

helpsystems

PowerHA and FlashCopy
Education

Brian Nordland


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www.helpsystems.com

Agenda

- ▶ Part 1 – High Availability
 - ▶ The state of High Availability
 - ▶ Meet the PowerHA Family
 - ▶ POWER9 and PowerHA
 - ▶ Concepts and Live Demo of PowerHA Cluster and Role Swap
- ▶ Part 2 – FlashCopy
 - ▶ FlashCopy overview/Demo
 - ▶ Full System FlashCopy
 - ▶ Hidden FlashCopy Feature!
 - ▶ Advanced Concepts
- ▶ Q & A

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Computer network outage forces Sutter Health to delay care to some patients **May 15th 2018**

The IRS website for filing tax returns is experiencing technical issues as Tax Day deadline looms
BUSINESS INSIDER | BOB BRYAN
Apr 17th 2018 1:28PM


Our mobile banking app and online banking are now up and running. Thank you for your patience and for bearing with us.
Paul Pester @PaulPester
3:40 AM - 25 Apr 2018
POSTED 7:25 AM, APRIL 24, 2018, BY Q23 R...

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How long can you be down for?

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How long can you be down for?


Recovery Time Objective

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Student data lost after Washington County Public Schools server outage

CJ Lovelace May 9, 2018 Updated May 9, 2018

Washington County Public Schools is trying to recover student data — including grades and attendance records — that was apparently not properly backed up and **permanently lost** following a **minor fire** that downed multiple servers more than a week ago

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How much data can you afford to lose?
Recovery Point Objective



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Recovery Point Objective (RPO):
How much data can you lose?

Recovery Time Objective (RTO):
How long can you be down for?

wake up for coffee

Unplanned Outage

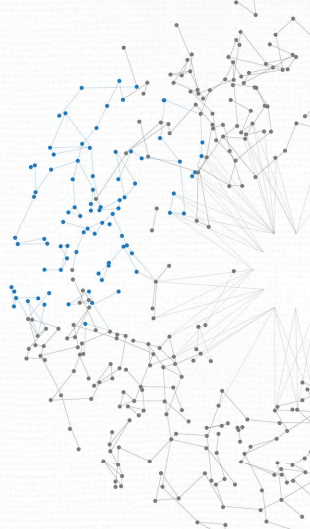
Data Lost

System Down

6:00am 9:55am 10:00am 10:05am

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The State of HA

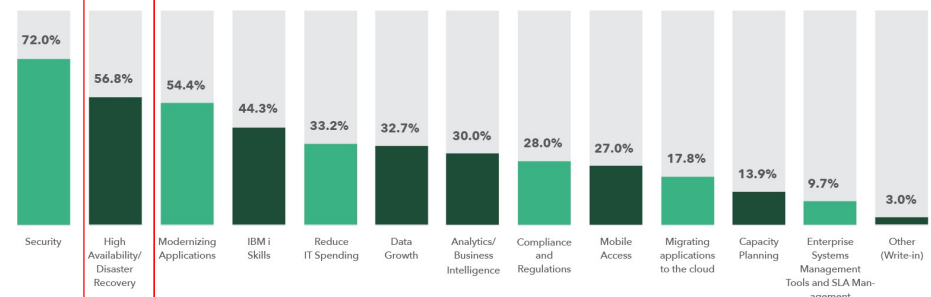


UP NEXT

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Top IT Concerns

What are your top concerns as you plan your IT environment? Check all that apply.

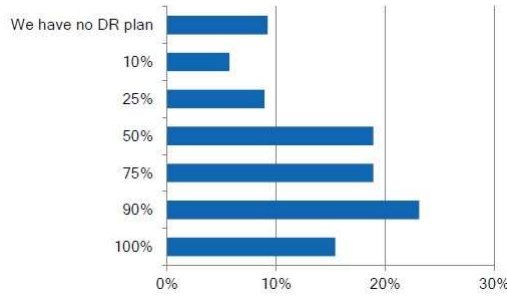


Concern	Percentage
Security	72.0%
High Availability/ Disaster Recovery	56.8%
Modernizing Applications	54.4%
IBM i Skills	44.3%
Reduce IT Spending	33.2%
Data Growth	32.7%
Analytics/ Business Intelligence	30.0%
Compliance and Regulations	28.0%
Mobile Access	27.0%
Migrating applications to the cloud	17.8%
Capacity Planning	13.9%
Enterprise Systems Management Tools and SLA Management	9.7%
Other (Write-in)	3.0%

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Current State of Affairs with Software/Logical Replication

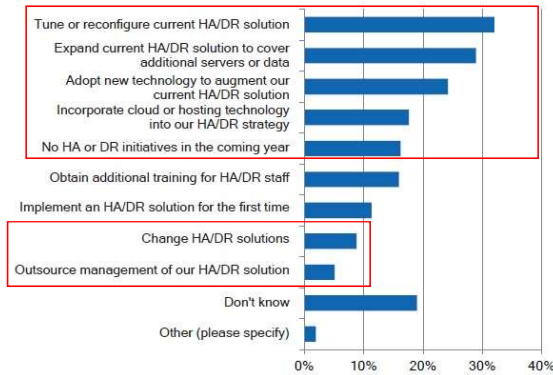
How confident are you that your company's Disaster Recovery (DR) plan for IT Systems is complete, tested and able to meet your recovery time and recovery point objectives?




Source: Syncsort 2018 Report

Customers Are Looking for a Better Solution

What initiatives does your business have regarding high availability or disaster recovery solutions in the coming year? Select all that apply.

