



# IBM i Storage Strategy Planning for 2011 and Beyond

The A-Z's of Storage on Power Systems IBM i

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COMMON Luxembourg, March 24<sup>th</sup> 2011



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## Agenda

- **Part 1 – Storage Strategy General Overview**
- **Part 2 – Storage de-mystification**
  - Understanding Disk Performance
  - The value of virtualized storage for IBM i
  - Minimize batch runtime, disk footprint, energy consumption with SSD technology
  - Advanced Disk Performance Analysis for IBM i

# IBM i Storage Strategy Planning

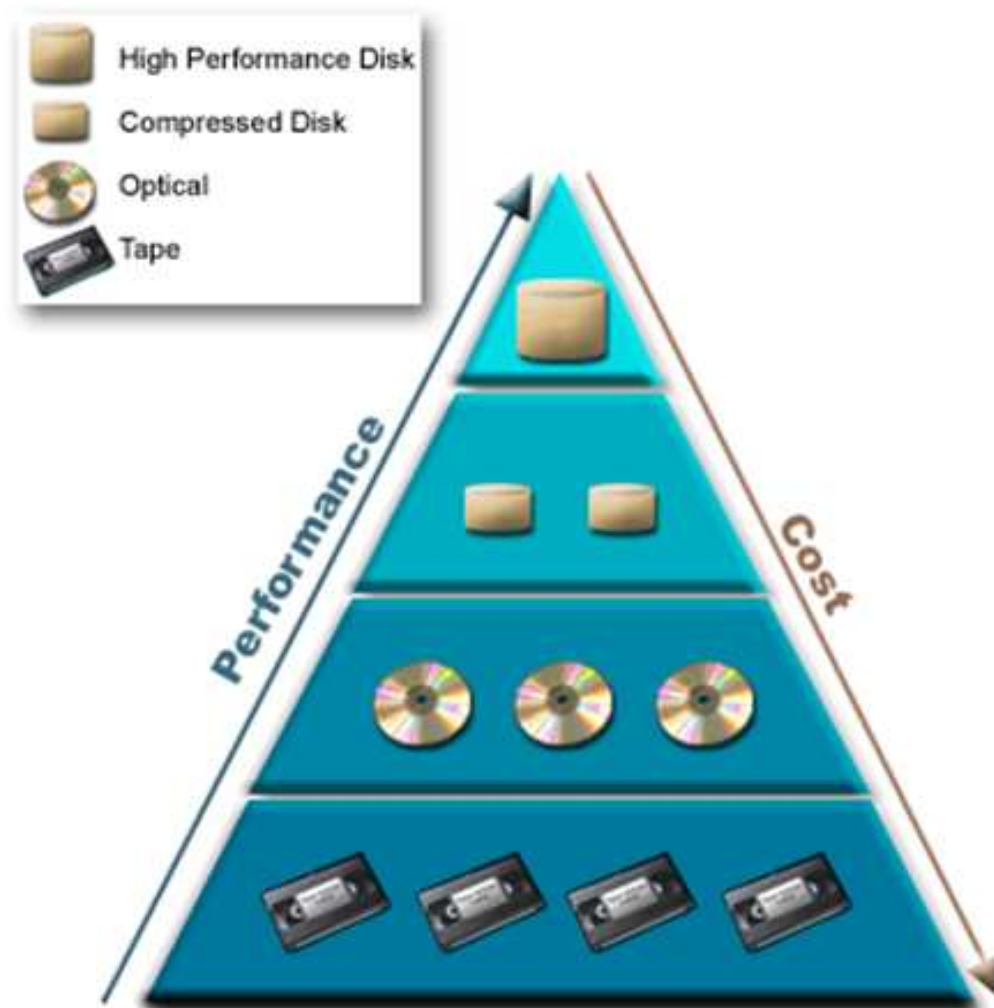
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## Then and Now

## Terminology

- CEC – Central Electronics Complex.
  - Refers to the processor enclosures for POWER5/5+, POWER6/6+, and POWER7 systems.
  - 520, 550, and 750 systems have a single enclosure
  - 560, 570, 770, and 780 systems have 1 or more enclosures.
- HDD – Hard Disk Drive
- IOP – I/O processor
- IOA – I/O Adapter
- NPIV – N\_Port ID Virtualization, a.k.a. virtual fiber channel
- SAN – Storage Area Network
- SAS – Serial Attached SCSI
- SCSI – Small Computer System Interface
- SSD – Solid State Drive
- VIOS – Virtual I/O Server
- SFF – Small Form Factor – 2.5” HDDs or SSDs
- SmartIOA – (IOP-less) an IOA which doesn't require an IOP, reducing card slot usage and cost
- PCI-x – PCI eXtended – enhanced PCI card and slot
- PCIe – PCI Express – latest and fastest enhanced PCI card and slot
- HSL – High Speed Link – POWER4 thru POWER6 I/O bus interconnect
- RIO – Remote I/O – same as HSL, but called RIO when used on System p
- 12X – IBM's implementation of InfiniBand bus interconnect for Power servers
- LIC – Licensed Internal Code, part of IBM i operating environment
- Native – direct attach storage where the the IBM i partition owns the adapters and management

## IBM i Storage Strategy: Then

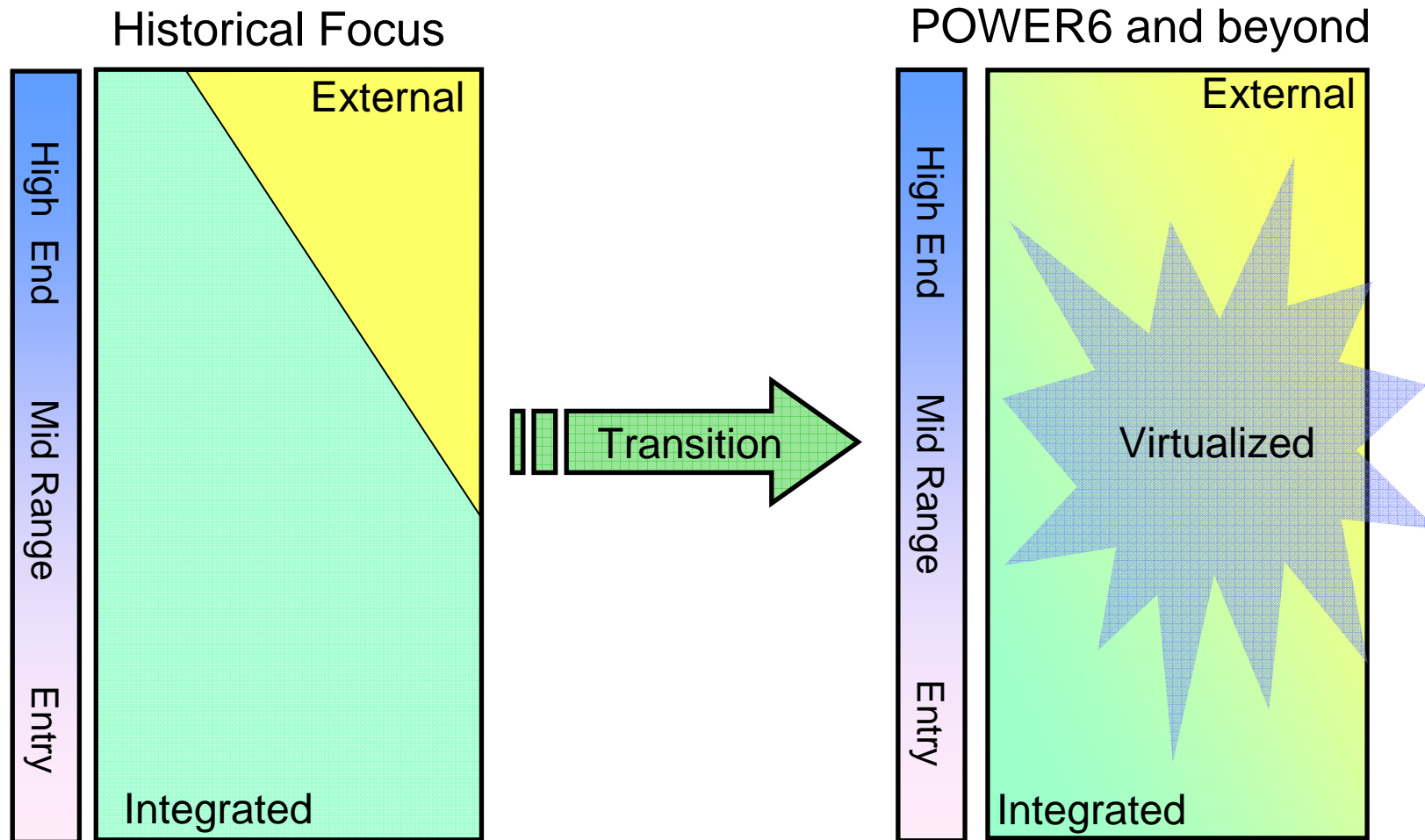


Circa 1995

\* Internal IBM i compressed disk options were phased out several generations ago

