IBM FlashSystem 820 Running in an IBM StorwizeV7000 Environment

IBM Redbooks Solution Guide

This IBM® Redbooks® Solution Guide provides an overview of IBM FlashSystem™ 820 integrated as back-end storage with IBM Storwize® V7000.

IBM Storwize V7000 is a virtualized software-defined storage system that consolidates workloads for simplicity of management, reduced cost, highly scalable capacity, performance, and high availability. This system offers improved efficiency and flexibility with built-in flash memory and disk storage optimization, thin provisioning, and nondisruptive migration from existing storage. IBM FlashSystem delivers performance that is driven by IBM MicroLatency™ for quick response time, and is a durable, high reliability enterprise class family of flash memory systems that are easy to integrate. FlashSystem uses IBM Variable Stripe RAID™ and two-dimensional RAID technology to maintain performance, protect data integrity, and preserve usable storage capacity.

IBM Storwize V7000 FlashSystem Edition enables you to accelerate your mid-range storage solution by taking advantage of the performance and low latency of FlashSystem 820. Figure 1 shows IBM FlashSystem 820 and IBM Storwize V7000 FlashSystem Edition.

Figure 1. IBM FlashSystem 820 and IBM Storwize V7000 FlashSystem Edition

Did you know?

- Integrating FlashSystem 820 with Storwize V7000 can increase storage performance as much as 2x.
- When used together, FlashSystem 820 and Storwize 7000 can provide a green solution that decreases power consumption as much as 50%.
- IBM Storwize V7000 FlashSystem Edition delivers the lowest latency that is available on any SAN platform.

Business value

Today, customers are challenged with the lack of solutions to manage the exponential growth in the volume of structured and unstructured data, and with shrinking product cycles and a focus on top-line growth. Customers are looking for infrastructure solutions that can be deployed rapidly, managed easily, and that can run optimally without compromising reliability. In a 24x7 market, clients often strive to achieve maximum performance that is coupled with deep features and functions, and this performance must be delivered in a cost-effective manner.

I/O performance is critical for applications such as read-intensive databases, SAP, and virtual desktop infrastructures (VDIs). Although you can improve performance by using faster processors and faster systems, data must still be read from and written to storage. Traditional hard disk drive (HDD) storage cannot provide the speed that is required by many applications. Many solid-state drive (SSD) solutions add latency because software is required to manage access to flash memory. Using FlashSystem with Storwize V7000 can increase storage performance as much as 2x.

FlashSystem 820 is energy efficient. Using FlashSystem storage with Storwize 7000 can provide a green solution that decreases power use by as much as 50%. For details and ordering information for the IBM Storwize V7000 FlashSystem Edition, see *IBM US Announcement Letter - IBM FlashSystem 720 and IBM FlashSystem 820*, found at the following website:

http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-047

When you combine FlashSystem storage with Storwize V7000, you can take advantage of the following V7000 features:

- Consolidation. Capacity from existing storage systems becomes part of the IBM storage system.
- Storage virtualization: Provides effective cloud deployment.
- IBM Easy Tier®. Storage efficiency
  - IBM FlashCopy®: Point-in-time copies
  - IBM Real-time Compression™: Up to 5x more data in the same physical space
  - Thin provisioning. Allocates storage “just in time”.
- Data migration. Move data without disrupting applications.
- Business Continuity - Remote mirroring
  - Mirroring and Copy services: Data replication and protection

FlashSystem benefits

FlashSystem storage products provide the following benefits:

- **Extreme performance**: Enable business to unleash the power of performance, scale, and insight to drive services and products to market faster
- **MicroLatency**: Achieve competitive advantage through applications that enable faster decision making because of microsecond response times

- **Macro Efficiency**: Decrease costs by getting more efficient usage of IT staff, IT applications, and IT equipment because of the efficiencies flash brings to the data center
- **Enterprise reliability**: Durable and reliable designs that use enterprise class flash and patented data protection technology

Storwize V7000 benefits

Storwize V7000 provides the following benefits:

- Capacity from existing storage systems becomes part of the IBM storage system.
- A single user interface manages all storage, regardless of vendor, which significantly improves productivity.
- Virtualized storage inherits all the rich base system functions, including Real-time Compression, FlashCopy, Easy Tier, and thin provisioning.
- You can move data transparently between external storage and the IBM storage system.
- Storwize V7000 extends the life and enhances the value of existing storage assets.