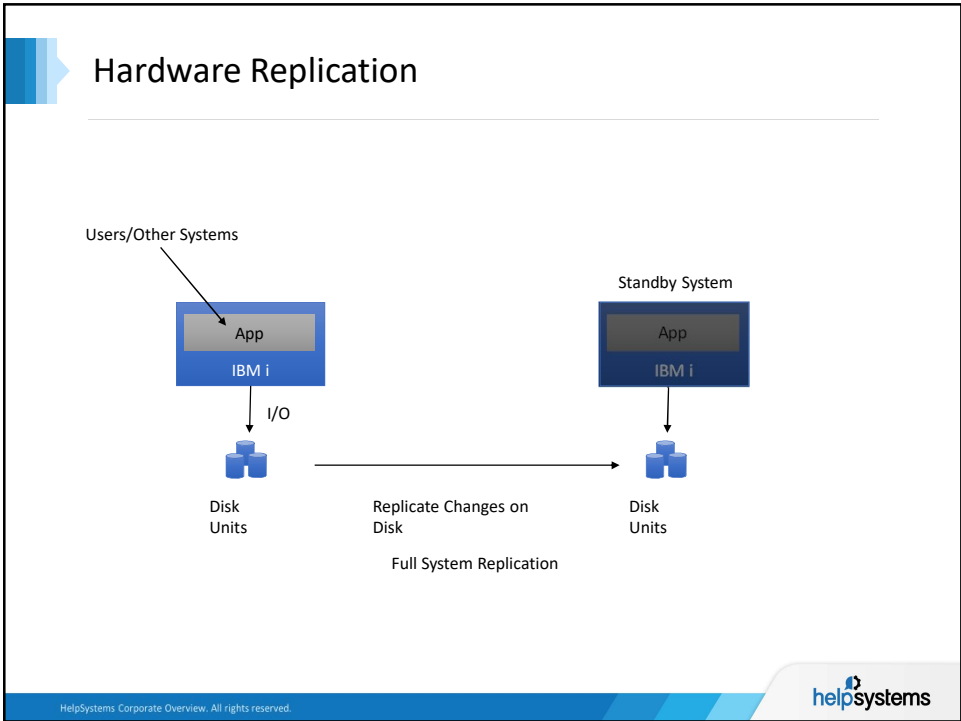


Source: Syncsort 2018 Report




▶ Simplifying HA with Hardware Replication

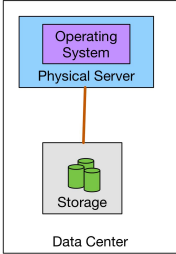
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Need to consider...
What are the causes of my outages?

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Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			



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Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

Operating System
Physical Server

Storage
Data Center

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Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

Operating System
Physical Server

Storage
Data Center

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Diagram illustrating an Outage Type classification and its components.

Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

The diagram shows a hierarchy: Operating System (with a red 'X') is connected to Physical Server, which is connected to Storage, which is connected to Data Center.

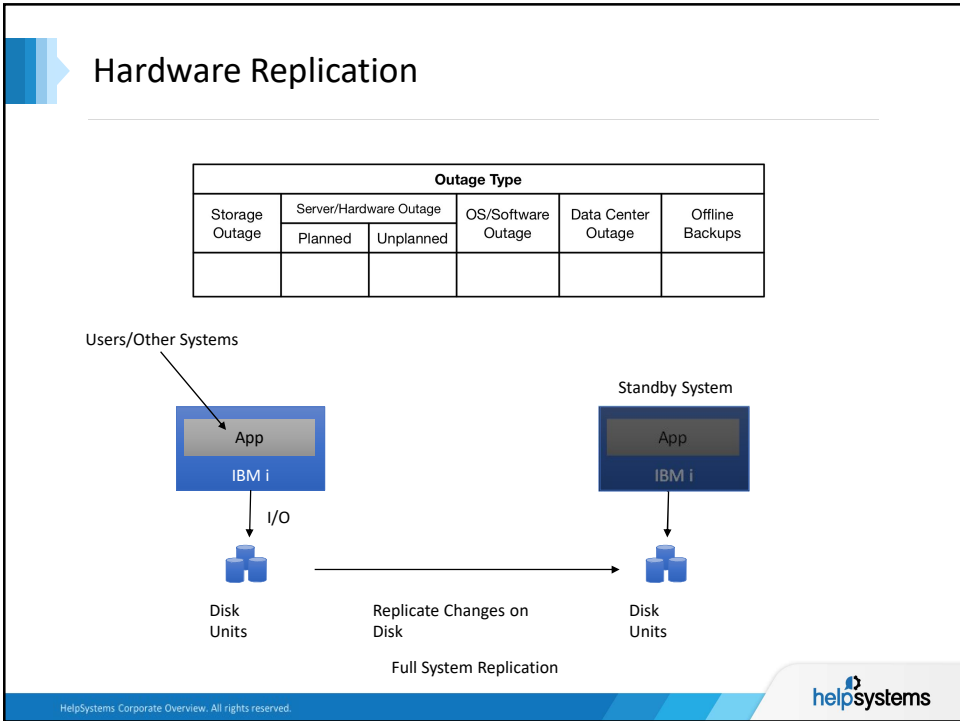
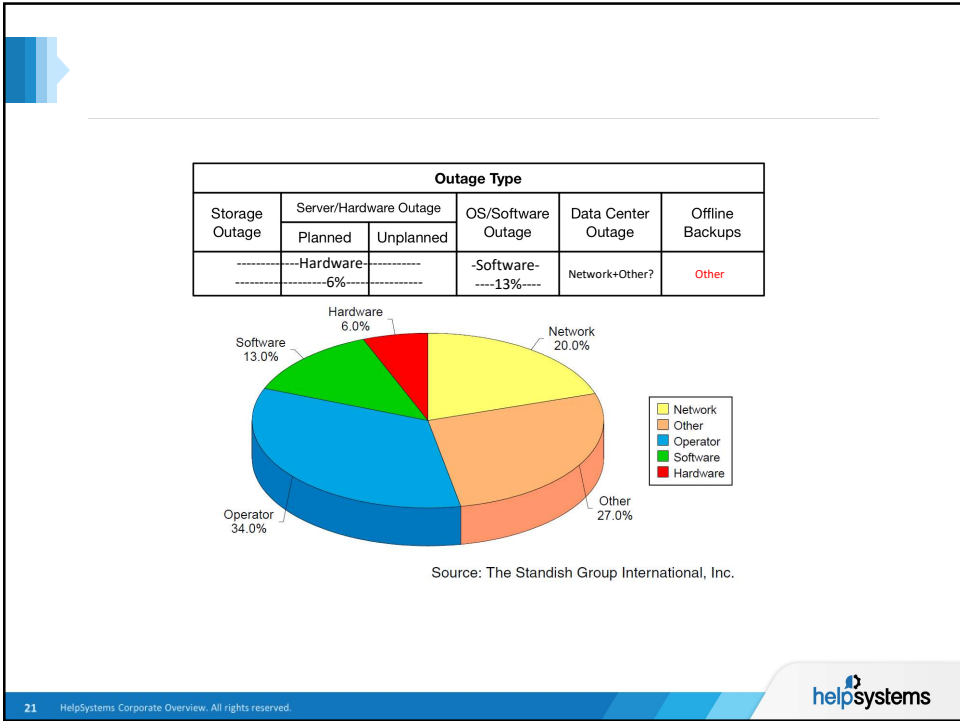
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Diagram illustrating an Outage Type classification and its components, with a red prohibition sign over the Operating System.

Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

The diagram shows a hierarchy: Operating System (with a red prohibition sign) is connected to Physical Server, which is connected to Storage, which is connected to Data Center.

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Hardware Replication

Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

Users/Other Systems

App
IBM i
I/O
Disk Units

Standby System

App
IBM i
Disk Units

Replicate Changes on Disk

Full System Replication

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Hardware Replication

Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
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Hardware Replication

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Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

Users/Other Systems

App

IBM i

I/O

Disk Units

Replicate Changes on Disk

Standby System

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Disk Units

Full System Replication

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Hardware Replication

Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

Users/Other Systems

Uh oh! How do we solve?

App

IBM i

I/O

Disk Units

Replicate Changes on Disk

Standby System

App

IBM i

Disk Units

Full System Replication

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Independent Auxiliary Storage Pools (IASPs)

- ▶ Separates the OS from Applications/Data
- ▶ Separate namespace and database
- ▶ Can be taken online and offline without a system restart
- ▶ Foundation for PowerHA technologies
- ▶ Some objects do not make sense in an IASP, for this there is the administrative domain

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Hardware Replication

Storage Outage	Outage Type		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

Users/Other Systems

Standby System

IASPs save the day!

Replicate Changes on Disk

Independent Auxiliary Storage Pool (IASP)

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Hardware Replication

Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			

PowerHA and FlashCopy!

Users/Other Systems

IBM i

Disk Units

Replicate Changes on Disk

Standby System

App

IBM i

Disk Units

Independent Auxiliary Storage Pool (IASP)

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Hardware Replication with IASPs


- ▶ Advantages
 - ▶ Ease of management (1 thing)
 - ▶ Peace of mind with switching
- ▶ Considerations
 - ▶ Bandwidth
 - ▶ Up front work required to move into an IASP


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Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			


You need to have an RTO and RPO for every type of outage

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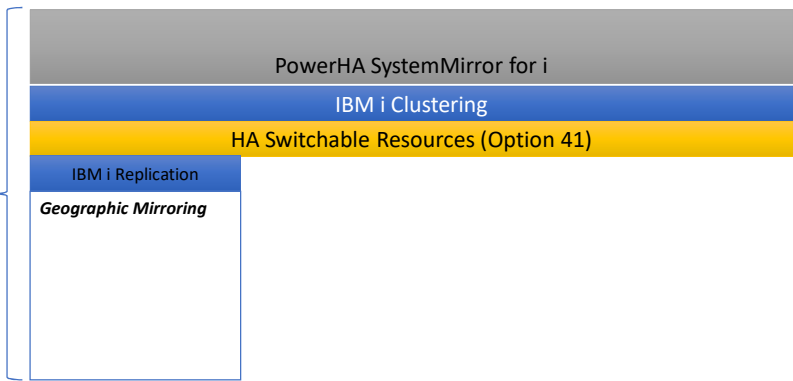
 Meet the PowerHA Family



 UP NEXT

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Meet the PowerHA Family



The diagram illustrates the PowerHA Family components as a stack of layers. From top to bottom, the layers are: PowerHA SystemMirror for i (grey), IBM i Clustering (blue), HA Switchable Resources (Option 41) (yellow), IBM i Replication (blue), and Geographic Mirroring (white). A bracket on the left side of the stack is labeled "Integrated End-to-End Solutions".

Integrated End-to-End Solutions

PowerHA SystemMirror for i


IBM i Clustering

HA Switchable Resources (Option 41)

IBM i Replication

Geographic Mirroring

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What is Geographic Mirroring?



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Stand-alone system operation

The diagram illustrates a stand-alone system operation. On the left, a user icon is shown next to a terminal window titled "Work with Cluster" with a list of options: "1. Display cluster information", "2. Display cluster configuration information", "3. Work with cluster nodes", "4. Work with device devices", "5. Work with resource devices", "6. Work with IASPs resource groups", "7. Work with IASPs resource groups", "8. Work with IASPs resource groups", "9. Work with IASPs resource groups", "10. Work with IASPs resource groups". Below the terminal is an IBM i A system with "Main Memory" and "Disk Units (IASP)". Red arrows indicate data flow between the Main Memory and the Disk Units. The helpsystems logo is in the bottom right corner.

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What is geographic mirroring?

The diagram illustrates geographic mirroring. It shows two IBM i systems, labeled "IBM i A" and "IBM i B", connected via a "TCP/IP Network". Each system has "Main Memory" and "Disk Units (IASP)". Red arrows show data flow between the Main Memory and the Disk Units on both systems, and between the two systems via the network. The helpsystems logo is in the bottom right corner.


Geographic Mirroring: "IASP replication using IBM i networking"

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Features of Geographic Mirroring

- ▶ Independent Auxiliary Storage Pool (IASP) replication technology
- ▶ IBM i storage management controls replication
 - ▶ Replication is done on at the page level, not object level
- ▶ Storage agnostic
- ▶ Tunable for synchronous or various levels of asynchronous replication.
- ▶ Partial resynchronization of suspend or detach of data
- ▶ Full resynchronization of data required after *unplanned* failure.
 - ▶ How much data can you tolerate to resync? 2TB, 4TB, 40TB?