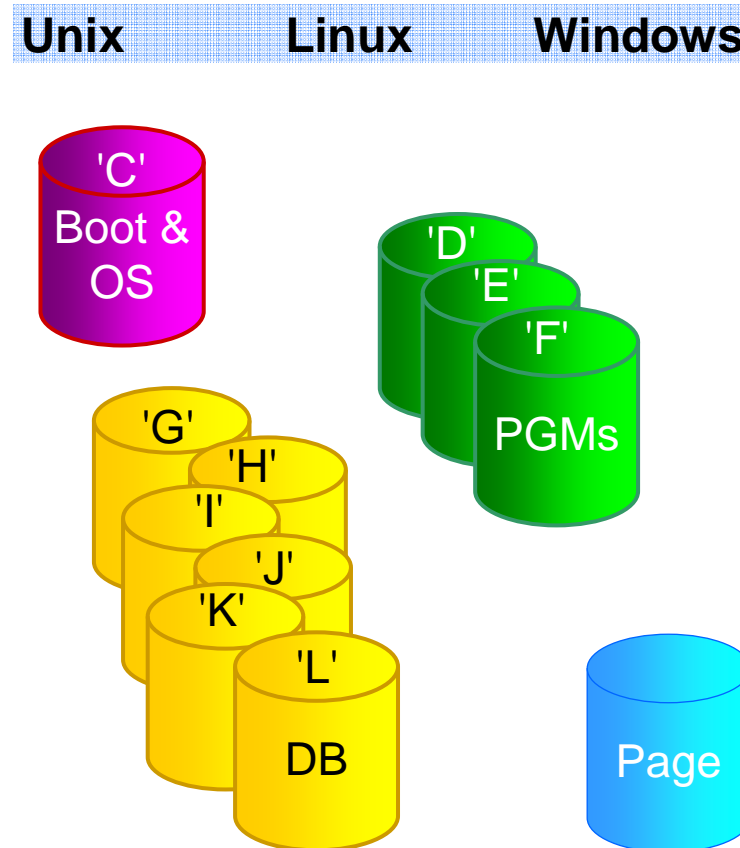
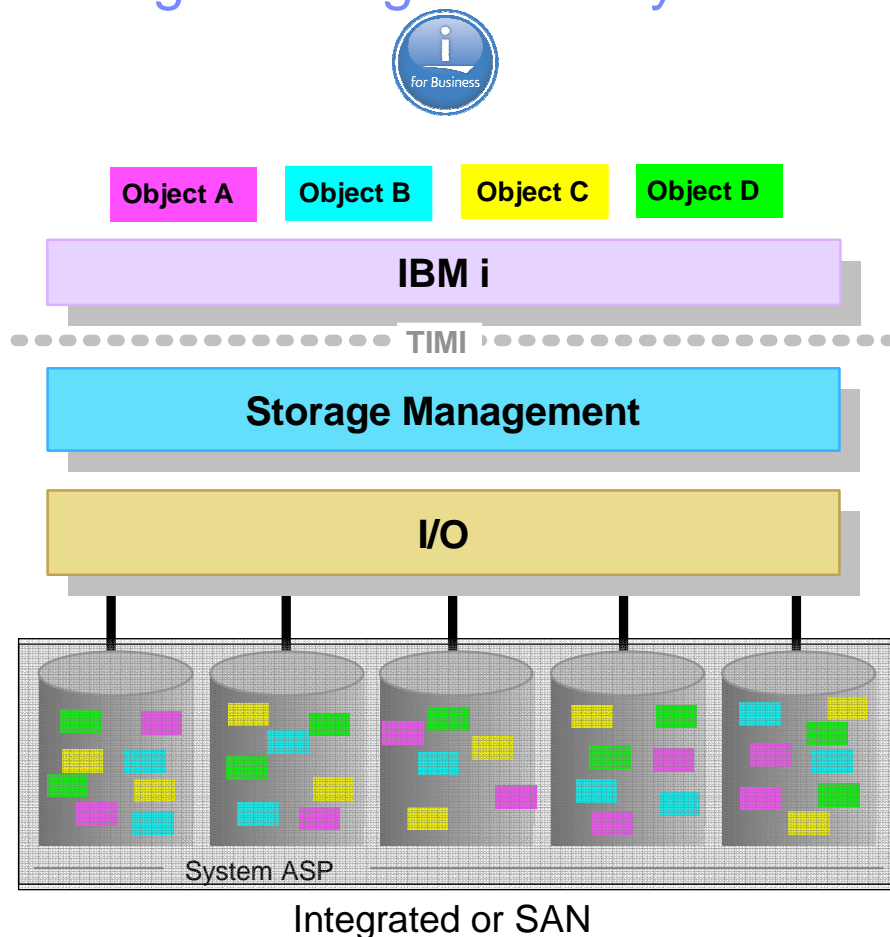
## IBM Power Systems Storage for POWER: Now

*Long term investment for internal, external and virtualized storage for IBM i, AIX, Linux*



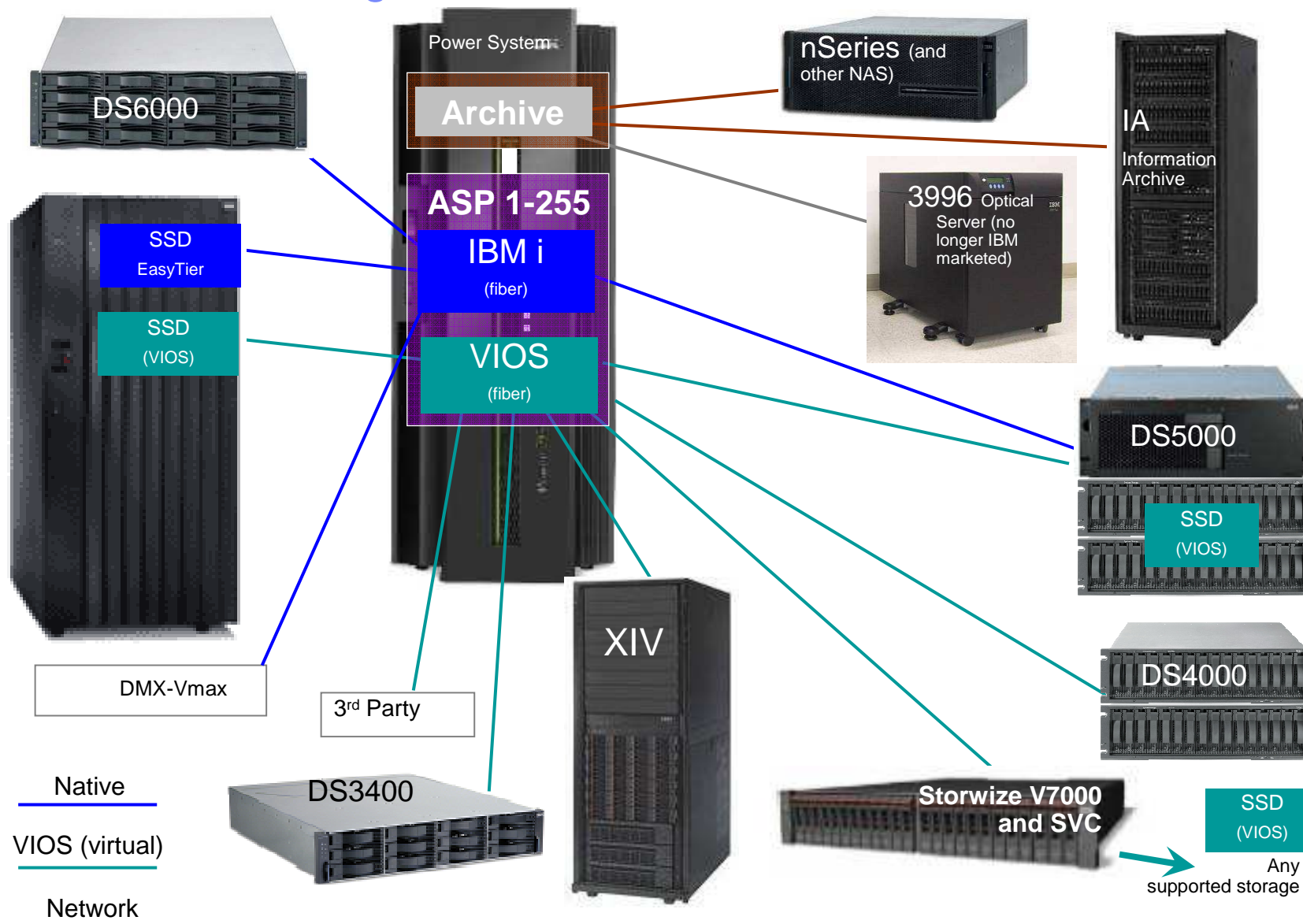
*SAN, Virtual, and Integrated can combine HDDs and SSDs.*

# Storage Management Styles – IBM i Compared To ...



Your IBM i solution is probably already delivering an enterprise class performance solution. Your future storage design should take this into account: for tier-1 storage, design for I/Os not capacity.

# External Disk Storage Servers for IBM i





## Fiber Adapters (HBAs) for IBM i External Storage Strategy

Systems	POWER5/5+	POWER6/6+	POWER7
PCIe dual port 8Gb (IOP-less) – Only adapter which supports NPIV  <b>6.1 – 7.1</b> <i>Best price/performance</i>	Not available		
PCIe single or dual port 4Gb (IOP-less)  <b>6.1 – 7.1</b> <i>Best price/performance</i>	Not available		
PCI-x single or dual port 4Gb (IOP-less)  <b>6.1 – 7.1</b> <i>Best price/performance</i>	 No IBM i load source support on POWER5/5+		
IOP based fiber adapters – Requires HSL loop technology – PCIx only  <b>5.4 and up</b>			 IOPs      5.4

IBM i 6.1 and 7.1 is key to enabling best external storage performance, reduced cost, better utilization of faster POWER processors and memory, and enablement of virtualized external storage

(Note) IOP-less single port fiber adapters are not supported for native attach IBM i, however, they can be used with VIOS to support IBM i

## Power System Internal Disks

- **Integrated with IBM i**
  - Native attach
  - Virtualized:
    - Virtual I/O Server (VIOS)
    - IBM i Hosting i

<b>SFF HDD</b>	Current IBM i Options		<ul style="list-style-type: none"> <li>▪ ½ the energy of 3.5-inch disk drives, reduced space</li> </ul>
15k	139 GB	#1888	
10k	283 GB	#1911	

<b>3.5 HDD</b>	Current IBM i Options		<ul style="list-style-type: none"> <li>• Traditional 3.5-inch disk drives</li> </ul>
15k	139 GB	#1888	
15k	283 GB	#3678	
15k	428 GB	#3658	



### SSD

- Typically around 200 microseconds vs. >2 milliseconds for HDDs
- 520, 550, 560, 570, 575, 595
- 710/720/730/740/750/770/780
- IBM i 5.4, 6.1, 7.1

