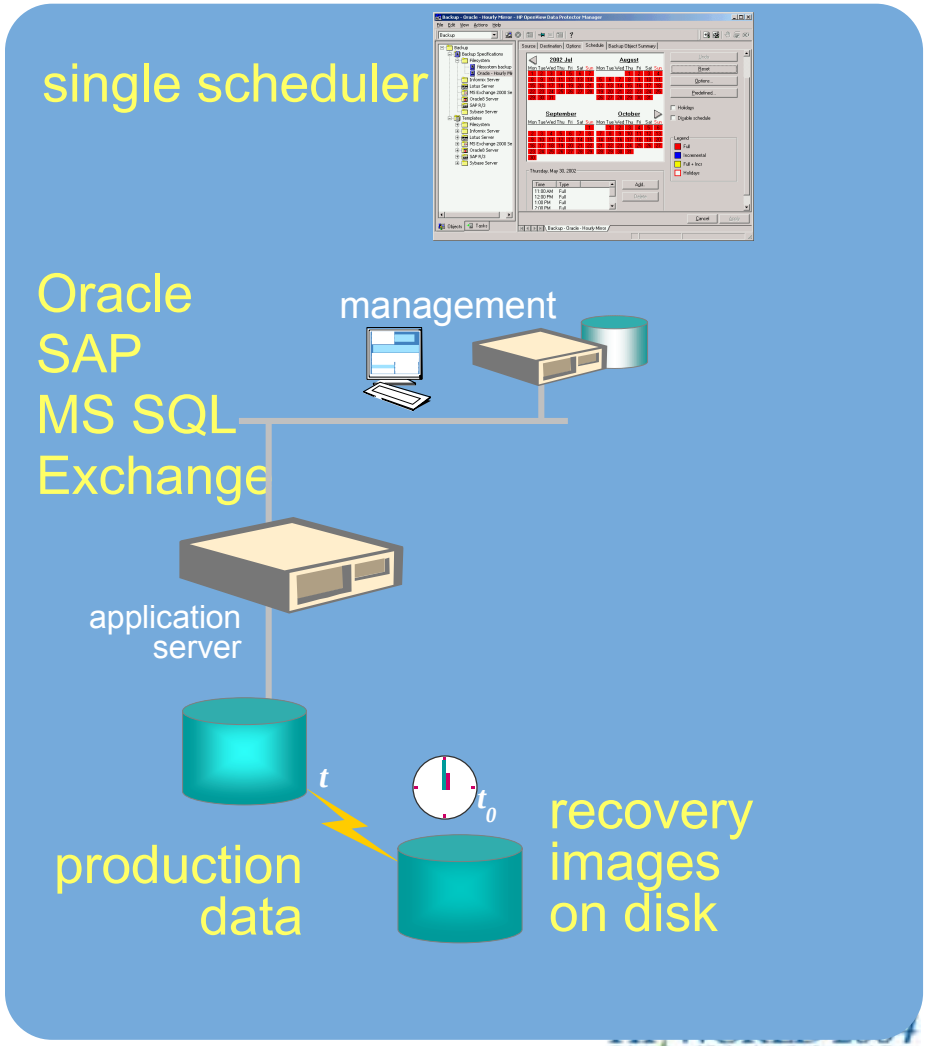
Starts as a Snapshot and becomes a clone over time

tape backup no longer meets the need for high-speed recovery



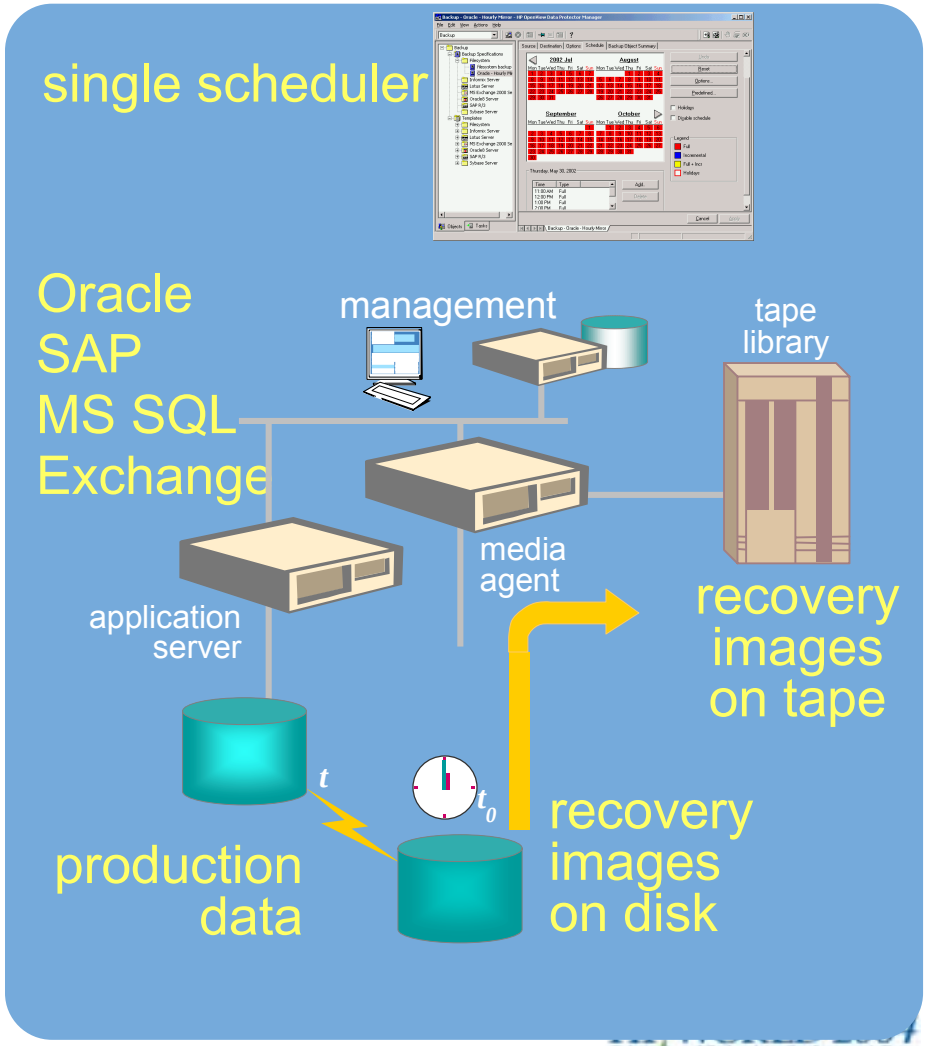
the roots of instant recovery: replication

- Disk replication techniques (snap, clone, mirror) create point-in-time images
- HP's replication management, integrated with key applications, guarantees recoverable images.



the roots of instant recovery: replication

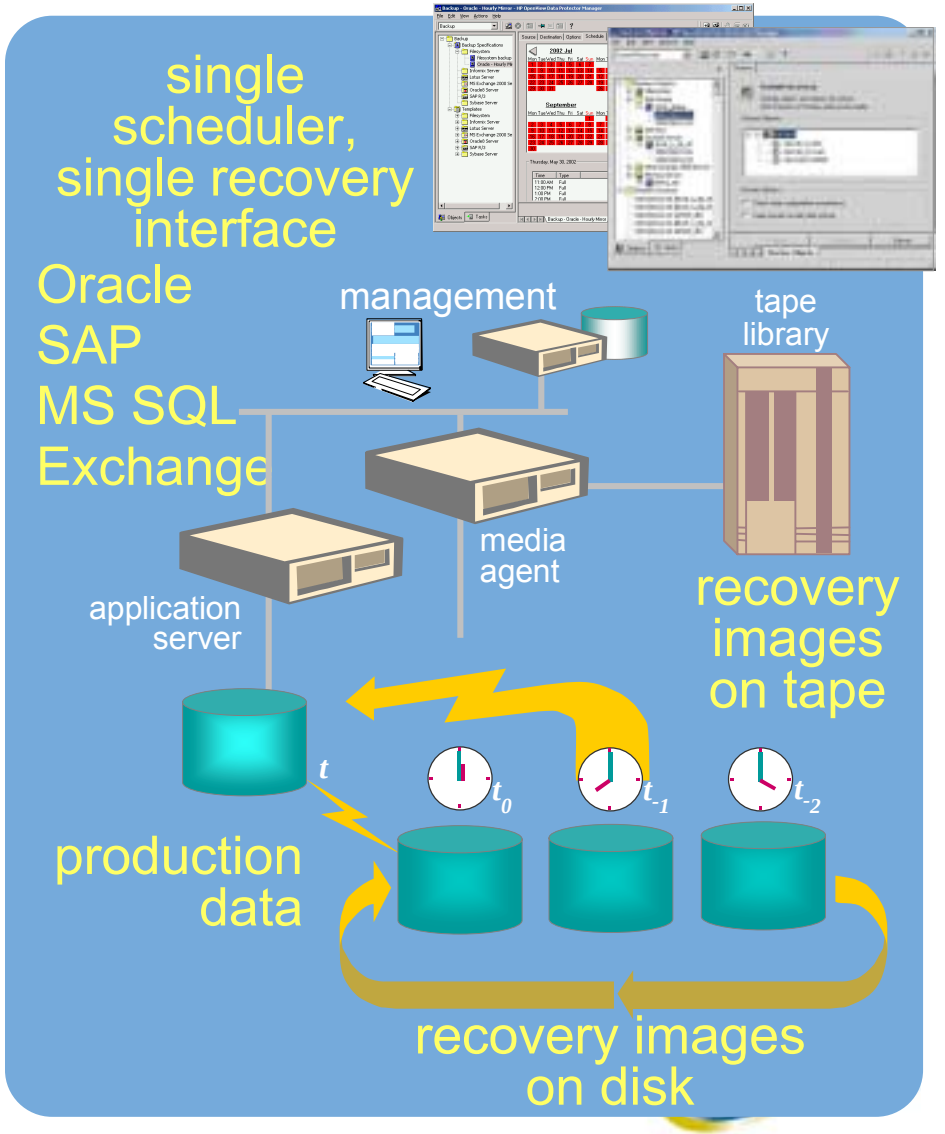
- Disk replication techniques (snap, clone, mirror) create point-in-time images
- HP's replication management, integrated with key applications, guarantees recoverable images.
- Disk Images may be copied to tape via separate data mover for
- application-serverless backups (zero-downtime backup)



