

Storage management solutions  
White paper



**Tivoli** software

## Manage the storage infrastructure with IBM TotalStorage Productivity Center.



September 2005

**Middleware is Everywhere** Can you see it?

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## Summary

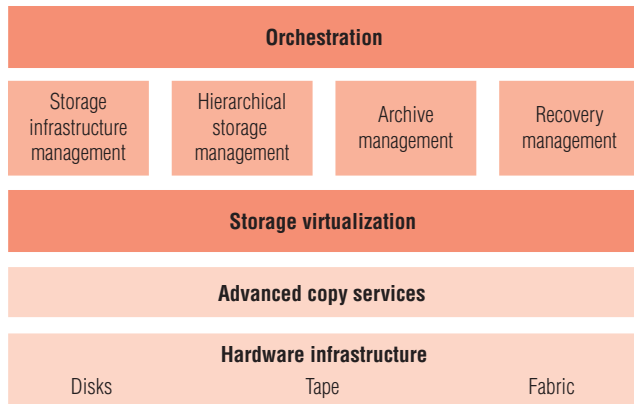
The IBM TotalStorage® Productivity Center is designed to manage the entire storage infrastructure, from the hosts through the fabric network and any virtualized storage layers to the physical disks. This white paper:

- Describes how IBM TotalStorage Productivity Center contributes to the evolution of storage management.
- Explores the capabilities of the individual IBM TotalStorage Productivity Center software offerings.
- Offers information about the relationship between IBM TotalStorage Productivity Center and IBM TotalStorage Enterprise Storage Server® (ESS) Expert.

By reading this white paper, you will better understand how IBM TotalStorage Productivity Center can be used to manage the storage environment.

## Leverage the IBM TotalStorage strategy for managing the storage infrastructure

At the outset, we need to define the scope of the storage infrastructure. Then we can explore how IBM TotalStorage Productivity Center covers this environment, how the software relates to the underlying storage hardware, including any virtualized storage, and how it addresses automation.



Architecture of the storage environment

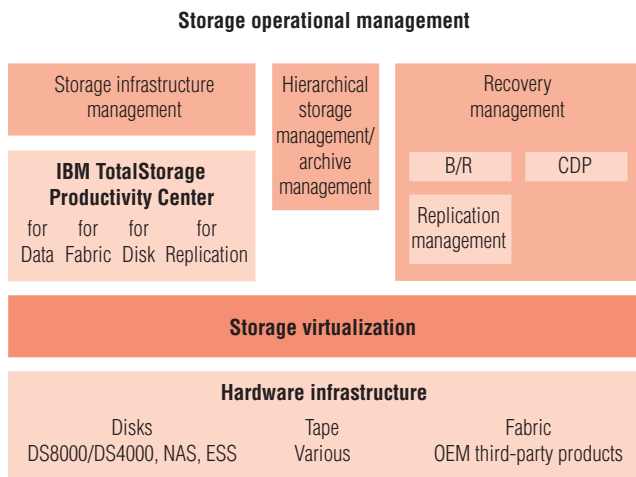
This diagram categorizes storage hardware into five layers. At the bottom, the hardware infrastructure layer represents the physical storage hardware (disks, fabric and tape). The next layer is the advanced copy services capabilities provided by the underlying storage components. Next is the storage virtualization layer (which are provided by IBM TotalStorage SAN Volume Controller and IBM TotalStorage SAN File System).

The bottom three layers represent components that need to be administrated and managed by the upper layers. To facilitate management, each component provides a Storage Management Initiative Specification (SMI-S) interface. SMI-S is an open standard adopted by the Storage Networking Industry Association (SNIA) interface for this purpose.<sup>1</sup>

The fourth layer includes:

- Storage infrastructure management — covers the administration and operational control of the lower layers, including the fabric components, storage virtualization and the storage subsystems.
- Hierarchical storage management — focuses on information lifecycle management (ILM), including the creation and active utilization of data, as well as moving data across classes of storage (such as enterprise, midrange, low end and tape).
- Archive management and recovery management — handle backup and restore, both for disaster recovery purposes and for compliance with data retention policies.

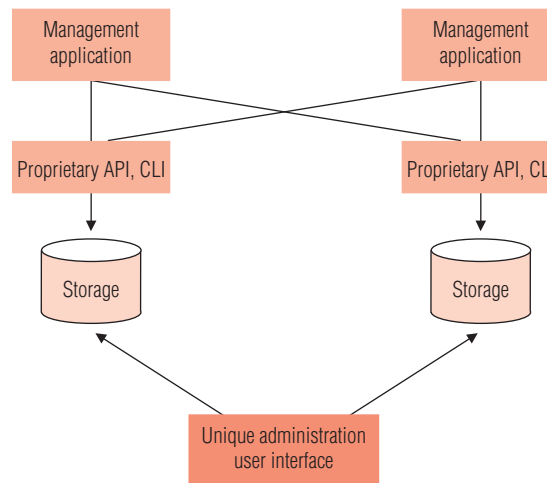
At the top of the diagram is orchestration, the automation of storage infrastructure administration and management. IBM Tivoli® Provisioning Manager provides a workflow engine to drive appropriate actions – both programs and people processes – and works flexibly with our clients’ established processes. Orchestration applies to servers and storage.