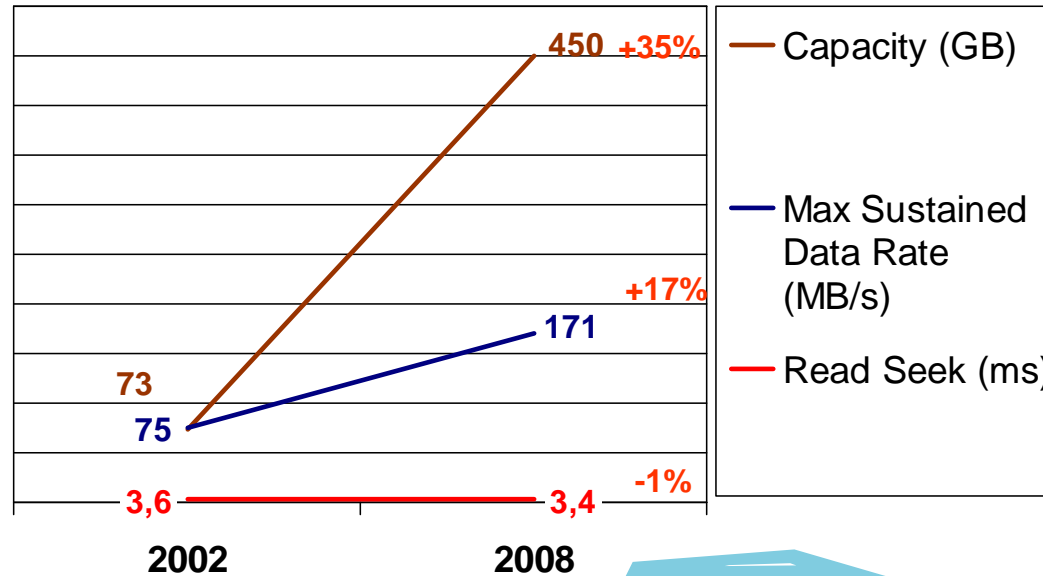


### PCIe-Based SSD

- 4 SSD bays on card: 1, 2 or 4 SSD modules per adapter
- 177 GB per SSD module / Up to 708 GB per card
- IBM i 7.1 and 710/720/730/740/750/770/780

# Why SSDs?

Seagate 15k RPM/3.5" Drive Specifications

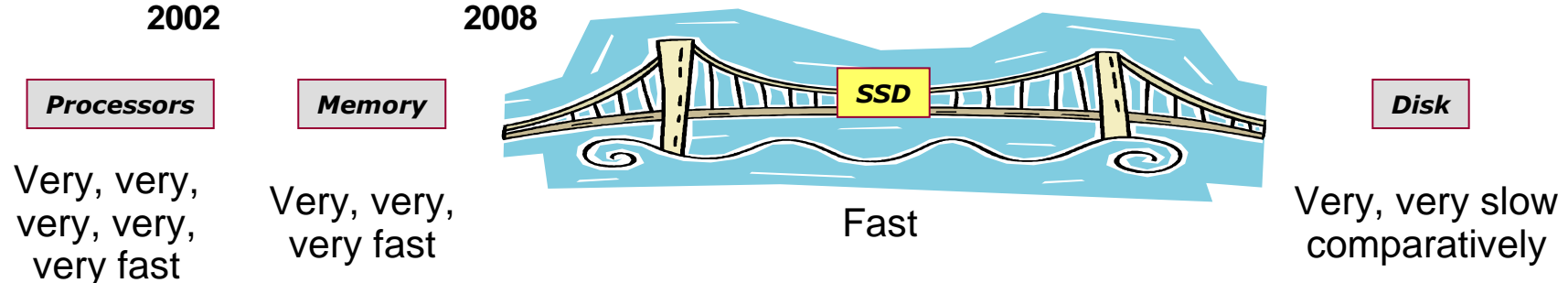


## ▪ HDDs

- Continue to provide value on a \$ per GB metric .... but are getting worse on an I/O per GB metric

## ▪ HDD Sweet Spot:

- No strong performance need
- Measuring performance in sustained GB/s



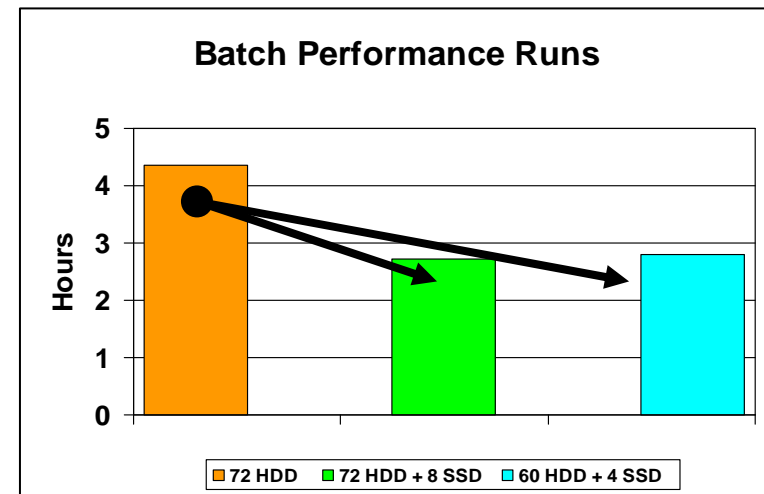
≤ 10's ns	~100 ns	~200,000 ns	1,000,000 - 8,000,000 ns
Access Speed			

## SSD - Batch Window Reduction Example

- Associated Bank needed to reduce month end batch run time from 4+ hours to under 3 hours
- SSDs cut 1.5 hours from batch run time
  - Plus a 16% reduction in # of disk drives

**40% Reduction**

	# of SAS 15K HDD	# of SSDs	Batch Run Time
Base run	72	0	4:22
SSD run 1	72	8	2:43
SSD run 2	60	4	2:48



- Placed eight DB2 Objects (table, index, view) on SSD
- SDD tools and software:
  - IBM i SSD Data Balancer -
  - IBM i DB2 and SSD integration for IBM i
  - DS8000 EasyTier

Source: IBM Power Systems Performance and Benchmark Center 5-23-09

[http://www-01.ibm.com/software/success/cssdb.nsf/CS/DLAS-7X9R7Y?OpenDocument&Site=powersystems&cty=en\\_us](http://www-01.ibm.com/software/success/cssdb.nsf/CS/DLAS-7X9R7Y?OpenDocument&Site=powersystems&cty=en_us)

## ASP Storage Design Strategies

Disk protection choice	Level of protection	Relative performance <sup>1</sup>	What is protected
RAID-5 with protected write cache	<b>Basic</b>	<b>Standard</b>	Single disk unit failure within a parity set.
RAID-6 with protected write cache	<b>Basic +</b>	<b>Slight degradation</b>	Multiple disk unit failures within a parity set. Protection from IOA write cache failure.
RAID-x with protected write cache and hot spare	<b>Better</b>	<b>No effect</b>	Same protection as RAID choice, plus reduced risk of write cache data loss. Plus reduced window of multiple drive failure risk. Outage occurs with disk IOA failure.
RAID-x with dual controllers	<b>Basic + (R5) or Better + (R6)</b>	<b>Standard to improved when active-active is utilized</b>	Potentially multiple hardware components including loop, tower, IOA, and disk are protected.
External (SAN) attached storage with multipath fiber	<b>Better to Best</b>	<b>Standard to improved</b>	Redundancy within storage subsystem minimizes outage and data loss due to multiple component failure in subsystem. Multipath minimizes outage due to IOA or path failure.
IBM i disk mirroring or external RAID-10	<b>Best</b>	<b>Improved</b>	Potentially multiple hardware components including loop, tower, IOA, and disk with no outage required during component failure.

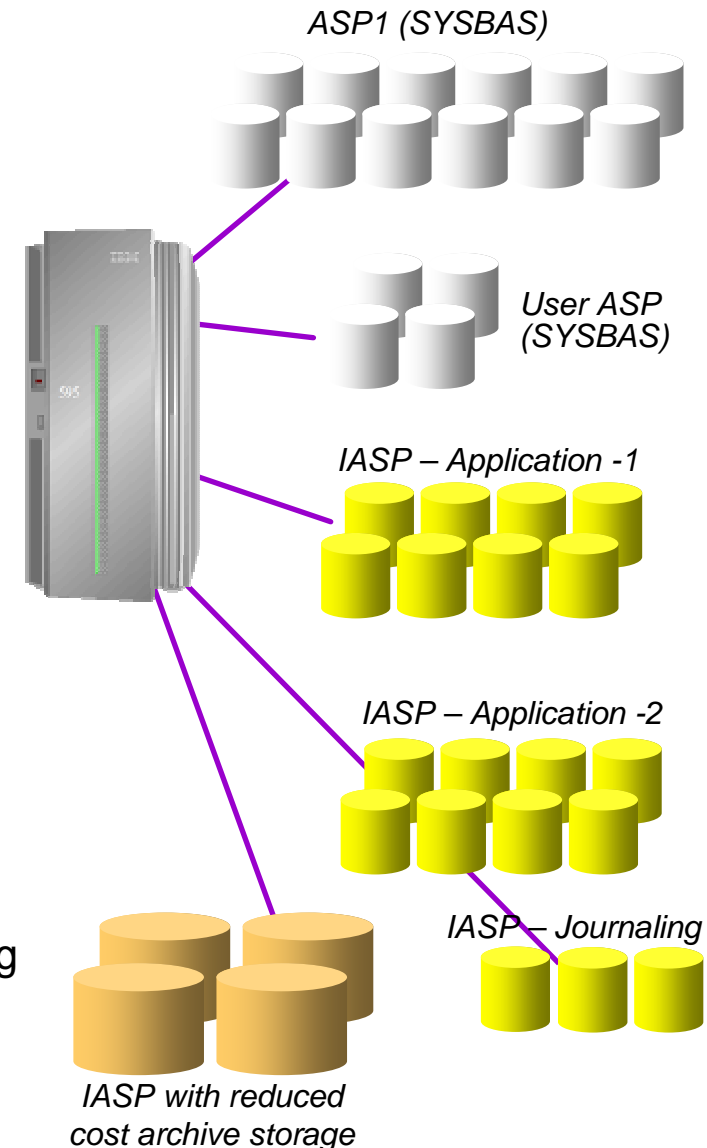
## IASPs: Foundation for Flexibility, Scalability and HA/DR

