



hp storage

october 2002

technical blueprint

mid-market Exchange solution

executive summary

Messaging and collaboration tools are changing the way companies do business today. The ability to communicate with co-workers, customers, and suppliers through messaging applications is critical. With mission-critical data being sent and received, the issues of availability and storage in your messaging system are of utmost importance to the success of your business.

Exchange 2000 from Microsoft is a leading messaging application for large and small businesses today. Given the increasing importance of this messaging application to our customers, HP provides technical blueprints to build tested and supported Exchange solutions. These solutions are designed to meet your messaging needs today and to grow with your requirements over time. This flexibility and scalability ensure your solution provides you the lowest total cost of ownership possible.

This document presents an Exchange 2000 solution supporting up to 5,000 users. It provides:

- A storage solution built around the HP StorageWorks Virtual Array 7410, providing exceptional data protection and availability with ease of management.
- A highly available solution based on clustered HP servers with multiple paths managed by the HP Auto Path VA software and Fibre Channel-connected Storage Area Networks (SANs).
- A scalable solution that can grow with your requirements.

Diagrams, design rules, scalability options, and a bill of materials are included for the example configuration. In addition, information is provided on HP Services that can help you design, install, and maintain your Exchange 2000 messaging application. See the "for more information" section at the end of this document for additional information on HP Exchange solution blueprints.

today's challenges in messaging applications

Exchange 2000 from Microsoft is one of the leading business-critical messaging applications available today. As more and more business activities rely on its operation, the cost of its failure can pose a significant threat to a company's success. The three major concerns customers have for their Exchange 2000 environment are:

- Availability — eliminate downtime and minimize the recovery window in case of downtime
- Scalability — scale up capacity and performance as an organization grows without affecting availability
- Manageability — establish effective management to achieve availability and scalability requirements

why an hp Exchange solution?

Figure 1 presents a logical view of the mid-market Exchange solution.