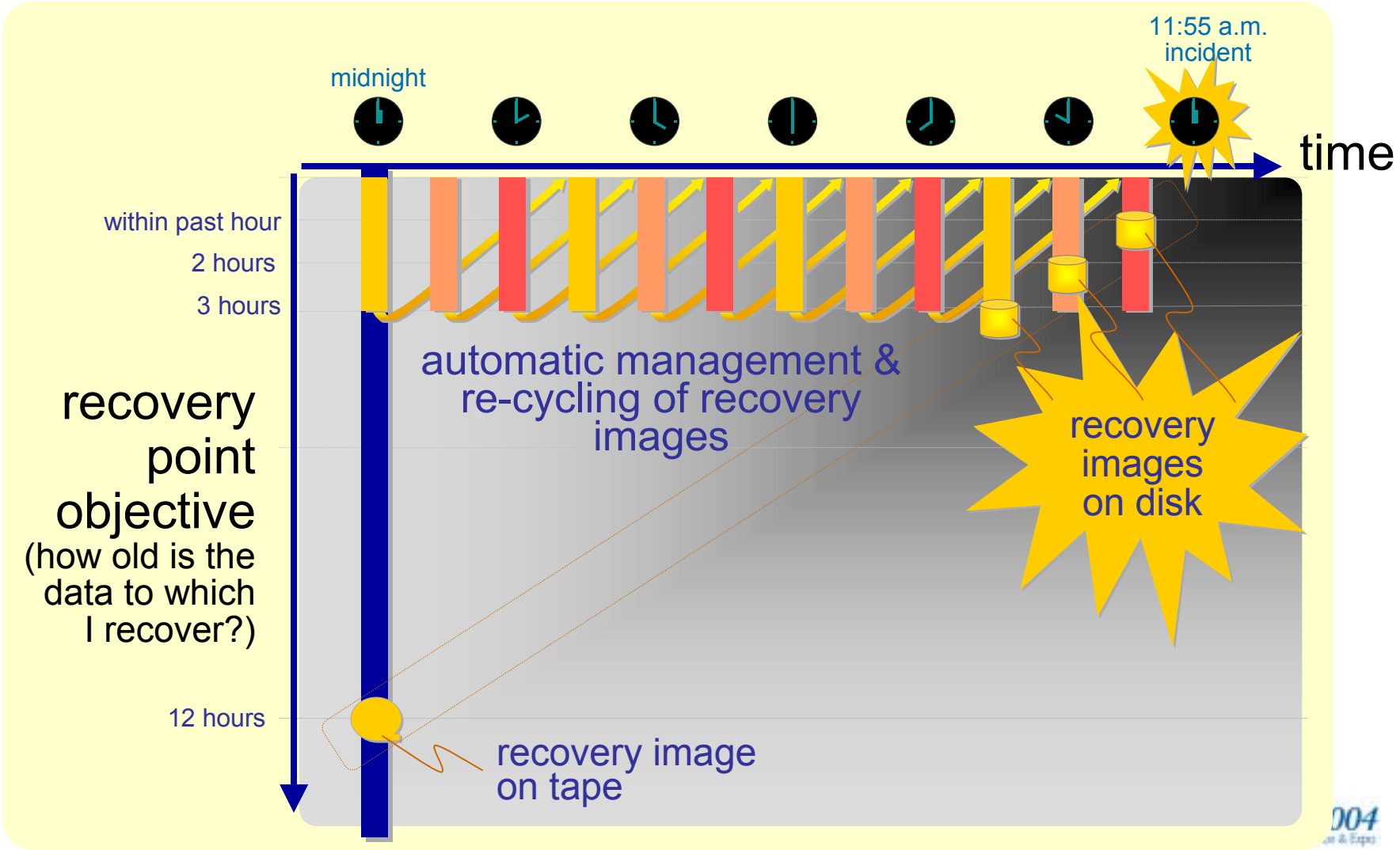
instant recovery

Builds on zero-downtime backup to retain multiple images on disk for selective recovery to any point-in-time image.

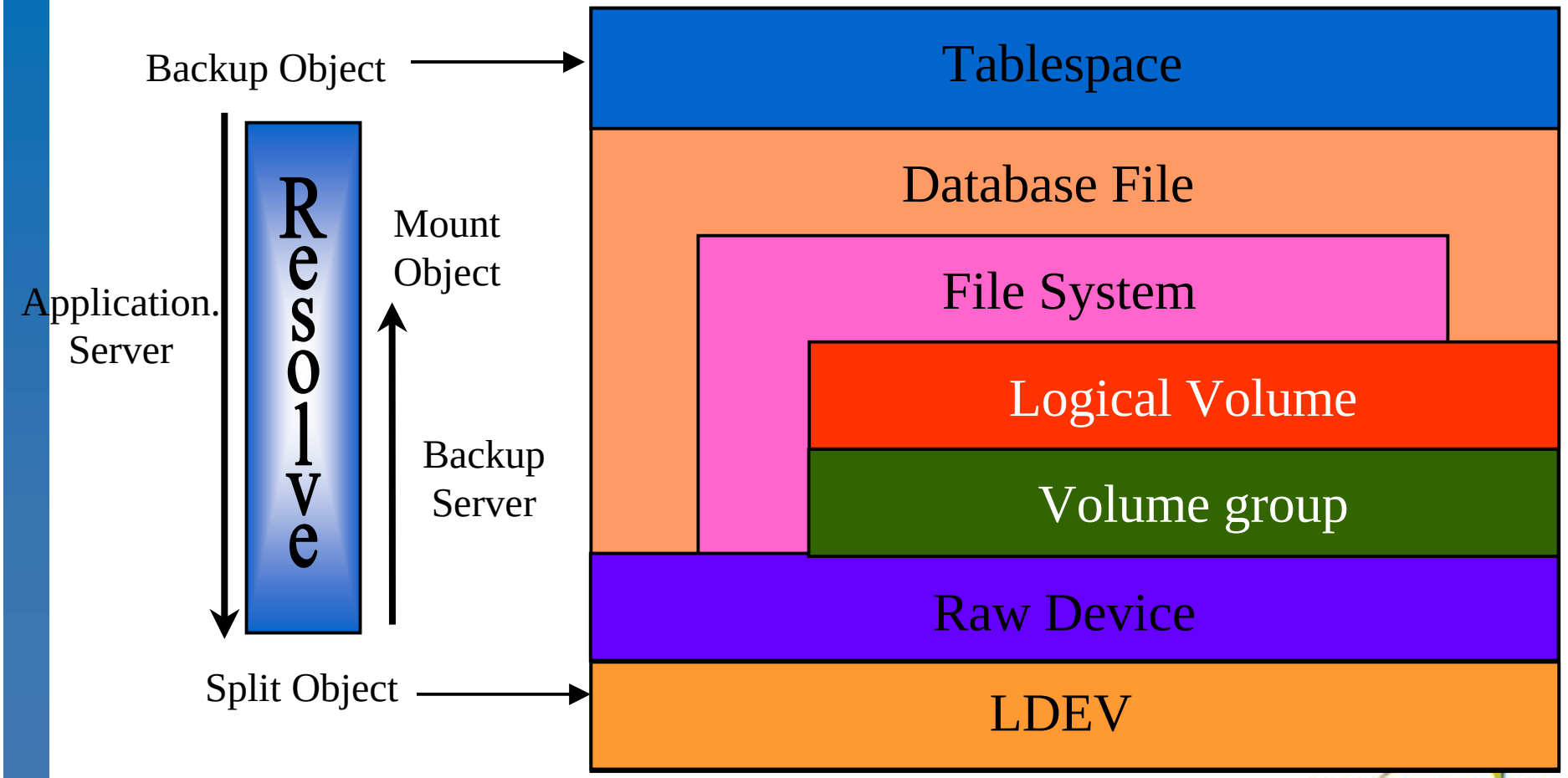
- Data Protector fully automates the protection process, including creation and rotation of mirrors or snapshots.
- for recovery, administrator selects a specific recovery image from the graphical user interface