### Independent ASPs (IASPs) offer:

- Uptime
  - Shorter IPLs – leave non-critical IASPs on-line
  - Reclaim Storage (RCLSTG) by IASP
- Security
  - Data and path encryption by ASP
- Archive
  - Storage performance and cost by IASP
- Consolidation
  - Meet compliance needs for isolation
  - SaaS (Software as a Service)
  - Reduce software licensing fees (single OS)
  - Reduce number of OS upgrades
- Any storage which support ASPs

### Foundation for all PowerHA solutions

- Switched IASPs
- PowerHA external storage LUN Level Switching
- IBM i Power HA Geographic Mirror
- Power HA external storage copy services





# IBM i Native Attach Storage and Resiliency

*Storage is a key part of your HA/DR solution decision*

	Internal SAS/SSD (1)	DS5000	DS6000	DS8000	EMC (2)
	POWER5/6/7	POWER6/7	POWER5/6/7	POWER5/6/7	POWER5/6/7
<b>PowerHA SystemMirror 6.1 or 7.1</b>					
FlashCopy	No	No	Yes	Yes	No (Timefinder)
Metro Mirror	No	No	Yes	Yes	No (SRDF)
Global Mirror	No	No	Yes	Yes	No (SRDF)
Switched IASP	Yes	Yes	Yes	Yes	No
LUN Level Switching	No	No	Yes (7.1)	Yes (7.1)	No
Geographic Mirroring	Yes	Yes	Yes	Yes	Yes
<b>PowerHA SystemMirror 6.1 or 7.1 plus Advanced Copy Services (ACS)</b>					
FlashCopy	No	Yes	Yes	Yes	No (Timefinder)
Metro Mirror	No	Yes	Yes	Yes	No (SRDF)
Global Mirror	No	Yes	Yes	Yes	No (SRDF)
LUN Level Switching	No	Yes	Yes (6.1)	Yes (6.1)	No
Metro/Global Mirror	No	No	Yes	Yes	No
<b>External Storage Full System Copy (crash consistent copy and cloning)</b>					
FlashCopy	No	Yes	Yes	Yes	Yes (Timefinder)
Global Mirror	No	Yes	Yes	Yes	Yes (SRDF)
Metro Mirror	No	Yes	Yes	Yes	Yes (SRDF)
<b>Logical Replication Add-on Software</b>					
iCluster and others	Yes	Yes	Yes	Yes	Yes

(1) SSD requires POWER6 or POWER7. (2) DMX, VMAX



# IBM i PowerVM VIOS Storage and Resiliency

	DS3000	DS4000	DS5000	DS6000	DS8000	XIV	SVC / Storwize
	BladeCenter	POWER6/7 BladeCenter	POWER6/7 BladeCenter	POWER6/7 BladeCenter	POWER6/7 BladeCenter	POWER6/7 BladeCenter	POWER6/7 BladeCenter
 PowerHA SystemMirror 6.1 or 7.1							
FlashCopy	No	No	No	No	Yes*	No	No
Metro Mirror	No	No	No	No	Yes*	No	No
Global Mirror	No	No	No	No	Yes*	No	No
Switched IASP	No	No	No	No	No	No	No
LUN Level Switch	No	No	No	No	Yes*	No	No
Geo'mirroring	Yes	Yes	Yes	Yes	Yes	Yes	Yes
 PowerHA SystemMirror 6.1 or 7.1 <i>plus</i> Advanced Copy Services (ACS)							
FlashCopy	No	No	No	No	Yes*	No	No
Metro Mirror	No	No	No	No	Yes*	No	No
Global Mirror	No	No	No	No	Yes*	No	No
LUN Level Switch	No	No	No	No	Yes*	No	No
External Storage Full System Copy ( <i>crash consistent copy and cloning</i> ) **							
FlashCopy	No	Yes	Yes	Yes	Yes	Yes	Yes
Metro Mirror	No	Yes	Yes	Yes	Yes	Yes	Yes
Global Mirror	No	Yes	Yes	Yes	Yes	Yes	Yes
Logical Replication Add-on Software							
iCluster, et al	Yes	Yes	Yes	Yes	Yes	Yes	Yes

\* Requires NPIV capable fiber channel adapter



## DS8700 with Easy Tier

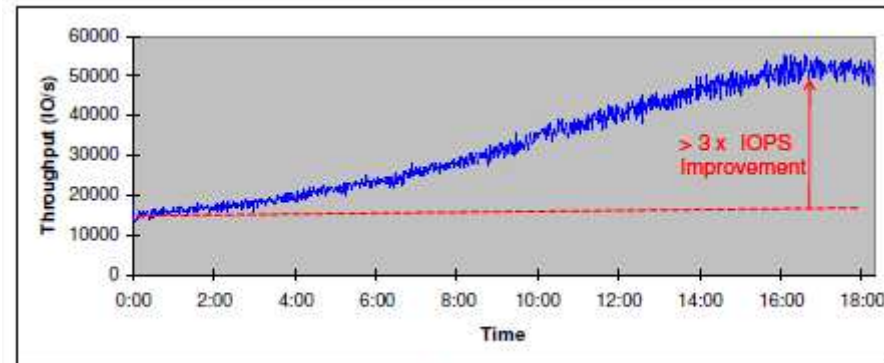


Figure 6: SPC-1 Throughput Improvement due to Easy Tier.

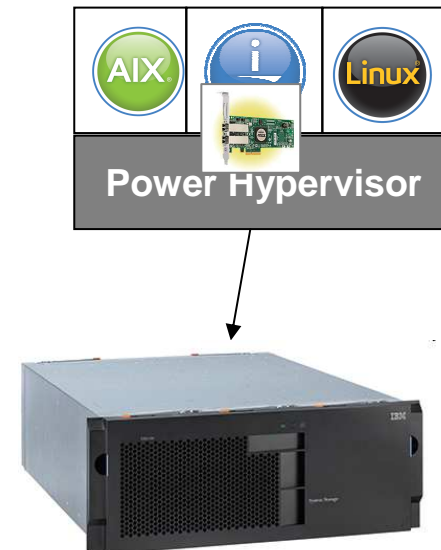
Key advantages of Easy Tier:

- **Designed to be Easy!** The user is not required to make a lot of decisions or go through an extensive implementation process to start utilizing Easy Tier.
- **Efficient Use of SSD Capacity.** Easy Tier moves 1 gigabyte data extents between storage tiers. This enables very efficient utilization of SSD resources. Other systems may operate on a full logical volume level.
- **Intelligence.** Easy Tier learns about the workload over a period of time as it makes decisions about which data extents to move to SSDs. As workload patterns change, Easy Tier finds any new highly active (“hot”) extents and exchanges them with extents residing on SSDs that may have become less active (“cooled off”).
- **Negligible Performance Impact.** Easy Tier moves data gradually to avoid contention with I/O activity associated with production workloads. It will not move extents unless a measurable latency benefit would be realized by the move.

## IBM i Direct Support for DS5000 overview

■ ***IBM i supports direct attachment to DS5100 and DS5300 storage to enable simpler SAN planning and leverage midrange open storage***

- DS5100 and DS5300 benefits Multiple RAID levels, including RAID 6
  - Custom XOR processor for RAID calculations
  - Consolidated storage for IBM i, Unix, Linux, Windows applications
  - Can use FC or SATA drives (FC recommended)
- DS5100 and DS5300 currently supported
  - New support **does not require PowerVM Virtual I/O Server (VIOS)**
  - PowerVM may be required for Active Memory Sharing
- **IBM i LPAR owns Fibre Channel adapter(s). Two adapters required for redundancy**
- **New IBM i host kit required on DS5100 and DS5300 Feature code #7735**
- IBM i supports Multi-path I/O with direct attachment to DS5100 and DS5300
  - No additional software required on DS5100 and DS5300
  - Round-robin algorithm used with Multi-path I/O in IBM i