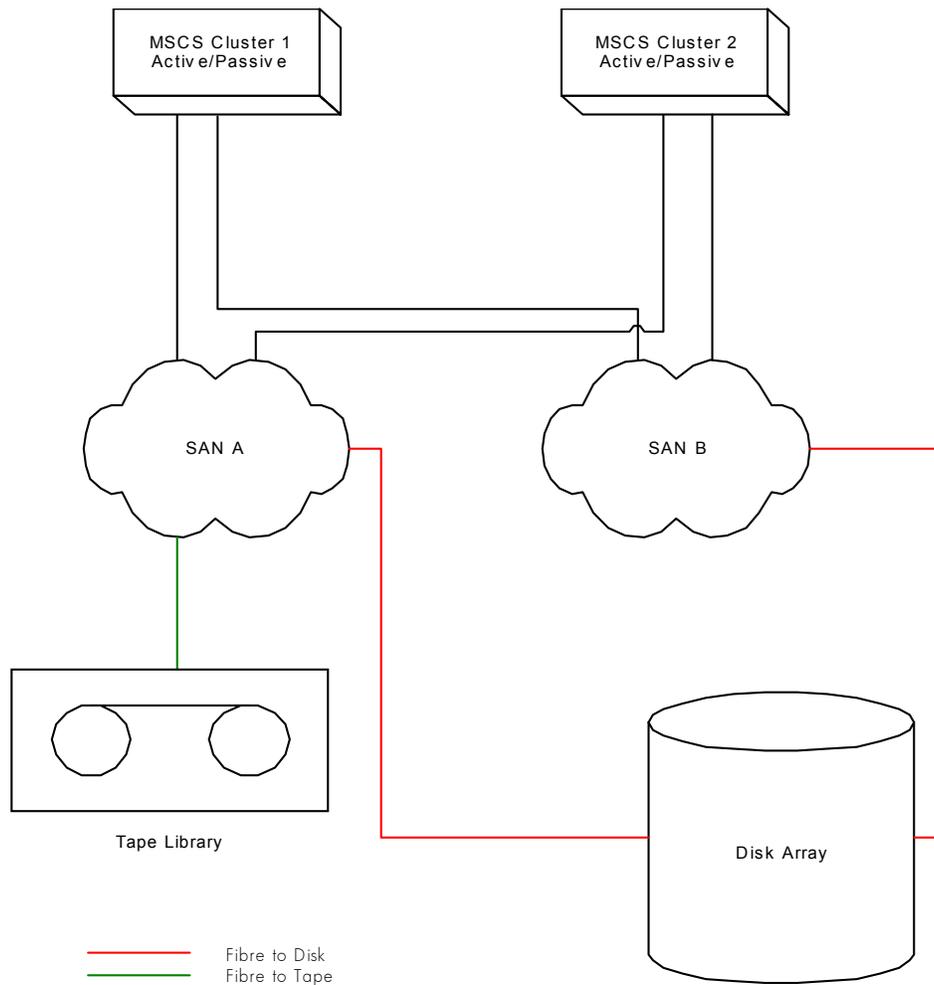


figure 1 - mid-market Exchange solution logical view

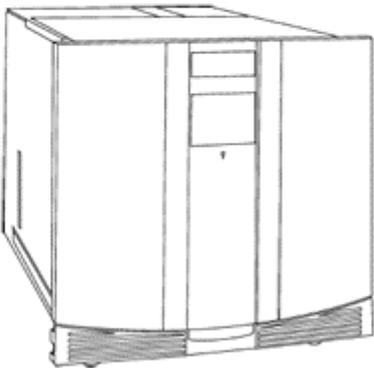
HP provides a tested and supported Exchange solution built with world-class servers and storage, supported by a single point of contact—HP. HP servers and storage are Microsoft-certified platforms. In addition, as a result of the strong services alliance between HP and Microsoft that spans over 15 years and the ongoing collaboration around key Microsoft technologies, HP can provide you with the highest level of services and support for Microsoft technology available today. With a service and support organization of over 65,000 professionals in 160 countries and a broad portfolio of services, HP offers customers the peace of mind that comes from knowing that their solution works right now and can expand into their future with them.

HP servers consistently rank among the top performing platforms in Exchange testing, as reported by Microsoft (www.microsoft.com/exchange/techinfo/planning/2000/PerfScal.asp). This solution is designed around an HP DL580 G2. HP servers provide a broad range of server-based solutions for a variety of needs. These servers feature the latest technology and can be configured to meet your specific requirements, including the number of processors, the amount of available RAM, or the number of network adapters. HP service and warranty offerings make HP servers the perfect platform for your Exchange solution.

HP StorageWorks tape libraries and HP OpenView Storage Data Protector software provide a secure and manageable solution for customer data protection. Data Protector and Exchange integration provides flexible backup protection with minimal impact on system performance and application availability. Depending on the available hardware, Data Protector can write backup streams to the same tape drive or to different ones. Backup streams can either go to devices locally attached to the Exchange server, go through the LAN to any system or systems, or make use of a SAN and move the data with maximum performance to Fibre Channel-connected devices. By using this flexible architecture Data Protector allows you to distribute the backup load and achieve the lowest possible backup times. Data Protector is scalable with a customer's infrastructure to provide highly reliable and cost-effective backup in systems of any size.

