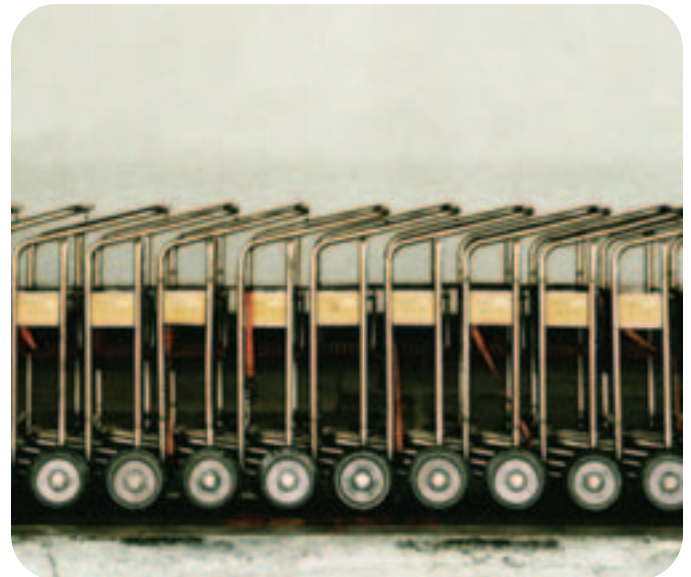
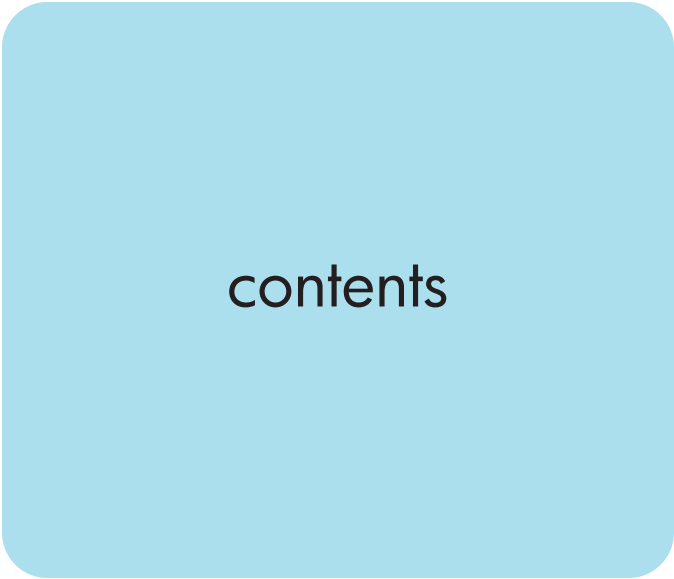


**hp storage area networking
for systems consolidation**





resource + ful



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overview

IT administrators are dealing with the explosive growth of digital information—email, multimedia applications, and other business technologies—which has created an extraordinary demand for more storage capacity. Given the complexity of today's IT environments, simply adding storage the conventional way is not always the answer. The fact is, in traditional server-centric storage systems, up to 50% of existing capacity can go unused. In a world of shrinking IT budgets, this waste is no longer acceptable.

IT managers must look for intelligent storage technologies that will maximize available resources now and into the future—strategies that integrate hardware, software, services, and support. This guide will explore the opportunities and benefits of migrating from direct-attached disk storage and LAN-based backup systems to an HP storage area network (SAN). HP solutions can help you take on the challenge of storing an ever-increasing volume of data while maintaining high network and application performance and delivering high return on investment.

introduction

for IT administrators,
the pressure is on for
more capacity and better
performance in less time

the limits of traditional storage technology

For years, businesses have relied almost exclusively on the traditional direct-attached and LAN-based backup storage management architectures. However, as demand on the SCSI bus that supports these models increases, the network storage capability and overall system performance may decrease.

