



HP Announces Game-changing Storage Integration

XP24000 Disk Array Simplifies Storage Provisioning and Improves Storage Infrastructure for the Delivery of Storage Services

Executive Summary

Over the last number of years, the growth rate of storage resources has been extraordinary, driven by applications that have a greater thirst for more and larger files and a diversity of performance requirements. In the fall of 2004 with the initial announcement of the XP12000 Disk Array, HP set the standard for enterprise-class storage and at the time put forth a vision to provide a storage architecture capable of efficiently managing enormous amounts of storage, both internal and external to the controller, utilizing virtualization technology that would eventually make storage allocation invisible to applications.

The announcement of the new HP StorageWorks XP24000 Disk Array advances that vision further by promising to put organizations on a vector to dramatically reduce the amount of physical storage that needs to be allocated in support of applications, and to package storage services in a way that completely alters the economics of storage delivery. A key underpinning of this announcement is HP's StorageWorks XP Thin Provisioning software, a service-side (front-end) virtualization service offering organizations new views of storage that lead to distinct and very real benefits. This capability exploits the platform's larger address space and builds on HP's existing delivery-side (back-end) virtualization and storage management services.

The three most important benefits of this new platform are 1) the potential to dramatically reduce the cost of storage configuration and data movement; 2) a reduction in the time and effort required for backup and remote replication; and 3) the simplification of resource utilization decisions and the potential to address accounting questions regarding how much an application, user or group utilizes storage at different performance levels.

These announcements will lead to tangible improvements in storage management efficiency. For example, our latest models show that for similarly configured systems, best-of-breed competitive solutions will consume 38% more IT budget dollars over a three-year period than the new HP XP24000 Disk Array configured together with MSA 1500 external storage. The models also demonstrate that when the benefits of additional flexibility, availability and security are factored in, the total business impact is a 56% reduction in the total cost of storage. These benefits are driven by combination of software functionality of the storage arrays (e.g., thin provisioning, virtualization) and using HP Unified Infrastructure Management total systems approach (e.g., HP Systems Insight Manager and HP Storage Essentials).

However, the most important conclusion of this announcement is that it enables IT management to effectively address disaffected users that purchase low-cost online consumer storage services and desire similar transparency, functionality and simplicity from their internal IT departments.

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ITCentrix recommends that CTOs and storage executives aggressively investigate and exploit the capabilities of the XP24000 Disk Array, especially its front-end virtualization functionality, to develop storage services strategies and enterprise architectures patterned after successful consumer models, where buyers have transparent knowledge and control of what services are being purchased and what is actually being consumed.

HP is well positioned a total systems vendor to help customers fulfill this vision. HP must accelerate and promulgate adoption of this technology by communicating to constituents in the boardroom as well as it does in the server room.

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XP24000 Technology Enhancements

In 2004, with the XP12000 Disk Array announcement, and again in 2006, HP raised the bar for ultra-consolidation and high I/O throughput applications. The XP's powerful controller architecture, multiple levels of virtualization (e.g., virtual ports, partitioning, virtualization of external storage and tiered storage) and no-data-loss guarantee have contributed to the HP success in the high-end storage marketplace. With the XP24000 Disk Array, HP continues its commitment to delivering high performance and an architecture capable of supporting seemingly limitless storage.

The XP24000 announcement includes:

- Increased internal bandwidth and I/O throughput to 3.5 million per second.
- An increase in the number of ports, virtual ports and single port performance and, as a result, increased throughput of copy service software.
- Increased total storage capacity that can be managed to 247 petabytes.
- Thin Provisioning software (initially on internal storage, but expected on external storage as well in a later release).
- Improved and expanded volume management.
- Simplified pricing and licensing by using bands and reducing restrictions on the licensing of external capacity.

Customers should focus attention not on the sheer horsepower of the platform; rather, they need to understand and apply the capabilities the platform enables, namely the ability to logically over-provision storage capacity and reclaim substantial wasted space. These capabilities are enabled by HP StorageWorks XP Thin Provisioning Software, virtual volumes, wide striping and logical storage pools. In addition, the HP XP24000 Disk Array offers customers the ability to deliver storage to its clients in a completely different manner by “selling” virtual capacity, delivering only the amount utilized and “profiting” by reselling the difference to other clients.

