hp mission-critical disaster recovery solution

executive summary

Your business is already operating at 24 x 365. You have implemented high availability strategies to keep your systems and employees productive. High-speed transaction processing is critical to your company's revenue; now you need to ensure that this environment continues to function in the wake of a site disaster. By managing the possibility of a site disaster, you can:

- protect your company's revenue
- maintain employee productivity
- achieve long-term competitive advantage
- stay out of the headlines

The working assumption is that disaster recovery plans have been developed at your company. You have a working plan for people and processes in case of disaster. You know the application environment and have developed recovery time objectives (RTO) for your critical environments and the recovery point objectives (RPO): the point in time to which data must be restored to resume processing transactions. However, if your enterprise is evaluating the creation of these plans and processes, Hewlett-Packard can partner with you to develop a complete solution.

This business blueprint outlines a series of choices that must be made to build an infrastructure that can survive a site disaster and maintain continuous operations. Several technical blueprints give examples of working disaster recovery solutions; these blueprints can be customized to meet your particular needs.

summary

This document is one of a series of Disaster Recovery Solution Blueprints from HP. Its intent is to help you make the most appropriate infrastructure choices for disaster recovery. At HP, we believe that you need to invest appropriately in disaster recovery solutions—this means matching the right technology at the right cost to the risk and consequences of your particular business.

Technical blueprints provide the next step by giving detailed schematics and parts lists to enable the recommended configurations to be implemented and giving design rules that deliver a flexible fit with your specific environment. The technical blueprints will reduce the risks associated with a major infrastructure investment by providing a clearly defined disaster recovery implementation that an HP technical consultant or channel partner can use to quickly configure the desired solution. The goal is to provide a fast ROI and to make the implementation of disaster recovery a straightforward task for your company.

Disaster recovery solutions from HP do not function in isolation; rather, they work with high-availability solutions, data protection solutions, and management solutions. Additional blueprints are available for each of these areas. The solutions are implemented and supported through a range of HP services. These solutions keep your business always on. The wide range of solutions available from HP gives you confidence that the solution will work in an integrated manner while dealing with a minimal set of vendors.

what is the disaster recovery problem?

Unplanned downtime, whether through storage device/host failure or problems in adding new devices/hosts to the storage environment, carries a significant business cost. In the always-on e-commerce world, the impact of system downtime in lost transactions and profits is obvious; however, even for more traditional "brick-and-mortar" organizations, downtime can result in delays to order processing, customer contact, and supplier transactions–all of which can impact revenue.

The figure below quantifies the average cost of downtime by some industry:

downtime can mean financial loss

	Legend
	Energy
	Telecommunication
	Manufacturing
	Financial Inst.
	Information Tech.
	Insurance
	Retail
	Pharmaceuticals
	Banking
	Food/Beverage
	Consumer Products
	Chemical
	Transportation
	Utilities
	Healthcare
	Metals/Natural Res.
	Professional Services
	Electronics
	Construction/Engineering
	Media
	Hospitality/Travel
	Average

Revenue/Hour
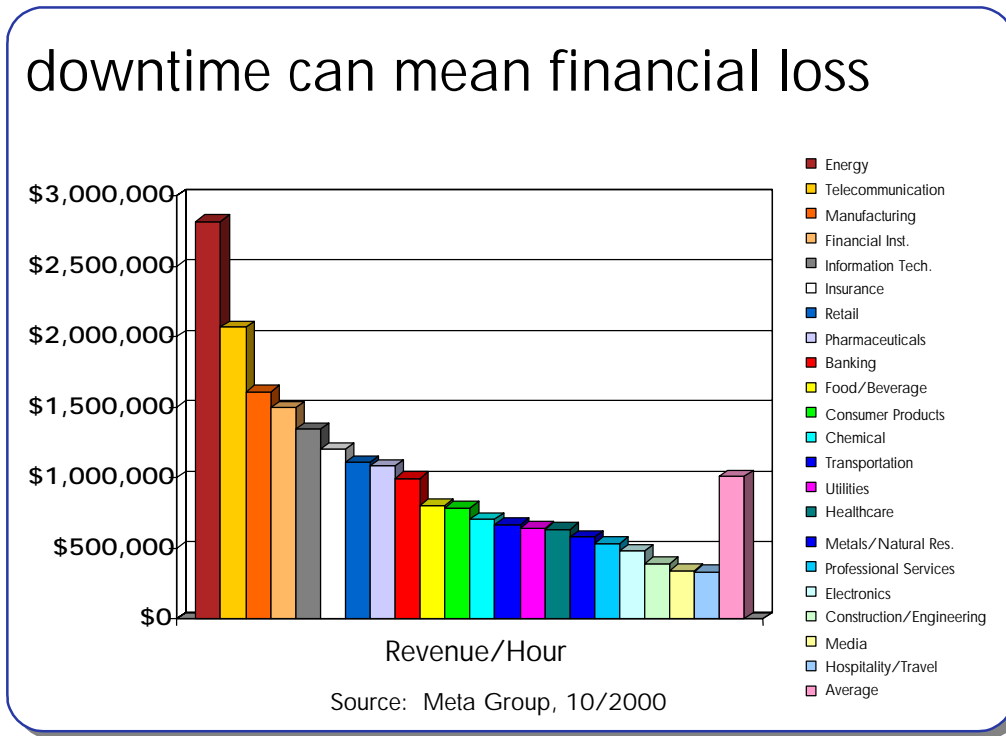
Source: Meta Group, 10/2000