The pressure is on for IT administrators to find better ways to get more storage capacity without compromising network availability, reliability, and efficiency.

today's storage requirements include:

- the ability to support a wide array of operating systems, platforms, connections, and storage architectures
- universal data access
- seamless scalability
- centralized administration for increased performance and uptime

That's why HP has developed a new approach to storage management based on the concept of federated storage area management (FSAM): HP's FSAM strategy is focused on the development and implementation of a *network-centric* storage approach, with the goal of delivering **ten times the storage scale** using the same number of storage systems administrators.

FSAM is not a product. Rather, it is an architecture that creates the building blocks for deploying open, custom storage solutions that scale more efficiently, offering more availability, performance, and capacity using fewer administration resources—thus providing a good return on investment.

The FSAM architecture represents the ultimate level of storage efficiency. But how can businesses with an existing server-centric architecture move closer to a completely federated system? The solution lies in the adoption of a storage area network (SAN).

progression from server-centric to network-centric storage

server-centric architecture

- least efficient storage architecture
- storage directly attached to single server
- management complex and inefficient with growth
- available capacity may not be on the server where needed
- business continuity commonly interrupted for reconfiguration and expansion

storage-centric architecture

- more efficient
- storage directly attached to multiple servers
- management focuses on the devices, offering higher levels of functionality for securing shared storage assets
- provides for simple to complex levels of business continuity
- high startup costs for architecture
- proprietary hardware and software

network-centric architecture

- most efficient of storage architectures
- servers and storage from several vendors linked together across a distributed network.
- management focus shifts from *devices* to the entire storage environment
- shared, secure access to data
- orders of magnitude improvement in storage management efficiency
- ability to manage and provision global pools of storage resources
- intelligence for a self-managing, self-tuning, self-healing storage environment

storage area network (SAN)

planning for tomorrow's storage needs today

what is a SAN?

At its most basic level, a SAN is defined as a dedicated Fibre Channel network of interconnected storage and servers that offers any-to-any communication between these devices and allows multiple servers to access the same storage device independently.

Fibre Channel is a scalable data channel designed to connect heterogeneous systems and peripherals. It enables almost unlimited numbers of devices to be interconnected and allows the transportation of different protocols simultaneously. Fibre Channel supports speeds up to five times current protocols and distances of up to 10 kilometers between system and peripheral—compared to just 25 meters for SCSI.

Much like a local area network (LAN), a SAN enables greater scalability and reliability for computer storage resources, making them less expensive to implement and easier to manage. Rather than attaching storage subsystems directly to the back end of servers (called direct attached storage, or DAS), a dedicated storage network is inserted between servers and the storage subsystems.

A SAN is viewed as the initial step in a progression towards a long-term vision of a completely open, federated computing environment.

SAN or DAS?

SAN

- significant cost savings due to increased efficiency and pooling of storage resources across the enterprise
- high availability redundancies created (e.g., in SAN architectures, if one server fails, storage is still accessible by failover application servers)
- backup and restore may be done without involving server CPU cycles and at higher speeds—without increasing LAN traffic
- file sharing occurs between servers with any-to-any connectivity
- SANs scale very efficiently as a result of shared storage; excess capacity can be allocated where needed as opposed to only being available to the server it's directly attached to

DAS

- ongoing data availability requires traffic over the LAN—in most cases
- management costs are high
- no 'any-to-any' connectivity
- data transmission slows when server reaches capacity
- scalable at the cost of maintaining unused capacity
- up to 50% of extant capacity often goes unused

why storage area networking?

Through a network of storage devices in a SAN, large numbers of users can simultaneously access storage subsystems through multiple redundant paths. This architecture offloads the data transfer bandwidth between storage systems from the LAN and servers. SAN storage devices include networking equipment, disk arrays, tape libraries, or optical drives. In a SAN, the storage subsystems are not dedicated to specific servers, as they are in direct-attached storage (DAS) architectures.

benefits of a SAN

maximize your current storage resources

benefits

virtuality: Virtualization minimizes the complexity of capacity provisioning by creating a pool from one or more disks or storage systems and allocating that storage from the pool to hosts as needed. HP's SAN provides virtualization capabilities at every level: device, network, and software.

scalability: By decoupling the direct link from server to storage, SANs allow for the seamless addition of more storage and servers—all managed with the HP OpenView Storage Area Manager Suite.