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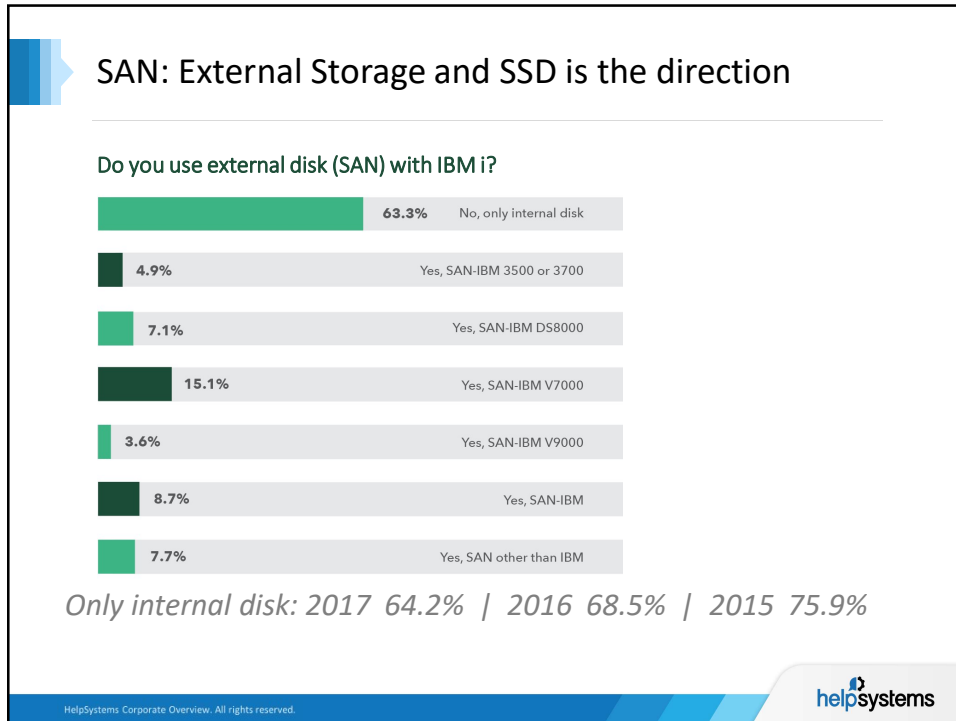


Meet the PowerHA Family

Integrated End-to-End Solutions	PowerHA SystemMirror for i	
	IBM i Clustering	
	HA Switchable Resources (Option 41)	
	IBM i Replication	SAN Storage Integration & Orchestration (SVC/Storewize/DS8000)
	Geographic Mirroring <ul style="list-style-type: none"> Sync/Async Any storage 	

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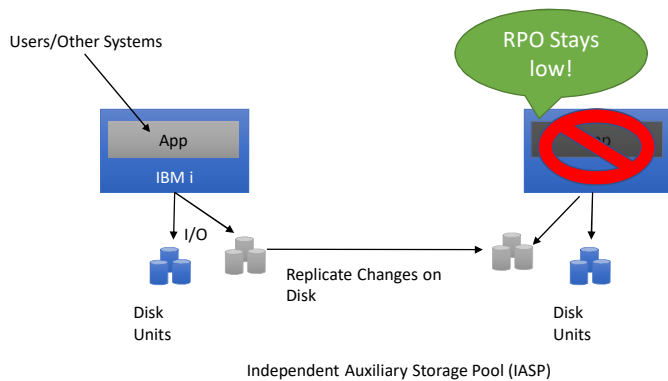
Why SAN on IBM i?

- ▶ Performance
 - ▶ SSD and more IO
- ▶ Flexibility
 - ▶ Virtualization is easier and sharing with other technologies
- ▶ Space
 - ▶ Physical storage in data center
- ▶ Availability
 - ▶ PowerHA
- ▶ It's the present and future

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Bonus when using External Storage

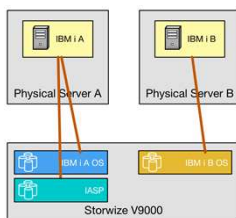
- The only HA solutions that continues when the target system down for upgrades, PTFs, maintenance!



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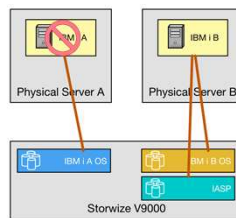
LUN Level Switching



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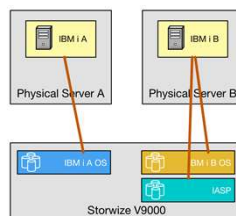
LUN Level Switching



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LUN Level Switching

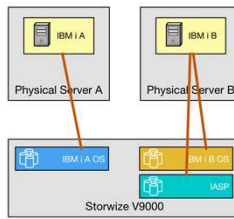
- ▶ Data is switched between servers
- ▶ Provides protection against software and server hardware outages
- ▶ Switch requires a varv off and a varv on of an Independent ASP



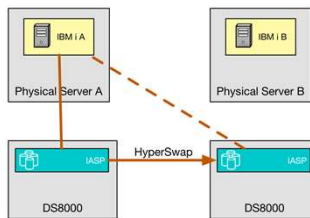
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LUN Level Switching

Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			
	●	●	●		



HyperSwap with IASP LUN Level Switching



HyperSwap with IASP LUN Level Switching

- ▶ Near-Zero application impact for planned storage outages

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HyperSwap with IASP LUN Level Switching

- ▶ Near-Zero application impact for planned storage outages
- ▶ Minimal application impact for unplanned storage outages

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HyperSwap with IASP LUN Level Switching

- ▶ Near-Zero application impact for planned storage outages
- ▶ Minimal application impact for unplanned storage outages
- ▶ Added benefit of LUN Level switching for server hardware, and OS outages

The diagram illustrates a HyperSwap configuration between two DS8000 storage units. Each storage unit is connected to an IASP (IBM Access Storage Pool) on a physical server. Physical Server A is shown with a red 'X' over it, indicating an outage. Physical Server B is active. A 'HyperSwap' arrow indicates data migration from the right DS8000 to the left DS8000.

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HyperSwap with IASP LUN Level Switching

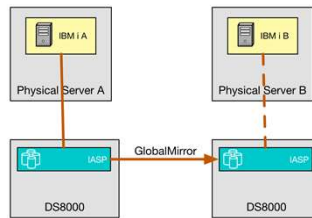
Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			
				Maybe	

The diagram illustrates a HyperSwap configuration between two DS8000 storage units. Each storage unit is connected to an IASP on a physical server. Physical Server A is active, and Physical Server B is shown with a red 'X' over it, indicating an outage. A 'HyperSwap' arrow indicates data migration from the left DS8000 to the right DS8000.

