

Gain visibility, control and automation in your storage environment

Optimize storage service delivery with IBM Tivoli Storage Productivity Center



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Introduction

As the world becomes increasingly interconnected, intelligent and instrumented, data center managers today often find themselves struggling to accommodate exponential data growth while maintaining high levels of service and availability. IBM Integrated Service Management solutions can help by providing the visibility, control and automation data center managers need in order to understand and manage today's complex storage infrastructures—including virtualized, cloud-based and consolidated data center infrastructures—effectively and efficiently while optimizing service delivery. This white paper shows how IBM Tivoli® Storage Productivity Center is designed to equip today's IT organizations with critical capabilities for visibility, control and automation in the storage environment.

The stumbling blocks to successful storage delivery

No matter what your industry or business model, providing storage services can be a challenge. Today's organizations are flooded with information, and it's coming in from all

sides—customer data, unstructured files, RFID information, and communications data, from blogs and social media to text messages and email. The variety of information being created and captured is staggering, as is the rate at which storage requirements are growing.

Today's IT organizations are dealing not only with a great volume and variety of information, but they are dealing with a rapidly changing business world that places new demands on its data every day—from the consolidation of data brought on by mergers and acquisitions, to demanding data retention requirements brought on by government and industry regulations. New paradigms such as virtualization and cloud computing can introduce additional complexity to the storage infrastructure. And alongside these requirements lies the mandate for high data availability—sometimes continuous availability. Without it, the data being stored has no business value.

A holistic approach to storage management

Dealing with these challenges effectively requires a smarter approach, and IBM Integrated Service Management solutions can help. With a full range of solutions that include hardware, software, best practices and expertise, IBM Integrated Service Management solutions can help organizations realize the full potential of their business by providing a holistic approach to delivering and managing IT services. These solutions can provide the visibility, control and automation IT organizations need in order to understand today's complex, multivendor storage infrastructures, manage them more effectively and efficiently, and optimize performance and availability for higher levels of service.

With Integrated Service Management, IBM offers organizations the solutions they need to manage the environment from one end to the other—from systems and applications to the business processes that are driving service delivery. Solutions like those

found in the IBM Tivoli Storage Productivity Center family are specifically designed to bring visibility, control and automation into the storage environment, equipping IT organizations with critical capabilities for successful storage service delivery.

Tivoli Storage Productivity Center Suite is a robust family of storage infrastructure management solutions that can help organizations reduce the complexity of managing storage environments by centralizing, simplifying, automating and optimizing the tasks associated with storage systems, storage networks, replication services and capacity management. These products provide a modular approach to storage resource management (SRM), allowing organizations to build on existing investments and expand storage management capabilities incrementally, as business needs demand.

Toward new levels of visibility, control and automation

According to TheInfoPro's recent storage study, using their unique one-on-one approach to interview over 200 decision makers, the top three storage management pain points for today's organizations are managing storage growth, executing capacity forecasting and storage reporting properly, and managing storage costs.¹ Like many IT challenges, these concerns can be addressed with improved visibility, control and automation provided by core and advanced capabilities of Tivoli Storage Productivity Center:

- **Visibility** enables users across the organization to understand the business in real-time. Visibility capabilities include configurable dashboards and reports that provide a comprehensive view of infrastructure and operations, driving insights for improved service delivery.
- **Control** enables the business to transform and adapt while limiting operational risk. Control capabilities include storage management and optimization options that drive performance improvement across heterogeneous infrastructures. Improved control can help organizations better manage storage processes as the infrastructure grows—all while controlling costs.
- **Automation** enables the business to achieve greater efficiency by standardizing on best practices in a repeatable and auditable way. Automation capabilities can be used to standardize processes from backups and configuration to SAN planning. Improved automation can help organizations reduce administrative overhead and reduce risk by eliminating time-intensive and error-prone manual tasks.

Tivoli Storage Productivity Center integrates with other software solutions in the Tivoli software portfolio, extending the value of those assets and adding new dimensions of visibility, control and automation in storage as well as systems and application environments.

Visibility: For on-demand information and insights

Most organizations have basic visibility capabilities—tools that monitor key infrastructure components, for example, and report engines that can generate documentation on those components. But visibility doesn't drive improved service delivery until it provides a comprehensive view of the storage environment, until it answers key questions about storage services in real-time, and until it enables actionable information and insights that inform storage planning, facilitate compliance and enable continuous improvement.

Tivoli Storage Productivity Center in action

Scenario: A storage administrator runs Storage Tiering Reports in Tivoli Storage Productivity Center to periodically monitor utilization of mDisk groups on an IBM Storwize®V7000 storage system. Over time the administrator notices an mDisk group moving up the highly utilized list. In response, the administrator identifies a suitable underutilized mDisk group and migrates the data, improving server performance without disruption.