One of the main components of IBM storage operation management, IBM TotalStorage Productivity Center provides the IBM solution for storage infrastructure management (see diagram at left). Part of the storage operational management strategy, storage infrastructure management tools increasingly integrate with other components such as recovery management, hierarchical storage management and archive management.

**IBM TotalStorage supports the evolution of storage management**  
***Open standards enable efficient management***

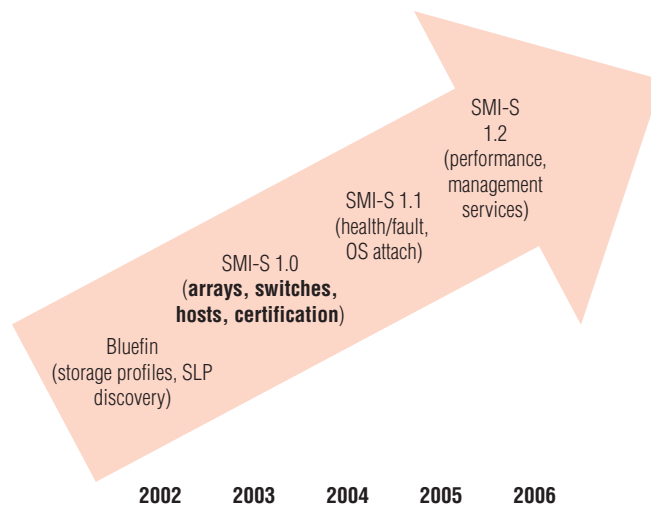
To manage storage efficiently, an overall architecture and strategy are required. In the past, storage vendors produced unique interfaces for each storage product. Examples included application programming interfaces (APIs), command line interfaces (CLIs) and user interfaces. Managing third-party storage depended on storage vendors exchanging proprietary interfaces.



*Open standards-based administration enables management of multivendor storage environments.*

In contrast, IBM supports open standards that facilitate administration of multivendor storage environments. The IBM storage strategy focuses on implementing the SMI-S open standard. SMI-S emerged from efforts of storage vendors – 18 members of the SNIA – to standardize the interfaces to storage resources. SMI-S defines storage resources and their attributes for managing storage resources.

The initial SNIA specification in 2003 – SMI-S 1.0 – focused on defining the initial representation of the storage resources, thereby enabling asset and capacity management. IBM TotalStorage Productivity Center passed the certification for SMI-S 1.0.2 in April 2005. (As of September, the SNIA is defining SMI-S 1.1 and will begin certification later in 2005.)



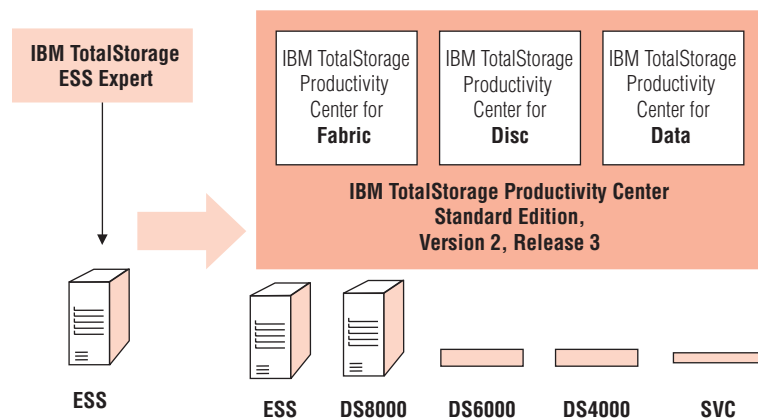
*Proposed evolution of SMI-S open standard, from the preliminary Bluefin specification to future SMI-S plans.*

**Shift from single-device management to multiple-device management**

Prior to the introduction of SMI-S, storage hardware vendors produced storage management applications unique to each storage resource. For example, IBM TotalStorage ESS Expert provided asset, capacity and performance reporting for ESS disk subsystems.

Other product-specific administration applications included IBM TotalStorage ESS Specialist for the ESS product line, IBM FAS*T* Storage Manager for the FAS*T* product line and IBM ServeRAID™ for lower end storage. Each storage product had a unique set of interfaces, at both the user level and the program level.

**Integrating storage management to provide a single point of control**



*The evolution of storage management from product-specific controls to a single, cross-product point of control.*

With the definition of SMI-S, storage components can be managed more consistently. APIs that conform to this standard provide the basis for managing storage consistently. IBM TotalStorage products not only include an open standards-based API, they also offer consistent administration and management capabilities:

- A standard CLI is being adopted across the product line, enabling organizations to easily write scripts that apply to multiple IBM TotalStorage products.
- A standardized administrator's user interface is being rolled out across the IBM TotalStorage products.
- Similar user interfaces across IBM TotalStorage SAN Volume Controller, IBM TotalStorage SAN File System, and the IBM TotalStorage DS8000 and DS6000 series enable organizations to manage and operate IBM TotalStorage products in a consistent manner, helping to minimize training costs.