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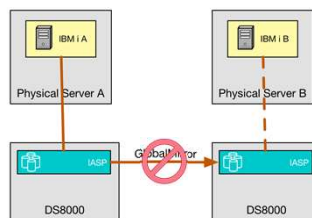
PowerHA MetroMirror or GlobalMirror

- ▶ Provides protection of IBM i Software outage or Storage Outage
- ▶ MetroMirror is synchronous, GlobalMirror is asynchronous
- ▶ Allows for detaching of remote copy for testing purposes



PowerHA MetroMirror or GlobalMirror

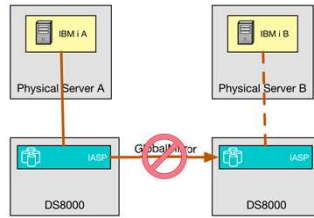
Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Offline Backups
	Planned	Unplanned			
●	●	●	●	●	●



PowerHA MetroMirror or GlobalMirror

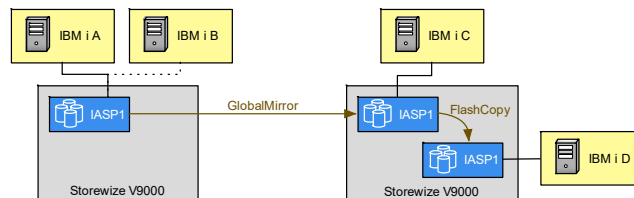
Outage Type					
Storage Outage	Server/Hardware Outage		OS/Software Outage	Data Center Outage	Base
	Planned	Unplanned			
●	●	●	●	●	●

FlashCopy to protect RPO!



Combining Technologies


LUN Level Switching plus GlobalMirror for DR



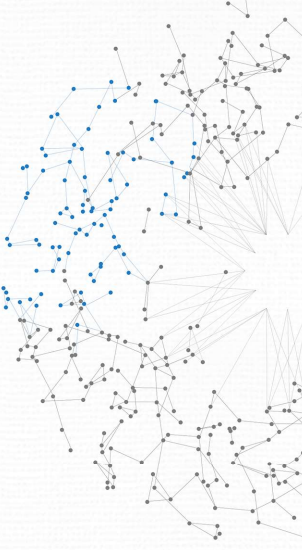
Meet the PowerHA Family


Integrated End-to-End Solutions


PowerHA SystemMirror for i	
IBM i Clustering	
HA Switchable Resources (Option 41)	
IBM i Replication	SAN Storage Integration & Orchestration (SVC/Storewize/DS8000)
Geographic Mirroring <ul style="list-style-type: none">• Sync/Async• Any storage	LUN Level Switching <ul style="list-style-type: none">• HA protection of OS/System FlashCopy <ul style="list-style-type: none">• Snapshot• Space Efficient MetroMirror/GlobalMirror <ul style="list-style-type: none">• Synchronous(Metro), Asynchronous(Global)• Storage & Site Outage Protection

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PowerHA and POWER9

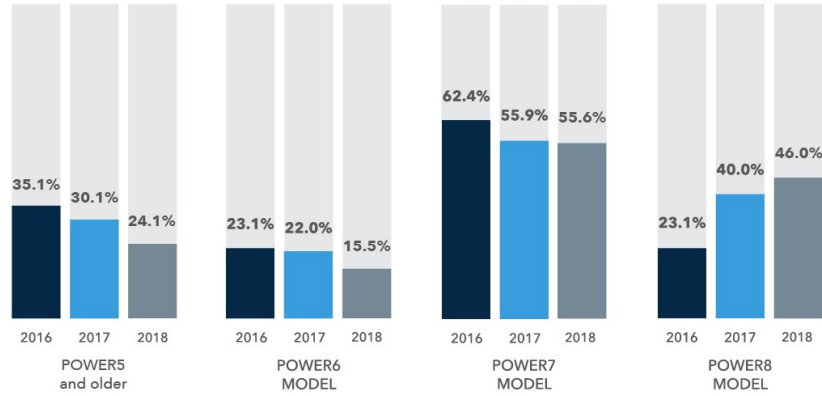


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Staying Current in the Data Center

What IBM Power servers do you own?



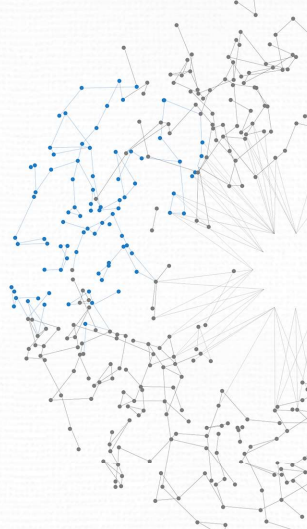
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- ▶ Tip: A new POWER system can be a good opportunity to implement a new HA solution.


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PowerHA Demo


Concepts and Interfaces

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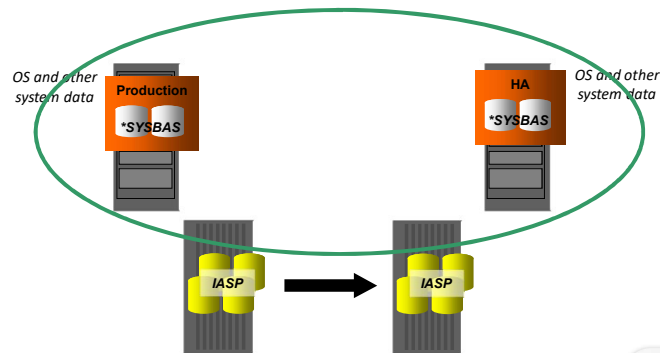
Concepts and Interfaces

- ▶ Concepts
- ▶ Two interfaces
 - ▶ GUI or green screen
- ▶ The cluster and simple monitoring
- ▶ How to failover

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Cluster

- ▶ The cluster provides the communication infrastructure between systems and/or partitions
- ▶ Facilitates the execution of cluster events
- ▶ Simplified management, single point of control

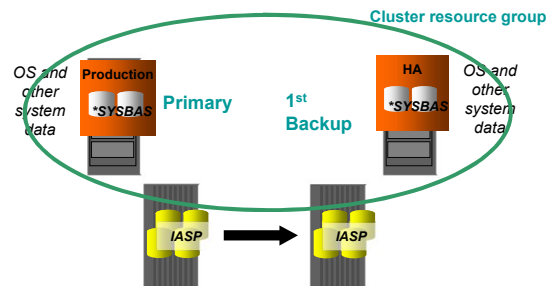


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Cluster Resource Group

- ▶ The cluster resource group defines which IBM i nodes are potential hosts for the IASP (replicated or switched)
- ▶ The recovery domain (list of nodes) is ordered
 - ▶ This determines replication direction
- ▶ An IP address can also be defined and PowerHA will activate it on whichever node is currently primary

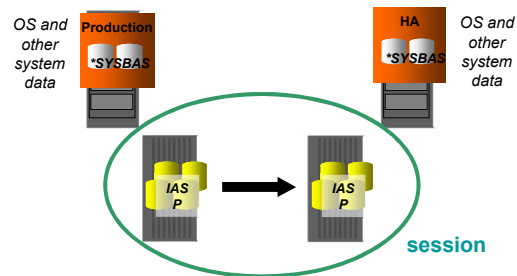


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Session

- ▶ The session describes the relationship between copies of the IASP
- ▶ The session will determine the type of replication from a system storage perspective
- ▶ PowerHA uses the session to control the replication



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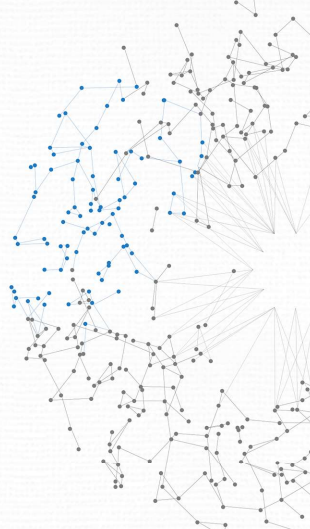
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Live Demo


PowerHA Cluster and Role Swap


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Part 2 - FlashCopy

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FlashCopy is...



