This issue of Computer magazine had its genesis at the Sixth IEEE Symposium on Mass Storage Systems held at Vail, Colorado, in June 1984. To owners of large collections of data at the symposium, the future looked bright indeed. There were descriptions of new high-performance optical digital data disk products, descriptions of new very high density magnetic tape and magnetic disk formats, and a discussion of the design decisions leading up to the IBM 3480 magnetic tape cartridge. To information systems directors, capacity planners, and storage managers, these new announcements meant new choices. They meant alternatives to satisfy the increasing demand for magnetic disks that can consume floor space and power at an alarming rate. They meant alternatives to the slow, error-prone, manual access to magnetic tape libraries.

For years, the standard storage paradigm has been a magnetic disk farm serving a cluster of mainframe/main memory units and a manually accessed magnetic tape library for backup and retention of less active files and data sets. There is frequently an off-site archive of magnetic tape and/or microfilm for vital records. The disk farm has also been referred to as a collection of direct access storage devices, or DASD, in the IBM world, and as a secondary store, working store, or local disk elsewhere. Mass storage systems, as opposed to manually accessed tape libraries, have automated the access to a portion of the library. A new physical-volume format is often required, for example, that of the IBM 3850 magnetic tape cartridge.

This standard storage paradigm is being altered by a wider need to share stored data and by the rapid growth in storage needs of a hierarchy of performance levels. The high-performance level is the mainframe level with data rates in the 1.5 to 3.0 megabyte-per-second range where the standard storage paradigm applies. The medium-performance range, characterized by specialized workstations and minicomputers with their own local magnetic disks and local area networks in the 0.1 to 1.0 megabyte-per-second range, is expanding. Workstations for CAD/CAM and document management, Ethernet and its competitors, new magnetic disk formats, and optical data disks in the 5.25- to 12-inch diameter range and the jukeboxes to serve them are all part of this mid-performance level, and they share rather than occupy mainframe I/O for access.

The low end of the performance hierarchy is characterized by the explosively growing personal computer field. Often, these are clustered with low-speed local area networks. A large part of today's innovation in magnetic, optical, and magneto-optical storage is directed at this low-performance end of the industry. Albert Hoagland states in his article for this issue of Computer, for example, that the magnetics industry is growing towards a $100-billion-a-year industry, with much of the growth expected to be in the...
lower two levels of the hierarchy. Much of the expected growth in optical data disk storage is also in these lower levels.

In this issue, we primarily address the high-performance end of the spectrum. Two major events occurred in 1984 that reduced the choices of media currently available at the high level. IBM announced the IBM 3480 magnetic tape cartridge, and Storage Technology Corporation declared bankruptcy under Chapter 11. Buyers will be tempted by the IBM product and will be unable to get StorageTek's high-performance optical disk data that matched client demands so well that many information system directors had already included it in their site planning.* We hope this issue of the magazine stimulates a growth of choices.

In the first article, William Collins and I describe a reference model for mass storage systems as a step in coping with some of the problems of emerging technology. We contend that more and better interface and module definitions will lead to more and better products to support evolving site architecture. Such products will more readily fit user-site requirements and reduce the need for expensive one-of-a-kind designs.

The second article, by Bernard O'Lear and David Kitts, describes an experiment in incorporating a new storage device and maintaining the requisite high data rate. The rising demand for storage often forces experimentation. They provide considerable guidance in site architecture.

The third article, by George Ammon, Joseph Calabria, and Douglas Thomas, reports that high-performance optical disk drives are now operational. The two subsystems they describe have now been delivered and are in operation. Although these units are not commercial products, they demonstrate the feasibility of an optical data disk at the high-performance level.

In the fourth article, Patric Savage describes an automated cartridge repository or data warehouse. To alleviate the problems associated with manual storage and retrieval of the physical volumes, regardless of whether the media are magnetic or optical, he suggests that the techniques of automated warehouses can handle any type of physical volume. Economical starter sets of warehouse modules can be configured to match site requirements. The repository is expected to give rise to changes in the development of storage media and their containers. The data warehouse concept is generally assumed to apply to the high-performance area, but it is applicable to other performance levels. The techniques described by Savage are independent of data rate.

The fifth article, by Hoagland, points out many of the recent advances in magnetic storage and recording technology. He hypothesizes that the very size of the magnetics industry and its continued R&D activity, very like a new high-technology industry, is increasing the magnetic technology's dominance. Hoagland's arguments for magnetic technology are very persuasive, although optical techniques for read/write of vertically oriented magnetic media (i.e., magneto-optics), may well become the storage technology of the future. □

References


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