Storage Virtualizer - VDisk Workload Activity Report

Storage Virtualizer: Storwize V7000-2076-ford1_tbird-IBM
 Date filter: Date Range (below)
 Start Date: Aug 15, 2011 12:00:00 AM
 End Date: Aug 17, 2011 11:59:59 PM



VDisk	MDisk Group	VDisk Report Date	VDisk Capacity (GB)	VDisk Thin Provisioning Capacity Status	VDisk Peak Utilization %	VDisk Read I/O Rate (ops/s)	VDisk Max Read I/O Rate (ops/s)	VDisk Average Read Response Time (ms/op)	VDisk Max Read Response Time (ms/op)	VDisk Max Read Response Time Threshold of (70%) Exceeded By (hr..min.)	VDisk Write I/O Rate (ops/s)	VDisk Average Write Response Time (ms/op)	VDisk Max Write Response Time (ms/op)	VDisk Max Write Response Time Threshold of (90%) Exceeded By (hr..min.)	VDisk Max Read Rate (ops/s per GB)	VDisk I/O Rate Share of Total VDisk Read I/O Rate (%)	VDisk Capacity Share of Total VDisk Capacity (%)	VDisk Average Read Cache Hits (%)	VDisk Max Read Cache Hits (%)	VDisk Max Read Cache Hits Time Threshold of (75%) Exceeded By (hr..min.)	VDisk Max Read I/O Rate Threshold of (80%) Exceeded By (hr..min.)	VDisk Max Write I/O Rate Threshold of (80%) Exceeded By (hr..min.)	VDisk Max Write Cache Delay I/O Rate (ops/s)
tpblade4_10	Cognos	Aug 15, 2011	10.00	Not Applicable	1.61	0.30	28.24	0.57	1.67	00:10	0.00	1.84	4.90	00:10	2.82	70.17	10.87	99.00	100.00	02:10	00:10	00:30	0.02
		Aug 16, 2011	10.00	Not Applicable	56.28	54.11	1,136.23	1.01	1.47	05:40	10.97	10.71	14.61	00:10	113.62	11.36	10.87	98.00	99.93	07:10	00:05	01:00	0.17
		Aug 17, 2011	10.00	Not Applicable	74.33	279.01	581.54	1.45	1.96	09:35	67.87	11.46	13.70	00:25	58.15	9.13	10.87	95.00	100.00	11:10	04:04	03:35	0.82
			Avg 10.00		Avg 44.07	Avg 111.14	Avg 582.00	Avg 1.01	Avg 1.70		Avg 26.28	Avg 8.00			Avg 58.20			Avg 97.33	Avg 99.98			Avg 0.34	
tpblade4-10_01	Cognos	Aug 15, 2011	3.00	Not Applicable	0.56	0.09	8.10	0.69	1.94	00:05	0.00	2.40	6.45	00:05	2.70	70.17	3.26	99.00	100.00	02:15	00:10	00:35	0.02
		Aug 16, 2011	3.00	Not Applicable	47.58	29.79	192.22	1.39	3.00	00:10	15.10	10.96	12.27	02:20	64.07	11.36	3.26	94.00	98.78	06:30	01:15	01:10	0.48
		Aug 17, 2011	3.00	Not Applicable	47.58	29.79	192.22	1.39	3.00	00:10	15.10	10.96	12.27	02:20	64.07	11.36	3.26	94.00	98.78	06:30	01:15	01:10	0.48

Figure 1: Visibility tools like the Virtual Disk Workload Report provide both detailed and at-a-glance information on key storage services.

The visibility capabilities of Tivoli Storage Productivity Center include:

- Detailed topology views** that show dependencies and connectivity among multivendor devices in a single view. The topology viewer allows users to see the entire storage path from end to end, including connectivity and relationships among physical and virtual storage resources. Real-time storage performance impact analysis provides insights into the service impact of bottlenecks and outages.
- Extensive storage metrics and analytics**, including data on storage capacity, utilization, SAN configuration, and storage performance and trends. The software captures both front-end and back-end performance metrics, including throughput and response time, as well as more detailed metrics, such as throughput of a cluster, a controller or an entire box. Detailed trend analysis helps IT administrators quickly identify possible application workload contentions in the storage array.

Tivoli Storage Productivity Center in action

Scenario: A storage administrator has several thin-provisioned volumes that over-commit storage on IBM SAN Volume Controller (SVC). In this situation, because Tivoli Storage Productivity Center monitors the logical utilization of the file systems on the thin-provisioned volumes, the software can alert the storage administrator of an impending out-of-storage condition before the SVC runs out of back-end storage.