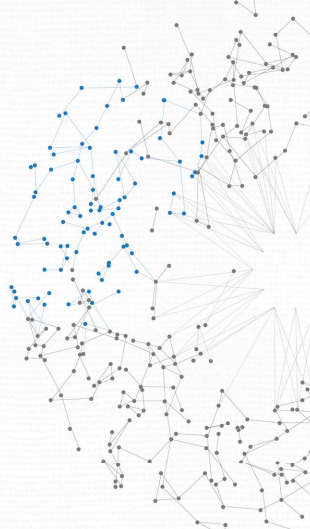
an *instantaneous* point in time copy of your data

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Quick Demo

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A network diagram graphic consisting of numerous nodes connected by lines, forming a complex web-like structure. The nodes are represented by small circles, and the connections are thin lines. The overall shape is roughly circular and occupies the right side of the slide.

You can use FlashCopy with

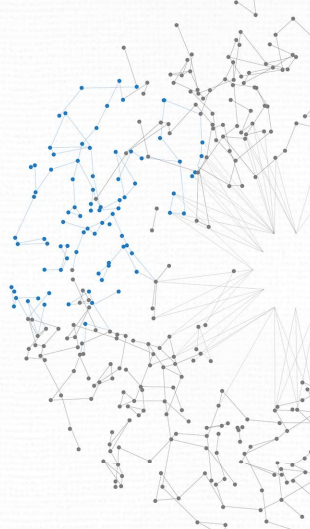
Four images of IBM storage hardware: a tall vertical tower server on the left, a horizontal server rack unit in the top right, a horizontal server rack unit in the middle, and a large horizontal storage array or tape drive on the bottom right.

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Full System FlashCopy

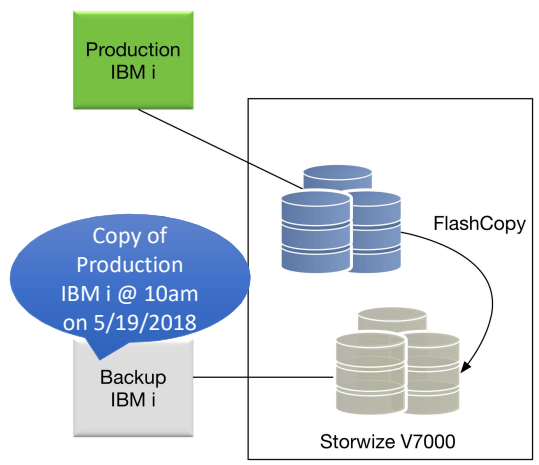
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A decorative graphic on the right side of the slide consisting of a network of interconnected nodes and lines, with some nodes highlighted in blue.

Full System FlashCopy

- Take FlashCopy
- Power on 'Backup IBM i'

A diagram illustrating the FlashCopy process. On the left, a green box labeled 'Production IBM i' is connected by a line to a blue oval containing the text 'Copy of Production IBM i @ 10am on 5/19/2018'. Below the oval is a grey box labeled 'Backup IBM i'. In the center, a box labeled 'Storwize V7000' contains two sets of disk icons. An arrow labeled 'FlashCopy' points from the top set of disks to the bottom set. A line also connects the 'Backup IBM i' box to the bottom set of disks.

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Full System FlashCopy

- Take FlashCopy
- Power on 'Backup IBM i'
- Perform backup/testing/etc.

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Full System FlashCopy

- Take FlashCopy
- Power on 'Backup IBM i'
- Perform backup/testing/etc.
- Once done
 - Power down 'Backup IBM i'

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Full System FlashCopy

The diagram illustrates the 'Full System FlashCopy' process. A green box labeled 'Production IBM i' is connected to a central box containing 'FlashCopy' (represented by three blue disks) and 'Storwize V7000' (represented by a stack of grey disks). A line connects 'Production IBM i' to 'FlashCopy'. Below this, a grey box labeled 'Backup IBM i' is crossed out with a red circle with a diagonal slash. A line connects 'Backup IBM i' to 'Storwize V7000', which is also crossed out with a red circle with a diagonal slash. This indicates that the backup system and its connection to the storage are disabled during the FlashCopy process.

- Take FlashCopy
- Power on 'Backup IBM i'
- Perform backup/testing/etc.
- Once done
 - Power down 'Backup IBM i'
 - End/Destroy FlashCopy

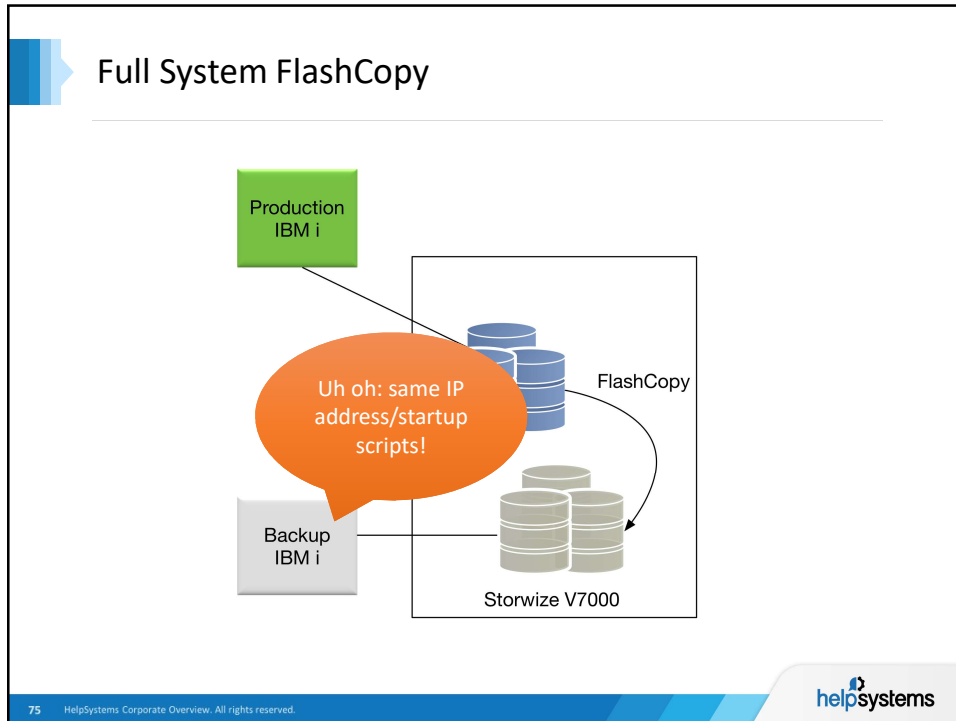
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Full System FlashCopy