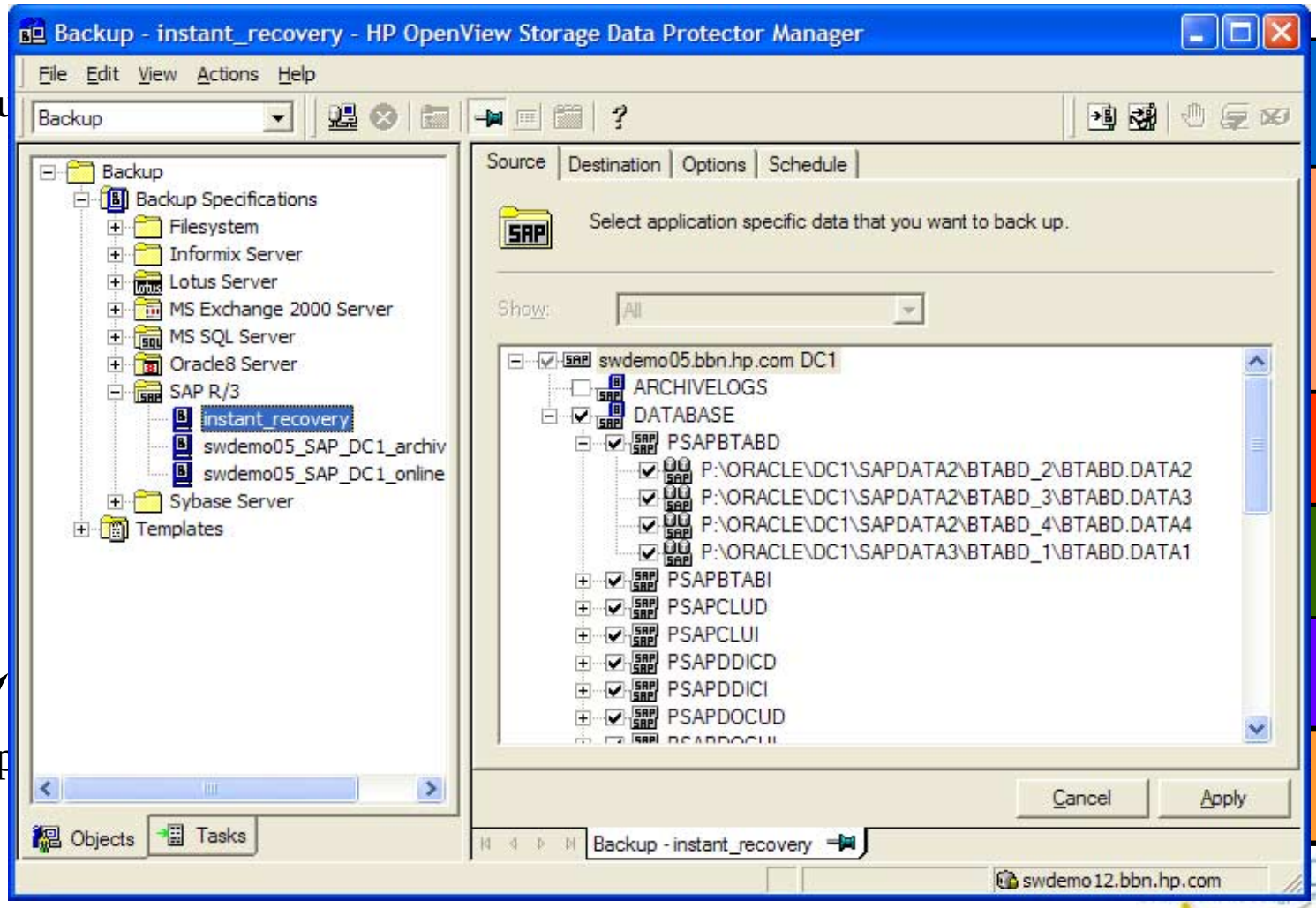
Life cycle for recovery images



Data Protector Integration - resolve function



Data Protector Integration - resolve function



Data Protector 5.5
Zero Downtime Backup & Instant Recovery

	HP XP *compatible can be certified* Zero Downtime Instant Recovery	HP EVA 3/5000 **(version 3)** Zero Downtime Instant Recovery	HP EVA 3/5000 **(v. 3.01x/4.0 – SMI-S API)** Zero Downtime Instant Recovery
Win 2000	Single-site , Multi-Site Exchange 2000 MS SQL 2000 Oracle, SAP File System /Raw	Single-site(Bus.Copy) Exchange 2000 MS SQL 2000 Exchange 2003 Oracle 9i, SAP brtools 6.20 File System /Raw	Single-site (Bus.Copy) Exchange 2000 MS SQL 2000 File System /Raw
Win 2003 IA-32	Single-site, Multi-site MS SQL Exchange 2003 Oracle, SAP File System / Raw	Single-site (Bus.Copy) MS SQL 2000 VSS Exchange 2003 Oracle 9i, SAP brtools 6.20 File System /Raw	Single-site (Bus.Copy) [Post-5.5] MS SQL 2000 Exchange 2003 VSS Exchange??? File System /Raw
HP-UX 11.11	Single-site, (Bus.Copy) [IRonEVA] Oracle 9i/OPS/RAC SAP brtools 6.20 File System /Raw	Single-site, (Bus.Copy) [IRonEVA] Oracle 9i/OPS/RAC SAP brtools 6.20 File System /Raw	Single-site, (Bus.Copy) Oracle 9i/OPS/RAC SAP File System /Raw
HP-UX 11.23 IA-64	Single-site, (Bus.Copy) Oracle 9i/OPS/RAC SAP brtools 6.20 File System /Raw	Single-site, (Bus.Copy) Oracle 9i/OPS/RAC SAP brtools 6.20 File System /Raw	Single-site, (Bus.Copy) (Post 5.5) Oracle 9i/OPS/RAC SAP brtools 6.20 File System /Raw
Solaris 8/9	Single-site, (Bus.Copy) [Solaris 9] Oracle 9i/OPS/RAC SAP File System /Raw	Single-site, (Bus.Copy) Oracle 9i/OPS/RAC SAP brtools 6.20 File System /Raw	Single-site, (Bus.Copy) [Solaris 8] Oracle 9i/OPS/RAC SAP File System /Raw

