The Future of Tapes in the New Compliance Context

What the Future Bodes for Tape Backups

There is much speculation in various industry segments and the corporate community regarding the role of backup tapes as they pertain to regulatory and compliance requirements. Historically, backup tapes have been both the salvation and the bane of corporate IT departments. On the one hand, they have played an indispensable role in disaster recovery scenarios and saved many an IT neck from the proverbial chopping block. On the other hand, they have garnered a reputation as a high risk asset, from a compliance and electronic discovery perspective, and are not known to be records management friendly.

As a result, there are some contradictory messages regarding the viability and role of tapes in the evolving technology landscape that is driven so much these days by regulatory and litigation concerns.

The New Landscape That Tapes Need to Address

It is clear that a new paradigm has arrived, one of the truly managed electronic information. This development has been driven by the perfect storm of regulatory, litigation and operational considerations that dictate the fundamental premises of the new order. In short, corporate data has been recognized as a valuable asset, in some instances the most valuable asset an organization possesses. Regulatory requirements have dictated that it be organized and managed, i.e. that organizations assume complete responsibility. Litigation and compliance have necessitated that it be easily and universally accessible, on an as needed basis.

We have come to a watershed era where information is no longer viewed as a nebulous, free flowing and largely invisible “ether” but must be considered a specific, quantifiable, manageable and controllable asset akin to the more traditional assets like plant and equipment. In an information economy it makes sense to manage the information produced or acquired within an organization.

The challenge is that there is no easy solution to implement that will get us from here to there. In fact, the whole arena is plagued by tremendous fragmentation and lack of clear technical directions, especially when it comes to storage media including backup tapes.

A Short Historical Perspective on Tapes

The whole rationale of tapes has been that they represent a less expensive storage medium than disks. This cost advantage has leveraged their popularity by allowing greater frequency of backups, whereas more expensive solutions would have constrained the users to fewer backups. In applications where large amounts of data need to be stored and the data doesn’t require the accessibility of on-line disk storage, tape has always had the upper hand. In addition, tapes have traditionally been physically smaller than equivalent capacity disk storage making for more convenient warehousing. Thus, it seemed like you could afford to make a tape backup and store it indefinitely. Even though disk storage costs have rapidly fallen and the price differential between the two media is not as dramatic, this is still largely true.

In fact, given their low cost, tapes have been utilized for the daily backups of information stores where the large amount of duplication across multiple tape backups has been considered a safety valve, i.e. if a restore from one backup fails, you can always go back to the previous one.

In addition, tape backups represented one of the earlier attempts at archival storage. Once you stored something to tape it would remain there until you either destroyed, or overwrote, the whole tape. However, the big limitation of tape backups, from a records management perspective, is that data is not normally selectively and granularly erasable on a tape.

This very feature of tapes, or rather, of the tools used to perform backups and manage them, i.e. that tapes need to be treated more as a physical unit rather than being accessible in a more granular, logical fashion seems to limit their applicability within the new conceptual framework of electronic content management. The new paradigm requires that data be managed in an arbitrarily and selectively granular manner, in order to fully support the records management dictates of total life cycle management, from creation to disposition.

Backup Tapes and the Role They Play in This New Landscape

Some bold visionaries have suggested that there may be little, if any, role for tape backups in the future of computing. This is not clear. However, it is likely that what we know as tape storage will change dramatically over the course of foreseeable period of time as tapes come to increasingly resemble their on-line disk competition. In order for this to come about, tapes would have to acquire the salient characteristics of disks such as near instant, random access, indexability, more granular backup and access (on a file level at a minimum), selective granular eraseability, etc.

Tape drive and tape media vendors are taking note and moving ahead to position themselves for the future. For instance, some of the tape technologies appearing on the market incorporate an index of contents on a microchip embedded in the plastic tape cartridge housing. This index allows the software or firmware of the tape drive to more directly and quickly access specific tape contents. WORM (Write Once Read Many) features are now being incorporated into many tape families to allow them to play a role in archival storage formerly reserved for optical disk media. And, of course, tapes are acquiring more capacity and are becoming increasingly faster.

The backup software vendors are also aggressively re-examining the role of tapes by, for instance, incorporating a disk based, on-line backup layer in front of the final backup to tape, to alleviate the perceived weaknesses of tape based backups, specifically, the slow backup and restore cycles and lack of logical granularity. These features will allow more effective incremental and archiving-specific backups supported by comprehensive retention schedules, as well as quick, granular restores.

Granular Restores

In line with records management dictates, ideally, the new tape technologies would allow granular, i.e. selective restores, deletes and updates of specific tape content. So, for instance, once a set of emails, based on date or some other criteria, were due for policy driven records destruction, the tape management software would allow for automated and surgically precise deletion of just those emails from a tape backup, without impacting any of the other content on the same backup tape set.

This, of course, is far from the current reality. The only way to modify the content of a tape backup, at present, is to restore the full tape content, make modifications utilizing whatever application software may be necessary and then backup the modified content onto a new tape set (or same tapes, if you feel comfortable with that). This is highly impractical and seldom exercised.

Backup Tapes Coming of Age

Many of these features, although seemingly outlandishly bold for tapes, can be implemented via software based strategies. Some of them have already been implemented, in association with tapes, albeit in a limited and fragmented fashion. Other features will need further hardware evolution for effective implementation. So far, no single tape based solution offers the full necessary feature set but it is not impossible to envisage the evolution of such functionality.

In a fully implemented application of such new feature sets, tape libraries would be seen, as a seamless extension of multi-tiered disk storage, with transparent re-positioning of data across all the storage assets of an organization, whether disk or tape, based on automated, policy driven management. In this vision, tapes would appear as logical storage pools rather than discrete physical units, just like networked disk storage is evolving.

Should tapes overcome their technical limitations, it is easy to foresee that the low storage cost of tape media would continue to drive a powerful dynamic in their favor as media of choice for archival and records management compliance applications. As in real estate, cost, cost and cost is still the most prominent driver of storage solutions.

In the Meantime

As for what this bodes for us in the present time dimension, here is a quick guideline for smart tape management.

On the most immediate basis, the greatest challenge we see companies facing is, surprisingly, the most simple to understand. It is the effective storage, management (including record keeping), and access to the physical media itself!

In simple terms, most large organizations have difficulty keeping track of what backup tapes they have and where they are. This difficulty relates back to the traditional role of tape backups as simple operational tools unencumbered by any larger considerations of record keeping and regulatory compliance and therefore not requiring the additional expense and effort associated with official corporate records.

A solution to this issue may not require any fancy futuristic technologies but rather straightforward operational controls and discipline, including staff training and responsibility ownership.

Taking care of this single problem would go a long ways to both addressing some of the current pain points and risks associated with tapes as well as setting the foundation for a happier organizational future of tapes, irrespective of what technology directions may finally materialize.

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