

IBM TotalStorage Open Software Family
for an on demand world



IBM TotalStorage Open Software Family

Essential technology for an on demand environment

open

software





a better

Overview

Storage is essential in helping enterprises around the world—of every size and type—house the information needed to achieve their business goals. Managing this storage within a framework of legal requirements, usage and availability needs, and operational-cost realities can be daunting. One key to turning this growing management challenge into a source of competitive advantage is the employment of an end-to-end storage management strategy that leverages the strength and breadth of a comprehensive, yet open, storage management and virtualization portfolio: the IBM® TotalStorage® Open Software Family.

The storage challenge

Storage is a top priority for every business—mission-critical and challenging to manage. What makes it challenging? Growth in storage demand due to digital content, e-mail, Internet-based applications and emerging technology; Complexity of storage networks with devices from different manufacturers, resulting in separate islands of storage; Pressure to retain data for compliance with a growing number of regulations worldwide. Threats to business continuity posed by disaster, outages or even human error.

If dealing with storage management strains your budget and your storage management team, you're not alone. Storage consumes 13% of the IT budget and is expected to increase to 15-17% by 2006/07¹. In addition, 40% of storage costs are due to personnel costs, which are increasing by 4% each year.

Essential technology for an on demand environment

The IBM TotalStorage Open Software Family can help you address your storage challenge by getting more out of your existing storage infrastructure investment. Open Software Family has the technology to help you build an on demand environment, which can help you:

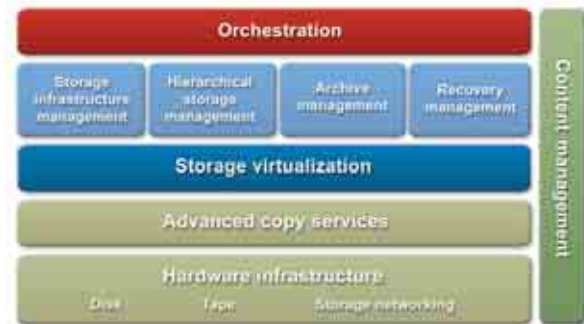
- **Innovate your business** *to differentiate and capture new value*
- **Make better use of resources** *to be more productive*
- **Increase resiliency and security** *of your organization*

way

Open Software Family products can be used alone or integrated together, based on your specific business needs as your storage environment evolves. They support an on demand environment by helping you to:

- **Simplify your infrastructure** and automate management to help improve productivity, increase storage utilization and reduce application downtime
- **Manage information throughout its lifecycle** to help meet your data retention requirements while helping lower costs by optimizing data placement across a tiered storage environment
- **Maintain business continuity** and recoverability with ease of use and low costs

Open Software Family capabilities include storage infrastructure management, hierarchical storage management (HSM), archive management, recovery management and storage virtualization. You can complement Open Software Family products with IBM TotalStorage hardware, storage orchestration capabilities from IBM Tivoli® software and IBM DB2® Content Management software, as well as education, financing and services for a complete storage solution from IBM.



Simplify your infrastructure

Open Software Family technology is designed to simplify the storage environment in a logical manner that takes into consideration the realities of high growth rates and ongoing development of multiple and potentially different storage systems. Infrastructure simplification typically begins with consolidation and the leveraging of tiered storage environments to better align data value with infrastructure costs. The IBM TotalStorage portfolio includes one of the broadest families of disk and tape systems to meet your consolidation and cost-aligned tiered storage needs. The Open Software Family includes IBM Virtualization Engine™ services to help further simplify and extend the value of storage consolidation and tiered storage approaches. Storage infrastructure management and orchestration are designed to help centralize management, reduce or eliminate human error and improve productivity by automating routine tasks.

software

Storage virtualization

Virtualization technology is designed to pool your storage volumes and file systems into a single reservoir of capacity for centralized management and provisioning. This pooled reservoir of storage can include storage capacity from multiple vendors and platforms in heterogeneous environments to help provide greater flexibility, capacity utilization, performance and availability. Virtualization is designed to help reduce the down-time effects of reconfigurations at the hardware level, to help improve application availability.