figure 1 - average cost of downtime per hour

It is important to note that not only can immediate costs result from unplanned system downtime, but the long-term effects of a company's stock price and ongoing business operations can be potentially disastrous. Research shows 93 percent of companies that suffer a significant data loss are out of business within 5 years (U.S. Bureau of Labor).

The chart below describes the categories of risks your operation must overcome, along with the available solutions to manage those risks.
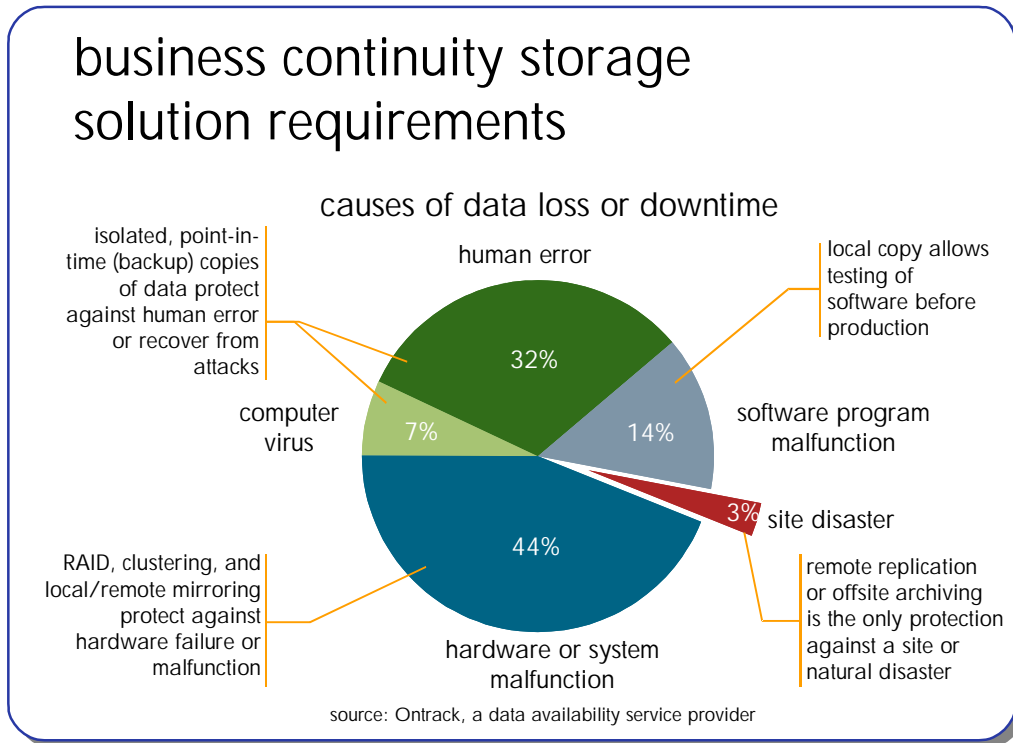

business continuity storage solution requirements

causes of data loss or downtime

isolated, point-in-time (backup) copies of data protect against human error or recover from attacks

human error

local copy allows testing of software before production

32%

14%

software program malfunction

computer virus

7%

RAID, clustering, and local/remote mirroring protect against hardware failure or malfunction