The diagram illustrates the 'Full System FlashCopy' process. A green box labeled 'Production IBM i' is connected to a central box containing 'FlashCopy' (represented by three blue disks) and 'Storwize V7000' (represented by a stack of grey disks). A line connects 'Production IBM i' to 'FlashCopy'. Below this, a grey box labeled 'Backup IBM i' is crossed out with a red circle with a diagonal slash. A line connects 'Backup IBM i' to 'Storwize V7000', which is also crossed out with a red circle with a diagonal slash. This indicates that the backup system and its connection to the storage are disabled during the FlashCopy process.

- Take FlashCopy
- Power on 'Backup IBM i'
- Perform backup/testing/etc.
- Once done
 - Power down 'Backup IBM i'
 - End/Destroy FlashCopy
- Repeat

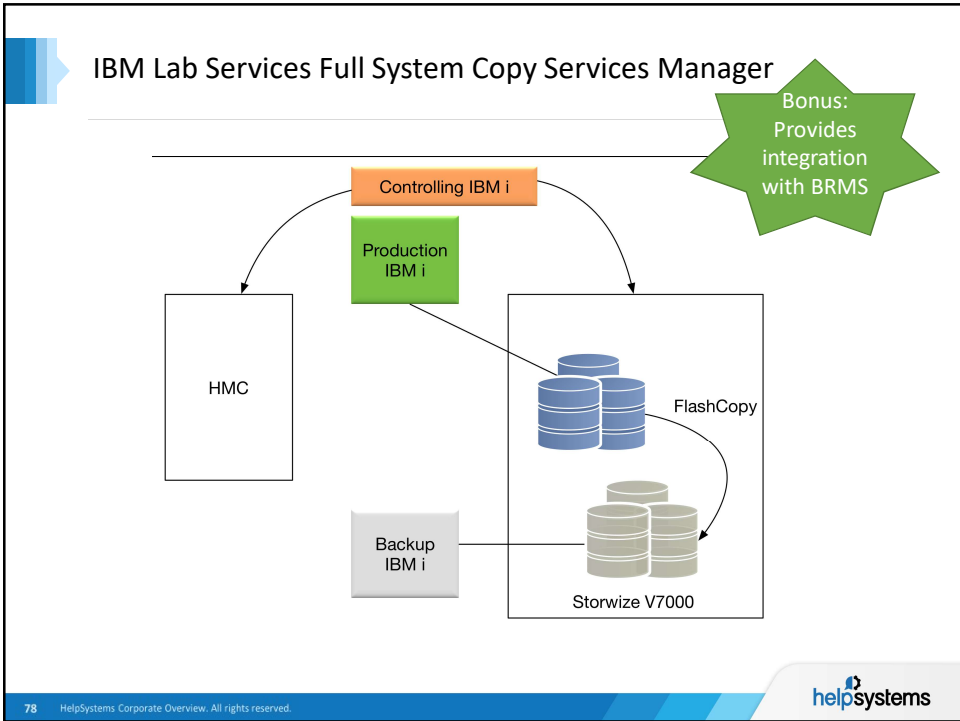
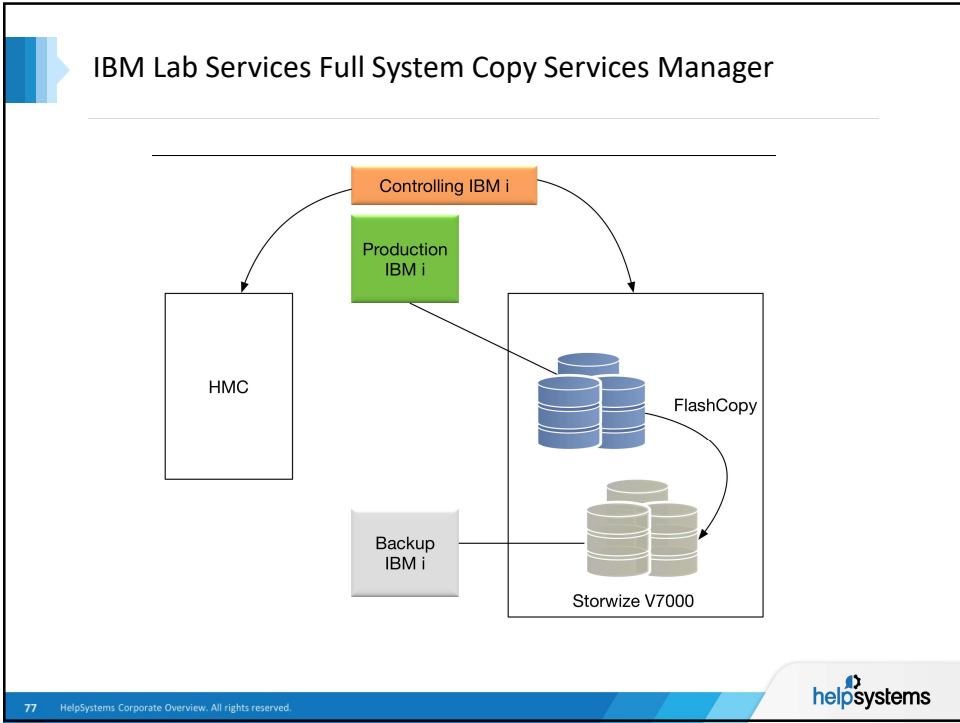
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How can I solve the issue? (IP address/Startup Scripts)