Storage infrastructure management

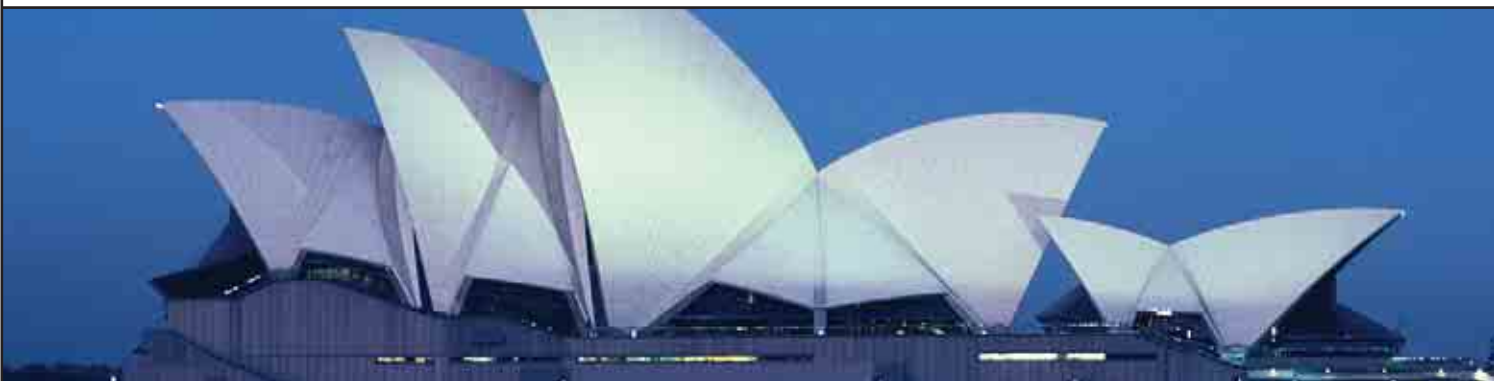
Storage infrastructure management software is designed to help enterprises understand and proactively manage their heterogeneous storage infrastructure. It helps empower administrators by providing an integrated view of the entire storage environment, including disk, SAN fabric, virtualization and your data usage in file systems and databases.

Storage infrastructure management provides insight into the historic, operational and predictive analytics of the storage environment that, in turn, can help administrators improve storage capacity and network utilization, and help avoid business outages. It also supports policy-based automation for tasks, such as capacity provisioning, performance optimization and data management, helping to provide outstanding business agility and improved personnel productivity.

The storage infrastructure management products of the Open Software Family use a common, open-standards interface for management, based on the Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S). This is designed to give you the flexibility to interoperate with products from many different providers, without having to change the way you manage your environment.

Storage orchestration

Storage orchestration and provisioning is designed to help automate the management of storage environments to meet service levels or other business policies. Beginning with policy-based, automated work flows, storage orchestration is planned to include real-time monitoring and intelligence designed to enable automatic management of the on demand storage environment. This is intended to help automate complex and error-prone tasks, to reduce or eliminate human error and associated application outages.



capabilities

Manage information throughout its lifecycle

Given the budgetary pressures of today's highly competitive world, companies are forced to evaluate the value of data constantly. How often do we need to access this information? How quickly do we need access? How long should we keep it? Where do we most effectively store this information?

Information lifecycle management solutions can help your business optimize the management of information according to its business value from the moment of its creation to the moment of its disposal. The IBM TotalStorage portfolio includes one of the broadest families of disk and tape systems, complemented by HSM, archive management and IBM DB2 content management capabilities to meet basic to advanced information lifecycle needs.

Hierarchical storage management

HSM can move data over time across different storage tiers based on its changing business value to help control data storage growth and costs. It is designed to allow you to capture low-activity or inactive data and feed it into a hierarchy of lower-cost or tiered storage. Automated, policy-based technology determines where data should be stored, based on factors such as how critical it is to your business, how accessible and available you want it to be, and the cost structures of available devices. Support for a broad range of platforms—spanning from mainframes to open, distributed systems—helps offer you flexibility in choice and investment protection. And interoperability with IBM Content and Records Management products allows enterprise data to be efficiently moved from one medium to another while helping avoid disruptions in service.

