D2D2T BACKUP
The Best of Both Worlds

In the late 20th century, disaster recovery generally meant backup, and backup meant tape. At that time disks were expensive, unreliable and not portable enough to compete with tape as a backup medium. Tape backup was slow and required a lot of manual labor, but that didn't matter much since data storage sizes were manageable and backup windows plentiful.

That is no longer the case. Data storage has exploded as organizations have hit the Web, digitized business processes and made increasing use of video and voice applications. Backup windows have disappeared in a Web based global business environment where systems are hit from all corners of the world 24 hours a day, 365 days a year. And with businesses so dependent on their applications and data, downtime has become unacceptable.

The result is that for most businesses today, backup to tape is simply too slow and resource intensive to be a viable solution. Tape restore has been shown to be rather unreliable as well. And tape libraries have mechanical components that require maintenance. That's the bad news. The good news is that backup to disk has become much less expensive and much more reliable than in the past, making it a competitive backup alternative to tape.

Advantages of Disk Based Backup

- *Speed:* Backup to disk takes a fraction of the time it takes to back up to tape, thanks to infinitely faster access and throughput. Since hard disks are random access devices, file and data recovery is also much faster than with a slow sequential access medium such as tape.
- *Affordability:* The prices of hard disks have come way down in the past 10 years, making them very price competitive with tape. Newer Serial ATA (SATA) disks are very reasonably priced for very large storage sizes. While performance and reliability are not up to higher priced disk storage options, SATA offers excellent performance and reliability for a disaster recovery solution.
- *Ease of Use:* Tape backup is a staff intensive function that requires a lot of tape loading and swapping. Tape libraries can make the process more automated, but they require maintenance and some expertise as well and are generally not used in small business environments. Disk based backup doesn't require swapping, so it can be much more automated and relatively maintenance free.
- *Reliability:* Hard disks have become much more reliable over time, particularly when implemented in fault tolerant RAID configurations, making data loss from disk crashes a truly rare occurrence. In the meantime, it's become much more obvious that tape restore is not as reliable as it should be, particularly when backup is implemented by people with little training and other job functions that are more important to them, a typical scenario in a small business or branch office.
- *Flexibility:* Depending on your environment, backup disks can be attached to an individual server or implemented as network attached storage on a typical Ethernet network or on a dedicated storage area network, allowing them to serve as backup media for data from many different storage devices.

Two relatively recent technologies have made disk based disaster recovery even more attractive:

- *Virtual Tape Library (VTL):* VTL technology backs up data to disk in the same format as tape which is faster than a straight copy and makes subsequent archiving to tape much simpler. The backup disks emulate typical tape library devices and appear to backup software as such.
- *Snapshots***:** A snapshot is not exactly a backup. Rather it is a virtual copy or picture of the file system as it looked at the time the snapshot was taken. The advantage of snapshots is that they are very fast and can be taken several times a day with little or no impact on application access. Continuous data protection (CDP) schemes allow several incremental snapshots to be taken to disk automatically many times a day. Those snapshots can then be used by CDP-supporting backup software to make subsequent backups to disk or tape when a backup window is available.

Disadvantages of Disk Based Backup

Disk based backup's speed can be indispensable in fast paced security conscious environments such as financial services and transaction heavy environments with no backup windows and little tolerance for downtime. However, like its tape counterpart, disk is not a perfect backup medium for several reasons:

- *Scalability:* While data storage is cheap, it doesn't have the infinite storage capabilities of tape, making it limited as a backup medium and even more impractical as an archiving solution.
- *Portability***:** It's relatively easy and inexpensive to transport tape to a secondary location that protects data from local disasters. The same cannot be said for disk. It's possible to replicate data to a secondary location, but that can be an expensive solution for a small or medium business and is still not appropriate for archiving. If a virus hits your primary site, it will be copied to the secondary site as well, rendering both copies useless.

The Solution: Disk to Disk to Tape

The best solution for organizations that require speed, portability, and reliability is one that combines disk backup with tape. Disk to Disk to Tape (D2D2T) is a backup solution in which tape serves as a secondary backup and archiving step to disk. The first step is a fast backup to disk, usually to inexpensive SATA disks. These disks are then used as backup holding area for quick restores and for a secondary backup or archiving to tape at a more leisurely pace. Since the secondary backup is from the backup hard disks rather than primary storage, there's no need for a backup window. The tape backup can then be transported to a secondary site so it is available in the event of a disaster at the primary location.

With a-disk-to-disk to tape scenario you get the best of both worlds: the speed and accessibility of disk with the reliability and infinite capacity and portability of tape. Add virtual tape library capability for the disk backup and you have even quicker preliminary and secondary backups.

In some cases the secondary backup is done over the network using a traditional backup software solution. Certain solutions however allow you to attach the tape devices directly to the disk storage so it can be copied without impacting network bandwidth. Most mainstream network backup solutions have support for D2D2T scenarios using VTL.

Another solution is to do repeated incremental snapshots to disk, which are then assembled appropriately and pushed to tape using a continuous data protection package. This makes the preliminary step almost instantaneous and undisruptive to existing applications.

With data stores almost doubling every year at many organizations and globally dispersed users requiring access at all hours of the day, traditional tape backup is simply not viable for many organizations any more. Disk based backup can accelerate the backup process dramatically. Add a secondary backup or archiving to tape and you have a powerful disaster recovery solution that combines speed, fast recovery, portability, and offsite storage.