The va7410 uses HP virtual array technology to deliver the best availability and manageability of your data. A single va7410 delivers extremely high availability—up to 99.95 percent uptime. The disk-based virtualization technology in the va7410 provides IT administrators with storage solutions that increase operational availability while reducing the IT management costs. The use of RAID 5DP can virtually eliminate data corruption.

key components

<p>HP ProLiant DL580 G2</p> 	<ul style="list-style-type: none"> ▪ Four-way Intel Xeon 1.6 GHz ▪ Two 72 GB disk drives ▪ 4 GB SDRAM ▪ Hotswappable, redundant power supplies and fans ▪ 4U rack-mountable enclosure
<p>HP StorageWorks SAN Switch 2/8 EL</p> 	<ul style="list-style-type: none"> ▪ Eight 1 Gb/2 Gb universal autosensing ports ▪ 1U rack-mountable enclosure
<p>HP StorageWorks MSL5060 Tape Library</p> 	<ul style="list-style-type: none"> ▪ Up to 4 HP Ultrium 230 drives ▪ Up to 6 TB native storage capacity ▪ 60 slots
<p>HP StorageWorks Virtual Array 7410</p> 	<ul style="list-style-type: none"> ▪ Up to 7.7 TB (with 6 ds2405 disk enclosures) ▪ Up to 99.95% uptime ▪ Available drive capacities: 18 GB, 36 GB, 73 GB

mid-market Exchange solution

This solution supports up to 5,000 users, each with a 50MB mailbox.

