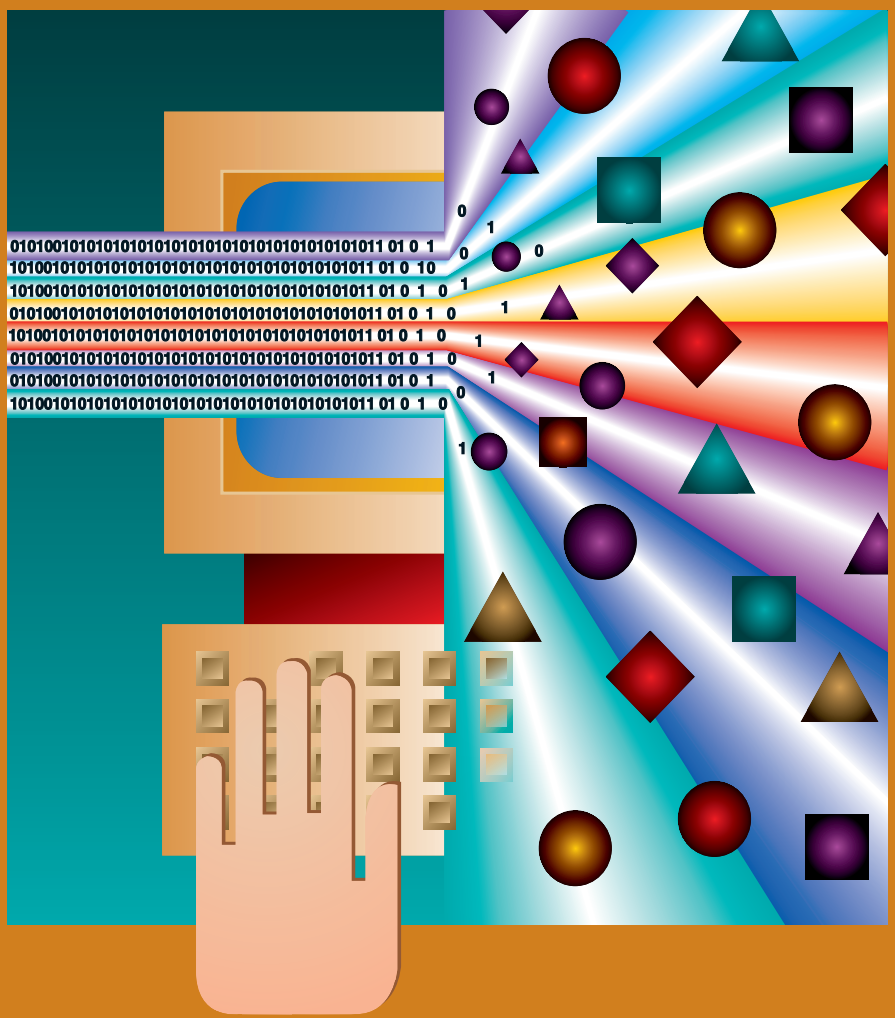
Storage Resource Guide

BY BARRIE SOSINSKY

Many people learn about storage technology incrementally, as their needs dictate. Storage is a challenging and diverse area, and one that is particularly hard to become expert in because it touches on so many disciplines. Learning is made harder still by the fact that the storage industry has been in flux during the past few years with the rapid introduction of new networking technologies, storage architectures, and software products and paradigms. So even if you took a course in storage a few years ago, you are likely to find many new concepts and practices in use.



A full appreciation of modern storage technology must include the following topics:

1. The underlying physics of storage devices
2. Disk and tape media and mechanisms
3. Storage allocation structures, such as blocks and file systems
4. Computer memory and caching technologies
5. Computer system bus and interface technologies
6. Network wire transport and protocols
7. Storage networking architecture and technologies
8. Host (Windows) storage management and storage software

In this Storage Resource Guide, I catalog some of the more valuable resources available to learn about computer storage, with a particular emphasis on Windows-based networks. The resources you will find here include books, industry associations, online and print publications, and vendor's sites that contain significant resources, such as white papers.

Books

You will find the following books about storage of value. They are listed by topic focus.

General Introductions

• **Designing a Total Data Storage Solution: Technology, Implementation, and Management,** Roxanne E. Burkey (Editor), Charles V. Breakfield (Editor), Roxanne Burkey; CRC Press; ISBN 0849308933.

• **Drive and Memory Troubleshooting Pocket Reference,** Stephen J. Bigelow, Osborne, ISBN 0071354530

• **Enterprise Storage Solutions Handbook,** IBM International Technical Support Organization (IBM Redbooks), IBM, ISBN 0738417793.