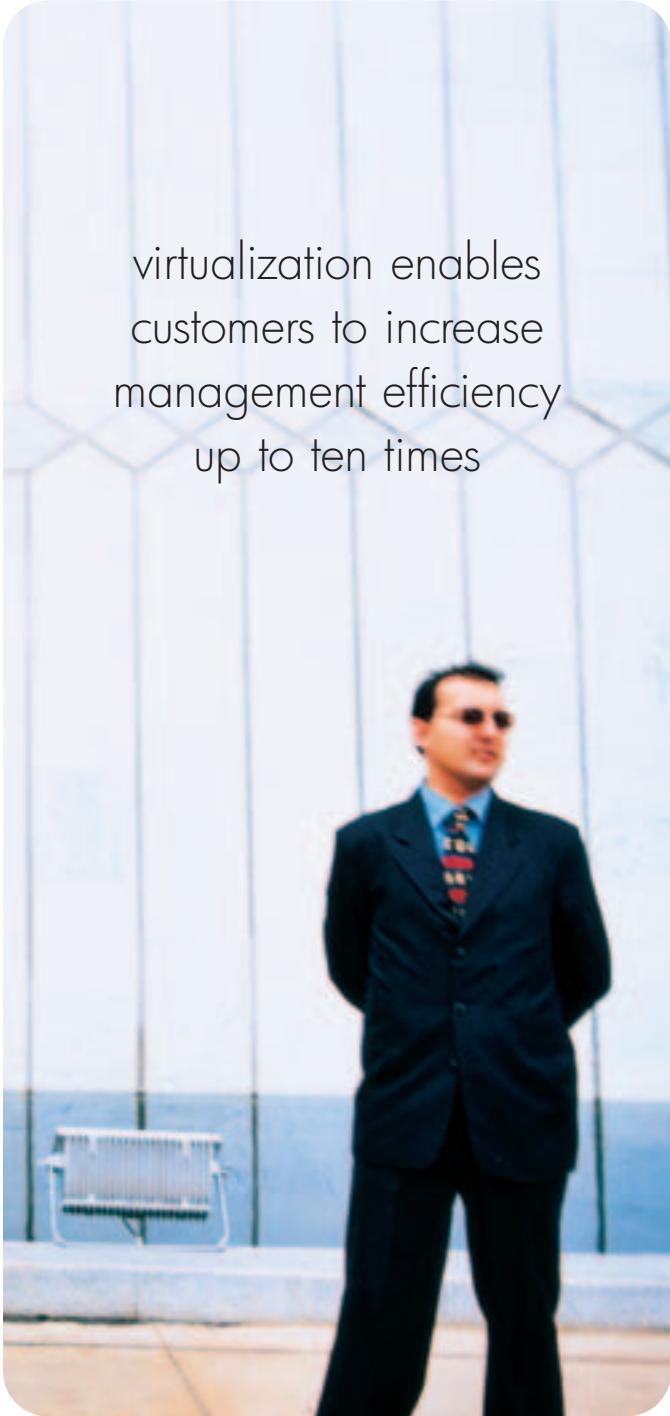
availability: SANs ensure high availability by removing single points of failure and allowing storage and servers to be scaled without downtime. In a SAN, high availability is moved from one failover server for every production server (1:1) to one failover server for multiple production systems (N:1). The need for fewer devices produces dramatic cost savings.

efficiency: SANs dramatically improve your storage ROI through consolidation and increasing utilization of tape or disk devices as much as 80%. Storage resources are pooled and shared across hosts, enabling the investment to be shared across the enterprise.

open connectivity: SANs allow multi-OS and multi-vendor storage to be managed as one coherent pool. Customers can continue using legacy devices and avoid replacing all existing storage.

cost effectiveness: SANs are usually justified by savings realized through the sharing tape drives; however, they are also cost effective for enterprises requiring high-speed access to substantial volumes of data from multiple networked servers.

manageability: HP's Storage Area Manager software allows easy allocation of SAN storage to servers, manages all storage capacity utilization and SAN infrastructure from one management console, and optimizes Fibre Channel network performance.



virtualization enables
customers to increase
management efficiency
up to ten times

managing a SAN

SAN architectures offload data transfer bandwidth between storage systems from the LAN and servers

To get the most from the SAN, customers must understand how to manage it—that is, how to continually gauge and leverage a SAN's performance levels, a process known as storage area management (SAM).