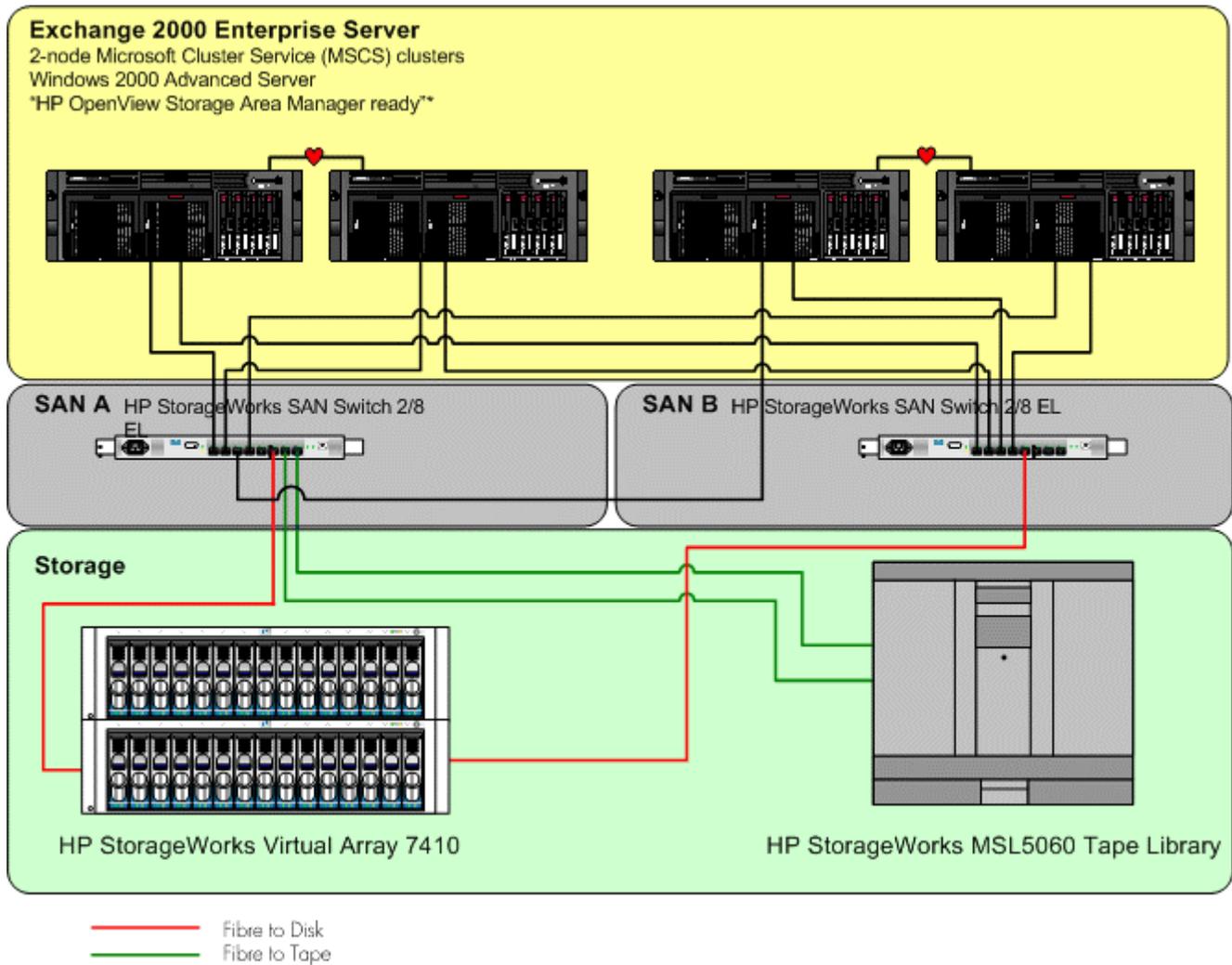


figure 2 - example mid-market Exchange solution physical view

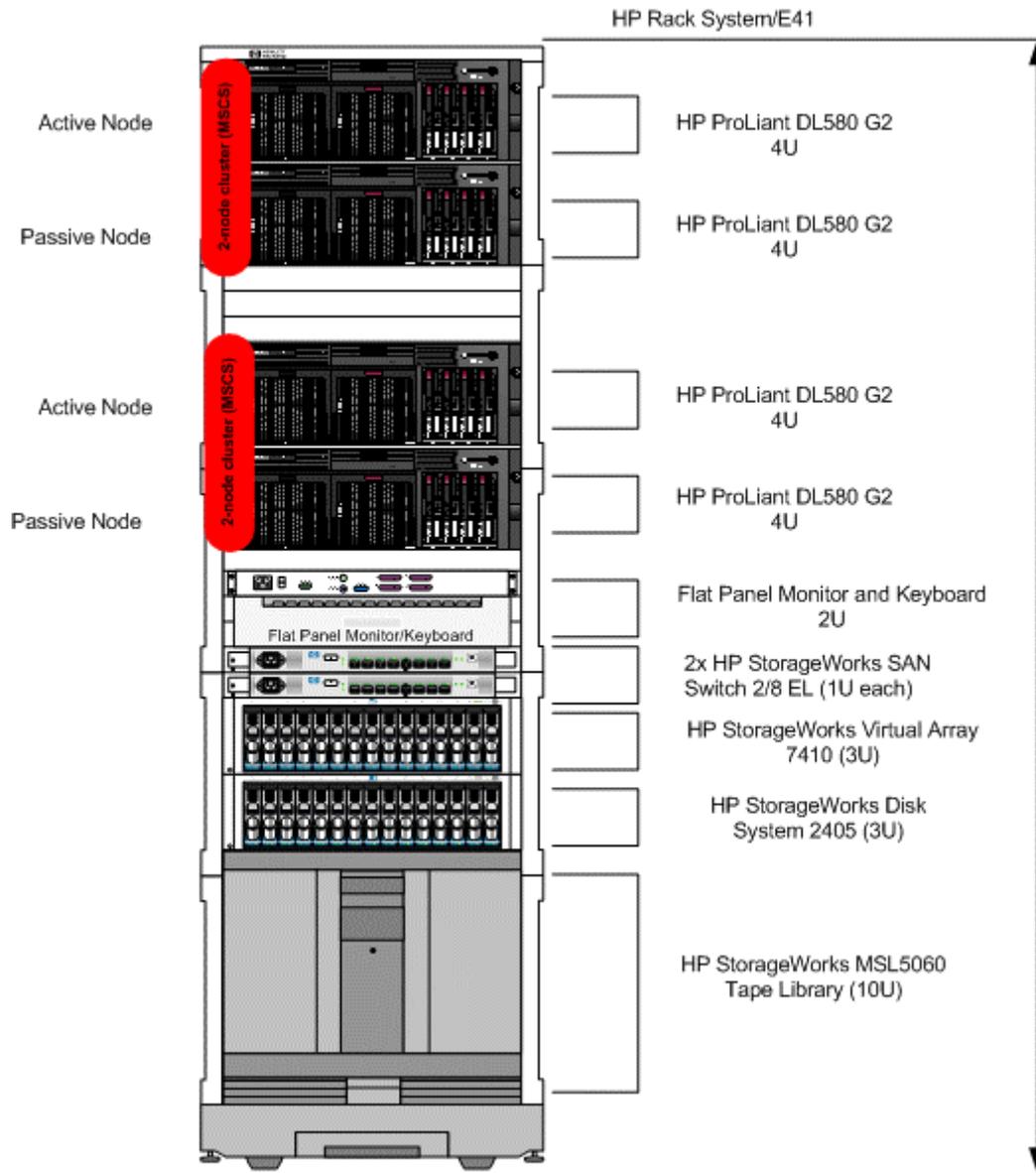


figure 3 - example mid-market Exchange solution rack

This Exchange solution can be racked in an HP Rack System/E41 rack. The example rack in Figure 3 includes an HP rackmount flat monitor and keyboard. This optional component provides device management capability at the rack in a minimum amount of space.

mid-market Exchange configuration

The example Exchange Solution in this blueprint can be modified to meet specific customer needs. The following are assumptions, design rules, and scalability options. This information is intended as a guide in configuring a specific Exchange Solution to meet a customer's requirements. The HP Exchange Solution Design Wizard may be used to build configurations using different assumptions and requirements. See your HP sales representative for more information.

assumptions:

Exchange usage profile

Exchange parameter	value	Exchange parameter	Value
Mailbox size	50MB	Internet users	10%
Maximum number of users	5,000	Bridgehead servers	No
Average message size	10KB	Front-end servers	No
MAPI users	90%		

Exchange architecture

- An existing Windows 2000 Active Directory Domain.