Customer Issues

Implementation Action

CTOs and storage executives should aggressively investigate and exploit the front-end virtualization capabilities of the HP XP24000 Disk Array to develop storage services strategies and enterprise architectures patterned after successful consumer models, where buyers have transparent knowledge of what services are being purchased and what is actually being consumed.

However, architects should keep the initial software management environments for virtualization as simple and homogeneous as possible, with single vendor solutions applied to different storage problems. Customers need to consider different virtualization approaches for different storage pools—one size may not fit all. For high-performance and high-availability environments, there are strong theoretical and practical reasons for putting the virtualization engine in the storage controller to improve availability and recovery. For other environments, the choice is wider.

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The capabilities offered by the XP24000 Disk Array and, in particular, Thin Provisioning present significant opportunities for organizations to reclaim wasted space simplify storage management and alter the economics of storage delivery.

This new platform ultimately provides three views of storage that lead to distinct but related value propositions:

1. A logical user view that allows individuals and developers to identify and monitor the specific storage resources under their control (e.g., “I have access to and am paying for 1GB of e-mail storage and I’ve only consumed 200MB”).
2. A resource management view that enables the dynamic allocation of resources so they can be applied as needed to support required service levels (e.g., “this data needs to be migrated to a lower-cost tier”).
3. An operational management view that effectively handles the allocation of onetime resources required to deliver committed services at the storage level (e.g., physical storage consumption has hit a defined threshold and more physical capacity is needed).

Customers of the XP24000 Disk Array should architect solutions with these three views in mind and establish related goals and strategies, including

- a) Providing previously unforeseen levels of storage services by establishing a clearer means of charging users for what they consume and providing flexible systems to order and adjust storage services;
- b) Reducing management complexity by leveraging dynamic allocation based on business-defined policies; and
- c) Reclaiming substantial wasted space by provisioning physical capacity only when absolutely needed.

Users should begin with this third goal as a starting point and establish broad goals to improve overall storage utilization rates, which at the high-end today effectively hover around 50% in most organizations, largely to accommodate future growth. Over time, it is feasible that customers implementing the XP24000 and Thin Provisioning could see 20%–30% improvements in effective capacity utilization, placing real dollars back into IT budgets.

HP is a total system vendor, and provides an excellent overall systems framework with HP Unified Infrastructure Management. This heterogeneous vendor framework which includes both server and storage, and for customers that have adopted it provides the structure, software agents, business process maps and services to adopt these new technologies, and to integrate them into a storage services topology.

However, users should be aware that these substantial benefits will take some effort to realize and will not come overnight. Organizations should target applications that can benefit from Thin Provisioning, as well as gain a good understanding of the exploitation of the capability. Good candidates include “safe” Tier 2 and Tier 3 storage applications that are large, consume lots of storage and demonstrate unpredictable growth. Good planning will be required to ensure that I/O response times continue to meet service level agreements while the number of physical drives are reduced. In short, initially target those T2 and T3 applications that historically require more physical storage up front than is necessary, such as many data warehousing applications.

Organizations should learn best practices and understand thoroughly how Thin Provisioning impacts backup, data movement and ultimately storage utilization. Customers should also develop clear metrics to understand the effects on backup windows and backup times, the implications for snapshots and remote copies, and the impact on overall performance.

The key action item here is that customers should rapidly develop a good understanding of where Thin Provisioning works, what application software support and changes are needed, and how processes are impacted. Storage customers should leverage user groups and buying power to push hardware and application vendors to help qualify this new capability to accelerate adoption.

“Thin Provisioning completely changes the economics of storage delivery. It allows you to ‘walk the storage dart into the client target.’”
—Storage Executive
U.S. Airline

Organizational Implications

According to a senior storage executive at a major U.S. airline, “Thin Provisioning completely changes the economics of storage delivery. It allows you to ‘walk the storage dart into the client target.’ Storage managers have become illusionists, creating the perception that capacity is always there; and clients will happily pay for that capacity without us having to actually provision it until they really need to use it.”

