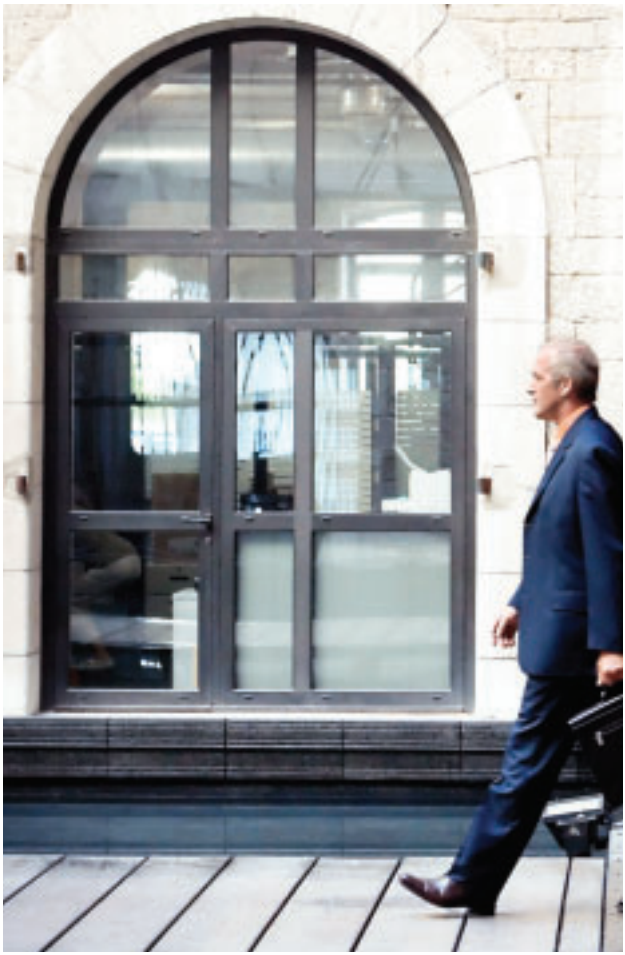


Simply Business Protection solution guide

Your guide to choosing the right data protection strategy for your business

Summer 2008

Simply StorageWorks

Lose your data and you could lose your business. That is why reliable data protection is one of the most important challenges your business faces today. In the event of any threat to your data – including a "worst-case scenario", when multiple system failures occur at the same time – it is essential that you have the appropriate data protection and recovery strategy in place.

How can this guide help you?

As part of the HP Simply Business Protection programme, this guide is designed specifically to help small- and midsized businesses choose the appropriate data protection strategy. It is divided into four parts to make it easier for you to find the information you need.

Part 1: The importance of data protection (pages 3 – 7)

- Why data protection is one of the key business concerns today
- What happens when data is not protected?
- Start planning your data protection solution
- What is HP's approach to data protection?
- Identifying your data protection needs
- HP's data protection technologies

Part 2: How to choose the HP solutions you need (pages 8 – 19)

- A typical small office environment
- A typical small business environment
- A typical networked environment
- A typical environment for tape backup consolidation
- A typical environment for both online storage and backup consolidation – all in one
- A typical environment for high availability and performance

Part 3: Choosing your products and services (pages 20 – 28)

- How to select the HP tape drives, autoloaders, tape libraries, or disk-based backup solutions that are right for you
- An outline of the benefits of HP software and media
- How HP Services can help support your solution

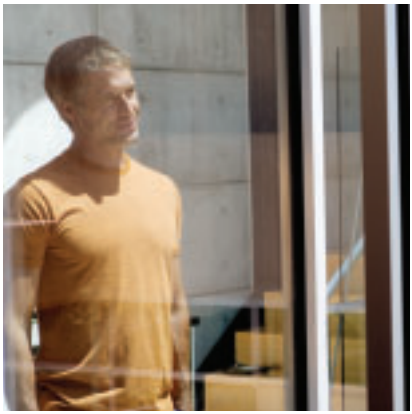
Part 4: Complete your knowledge (pages 29 – 31)

- Quick answers to commonly asked questions
- Jargon buster – simple definitions of key technology terms used in this guide

Can we help you further?

This guide is part of the HP Simply StorageWorks framework, which provides comprehensive information about the complete line of HP storage for small and midsized businesses. If you require information on network-attached storage (NAS) and storage area network (SAN) solutions, please refer to the Simply File Services and Simply Consolidation solution guides.

Part 1: The importance of data protection



Why is data protection important?

Data is the backbone of every organisation. Whatever business you are in, enormous amounts of data are needed every day to keep it running.

Furthermore, large businesses are no longer the only organisations that need sophisticated data protection strategies. Recent surveys indicate that backup and recovery is the top IT priority among small and midsized businesses. As a result, smaller companies are also looking for advanced data protection features with high levels of availability and recovery.

For example, what would happen if the data on your systems were wiped out by a power surge or system failure? What if a fire or flood destroyed your electronic or paper-based records? Would you be able to recover all of your information?

What if a crucial manual backup had been forgotten? Would you know which customers to invoice – and for how much? Could you pay your bills? Could your business continue to run?

Fifty per cent of companies that lose their data go out of business immediately, and 90 per cent do not survive for more than two years after such a loss.[1] Given the importance of information and the potential high cost associated with data loss, reliable data protection is no longer an option – it is an obligation. Whether you need to capture, distribute and protect data automatically, or you need a fast and affordable backup and recovery system, data protection must be performed in a systematic way.

HP's role is to help you find a solution that fits your specific needs – no matter what size your business happens to be.

[1] Based on research from Baroudi Bloor International; *Sarbanes-Oxley Compliance Journal*, December 2005.

Start planning your data protection solution

Now that you have learned what risks are associated with data loss, it is vital that you choose a data protection solution that fits your needs and addresses your current concerns. Among the considerations to keep in mind:

- Affordability and cost control are primary considerations in every business, but even in very small companies the value of the business data will far outweigh the costs of a simple tape-based data protection regime. However, in larger businesses, attaching a separate tape drive to each server duplicates resources and adds to your IT management overhead as the number of servers grows.
- Distributed backup can complicate management and disaster recovery planning.
- Is your LAN fast enough to handle the volume of traffic produced when it runs your backups? Can you manage your backup windows to keep the network free during working hours?
- How quickly is your data multiplying? Do you have enough storage capacity available to meet both your primary storage and data protection needs?
- Do your backup window requirements and value of data require a dedicated backup server? Can your infrastructure scale to meet your growing needs over time?

The first step in planning your data protection solution is to understand what type of IT environment you are running.

DAS environments

Direct-attached storage (DAS) is the simplest backup and restore environment, usually consisting of a stand-alone tape drive or an autoloader attached directly to the server it is protecting. Businesses that operate DAS usually

- Require only daily and/or weekly backups
- Maintain only a few (one to two) networked servers on each network
- Require only a single operating system
- Do not employ online business-critical operations

LAN environments

Local area network (LAN)-based backup has storage backup devices that are connected to the LAN and managed centrally from a single console through a single backup server, reducing hardware costs and management time. Businesses that operate LAN-based backup usually

- Require continuous, business-critical operations
- Require hourly or daily backups
- Have three or more networked servers
- Run multiple operating systems

SAN environments

Businesses that run storage area networks (SANs) have characteristics similar to those that operate LANs and usually

- Have a large and possibly complex network
- Have dedicated IT staff, exponential data growth and a need for instant recovery

DAT 160 **Ultrium 920** **Ultrium 1760** **Ultrium 1840**




What is HP's approach to data protection?

HP provides solutions that range from the simplest IT environments to the most complex ones running multiple operating systems and business applications – as well as support for heterogeneous environments. HP's range includes a rich array of reliable, simple and affordable solutions that capture, distribute, consolidate, restore and protect your data. Each is designed to make sure your data is there when you need it.

How do you choose the right business protection strategy?

First, you need to consider and understand the value that your IT brings to the business. For example, can an application be down for 24 hours without significantly affecting your business, or would an outage lasting just minutes be catastrophic?

Two key measures can help you assess the needs of your business. The first is the Recovery Time Objective (RTO), which is the amount of time a business process can be down. The second, the Recovery Point Objective (RPO), is the amount of data you can afford to lose. For 24x7 applications, the RPO could be the most recent transaction; for file servers, it could be last night's backup.