Easy to use roll forward of transaction logs

Secure path support for EVA via SMI-S

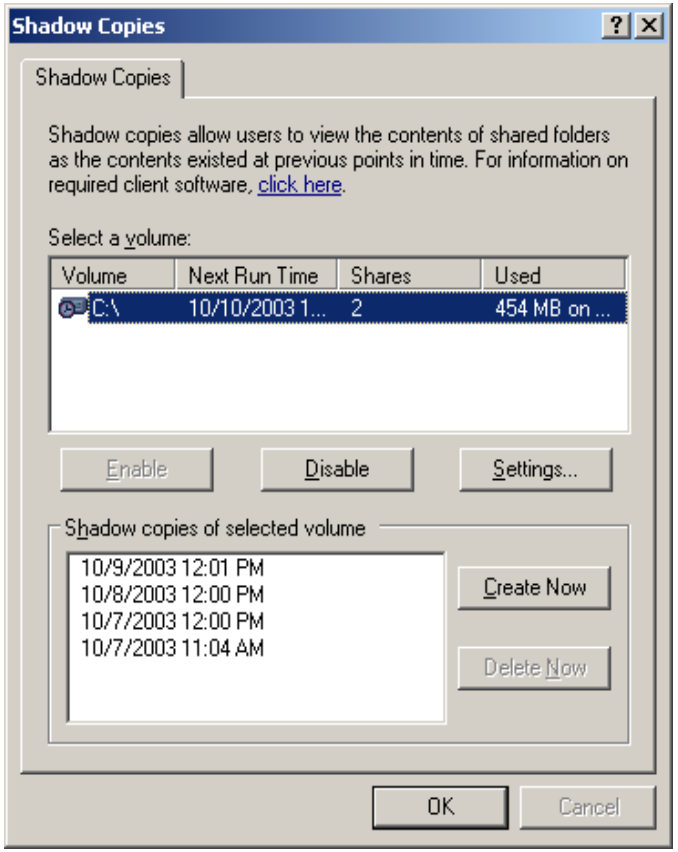
Red items are on risk

Windows 2003 snapshot capabilities

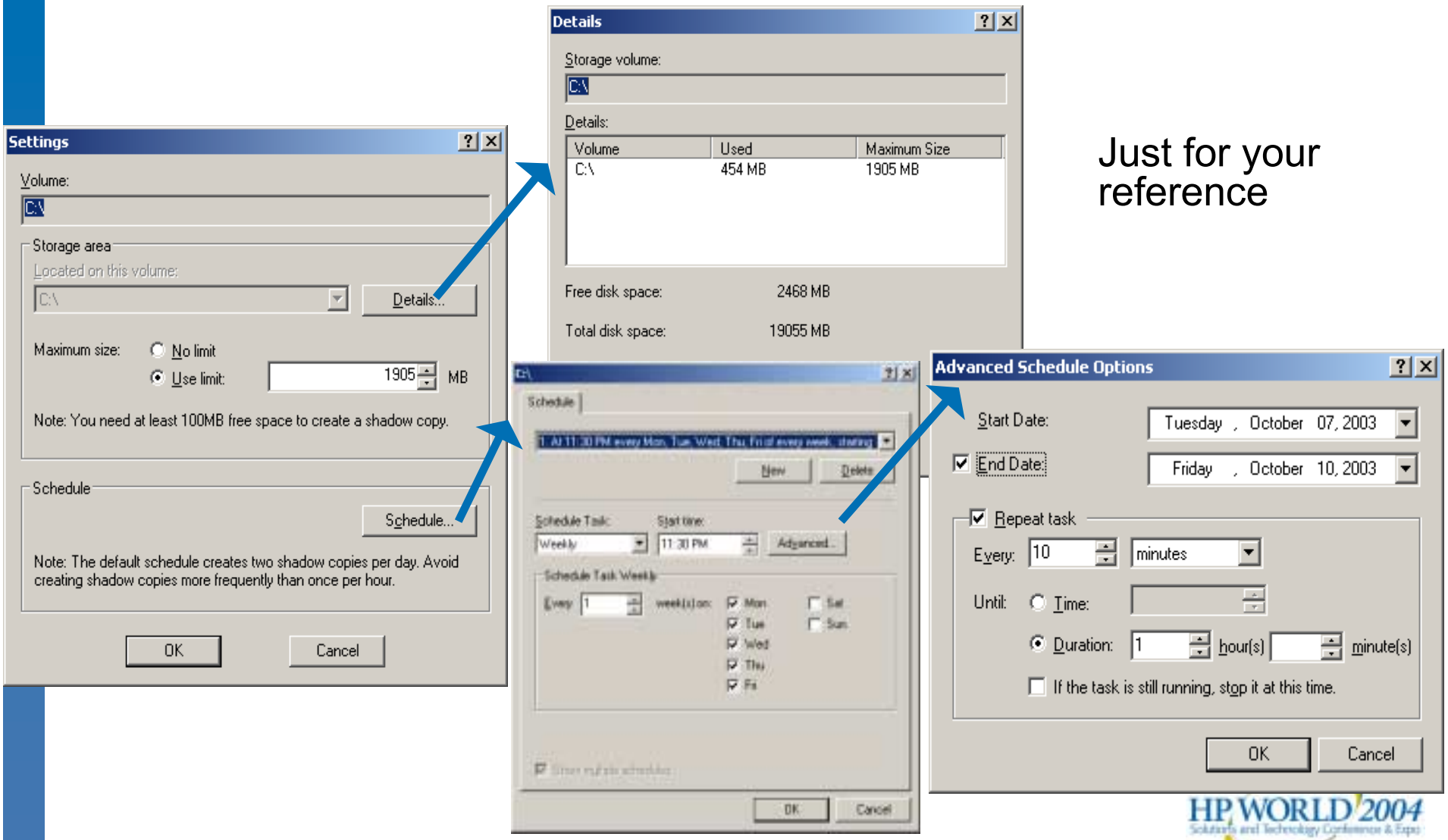
- Windows 2003 introduces snapshot capabilities to attack the NAS filer market
  - Windows 2003 Storage Server
- Volume Shadow Copy Service (VSS) is one message, but two distinct tools
  - Shadow Copies of Shared Folders
    - One tool to create local file system snapshots
  - Shadow Copy (VSS) API
    - One tool to provide a replication management interface for 3rd parties with a limited snapshot included

Windows 2003 Shadow Copies of Shared Folders

- Limited management GUI on the server
  - Start -> Administrative Tools -> Manage Your Server -> Manage this file server -> Configure Shadow Copies
- Up to 64 snapshots in parallel
  - Circular buffer if more than 64 snapshots (first in – first out)
- End user restore for Windows 2003 and Windows XP clients
  - right click on a file in the Explorer shows available file version
- No API
- Snapshots backup issue
  - Backup API does not protect the snapshots
  - Image backup is the only option to get the snapshots to tape, but allows only full system restore