- Two Storage Groups with four mailbox stores each (300 users per store) per cluster.
- Two clusters are needed to support 5,000 users.

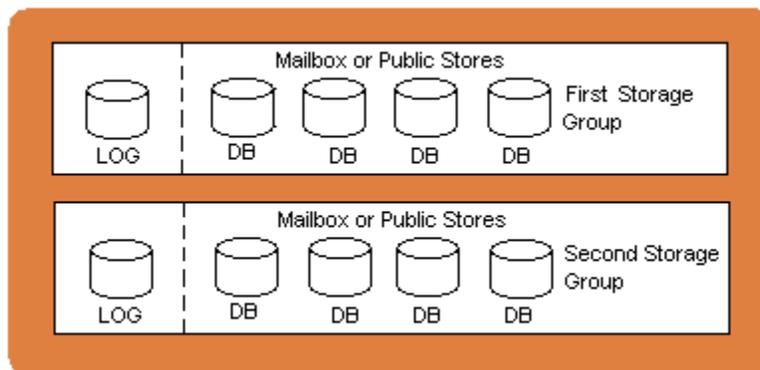


figure 4 - storage groups for each cluster

- Total storage required for mailbox stores is 250GB (each user has a 50MB mailbox). Per Microsoft recommendations, twice that amount of storage is provided to allow for restore and recovery operations. In addition, 10GB is provided for each Storage Group's log files and 10GB is provided for a quorum disk per cluster.
- Databases and transaction log files are on different LUNs on the disk array.
- Use different redundancy groups for different storage groups and logs on the va7410.

server

- Four ProLiant DL580 G2s with 4-way processors and redundant power supplies and fans. See "mid-market Exchange solution specifications" for specifics.
- Two HBAs per server with HP Auto Path VA software to manage multipath I/O.
- Two network interface cards (NICs) per server. One connection is needed for the cluster heartbeat.
- Exchange 2000 Enterprise, HP Auto Path VA, and HP StorageWorks Command View VA applications.
- Data Protector Disk Agent that is downloaded from a backup management server running HP OpenView Data Protector Cell Manager Starter Packs.

