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Navigator™

IBM's TotalStorage Productivity Center — Seeing The Big Picture

Analyst: Michael Fisch

Management Summary

The really understand something, you have to see it in context. For instance, you had to see Wayne Gretsky playing a hockey game with his team to really appreciate his skill and talent. Watching him skate by himself on the ice would not have done it – the interaction with teammates, opponents, and the puck is where it showed. You have see a piston firing in an engine to understand its role in generating horsepower to drive a car. To many, a piston lying on a table would be merely a curious hunk of metal. **So, it is in the big picture that you see the significance of things – whether people, events, objects, or ideas.**

IBM announced a new management software solution called *TotalStorage Multiple Device Manager* for heterogeneous storage arrays. It joins with *Tivoli Storage Resource Manager* and *Tivoli SAN Manager* to form a multi-part solution called *TotalStorage Productivity Center*, which is a member of the IBM *TotalStorage Open Software Family*. This family of solutions is the delivery mechanism for IBM's vision of the *On Demand Storage Environment* – a more adaptable and effective means to meet the ever-increasing storage requirements of enterprises. If Multiple Device Manager is the *object*, the rest is the *context*, and one cannot fully understand the former apart from the latter.

Multiple Device Manager allows administrators to configure and manage multiple, heterogeneous, SAN-attached storage arrays and their advanced replication services from a single console. It also tracks and monitors array performance. Multiple Device Manager provides open support through the Storage Management Interface Specification (SMI-S) standard, plus in-depth support for IBM storage platforms. It consists of two components:

- **Performance Manager** – Performs LUN provisioning, best LUN recommendation, granular performance monitoring, alerts, and capacity utilization reporting.

- **Replication Manager** – Configures and monitors data replication, including point-in-time copies, mirroring, and cross-platform consistency groups.

Multiple Device Manager is designed to reduce the cost and complexity of storage array administration. Pricing is based on terabytes under management, and general availability is scheduled for May 2004.

This solution also completes an important part of IBM's comprehensive offering for delivering the On Demand Storage Environment. But you have to look at the context to see how and why it fits. Read on for the details.

Storage, Business, and Complexity

In one sense, storage is a straight-forward concept: It is a repository for digital information. An enterprise needs storage to function on an ongoing basis, just like it needs employees or cash flow. *Exhibit 1, below, shows the relationship between storage and the overall business context.*

Starting from the base, the *storage infrastructure* – a combination of hardware, software, and administrative processes – delivers storage as multiple, dynamic service levels for precisely meeting business requirements. (Ideally, anyway.) These tiered qualities of service offer different performance, availability, capacity, and cost characteristics. Next, *IT applications* consume the storage as they support specific *business processes*, like order processing and customer support, or the enterprise in general with applications like e-mail and content management. In turn, the business processes work together to meet *enterprise objectives*. These define the highest purpose of an enterprise and include goals like customer satisfaction, profitability, and growth. They are what the board of directors and corporate executives are most concerned about achieving. **Enterprise objectives are the end, and everything else is the means – including storage.**

All well and good, but this straight-forward view becomes much more intricate when you look "under the hood" and into the infrastructure itself. This difference is akin to examining an amoeba underneath a microscope. At first glance, it appears to be

Exhibit 1
Storage in Context
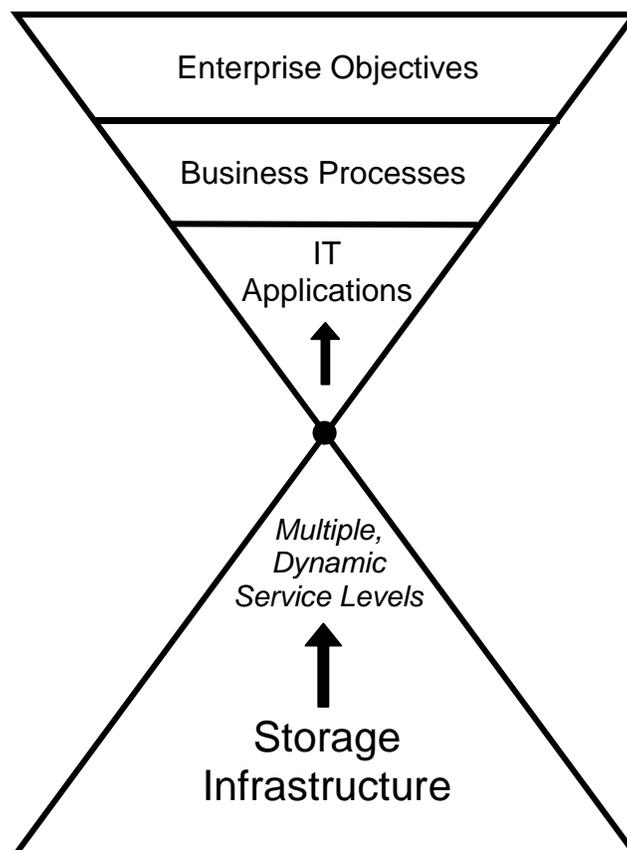
a simple, single-celled creature happily swimming around. How complicated could it be? Well, modern microbiology has shown that the inner workings of the lowly amoeba are like a tiny city full of inter-related systems and processes. It is complex indeed when you look inside. The same is true of storage.