SAM will become the focus for the future as businesses move toward a network centric model offering users high levels of self-managing, self-tuning and self-healing functionality.

- **self-managing** environments automatically monitor and manage storage and data, and make decisions about when to allocate additional capacity, report/escalate events, etc.
- **self-tuning** environments are capable of meeting service-level agreements, specifically in the area of performance
- **self-healing** environments have the capability to proactively avoid downtime and the need to reload from tape due to device failure

hp OpenView software for optimal storage area management

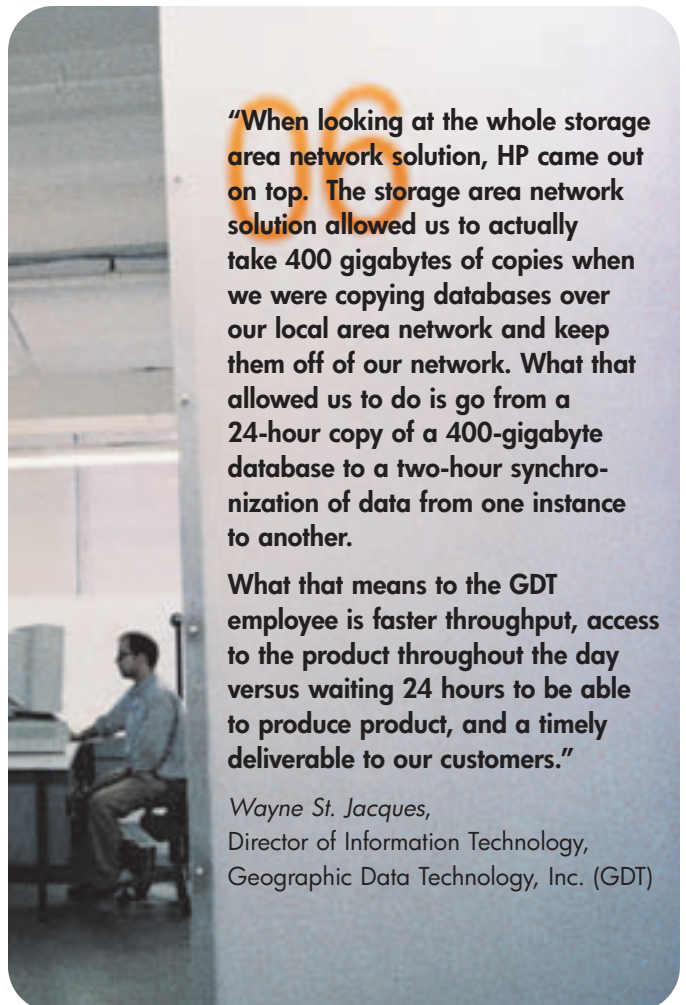
HP OpenView SAM software provides you with the tools to monitor, measure, and control storage devices to ensure their most efficient use and to provide a plan for future capacity increases. As a result, you are able to manage a larger number of storage resources with fewer people and reap the financial benefits that come with increased productivity.

HP OpenView SAM software provides a uniform management console and reporting protocol, enabling you to centrally manage multi-vendor storage devices across distributed, networked storage environments.

HP OpenView Storage Area Manager suite enables storage administrators to manage a Fibre Channel SAN environment in the same way that network administrators are able to manage their general Ethernet LAN.