## Highlights

Reduce the time to identify and diagnose SAN problems

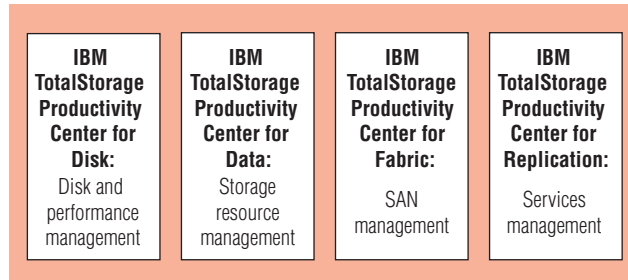
### *Integrate storage management*

The storage industry is evolving with the delivery of more integrated storage management capabilities. Because provisioning storage involves configuration and management of both storage disks and fabric network, combining these tasks eases administration of the storage area network (SAN). Storage fabric and management-software vendors once delivered SAN managers independently, but now they are being integrated to support multiple storage devices and protocols. Integration avoids the need to use separate user interfaces and manually coordinate information across tools.

Integrated storage management also helps reduce the time required for SAN problem determination and diagnosis, by providing a clearer picture to the storage administrator. For example:

- To quickly assess the business impact of an outage, an administrator must be able to clearly associate consumers of storage — including file systems, databases and applications — with the underlying storage infrastructure they are using.
- To rapidly pinpoint bottlenecks and contention, management tools must provide a complete topology of the storage environment, including hosts, host bus adapters, fabric network paths, storage virtualization and storage arrays.

These requirements are driving the integration of storage resource management solutions — which report on software deployment, capacity and more — with the storage hardware configuration management. IBM TotalStorage Productivity Center addresses these requirements by offering an integrated suite of storage management applications that can define, assess and change the storage configuration from a central point.



*IBM TotalStorage Productivity Center consists of an integrated suite of storage management applications.*

### **Deploy IBM software to address a wide range of storage management challenges**

IBM TotalStorage Productivity Center is built as an integrated, modular set of components:

- IBM TotalStorage Productivity Center for Disk
- IBM TotalStorage Productivity Center for Data
- IBM TotalStorage Productivity Center for Fabric
- IBM TotalStorage Productivity Center for Replication

Organizations can order each component individually or as a package containing multiple products:

- IBM TotalStorage Productivity Center Standard Edition contains IBM TotalStorage Productivity Center for Data, IBM TotalStorage Productivity Center for Disk and IBM TotalStorage Productivity Center for Fabric — at a reduced price. This package provides a starter set for organizations that are currently managing their storage with unique, independent tools; customized scripts; spreadsheets; and manual processes.
- IBM TotalStorage Productivity Center with Advanced Provisioning provides automation for storage provisioning. This package includes Tivoli Provisioning Manager along with all four IBM TotalStorage Productivity Center components.

On the following pages, you can learn more about the storage management capabilities of each component of IBM TotalStorage Productivity Center.



## Highlights

### ***Manage SANs and heterogeneous storage from a single console***

IBM TotalStorage Productivity Center for Disk software has been designed specifically for managing networked storage components based on SMI-S, such as:

- IBM TotalStorage SAN Volume Controller.
- IBM TotalStorage ESS.
- IBM TotalStorage DS4000, DS6000 and DS8000 series disk subsystems.

IBM TotalStorage Productivity Center for Disk supports count key data (CKD) and fixed-block architecture (FBA) volumes.

IBM TotalStorage Productivity Center for Disk includes the IBM TotalStorage Productivity Center for Fabric Bonus Kit to support SAN management of up to 64 switch ports in the same enterprise. Organizations with more than 64 ports in their enterprise can upgrade to the full IBM TotalStorage Productivity Center for Fabric product.

The major features of the IBM TotalStorage Productivity Center for Disk are:

### **Integrated administration console**

The storage management workspace provides single-action management across many storage resources. It also enables administrators to group devices to help further simplify management.

Group storage devices to simplify management

### **Device manager**

Leveraging the IBM DB2<sup>®</sup> and IBM WebSphere<sup>®</sup> Application Server software included with IBM TotalStorage Productivity Center for Disk, the device

## Highlights

manager provides discovery, configuration and launching of element managers for the various supported storage devices:

- Discovery of the devices is accomplished using the service location protocol (SLP), as specified by SMI-S.
- Configuration of the discovered devices is possible in conjunction with the common information model (CIM) agents associated with those devices, using the standard mechanisms defined in SMI-S.
- The device manager also gathers events and error logs, and can launch an element manager specific to each device.

Additionally, administrators can configure and assign logical units (LUNs) to host systems. If IBM TotalStorage Productivity Center for Fabric is also installed, administrators can also zone the appropriate ports in the SAN.