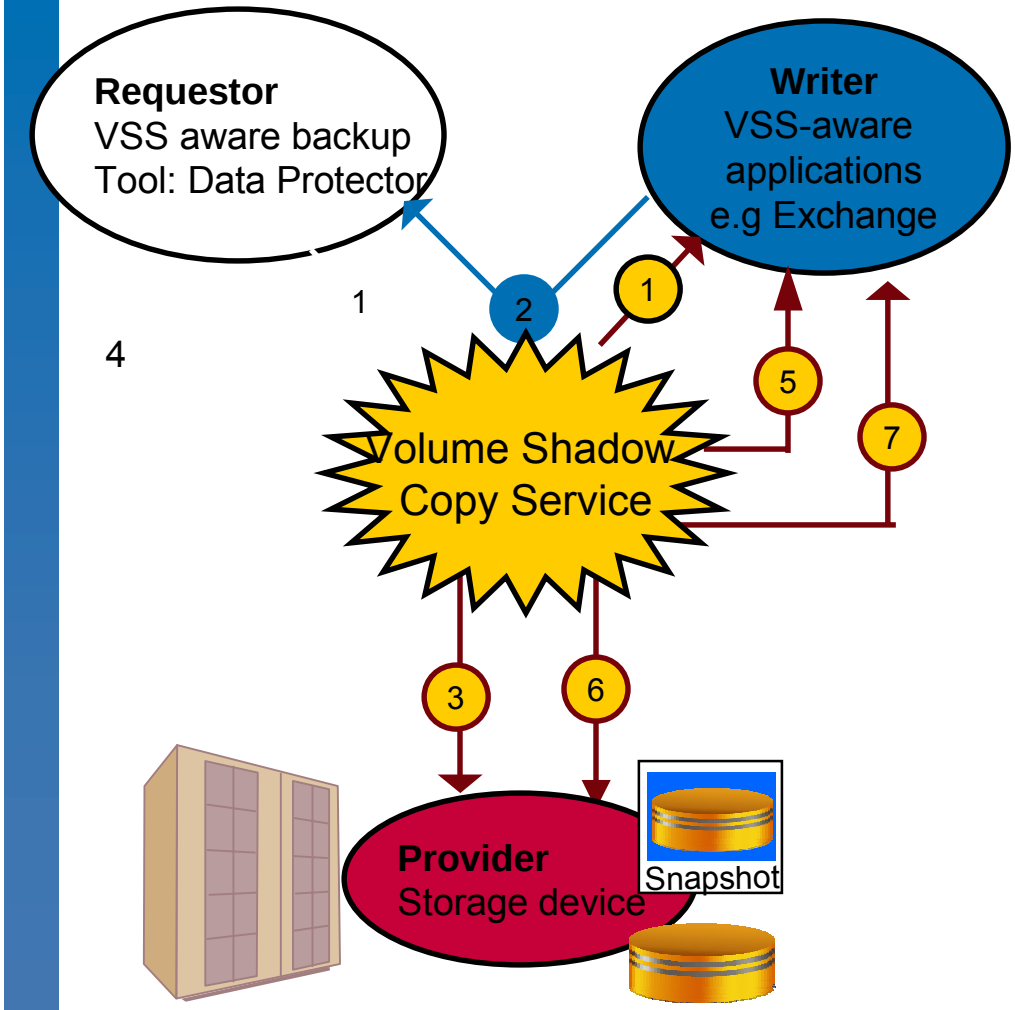


Shadow Copies of Shared Folders: Demo screens



Just for your reference

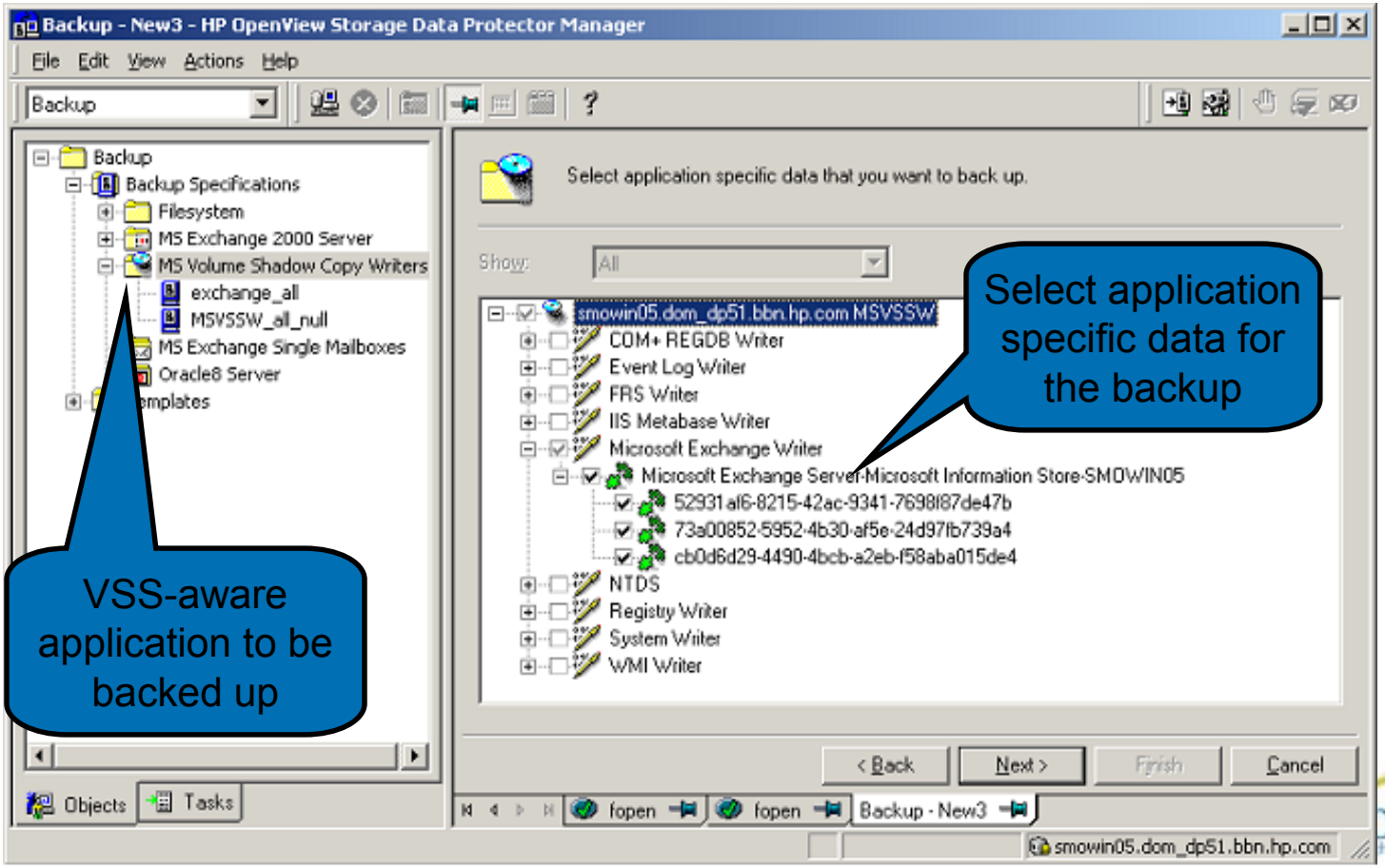
How the Shadow Copy API works



1. Data Protector asks the Volume Shadow Copy service which applications will be involved and accumulates their meta data
2. The application supplies backup elements and sets parameters needed for the restore
3. The Shadow Copy service identifies which providers (storage devices) are available
4. Data Protector asks the Volume Shadow Copy service to create the shadow copy
5. The Volume Shadow Copy provides a frozen image of the application (writer)
6. The Volume Shadow Copy service tells the provider to make a shadow copy of the prevailing disk state and backup the frozen image to the tape
7. The Volume Shadow Copy service unfreezes the writers

Data Protector fully integrated with Shadow Copy API

- Backs up open file
- Ensures consistency and integrity of backed up volumes



Windows 2003 Shadow Copy API - snapshot interface for 3rd parties

- API for
  - Requestors (backup application e.g. Data Protector 5.1)
  - Writers
    - Any application which requires on-line backup, for example Exchange
    - OS services, which are database or locked file based, for example the registry
    - There is no writer for the file system
      - snapshot possible, however no file system synchronisation
      - Only local, not supported for disk arrays
      - Data Protector file system backup -> advanced options
      - Watch out, file system backup includes configuration backup per default. Restore of VSS based configuration backup might not work.
    - Data Protector provides already system configuration backup -> Don't use VSS for system configuration backup
  - Providers (disk array with embedded replication technology, for example HP EVA)

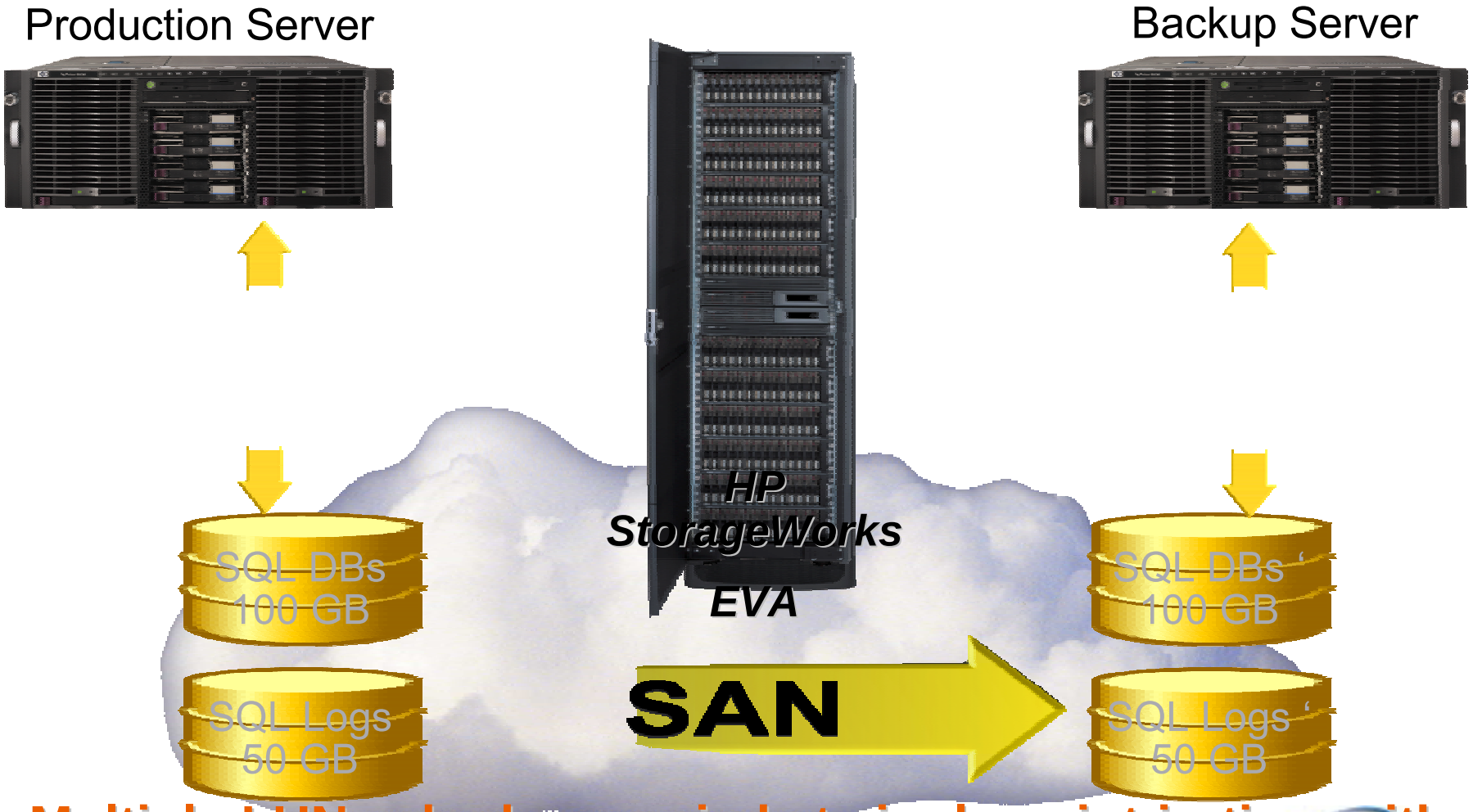
Windows 2003 Shadow Copy API - snapshot interface for 3rd parties

- Use cases
  - Backup of exclusively opened files, for example PST files
  - Exchanges 2003 ZDB
  - ZDB for other applications supporting VSS, for example Lotus Notes/Domino
  - New: ADAM (Active Directory Application Mode)
  - Future system services
- Max 1 snapshot
  - however providers with build in replication could provide more
- Snapshot freed after backup -> no Instant Recovery via the VSS API
  - Instant Recovery could be implemented via disk array API / CLI
    - Scripted solution from HP TCs
    - Whitepaper solution possible

Shadow Copy API Transport

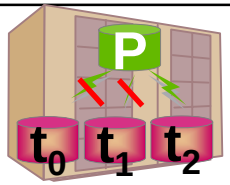
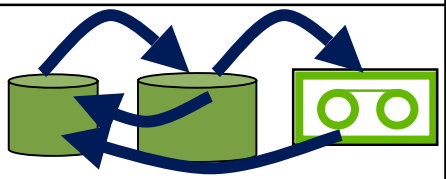
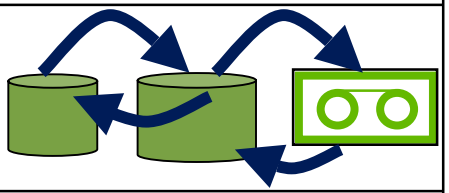
- Enables you to easily transport data and volumes on your SAN
- Create and export a shadow copy of your data volume or database
  - Import that shadow copy and data on a second server
- Requires a provider for the SAN array
- HP released compatible VSS hardware providers for EVA, VA, XP arrays