- **HP OpenView Storage Node Manager** centrally controls and monitors the health of all the components within a SAN as well as any direct-attached storage device

- **HP OpenView Storage Allocator** automatically discovers and maps storage and servers, and allows the secure allocation of storage to servers via a simple drag-and-drop operation
- **HP OpenView Storage Builder** helps assess, control, and plan storage capacity to maximize the utilization of resources
- **HP OpenView Storage Optimizer** enables users to identify bottlenecks and enhance the performance of the SAN



“When looking at the whole storage area network solution, HP came out on top. The storage area network solution allowed us to actually take 400 gigabytes of copies when we were copying databases over our local area network and keep them off of our network. What that allowed us to do is go from a 24-hour copy of a 400-gigabyte database to a two-hour synchronization of data from one instance to another.

What that means to the GDT employee is faster throughput, access to the product throughout the day versus waiting 24 hours to be able to produce product, and a timely deliverable to our customers.”

*Wayne St. Jacques,
Director of Information Technology,
Geographic Data Technology, Inc. (GDT)*

SAN solutions blueprints

hp's SAN blueprints increase your ROI by speeding up your implementation with tested and certified configurations

customer + ize

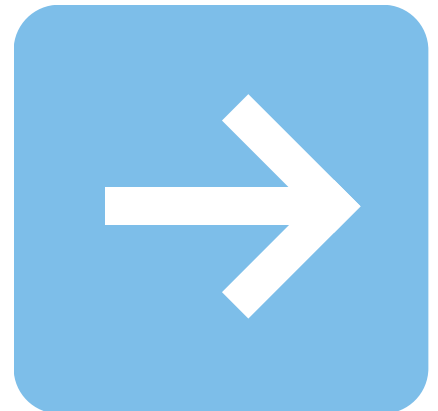
hp's SAN solutions blueprints deliver SANs for diverse business platforms

HP's design specialists have developed a powerful strategy to help you and other IT administrators integrate legacy systems into their new storage area network. This strategy, or solutions blueprint, combines best-practice guidelines for configuring your SAN along with tips that will help customize your architecture to your unique business demands.

solve real-world storage problems: Rather than upgrading your infrastructure simply because new technology is available, blueprints provide a sound rationale for deployment.

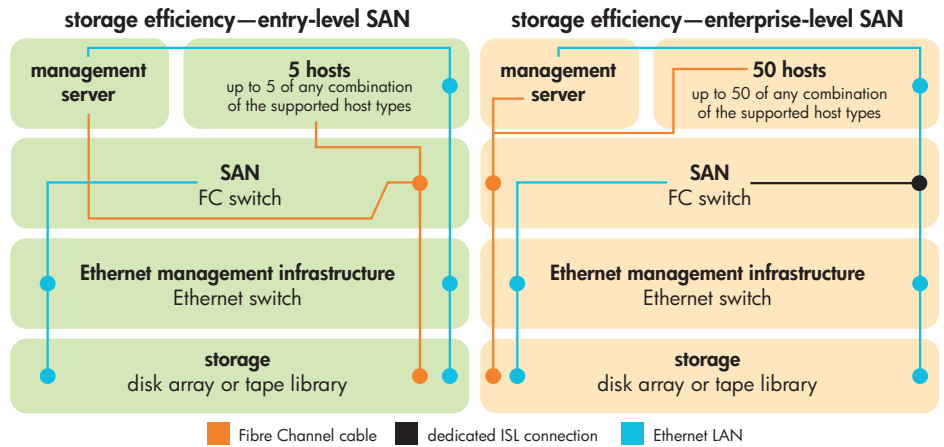
gain faster ROI and reduced costs: Solutions blueprints reduce the risks associated with a major infrastructure investment by spelling out anticipated ROI benefits and by providing a clearly defined SAN implementation. The goal is to provide a fast ROI and reduce entry costs associated with the adoption of storage area networks over direct-attached storage solutions.

receive comprehensive guidance: There are two levels of solutions blueprints—business and technical. The business blueprint is a high-level guide that defines a storage problem and recommends an HP SAN configuration. The technical blueprint provides detailed schematics and parts listings for implementation of the recommended configuration.