- **Comprehensive reporting capabilities**, with more than 400 prebuilt reports as well as flexible report customization and automation options. Performance reports are built using the extensive storage metrics captured by the software, enabling a wide variety of report views. Multiple storage subsystems can be included in a single report, forming the foundation for SAN planning, performance tuning, workload management and other storage management functions.

Tivoli Storage Productivity Center enables integrated performance monitoring and reporting capabilities from the host file system to the physical disk, including in-depth performance monitoring and analysis on SAN fabric components. Administrators can monitor the performance of both IBM and third-party storage systems, as well as monitoring the performance of replication services. These visibility capabilities enable more efficient and effective storage service level management.

Control: For optimum storage performance

Achieving and maintaining high storage service levels requires fine-grained management control of storage resources. The most effective management—whether it's performance management, capacity management, configuration management, change

management, problem management, security management or compliance management—demands central control across the storage infrastructure from a single platform.

Tivoli Storage Productivity Center helps ensure high availability, performance and utilization by providing end-to-end management of the storage infrastructure, with robust capabilities that are easy to use. The software allows administrators to monitor and track performance for the multivendor storage systems that characterize today's complex storage environments, while native interfaces for multiple IBM System Storage® platforms improve scalability and boost performance. A single management platform enables centralized management of the entire storage infrastructure, including the following capabilities:

More efficient and effective problem management: The software provides performance thresholds, alerting and bottleneck analysis, which enable more efficient and effective problem identification, isolation and resolution. The software provides views of performance data for individual components as well as the entire data path. A health impact analysis view displays the resources associated with the affected data path, the aggregated health status of those resources and their subordinate objects, their port connection status, relevant performance alerts that have been triggered, and the most recent performance metrics for those resources.

Tivoli Storage Productivity Center in action

Scenario: A storage administrator needs to find space on a volume that is almost filled. In this situation, Tivoli Storage Productivity Center can be used to identify data that is suitable for archiving, such as data that has not been accessed in more than two years. This list of files can then be transferred to Tivoli Storage Manager for archiving.

Policy-based group management: The software enables management of group storage resources by application, line of business, or other user-defined categories. Storage resources can be mapped to the organizational structure by creating hierarchies of storage resource groups (SRGs). The software can monitor the health and performance of individual SRGs to ensure application availability and can customize preferential access to mission-critical resources.

Tivoli Storage Productivity Center in action

Scenario: A storage administrator is noticing eroding performance on a database. In this situation, the Storage Optimizer in Tivoli Storage Productivity Center can locate the “hot” volume and determine a strategy for moving the workload to a less-utilized volume.

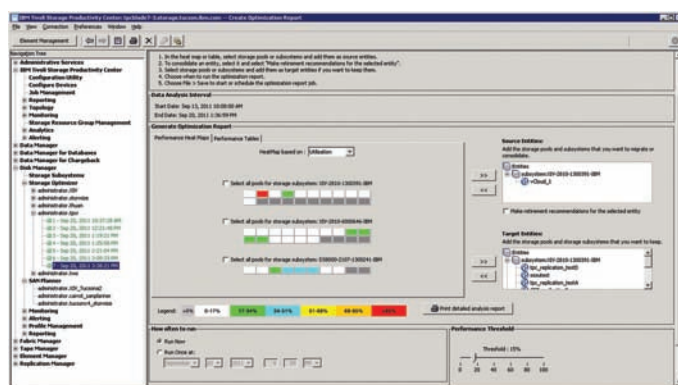


Figure 2: Non-intrusive analysis generates recommendations for improving storage optimization.

Storage resource optimization: The software provides end-to-end, wizard-based storage provisioning and helps optimize storage and network configurations for better throughput. Analysis-based intelligent data migration, storage allocation and consolidation help improve space utilization, while non-intrusive analysis helps identify hot spots and provides recommendations to improve disk efficiency. Capacity utilization can be viewed by computer or by storage system, complete with file system and database storage utilization details. Filters such as age and file type can be used to help identify wasted space.

Disaster recovery management: Tivoli Storage Productivity Center for Replication manages IBM disk-based replication functions, including IBM FlashCopy®, Metro Mirror, Global Mirror and Metro Global Mirror. This solution provides central control of the replication environment, including end-to-end management and tracking of copy services. It helps simplify and automate complex replication tasks, and it helps reduce risk by reducing the time it takes to execute replication jobs and by enabling continuous testing on practice volumes.