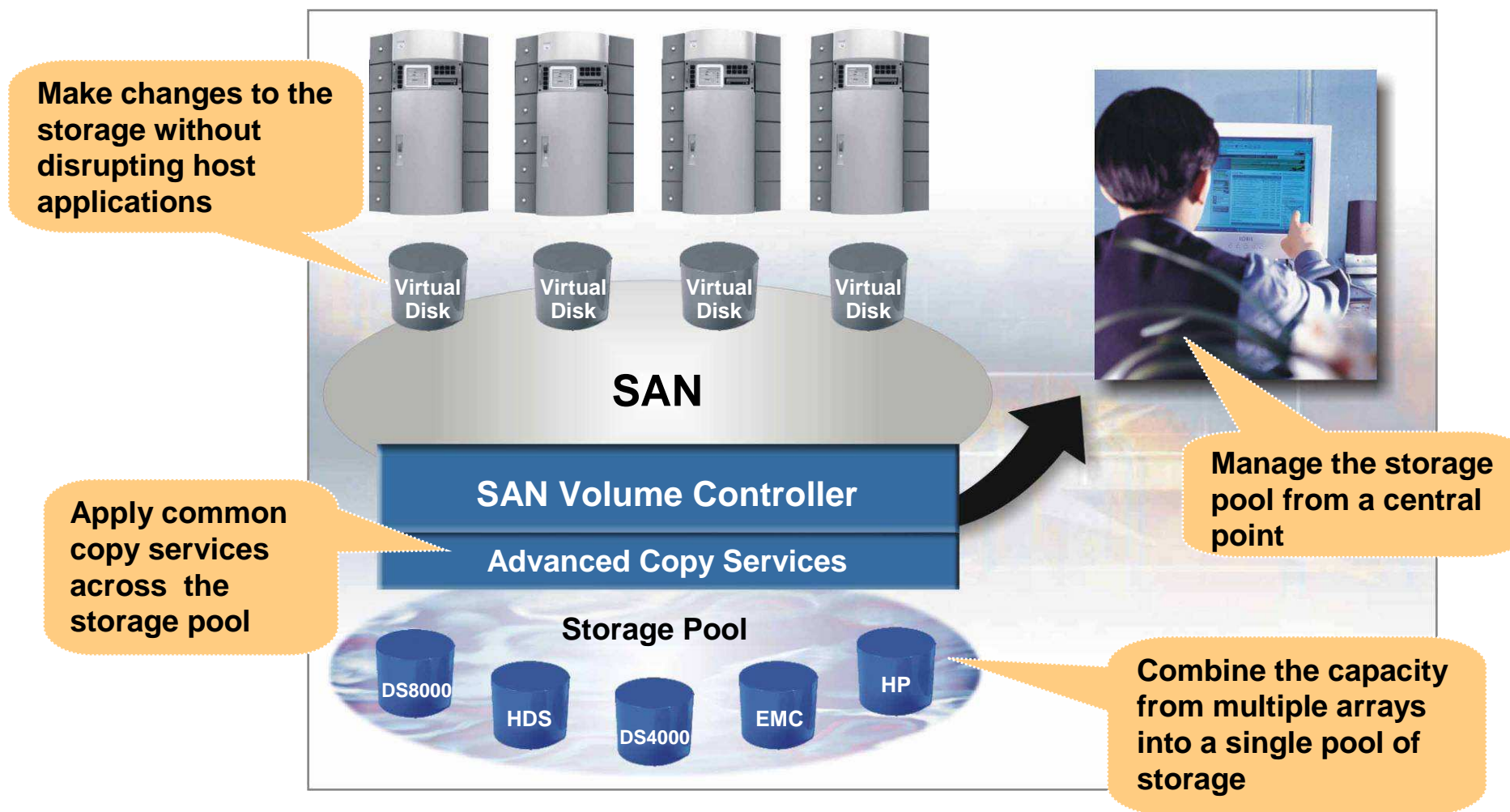
## DS5xxx Requirements for IBM i

- Hardware requirements:
  - DS5100 or DS5300
  - Power servers (Power blades not supported for direct attachment)
  - POWER6 hardware
  - POWER5(+) hardware not supported
  - Smart I/O adapter (IOPlless adapter)
    - #5735 (8Gb dual-port PCI-E)
    - #5774 (4Gb dual-port PCI-E)
    - #5749 (4Gb dual-port PCI-X)
- Software requirements:
  - IBM i 6.1 with IBM 6.1.1 LIC refresh
  - IBM i 5.4.5 or earlier not supported
  - 7.60.26.00 or later DS5100 or DS5300 controller firmware
  - NVSRAM version N1818D5xR1060V08 (x can be 1 or 3 for DS5100 or DS5300)

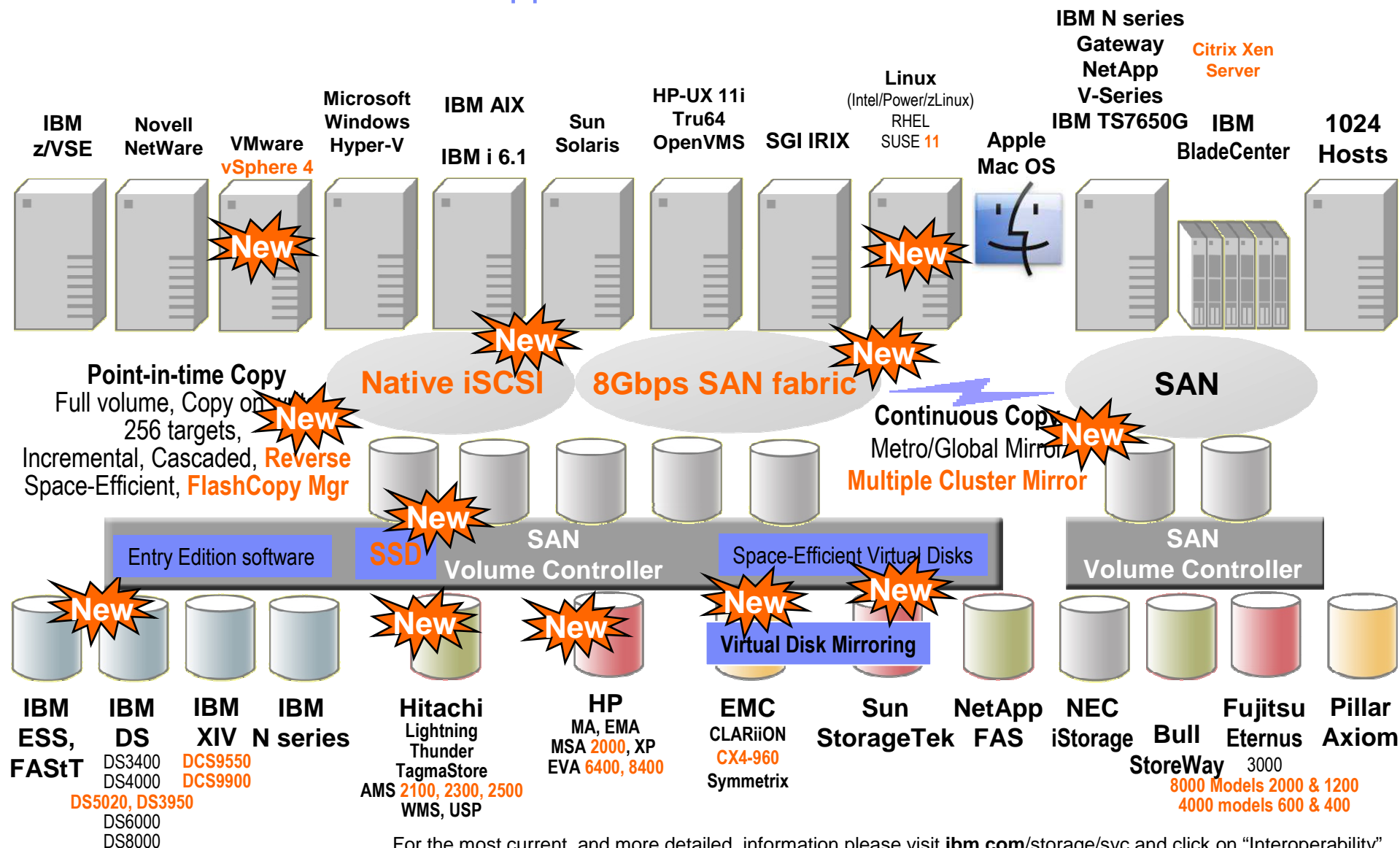
## DS5xxx Best Practices and Limitations for IBM i

- Maximum LUN size for IBM i is < 2TB (volume size >= 2TB will not work)
- Mixing FC and SATA drives within enclosure is supported
- FC drives recommended for production workloads
- Maximum 64 LUNs per FC port (same as DS8000 direct attach)
- SSDs not supported at this time
- Drive encryption in DS5100/DS5300 is supported
- Boot from SAN requires active connection, IBM i will not IPL from passive connection
- Maximum of 300 LUNs from a single DS5100/DS5300 per ASP add
  - Adding more LUNs to same ASP requires multiple ASP adds
- All LUNs must be protected (RAID0 arrays for LUNs not supported)
- Dynamic volume expansion on DS5100 and DS5300 is not supported
- IBM i system-level disk mirroring not supported
  - Disk protection configured on DS5100 or DS5300
  - Drives report in IBM i as protected (same as DS8000 protected LUNs)

# Flexible Storage Infrastructure with SAN Volume Controller



## SAN Volume Controller Supported Environments



For the most current, and more detailed, information please visit [ibm.com/storage/svc](http://ibm.com/storage/svc) and click on "Interoperability".

## IBM XIV Balances Disk Usage

- Each volume is spread across all drives
- Data is “cut” into 1MB “partitions” and stored on the disks
- XIV algorithm pseudo-randomly distributes data in the system

XIV disks behave like connected vessels, as the distribution algorithm aims for constant disk equilibrium.

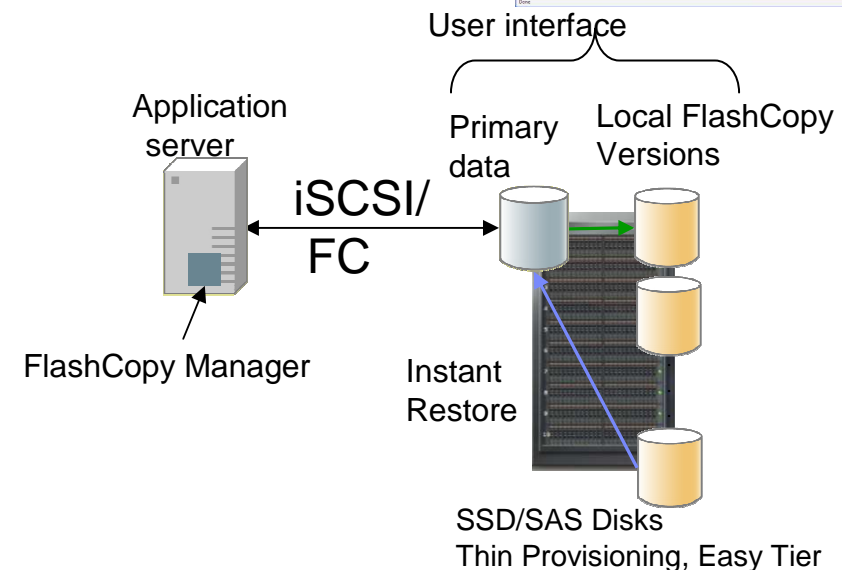
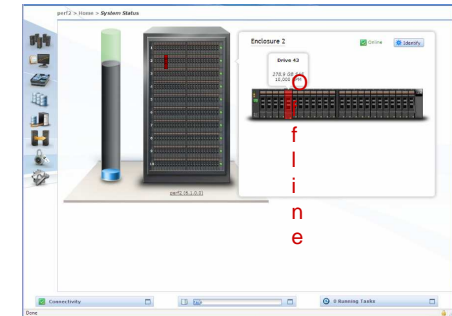
Thus, XIV's overall disk usage could approach 100% in all scenarios.