Figure 2 shows the benefits of IBM Storwize V7000 FlashSystem Edition.

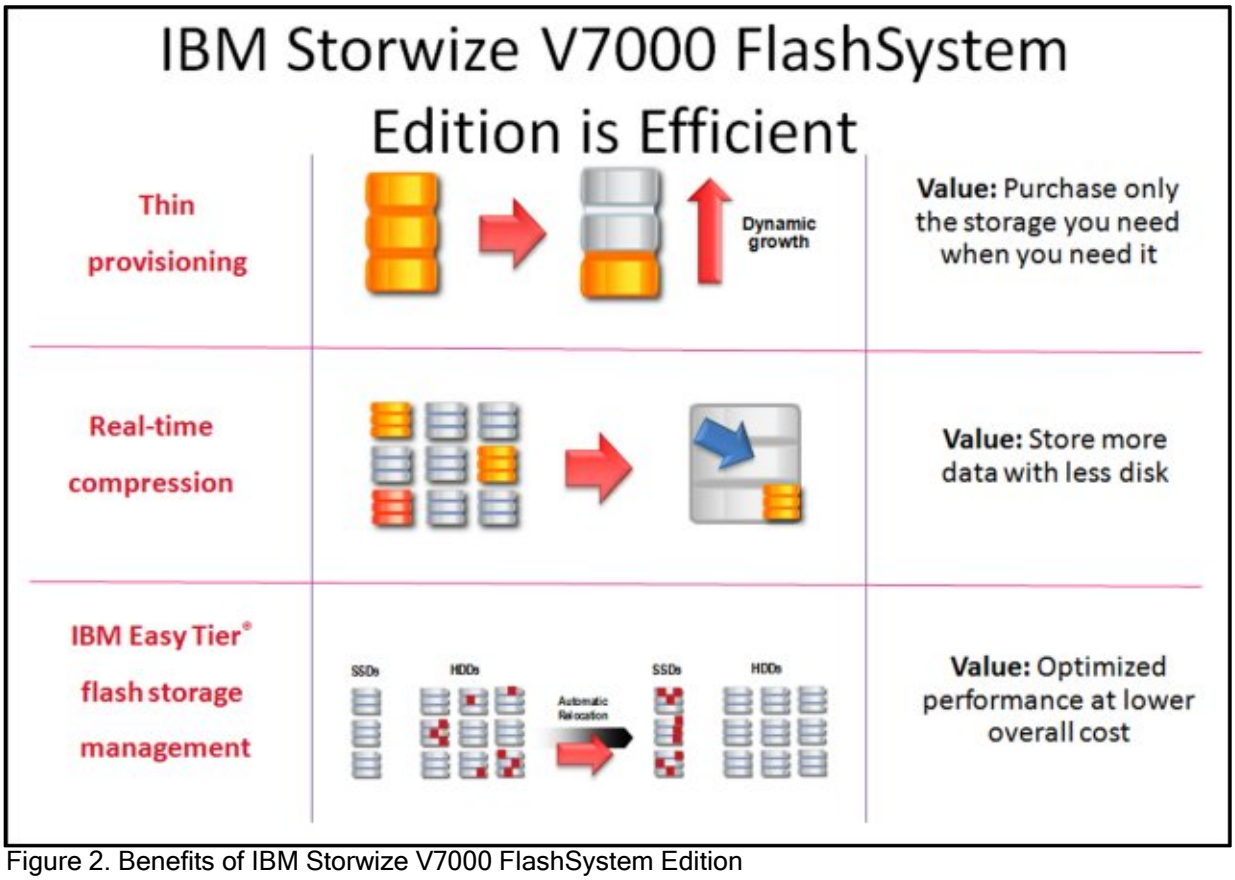

Figure 2. Benefits of IBM Storwize V7000 FlashSystem Edition

Solution overview

This solution includes one FlashSystem 820 that is virtualized by Storwize V7000, providing the performance of FlashSystem capacity with the advanced functions of the Storwize V7000.