In a networked storage environment, there are disk drives and data paths, switches and storage arrays, ports and production applications, data replication and RAID algorithms, backup jobs and HBAs, tape drives and thingamajigs. The point is that all of these diverse, interconnected components must work together *systematically and synergistically* to deliver the "multiple, dynamic service levels" depicted above. And therein lies the rub – because the components are not self-ordering or presumably interoperable. The bigger and more hetero-geneous the environment, the greater the complexity becomes. Tasks like provision-ing capacity involve coordinated configure-ations at multiple points in the infra-structure. **The only way to bring order to this chaos in a leveraged manner[1] is through sophisticated software that oper-ates on multiple levels to coordinate, virtualize, and automate the infra-structure.**

On Demand Storage Environment

The phrase *on demand* suggests delivering what you need, when you need it. **It emphasizes adaptability and respon-siveness to changing business require-ments, reflecting the reality of a fast-paced and dynamic business world.** IBM's vision for the *On Demand Storage Environment* is focused on delivering a "more perfect" version of the storage infrastructure depicted above. It leverages automation, virtualization, openness, modu-larity, and integration to deliver storage service levels in an adaptable and efficient manner.

A distinction of IBM's storage offering

is that it is comprehensive. It includes everything from hardware (e.g., disk, tape, switches, HBAs) to a full management software stack to professional services for integration, installation, and management. It is designed to deliver the whole *On Demand Storage Environment*, while being open and modular enough to reflect the street-level reality of heterogeneous environments.

As you can see in the figure below, the first layer of IBM's storage offering consists of hardware. This is what you see when walking onto the data center floor. Examples include *TotalStorage Enterprise Storage Server* and *FAStT* storage arrays. Virtualization is the next layer, which includes block (*SAN Volume Controller*[2], *SAN Integration Server*) and file (*SAN File System*[3]) services. Virtualization aggregates resources, masks complexity, and mitigates disruptions to storage availability. It sim-plifies the management and use of resources. Next up is a range of management services that emphasizes data replication and move-ment, monitoring and reporting, and device configuration and tuning. Capping it off is the storage orchestration layer, which includes software like *Tivoli Intelligent ThinkDynamic Orchestrator* and *Tivoli Provisioning Manager*. The former moni-tors and delivers service levels and the latter automates workflows for provisioning resources. This software is intended to interact with and coordinate the pieces underneath, like a conductor directing an orchestra (hence, the name).
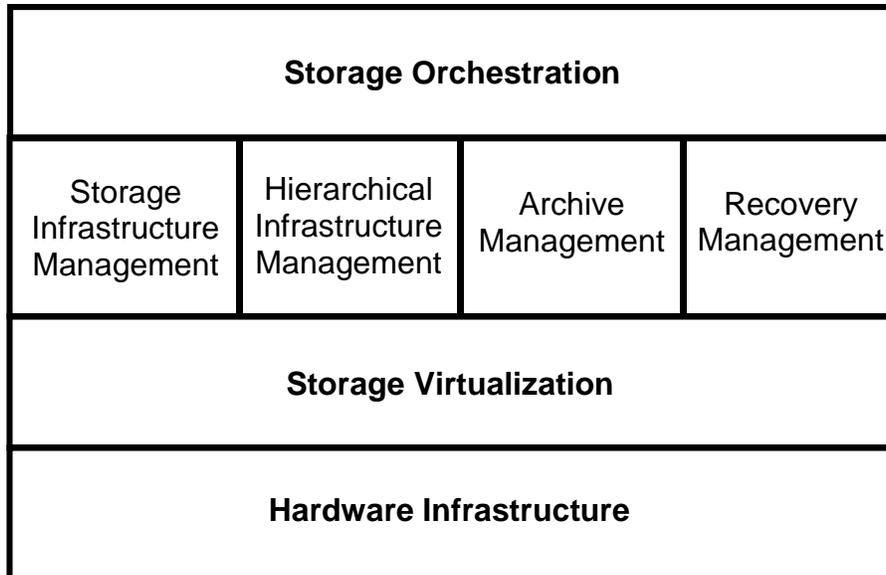
IBM TotalStorage Productivity Center

IBM TotalStorage Multiple Device Manager is part of a suite called *Productivity Center* that fits in the category above called storage infrastructure manage-ment. *Tivoli Storage Resource Manager*

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[1] Versus simply throwing more equipment, people, and – therefore – money at the problem.

[2] See *Managing More Storage with Less Effort – IBM Unveils Its SAN Volume Controller* in **The Clipper Group Navigator** dated April 30, 2003, at http://www.clipper.com/research/TCG2003018.pdf.
[3] See *IBM SAN File System Redefines Role and Impact of a File System* in **The Clipper Group Navigator** dated November 13, 2003, at http://www.clipper.com/research/TCG20030059.pdf.