Once you have established the RTO and the RPO for your business, you can consider the hardware, software and services available that will provide you with the right level of protection against specific causes of data loss. Three examples illustrate how this might work:

- In a typical small business a daily or weekly backup stored off site may be sufficient to allow the business to keep running in the event of data loss. In these circumstances traditional tape backup or removable disk system provides a reliable and cost-effective solution.
- Tape backup effectively protects your systems against virus attacks because data can be restored from the most recent healthy backup. However, recovery time may be longer than your business can tolerate, in which case a multi-tier backup that includes both disk and tape can be beneficial.
- Remote replication of data between sites will provide much faster recovery of a site disruption compared to tape. However, it will not supply the same level of protection against accidental deletion or virus attacks.

These are just three ways to look at the problem. Because HP has such a wide array of storage technologies available, you can find and implement the solution that best meets the specific needs of your business.

Identifying your data protection needs

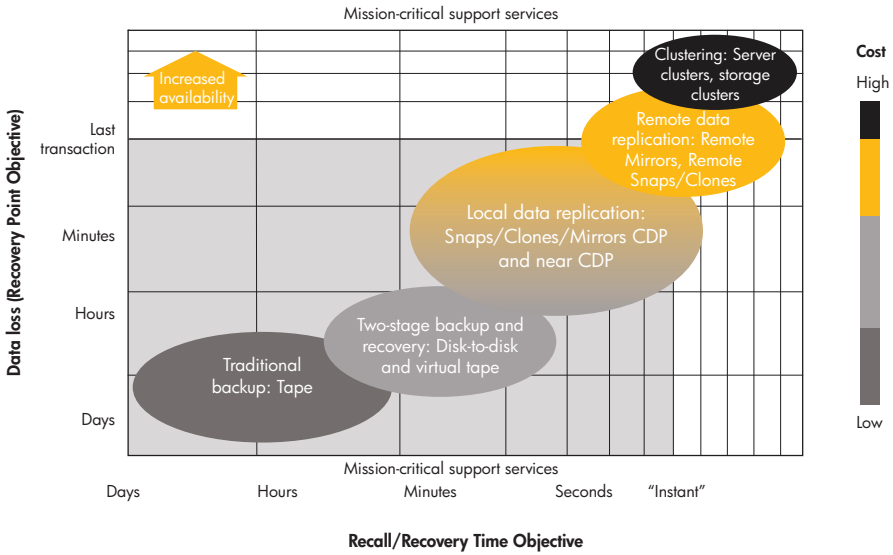
The diagram below shows the spectrum of business continuity solutions available from HP. It also allows you to see where your business protection needs are today.

Recovery Time Objective:
How long can your business tolerate downtime?

Recovery Point Objective:
How much data can you afford to lose, and what point in time do you need to recover:

- 24 hours ago?
- 1 hour ago?
- 5 seconds ago?

HP StorageWorks continuum for business continuity and availability



From data protection to business protection

When does ordinary data protection become business protection? When you match the value of your data to the storage solution you use.

HP provides a broad range of data protection solutions that can help you to optimise your backups during all phases of your data's life-cycle. Incorporating disk-based backup solutions can improve the performance of backup jobs and make it simple for you to access multiple "recovery points" and obtain faster restore of lost or corrupted files. Tape storage retains its place as the foundation of a sound data protection strategy because of its portability, long shelf-life and low cost per gigabyte, which make it ideal for longer-term archival of data and off-site storage for complete disaster recovery. Using both disk and tape together is often referred to as disk-to-disk-to-tape (D2D2T) data protection.

HP's D2D2T solutions leverage the speed and efficiency of disk along with the portability, longevity and low cost of tape. A comprehensive backup strategy that employs both disk and tape is becoming the smart choice for businesses of all sizes.

Data deduplication is a method of reducing the amount of disk space required for backups by searching blocks of data that are identical and then eliminating redundant copies from being backed up. Data deduplication is particularly powerful when it is applied to backup, because most backup data sets have a great deal of redundancy. Over time, only one unique instance of the data is actually retained on disk. As a result, you get a much more efficient data protection solution, allowing up to 50 times more backup data to be stored on the same amount of disk capacity. This enables you to retain more data online for instant restore of individual files. Lost or corrupt files can then be restored quickly and easily from multiple available recovery points. By extending data retention periods on disk, your backup data is accessible for longer periods of time, before archiving to tape. HP solutions that provide data deduplication provide dramatically higher levels of efficiency.

1/8 G2 autoloader

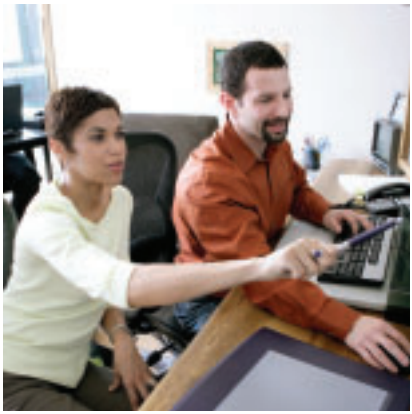
D2D130

D2D2500

MSL2024

Part 2:
How to choose the HP solutions you need

The following scenarios were created using hypothetical businesses to illustrate the range of data protection needs faced by small- and midsized businesses, as well as the strategies HP recommends for each. One or more of these business situations is likely to be similar to your own. These examples will help you to identify the right data protection method for you.



A typical small office environment

Middlebury Dental Associates is a small dentist office with 12 employees. Until recently, the firm had only been backing up their files to CDRs, but found it difficult to keep up with all of their data. The company also needed more durable media to store off site. Middlebury Dental Associates staff members all use individual PCs that connect centrally to an HP ProLiant ML110 Server running Microsoft® Windows® Server. This server houses all of the company's financial books as well as customer records.

Recovery Time Objective:
If an outage occurs, Middlebury Dental Associates needs to recover data within 12 hours.

Recovery Point Objective:
If an outage occurs, Middlebury Dental Associates needs to recover data from the previous day.

Other considerations:
Middlebury Dental Associates has no IT staff; therefore, they require an easy-to-use, rugged backup solution.

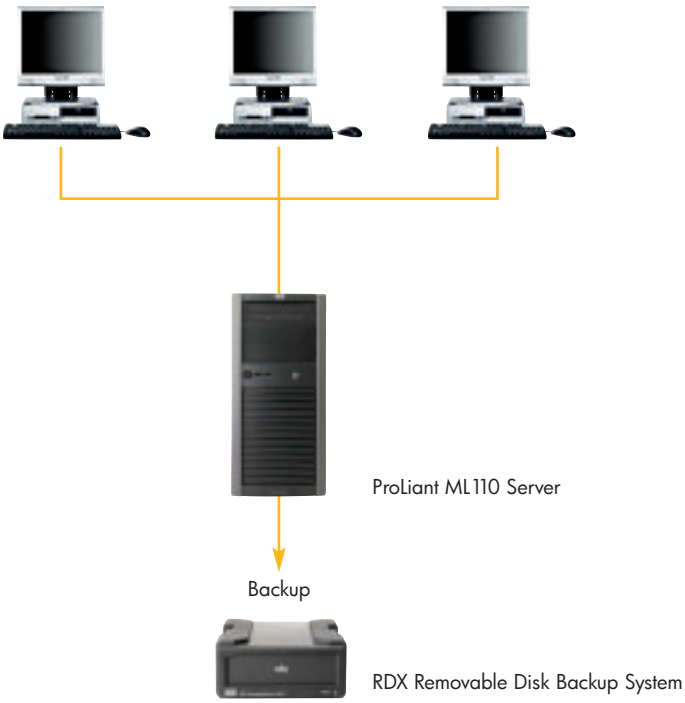
Single-server, entry-level removable disk backup solution

To meet their data protection needs, Middlebury Dental Associates chose an HP StorageWorks RDX Removable Disk Backup System. This would provide simple drag-and-drop file backup and file restore capability to make the data protection process easy to complete. The company can protect its entire system with the included "hands-free" HP RDX continuous data protection software. Portable and durable disk cartridges allow for reliable off-site backup and disaster recovery, and the ruggedness protects data from drops and will not scratch in the same way as their CD copies.