When paired with Storwize V7000, FlashSystem inherits all the rich base system functions, including Real-time Compression, FlashCopy, Easy Tier, and thin provisioning.

Solution architecture

IBM FlashSystem 820 supports Fibre Channel connections to Storwize V7000. You can attach FlashSystem 820 to the rack Fibre Channel switch and gain the benefits of the V7000 functions by having FlashSystem as Tier 0 storage and using the hard disk drive (HDD) disks that are contained in the V7000 enclosures to provide a tiered solution.

This solution architecture provides nondisruptive capacity scaling in two dimensions. Additional FlashSystem 820 systems can be added to the solution as Tier 0 capacity to maintain high IOPS performance. Additional Storwize V7000 expansion enclosures and HDD capacity can also be added to the Storwize V7000 enclosures to add capacity that Easy Tier uses to intelligently move hot (frequently accessed) data to FlashSystem capacity, and cooling (less frequently accessed) data to the HDD media automatically.

Usage scenarios

There are many usage scenarios where IBM Storwize V7000 FlashSystem Edition is useful. Here are a few such scenarios.

Accelerating databases

Most database applications are highly read-intensive. As such, additional processing power alone does little or nothing to improve performance. By placing all read data on low latency flash memory, reads are performed much faster, boosting database performance over conventional disk systems with no tuning or changes to the code or system architecture.

IBM Storwize V7000 FlashSystem Edition has the following capabilities:

- Decreases I/O wait time in enterprise workloads
- Delivers the lowest latency available on any SAN platform
- Accelerates commonly I/O-bound workloads, including transactional, batch, and complex analytics

SAP acceleration

Many SAP databases consume less than 2 TB of storage. SAP is pushing clients to accelerate performance by adopting the High Performance Analytic Appliance (HANA) in-memory database architecture. This adoption often leads to a significant rearchitecture of the entire SAP infrastructure, which can lead to high costs and a risk of disruption in service delivery.

IBM Storwize V7000 FlashSystem Edition offers the following capabilities:

- Eliminates I/O bottlenecks in enterprise SAP workloads
- Provides the lowest latency of any SAN-based storage solution for time-sensitive workloads with IBM MicroLatency

- Enables a small, cost-effective pool of flash memory to deliver performance improvements
- Supports a phased approach to HANA adoption by delivering consistently higher performance for SAP NetWeaver Business Warehouse workloads with no rearchitecture required.

Accelerating virtual servers and VDI

Virtual servers and virtual desktop infrastructure push conventional storage systems to their performance limits. The result is poor application response times and a bad customer experience. Virtualizing your environment with IBM Storwize V7000 FlashSystem Edition results in drastically faster response times for the most common virtualized applications. Couple this performance to the "log on" or "boot" storm and make system usage productive again.

IBM Storwize V7000 FlashSystem can offer the following capabilities:

- Virtualizes databases without performance loss
- Eliminates I/O density and hot-spot issues that are common to highly virtualized environments
- Controls and mitigates ‘log on’ or ‘boot’ storm performance issues
- Delivers storage consolidation without sacrificing performance

Integration

IBM FlashSystem 820 integrates with Storwize V7000 as tiered storage.