Automation: For maximum operational efficiency

Automation is not a luxury in the storage environment—it’s a necessity. Automating repeatable tasks can result in fewer errors, help facilitate compliance, ensure the consistent application of policies and best practices, and increase the productivity of IT staff. These benefits in turn can lead to reduced risk, lower costs, and higher levels of service. Automation also contributes to improved visibility and control across the storage infrastructure.

Tivoli Storage Productivity Center automates a wide range of storage management tasks while helping administrators maintain fine-grained control of the environment:

- **Automated discovery** of multivendor storage and network devices helps create storage topology views for improved visibility into the storage infrastructure.

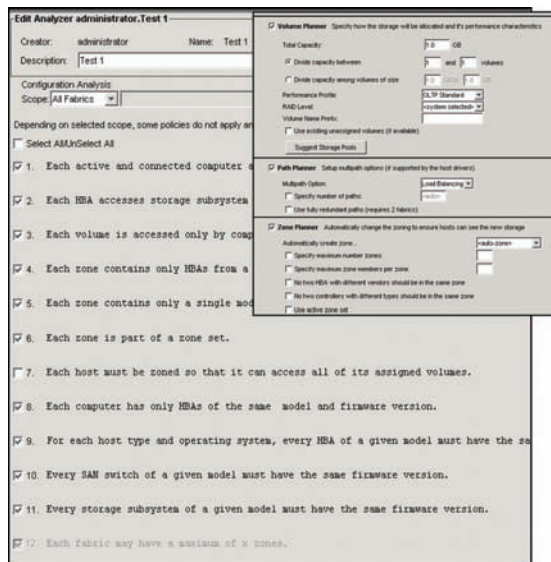


Figure 3: Automated SAN configuration analysis and planning assists IT administrators in end-to-end SAN planning.

- **Automated SAN configuration analysis and planning** assist IT administrators in the complex task of provisioning storage. Automated analysis can be applied to all fabrics, a single fabric, or a single zone set. End-to-end SAN planning capabilities can involve fabrics, hosts, storage controllers, storage pools, volumes, paths, ports, zones, zone sets, SRGs and replication. Once a plan is made, the administrator can opt to have the plan implemented automatically by the software.
- **Automated alert management** capabilities are based on predefined events and thresholds, whether for security, capacity or performance. Automated actions can be customized to include centralized alerting, distributed responsibility, fully automated response, or alert suppression.

- **Automated execution of complex replication tasks**, provided by Tivoli Storage Productivity Center for Replication, helps improve the efficiency of copy services and helps improve disaster recovery response.
- **Automated detection of changes** to the storage topology helps minimize the potential outage impacts resulting from SAN configuration changes.
- **Automated performance optimization** capabilities can identify hot spots on the disk controller and provide recommendations to improve disk efficiency.

These and other automated capabilities can help IT organizations achieve new levels of operational efficiency and maximize the value of the storage infrastructure.

Setting the stage for successful storage service delivery

IBM has continued to demonstrate a deep commitment to the Tivoli Storage Productivity Center family of products, with continuous improvements that help organizations extract maximum value from their storage hardware and software investments. The latest enhancements to the solution include improved visibility into storage tiering, enhanced support for IBM storage platforms such as IBM XIV® and IBM Storwize V7000, and simplified licensing models.

Whether you're exploring storage virtualization technologies, expanding into cloud storage, or simply shoring up your storage strategies to meet increasing demand, the visibility, control and automation capabilities of Tivoli Storage Productivity Center can help ensure successful storage service delivery. Part of IBM Integrated Service Management, the solution can help IT organizations meet today's storage challenges with a modular approach that makes it easy to upgrade to meet the storage challenges of tomorrow.

For more information

To learn more about the IBM Tivoli Storage Productivity Center family of solutions, contact your IBM representative or visit: ibm.com/storage/software/center. You can schedule a product demonstration or request a proof of concept, which will give you hands-on experience with the product's capabilities.

About Tivoli software from IBM

Tivoli software from IBM helps organizations efficiently and effectively manage IT resources, tasks and processes to meet every-shifting business requirements and deliver flexible and responsive IT service management, while helping to reduce cost. The Tivoli portfolio spans software for security, compliance, storage, performance, availability, configuration, operations and IT lifecycle management, and is backed by world-class IBM services, support and research. For more information on Tivoli software from IBM, visit: ibm.com/tivoli

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IBM Corporation Software Group
Route 100
Somers, NY 10589
U.S.A.

Produced in the United States of America
January 2012

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¹ "TheInfoPro Storage Study Wave 15 – 1H 2011," TheInfoPro, 2011.



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