Archive management

As your business captures point-in-time copies of important data for storage requirements, archive management helps you manage the cost. Archive, retain and manage data, including e-mail. Archive management also provides HSM technology. Open Software Family archive-management products are interoperable with many content management products available in the marketplace, including the IBM DB2 Content Management family. And they support a wide variety of storage media, write-once read-many (WORM) tape and magnetic disks.

The IBM TotalStorage Data Retention 550 is designed as a preconfigured, integrated solution designed to help store, retrieve, manage, share and secure data. It uses IBM Tivoli Storage Manager for Data Retention for management and enforcement of data-retention policies. The solution's policy-based archive data retention² technology is designed to support non-erasable, non-rewritable data storage. Using an established archive application programming interface (API), it helps address the needs of businesses with long-term data retention and protection needs.

Storage virtualization

In addition to simplifying your storage infrastructure, storage virtualization can help you meet your information lifecycle management needs through policy-based file provisioning that places files on and moves data across different tiers of storage. This supports the ability to match the value of your data to the appropriate class of storage. In addition, storage virtualization can pool storage from similar storage devices into managed storage groups for each of your storage tiers.

software

Maintain business continuity

To succeed in an increasingly on demand world, companies need to make sure they can access mission-critical data—at any time. The IBM TotalStorage Open Software Family includes enterprise-class recovery management and advanced copy-services technology to help provide this capability.

Recovery management

Recovery management helps you create and track reliable recovery points of your most critical enterprise data, based on preset policies. Through centralized, Web-based management, it provides intelligent backup and archiving to help avoid impact on application availability. And it's designed to match the value of protected data and applications to the most cost-effective media—whether tape or disk storage. Recovery management is scalable, designed to help you address a wide range of service level agreements (SLAs) using the appropriate cost structure. Automated policy-based data movement and intelligent storage techniques are designed to help free administrators to work on higher value tasks and projects.

Advanced copy services

Open Software Family storage virtualization products have copying and mirroring capabilities designed to give you almost instant and highly available access to critical information during both planned and unplanned local outages. These are designed to provide levels of data availability and resiliency that are essential for on demand environments.

IBM FlashCopy® point-in-time copy services are designed to replicate data across heterogeneous storage devices, helping you to copy storage volumes from higher cost primary storage devices to lower cost targets. Metro Mirror copy services help you to create duplicate copies of application data at remote sites, again across heterogeneous devices. File-based FlashCopy can be used to create multiple online backups of your virtualized file system. FlashCopy can also be used to make point-in-time copies that can then be backed up to tape, helping to eliminate your backup windows.

Storage infrastructure management

Storage infrastructure management plays a role in business continuity by helping you centralize and automate the setup and management of your site-to-site replication environment. It also enables you to monitor copy operations.

family

The Open Software Family portfolio of products

With the IBM TotalStorage Open Software Family, you can choose from a broad portfolio of storage infrastructure management, virtualization, HSM, archive management and recovery management capabilities. And the Open Software Family lets you choose hardware and software from a wide range of vendors for your infrastructure, IBM or not. That's because many of our products are designed to be modular, integrated and interoperable with those of many other vendors based on open industry-supported standards.

IBM Virtualization Engine Suite for Storage

The IBM Virtualization Engine Suite for Storage comprises three separately orderable offerings designed to help optimize storage resource utilization, improve application availability and enhance storage personnel productivity. These offerings provide a set of complementary Virtualization Engine Systems Services that you can choose depending on your needs. These capabilities complement the capabilities of the IBM Virtualization Engine Suite for Servers and IBM Virtualization Engine technologies that are embedded in IBM **@server** servers and the IBM TotalStorage DS8300 disk storage system.

- **IBM TotalStorage SAN Volume Controller**

SAN Volume Controller is designed to virtualize the storage in your network and centralize management. It is designed to help administrators migrate data and add capacity, and apply software upgrades without disrupting application availability. SAN Volume Controller storage software can be delivered as an appliance within the SAN Volume Controller or embedded within the Caching Services Module of the Cisco MDS 9000 Switch.