Exhibit 2
IBM TotalStorage Open Software Family

Storage Orchestration			
Storage Infrastructure Management	Hierarchical Infrastructure Management	Archive Management	Recovery Management
Storage Virtualization			
Hardware Infrastructure			

and *Tivoli SAN Manager* are also part of the suite. There is a common GUI that links into the individual applications for specific management activities.

The constituent applications of Productivity Center perform the following roles:

- *Tivoli Storage Resource Manager* – Monitors and manages data in heterogeneous environments from the host server perspective, primarily. Tracks utilization by disk, file system, and database, identifies files for archiving or purging, monitors disk availability, assists with capacity planning, supports chargeback and quota management, inventories assets, and provides policy-based event management and alerts. Benefits include improved capacity utilization, lower storage costs, downtime avoidance, and simpler management.

- *Tivoli SAN Manager* – Centrally manages and monitors a heterogeneous SAN fabric. Discovers devices, maps topology (physical and logical), monitors statistics and faults in real time, predicts errors, configures zones, and integrates with *Tivoli NetView* for managing SANs, LANs, and WANs from a single console. Benefits include simplified SAN management and improved SAN availability.

- *TotalStorage Multiple Device Manager* (incorporating Performance Manager and Replication Manager) – Centrally manages multiple, heterogeneous storage arrays. Recommends and provisions LUNs, monitors performance and capacity utilization, provides alerts, configures and monitors data replication (i.e., point-in-time copy, mirroring) in and among storage arrays. Initially supports the IBM storage family: *TotalStorage Enterprise Storage Server (ESS), FAStT, SAN Volume Controller*, and *SAN Integration Server*. Also provides a degree of support for any array compliant with the SMI-S management standard, including third-party platforms. Indirectly supports heterogeneous arrays through IBM's SAN Volume Controller.

Together, the three manage essential infrastructure components of data, SAN fabric, and storage arrays. They can be bundled or purchased individually.

TotalStorage Productivity Center's Multiple Device Manager fills out a key piece of IBM's storage offering – centralized management of heterogeneous arrays. This is a characteristic of many IT environments, which is why IBM targeted it. **Like the richer sound of an orchestra with all of the instruments present, a comprehensive offering with all of the necessary components to deliver storage "on demand" offers significantly more value than point products alone.**

The Path Forward

IBM continues to develop the TotalStorage Open Software Family as it pushes to deliver the full promise of the On Demand Storage Environment. In the future, expect IBM to expand upon its current value proposition with enhanced capabilities, greater heterogeneous support, and more integration linkages among the components of its software suite. The ideal offering (for which several vendors are striving, but have yet to fully attain) is a family that works together fully and seamlessly, while maintaining modularity, in a heterogeneous storage environment to deliver multiple, dynamic service levels at the lowest total cost of ownership.

Conclusion

For interested consumers of storage technology, IBM's TotalStorage Productivity Center raises a couple of questions. The first is obvious and the second is less obvious but more strategic:

- **Is TotalStorage Productivity Center right for your enterprise?** The answer will depend on your particular needs and whether this solution offers the right set of features, pricing, support, and vendor relationship. It is most attractive initially for purchasers of IBM disk technology, those looking to understand how their storage is being used, and those wishing for simplified SAN management.

- **Do you believe in IBM's vision for the On Demand Storage Environment?** The answer will be influenced by your particular vision for your enterprise's storage infrastructure and how well IBM's vision and capabilities align with it. The answer will also influence the perceived value of TotalStorage Productivity Center, because the solution's value is greater as a synergistic part of a comprehensive storage offering than as a standalone point utility.

Furthermore, if you subscribe to IBM's vision, it raises the question of where to start. An enterprise is unlikely to buy into the whole offering at once. The answer, in part, depends on your enterprise's pain points. For instance, if excessive and undisciplined storage usage is the problem, then Tivoli SRM may be the solution. If it is configuring and maintaining a complex set of data replication processes, it may be Multiple Device Manager – Replication Manager. Where to start also depends on your particular strategy for evolving your storage infrastructure. A product purchase may flow from a strategic plan as well as a tactical pain point.

In summary, IBM is taking a comprehensive approach to delivering the next-generation On Demand Storage Environment. The new Multiple Device Manager plays a necessary role. IBM's approach is compelling, and it will become more so as enterprises increasingly desire to implement a flexible infrastructure that delivers multiple, dynamic service levels to better meet the storage needs of the business.

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➢ *The Clipper Group can be reached at 781-235-0085 and found on the web at www.clipper.com.*

About the Author

Michael Fisch is Director of Storage and Networking for The Clipper Group. He brings over eight years of experience in the computer industry working in sales, market analysis and positioning, and engineering. Mr. Fisch worked at EMC Corporation as a marketing program manager focused on service providers and as a competitive market analyst. Before that, he worked in international channel development, manufacturing, and technical support at Extended Systems, Inc. Mr. Fisch earned an MBA from Babson College and a Bachelor's degree in electrical engineering from the University of Idaho.

➢ *Reach Michael Fisch via e-mail at mike.fisch@clipper.com or at 781-235-0085 Ext. 25. (Please dial "1-25" when you hear the automated attendant.)*

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