• **The Holy Grail of Data Storage Management,** Jon and Margaret Toigo, Prentice-Hall, August 1999, Prentice Hall PTR, ISBN 0130130559.

• **Magnetic Information Storage Technology,** Shan X. Wang and

Alexander M. Taratorin, Academic Press, ISBN 0127345701.

• **The Essential Guide to Computer Data** Storage: From Floppy to DVD, Andrei Khurshudov, Prentice Hall PTR, ISBN 0130927392.

High Availability

• **Blueprints for High Availability: Designing Resilient Distributed Systems,** Evan Marcus and Hal Stern, John Wiley & Sons, ISBN 0471356018.

• **RAIDbook,** RAID Advisory Board, http://www.raid-advisory.com/membership200.html#pubs.

• **Storage Networking Virtualization: What's It All About?** IBM International Technical Support Organization (IBM Redbooks), IBM, ISBN 0738421367.

Protocols and Transports

• **Fibre Array Storage Technology: A Fast Introduction,** IBM Redbooks, ISBN 0738421677.

• **Fibre Channel for SANs,** Alan F. Benner, McGraw-Hill Professional Publishing, ISBN 0071374132.

• **Fibre Channel for Mass Storage,** Ralph H. Thornburgh, Prentice Hall PTR, ISBN 0130102229.

• **The InfiniBand Architecture, 1.0a Specification Release,** InfiniBand Trade Organization, http://www.infinibandta.org/estore.html.

• **IP Storage Networking: IBM NAS & ISCSI Solutions,** IBM Redbooks, IBM, ISBN 0738421588.

• **IP SANS: A Guide to iSCSI, iFCP, and FCIP Protocols for Storage Area Networks,** Tom Clark, Addison-Wesley, ISBN 0201752778.

Software

• **Backup Technologies: New Solutions to Protect Your Business,** Gayle Humphrey, CD-ROM, WatchIT, ISBN IT10221316.

Storage Networking

• **Building SANs with Brocade Fabric Switches,** Chris Beauchamp, Josh Judd, and Benjamin Kuo, Syngress Publishing, ISBN 192899430X.

• **Building Storage Networks 2nd Edition,** Marc Farley, McGraw-Hill Professional Publishing, ISBN 0072130725. The most widely cited introduction to storage networking.

• **Designing Storage Area Networks: A Practical Reference for Implementing Fibre Channel SANs,** Tom Clark, Addison-Wesley, ISBN 0201615843.

• **IBM Redbooks Enterprise Storage, SAN/NAS, and System Management Solutions Collection,** IBM Redbooks, CD-ROM, ISBN 0738421758.

• **Storage Area Networks: Designing and Implementing a Mass Storage System,** Ralph H. Thornburgh, Barry J. Schoenborn, Prentice Hall PTR, ISBN 0130279595.

• **Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs,** Richard Barker and Paul Massiglia, Wiley & Sons, ISBN 0471034452.

• **Storage Consolidation in SAN Environments,** IBM International Technical Support Organization (IBM Redbooks), IBM, ISBN 0738419540.

• **Using Storage Area Networks Special Edition,** NIIT, Que Publishing, ISBN 0789725746.

Windows Storage

• **Disk Storage Management for Windows Servers 2nd Edition,** Paul Massiglia, VERITAS Software Corporation. A good general introduction, including hardware principles, RAID, system management and setup, and VERITAS software usage (Volume Manager).

• **Microsoft Windows 2000-Installation and Administration: Storage and Printing,** SmartForce, ISBN IT10224216.

Obviously, I've chosen some giants of the storage industry to illustrate the point that vendor Web sites can provide useful information. But you can find some of the best informational resources on the Web sites of smaller companies that specialize in a particular technology.

Storage Publications and Online Resources

You can find a variety of online publications, storage portals, and storage-specific search engines on the Internet and in print. The following are some of the most commonly mentioned resources.