With fast disk-based file transfers and retrieval performance, the HP StorageWorks RDX Removable Disk Backup System gives Middlebury Dental Associates the flexibility to meet budgetary and capacity requirements while spending less time on backups. It can also enhance application availability, staff productivity and customer service. The reliability of the RDX Removable Disk Backup System lets Middlebury Dental Associates store data securely, while the removable storage capacity of the RDX solution gives the organisation scalability to keep pace with future growth.

"The HP RDX Removable Disk Backup System gives us affordable data protection at the click of a mouse. It couldn't be easier to use."

Single-server, entry-level removable disk backup solution



Typical configuration

Description	Part number	Qty.
HP StorageWorks RDX 160 External Removable Disk Backup System	AJ766A	1
HP 160 GB RDX Removable Disk Cartridge	Q2040A	2

A typical small office environment

A small architectural practice with five employees is called Simply Ltd. The company's chief architect uses a notebook computer, the junior architects and the technician have workstations, and the administrator has a desktop computer – all of which run on Microsoft Windows. An HP ProLiant ML310 Server acts as a shared file server for all the firm's computer-aided design (CAD) drawings.

Recovery Time Objective:
If an outage occurs, Simply Ltd needs to recover data within 12 hours.

Recovery Point Objective:
If an outage occurs, Simply Ltd needs to recover data from the previous day.

Other considerations:
Simply Ltd is a small practice with a limited IT budget; therefore, they need the lowest-cost solution they can find.

Single-server, entry-level tape backup solution

To meet its data protection needs, Simply Ltd chose an HP StorageWorks DAT 160 USB Tape Drive. Using USB to connect to a file server, backups are performed easily using the HP Data Protector Express Single Server Edition software included with the tape drive.

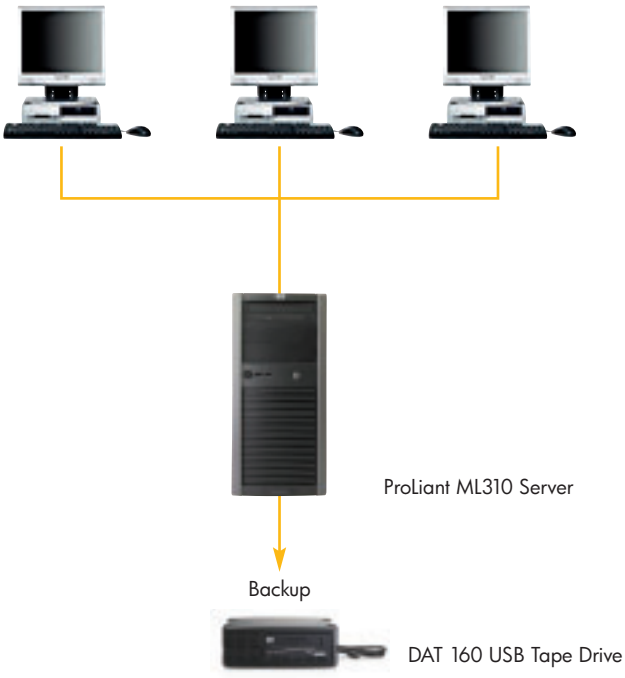
Data Protector Express Single Server Edition software is used to schedule incremental server backups of 3 to 5 GB each night, as well as a full 50 GB backup at the weekend. The system administrator takes the incremental backup tapes home to make sure the data will still be available if a disaster occurs.

All HP tape drives also include the Data Protector Express Bare Metal Disaster Recovery option. This is used in conjunction with the tape drive's One-Button Disaster Recovery (OBDR) feature, which provides fast and automated recovery of the entire system.

Furthermore, the low cost of DAT media and the inclusion of Data Protector Express Single Server Edition software and the Data Protector Express Bare Metal Disaster Recovery (BMDR) option add to the cost-effectiveness of the company's data protection solution.

"Knowing that HP's One-Button Disaster Recovery will help me get the system up and running quickly if the worst happens gives me peace of mind."

Single-server, entry-level tape backup solution



Typical configuration

Description	Part number	Qty.
HP StorageWorks DAT 160 USB External Tape Drive	Q1581A	1
HP DAT 160 cartridge, 160 GB	C8011A	8
HP Data Protector Express Single Server Edition software (included with HP StorageWorks tape drive)	—	1
HP Data Protector Express Bare Metal Disaster Recovery option software (included with HP StorageWorks tape drive)	—	1

A typical small business environment with two servers

A small accounting and financial services company called Kalm Associates has a staff of 35, all of whom operate from a single office. The office manager has responsibility for the firm's IT systems, which are supported by a local reseller. The firm's infrastructure includes a file server, an HP ProLiant ML350 G5 Storage Server, to hold customer records. An additional server, an HP ProLiant ML370 Server, is used for e-mail and print jobs.

Recovery Time Objective:
If an outage occurs, Kalm Associates needs to recover data within 12 hours.

Recovery Point Objective:
If an outage occurs, Kalm Associates needs to recover data from the previous day.

Other considerations:
Kalm Associates has no online business-critical operations and requires only a daily data backup. A solution that is simple to operate is key.

DAS-based backup solution

The company selected an HP StorageWorks Ultrium 920 SCSI Tape Drive and HP Data Protector Express Single Server Edition software (included with the drive) to back up the 520 GB of data stored on the file server. The office manager takes the backup tapes home with her each day to protect the data from an on-site disaster.

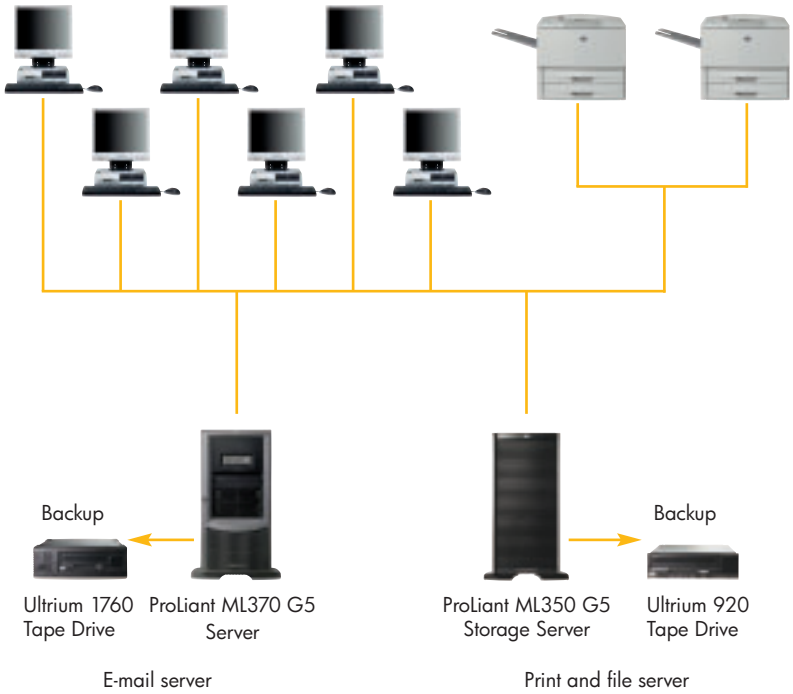
The print and e-mail server, which holds almost 1 TB of data, is backed up to an HP StorageWorks Ultrium 1760 SAS Tape Drive featuring Data Protector Express software. Data Protector Express Single Server Edition software is used to schedule a full backup every Friday night as well as incremental backups every other night. The office manager stores the weekly full backup media off site for four weeks, so that data can be restored to any point up to a month before.

For additional protection from more catastrophic disasters, Kalm Associates uses the Data Protector Express Bare Metal Disaster Recovery (BMDR) option in conjunction with the Ultrium 1760 Tape Drive's One-Button Disaster Recovery (OBDR) feature, which works with HP ProLiant servers. Each time a full backup is written to tape, a disaster recovery image is created automatically and written to tape and the Data Protector Express catalogue. If the worst happens, the repaired ProLiant server or replacement hardware can be booted from the Ultrium tape, and the Data Protector Express BMDR option will restore the operating system, applications and data automatically using only the backup tape.