array

- va7410 array with two 512MB controllers.
- ds2405 enclosure to expand available storage.
- Disk capacities calculated with the va7410 array in RAID 1+0 mode with two hot spares.
- Eight LUNs created for use by Exchange (four for Storage Group log files, four for Storage Group databases).

tape

- HP StorageWorks MSL5060 Tape Library with four Ultrium tape drives.

design rules:

- Each Storage Group's log files and mailbox stores reside on separate LUNs in the same va7410 redundancy group.
- Active/Passive cluster configuration is highly recommended.
- Use multiple mailbox stores inside a Storage Group minimize the impact of restoring a single mailbox store.
- Use multiple paths for each server to provide additional availability.
- For best backup and restore performance, one tape drive per Storage Group is recommended.

backup strategy:

- Data Protector software is used to manage online backups.
- Circular logging is turned off. Log files are not overwritten after they are applied to a database. This allows the log files to be used with the last full database backup to recover a database. If you enable circular logging, you can restore data only up to the last backup. You may not be able to restore data from the last backup to the point of the failure because the required log files may not be available.
- Four tape drives, one for each Exchange Storage Group, allow for parallel backups from both clusters.
- Full Exchange database backups occur seven days a week. Full daily backups delete log files that contain transactions already committed to the database, minimizing the amount of storage space needed for log files. They also minimize the number of tapes needed for recovery.
- Backups during periods of low system load should be scheduled. A system load up to 30 percent has minimal impact on backup time.
- Several incremental backups should be run during the day.
- The Exchange application and the Active Directory are backed up regularly as part of the customer's normal backup procedure.
- Full Exchange database (all clusters) can be backed up in less than 1 hour using an HP StorageWorks MSL5060 Tape Library with Ultrium drives.
- Best case (no system load) backup/restore speed for each Exchange server in this configuration is approximately 190GB/h using Ultrium drives. Each Storage Group has its own tape drive (a 1:1 correspondence).
- Recovery time is determined by the restore time plus the time needed to replay the log files. The number of log files varies depending on the time interval between incremental backups and the arrival rate of new email messages.
- Full restore of all databases for each Exchange Server can be done in less than one hour using the MSL5060 Tape Library with Ultrium drives. Additional time may be necessary to replay log files for complete recovery.

availability

- The Exchange server database is available during backups.
- In the event that a single database recovery is required, only the individual Exchange database that is being restored is not available during the recovery. All other databases are available.
- The active/passive server cluster ensures availability should an Exchange server fail.
- Using Auto Path VA with redundant paths through two Fibre Channel switches increases the system's availability should an HBA, Fibre Channel cable, switch, or controller fail.
- Response time is less than 500ms.

scaling options for the mid-market Exchange solution:

adding additional messaging users

- Expand this configuration beyond 5,000 users by installing additional clusters, Fibre Channel switches, and disk storage. Add additional switches or upgrade 8-port switches to 16-port switches to provide additional ports to connect new clusters to each SAN.

scaling for 2,500 users or less

- Eliminate one server cluster from the configuration in Figure 2.
- To maintain high availability, the second switch in Figure 2 must remain.
- An MSL5030 Tape Library could be used in place of the MSL5060 Tape Library.
- The storage needed would be reduced by approximately 50 percent.

online storage

- va7410 capacity may be expanded online by adding additional disks and HP StorageWorks Disk System 2405 disk enclosures. Up to six ds2405 disk enclosures are supported by a single va7410. The virtual array is capable of instantly taking advantage of adding disks to array enclosures. If the Auto Include and Auto Format options are enabled, the array will add disks and re-distribute data across their new capacity to provide improved performance.