Storwize V7000 provides the following features:

- Provides SAN-attached 8 Gbps Fibre Channel (FC) host connectivity and 10 Gigabit Ethernet (GbE) and Gigabit iSCSI host connectivity
- Accommodates up to twenty-four 2.5-inch disk drives or twelve 3.5-inch disk drives that are installed within the IBM Storwize V7000 Control Enclosure, with attachment support for up to nine IBM Storwize V7000 Expansion Enclosures, providing modular and highly scalable storage solutions that range up to 240 TB physical storage capacity, and 480 TB physical storage capacity in a clustered system
- Supports intermixing of SAS drives, Nearline SAS drives, and solid-state drives within IBM Storwize V7000 Control Enclosures and IBM Storwize V7000 Expansion Enclosures
- Includes IBM Easy Tier technology for automatically moving heavily used data extents onto high-performance SSD storage
- Supports attachment of other storage devices through the Fibre Channel interface, just like the SAN Volume Controller.
- Supports a complete set of SAN Volume Controller functions, including FlashCopy, RemoteCopy, Volume Mirroring, and thin provisioning

Supported platforms

For the latest information about supported systems and platforms, see the IBM System Storage® Interoperation Center (SSIC) at the following website:

http://www.ibm.com/systems/support/storage/ssic/interoperability.wss

Ordering information

IBM Storwize V7000 External Virtualization Software, 5639-EV7 or later, must be ordered when this bundle indicator is selected. Ordering information is shown in Table 1.

Table 1. Ordering part numbers and feature codes

Item	Product number	Feature code	Description
Storwize V7000 Disk System 10 GbE Control Enclosure	2076-112, 2076-124, 2076-312, or 2076-324		The IBM 2076 Storwize V7000 Disk System 10 GbE Control Enclosure Model 312 is for 3.5-inch drives. Model abstract 2076-324 The IBM 2076 Storwize V7000 Disk System 10 GbE Control Enclosure Model 324 is for 2.5-inch drives.
IBM Storwize V7000 FlashSystem Edition Indicator	2076-112, 2076-124, 2076-312, or 2076-324	AF0U	This feature is used to indicate an order that is included as part of a solution that includes one FlashSystem 820 virtualized by Storwize V7000, providing the performance of FlashSystem capacity with the advanced functions of the Storwize V7000. It is for administrative purposes only. The maximum order quantity for this feature is one, and this feature is for initial plant order only. The IBM Storwize V7000 External Virtualization Software, 5639-VC7 or later, must be ordered when this bundle indicator is selected.
IBM Storwize V7000 External Virtualization Software*#	5639-EV7 or later	N/A	IBM Storwize Family Software for the Storwize V7000 disk system helps address midrange or departmental storage requirements. Each IBM Storwize V7000 disk system operates using IBM Storwize Family Software for Storwize V7000 software V7.1 and later.

* There is no minimum disk requirement in the Storwize V7000 with this solution, which allows an empty Storwize V7000 to provide maximum growth for spinning media in the future.
# Either 10 or 20 TB (RAID 5 protected usable) capacity points are available in the IBM Storwize V7000 External Virtualization Software Edition 5639-EV7 or later.

Related information

For more information, see the following resources:

- Family 2076+02 IBM Storwize V7000 Disk System
  http://ibm.co/1cn7Tm1
- IBM FlashSystem family product page
  http://www.ibm.com/storage/flash
- IBM Redbooks Solution Guides for IBM FlashSystem family
  http://ibm.co/1i9jM2j
- *Flash or SSD: Why and When to Use IBM FlashSystem*, REDP-5020
  http://www.redbooks.ibm.com/redbooks.nsf/searchsite?SearchView&query=flashss
- IBM Storwize V7000 and Storwize V7000 Unified Disk Systems product family page
  http://www.ibm.com/systems/storage/disk/storwize_v7000/
- IBM System Storage Interoperation Center (SSIC)
  http://www.ibm.com/systems/support/storage/ssic/interoperability.wss
- IBM Support Portal
  http://ibm.com/support/entry/portal/
- IBM US Announcement Letter - IBM FlashSystem 720 and IBM FlashSystem 820
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-047
- IBM Offering Information page (announcement letters and sales manuals):
  http://www.ibm.com/common/ssi/index.wss?request_locale=en

  On this page, enter FlashSystem, select the information type, and then click **Search**. On the next page, narrow your search results by geography and language.

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