44%

3% site disaster

remote replication or offsite archiving is the only protection against a site or natural disaster

hardware or system malfunction

source: Ontrack, a data availability service provider

figure 2 - downtime risks and solutions

High availability solutions keep systems running in light of hardware or software failures. Point-in-time copies allow for testing of software before production or fast recovery to a known state prior to hardware/system malfunction, human error, or virus attack. Backup solutions provide a final line of defense against all situations; although site disasters account for only 3 percent of downtime, their losses can be astronomical to the enterprise. The traditional method of disaster recovery is to perform a restore from backup media. Today's high availability environments cannot tolerate downtime and lost business associated with the time it takes to accurately restore the environment. If data centers can be sufficiently separated to reduce the possibility that both data centers would be affected by a disaster, HP's disaster recovery technologies can practically eliminate all scenarios of downtime.

selecting a solution

Once an assessment of your disaster recovery needs has been prepared, the selection process of the disaster recovery solution follows:

- determine the data mirroring requirements
- select a distance networking solution
- size and select the storage arrays
- select the high availability solutions
- determine remote clustering requirements

General guidelines for a solution will be developed here. The technical blueprints describe specific, typical solutions. HP can work with you to develop solutions that precisely fit your existing environment.

data mirroring
Data mirroring is one of the most important elements of a disaster recovery solution; after all, systems and networks can be replaced after a disaster, but your data cannot. Data mirroring is done directly between two HP Surestore Disk Array XP's with HP Continuous Access XP. This is among the most robust and high-performance mirroring solutions offered in the

industry. The solution requires XP disk arrays on both ends. The current solution for the HP Virtual Array is host-based, which means that the remote mirroring solution transfers data through the server instead of direct communication between the arrays. While this requires some additional server cycles, it allows different storage in each data center to be attached and mirrored; for example, a Virtual Array and an XP disk array can be mirrored to each other.

The most important consideration for XP disk array data mirroring is "What is the Recovery Point Objective?" If no transactions can be lost during a disaster, synchronous operation is the only choice. Synchronous solutions ensure that the data at the remote site is consistent with the data at the local site before moving on to the next transaction. As distance increases, latency must be taken into account. The latency associated with optical fiber adds approximately 1 ms for every 125 miles (each direction) of separation between data centers; this does not include the overhead in converting from one protocol to another.

Asynchronous data mirroring is a unique HP advantage. As changes are written to the primary array, they are immediately sent to the secondary array, without waiting for acknowledgement so processing can continue unhindered. By replicating in this manner, the local data center does not see any performance degradation while the mirroring is underway. With the appropriate distance networking solution, any distance between data centers can be accommodated without the expense of so-called multi-hop solutions. HP's asynchronous solution also has a sequence stamping feature; this means that writes to the remote array are performed exactly in the order they are written in the local array, a crucial function for preserving application consistency over distance. Naturally, with an asynchronous solution, the primary and remote sites could have a concurrency gap between the primary and remote data during the disaster.

This solution works at the logical unit level (LUN); therefore, two XP disk arrays at two data centers are able to mirror each other's data.

distance networking solutions

There are several network choices for mirroring data over distance. These solutions are selected based on distance, cost, performance, and leverage with your currently available networking solutions. Bandwidth requirements can be determined by finding the peak performance required.

