



*Complementing Your Storage Environment
with e-Space™*

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1. Introduction

Every day it seems a new data storage term is used in trade magazines, newspapers, presentations, and on the Web. Lately, interest is surging in "Storage Area Networks" (SAN). Historically, terms such as hierarchical storage management (HSM), direct access storage devices (DASD), enterprise storage systems (ESS), and journal file system (JFS) have been introduced.

Why all these new terms? The cynical answer is that marketing departments created each new term simply to reintroduce or repackage an already existing product, which in some cases may be true. Nevertheless, each one of these terms, and a host of others, represent advances in storage technology. These technologies play a crucial part in an IT environment because of the increased demand on storage.

The explosion in the amount of data is not new and is no secret. Regardless of whether the subject matter is about clients, servers, or mainframes, we see a continuing exponential increase in stored data. This stems from new types of data, such as streaming video, and from the simple increase of older types, such as ASCII email messages or accounting transactions.

As the data to be stored increases, new methods for managing larger and larger data "farms" are necessary. The speed of changes in storage devices and software continues to increase as companies try to keep abreast of the data explosion. Recently, "offline" archiving technology was augmented with "nearline" archiving technology, and today "online" archiving technology is reality.

So how do all these technologies play together? This white paper will not answer that question completely but will introduce the technologies and explain how online archiving provides additional benefits to them.

Solution-Soft's e-Space online archiving is the next step in data storage. With e-Space, even large OLTP environments will not have their I/O impacted. The design of e-Space allows OLTP environments to take limited performance impacts and yet continue to gain top backup performance and disk space usage.

2. e-Space and Hierarchical Storage Management (HSM)

While hierarchical storage management systems are not widely utilized, in large data environments they are used to archive files to "nearline" storage devices. Primarily, these are robotic tape devices and laser or magnetic-optical jukeboxes.

Like e-Space, HSM selects files through a policy procedure and archives these files. The archiving is a multi-step process including data compression and then moving the files to the nearline storage device. Additionally, when a user or application attempts to access an archived file, a time lag occurs. The HSM will find the device and media where the file is located, and then inform the device to load the appropriate media. Once loaded, the HSM will retrieve the file from the media, and decompress it, at which time the file will be available.

The e-Space Solution perfectly complements an HSM environment. Because of the time lag in bringing the file back from the nearline storage device, the selection policy typically is complicated and carefully set to select files that will not need to be accessed frequently. For example, if the wrong file is selected, the time delay could adversely affect processing windows. The tendency is to not select a file unless there will be almost no need to access the file. With e-Space, the file is archived online, instead of on a nearline device. Therefore, selection policies can choose intermediate files for online archiving. Since there is no time lag for finding the file, there is little performance impact. A selection policy might choose files not accessed between 30 days to 360 days for online archiving, and files not accessed within 360 days for nearline archiving.

3. e-Space and Direct Access Storage Devices

Direct Access Storage Devices, or DASD, are what we commonly consider disk drives connected via SCSI, fiber or other cabling. Naturally, the advantage of DASD is speed. This is why we keep so much data on DASD. We need the speed!

So, how does e-Space complement DASD? When e-Space is used, not only are the online archived files still located on the DASD, but there is more room available on the DASD. If manual archiving is done, which is common, users can reduce the amount of data stored on the disk. But, why manually move a file off to tape, only to have to bring it back during year-end processing? With e-Space's online archiving, you not only reduce the space required for the file, but you also reduce the space taken up by all online archived files.

The e-Space Solution will help you manage your files based on policy. Better management of your files through online archiving reduces the required space for each file, and therefore increases the amount of free space on your DASD. You can use this free space to online archive other files that are currently manually archived to tape. The e-Space Solution gives you the ability to use "all you have" more efficiently.

4. e-Space and Enterprise Storage Systems

Many companies have expanded their DASD environment with Enterprise Storage Systems (ESS) (such as Hewlett-Packard's SureStore and EMC²'s Symmetrix). The ESS environment is really a disk subsystem, with a computer and operating system provided to maintain 99.9% disk uptime. Performance is generally equivalent to DASD, but the added features of RAID, hot-swappable drives, large buffering, etc., are attractive for many medium to large companies with mission-critical environments.

Again, e-Space complements ESS environments well. All of the advantages of the ESS are gained, plus the advantages of e-Space as described in Section 3. No advantage or feature of the ESS is lost, but online archiving provides more efficient use of the ESS. If files are used less than once a month, why use up disk space for the file? With e-Space's online archiving, disk space for a given file is reduced and therefore you can store more data on the ESS device.

5. *e-Space and Backup Compression*¹

Many backup software products have compression capabilities, which help to reduce the amount of backup media. Additionally, backup devices often have options for hardware compression. In general, if you have the available CPU performance for software compression, you use it. Otherwise, you use hardware compression. The outcome is similar -- reduced backup media.

However, with e-Space the backup media will automatically be reduced for all e-Space files, saving the overhead of the backup compression. Additionally, since the archived files require much less disk space, the backup process will require less time to complete. So, not only will the required backup media continue to be reduced, the backup performance will be much faster.

6. *e-Space and Manual Archival (or offline archival)*

While this white paper has discussed areas where e-Space clearly complements other technologies, offline archiving is one area where "complementing" is less direct. When disk space fills up, you have traditionally had three basic tactical options. First, you could add more disk space. Second, you could add an HSM product. Or third, you could manually archive files offline. Now, e-Space presents a much better option.

The first option solves the problem for some pre-planned period of time, and requires hardware installation, configuration, maintenance, etc. Then all this activity is required again -- sooner than later. The second option handles the problem well, except for the required configuration and price of installation and on-going maintenance. The third option is the most chosen for small, medium, and even large companies.

By archiving files offline, you gain the necessary space and, initially, everything seems great. You have the files stored somewhere within your tape library system. Now, when the file is needed all you have to do is find and restore it. Everything's great. Except... the application failed when the file wasn't found, so your processing window was destroyed. Except... the external tape number has fallen off some of the older tapes and you need to go through six tapes to find the right file. Except... the tape media was damaged and the file cannot be retrieved from the media. Except...

We all know the problems associated with offline archiving and tape media, and then with getting those files back. This is why we don't do it unless absolutely necessary. This is why e-Space is an excellent replacement for offline storage! Why risk all the possible problems when simple online archiving will solve them?

7. *Summary*

The storage technologies are changing rapidly. The reason is obvious: The continued exponential growth of data. Managing the data continues to be an issue, and several different methods exist. You probably have one or more of these technologies in your environment.

The e-Space Solution is the perfect complement to these technologies, because not one of them alone completely solves the problem. In fact, used individually, they often only present new problems. Whether the problems are related to backup, disk space usage, nearline archiving, or offline archiving, adding e-Space to these technologies helps solve problems associated with extreme data growth.

¹ e-Space and backup are technical subjects. Complete coverage requires more than just a couple of paragraphs. While these paragraphs clearly layout the general advantages of complementing a backup product with e-Space, for a more in-depth study please refer to the white paper: ***Backup Performance Gains with the e-Storage™ module, e-Space™***

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