This quote from a noted industry practitioner sums it up perfectly. A front-end virtualization capability through Thin Provisioning rewrites the book on storage economics by allowing organizations to “double dip,” charging clients for virtual capacity many times over but only paying for the physical capacity provisioned. And the best part of the story is, customers are happier-- assuming the right metering and monitoring capabilities are in place to provide visibility on consumption.

However, IT organizations must understand that this trend is both an opportunity and a threat. Specifically, as end-users begin to experience firsthand the storage services of the likes of Amazon, Google and Xdrive, they will come to expect from their IT organizations the same level of transparency and ease-of-use that they receive from these service suppliers.

Organizations need to get “down and dirty” with storage chargeback, which is understandably an unappealing exercise but well worth the effort, given the capabilities of the HP XP24000 Disk Array. Businesses naturally want to know what they are getting for their dollars, but at the same time the information available on actual consumption of resources is often not forthcoming. IT management needs to change this.

The key issue with storage chargeback is, IT has not typically had an incentive to provide easy ways to monitor, meter and charge appropriately for the consumption of storage services to the business. The HP XP24000 Disk Array has the potential to change this by allowing application owners and users to purchase only those services they consume. This necessitates a change in the way chargeback is fundamentally viewed and requires organizations to develop new business models for storage provisioning.

The action here is, storage administrators need to begin constructing new, pay-as-you-go models of storage that reflect the consumption of storage and related services versus some vague concept of chargeback. Importantly, IT must provide transparency by using clear metrics that tie business value to the delivery of storage services. The HP XP24000 Disk Array, the XP storage management software, and the HP Unified Infrastructure Management are enablers for this new mode of doing business.

Asset Management Implications

The additional power of the XP24000 provides an opportunity for customers to extend the useful life of existing storage subsystems on the floor by taking advantage of the platform’s ability to manage external storage, ultimately lowering overall TCO.

Sensible target applications include capturing existing Tier 2 and Tier 3 storage and externally attaching it to the XP24000. These repurposed subsystems can be aimed at applications such as development. Existing boxes can be taken off maintenance, and if services are required they can be acquired on a time and materials basis. Or simply, if the systems go down, new capacity can be added and the older systems retired.

Employing these types of strategies by exploiting the new HP XP24000 can squeeze more value out of existing assets, delay the capital costs of new acquisitions and lower ongoing support expense.

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Case Study

Case Study—Manufacturing Organization

This case study quantifies the business value of the new HP XP24000 Disk Array together with MSA 1500cs storage and demonstrates that a combination of cost savings (TCO reduction) and business-side benefits will yield about \$3M in benefits over a three-year period. The situation is that a medium sized banking organization has \$38 billion in assets. It has 8,700 staff, with an average salary of \$50,000. The main applications running on this storage in the primary data center are the core banking applications and support applications.

The data center environment includes a large number of UNIX and Windows servers used for a range of applications, including account management, teller, internet banking,, wealth management, risk management, banking data warehouses and data marts, and other financial support systems. The center supports 6,090 internal users that are using the systems for 40% of the time.

There is a requirement to replace 190 terabytes of high-function operational Tiers 1 and 2 usable storage. 40% additional storage (~76 terabytes) is required to support remote replicated storage over a 250 mile high-speed connection to a remote site.

There is 232 terabytes of additional usable installed data center storage to cover Tiers 3 and 4 operational systems and Tiers 1–4 reference systems. None of this storage is replicated remotely.

Case Study—Goals and Assumptions:

- Compare the HP solution against best-of-breed competitive solutions.
- Assume that the disk storage behind the controller is priced the same for both HP and competitive solutions and that storage management software is priced the same per terabyte.
- Use 232 terabytes of either SCSI or SATA storage via MSA 1500cs drives for tiered storage where appropriate.
- HP storage software is as follows:
 - HP StorageWorks XP Continuous Access Journal used (7% of storage)
 - HP StorageWorks XP External Storage is invoked
 - HP StorageWorks XP Business Copy applied (~13%)
 - HP Storage Works XP Thin Provisioning
 - HP Unified Infrastructure Management
 - HP Systems Insight Manager
 - HP Storage Essentials
 - HP StorageWorks XP Disk/Cache Partition Software (not enabled)
 - HP StorageWorks XP Array Manager

The TCO conclusion is that best-of-breed competition providing 866 terabytes of storage with replication on a small portion of data requires \$4.72M (63.8%) more IT budget than a HP XP24000 configured to provide the same level of service.