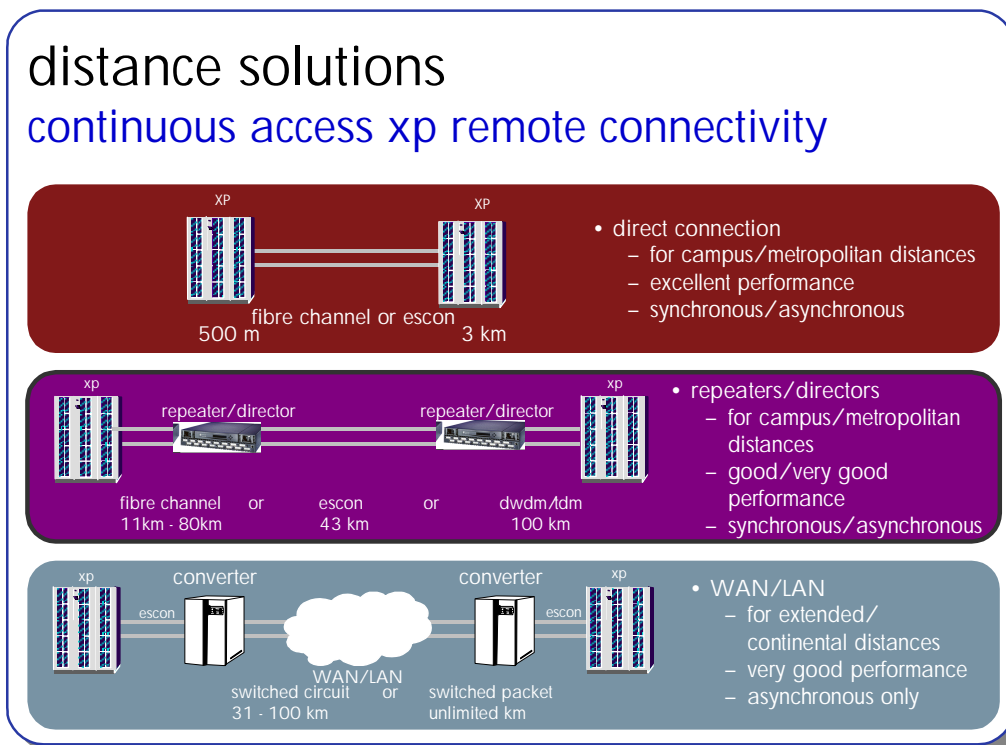The figure below outlines the range of distance solutions offered at this time.

figure 3 - distance solutions — continuous access XP remote connectivity

storage arrays

HP has two classes of arrays: the XP Disk Array family for the enterprise and the Virtual Array family for midrange applications. The selection of the appropriate array is made based on the capacity, performance, and redundancy required. The XP arrays are the ultimate in mission-critical storage; they reach a raw capacity of up to 93 terabytes (TB) and have up to 32 Fibre Channel ports. The VA family of arrays is modular and scalable as they reach a capacity of 7.7 TB, and has two Fibre Channel ports. In selecting the class of arrays, it is also important to anticipate the growth in capacity over the useful life of the storage solution.

high availability solutions

High availability solutions are designed to reduce the probability of downtime in a local data center. One of the most fundamental ways of achieving high availability is to build an infrastructure with no single points of failure. HP's XP disk arrays are truly high-availability products for mission-critical applications with no single points of failure, including the cache. HP's enterprise mirroring solutions work directly between the XP disk array at a local site and an XP array at a remote site; therefore, there is no server performance penalty for data mirroring.

MC/Serviceguard is HP's premier clustering technology, providing failover capabilities for multiple HP-UX servers operating as a cluster.

A multi-path connection between the servers and storage is made with HP Auto Path XP; this solution allows load balancing between network paths, and automatic failover and failback.

HP's server, clustering, storage, and networking solutions are a comprehensive high-availability solution without any single points of failure.

remote clustering

In many cases, data mirroring or backup/restore can be used to form the core of a disaster recovery solution. When there is a disaster, new servers and networking can be brought in and configured so your data and applications are available again. Many options exist for provisioning servers and networks. Servers can be preconfigured and kept at a warm site or can be rapidly delivered through HP's Business Recovery services. In these cases, there may be significant downtime as the systems are rebuilt, reconfigured, and users are managed. The choices are really dictated by the RTO and RPO goals weighed against the cost of the project.

If there is a requirement for applications to keep operating through a disaster, there is no substitute for remote clustering. This high availability configuration is an ideal solution for applications that deliver ongoing revenue and profit to your enterprise or keep your customers satisfied.

HP's remote clustering software works with HP Continuous Access XP mirroring software, and with local clustering software to provide appropriate failover and failback over a remote link. HP's products in this area are Cluster Extension XP (for non-HP platforms), Campus Cluster, Metrocluster and Continentalclusters for HP-UX systems. HP supports a wide range of servers and server clustering software for disaster recovery installations to ease integration with your open systems environment, including HP-UX (MC/Serviceguard), Microsoft Cluster Service (MSCS), Solaris (Veritas Cluster Server), and AIX (HACMP).

for more information

For technical-level information on implementing the disaster recovery blueprints, you will find more information at http://www.hp.com/go/storage_blueprint

- Enterprise Mission-critical Disaster Recovery Solution over IP
- Enterprise Mission-critical Disaster Recovery Solution over DWDM
- Midrange Mission-critical Disaster Recovery Solution