Packaging supplier Bischof + Klein virtualized its storage using SAN Volume Controller for an IBM TotalStorage SAN environment. SAN Volume Controller provides the company with a network designed to provide resiliency in a disaster scenario, along with the ability to add new capacity or bring new systems into the SAN with minimal effort and at low cost. Metro Mirror and FlashCopy are designed to copy services help transfer data consistently from production systems and across the network.

"Data volumes are always increasing, as the business grows and moves increasingly away from paper-based systems, and it is vital for us to be prepared for this growth," said Holger Hahn, IT Director, Bischof + Klein. "The new solution offers us functionality and flexibility, and has doubled our storage capacity, providing useful headroom for the future."

benefits

- **IBM TotalStorage SAN File System**

SAN File System³ is designed to virtualize and consolidate file systems across Microsoft® Windows®, UNIX® and Linux® servers, and provide a common pool of storage that can be shared across servers. It is designed to support multiple tiers of storage and provide policy-based allocation of space at a file level and policy-based migration of files between storage pools.

Researchers at Johns Hopkins Center for Cardiovascular Bioinformatics and Modeling are using IBM technology to help discover how genes and proteins can influence heart disease. One of the key challenges is to manage the data and storage associated with this research—particularly since the data is deployed across Hopkins' many hospitals and research campuses. This makes it difficult to manage data and storage consistently, migrate data, or make changes to storage and servers without impacting application availability.

"We've chosen the IBM TotalStorage SAN File System as a key component of our infrastructure, and it is implemented and running in our Storage Systems Lab today," said Randal Burns, Assistant Professor, Department of Computer Science and Director of the Hopkins Storage Systems Lab, Johns Hopkins University. "We have found that the SAN File System provides us the scalability, data sharing, and management capabilities that can allow us to easily support the variety of applications our researchers will be using."

- **IBM TotalStorage Productivity Center**

Productivity Center is designed to help simplify and automate the management of your storage infrastructure through a centralized, common suite of tools for storage devices, data and storage networks. It is designed to help optimize storage resource utilization, improve application availability and enhance storage personnel productivity. Productivity Center also adds intelligence to data-protection practices.

IBM TotalStorage Productivity Center includes:

- **IBM TotalStorage Productivity Center for Data**

Designed to automate the capacity management of file and storage system resources in a storage infrastructure. It also offers capabilities for analyzing how effectively these resources are being used

- **IBM TotalStorage Productivity Center for Fabric**

Designed to automate management of a broad range of devices in a storage network. It offers automatic resource discovery, event monitoring and alerting, zone control, and storage area network (SAN) error-prediction capabilities

- **IBM TotalStorage Productivity Center for Disk**

Designed to help administrators manage a heterogeneous SAN environment from a single point. It is designed to allow administrators to configure multiple storage devices from a single console, and monitor and track the performance of SAN-attached, SMI-S-compliant storage devices

- **IBM TotalStorage Productivity Center for Replication**

Designed to control and monitor copy services operations in storage environments. It is also designed to provide advanced copy services functions for supported storage subsystems on the SAN, including support for Metro Mirror and FlashCopy for ESS and SAN Volume Controller, using the SMI-S-enabled interface

IBM Tivoli Storage Manager family

The IBM Tivoli Storage Manager family of offerings provides centralized, automated data protection that can help reduce the risks associated with data loss, help to reduce complexity, manage costs, and help ensure compliance with regulatory data retention requirements. Tivoli Storage Manager can reliably protect an organization's data from failures and disasters by storing backup data in direct attached storage and archive copies in offline storage. Tivoli Storage Manager is designed to help enterprises manage their data, based on factors such as the criticality of the data to the business, accessibility and availability requirements, and the service quality levels and associated cost structures of the various storage media. Tivoli Storage Manager can protect thousands of computers running more than a dozen different operating systems, and with its intelligent data move, store techniques and policy-based automation, it provides a cost-efficient and highly scalable solution.

- ***Centralize data backups and restores***

With the Tivoli Storage Manager progressive backup approach strategy, only files that have changed or that are new are backed up. This helps to reduce or eliminate unnecessary data transfers that rob your network and processors of vital power and productivity.