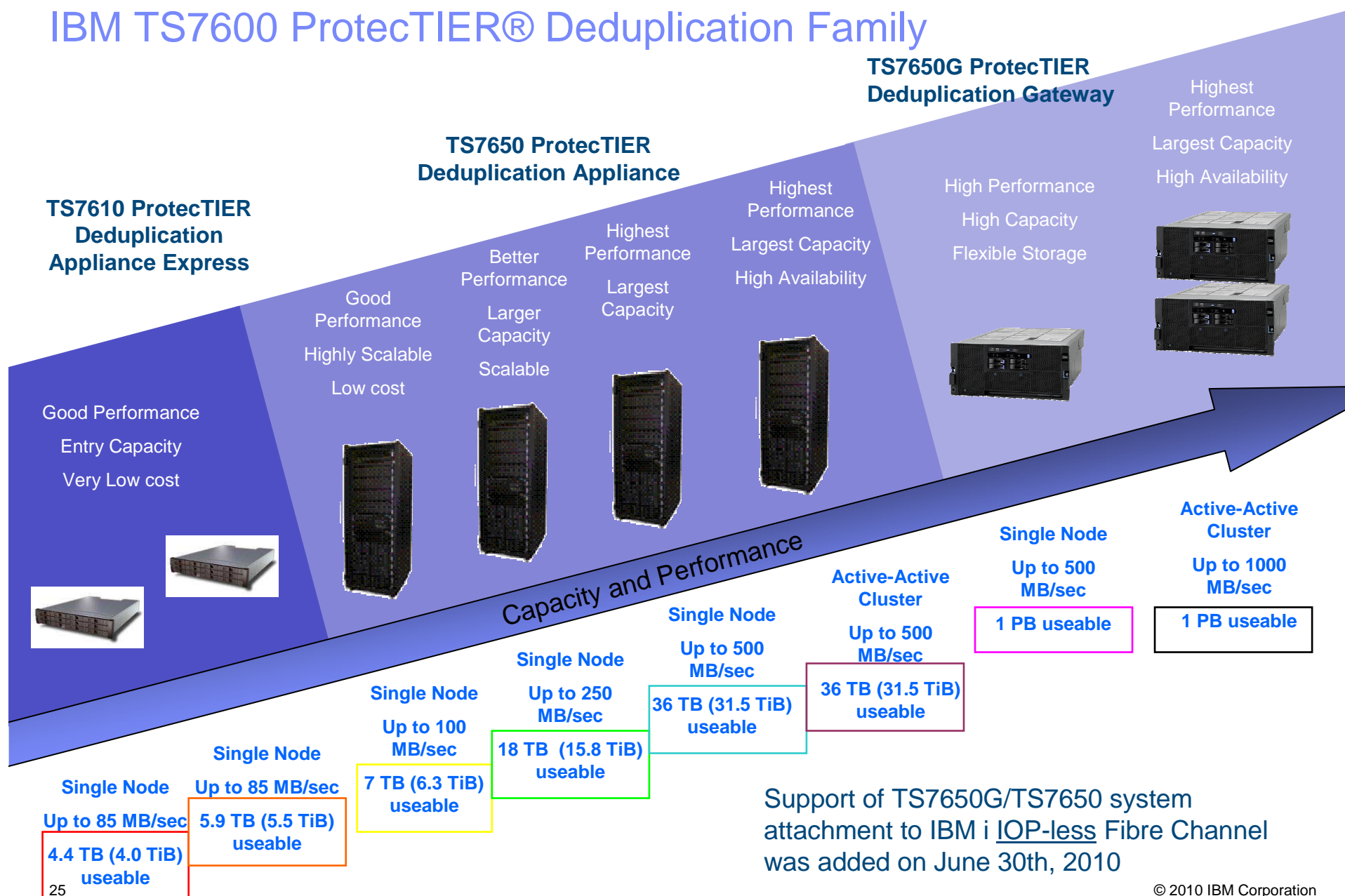
## V7000 Storwize

- **Thin Provisioning** – Included
- **FlashCopy** – Included
  - FlashCopy Manager
- **Easy Tier** – Included
  - TPC for Disk Midrange Edition
- **Metro and/or Global Mirror** – Optional
  - TPC for Replication
- **Mirror over IP** – Optional
  - FastBack for Replication
- **External Virtualization** – Optional
  - Allows you to bring external fibre channel disk systems under Storwize V7000 control providing access to all the functions of the V7000 virtualization software

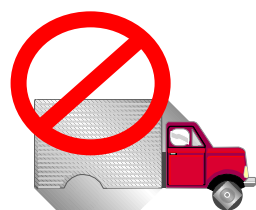




# IBM TS7600 ProtecTIER® Deduplication Family

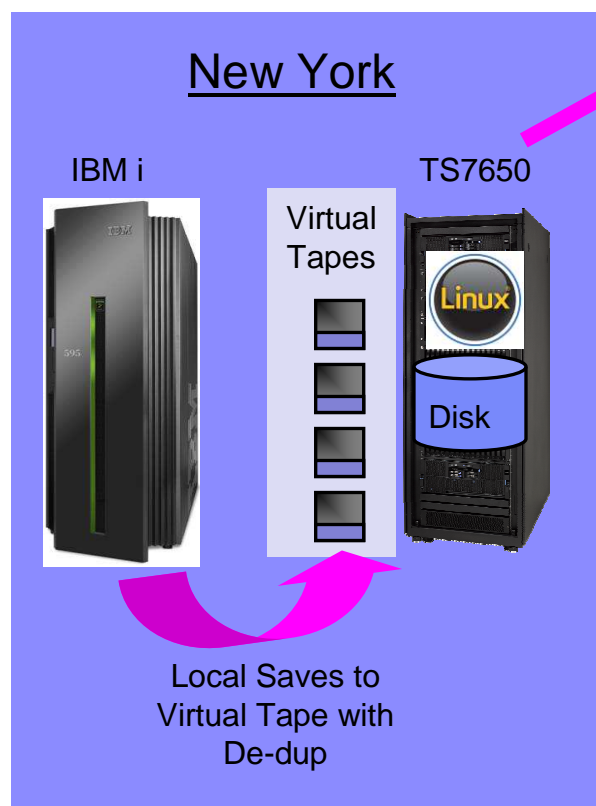
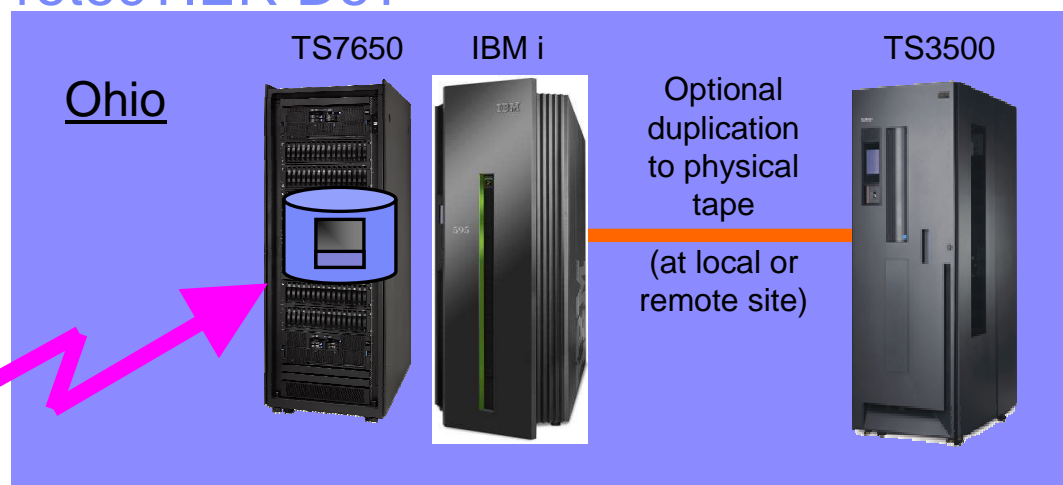


# What Does the TS7650 ProtecTIER Do?

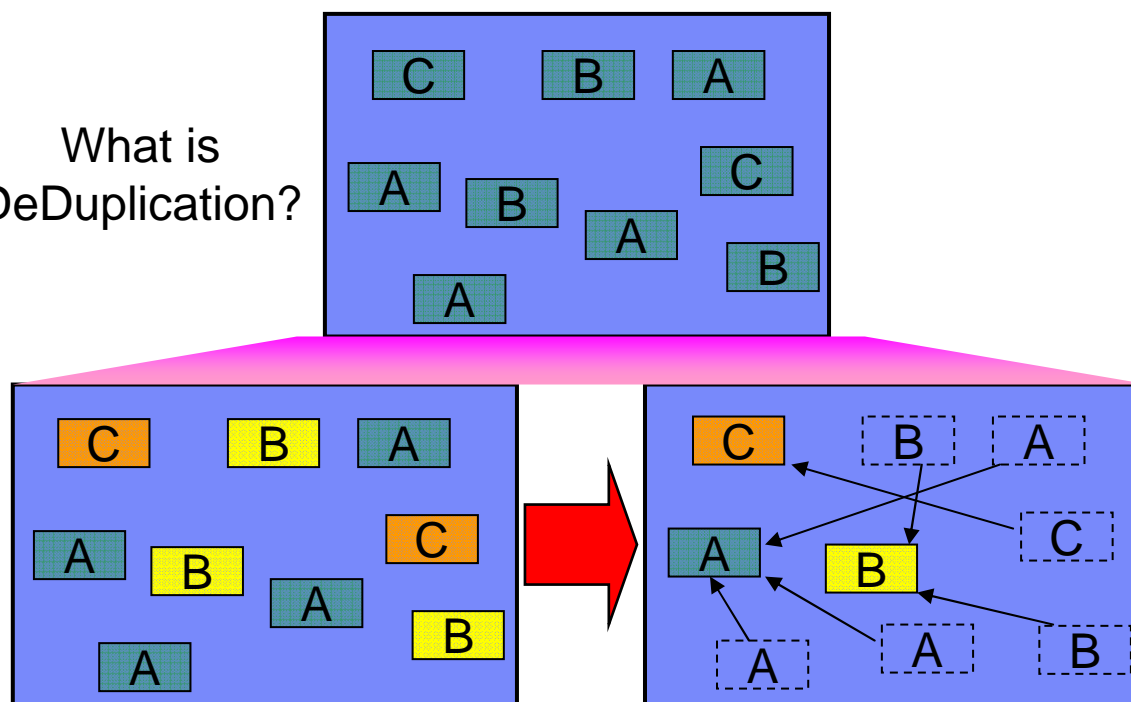


IP Replication

Minimized bandwidth  
since data is de-dup'd  
before sending





What is  
DeDuplication?