decreasing the recovery window

- Employing the HP Zero-Downtime Backup (ZDB) approach and Instant Recovery can significantly reduce the Exchange database recovery window, from hours to minutes. ZDB automates the creation and splitting of a business copy. Instant Recovery automates the recovery from that business copy.
- The recovery window also can be reduced from hours to minutes using the HP Fast Recovery Solution for Exchange. The Fast Recovery Solution automates the recovery of an Exchange database from a recovery-ready copy.

mid-market Exchange solution specifications

Use the latest released software, firmware, and driver revisions for each component. Your HP sales representative or channel partner can assist you.

server

Exchange 2000 Server Configuration

Operating System	Server	Host Bus Adapter	Processors	PC 1600-MHz Registered SDRAM	Disk Drives	Network Interface Cards
Windows 2000 Advanced Server, SP 2	DL580 G2	2 x 64-bit/66-MHz Fibre Channel	4 x 1.6 GHz	4 GB	2 x 72 GB	NC7770 PCI-X Gigabit Server Adapter (1 Built In, 1 expansion card)

interconnect

SAN Fibre Channel Infrastructure

Features	HP StorageWorks SAN Switch 2/8 EL	HP StorageWorks FC 1Gb/2Gb Switch 16B
Number of Ports	8	16
Per Port Line Speed	1.0625 / 2.125 Gbps, Full Duplex	1.0625 / 2.125 Gbps, Full Duplex
Note: Shaded areas represent hardware used in example technical blueprint configuration.		

storage

Disk Storage

Features	va7410 + Four ds2405 Disk Enclosures 18GB Drives	va7410 + Two ds2405 Disk Enclosure 36GB Drives	va7410 + Single ds2405 Disk Enclosure 73GB Drives
Number of va7410 Drives	14	12	12
Number of ds2405 Drives	54	22	11
Total Usable Capacity With RAID 1+0 and 2 Hot Spares	563 GB	563 GB	764 GB
Total Raw Capacity	1135 GB	1135 GB	1535 GB
Note 1: Shaded areas represent hardware used in example technical blueprint configuration.			
Note 2: One va7400 can support a total of six ds2400 Disk Enclosures.			
Note 3: A minimum of 23 disks is required. If HP AutoRAID is used, the number of disks needed will be different.			

Tape Storage

Features	MSL 5026 Tape Library	MSL 5030 Tape Library	MSL 5052 Tape Library	MSL 5060 Tape Library
Drive Type	SDLT	Ultrium	SDLT	Ultrium
Number of Drives	2	2	4	4
Number of Slots	26	30	52	60
Max Native Storage Capacity	2.86 TB	3 TB	5.72 TB	6 TB
Max Native Data Transfer Rate (Fully loaded)	22 MBps	30 MBps	44 MBps	60 MBps
Note 1: Shaded areas represent hardware used in example technical blueprint configuration.				

software components

Exchange Server Software

Software Name	Description
Microsoft Exchange 2000 Enterprise Server	Supports messaging application for multiple Storage Groups.
HP Data Protector Disk Agent	Allows data protection through automated backups. Downloads from Data Protector Cell Manager running on a backup management server.
HP Command View Virtual Array	Provides device configuration and management for the HP Virtual Array family of products.
HP Secure Manager Virtual Array	Provides LUN-by-LUN array-based data security for maximum protection.
HP Auto Path Virtual Array	Provides a graphical user interface to manage I/O multipath failover for single or clustered server configurations, automatically recognizing and configuring HP virtual arrays and supported host bus adapters.
HP OpenView Storage Area Manager - host agent component (optional)	Allows Exchange server to be managed as part of a SAN. Host agent was loaded on Exchange server during solution testing.