This simple DAS solution makes life very easy for Kalm's office manager, who occasionally must restore lost or corrupted files but has never needed to perform a complete disaster recovery. However, on the advice of her reseller, she does a periodic test restore at weekends, just to make sure the process will work flawlessly should she ever need it.

"We needed a simple and reliable backup solution, and our reseller told us that you can't get any easier than HP StorageWorks Ultrium products."

DAS-based backup solution



Typical configuration

Description	Part number	Qty.
HP StorageWorks Ultrium 920 SCSI Internal Tape Drive	EH841A	1
HP SC11Xe PCIe Ultra320 SCSI HBA	412911-B21	1
LTO-3 Ultrium 800 GB RW Data Cartridge (for Ultrium 920)	C7973A	7
HP StorageWorks LTO-4 Ultrium 1760 SAS Tape Drive	EH1919A	1
HP SC44Ge SAS Host Bus Adaptor	416096-B21	1
HP LTO-4 Ultrium 1.6 TB RW Data Cartridge (for Ultrium 1760)	C7974A	7
2 x HP Data Protector Express Bare Metal Disaster Recovery option software (one copy included with HP StorageWorks tape drive)	–	2

A typical networked environment

ExeMed is a small firm that designs and manufactures specialised medical equipment. The firm has 100 employees, two offices and a dedicated three-person IT team that looks after a network of seven servers: five in the suburban head office, and two in the second office located in the city's financial sector. These are mainly Intel® processor-based servers, including an HP ProLiant DL360 Server, several non-HP servers and an HP Integrity rx4640 Server running the HP-UX 11i v1 operating system.

Recovery Time Objective:
If an outage occurs, ExeMed needs to recover data within eight hours.

Recovery Point Objective:
If an outage occurs, ExeMed needs to recover data from the previous day.

Other considerations:
Because ExeMed runs continuous business processes, backups must be performed frequently during the day, as well as nightly on specific servers at scheduled times.

LAN-based backup solution

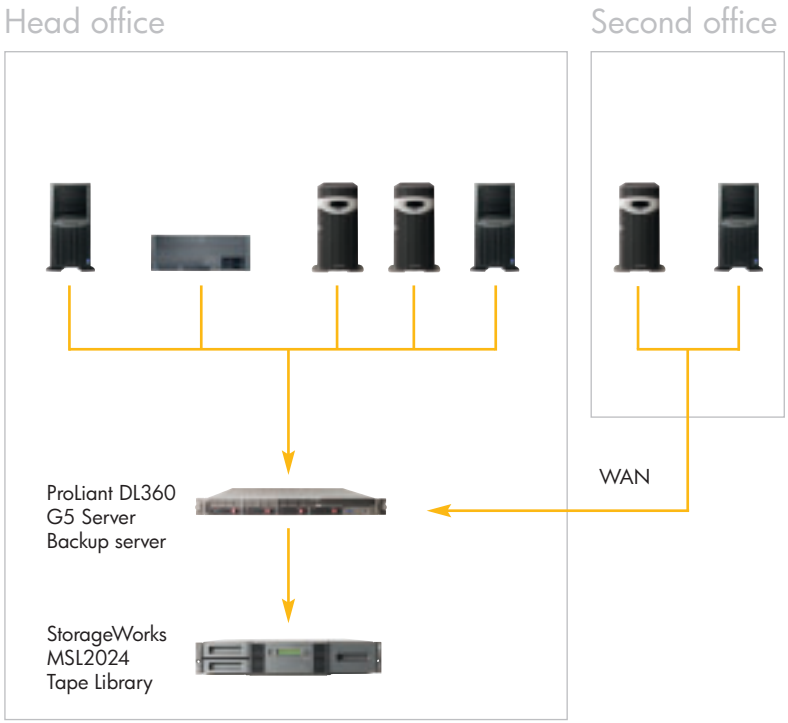
The company's data protection strategy is straightforward: incremental backups of 20 to 30 GB are performed each night over the LAN to an HP StorageWorks MSL2024 Tape Library with an HP StorageWorks Ultrium 1840 Tape Drive. Thanks to superdrive tape technology, each backup fits onto a single data cartridge that the IT manager can take home for off-site storage. A full backup (totaling more than 600 GB) is performed at weekends, with the tape library changing the cartridges automatically as required.

With its main supplier located on a different continent, the company's network must be available 18 hours a day so that the systems can be updated by the supplier during local business hours. That leaves only a six-hour window to complete the backup each night. The Ultrium 1840 Tape Drive is up to the challenge, backing up all the LAN's local office servers. By using LTO-4 Ultrium 1840 encryption, not only is data fully capable of being compressed and therefore maximising capacity, but encrypted backups can also be completed without a loss in performance. The two servers in the remote office are staged to a disk in the main office over the WAN using Data Protector Advanced Backup to Disk software, then copied to tape over the LAN along with data from the local servers.

Overall, the LAN-based solution has simplified IT management processes, allowing ExeMed to consolidate the backup from multiple servers onto a single device. For added simplicity, the MSL2024 tape library is housed in the same rack as the ProLiant DL360 Server, which manages the backup process in combination with HP Data Protector software.

"My backups need to be completed by 6 a.m., when the first employees arrive at the office. Moving up to the tape library means the whole cycle can be completed without human intervention, day in and day out."

LAN- and WAN-based backup solution



Typical configuration

Description	Part number	Qty.
HP StorageWorks MSL2024 1 LTO-4 Ultrium 1840 SCSI Tape Library	AJ033A	1
HP LTO-4 Ultrium 1.6 TB data cartridge	C7974A	24
HP Data Protector software	B6961AA	1
HP Data Protector Advanced Backup to Disk software	B7038AA	1

A typical environment for multi-tiered (D2D2T) data protection

Sabrestar is a midsized advertising agency that has four servers, each of which backs up to a stand-alone LTO Ultrium tape drive. This presents daily problems related to backup scheduling, backup completion within the window and tape media management (primarily tape rotation).

As more and more media are needed for each tape drive, costs continue to escalate. Furthermore, managing four individual backups puts undue strain on the company's limited IT staff. When backups fail, the staff must either rerun the previous night's backup (which affects server bandwidth and IT resources) or risk using an older backup copy.

Sabrestar need a solution that will enable them to consolidate their tape drives, yet still migrate much of their data to tape for off-site storage and compliance with regulatory requirements.

Recovery Time Objective:
If an outage occurs, Sabrestar needs to recover data within three hours.

Recovery Point Objective:
If an outage occurs, Sabrestar needs to recover data from the previous day.

Other considerations:
Sabrestar performs a full backup once a week, plus daily incremental backups during an eight-hour backup window at night. To reduce the strain on IT resources, Sabrestar needs a better solution for restoring lost files quickly without having to retrieve tapes.

Disk-based backup solution

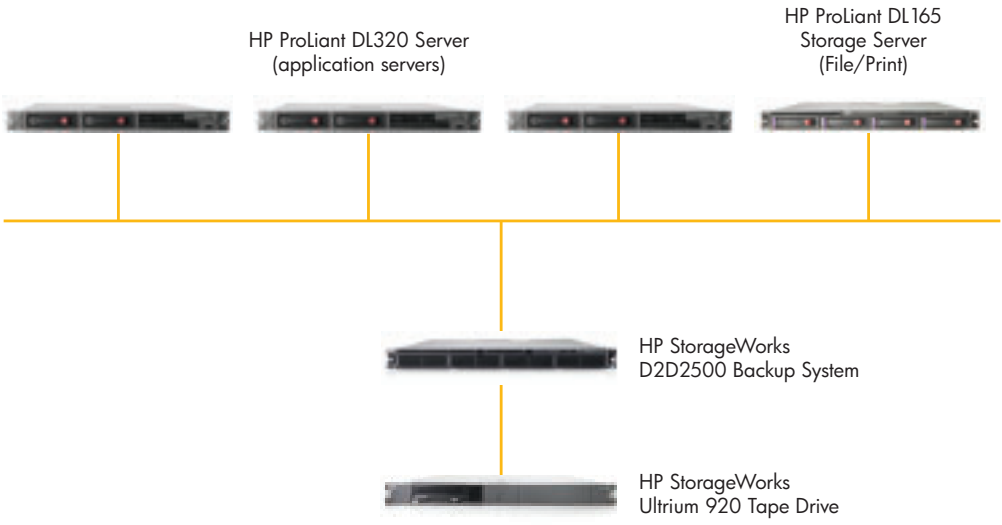
The traditional solution would be to transition the stand-alone tape drives to an automated solution, such as a tape autoloader. However, this could create further problems, such as trying to back up four servers to one autoloader in a given backup window. Additionally, restores might exceed their needed recovery time and tape media investments would continue to increase.