Shadow Copy API Transport



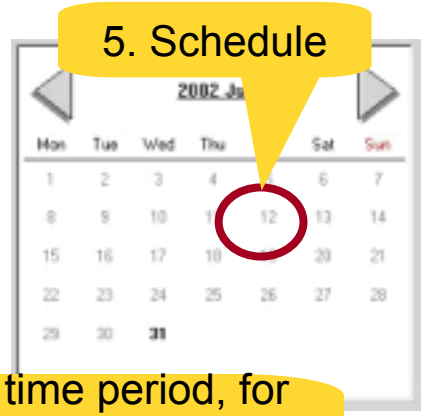
Multiple LUNs shadow copied at single point-in-time with data consistency

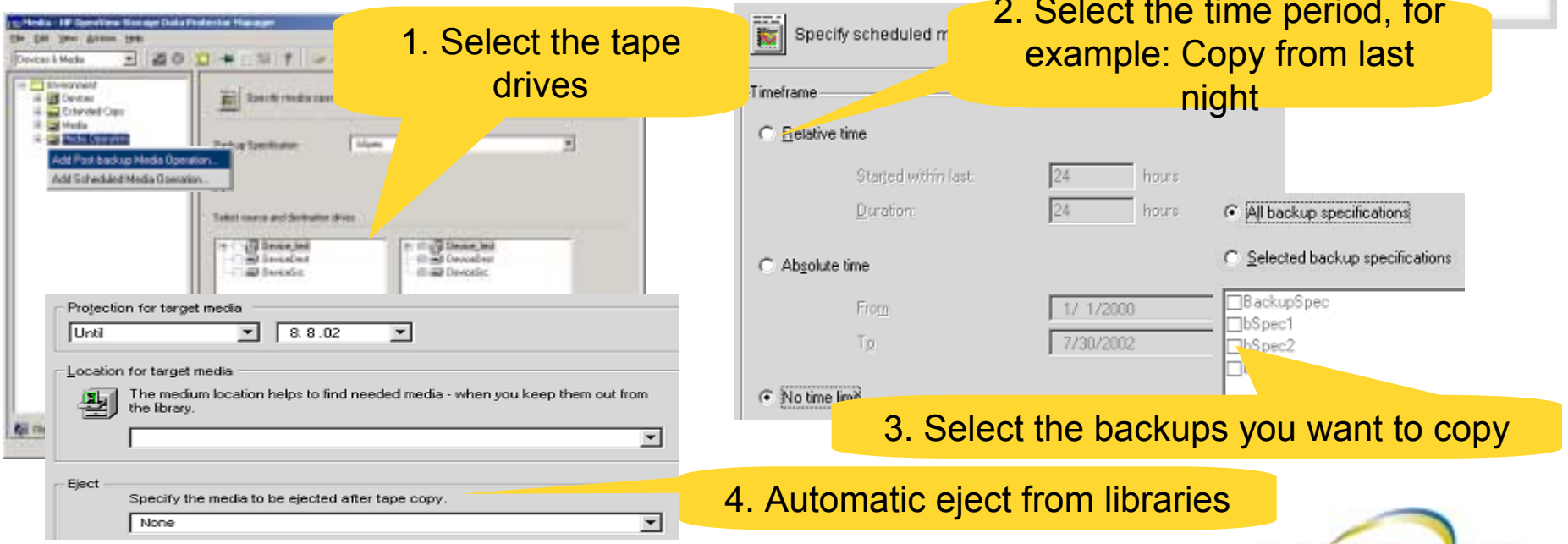
Positioning backup to disk technologies

	ZDB / IR Replication	**Advanced Backup to Disk** NEW Virtual Tape, Disk Stage D2D(2T)	**File Device** Virtual Tape
			
How?	mirror, snap…	backup to disk	backup to disk
Instant Recovery	yes	no	no
On-line Application b.	yes	yes	yes
Easy single file restore	no	yes	no
Easy setup	yes	yes	no
Incremental backup	no	yes	yes
Cheap disk	no	yes	yes
Operating systems	HP-UX, Win, Linux, Solaris	all	all
Licensing	per TB	per TB	Per file device “drive”
Use case	7* 24 DBs, appl	many	limited

Advanced Media Management
Space Efficient Automated Media Copy

- no need to copy the entire tape / disk
  - copies only portions added during the selected period
- append to the end of an already copied tape / disk

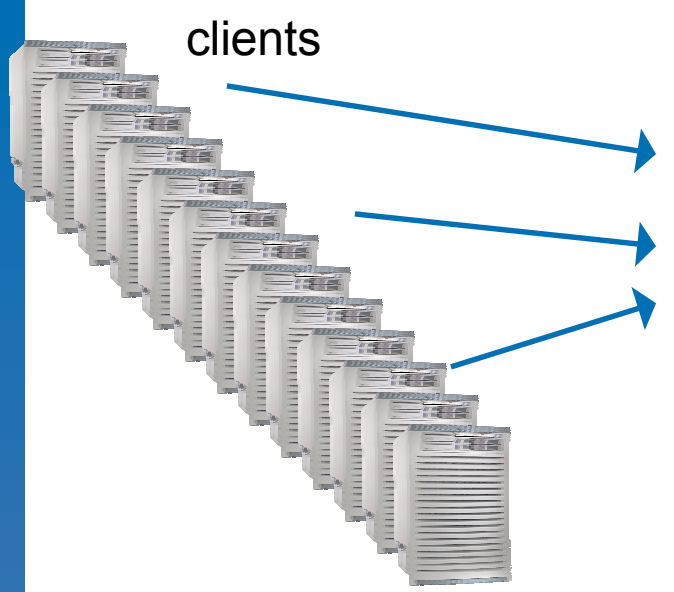


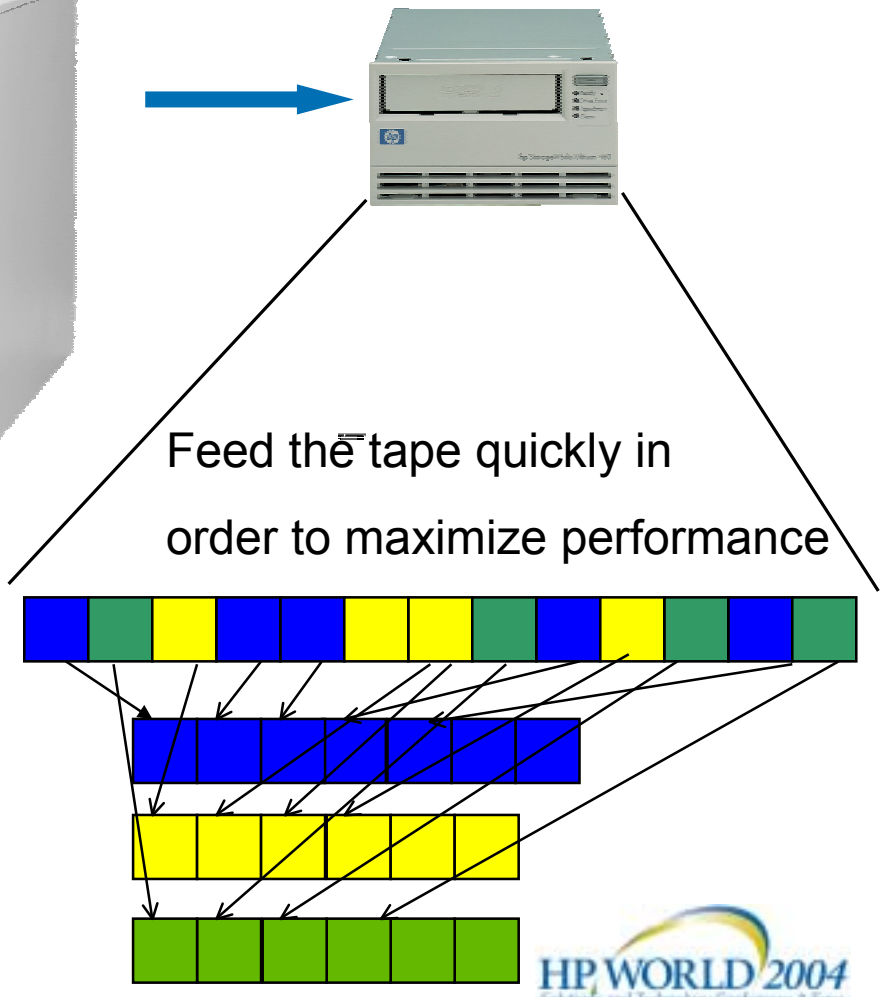


Advanced Media Management - other features

- tape type migration & consolidation, for example from DLT to LTO, from disk to tape
- tape compaction to eliminate unprotected backups to save tape space
- scheduled refresh of long term protected objects
- Tape collocation / de-multiplexing
  - for faster recovery
  - creation of system/customer specific disaster recovery tape(s) through de-multiplexing and combination of last full with last incremental(s) on one tape
- Supported for all Media Agents

Multiplexing for maximum backup performance from slow clients



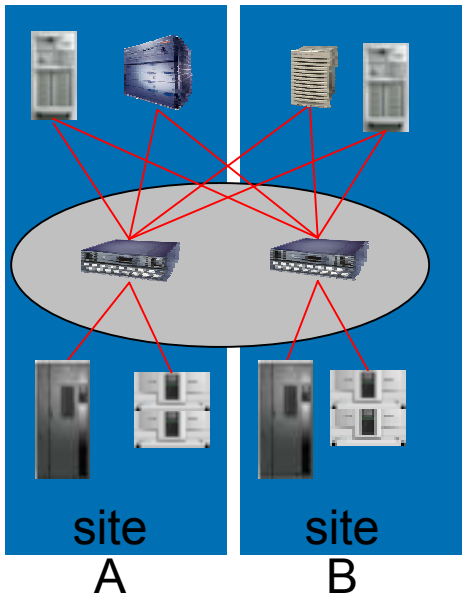


Tape de-multiplexing for faster recovery speed (coming with 5.5)