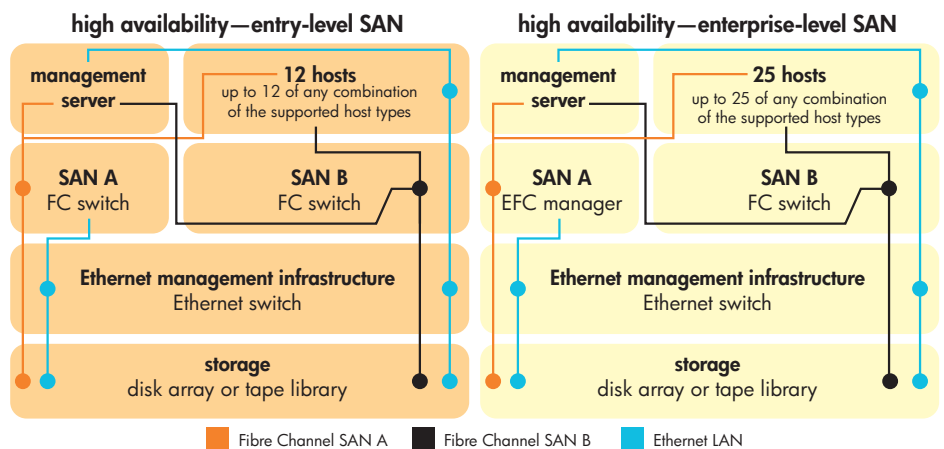
SAN solutions blueprints

SAN is a more robust, reliable, and scalable data architecture



storage efficiency: Created in two versions for entry- and enterprise-level organizations, efficiency blueprints are designed to help companies pool existing storage resources, optimize uptime, and achieve the following objectives:

- increased capacity utilization—disk and tape
- reduced management cost—manage more capacity with the same, or fewer people
- a SAN provides a high-level view of your total storage pool, thus simplifying resource planning
- reduced LAN congestion
- disaster avoidance



high availability: Both entry- and enterprise-level high availability blueprints help prevent downtime resulting from device failure or changes to the storage capacity. Blueprints offer instructions that enable your storage area networks (SANs) to:

- remove the single points of failure associated with direct-attached storage (DAS)
- provide load-balancing functionality to prioritize critical data transfers
- allow for nondisruptive scaling of storage and hosts

security

access + ible

with all the potential risks today, how can you provide an effective level of security for network storage systems?

In a disk SAN, a range of servers can access the same storage. In order to prevent multiple operating systems from attempting to write to the same disk space, potentially corrupting data, it is essential that access be carefully controlled.

HP data protection solutions are the final line of defense against human errors, viruses, and hardware or software malfunctions. HP data protection solutions support all key open systems platforms, including disk arrays and software, tape libraries, leading backup software packages, SAN and network infrastructure, and mainframe environments. HP offers worldwide consulting and support services for designing, implementing, and maintaining solutions that work.

Additionally, HP provides data protection solutions that allow you to back up virtually any type of data. HP's business continuity solution allows for backup through a wide range of methods, including network LAN-based backup, SAN (LAN-free) backup, backup for local clusters, zero downtime backup (eliminates backup windows), instant recovery (eliminates recovery windows), fast recovery for Exchange, direct backup (server-less backup), remote backup, disaster-tolerant backup, and open systems-to-mainframe backup. No matter what type of data protection needs you have, HP offers reliable, scalable, and complete solutions to meet them.

Depending on the SAN configuration, any one, or any combination of three solutions, can control disk access. With HP, users are free to choose from the following:

1. control access at server/host level

LUN access control using HP OpenView Storage Allocator allows storage sharing at block level, controlling multiple OS access to LUNs. It provides centralized control of all the storage resources in a SAN and allows assignment and reassignment of storage to servers—all without rebooting servers. Host control also offers simplified management through automatic host and storage discovery.

LUN (logical unit number): A RAID manager creates LUNs and can present multiple LUNs via a single port. A JBOD or tape is typically a single LUN.

A LUN is "the portion of the array capacity that appears to the OS as a physical disk." Only capacity that has been assigned to a LUN is available to the operating system.

LUN access control can be provided by a host bus adapter (HBA), rather than host software, with separate management for each HBA. This is different from HP OpenView Storage Allocator, which spans the whole system.