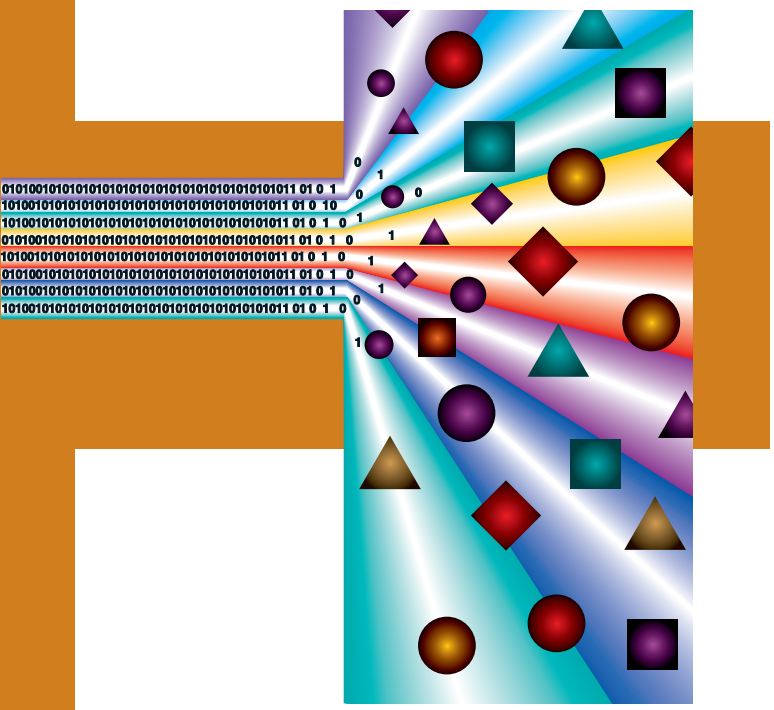
• **Bit Pipe** (http://www.bitpipe.com/) — a publisher and distributor of original research and IT content from several analyst firms, including IDC, Meta Group, and Yankee Group.

• **Byte and Switch** (http://www.byteandswitch.com/) — specializes in storage networking site news and analysis.

• **Infostor** (http://www.infostor.com) — the online version of the storage-specific industry magazine of the same name.

• **ITtoolbox** (http://storage.ittoolbox.com/) — a storage portal with news and discussion forums.

• **Network Buyer's Guide** (http://www.networkbuyersguide.com/netstorguide/) — an online searchable resource for available storage hardware and software.



• **Network Storage Forum** (http://www.networkstorageforum.com/) — a portal containing articles and news about the network storage industry.

• **SearchStorage** (http://searchstorage.techtarget.com/)— Techtarget.com's storage search engine and portal.

• **StorageSearch** (http://www.storagesearch.com/) — a news site for the storage industry.

• **Windows Storage Admin** (http://www.storageadmin.com/) — a Windows storage network portal containing articles and news from the Storage UPDATE email newsletter and a forum run by Windows and .NET Magazine.

Industry Associations

The following are the most influential organizations working in storage.

• **American National Standards Institute** (ANSI; http://www.ansi.org/). ANSI creates many voluntary industry standards across several industries and has working committees in various areas relating to computer storage.

• **Distributed Management Task Force** (DMTF; http://www.dmtf.org/). DMTF creates management standards for computer system and enterprise environments.

• **Fibre Alliance** (http://www.fibrealliance.org/). An industry consortium founded by EMC, Fibre Alliance developed the SNMP MIB standard for storage network and devices, which enables heterogeneous Fibre Channel SANs. The IETF is ratifying this SNMP MIB standard.

• **Fibre Channel Industry Association** (FCIA; www.fibrechannel.com). FCIA offers test suites and provides interoperability testing for fibre channel products. FCIA offers an overview of Fibre Channel at http://www.fibrechannel.com/technology/index.master.html.

• **IEEE SSSWG** (http://www.ssswg.org/). The Storage Systems Standards Work Group of the IEEE defines disk architectures and tape and format issues.

• **Infiniband Trade Association** (http://www.infinibandta.org/). This organization is developing the InfiniBand I/O bus specification for a channel-based, switched fabric. Infiniband will connect servers to servers, servers to storage, and networking devices to both, enabling a high-speed bus and clustering.

• **Internet Engineering Task Force** (IETF; http://www.ietf.org/). IETF is known for its work on TCP/IP standards. In addition, its work on SNMP to monitor and manage networks; an MIB-based device definition; IP over Fibre Channel; and a policy for Quality of Service (QoS) is of fundamental importance for the storage industry.

• **Network Data Management Task Force** (http://www.ndmp.org/). This organization is responsible for the Network Data Management Protocol (NDMP), an open, standard protocol for direct network backup from Network Attached Storage (NAS) devices. Although NDMPis limited to tape drives, the protocol may be extensible to other areas of technology.

• **National Storage Industry Consortium** (NSIC; http://www.nsic.org/). NSIC runs industry and government collaborative research projects. Current activities are in the Extremely High Density Recording (EHDR) field for disk drives, Mulitple Optical Recording Enhancements (MORE), NAS, and tape.