Adding a disk-based backup device such as the HP StorageWorks D2D2500 Backup System to the environment will both automate and centralise the backup process – reducing the strain on IT resources – and will make it possible to restore files much more quickly. By accessing backup data from a centrally managed disk-based device, restore times can be reduced dramatically. Because data is readily available online, access can be gained much more quickly than with direct backup to tape. The backup window can be met because multiple backups occur in parallel, at the same time.

Because the D2D2500 Backup System uses disk rather than tape media, Sabrestar would also see a decrease in their ongoing data protection costs, as well as fewer tape media management problems. The HP StorageWorks D2D2500 Backup System also features dynamic deduplication, which removes redundant data from its backup, significantly reducing the total amount of backup storage required, allowing Sabrestar to keep more backup data online before archiving to tape. The easy-to-use tape offload feature allows the company to copy or export cartridges from the D2D system to an Ultrium 920 Tape Drive, reducing traffic on the LAN when moving data to tape for long-term storage and disaster recovery purposes.

"I have so much more time to focus on strategic projects now. The backups really take care of themselves with the D2D Backup System."

Backup consolidation using a disk-based solution



Typical configuration

Description	Part number	Qty.
HP StorageWorks D2D2503i Backup System with 3 TB of disk storage	EH945A	1
HP Data Protector Express upgrade form HP Data Protector Express Single Server Edition	BB117BT	1
HP Data Protector Express Network Server Agent 3 Pack	BB122BA	1
HP Data Protector Express Application Online Agent	BB125BA	2
HP Ultrium RW data cartridge, 800 GB	C7973A	12
HP StorageWorks 1U Rack-Mount Kit with one LTO-3 Ultrium 920 drive	EH903A	1

A typical environment for high availability and performance

A growing number of businesses place round-the-clock demands on their core data; one might be the IT manager at a company called Delvin Market Research. He wants to increase the availability and performance of the company's Microsoft SQL Server database while reducing backup cycles. To do this, he has decided to replace the existing direct-attached storage environment with a cost-effective, high-capacity SAN.

Recovery Time Objective:
If an outage occurs, Delvin Market Research needs to recover data instantly.

Recovery Point Objective:
Delvin Market Research needs to recover all data created prior to any outage.

Other considerations:
The SAN environment offers high scalability, availability and utilisation of disk resources, plus simple and centralised management. Delvin needs a backup and recovery solution to match.

Entry-level SAN backup solution

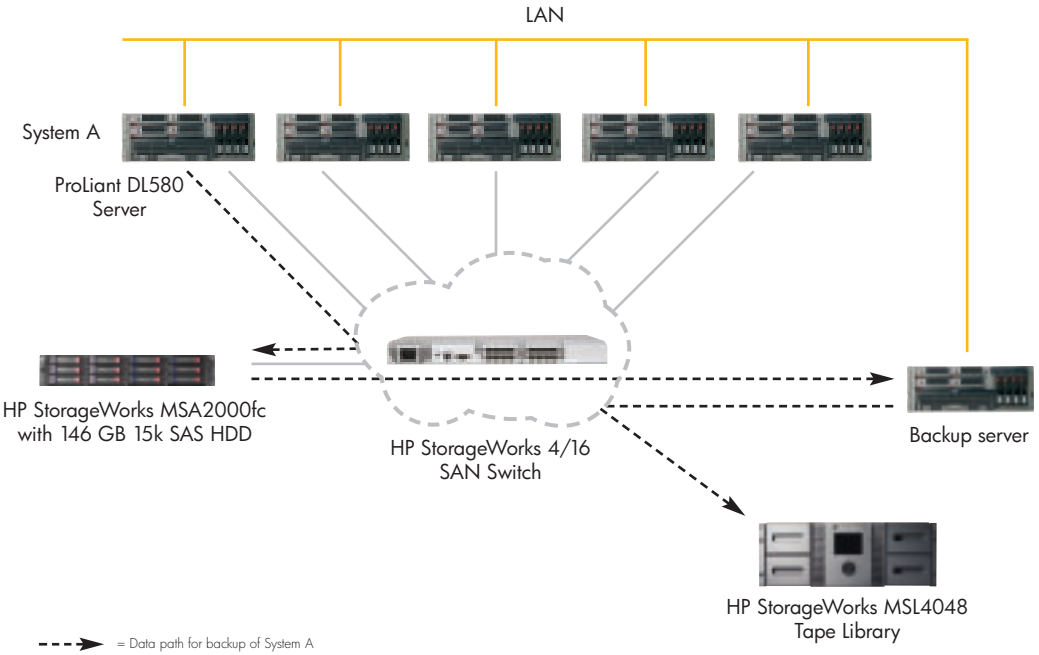
Taking advice and support from the experts at HP Services, Delvin based its solution on an HP StorageWorks 2000fc Modular Smart Array (MSA2000fc), five HP ProLiant DL580 Servers, an HP StorageWorks MSL4048 Tape Library with HP StorageWorks LTO-4 Ultrium 1840 Fibre Channel Tape Drives and selected HP storage software products. HP Data Protector software works as the core manager of the solution to monitor backup and restore operations quickly and easily, so system performance and staff productivity are increased significantly.

The LTO-4 Ultrium 1840 Fibre Channel Tape Drives deployed within the MSL4048 tape library provide more than enough performance for the daily backup operations, while the MSA2000fc array works seamlessly with HP StorageWorks Storage Mirroring software. This enables IT staff to replicate critical data for near-instant recovery following disaster.

With this solution, Delvin Market Research now has the technology in place to back up data more efficiently than ever – and to serve increasing customer demands by keeping more data online. Delvin also has the tools and utilities to recover any corrupted or lost data in minutes.

"Deploying this SAN solution has helped increase the availability and performance of our database fundamentally. We have managed to reduce our backup cycles significantly and are now able to recover our data in minutes if needed."