### Performance manager

To monitor IBM TotalStorage ESS, IBM TotalStorage DS8000 and DS600 series, and IBM TotalStorage SAN Volume Controller systems, the performance manager in IBM TotalStorage Productivity Center for Disk collects data, enables the setting of thresholds and provides useful gauges:

- Performance management starts with data collection — capturing performance statistics for the devices and storing the data in the performance database.
- During data collection, the performance manager can check device-specific thresholds for certain performance metrics. When performance is outside the normal bounds of operation that have been defined, the software can raise alerts.
- Gauges can be configured to present graphical or textual reports about the current or historical performance behavior of particular devices — or specific internal components of those devices — against the defined performance metrics.

Collect performance data, check against thresholds and automatically raise alerts

## Highlights

Balance workloads across ESS components by leveraging workload profiles

To balance the workload across all ESS components, the volume performance advisor within the performance manager helps identify the best placement of new ESS LUNs – based on configuration and performance data:

- The user specifies in a workload profile the performance behavior of the newly allocated volumes, estimating their performance workload characteristics.
- The volume performance advisor performs *contention analysis*— it determines the current performance behavior of the existing ESS volumes and their effect on the other components. Relative utilizations of the various ESS components are computed based on the maximum capabilities.
- *Solution analysis* factors in the estimated workload profile of the new volumes to suggest ways to place volumes to help balance component utilization.

IBM TotalStorage Productivity Center for Disk includes five predefined workload profiles:

- Standard online transaction processing environment (OLTP) profile
- Higher-demand OLTP profile
- Data warehouse environment profile
- Profile for batch applications that access the data sequentially
- Document archival profile, where the data is written once and read infrequently

These profiles can be used directly or as models for other workload profiles. Users can also create custom workload profiles by performing a workload analysis of existing volumes:

- Collect performance statistics over sample periods.
- Select the volumes currently being utilized by a specific workload and run performance collections on these volumes.
- Use these collections to create a custom profile.

## Highlights

Provision DAS, NAS and SAN capacity

When a workload requires more storage, a custom profile can capture the storage utilization of this workload and use it as a basis to select new storage. The user identifies a set of volumes that the workload may use, and IBM TotalStorage Productivity Center for Disk performs a contention analysis to recommend the best fit.

### ***Deploy comprehensive file and capacity management***

IBM TotalStorage Productivity Center for Data includes enterprise-wide reporting and monitoring, policy-based management and automated capacity provisioning for direct attached storage (DAS), network attached storage (NAS) and SAN environments.

IBM TotalStorage Productivity Center for Data is designed to help minimize storage costs by:

- Optimizing storage utilization.
- Enabling intelligent capacity planning.
- Allowing the same staff to manage more storage.
- Driving application availability.

In addition to helping maintain a healthy and efficient storage environment, companies can use IBM TotalStorage Productivity Center for Data to help manage:

- Server and storage consolidation.
- SAN planning and implementation.
- Backup planning.
- Service level agreements.

## Highlights

The software allows a small number of system administrators to leverage their knowledge and skill to effectively manage the storage assets of the company – across the enterprise. System administrators leverage a comprehensive view of all storage assets, including DAS and NAS devices, to manage much larger environments. At the same time, users get utilization information that large environments typically require.

IBM TotalStorage Productivity Center for Data collects data automatically, on a user-defined schedule, and stores the resulting data in a repository of storage metadata. The organization can extract metadata with a graphical user interface (GUI) that is invoked as an application or as an applet through a browser. Alternatively, the data can be automatically published in a number of formats, including HTML for storage portal presentations.

Leverage storage metadata to enable intelligent decision making

The information collected helps users make intelligent decisions that help optimize the utilization of open systems environments. The scope of IBM TotalStorage Productivity Center for Data is not limited to files and their attributes; it also includes relational database managers such as Oracle, Sybase, SQL Server and DB2. As a result, organizations can understand what is really going on with the data that resides on their servers:

- Views of when files are created, accessed and modified — and by what group or user — enable system administrators to map actual storage resources to the consumers of that resource. This capability has become increasingly important as the size of the open systems environment has increased.
- Information about historical consumption and use of data allows the organization to see trends over time and project storage use into the future. As a result, the system administrator can prepare for purchasing additional capacity in a planned, proactive manner.

## Highlights

Expand file systems automatically and in accordance with policy

IBM TotalStorage Productivity Center for Data has the capability to automatically expand file systems and allocate storage to a LUN, based on storage policy set by local system administrators:

- To automatically expand a file system, the software leverages a logical volume manager such as those found on IBM AIX® and Sun Solaris operating environments.
- To allocate storage to a LUN, the software sends commands to a SMI-S-enabled storage subsystem using a Common Information Model Object Manager (CIMOM) server, which in turn passes the LUN creation commands to the storage subsystem.

Administrators can set file systems extension storage policy that specifies the scope of the automation and the resources to which automation applies.

### ***Centralize management of heterogeneous fabric environment***

IBM TotalStorage Productivity Center for Fabric helps manage the SAN fabric that connects the host systems and applications to the storage devices. IBM TotalStorage Productivity Center for Fabric is a comprehensive management solution for multivendor SANs; because it is an enterprise scalable solution that is architected to American National Standards Institute (ANSI) SAN standards, organizations can choose the products that are right for their storage infrastructure.