- ***Manage data archiving and retrieval***

With Tivoli Storage Manager, data archives are managed for a defined lifetime through the policy-based automation engine. The Tivoli Storage Manager client can quickly and easily retrieve the archived data, giving you a secure, easy way to store important data for long periods. The files are kept for a specified amount of time, and then expired from the hierarchy of storage.

- ***Manage inactive in a storage hierarchy***

Tivoli Storage Manager ensures that inactive data is managed and stored in a hierarchy of lower-cost storage that can include low-cost disk systems, such as Serial Advanced Technology Attachment (SATA), automated tape systems and optical libraries. As an added benefit, the data can be compressed and encrypted on its way into the hierarchy. As soon as the data is in the hierarchy, it can be seamlessly moved from one type of storage to another.

Tivoli Storage Manager is designed to interoperate with a wide range of optional, separately orderable modules for mail, databases, application servers, enterprise resource planning (ERP) and hardware. The optional modules for the Tivoli Storage Manager family are designed to provide a high level of application and hardware integration with the data protection process. They include IBM Tivoli Storage Manager for Space Management to address your HSM needs, and IBM Tivoli Storage Manager for Data Retention to address your archive needs

- ***IBM Tivoli Storage Manager for Space Management***

Designed to allow you to move inactive, rarely accessed data to less-expensive offline storage or near-line storage. It can free online disk space for more important, active data, which remains in the local file system.

- ***IBM Tivoli Storage Manager for Data Retention***

It also helps manage and simplify the retrieval of data that must be retained to comply with records-retention regulations. Short of physical destruction of the storage media or server, or deletion of the Tivoli Storage Manager database, it is difficult to delete data before its scheduled expiration. Tivoli Storage Manager for Data Retention helps ensure that data remains available until its scheduled expiration date.

Handtmann Companies implemented IBM Tivoli Storage Manager as part of its storage solution to address an increase in the number and complexity of its IT systems. Headquartered in Biberach, Germany, the growing company manufactures components and equipment for the automotive, electrical, chemical, food and pharmaceutical sectors.

“The IBM storage solution has enabled us to manage storage for our heterogeneous environment easily and cost-effectively,” said Klaus Zell, IT Manager. “We can now provide more storage to a particular system with a single mouse click, and TSM makes backup and restore much faster and easier.”

IBM Virtualization Engine Suite benefits at a glance

	Designed to help improve application availability	Designed to help optimize storage resource utilization	Designed to help enhance storage personnel productivity
IBM TotalStorage SAN Volume Controller is designed to help:	<ul style="list-style-type: none"> Eliminate or reduce many of the causes of storage-related downtime Perform data migrations between storage systems without disrupting applications Create a common platform and API for volume point-in-time and remote copy services across multiple storage systems 	<ul style="list-style-type: none"> Aggregate disk capacity from multiple storage systems into a single pool of storage, which can be managed from a central point Enable creation of a tiered storage environment in which the cost of the storage can be matched to the value of the data 	<ul style="list-style-type: none"> Create a central point of management to help reduce training costs, because administrators need only learn a single interface for volume management Enable physical changes to the storage infrastructure without disrupting applications
IBM TotalStorage SAN File System is designed to help:	<ul style="list-style-type: none"> Create a common platform and API for file point-in-time copy services Reduce downtime for backups using file-based IBM FlashCopy function Eliminate application downtime for file and data management tasks—add, move, change file system capacity nondisruptively 	<ul style="list-style-type: none"> Eliminate the pre-allocation of disk capacity to specific host systems or applications, pool file space across heterogeneous platforms Share files between applications—even between server platforms and help eliminate the need to maintain duplicate data for sharing Enable proactive file space management with tools for quota management Define multiple, space-efficient, online recovery points 	<ul style="list-style-type: none"> Create a single point of control and administration for file management Automate routine tasks through policy-based provisioning Perform many routine file and data maintenance tasks as needed without the need for planned downtime Enhance sharing and collaboration through a single global name space across heterogeneous servers