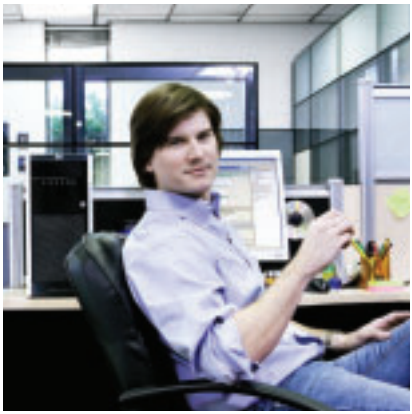
Entry-level SAN backup solution



Typical configuration

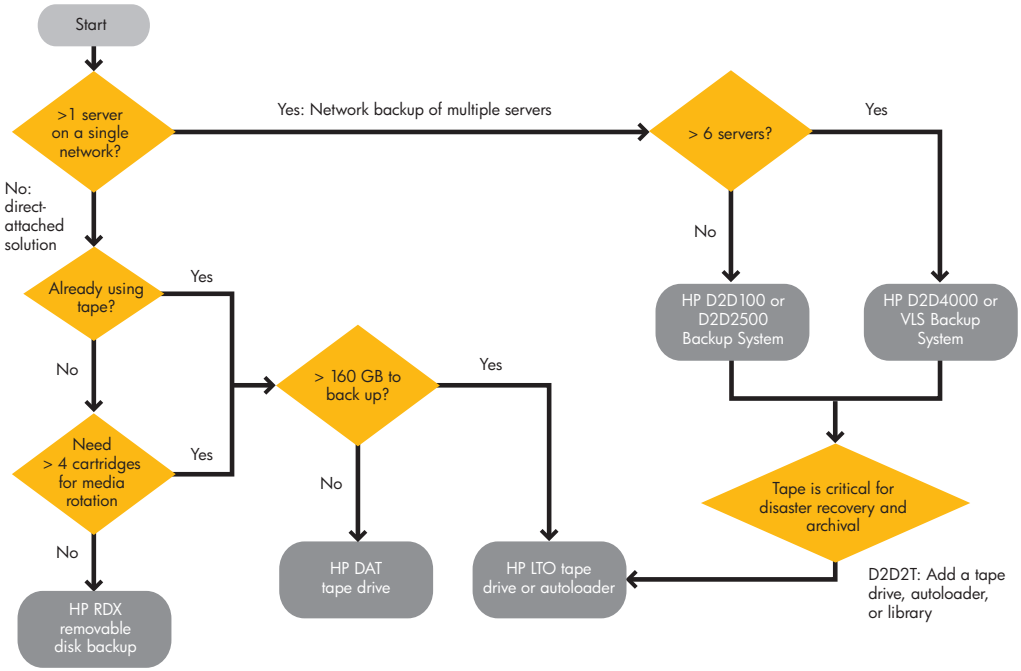
Description	Part number	Qty.
HP StorageWorks MSA2000fc	AJ743A	1
146 GB 15K universal SAS disk drive	AJ735A	8
HP StorageWorks 4/16 SAN Switch	A7985A	1
HP StorageWorks FCA2242SR 4 GB Fibre Channel, HBA	A8002A	6
HP 4 GB short-wave SFP transceivers	A7466A	8
HP 5 m LC/SC Fibre Channel cable	221691-B22	8
HP StorageWorks MSL4048 2 LTO-4 Ultrium 1840 4 Gb Fibre Channel Tape Library	AJ038A	1
HP Ultrium RW data cartridge, 1.6 TB	C7974A	48
HP Data Protector software	B6961AA	1
HP Data Protector SAN Drive Extension software	B6953AA	1
HP StorageWorks Storage Mirroring software	T5440A	5

Part 3:
Choosing your products and services



HP provides a wide range of data protection solutions, from tape and disk drives to RAID and data mirroring, in combination with storage software to manage it. The decision tree shown below will help guide you to the right solution for your specific needs.

Choose a solution that fits your needs



HP StorageWorks tape-based technology solutions

The unique characteristics of tape-based storage make it the foundation of a solid data protection strategy. Because it is small and portable, tape storage allows you to take data off site, giving you protection against site-wide disasters, virus attacks, or equipment failures. Tape's low cost and long media life also make it an effective means for long-term data archiving. HP offers a full range of tape-based solutions, including tape drives, autoloaders and libraries.

HP StorageWorks tape drives

All HP StorageWorks DAT and Ultrium tape drives provide a complete backup solution that includes the following:

- **One-Button Disaster Recovery (OBDR)** – a unique HP feature that allows you to restore systems quickly and effortlessly with the touch of a single button
- **HP Data Protector Express Single Server Edition software** – an easy-to-use backup application to protect a single server
- **HP Data Protector Express Bare Metal Disaster Recovery software** – an option of Data Protector Express that creates bootable optical or tape media (with HP tape drives) from a full backup to automate recovery of a repaired ProLiant server after a disaster or serious failure
- **HP Library and Tape Tools (L&TT)** – a comprehensive suite of tape drive management utilities

HP StorageWorks DAT drives
DAT drives are ideal for entry-level business protection needs. They combine proven reliability with a low cost of ownership, helped by affordable DAT media. The range consists of 40 GB, 72 GB and 160 GB drives, available as internal, external and rack-mounted models.

HP StorageWorks Ultrium half-height drives
Half-height LTO Ultrium drives provide simple integration with workstations and servers while retaining the capacity of traditional full-height drives. Available in 200 GB, 400 GB, 800 GB and 1.6 TB capacities, they provide unique HP features such as dynamic data rate matching (DDRM) and a choice of SCSI or SAS interfaces.

HP StorageWorks Ultrium full-height drives
Full-height Ultrium drives combine a rugged design made for demanding 100 per cent duty cycles with outstanding performance. The HP StorageWorks Ultrium 1840 Tape Drive backs up 1.6 TB of data in less than two hours. Our full-height Ultrium drives include dynamic data rate matching (DDRM), Write-Once, Read-Many (WORM) capabilities, data encryption for greater levels of information security (on LTO-4) and low power consumption. They are available in 200 GB, 400 GB, 800 GB and 1.6 TB capacities.

HP StorageWorks tape blades

Exclusive to HP BladeSystem c-Class enclosures, HP StorageWorks tape blades provide an integrated data protection solution for enclosures not connected to a storage area network (SAN). These tape blades provide direct backup of the adjacent server blade with network backup capability for all other storage residing within the enclosure.

HP StorageWorks tape autoloaders

Designed to automate media management and the backup process, autoloaders are ideal for environments that have outgrown stand-alone tape drives and have RTOs of hours to days. All models come with HP Data Protector Express Single Server Edition software and the HP Data Protector Express Bare Metal Disaster Recovery option.

HP StorageWorks DAT 72x10 Autoloader
For environments using DAT technology that have longer backup windows, the most cost-effective automated solution is the ten-slot DAT 72x10 autoloader, which provides more than a week of unattended backup for a single server, with room for a cleaning cartridge, too.

HP StorageWorks 1/8 G2 Tape Autoloader
HP 1/8 tape autoloaders are equally at home in a data centre rack or on a desk next to the office server. They are equipped with a choice of tape drives and house up to eight cartridges. Ideal for LAN environments, the 1/8 tape autoloaders have a high duty cycle that makes them suitable for backing up multiple servers.

HP StorageWorks tape libraries

For consistent, automated backup of large volumes of data – without the need for specialised resources or time-consuming processes – HP StorageWorks tape libraries provide a perfect solution. They are simple to manage, fit into multi-vendor environments easily, work well in LANs or SANs and come complete with intelligent tools to streamline backups and simplify management.

HP StorageWorks MSL2024, MSL4048 and MSL8096 Tape Libraries
These tape libraries provide dense, high-capacity storage without requiring much valuable rack space. The MSL4048 and MSL8096 tape libraries can handle the sort of backup and recovery jobs typically managed by larger tape libraries, thanks to a maximum compressed capacity of up to 153.6 TB when using HP StorageWorks Ultrium 1840 Tape Drives.[2] The libraries are perfect for businesses with remote offices because of their integrated Web-based management that allow them to be managed centrally.

[2] Assumes 2:1 data compression.

1/8 G2 autoloader

MSL2024

MSL4048

MSL8096

HP StorageWorks disk-based technology solutions

Disk-based backup has generated a lot of interest in the last few years because it can deliver real benefits to a business. Disk-to-disk (D2D) backup automates the backup process and makes it practical to perform more frequent backups – or even continuous data protection – thus meeting a more demanding Recovery Point Objective (RPO). Storing backup data online can provide quicker access in the event of data loss, and these fast restores improve the ability to meet a challenging Recovery Time Objective (RTO). To meet diverse business requirements, HP provides a number of different solutions for disk-based data protection.

While disk-based data protection can remove some of the human error and hardware problems that can affect a tape-based backup process, most environments require the additional protection of tape to protect against all types of risk. Two-stage backups, often called disk-to-disk-to-tape (D2D2T), combine the benefits of disk and the benefits of tape. With the exception of certain removable disk systems, HP's range of disk-based data protection solutions can all be combined with tape to provide the best of both.

HP StorageWorks RDX Removable Disk Backup System

The HP StorageWorks RDX Removable Disk Backup System is an easy-to-use, affordable and rugged removable disk backup solution for workstations and entry-level servers. It is the ideal entry-level backup solution for budget-conscious micro or small businesses that have little or no IT resources and lack adequate backup processes. Drag-and-drop file access features in the RDX Removable Disk Backup System make backup easier and more convenient.

RDX Removable Disk Backup System

D2D130

D2D2500

D2D4000

HP StorageWorks D2D Backup System

For businesses that are looking to enhance their data protection strategy by using both disk and tape, the HP StorageWorks D2D Backup System provides reliable, automated backup of up to six servers in a single, self-managing device. Designed expressly for smaller businesses with limited IT budgets, the D2D Backup System automates daily backups, reducing the tasks associated with data protection management – an ideal solution if you have limited IT resources.