Advanced Media Management benefits

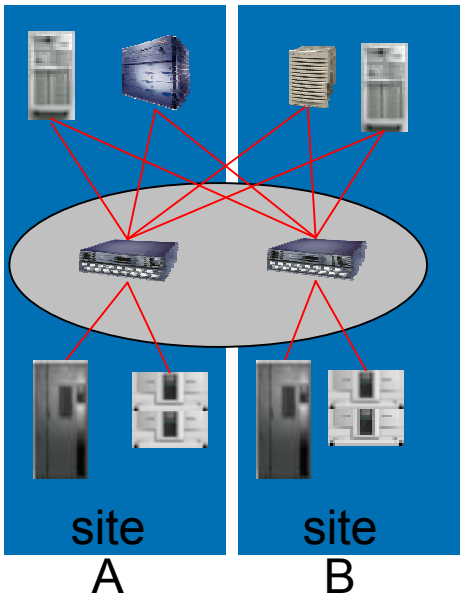
- reduced Total Cost of Ownership
  - reduced tape space consumption
  - reduced tape drive consumption
- flexibility
- performance
  - recovery
  - copy
  - backup
    - Increased backup frequency for backup of small transaction logs
    - slow clients
- archiving

Data Protector 5.5 - Backup Mirroring – features



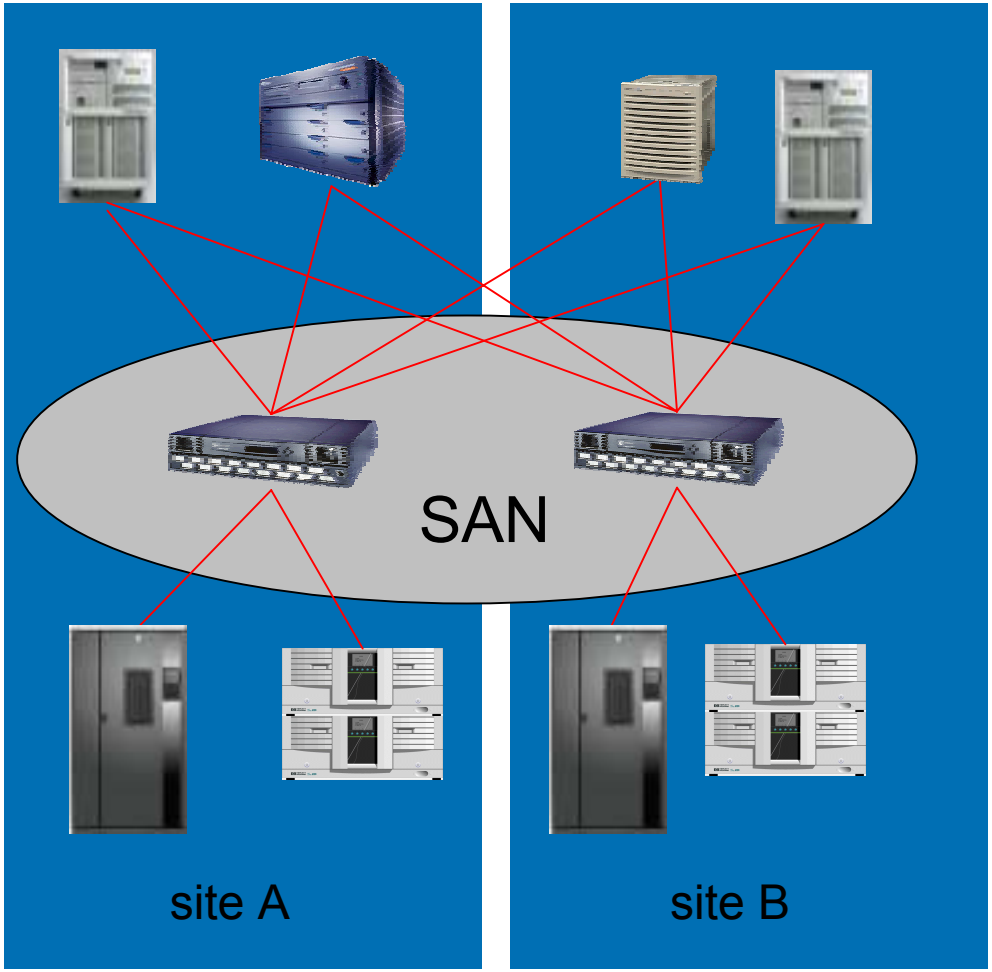
- unlimited distance: SAN & LAN & WAN
  - data stream split at the Media Agent via daisy chain
  - DA -> MA -> MA -> MA
- highest performance via shared memory (in case DA & MA or MA & MA reside on the same system)
- backup has higher priority than mirroring in case of failures or mount request time out
- appendable
- different & changeable protections, different locations -> unique media identifiers
- up to 5 mirrors
- comes free of charge & out of the box seamless integrated into GUI and CLI
  - however, a mirror backup drive requires an additional backup drive license

Data Protector 5.5
- Backup Mirroring features



- same concept adoptable for disk & tape
  - mirror tape to tape
  - mirror disk to disk
  - mirror disk to tape
  - multiplexing
- FUTURE: SAN direct backup based on Xcopy

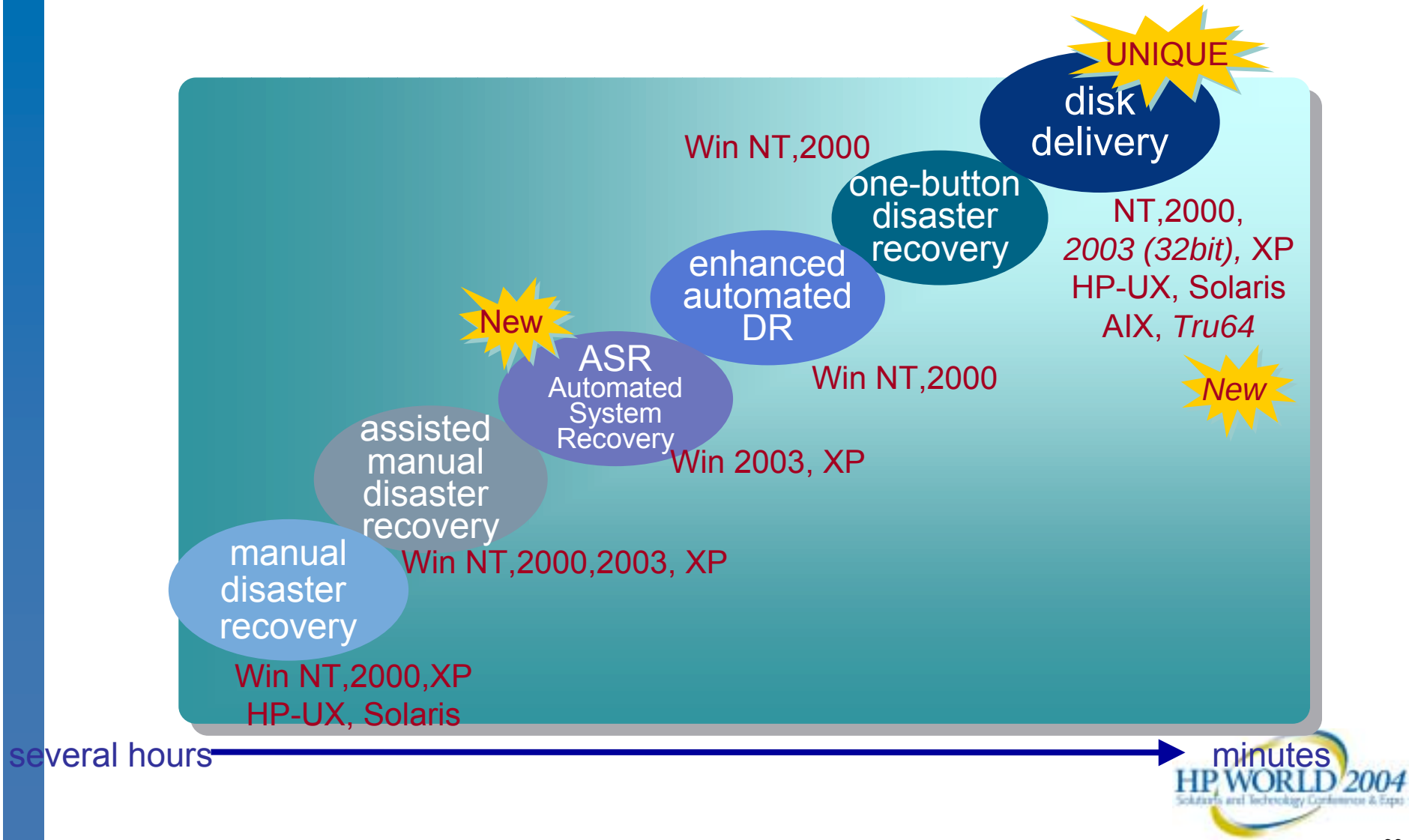
Data Protector 5.5
- Backup Mirroring benefits