## Archive (or, what to do with an aging 3995-3996 ?)

<p><b>3996 and related features were withdrawn from marketing in 08</b></p>	<ul style="list-style-type: none"> <li>▪ Alliance Storage Technologies Inc. G-Series models for IBM i</li> <li>▪ POWER7 planning: <ul style="list-style-type: none"> <li>– 3995 is not supported on POWER7 (<i>no HVD SCSI adapter available</i>)</li> <li>– 3996 and select G-Series LVD SCSI models can attach to POWER7 <ul style="list-style-type: none"> <li>• Use LVD SCSI adapter FC 5736 (<i>PCI-X SCSI IOP-less IOA</i>)</li> </ul> </li> </ul> </li> </ul>
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## Example strategies for moving beyond 3995/3996

<p><b>Image Catalog Media Library for Archive</b> (Virtual Optical Library)</p> 	<ul style="list-style-type: none"> <li>▪ IBM i APIs allow HDD based storage to emulate 399x <ul style="list-style-type: none"> <li>– Any internal or external storage which supports ASPs</li> <li>– Transparent to archive and content management applications</li> <li>– IBM i 7.1 and Lab Services fee offering</li> </ul> </li> </ul>
<p><b>IBM Information Archive (IA)</b></p>	<ul style="list-style-type: none"> <li>▪ External HDD based retention <ul style="list-style-type: none"> <li>– WORM, encryption and backup</li> <li>– Supports IBM i archive solutions (e.g. Content Manager)</li> </ul> </li> </ul>
<p><b>NAS Storage</b> (for image storage)</p>	<ul style="list-style-type: none"> <li>▪ Network attached (<i>Network Attached Storage</i>) <ul style="list-style-type: none"> <li>– IBM i becomes NFS client (<i>Network File System</i>)</li> <li>– For image storage only (<i>bitmap, gif, etc.</i>).</li> </ul> </li> </ul> <div data-bbox="1603 1230 2007 1382">  <p>Exploring NFS on AS/400, SG24-2158</p> </div>

# IBM i Storage Strategy Planning

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## Software and Tool Examples

## IBM i Resiliency and Replication Solutions

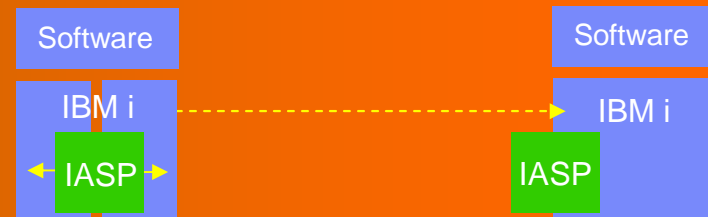
### Software replication

- Vendor logical replication software
- Domino clusters
- 3<sup>rd</sup> part cloud solutions for backup



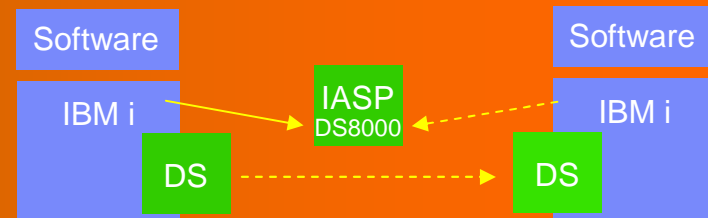
### Operating system delivered resiliency

- PowerHA Switchable IASPs
- PowerHA Geographic Mirroring replication
- PowerHA Admin Domain (security and config)



### Native attached external storage resiliency

- PowerHA DS8000 LUN Level Switching
- PowerHA and DS5000/DS8000 copy services
- Full system copy (cloning)



### Virtualized (VIOS) external storage resiliency

- Storage attached to VIOS and SVC
- Basic - full system copy (cloning)
- PowerHA Geo' Mirroring and logical replication



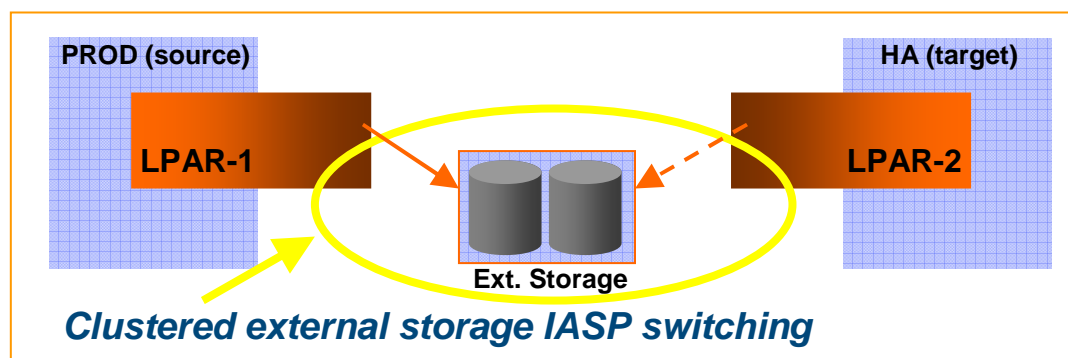
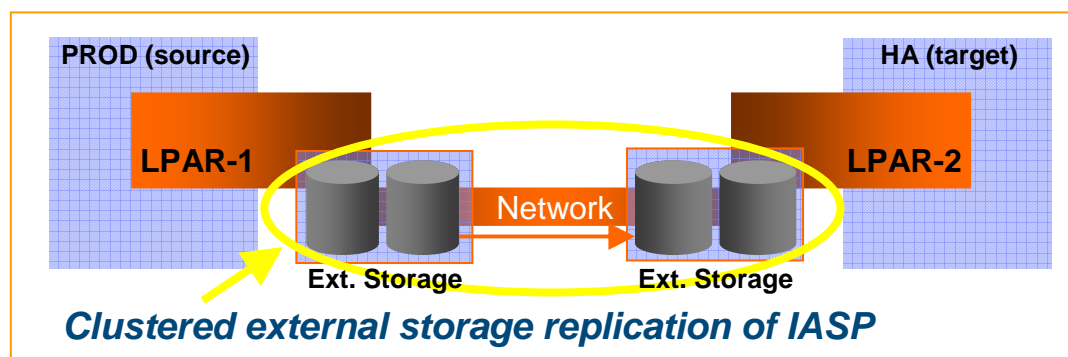
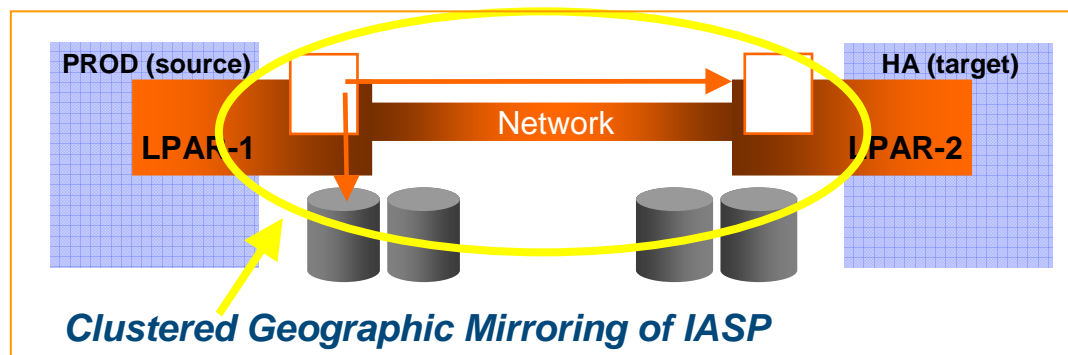
DS = Storage such as DS6000, DS5000 or DS8000



## Why PowerHA SystemMirror for i ?

### Hardware level resiliency and replication with IBM software management

- Does not rely on software ‘application transaction replay’ techniques
- Eliminates the causes of out-of-sync situations
- Fussy applications, complex SQL, reorgs, deletes, heavy batch, etc. are not a replication headache
- Scalable, robust and automated solution
- Always ready to switch



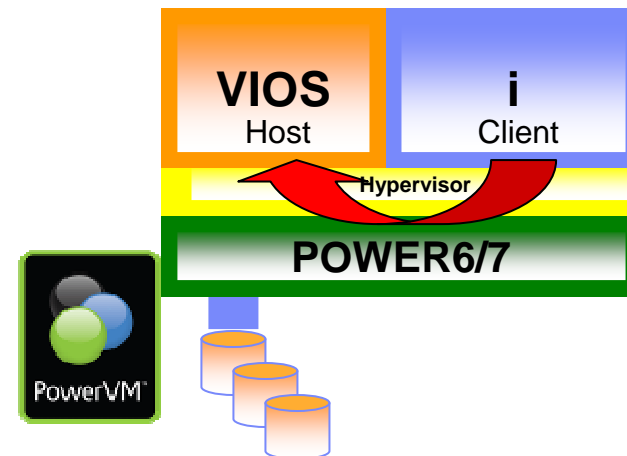
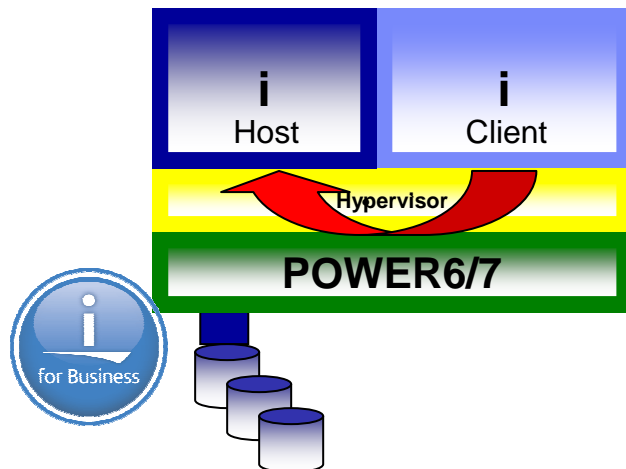
## Image Catalog Virtual Optical Media Library for Archive



- **Eases Transition from IBM 3995, IBM 3996 and Plasmon G-series**
  - IBM i image catalog extended to support library mode
  - IBM i APIs allow HDD based storage to emulate 3995/3996/399F media
  - Supports High Performance Optical File System (HPOFS) and \*WORM media type to facilitate compliance with data retention requirements
  - Supports image media types \*WORM, \*ERASE and \*RAM
- **Benefits:**
  - Any native internal or external attached HDD storage which supports ASPs
  - Transparent to optical library enabled archive and content management applications
  - Higher performance HDD storage and no mount time
- **Planning Considerations**
  - Available with IBM i 7.1, PTFs and Lab Services offering
  - HDD and ASP storage planning
  - Use of the *Enhanced Optical Library Data Migration* Lab Services offering
  - Backups (save) of virtual library volume images and image catalogs
  - Any High Availability or Disaster Recovery needs for archive images or data
- **Available today (3Q10)**
  - To inquire about pricing and availability, contact Mark Even, [even@us.ibm.com](mailto:even@us.ibm.com), (507) 253-1313.