2. control access within the network, using zoning at the switch level

A system called zoning (either "hard " or "soft ") can be used to control which servers can access which storage device.

Hard zoning specifies which ports can communicate with which ports within a switch. This is secure, but also rather inflexible. If, for example, several LUNs are allocated to a single port on a disk array, then access to all those LUNs is granted to the host, limiting the degree of control.

A service provider might want to use this method to show physical separation between storage that is rented to two separate, or even competing, customers. It is best used in conjunction with one of the other two security methods.

Soft zoning is based on mapping worldwide names (the identifier of HBAs on a SAN), and so it specifies which host can access which port on a storage device. As with hard zoning, granularity of control can be limited. Typically, soft zoning offers automated host discovery, as with LUN access control software such as HP OpenView Storage Allocator.

3. control access within the storage arrays, using software such as hp's secure manager

A very secure approach for sensitive data is to control access at LUN level within the storage arrays themselves. This means that access control must be managed device by device, rather than centrally.

hardware/ software portfolio

hp storage hardware, software, and solutions

HP offers a complete portfolio to build, manage, and optimize your infrastructure.

hp SAN disk products: disk arrays/virtual arrays and software

HP's superior disk storage solutions for mission critical applications offer high availability, reliability and redundancy, outstanding performance, and scalability for shared and secured heterogeneous environments.

hp SAN tape products: tape libraries

Tape libraries serve as key components of a storage area network, performing critical backup and restore functions. HP Surestore Tape Libraries are ideally suited for heterogeneous environments within medium-to-large enterprises, offering a common, modular architecture for complete scalability.

hp storage management: OpenView storage area manager software

HP's OpenView Storage Area Manager software suite is a complete portfolio of scalable, easy-to-deploy storage management products that enable you to centrally manage multivendor storage devices across distributed, networked storage environments. With automatic discovery, topology maps, performance monitoring, storage capacity assessment, and management through one centralized console, it represents the most advanced network storage management solution on the market.

HP Surestore SANmaster information system is the only storage area network (SAN) information system that provides complete remote monitoring and can help you manage your enterprise's storage network.

hp SAN infrastructure products: bridges, hubs, switches, and cables

SAN infrastructure products enable sharing of resources among multiple servers in a heterogeneous environment. They offer ease of installation in one scalable package that easily integrates with HP's High Availability Cluster Support.

hp virtualization appliances: creating a single capacity pool

Storage virtualization is the creation of a storage pool from one or more disks or storage systems, and the allocation of that storage from the pool to hosts as needed. LUN partitioning and expansion virtualizes all attached storage, enabling:

- merging multiple physical LUNs into a single LUN
- partitioning a physical LUN into multiple LUNs
- dynamic resizing of storage to meet the host's changing needs (if host OS supports it)
- LUNs that span multiple disk arrays

third-party software

To offer a wide range of storage management and backup products for enterprises with heterogeneous environments, HP has partnered with leading vendors:

- VERITAS
- Computer Associates (ARCserve)
- Legato (NetWorker)
- Quadrantech (Time Navigator)

high availability for SANs

cluster support

- MC/Serviceguard on HP-UX
- VERITAS Cluster Server or Sun cluster on Solaris
- HACMP on AIX
- Microsoft® Cluster Server on Windows NT/Windows® 2000
- TruCluster on Tru64
- OpenVMS clustering
- Network Cluster Services on NetWare
- FailSafe on IRIS (SGI)

replication

- local
- remote
- metro/continental

SAN backup/recovery solutions

cluster support

- tested and supported backup for HP MC/Serviceguard in a clustered failover environment

zero downtime backup

- true online backup for relational DB, ERP, and e-mail
- no performance impact on application/database during backup
- maximum uptime of business critical applications



hp integrated storage services offering for SAN

“HP has supported our growth and has allowed us to stay competitive, getting our product to market faster. Thanks to HP, our infrastructure is built to handle the changes we’ve made until now, and whatever awaits us tomorrow.”