IBM TotalStorage Productivity Center benefits at a glance

	Designed to help improve application availability	Designed to help optimize storage resource utilization	Designed to help enhance storage personnel productivity
IBM TotalStorage Productivity Center for Data is designed to help:	<ul style="list-style-type: none"> Prevent out-of-space conditions on file and storage systems 	<ul style="list-style-type: none"> Conduct storage system, file system, directory and file-level analysis Identify obsolete or orphan data and automatically archive it Forecast future growth and many at-risk situations 	<ul style="list-style-type: none"> Automate reporting of information and metrics to help administrators make better, more timely decisions
IBM TotalStorage Productivity Center for Fabric is designed to help:	<ul style="list-style-type: none"> Predict storage network failures before they happen to help enable preventive maintenance Accelerate problem isolation when failures do happen 	<ul style="list-style-type: none"> Report on storage network performance 	<ul style="list-style-type: none"> Create a single point of control and administration for managing heterogeneous storage networks
IBM TotalStorage Productivity Center for Disk is designed to help:	<ul style="list-style-type: none"> Use disk resources (cache and busy I/O) effectively 	<ul style="list-style-type: none"> Monitor and automate replication operations across storage devices Manage storage devices proactively 	<ul style="list-style-type: none"> Provide advanced, heterogeneous storage management from a single console
IBM TotalStorage Productivity Center for Replication is designed to help:	<ul style="list-style-type: none"> Suspend resume and resynchronize replication operations 	<ul style="list-style-type: none"> Provide configuration and management of the FlashCopy and Synchronous PPRC capabilities of the IBM TotalStorage Enterprise Storage Server® (ESS) 	<ul style="list-style-type: none"> Simplify copy services management for the ESS



take the

IBM Tivoli Storage Manager Family benefits at a glance

	Designed to help improve application availability	Designed to help optimize storage resource utilization	Designed to help enhance storage personnel productivity
IBM Tivoli Storage Manager family is designed to help:	<ul style="list-style-type: none">• Maintain business continuity and recovery while still operating your business• Provide disk-to-disk backup for frequently accessed information that is needed quickly• Integrate with many content management applications for advanced search and audit capabilities• Free disk space for more active data• Speed recovery of files, file systems or other data retained for regulatory requirements• Include file recovery in a comprehensive data disaster-recovery plan• Enable freeing of disk space for more active data• Provide ease of integration with existing applications	<ul style="list-style-type: none">• Protect valuable data and business processes• Archive inactive data to help reduce costs• Provide a single, integrated point of management from laptop to mainframe, optimized for local area network (LAN), wide area network (WAN) and SAN• Support hundreds of types of storage• Store data in a hierarchy of lower-cost storage—the specific level chosen to optimize cost against the recovery-time objective• Provide off-site copy creation• Move inactive data to less-expensive devices• Protect data that needs to be retained on less-expensive devices, such as SATA, DVD and WORM tape with one interface	<ul style="list-style-type: none">• Automate recovery management tasks• Enhance reporting for ease of administrative tasks• Provide graphical tools and wizards to simplify installation and administration• Provide health monitoring tools to maintain efficient and reliable performance of storage management tasks• Automate HSM data movement through flexible policies• Automate archive-management tasks, including automatic expiration of data when retention policy is met

next step

Enabling on demand breakthroughs

By evolving your storage infrastructure to an on demand storage environment, you can address your storage challenges. The IBM TotalStorage Open Software Family provides essential technology for an on demand storage environment. This family of storage software products offers storage infrastructure management and virtualization capabilities, along with capabilities in HSM, archive management and recovery management. The modular, integrated and open solutions of the Open Software Family can help you control storage growth and costs in a flexible environment. An environment that can be managed enterprise-wide using automated processes through software products based on standard interfaces.

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We can assist you in developing and deploying complete, end-to-end storage solutions to meet your business requirements. And we can assist you throughout the IT life cycle, including assessment, design and implementation—all delivered locally by our global network of skilled professionals. IBM also works with IBM Business Partners and other leading technology companies to deliver the right solutions to help your business succeed in today's dynamic workplace.



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¹ Source: Dissecting storage TCO: Getting to the heart of the matter, META Group Inc., Feb. 12, 2003.

² IBM Tivoli Storage Manager Extended Edition is a prerequisite for IBM Tivoli Storage Manager for Data Retention.

³ Based on IBM Storage Tank™ technology