

Tivoli SAN Vision

The Value of Information

Tivoli

The Roots of Information

People have always placed a high value on information and knowledge. From the first cuneiform characters pressed into clay tablets to today's petabytes of data held on magnetic media, information has been protected and valued. Because it was valuable and hard to acquire or store, information was kept in the hands of a few experts for thousands of years. It was only with the advent of printing in the fifteenth century that an information explosion began that led to thriving new nations and burgeoning societies, such as those of North America and Europe.

As information and knowledge became more available from 1500 onwards, it became essential to learn to read. At first, only the rich and privileged had the time and the means to learn to read and access new information. However, as the need for skilled labor to build and maintain societies evolved, governments realized that an educated workforce was essential to national prosperity. An association of schools, libraries, vocational training establishments, and colleges appeared almost overnight in the newly industrialized countries, and created a knowledge and information system that catapulted its developers into the twentieth century, laying the foundation for today's astonishingly successful, connected world.

The lesson learned from these information-based developments is that sharing knowledge and data makes a society and its individuals and organizations better able to communicate and work together for mutual benefit. Just as money is much more useful when it is invested and in circulation, so is information a much more useful tool and broader resource when it is shared. The opening months of the twenty-first century show global business poised to benefit from shared electronic information in the same way that society was just beginning to see the real advantages of universal education around 1900.

The Business Information Landscape Today

The profusion of storage technology advances available now or soon to come to market is guaranteed to confuse information technology (IT) professionals and leave business executives bewildered. While the objective is simple—to provide the best possible information systems—the method and technologies to be used are anything but simple.

Tivoli® has refined the various available components into what it calls the Information Grid. This combination of components consists of: storage area networking (SAN) topology; new technologies, such as fiber channel hubs; switches and interconnects; new disk and tape technologies;

and resource and data sharing techniques. The Information Grid promises extraordinary opportunities if organizations can deal with the inherent challenges.

Today's business information environment still consists largely of islands of information within an organization that have limited contact with each other and very little in the way of effective links and conduits across which information and data can flow to the people who need it. These islands may be in the form of large existing corporate systems that are based on mainframe architecture. They may be simple local area networks (LANs) that link the personal computers (PCs) or Microsoft® Windows NT® systems of a branch office or remote facility, or perhaps UNIX® technology-based departmental systems in engineering, research, or accounting functions. Whatever form information takes, it has always been difficult, if not impossible, to share—and it is even more difficult to achieve the powerful benefits of harnessing information into a single, seamless environment.

Preparing for Storage Area Networking

By December 2000, most experts expect the first complete implementations of SANs to be in place and running successfully. A large number of IT vendors are actively pursuing this goal. However, for the IT user community, deciding which company or companies to form successful relationships with will be critical.

SAN technology is part of the larger challenge of establishing a full storage networking management strategy. Careful consideration should be given to choosing a vendor or partner that is capable of implementing the full range of benefits of storage management. These benefits include:

- 24x7x365 availability
- Scalability
- Data sharing across different architectures
- Storage access at all times and from all locations
- Better performance
- Cost reductions
- Improved security
- Significantly better data protection
- Verifiable and consistent data integrity
- Easy-to-use, consistent data management tools

Tivoli, in partnership with many of the leading storage management and SAN vendors, has developed and planned for the technology required to ensure successful, full implementation of SANs. Tivoli is developing new products that will be essential to exploit the Information Grid in all its capabilities. As highly IT-dependent companies develop increased competitive advantage from adept management of their information and data, they are turning to Information Integrity Initiatives (I³) to provide the structure for their storage strate-

gies. The key areas where installations must be prepared for SAN implementation and also for storage management fulfillment are:

- *Application management*

Application management is a vital component of the relationship between business systems and IT capabilities. It is also the obvious point at which strategic business goals can be furthered by the skillful implementation of I³. However, there are some considerations that affect application management in an enterprise environment. Large-scale business applications are usually very complex, involve custom and off-the-shelf software, and are linked to the three most common architectures—mainframe, open systems, and desktop environments. The picture is further complicated because all of these enterprise applications are essential to the financial health of a business.