Wayne St. Jacques,
Director of Information Technology,
Geographic Data Technology, Inc. (GDT)

hp integrated storage services offering

1. analyze/design

HP SAN architecture service offers a detailed technical assessment of your current storage environment including an analysis of how your business objectives will impact future storage requirements. Our architecture service will assist you to:

- define an overall approach to storage utilization and deployment
- design a comprehensive storage solution that addresses software, architecture, interoperability, capacity, performance, connectivity, and scalability
- develop a timeframe—plus, resource, measurement, and reporting requirements

2. implement

Our SAN implementation service brings your system online quickly, assuring you of an operational SAN that’s right the first time! Among other implementation services, we:

- create and deliver a SAN Implementation Plan (IP)
- connect and configure the SAN according to the Plan
- verify, document, and demonstrate connectivity
- provide hands-on training on basic SAN operation and use

Critical to effective SAN implementation, HP’s data migration service ensures continuous business operation and data availability. The data migration team:

- establishes a detailed migration strategy and timetable
- executes the migration and documents the new data layout
- reviews critical operational changes with your support staff

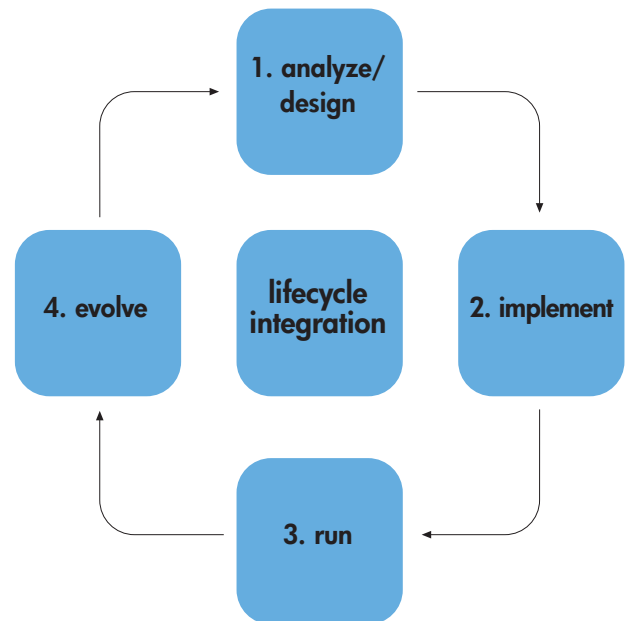
HP SAN implementation training courses cover our Federated Storage Area Management (FSAM) strategy, an overview of SANs, plus specific courses that allow you to manage and maintain SAN switches, Omniback II backup hardware, and XP/VA arrays. HP offers:

- 80 education centers and 200 partner locations worldwide
- online education resources
- storage and network specific courses
- online registration and certification

3. run

HP SAN environmental support services maximize the availability, stability, and interoperability of HP and multivendor SANs. We enable you to:

- proactively prevent problems and manage change that can cause system downtime
- turn to a single expert source for timely, efficient, and effective SAN infrastructure support



4. evolve

HP high availability storage assessment services identify the potential risks to success in mission critical environments that cannot afford downtime. We provide:

- detailed documentation of your XP and SAN storage configuration
- technical analysis of your storage architecture based upon the latest storage technology and high availability techniques
- action items that will increase your data availability

end-to-end solution—HP’s storage area management service is designed to grow your storage landscape according to your business needs, while managing it with the same people print. Our integrated storage services include:

- an assessment of your current processes, people skills, and management tools
- creation of a business case and benefits analysis
- development and implementation based on a detailed set of business and functional requirements
- hp project management expertise to ensure compliance with original requirements and organized knowledge transfer

www.hp.com/go/storage



for more information

hp SAN solutions: visit www.hp.com/go/san

purchase: HP business solutions, products, and supplies can be purchased at your local HP partner (www.hp.com/go/locator), or call 800-613-2222.

finance: HP Finance plans provide all the benefits of new technology without the risk or cost of ownership. For details, call toll-free 888-999-hpTF (4783).

accessibility: HP is committed to providing products and services that are accessible to people with disabilities. For more information, please visit www.hp.com/accessibility or call 888-259-5707.