• **Storage Networking Industry Association** (SNIA; www.snia.org). SNIA maintains a list of resources at http://www.snia.org/English/Resources/.

SNIA also publishes a useful and widely quoted dictionary of terms at http://www.snia.org/English/Resources/Dictionary_FS.html/.

The association is developing a Shared Network Storage Model similar to the ISO's OSI 7-layer networking model. You can download the current version of this model's white paper or a PDF of the Microsoft PowerPoint presentation from http://www.snia.org/English/Overview/Technical_Council/Shared_Storage_Model.html.

Additionally, you can find a list of training resources available from SNIA members at http://www.snia.org/English/Resources/Training_Courses/Training_Courses.html.

• **Storage Performance Council** (SPC; http://www.storageperformance.org/). SPC is a standards body that offers vendor-neutral benchmarks that characterize storage subsystem performance. The SPC's purpose is similar to that of the more widely known TPC organization that publishes database benchmarks.

Vendor Resources

Many leading storage vendors offer resource pages that contain information about their products, white papers (some general or vendor neutral; some product-specific). You can find searchable vendor listings by category and by name at the following sites.

- The *Windows & .NET Magazine's* IT Buyer's Network (http://www.winnetmag.com/Techware/InteractiveProduct/Storage/) lists some of the more prominent Windows network storage providers and offers a jump page to their various sites.
- SearchStorage.com offers a useful listing of storage vendors in hardware, software, and services. http://searchstorage.techtarget.com/buyersGuideCategory/0,289858,sid5,00.html.

Vendor sites are too numerous to document here, but as an illustration of the sort of resources you can find on vendor Web sites, consider the following six examples.

1. **Compaq Storage.** Following the links from Compaq Storage's home page at http://searchstorage.techtarget.com/buyersGuideCategory/0,289858,sid5,00.html you can find news, case studies, and events related to Compaq's products and technologies.

2. **EMC².** From EMC's home page (http://www.emc.com), you will find a specific link to EMC's Windows NT/2000 group at http://www.emc.com/horizontal/windows_nt.jsp?openfolder=winnt. The Windows page offers links to products, services, white papers and reports, news and events, and customer profiles.

3. **Hewlett-Packard** (HP) Enterprise Storage. HP's storage page (http://www.products.storage.hp.com/eprise/main/storage/DisplayPages/storageindex.htm) leads you to a product listing called the Storage Index. Each listing offers detailed product information, but HP's site offers few general resources and is poorly organized for anything other than specifying and buying HP products online.

4. **IBM Storage.** IBM's storage home page (http://www.microsoft.com/windows2000/techinfo/default.asp) offers links to product information, training resources, and to the IBM research Web sites (for example, IBM's Almaden Web site, which is renowned for its work in disk storage technology).

5. **Microsoft.** Microsoft's Web site (http://www.microsoft.com) doesn't break storage out as a separate entity. You can find storage-related articles by searching for individual topics using the Microsoft search engine, which will yield hits in the Microsoft Developer Network and in the Knowledge Base. Two pages that you might want to look at are the storage section of the new Windows Catalog (a store) at http://www.microsoft.com/windows/catalog/catalogshell/shell.asp?subid=22, and the home page for Microsoft Network Attached Storage Appliances at http://www.microsoft.com/windows/serverappliance/nas/default.asp. Some storage-related white papers are located at http://www.microsoft.com/windows2000/techinfo/default.asp.

6. **VERITAS Software.** VERITAS's site (http://www.veritas.com) has a rich listing of resources, including eLearning, training, product information, and an extensive white paper collection that is searchable from http://www.veritas.com/news/listing/WhitePapersBySection.jhtml?start=51&section=W&subject=Product&entity=ProductDownloadCategory&subview=getDownloadListBySection. Many of these white papers are devoted to Windows storage software and technology.

Obviously, I've chosen some giants of the storage industry to illustrate the point that vendor Web sites can provide useful information. But you can find some of the best informational resources on the Web sites of smaller companies that specialize in a particular technology. Because these companies are at the forefront of emerging technologies, they often need to educate their investors and customers by providing white papers in their areas of expertise. The following are two examples of companies that have emerging technologies.

- **Alacritech** (http://www.alacritech.com/html/storagewhitepaper.html), which is developing a TCP/IP offloading hardware solution.
- **Nishan Systems** (http://www.nishansystems.com/techlib/technical.html), which focuses on IP storage technology.

About the Author

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