The software includes automatic resource and topology discovery, SAN error-prediction capabilities, zone control, and monitoring and alerts that combine to help companies:

- Simplify SAN management and configuration.
- Maximize SAN availability.
- Derive optimal value from their SAN investment.

## Highlights

Centralize SAN topology and configuration information

IBM TotalStorage Productivity Center for Fabric brings all sources of SAN topology and configuration information into a single place. Without this type of centralized topology, an organization would continually have to manually monitor and correlate information from sources such as element management tools, device logs and system network management protocol (SNMP) traps.

In contrast, IBM TotalStorage Productivity Center for Fabric creates host- and device-centric topology maps of the SANs that can be displayed graphically or in a hierarchical format. These displays track all topology and configuration changes, thanks to both in-band and out-of-band monitoring. Events are displayed in a color-coded fashion, and views can be customized to reflect organizational priorities. IBM TotalStorage Productivity Center for Fabric can also forward events that signal topology changes or updates to IBM Tivoli Enterprise Console<sup>®</sup>, another SNMP manager or both.

Filter out extraneous information

Source-side filtering of SAN topology and configuration information by IBM TotalStorage Productivity Center for Fabric allow an organization to control what events are sent to its centralized console. Filtering out informational and duplicate events helps give the administrators precisely the information they need – not extraneous information.

To perform autonomic error detection and fault isolation (ED/FI) and *predict* the most likely SAN hardware failures in the optical transceivers of the link level – before they occur – IBM TotalStorage Productivity Center for Fabric provides a SAN error predictor. This is more than mere simple error rate trending:

- At the hardware level, Fibre Channel adapters gather error data, including the number of data errors and underlying causes (such as loss of light, loss of synchronization or operational readiness).
- This data is put into a historical database, against which an analysis engine runs to spot trends and perform predictive failure analysis. The analysis — based on IBM's vast experience with Fibre Channel — considers the types, timing and number of the errors.
- When the combination of errors indicates that a problem results from a condition that may get worse and result in a hard failure (as opposed to transient, tolerable errors), IBM TotalStorage Productivity Center for Fabric notifies the administrator.

As a result, administrators can schedule replacement of failing network hardware components rather than face a reactive crisis. In an era when acceptable levels of availability are measured in minutes over the course of a year, IBM TotalStorage Productivity Center for Fabric enables companies to proactively pursue application availability.

To help repurpose IT resources to meet business requirements, IBM TotalStorage Productivity Center for Fabric has two built-in features:

### **Zoning**

One of many SAN security options, zoning is almost universally employed along with subsystem-based LUN masking to help make sure that only authorized systems can access selected data. Zoning is provided by the switch at the port level. For example, a host on port X can access the subsystem connected by port Y. When business needs change, zones often must change too.

IBM TotalStorage Productivity Center for Fabric enables zone control from a centralized location, using an intuitive GUI. The software discovers existing zones and allows the members that make up the zone to be viewed and added to or deleted from the zone. Users can easily create new zones and delete existing zones. Support for aliases is also provided, so that the name assigned to a device can be meaningful and familiar. Aliases can also be groups of devices that can be managed together to make the zoning process even easier.



### **SAN fabric performance and capacity management reporting and monitoring**

IBM TotalStorage Productivity Center for Fabric helps organizations determine if more bandwidth is needed. Like wide-area and local-area IP networks, SANs move data from one place to another and need to manage the bandwidth that moves the data. In response, IBM TotalStorage Productivity Center for Fabric continually monitors for link utilization and errors, gathering the data to tune resources, balance workloads and do capacity planning. The software helps organizations easily answer questions such as:

- Are there enough interswitch links (ISL) connecting core switches to achieve adequate peak performance?
- When will service level response times require upgrading devices to higher speed attachments?
- Have any traffic or error thresholds created temporary bottlenecks?

### ***Provide a common control point for managing disaster recovery and data consistency***

IBM TotalStorage Productivity Center for Replication can help minimize:

- Complexity of initial replication setup.
- Time required to monitor sessions after initialization.
- Mistakes during the recovery process.
- Downtime while switching to the secondary site.

To keep data and multiple related heterogeneous volumes consistent, IBM TotalStorage Productivity Center for Replication supports “replication sessions” when the underlying hardware supplies the necessary operations. For example, if an organization requires consistency across AIX and IBM z/OS® systems, it can use the “freeze and run” function in which multiple pairs of volumes and LUNs on an ESS are handled as a consistent unit.

## Highlights

The software is also designed to control and monitor copy-services operations in large-scale environments with thousands of volumes. IBM TotalStorage Productivity Center for Replication supports IBM TotalStorage Metro Mirror – synchronous peer-to-peer remote copy (PPRC) – and IBM FlashCopy® on the Enterprise Storage Server.

Furthermore, IBM TotalStorage Productivity Center for Replication provides source/destination matching. A group of source volumes will be paired one-by-one to volumes in one or more destination pools. The volumes may span multiple ESS subsystems and can be comprised of IBM zSeries® CKD volumes and distributed-systems FBA format LUNs. Users can also match volumes manually with add-pair and delete-pair functions that are available through the CLI.