- *Data management*

Data is the lifeblood of business. Just as governments and business discovered that money was an engine for economic growth only when it was available, so are businesses rapidly realizing that data assets are many times more effective and valuable when widely accessible. In the Tivoli

Information Grid, data management assures that data is available and accessible for applications; that data meets the specifications for application use; and that data is recoverable in case of a failure. Data management functions with all types of storage, whether remote, centralized, or removable. Data management functions at all levels, from large system servers to desktops.

- *Resource management*

Business executives who are intimately involved with IT are sometimes puzzled by decreases in the unit cost of processors, storage, communication, and the increased total cost of IT. Storage management, in general, and storage area networking, in particular, should provide some relief from this conundrum by managing pooled, fixed disk, and tape resources, as well as all removable media and the implementation of just-in-time storage management.

- *Network management*

Network management is probably the most critical part of the SAN and storage management challenge, in terms of the burgeoning e-commerce market. Local area network (LAN) and wide area network (WAN) resources already form part of every large

enterprise and are familiar to all business executives. SANs are the logical extension of these proven networks and bring the same, or greater, value to the companies that deploy them. SANs will be as critical to business success in the future as LANs and WANs are today. SAN capabilities in the network management space include predictive capacity planning, connectivity mapping, performance, and error mapping, largely in the fibre channel area.

- *Element management*

Element management is the most detailed of the layers of storage management, and is usually overlooked by business planning. It involves the management and interaction of individual hardware elements within the SAN from different storage manufacturers, which enables SANs to integrate different storage architectures from different manufacturers.

The Challenge of Implementing SAN Technology

Although rapid strides have been made in SAN technology, and a great deal of implementation work is underway, knowledgeable IT watchers do not expect to see genuine SAN solutions up and running until the last quarter of 2000. To achieve a genuine SAN solution, the following are the basic conditions that a network must meet:

- Any-to-any interconnection of servers and storage systems
- Universal access and sharing of resources
- Centralized resource management
- Excellent information protection and disaster tolerance
- High levels of security and data integrity in system architectures
- Massive scalability to cope with the future explosive growth in information technology deployment

SAN is not the ultimate cure for the challenges executives face due to the exponential growth of e-business and corresponding requirements for high storage capacity and data protection. However, SAN is an essential component in the future of business IT. Terms like multi-vendor tape resource sharing and LAN-free data transfer over established IP and fiber channel networks will soon become commonplace, as companies encounter the challenge of using SAN technology to provide business advantage.

Implementing SAN environments will consume many resources in the coming years. The selection of trading partners, such as IBM, Tivoli, or one of the other experienced technology creation and deployment companies, will be an essential prerequisite for success. As further enhancements—such as disk and data sharing—become

common, the more important it will be to have a broad spectrum of experience and capability with technology integration.

The essential characteristics to look for in a SAN vendor or trading partner are not found in any one capability. It is immaterial whether that capability is in volume mapping, tape management software, or any other point. The key criteria for selecting a company to build a SAN or storage network management system is its ability to help make the best-of-breed technologies from all sources work together for the best total system. Most of the proven, smaller vendors have excellent products that can be considered at the element-management stage of creating a SAN. Tivoli brings strength to this process in its ability to make its own excellent products work together with those from other vendors. This process is formalized in the Team Tivoli concept which creates the solutions that IT-dependent enterprises need from a wide choice of leading technologies.

The Storage Networking Management Vision

The Tivoli vision of storage area networking management is one that exploits both the Information Grid and customers' I³ to create storage solutions and networks that build business advantage. By taking the best technologies that Tivoli has to offer and combining them with those from its Team Tivoli partners, it will be possible to assemble e-business, manufacturing, retail, banking, healthcare, or any other type of business IT solution that an enterprise will need. Islands of data will become transformed into a united resource that shares information and multiplies its worth to each organization.

Storage area networks will vault their users into the twenty-first century by enabling sharing of data and information, multiplying their worth far beyond their value as discrete resources.



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