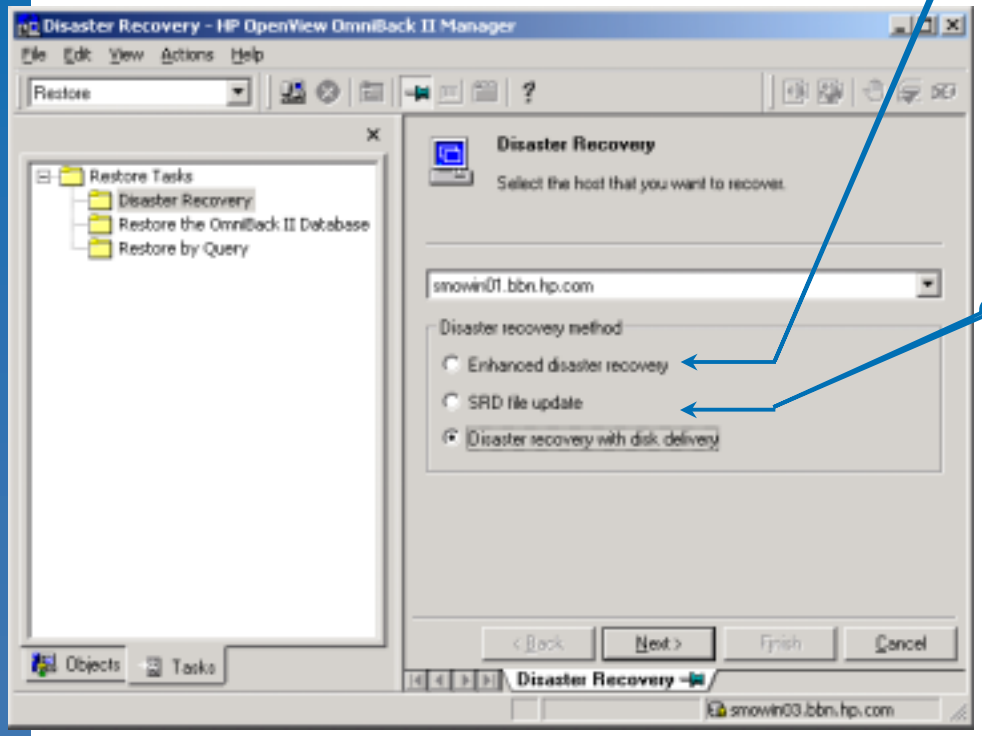
- overcome a local datacenter disaster combined with fast local tape access
- remote long term archiving combined with fast local tape access
- overcome defect tapes

How to recover the Windows server

Full range of system disaster recovery options



data protector bare-metal disaster recovery



Enhanced Automatic DR

- recovery CD-ROM image provides unattended installation (operating system & Data Protector agent)
- restore data from tape

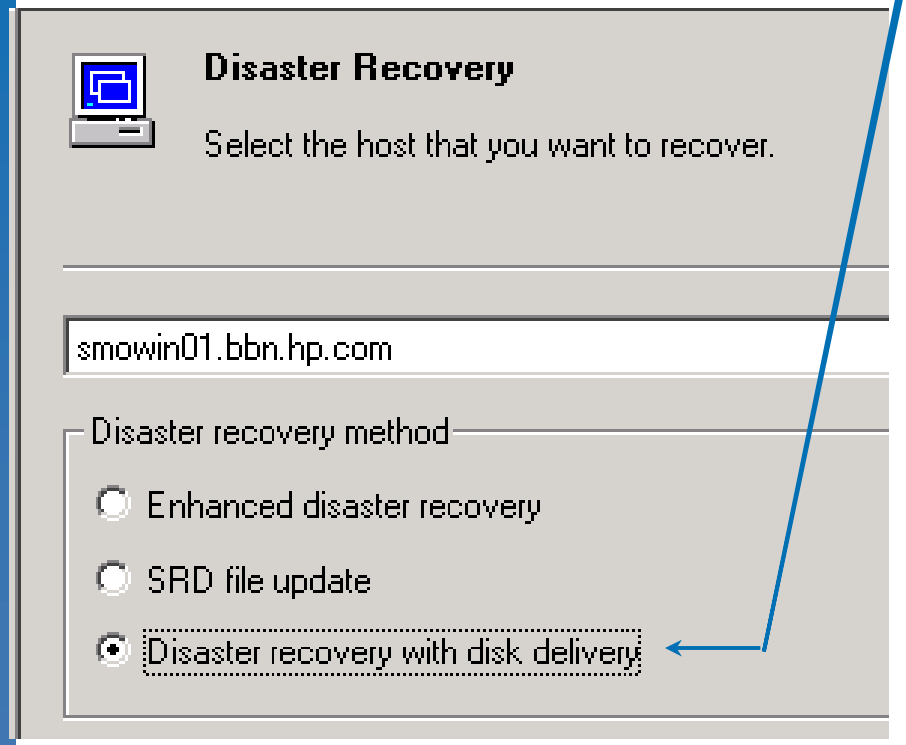
Assisted Manual DR

- install operating system
- Data Protector restore command

Manual DR

- install operating system
- install Data Protector agent
- restore data from tape

data protector bare-metal disaster recovery



Disk Delivery

UNIQUE

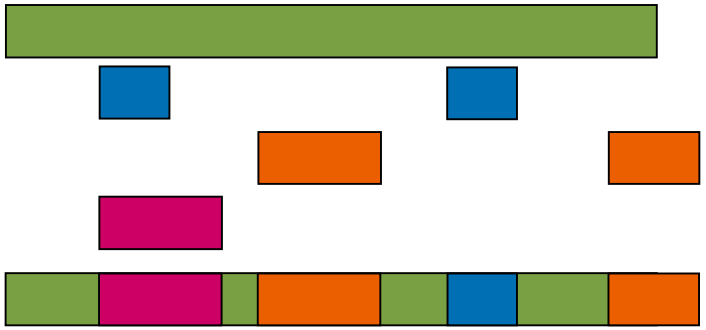
recreates a crashed system disk on any other Data Protector client - disk is installed in downed server and server rebooted for immediate recovery.

One Button Disaster Recovery (OBDR)

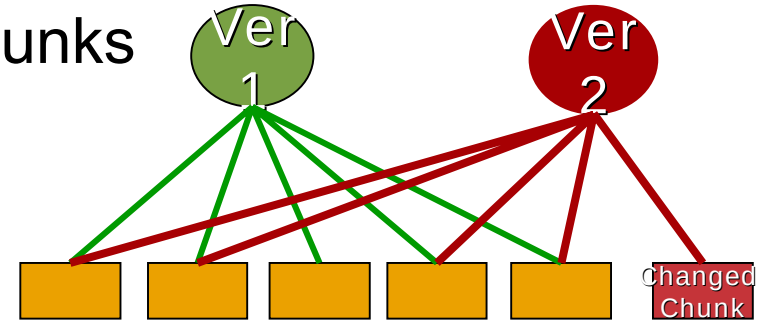
- crashed system boots directly from tape - almost no user interaction for complete reload of O/S, applications and data.
- available for HP tape drives

Outlook: Intelligent Backup Disk

- File level and block level incremental forever backup
  - Only changed files and chunks send over the network
  - No time consuming tree-walk -> file close event based
  - Virtual full restore for any available point in time



- No redundant data chunks
  - File system
  - Across systems
  - Over time



Summary

When to use backup to disk vs. tape?

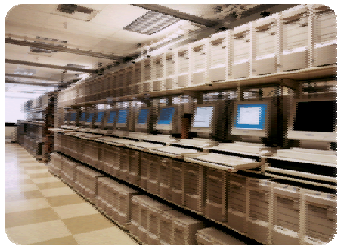
- It's your choice
- All new Data Protector functions are designed to seamlessly combine backup to disk and tape
- Recommendation:
  - Short term retention on disk
  - Long term retention on tape

HP OpenView Storage Data Protector

Seamless integration of disk & tape backup & recovery

Faster Recovery

- Recover TBs of data in minutes from disk with Instant Recovery
- Recover a single file, a mailbox, … or the entire site
- Full range of bare metal disaster recovery options



No Backup Window

- No performance impact during backup with Zero Downtime Backup (ZDB)
- Online database backup (Oracle, SAP, SQL, Exchange, DB2, …)
- Fully automated tasks and centralized, multi-site management

Proven Product

- Installed base of more than 20 000 customers
- Over 1000 features implemented
- All major operating systems, platforms, libraries, disks & topologies supported

Better Together from HP

- Developed, integrated, and tested with HP servers and storage
- Seamless integration with HP OpenView
- HP support & services for hardware and software

For More Information

- For More Data Protector Info:
  - http://www.hp.com/go/dataprotector
    - Product Info
    - Support Matrices
    - Data Protector Manuals
    - Evaluation Software (60-day Trial)

- See you at the Technology Showcase

- Speak to your HP Storage Specialist

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