Because backup data is held online, this disk-based solution makes restoring lost or corrupted files a quick and easy process. Consolidating the backup of multiple servers means that there are fewer devices to manage, and the browser-based interface allows you to manage the device remotely from anywhere on your network.

This simple solution fits right into existing Windows and Linux environments, in many cases existing tape drives can still be used for off-site copies and disaster recovery, connecting to either the host or backup server, or by connecting the tape drive directly to the D2D Backup System. Existing backup software may also be used because the D2D Backup System is managed as a tape device.

The D2D2500 and D2D4000 systems extend the value of disk-based backup by including deduplication technology to improve disk capacity, increase efficiency and extend the amount of data that can be stored on disk before archiving to tape. Retaining more backup data on disk for longer periods of time results in greater data accessibility for rapid restore of lost or corrupt files and reduces the impact on business productivity.

For more information about the HP D2D Backup System, visit: **www.hp.com/go/d2d**

HP All-in-One Storage Systems

The HP StorageWorks All-in-One (AiO) Storage System provides shared iSCSI SAN storage for application servers and file/print serving in a single unified device that can be backed up directly to tape using the integrated data protection software.

In addition to providing primary storage consolidation, an HP AiO Storage System can be used as a D2D backup target for other devices on the LAN but is not designed to be a dedicated disk-based backup target.

HP StorageWorks tape devices can be connected directly to the AiO Storage System to provide off-site, long-term archival and disaster recovery storage. HP StorageWorks Storage Mirroring software can also be installed on the AiO Storage System to enable replication and advanced disaster recovery between systems or across sites.

For more information about HP All-in-One Storage Systems, visit:
www.hp.com/go/aiostorage

HP data protection software products

HP provides backup and storage management software suites to suit all environments. For example, HP Data Protector Express software is designed for protecting the systems and data of single machines and small networks. For larger and more complex environments, there is HP Data Protector software.

The HP StorageWorks Storage Mirroring software prevents data loss due to failure, error, or disaster by providing replication of your Windows, Exchange and SQL Server data to another Windows server.

HP Data Protector software

HP Data Protector software enables rapid, automated and efficient backup and recovery over unlimited distances, from either disk or tape. It fully integrates with HP SAN solutions for a high level of business continuity and availability. Furthermore, HP Data Protector software allows you to reduce backup windows and secures high availability of data and systems by providing fully integrated Zero Downtime Backup and Instant Recovery.

Data Protector 6.0 software provides:

- **Virtual full capability:** Reducing time and resources needed to perform full backups and improving tape utilisation with "pointers"
- **Instant, automated e-mail recovery:** Enables mail services to continue during backup as well as allow extremely fast recovery of terabytes of e-mail data
- **Data encryption:** Performed using 256-bit Advanced Encryption Standard (AES), which helps protect data from unauthorised access and allows backups to meet all compliance and regulatory requirements for government agencies and financial institutions

For more information, visit the Data Protector software Web site at:
www.hp.com/go/dataprotector

HP Data Protector Express software

For smaller and less complex environments, HP Data Protector Express software is both powerful and easy to use – with a Windows-like interface and wizards. Both the Data Protector Express Single Server Edition software and the Data Protector Express Bare Metal Disaster Recovery option are included with all HP StorageWorks tape drives and autoloaders.

Data Protector Express software provides simple, affordable and reliable backup and recovery for file servers, application servers and Windows-based desktop systems. It runs in Windows, Linux and NetWare environments, and supports tape, disk, optical and removable devices as backup targets. You can encrypt backup data easily and securely, and if you lose a backup tape, the protected data is not compromised.

For more information on Data Protector Express software, visit:
www.hp.com/go/dataprotectorexpress

HP StorageWorks Storage Mirroring software

To prevent data loss from failure, error, or disaster, HP StorageWorks Storage Mirroring software provides replication and failover of your valuable Windows, Exchange and SQL data to another Windows server. Proactive replication is a key strategy that can be coupled with tape backup and/or snapshot technology for continuous data protection and point-in-time copies. Keeping data located at two sites with the StorageWorks Storage Mirroring server failover function means that your business can recover static and transactional data in seconds, without losing productivity.

HP StorageWorks Storage Mirroring software provides host-based, continuous replication for small to midsized businesses seeking an alternative to fabric or array-based replication. Patented replication and failover technology capture byte-level data changes continuously as they happen and replicate those changes to one or more target servers to any location – with no geographic limitations. StorageWorks Storage Mirroring software's flexibility, resource optimisation and application-specific protection enable you to solidify your data and disaster protection strategies.

For more information about StorageWorks Storage Mirroring software, visit: **www.hp.com/go/storageworks/storagemirroring**

HP Data Protector Express

HP media

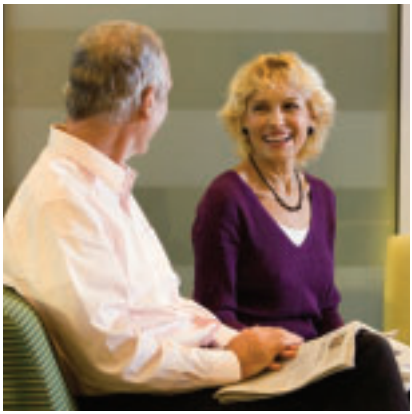
The value of HP media

HP data cartridges endure a continuous testing program to guarantee the high levels of quality specified by HP. Data cartridges are ideally suited for backup and restore operations that have critical requirements for capacity, performance and cost.

The price of storage media is small compared to your need to save and store critical information reliably. That is why HP has a quality control program that tests HP media, pushing them to extremes. Furthermore, each batch of media must pass these tests before it is shipped. HP also has 20 custom-built test chambers, in use around the clock, that emulate real-world environmental conditions in 70,000 tests and 1.3 million test hours a year. The goal is to make sure that every tape works reliably the first time and every time it is loaded into a drive.

HP's 20-year track record of saving and restoring more than one billion TB of data means that you can feel secure with HP storage supplies. In fact, HP is so confident of media quality that we guarantee the products for the lifetime of their use – up to 100 years of archival life.

Measure the value of successful backup and restore processes against the cost of a short-term disruption – or even a complete interruption – of your business. Protect your investment with HP storage media. HP's media testing exceeds ANSI and ISO/IEC requirements, and maintains a defect level among the lowest in the industry.



Tested thoroughly onHP drives

Because HP is committed to providing a whole solution for our customers, we ship drives with everything you need – including the media. That is also why HP media are tested on HP drives more than on any other; every element must meet HP's stringent requirements, rigorous testing standards, and compatibility. No matter which hardware you use, HP's exacting tests mean you will be able to back up your data successfully, so that the next time you restore them, your data will be there.

HP Services

HP Services provides support for each element of your IT environment, at every point of the IT life-cycle.

HP Care Pack Services: We care about IT

When it comes to keeping your business competitive, it is good to know that you are not alone. HP Care Pack Services mean expert advice and personalised, reliable IT support that suits you – at a price you can afford. Select from an easy-to-buy, easy-to-use line of packaged services that complement your staff and skills with HP-certified expertise. Our experience and insights help you focus your IT resources to optimise your business results. Choose from the following range of services:

- **Deployment Services** make sure your products are operational with minimal disruption to your business.
- **Hardware Support Services** deliver high-quality on-site and off-site support.
- **Software Support Services** provide direct access to HP Response Centres for rapid problem diagnosis and resolution, plus substantial savings on software updates.
- **Support Plus/Support Plus 24** provide an integrated set of hardware and software problem resolution features at predictable packaged prices.
- **Proactive 24 Service** is an integrated hardware and software support solution that combines proactive problem preventive measures with responsive technical assistance.
- **Critical Service** provides expert proactive services to keep your mission-critical hardware and software highly available, as well as rapid reactive support for seamless problem resolution.

Why buy an HP Care Pack?