### ***Integrate storage capacity provisioning with server provisioning***

IBM TotalStorage Productivity Center with Advanced Provisioning is an integrated solution that is designed to help minimize the cost and effort of provisioning storage capacity in the enterprise environment while helping to maximize availability. By leveraging the integration of Tivoli Provisioning Manager with IBM TotalStorage Productivity Center, organizations can deploy a common look-and-feel approach for storage provisioning and server provisioning.

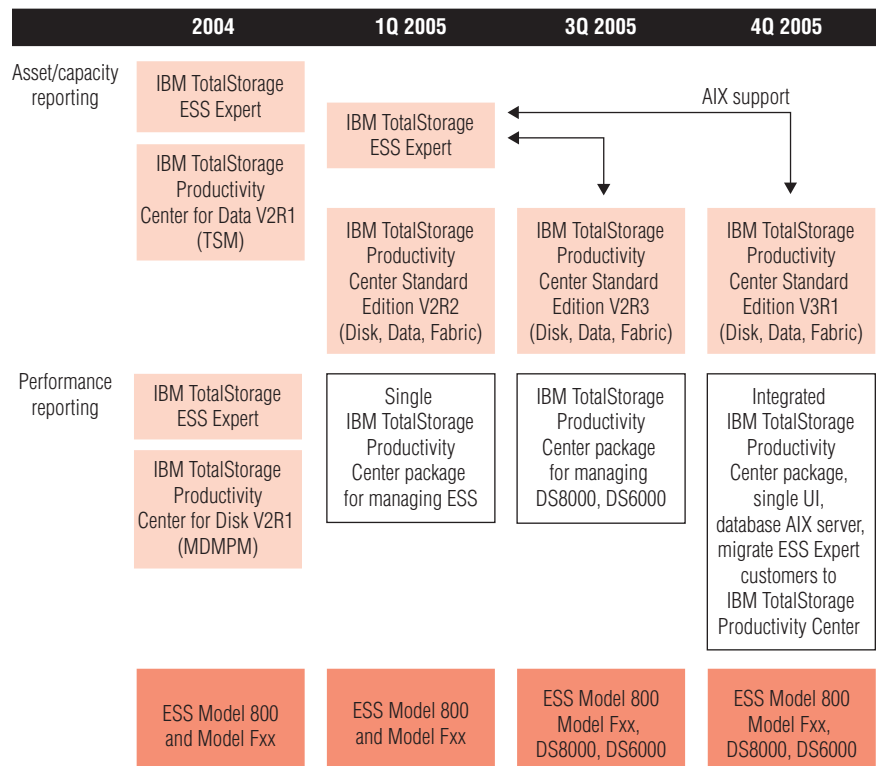
Deploy a common interface for provisioning storage and servers

**Transition from IBM TotalStorage ESS Expert to IBM TotalStorage Productivity Center**

IBM TotalStorage ESS Expert provides asset, capacity and performance reporting for the ESS. Organizations use the data collected by IBM TotalStorage ESS Expert to:

- Report on the total ESS storage available.
- Track use to forecast when more storage will be required.
- Utilize performance statistics for offline analysis and correlation.

Now, these same capabilities are being provided by IBM TotalStorage Productivity Center. IBM TotalStorage ESS Expert customers should plan their migration to IBM TotalStorage Productivity Center.



Roadmap and timeline for managing IBM TotalStorage DS8000 and DS6000 series and IBM TotalStorage ESS with IBM TotalStorage Productivity Center.<sup>2</sup>

IBM TotalStorage Productivity Center supports the management of multiple storage arrays. Although the diagram on page 19 focuses on support for IBM TotalStorage DS8000 and DS6000 series and IBM TotalStorage ESS, IBM TotalStorage Productivity Center also offers support for third-party storage that complies with SMI-S.

The following table provides a recommended migration strategy for management of the ESS.

If you are a...	Then you should...
New customer who is interested in monitoring and managing availability and performance...	Purchase IBM TotalStorage Productivity Center for Disk to collect and manage performance data.
Current IBM TotalStorage ESS Expert customer (on Microsoft® Windows®, open or mainframe systems) who wants to compare IBM TotalStorage ESS Expert and IBM TotalStorage Productivity Center — or make the transition between them...	Run IBM TotalStorage Productivity Center for Disk side by side with IBM TotalStorage ESS Expert against the same subsystems.
Current IBM TotalStorage ESS Expert customer (on Windows or open systems) who uses the software for asset management, capacity management or both, and wants to expand reporting to other storage resources...	Purchase IBM TotalStorage Productivity Center for Data to provide enhanced capacity reporting.
Current ESS customer (on Windows or open systems) who does not have IBM TotalStorage ESS Expert but is interested in asset management, capacity management or both...	Purchase IBM TotalStorage Productivity Center for Data to provide enhanced capacity reporting.
Current ESS customer who does not have IBM TotalStorage ESS Expert but is interested in performance management...	Purchase IBM TotalStorage Productivity Center for Disk to collect and manage performance data.
Current IBM TotalStorage ESS Expert customer who plans to add future DS8000 and DS6000 systems...	Continue using IBM TotalStorage ESS Expert but plan to migrate to IBM TotalStorage Productivity Center for Disk and IBM TotalStorage Productivity Center for Data when the new storage is installed.