Case Study—TCO Comparison:

Figure 1 below shows the TCO comparison between a HP XP24000 configuration and a competitive best-of-breed solution. The main savings come from:

- Reduced storage cost—more effective utilization of storage because of virtualization, Thin Provisioning and effective use of SATA storage where suitable.
- Reduced cost of storage administration—virtualization, Thin Provisioning, and common storage management provide significant efficiency benefits, based on HP Systems Insight Manager and HP Storage Essentials.
- Reduced cost of storage operation—because there are a large number of servers and other devices, HP’s virtual ports significantly reduce the loss of connection to the storage network.

The TCO conclusion is that best-of-breed competition providing 422 terabytes of storage with 18% of that data remotely replicated on an additional 76 terabytes requires \$2.97M (63.8%) more IT budget than a HP XP24000 configured to provide the same level of service.

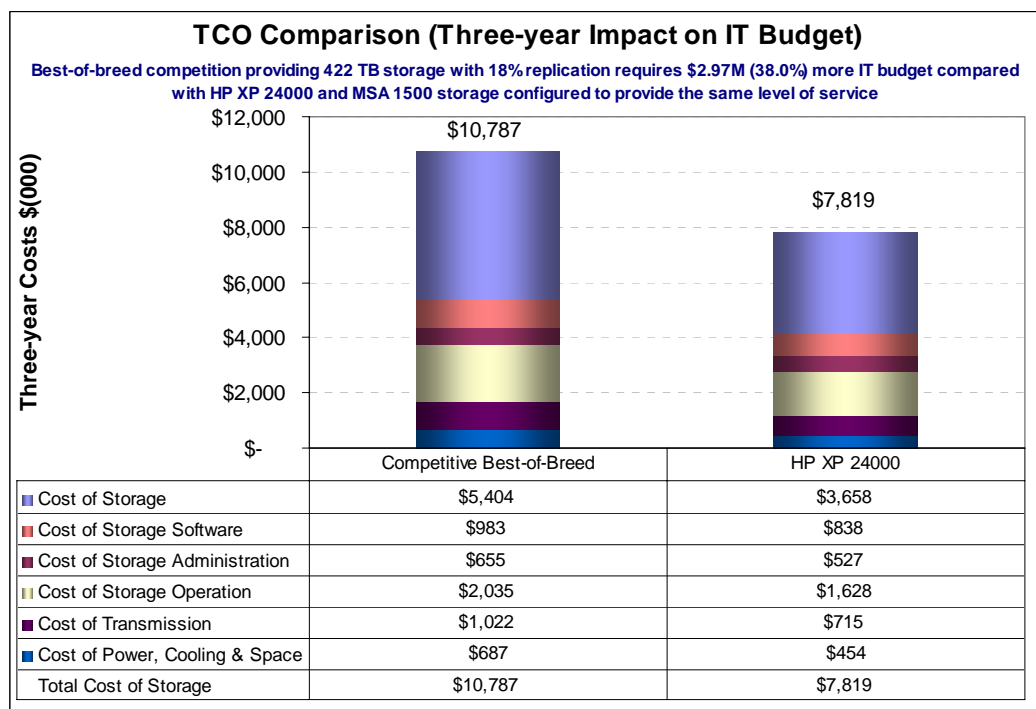


Figure 1. TCO Comparison between HP XP24000 Configuration and Competitive Best-of-Breed Solution

The total economic impact analysis of best-of-breed competition providing 422 terabytes of storage with 18% replication is that it would deliver \$6.06M less total business benefit than an HP XP24000 and MSA 1500 configured to provide the same level of service.

Case Study—Total Economic Impact:

Figure 2 shows the total business benefit of the HP XP24000, which includes the total cost of ownership (storage savings), as well as the business benefits from better service delivered to the end users. The major business savings come from improved flexibility. This means new applications and upgrades to existing applications are implemented faster in the data center. The primary drivers for this is improved management derived from the virtualized environment, the automation and availability from thin provisioning and common processes and procedures and automation that derive from the HP Unified Infrastructure Management and Storage Essentials.

