



IBM's TPC Takes a Big Step Forward in Delivering Storage as a Service

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Management Summary

When turning on lights and appliances at home, do you think about the infrastructure that supplies the electricity? Power generation plants, transmission systems, substations, and local power lines all work together to deliver electricity to your household. However, we do not concern ourselves with this vast network or the work done to maintain it – we just expect the service to be available when we turn on a light or the television. In IBM parlance, it is *on demand*.

Enterprise storage is another on demand service, at least from the perspective of users and applications. Data storage consumers are not concerned with the network of disk arrays, network switches, data protection technologies, volumes, file systems, etc. that provide it. They just expect a certain quality of service to be available when needed. Nevertheless, as anyone who manages storage infrastructure knows, it requires significant and ongoing work to deliver a reliable service, especially as requirements and data continue to grow. This is a big operating expense.

It is for this reason that IBM continues to build out the feature set of *TotalStorage Productivity Center (TPC)*. **IBM's strategy is to create a management tool that makes networked storage services nearly as easy to deliver as they are to consume. It provides end-to-end, automated management of a heterogeneous infrastructure, which includes disk, fabric, data, and replication.** The new features in TPC v3.1 are:

- Single management console and data repository
- End-to-end topology viewer with drill-down analysis
- Enhanced storage device support, including tape libraries
- Performance analysis
- Volume provisioning
- Role-based user profiles
- Functional replacement for *ESS Expert*
- TCP Limited Edition with basic device support (included with IBM storage products).

From an operational and business perspective, these features offer a greater degree of management centralization and simplicity, lower management costs, and improved quality of storage service. Read on for the details.

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New TPC v3.1 Features

IBM *TotalStorage Productivity Center (TPC)* is a tool for managing storage infrastructure, from the disk to the network to the file system and application. Think of it as a management umbrella for delivering storage as a service.¹

The newest TPC version 3.1 has several salient features.

Single Management Console and Data Repository

TPC is a composite of four related software products that manage disk, fabric, data, and replication, respectively. In this version, IBM united the first three - from a user/administrator perspective - by building a single management console and a single database for tracking statistics. Based on the idea that it is easier to manage one thing than many, TPC's single interface increases administrator productivity by allowing them to manage everything from one spot. And, since more complete information enables better decision making, the unified repository for statistical data and metrics makes reporting, analysis, and decision-making easier. It also paves the way for more sophisticated analytical tools in the future. In short, both features increase productivity and help lower the cost of management.

End-to-end Topology Viewer

The topology viewer automatically creates a map of the storage infrastructure, showing the web of interconnections and relationships among servers, file systems, switches, and storage systems. It lets administrators see the "big picture" and monitor overall health and performance, even as the infrastructure grows and evolves. This is indispensable in a networked storage environment of any size, just as a map is needed for a road trip or hike in the wilderness. TPC can also launch a drill-down analysis of individual elements while preserving the broader context. It shows

health and performance and provides alerts and automated responses based on policy.

Enhanced Storage Device Support

Managing storage as a service requires support a variety of different products and vendors. The reason is straightforward - enterprise environments are heterogeneous and no two are alike. Therefore, broader device support means greater applicability for TPC.

In this version, IBM added SMI-S v1.0.2 and v1.1.1, which are recent specifications of a standard protocol for device management. Of IBM storage devices, TPC supports:

- *Enterprise Storage Server (ESS Model 800)*
- *DS4100/4300/4400/4500/4800*
- *DS6000 series*
- *DS8000 series*
- *SAN Volume Controller v2.1*

Among third-party storage, IBM supports:

- *EMC Symmetrix*
- *EMC Clariion*
- *HDS 9900v and 9500v series*
- *HP StorageWorks Virtual Array family*
- *HP XP 512/1024*
- *Engenio.*

In addition, it supports Brocade, McData, and Cisco fabric switches. Furthermore, it supports IBM tape libraries, the 3584 fully and the 3494 partially.

Performance Analysis

Storage performance is a function of the end-to-end data path. Like water flowing through a pipe, output is determined by the slowest point along the way - the bottleneck. Therefore, the ability to monitor and tune performance at each point in the data path (i.e., disk, fabric, and host) is necessary for complete performance management.

SMI-S v1.1.1 protocol offers perfor-

¹ See **The Clipper Group Explorer** dated April 7, 2003, entitled *Storage Is Not Just a Box Anymore - Managing the Data Path* and available at <http://www.clipper.com/research/TCG2003013.pdf>.

mance reporting for third-party storage. The metrics include IO/s, MB/s, and KB/s for individual ports and the overall device, plus cache hits. TPC also supports performance reporting for IBM storage and Brocade, McData, and Cisco fabric switches. For all metrics, it can set two thresholds each, for upper boundaries and lower boundaries. This helps administrators identify and correct bottlenecks and under-utilized resources, which improves performance levels for applications and their associated business processes.

Volume Provisioning

TPC can now provision volumes to host servers. It performs multiple steps in this process: create volume, define RAID level, create/assign zone, assign array port, and assign host. This capability replaces multiple tasks that administrators previously had to do through element managers at the disk array, fabric, and host levels.

Role-based User Profiles

Enterprise storage is like a bank vault in that it protects and preserves a valuable resource – information. Therefore, it is important to limit who has access and what each can do. Just as an enterprise would not give a cost accountant authority to write million-dollar checks, it would not give a database administrator universal authority to delete volumes. However, both may need to see what is happening to accounts and storage volumes, respectively.

TPC addresses the problem of access security through role-based user profiles. Administrator roles can make changes while operator roles can only read data. These roles are defined at the disk, fabric, data, tape, and super-user levels.

Functional Replacement for ESS Expert

TPC is now a functional replacement for *ESS Expert*, which is an earlier tool that offers asset, capacity, and performance reporting for the IBM ESS. This represents another degree of management centralization for TPC.

TPC Limited Edition

TPC Limited Edition is a basic device manager that IBM will include with all TotalStorage DS arrays and 3584 tape libraries. It provides basic asset and capacity reporting, a topology viewer, and limited provisioning. This is a subset of full functionality and gives customers a sample of what TPC can do. Of course, customers can purchase an upgrade to the *TPC Standard Edition*.

Conclusion

Enterprises increasingly view storage as a service, not merely as a box in the data center. This is appropriate because the service-oriented view is tied more closely to applications and business processes. In other words, it is a business view.

IBM TotalStorage Productivity Center is a good tool for managing storage as a service. It actively manage the many and varied components of networked storage – disk, fabric, data, and replication. **The new features in TPC version 3.1 represent a big step forward in realizing the ideal – storage services in a heterogeneous, networked environment that are as easy to deliver as they are to consume.**



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