These convenient service packages

- Reduce time to implementation and time to revenue return through installation and integration with your existing IT environment
- Give you direct access to HP-certified storage support teams, complemented by solution partnerships with leading storage suppliers for technical and problem-solving expertise
- Provide committed response times for SAN and NAS environments to improve performance and reduce the downtime risks of your data protection solution
- Ease budget planning and reduce your management costs with fixed-cost support that includes parts and labour

For more information about HP Care Pack services, visit:
www.hp.com/services/storage_carepacks

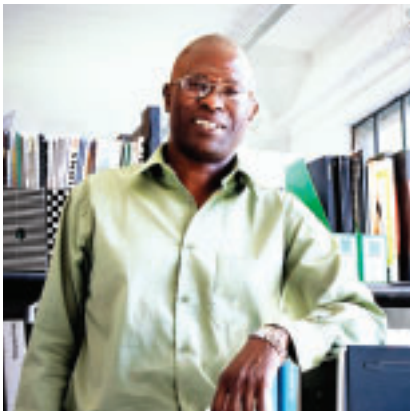
Further support

Education services

HP provides a range of training methods to fit your needs, including traditional instructor-led courses at one of our 120 training centres worldwide, on-site training customised to your needs, training at your facility, or even Remotely Assisted Instruction Learning that combines the best of traditional classroom training (including live instructors and labs) with the best of online training (no traveling required). Further, if you like learning on your own schedule, at your own pace, you can make use of e-learning opportunities on the award-winning HP IT Resource Centre, a "learning community" with extensive on-demand resources that can be accessed 24x7.

For more information about these services, contact your HP sales representative, authorised HP business partner, or visit:
www.hp.com/learn/storage

Part 4:
Complete your knowledge



Questions and answers

Q: Are HP storage backup products compatible with other manufacturers' servers?

A: All HP DAT and Ultrium tape drives, autoloaders and tape libraries, as well as disk-based solutions such as the D2D Backup System and VLS1000i are tested on leading third-party servers. This means that you are not tied to any particular vendor, and you can integrate multi-vendor products to your system as required.

For specific information, visit: www.hp.com/go/connect

Q: Can tape drives back up multiple servers?

A: HP tape drives and autoloaders can back up multiple servers. The most common configuration is to attach the tape drive or autoloader to a backup server, and then use the backup software to schedule the backup of servers connected to the LAN.

Q: When should an autoloader or a tape library be considered?

A: When you want to automate your backup process and schedule backups on certain servers at specific times to reduce human intervention, an autoloader is ideal. An autoloader with a single tape drive will provide efficient, unattended backup.

For businesses with uncertain data growth or that require a high storage capacity, HP StorageWorks MSL tape libraries provide centralised backup to a single automated device. This frees up valuable IT resources and provides a complete backup and restore solution for small to mid-range environments – with or without a storage area network (SAN).

Q: What benefits can disk-based backup add to my data protection strategy?

A: HP disk-based backup devices provide the advantages of both tape and disk backup, making them ideal if you want a D2D or D2D2T solution. In short, they are backup storage products that integrate easily into current IT infrastructures. They can automate backups, improve backup and restore performance, and reduce media management problems (rotation, cataloguing, storage and replacement). By allowing you to consolidate multiple backups on a single network-attached device, they also provide a solution for distributed environments in which backups must be managed physically. This will give you better control, efficiency and reliability.

Q: Are the backup purchases made today adaptable for the future if I need to upgrade due to data growth or critical operations?

A: At HP, we continue to invest in key tape and disk technologies that provide our customers with a clear strategy for the future. HP's wide range of backup products allows you to consider alternative capacities and technologies as your needs change.

Q: How does the HP StorageWorks All-in-One Storage System compare to a dedicated disk-based backup device such as the D2D Backup System?

A: The All-in-One storage products are designed to provide online access to files using their NAS capabilities and structured databases using their iSCSI SAN capabilities. HP All-in-One Storage Systems provide integrated data protection for such online data, but they are not dedicated disk-based backup solutions. If you are looking for a dedicated disk-based backup solution for servers on your network, then a solution such as the D2D Backup System or the VLS1000i would be a good match for your needs.

Q: What backup applications do HP StorageWorks products support?

A: HP data protection hardware supports a wide range of backup applications and solutions. Included with all HP tape drives and autoloaders is a copy of HP Data Protector Express Single Server Edition software, which allows you to install and work with your backup device from initial set-up. For larger and more complex environments, HP recommends HP Data Protector software. HP also supports various third-party backup and recovery software products on its tape drives, autoloaders and libraries.

For a complete list of supported backup applications and tape drive compatibility, refer to: **www.hp.com/go/connect**

For more information about automated tape solutions and virtual libraries, visit: **www.hp.com/go/ebs**

Q: Is the tape blade my only option for backing up data on my blade enclosure?

A: HP provides a wide range of data protection solutions for the HP BladeSystem c-Class enclosures. The tape blade is ideal for the remote office/branch office environment or for blade enclosures that are not connected into a SAN. For customers looking for external data protection solutions, HP provides both tape automation and virtual library systems.

For more information about tape blade compatibility, visit: **www.hp.com/go/connect**

Q: What are the benefits of data encryption in the Ultrium 1760 and 1840 tape drives?

A: Backup data is compressed before encryption, maximising the use of tape media. The encrypted backups are completed without a loss in server performance because the processing is done by the tape drive.

Q: What is HP Dynamic deduplication?

A: The HP patented Dynamic deduplication algorithm is designed specifically for smaller IT environments, such as remote and branch offices, to provide low-cost solutions with a small footprint. It uses in-line deduplication based on hash-algorithms with additional levels of error prevention and correction to verify the integrity of data backup and restore. Unlike some other forms of data deduplication technology, the HP Dynamic deduplication is independent of the data format recorded and works with all the leading backup application packages.

Jargon buster

Data deduplication
Data deduplication is a method of reducing storage needs by eliminating redundant data so that over time only one unique instance of the data is actually retained on disk. As a result, up to 50 times more backup data can be retained in the same disk footprint.

Disk-to-disk-to-tape (D2D2T)
D2D2T is a two-stage backup process that combines disk-based and tape-based data protection to achieve the benefits of both. Typically, a D2D backup is run during the backup window. The backup data will then be copied to tape in a separate operation during normal hours without affecting server operations.

Dynamic data rate matching (DDRM)
Dynamic data rate matching is a unique feature of HP Ultrium tape drives that allows the tape drives to adjust their speed continuously and dynamically to match the speed of the host and network. This prevents the stopping and starting that reduce overall performance and create wear and tear on both the drive and the media.

iSCSI protocol
iSCSI is a new networking protocol. It is similar to the Fibre Channel protocol, but it uses standard Ethernet-based IP (Internet Protocol) networks. iSCSI is particularly useful for small environments with lower performance requirements.

Redundant Array of Independent Disks (RAID)
RAID is a method of writing data simultaneously over multiple disk drives. It is used in disk arrays for increased data protection and/or increased performance.

Snapshots, clones and mirrors
Usually deployed in 24x7 mission-critical environments, these are disk-based copies of data that reduce backup and restore time to just seconds. Because a "snapshot" replicates pointers to data – not the actual data itself – it is virtually capacity free. When a snapshot is created, the array controller begins copying data to a clone – a full, identical copy of the data. A mirror is the same as a clone, but is located at a remote, second site for disaster recovery purposes.

Ultrium
Ultrium is a high-capacity tape format based on LTO technology. It is an open format used by multiple manufacturers that provides enhanced performance and reliability over earlier tape formats.

Virtual tape
Virtual tape is a disk-based technology that emulates one or more tape drives, autoloaders, or libraries. A virtual tape device appears to the backup software and other devices on the network as a physical tape device, making it easy to deploy in a traditional backup environment.

Write-Once, Read-Many (WORM)
WORM is a data storage technology that allows information to be written to storage media only once. It is used to prevent data from being altered or erased, and it helps organisations meet regulatory requirements for retaining data securely in an unalterable format. Data can be appended but not changed or overwritten.

Simply StorageWorks

Storage is easy when you choose HP.

For information about Simply Business Protection and Simply StorageWorks solutions, visit:
www.hp.com/eur/simply (Europe, the Middle East and Africa)
www.hp.com/apac/simply (Asia, Australia and New Zealand)

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Technology for better business outcomes