***Map IBM TotalStorage ESS Expert functions to IBM TotalStorage Productivity Center***

The following ESS management features were provided by IBM TotalStorage ESS Expert but are now delivered by IBM TotalStorage Productivity Center. By planning to move to IBM TotalStorage Productivity Center, organizations can continue to enjoy these features:

**Asset management** – reports provided by IBM TotalStorage Productivity Center for Data:

- Discovery
- Host-LUN mapping
- Serial numbers
- Licensed internal code (LIC) levels
- Fibre Channel worldwide node names
- Asset statistics reports:
  - By storage server
  - By LIC level
- Volume statistics:
  - By single volume (by LUN)
  - By groups of volumes
- Drill down:
  - Graphs
  - SQL scripts
- Support for IBM TotalStorage SAN Volume Controller
- Amount of data accessed, modified and created — by directory level

**Capacity management** – reports provided for the ESS by IBM TotalStorage Productivity Center for Data:

- Raw capacity
- Usable capacity (total, assigned, free)
- Historical data
- Reporting — through GUI
- Capacity statistics reports:
  - Recent data (logical view and physical view)
  - All hosts
  - Historical data — capacity growth report
  - By week, month, quarter, six months and year
- Drill down:
  - Graphs
  - SQL scripts

**Performance management** – capabilities provided for the ESS by IBM TotalStorage Productivity Center for Disk:

- Adjustable threshold warning indicators
- SNMP alerts
- Historical data
- Performance statistics reports:
  - Storage server (ID and date range)
  - Summary
  - Ranked by:
    - Disk group: disk utilization
    - Logical volume: I/O requests
    - Logical volume: total cache hits
    - Logical volume: nonvolatile storage (NVS) cache full
- Immediate report display, based on n samples

**Performance metrics** – collected from an ESS by IBM TotalStorage Productivity Center:

- Array-level statistics:
  - Number of writes and reads
  - Total time to satisfy reads and writes
  - Average subsystem I/O rate
  - Average response time (in milliseconds)
  - Utilization
  - Total I/Os issued to the volumes
  - Total sequential I/Os issued to the volumes in this array
- Volume-level statistics:
  - Number of writes and reads
  - Number of cache hits (reads and writes)
  - Disk-to-cache and cache-to-disk transfers
  - Cache-to-hit ratio (reads, writes and overall)
  - Fast writes
- Cluster-level statistics:
  - Average cache holding time
  - Percent of total I/O requests delayed

Remember, organizations can run IBM TotalStorage Productivity Center in parallel with IBM TotalStorage ESS Expert to help ease the transition.

***IBM TotalStorage Productivity Center provides additional capabilities***

IBM TotalStorage Productivity Center for Data and IBM TotalStorage Productivity Center for Disk provide many features that were not available with IBM TotalStorage ESS Expert. These features extend the management capabilities to additional storage devices, including third-party storage. Additionally, IBM TotalStorage Productivity Center integrates with several storage management applications and automation products.

With the more robust reporting capability of IBM TotalStorage Productivity Center for Data, organizations can better customize reports, generate HTML reports for Web-based reporting and create comma-separated values (CSV) for graphical and charting applications.

IBM TotalStorage Productivity Center for Data also provides file and database management, allowing the mapping of host-based resources to the underlying physical storage. When administrators can map users to the storage, it facilitates chargebacks and better reporting to the users and customers of the storage infrastructure.

IBM TotalStorage Productivity Center for Data supports multiple databases, additional operating systems, and asset and capacity reporting for third-party storage (including EMC, HP and Hitachi). Support for IBM TotalStorage SAN Volume Controller includes performance and configuration management.

To facilitate storage provisioning, integration with IBM TotalStorage Productivity Center for Fabric allows zoning the fabric, and allocation and assignment of storage. IBM TotalStorage Productivity Center for Disk contention analysis features further assist the storage administrator with storage provisioning tasks.