## Virtual Storage for Partitions on Power Servers IBM i

- IBM i hosting
  - **IBM i partition uses I/O resources from another IBM i partition**
  - Best option for Windows Integration on IBM i
  - Familiar IBM i environment
  - Supports PowerHA Geographic Mirroring
  - Supports internal and native attached external storage (DS5000 or DS8000)
- Virtual I/O Server (VIOS) hosting
  - **IBM i partition uses I/O resources from a VIOS partition**
  - Best environment for IBM i, AIX and Linux
  - Typically requires the least amount CPU
  - Faster provisioning - fewest setup steps
  - No network storage space required
  - Simple startup - VIOS is always active
  - Provides tape virtualization
  - Supports PowerHA Geographic Mirroring and DS8000 Copy Services
  - Supports internal and a growing variety of external storage





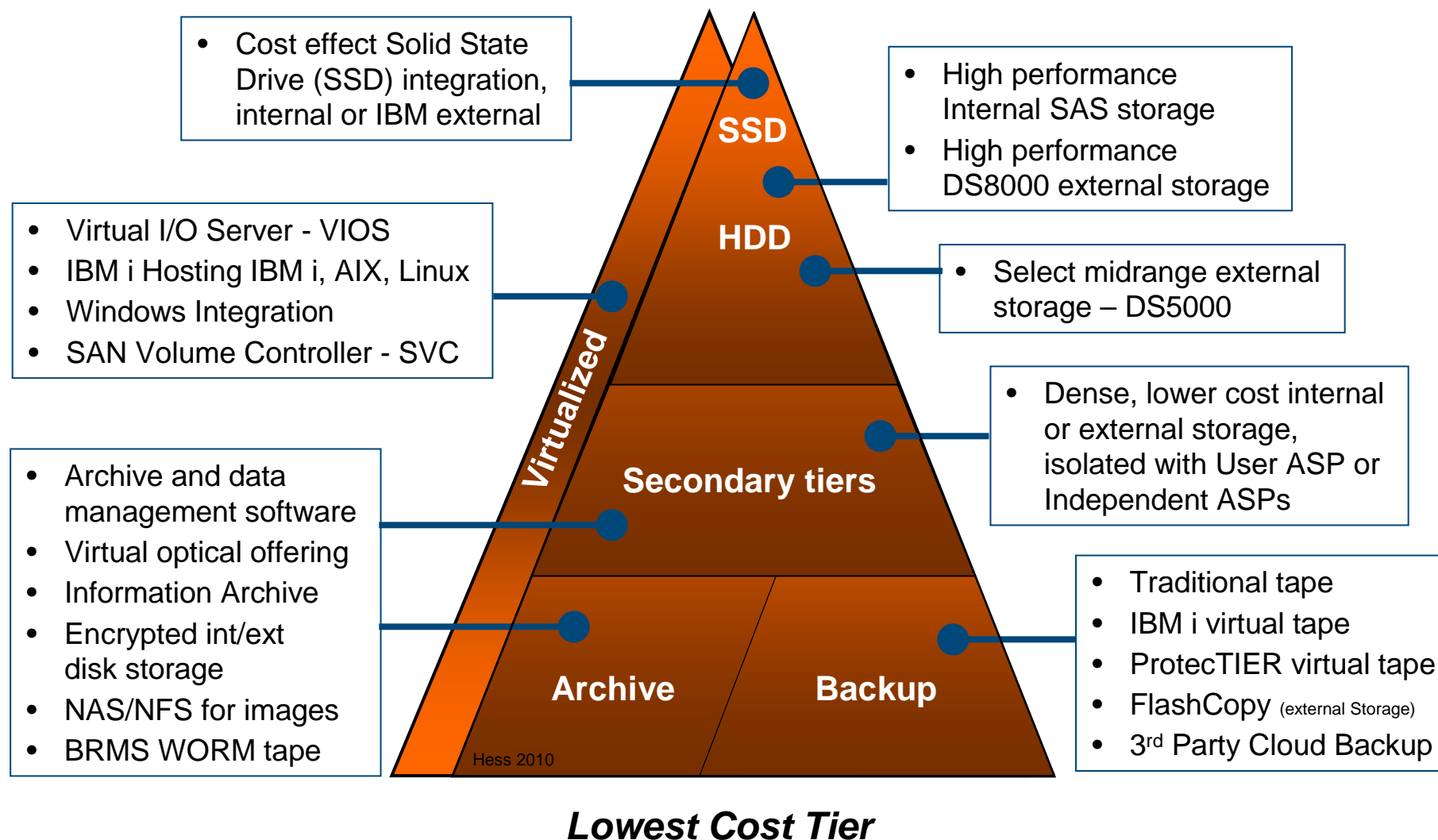
# IBM i Storage Strategy Planning

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## References and Summary

# IBM i Storage Strategy: Now

## Top Performance Tier



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## Part 2

- **IBM i: Understanding Disk Performance**
  - <http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4365>
- **The value of virtualized storage for IBM i**
  - <http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4368>
- **Minimize batch runtime, disk footprint, energy consumption with SSD technology**
  - <http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4363>
- **Advanced disk performance analysis for IBM i**
  - <http://www-03.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4366>



## Additional Material



## Additional Information - References

- **IBM i 7.1 Technical Overview Redbook**
  - <http://www.redbooks.ibm.com/redpieces/abstracts/sg247858.html?Open>
- **More on IBM i Storage – Techdocs**
  - [www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4011](http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4011) (choosing storage)
  - [www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4010](http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS4010) (SSDs)
- **Image Catalog Virtual Optical Media Library for Archive offering**
  - [www.ibm.com/systems/i/hardware/storage/optical/imagelibrary1.html](http://www.ibm.com/systems/i/hardware/storage/optical/imagelibrary1.html)
  - [www.ibm.com/systems/i/hardware/storage/optical/index.html](http://www.ibm.com/systems/i/hardware/storage/optical/index.html)
- **IBM Information Archive (IA) storage server**
  - [www.ibm.com/systems/storage/disk/archive/](http://www.ibm.com/systems/storage/disk/archive/)
- **IBM ProtecTier**
  - [www.ibm.com/systems/storage/tape/protectier/](http://www.ibm.com/systems/storage/tape/protectier/)
- **IBM i Archive and data management software**
  - [www.ibm.com/systems/i/hardware/storage/optical/applications/optapps.html](http://www.ibm.com/systems/i/hardware/storage/optical/applications/optapps.html)
- **Alliance Storage Technologies Inc. G-Series models for IBM i:**
  - [www.plasmon.com/archive\\_solutions/qi5os.html](http://www.plasmon.com/archive_solutions/qi5os.html)

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## Additional Information - Education

- **POWER IBM i server and storage details**

- [www.systeminetwork.com/article/ibm-amps-storage-options-new-ssd-and-san-support](http://www.systeminetwork.com/article/ibm-amps-storage-options-new-ssd-and-san-support)
- [www.systeminetwork.com/article/dr550-systems-supplant-optical-storage-insurance-giant](http://www.systeminetwork.com/article/dr550-systems-supplant-optical-storage-insurance-giant)

- **The Power of i - IBM 2010 Webcast Series – iNetwork:**

- <https://event.on24.com/eventRegistration/EventLobbyServlet?target=registration.jsp&eventid=189410&sessionid=1&key=227F88AB2EFE8C644A44265CDFEB75DE&partnerref=mminstall1&sourcepage=register>

## Summary

- There are many new tiered storage options to choose from for your storage strategy
- IBM has a long term focus on both internal and external storage for Power Systems and IBM i
- For high performance storage, the design point is becoming dollars per I/O's per second versus the old metric of dollars per GB
- Cost effective use of internal and external Solid State Drives (SSDs) are a growing part of a balanced storage performance design
- POWER IBM i will continue to invest into, and deliver more, virtualized storage solutions
- Storage choices are now a key part of an archive, High Availability, Disaster Recovery, and off-line backup strategy
- IBM i 6.1 and 7.1 are key to enabling new storage solutions

Thank you!





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## ***IBM i Storage Virtualization***

Two nice technical documents to get familiar with Open Storage virtualization on **IBM i**  
Read-me first documents are must have read literature before jumping into this specific architecture.

- ***IBM i Virtualization and Open Storage Read-me First***

[http://www-03.ibm.com/systems/resources/systems\\_i\\_Virtualization\\_Open\\_Storage.pdf](http://www-03.ibm.com/systems/resources/systems_i_Virtualization_Open_Storage.pdf)

- ***IBM i Virtualization and Power Blades Read-me First***

<http://www-03.ibm.com/systems/power/hardware/blades/ibmi.html>

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Revised February 9, 2010