services

HP Services

Exchange consulting services	HP can help you assess your current and future messaging and collaboration solution requirements and then design a solution that leverages the full power of Microsoft Exchange to meet those needs enterprise-wide.
Microsoft education services	HP has fully certified and integrated education solutions that get your IT professional and end users up-to-speed quickly on your Exchange server system.
Microsoft software licensing services	HP can help you manage Microsoft licensing on a worldwide basis, optimizing software procurement and deployment for your entire organization.
Global deployment services	HP's onsite installation services are fully coordinated with our integration services to get your Microsoft Exchange solution up and running quickly and reliably.
Support services	Once HP has helped you build the messaging and collaboration solution, we keep it running strong with industry-leading software, hardware and network support services. These comprehensive services provide a single point-of-contact for both HP and multivendor products.

mid-market Exchange bill of materials

The following bill of materials (BOM) represents the hardware and software used in the example Exchange solution configuration in Figure 2 of this blueprint.

Exchange Server		
QTY	DESCRIPTION	COMMENTS
4	HP ProLiant DL580 G2 in the following configuration:	Windows 2000 Advanced Server (SP2 or better)
	4 Processors (1.6 GHz) 4 GB or more of PC1600-MHz SDRAM Redundant power supplies Monitor, keyboard, and mouse	
4	HP NC7770 PCI-X Gigabit Server Adapter	Each server uses one NIC for the cluster heartbeat
8	HP 72.8 GB 10K Ultra3 Wide SCSI-3 HD	Min 2 , Max 4 for each server.
8	64-bit/66-MHz PCI-to-Fibre Channel Adapter	
SAN Hardware Components		
QTY	DESCRIPTION	COMMENTS
2	HP StorageWorks SAN Switch 2/8 EL	
12	Optical SFPs	
HP Tape Libraries		
QTY	DESCRIPTION	COMMENTS
1	HP StorageWorks MSL5060 Tape Library	
2	HP StorageWorks Network Storage Router e1200	
4	HP StorageWorks Ultrium Tape Drive (LVDS)	
Tape Media		
QTY	DESCRIPTION	COMMENTS
40	HP Ultrium Data Cartridge, 200GB	
1	HP Ultrium Cleaning Cartridge	Minimum.
Disk Array		
QTY	DESCRIPTION	COMMENTS
1	HP StorageWorks va7410, two 512 MB controllers	
1	HP StorageWorks ds2405	
34	36 GB disk drives	18 GB, 36 GB or 73 GB disk drives available
Application Software		
QTY	DESCRIPTION	COMMENTS
1	MS Exchange 2000 Enterprise	SP2 or better
1	HP Data Protector	For backup management server
3	HP Data Protector Drive Extensions	
1	HP Command View VA	One license comes with the VA. Two are needed for one cluster. An optional management station also could be used to run Command View Virtual Array.
1	HP Auto Path Virtual Array + media kit	Need a 5 host license.
1	HP Secure Manager Virtual Array	

figure 5 - example mid-market Exchange solution BOM

for more information

Exchange solutions

Additional HP Exchange solution technical blueprints are available at www.hp.com/products1/storage/application/email/info_library.html

Entry-Level Exchange Solution

Enterprise Exchange Solution

For more business-level information, take a look at our business blueprint available at www.hp.com/products1/storage/application/email/info_library.html

To get answers on additional Exchange implementation questions, contact your HP sales representative who can consult our Solution Design Wizard to tailor a solution that meets your requirements.

hp Exchange solution components

To get more information on the individual components, go to www.hp.com

hp services

A full range of Exchange services are available including planning, implementing, and evolving your Exchange solution as your needs change. For full details see www.hp.com/go/mstechservices. Available services include:

Exchange consulting services

HP consultants can help you build an always-on messaging infrastructure that your organization can depend on. Available consulting services include:

- readiness assessment
- planning and design
- migration planning
- implementation

HP can help you address your requirements for availability, manageability, server consolidation, storage and capacity planning, backup and restoration, co-existence with other messaging systems, global deployment, definition of service level objectives, and implementation of management policies.

support services

These comprehensive and flexible services provide single point-of-contact for both HP and multivendor products. Specific support services from HP include:

- software support
- multivendor hardware support
- multivendor network support