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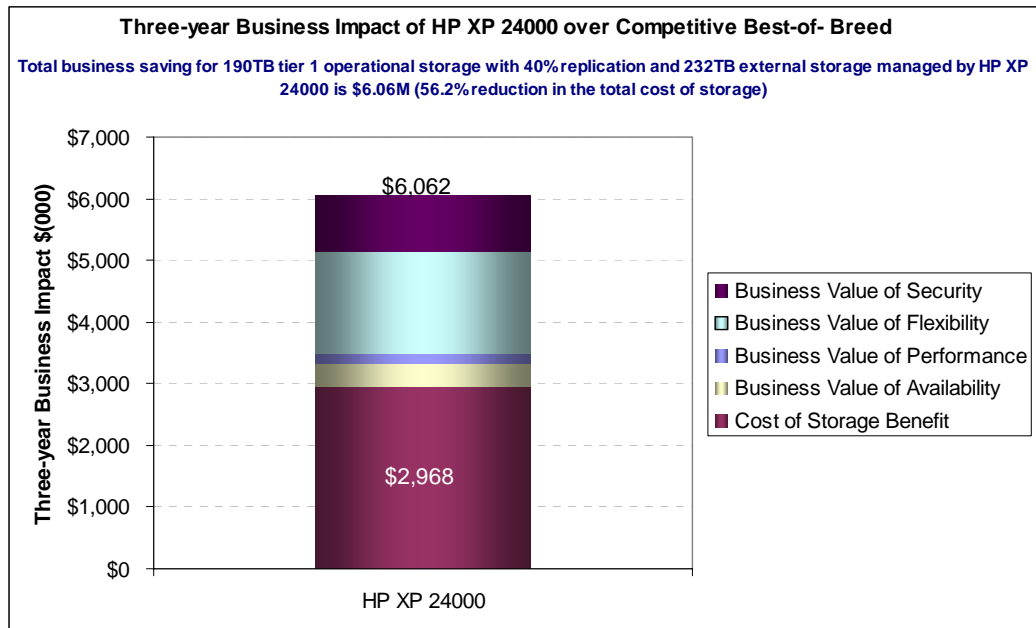


Figure 2. Total Business Impact of HP XP24000 over Competitive Best of Breed

Industry Implications

In addition to the obvious fact that HP continues to demonstrate its leadership in the storage market, HP's XP24000 Disk Array underscores several industry implications, including the following:

- The platform can usher in a new era of storage services delivery by allowing applications to operate logically and independent from physical storage resources.
- This marks the first time that an enterprise-class virtualization layer is combined with thin provisioning in a single platform. Having a common service-side and delivery-side virtualization platform significantly enhances the ability to optimize, manage and report storage resource consumption.
- The announcement lends credence to efforts by smaller, less established companies to increase adoption of front-end virtualization functionality but is the first example of a leading enterprise storage supplier delivering this capability on an enterprise scale.
- The importance of being a Total System provider, and having a common heterogeneous framework for integrating the management of heterogeneous servers and storage, and the importance of rich services offerings to enable early implementation and adoption of technologies by users.
- The capabilities of the XP24000 Disk Array and HP Thin Provisioning in particular set the stage for large, established enterprise storage companies to effectively

Specifically, 500GB disk drives can be purchased for \$150 on eBay. At \$0.03 per megabyte, it now costs about the same to store one minute of audio on a hard drive as it does to purchase a minute of dial tone.

compete with consumer-oriented service suppliers that are setting the standard for simplified storage service delivery.

This last point is particularly intriguing. Specifically, 500GB disk drives can be purchased for \$150 on eBay. At \$0.03 per megabyte, it now costs about the same to store one minute of audio on a hard drive as it does to purchase a minute of dial tone.