**IBM storage devices supported by IBM TotalStorage Productivity Center, Version 2.3**

Devices	IBM TotalStorage Productivity Center for Data	IBM TotalStorage Productivity Center for Disk	IBM TotalStorage Productivity Center for Replication
ESS	<ul style="list-style-type: none"> <li>• Discovery</li> <li>• Asset reporting</li> <li>• Capacity reporting</li> <li>• File system extension</li> </ul>	<ul style="list-style-type: none"> <li>• Discovery, configuration and launching IBM TotalStorage ESS Specialist</li> <li>• Gauges, thresholds, collections and volume performance advisor</li> </ul>	<ul style="list-style-type: none"> <li>• IBM FlashCopy</li> <li>• IBM TotalStorage Metro Mirror (synchronous PPRC)</li> </ul>
IBM TotalStorage DS8000 and DS6000 series (IBM TotalStorage ESS Expert will not be enhanced to support these new storage arrays)	<ul style="list-style-type: none"> <li>• Discovery</li> <li>• Asset reporting</li> <li>• Capacity reporting</li> <li>• File system extension</li> </ul>	<ul style="list-style-type: none"> <li>• Discovery, configuration and launching IBM TotalStorage ESS Specialist</li> <li>• Gauges, thresholds and collections</li> </ul>	
IBM TotalStorage DS4000 series (FAStT)	<ul style="list-style-type: none"> <li>• Discovery</li> <li>• Asset reporting</li> <li>• Capacity reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Discovery and configuration</li> </ul>	
IBM TotalStorage Enterprise Tape Library (ETL)	The IBM TotalStorage ETL Expert will continue to be supported.		
<p>For detailed information on the version, release and modification levels for the storage microcode and interfaces, please refer to the IBM TotalStorage support site at <a href="http://ibm.com/servers/storage/support/software/tpc">ibm.com/servers/storage/support/software/tpc</a></p>			

**Platforms supported by IBM TotalStorage Productivity Center, Version 2.3**

<b>Management server platform</b>	<b>IBM TotalStorage Productivity Center for Data</b>	<b>IBM TotalStorage Productivity Center for Disk</b>	<b>IBM TotalStorage Productivity Center for Fabric</b>	<b>IBM TotalStorage Productivity Center for Replication</b>
Windows 2000/2003	Yes	Yes	Yes	Yes
Red Hat Enterprise Linux® Advanced Server	Yes	Yes	Yes	Yes
AIX	Yes	Planned	Yes	Planned
SUSE Linux Enterprise Server	Planned	Planned	Planned	Planned
For detailed information on the version, release and modification levels for the server operating systems, please refer to the IBM TotalStorage support site at <a href="http://ibm.com/servers/storage/support/software/tpc">ibm.com/servers/storage/support/software/tpc</a>				

**For more information**

To learn more about IBM TotalStorage Productivity Center and the products mentioned in this white paper, contact your IBM representative or IBM Business Partner, or visit [storage.ibm.com/software/center](http://storage.ibm.com/software/center)

You can also consult any of the following publications, education and training resources, or Web sites for additional information.

### ***Publications***

Publications are available from IBM International Technical Support Organization Redbooks to guide this migration process. These are available online at the IBM Redbooks Web site: [redbooks.ibm.com](http://redbooks.ibm.com)

#### IBM TotalStorage Enterprise Storage Server:

- IBM TotalStorage Enterprise Storage Server: Implementing ESS Copy Services with IBM @server™ zSeries, SG24-5680
- IBM TotalStorage Enterprise Storage Server: Implementing the ESS in Your Environment, SG24-5420

#### IBM TotalStorage DS8000, DS6000 and DS4000:

- The IBM TotalStorage DS8000 Series: Concepts and Architecture, SG24-6452-00
- The IBM TotalStorage DS6000 Series: Concepts and Architecture, SG24-6471-00
- IBM TotalStorage DS4000 Series and Storage Manager 9.10, SG24-7010-01

#### IBM TotalStorage Productivity Center:

- IBM TotalStorage Productivity Center: Getting Started, SG24-6490-00
- Managing Disk Subsystems Using IBM TotalStorage Productivity Center, SG24-7097-01



### Education and training

For training and education of IBM TotalStorage Productivity Center, the following courses are available:

Venue	Topics covered	Web reference
Online education	IBM TotalStorage Productivity Center: Overview IBM TotalStorage Productivity Center: Data Management for Administrators: Getting Started IBM TotalStorage Productivity Center: Data Management for Administrators: Customization and Integration IBM TotalStorage Productivity Center: Fabric Management for Administrators IBM TotalStorage Productivity Center: Installation and Basic Configuration for Implementers IBM TotalStorage Productivity Center: Replication Management and Disk Management for Administrators	Customers, please visit the Virtual Tivoli Skills center at: <a href="http://www.cgselearning.com/tivoliskills">www.cgselearning.com/tivoliskills</a> IBM Business Partners, please visit: <a href="http://ibm.com/tivoli/education/edu_type.html">ibm.com/tivoli/education/edu_type.html</a> <a href="http://ibm.com/tivoli/education/edu_sol.html#7">ibm.com/tivoli/education/edu_sol.html#7</a>
IBM TotalStorage Open Software Family Hands-On Workshop	IBM TotalStorage Productivity Center, SAN Volume Controller and SAN File System	<a href="http://www-304.ibm.com/jct03001c/services/learning/ites.wss/us/en?pageType=course_description&amp;courseCode=SN860">www-304.ibm.com/jct03001c/services/learning/ites.wss/us/en?pageType=course_description&amp;courseCode=SN860</a>

### Web site

For more information on IBM TotalStorage Productivity Center, refer to [ibm.com/servers/storage/software](http://ibm.com/servers/storage/software)

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<sup>1</sup>For more details on SMI-S, visit [www.snia.org](http://www.snia.org).

<sup>2</sup>The roadmap is subject to change. Please contact IBM TotalStorage Productivity Center marketing or product management for the latest information.