Consumer storage service providers understand this and will sell 50GBs of storage per month for \$10. It doesn't take long for these companies to break even on such a deal. What's more, if they sell fifty virtualized gigabytes, any unused capacity can be resold to other customers. Large consumer-oriented players are "licking their chops" at these prospects. Consumer services suppliers with easy-to-use software based on the principles of virtualization are delivering cost-effective services that meter capacity available, capacity utilized, cost per month and security levels. Recovery objectives are not far off. Application and business owners crave this level of simplicity and transparency and will increasingly get it from consumer services suppliers. IT must respond, and the XP24000 Disk Array holds great potential to help customers offer internal services that begin to offer many of the benefits of simplicity being pioneered by consumer services companies.

The bottom line is consumer-oriented services companies are encroaching on the domain of established storage vendors and IT departments by using highly scalable business models and technologies such as virtualization as the underpinning of their competitive strategies. In order to recoup substantial software R&D investments, established storage vendors (and internal IT) will have to either compete head-on with their own services business models or flee to high-ground transaction-oriented mission-critical applications or both.

Conclusions and Recommendations

HP's new XP24000 Disk Array represents both the natural evolution of the architecture, providing higher throughput, capacity and performance, and substantial incremental exploitation of the architecture, specifically with regard to Thin Provisioning. It should now be obvious to industry observers what HP has planned for the platform, supporting massive amounts of internal and external storage, virtualizing service-side and delivery-side resources and exploiting the platform's large address space to provide a new business model by logically over-provisioning storage and supporting a services-oriented approach to storage delivery. HP is a total systems supplier, and has invested heavily in a heterogeneous server and management infrastructure framework with HP Unified Infrastructure Management. ITCentrix recommends that customers should understand the capabilities of this announcement and begin weaving its capabilities into strategic and operating plans. ITCentrix recommends taking advantage of HP Systems insight and HP Storage Essentials software together with HP services will minimize risk, minimize time to adoption and maximize return on investment.

HP continues to deliver the industry's most impressive total-cost-of-ownership numbers in large configurations, due to its ability to virtualize external storage assets. The ability to dynamically provision storage only furthers this lead. The real story of this announcement however is that it gives IT organizations the tools to completely alter the economic model within their organizations and essentially be competitive with the likes of consumer-oriented Web services providers that are dramatically simplifying end-user storage choices. HP's challenge is to evolve this vision rapidly and apply this thinking to enterprise-class storage.

User departments will demand consumer-like services that provide simple interfaces, reasonable service levels, and transparent costs and usage metrics. IT should facilitate such services offerings, leverage emerging consumer service infrastructures and focus on aligning internal resources to areas these providers will not address. This is where the HP XP24000 Disk Array

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can be most applicable, by providing incremental enterprise services such as very fast recovery through snapshots, recovery with zero data loss, remote replication and highly specific application functionality.

Adopting technologies such as the XP24000 can deliver significant benefits but will feature multiple challenges and risks. The greatest risk will be social, namely bringing together an organization's disparate views of storage requirements and performance attributes into a common set of capabilities that can be structured as storage services to be delivered through virtualization. The metadata management technologies and operational/administrative practices adopted will be the real linchpins to success. Often, IT organizations default to the control processes and metadata dictated by a product set's management software; that's the easiest path to exploiting products. However, in the case of storage virtualization, it's also the certain path to long-term vendor lock-in. To avoid onerous long-term dependencies on one or another storage virtualization path, users must establish independent rules, roles, responsibilities and data structures that can accommodate multiple storage virtualization strategies, and not constrain themselves to "out-of-the-box," implied knowledge. In short, organizations must emphasize the transfer of knowledge about storage virtualization metadata and practices over the transfer of products, either hardware or software.

Following such basic principles can allow customers to take full advantage of the new HP XP24000 Disk Array while at the same time preserving the flexibility to apply different storage strategies where needed.

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About ITCentrix

ITCentrix, which primarily serves the needs of CIOs and technology professionals, is a division of Barometrix Software Corporation. Barometrix is a privately held software company founded in 1999 by leading business and technology professionals. The company uses software tools and analytic modeling techniques to advise clients on increasing company performance through improved resource allocation and management.

The company's products and services have been used at several hundred organizations in North America, Europe, the Asia/Pacific region and emerging countries to focus investments on returning optimal business value.

In 2007, the company launched The Wikibon Project (<http://www.wikibon.org>) a community of practitioners, consultants and analysts dedicated to improving technology adoption through the open sharing of business and advisory knowledge.

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