- ▶ Option 1 – Configure the system to not automatically start anything
 - ▶ Disadvantage – makes it a pain to start your normal system
- ▶ Option 2 – Create a custom startup script to selectively start correct IP, and jobs depending on the system
 - ▶ Need a way to tell which is which system since all of the disk unit data is identical between the systems.
 - ▶ If on separate systems - Serial number (QSRLNBR system value)
 - ▶ Materialize MI instructions – Lpar name
 - ▶ Etc.
- ▶ Option 3 – IBM Lab Services Full System Copy Services Manager

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How can I solve the issue? (IP address/Startup Scripts)

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 - ▶ Materialize MI instructions – Lpar name
 - ▶ Etc.
- ▶ Option 3 – IBM Lab Services Full System Copy Services Manager
- ▶ Option 4 – FlashCopy is fully integrated with PowerHA

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Advantages of IBM i PowerHA over Full System


- ▶ No “fixup” required
- ▶ Integrated clustering interfaces
- ▶ Application data only – no OS/Temporary Data
- ▶ Typically faster availability of data
- ▶ Greater flexibility with OS Release/etc.
- ▶ IASPs are the foundation for other PowerHA technologies

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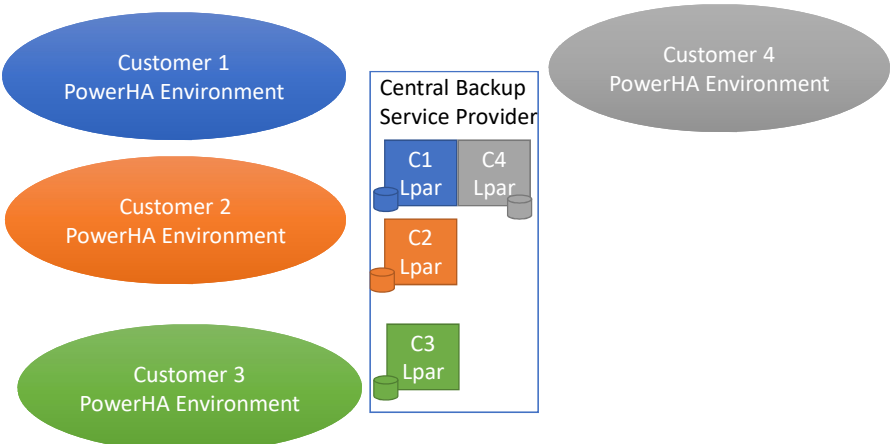


Hidden Feature - Independent ASP Assigner



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Independent ASP Assigner (PowerHA 7.2)



Customer 1 PowerHA Environment

Customer 2 PowerHA Environment

Customer 3 PowerHA Environment

Customer 4 PowerHA Environment

Central Backup Service Provider


C1 Lpar

C2 Lpar

C3 Lpar

C4 Lpar

How can we reduce the resources required for doing backups?



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Independent ASP Assigner (PowerHA 7.2)

The diagram illustrates a central backup service provider connected to four customer PowerHA environments. The provider is labeled 'Central Backup Service Provider' and contains a red box labeled 'Backup Lpar' and several storage units (blue, orange, green, and grey cylinders). The customers are labeled 'Customer 1 PowerHA Environment' (blue oval), 'Customer 2 PowerHA Environment' (orange oval), 'Customer 3 PowerHA Environment' (green oval), and 'Customer 4 PowerHA Environment' (grey oval).

How can we reduce the resources required for doing backups?

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How can we reduce the resources required for doing backups?

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Independent ASP Assigner (PowerHA 7.2)

Customer 1 PowerHA Environment

Customer 2 PowerHA Environment

Customer 3 PowerHA Environment

Customer 4 PowerHA Environment

Central Backup Service Provider

Backup Lpar

How can we reduce the resources required for doing backups?

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Independent ASP Assigner (PowerHA 7.2)

Customer 1 PowerHA Environment

Customer 2 PowerHA Environment

Customer 3 PowerHA Environment

Customer 4 PowerHA Environment

Central Backup Service Provider

Backup Lpar

How can we reduce the resources required for doing backups?

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Independent ASP Assigner (PowerHA 7.2)

Customer 1 PowerHA Environment

Customer 2 PowerHA Environment

Customer 3 PowerHA Environment

Central Backup Service Provider

Backup Lpar

Customer 4 PowerHA Environment

How can we reduce the resources required for doing backups?

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Independent ASP Assigner (PowerHA 7.2)

Customer 1 PowerHA Environment

Customer 2 PowerHA Environment

Customer 3 PowerHA Environment

Central Backup Service Provider


Backup Lpar

Customer 4 PowerHA Environment


- Do not need running system for each customer's cluster
- Just need the IASP to assign (attach) to a system.


How can we reduce the resources required for doing backups?

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- ▶ Speaking of backups - can FlashCopy replace my backup strategy?
- ▶ No

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- ▶ Since FlashCopy can happen when my system is running, how 'good' is my data? What happens to everything in memory?

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Full System FlashCopy Temperature

→ Hot FlashCopy – Longest IPL/Vary on

→ Warm FlashCopy – CHGASPACT Command
- Quiesce
- Force Write

→ Cold FlashCopy

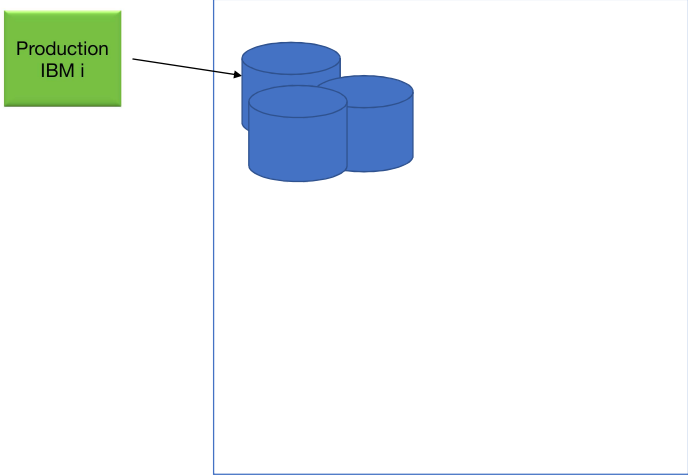
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Advanced Concepts

UP NEXT

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Instantaneous...?



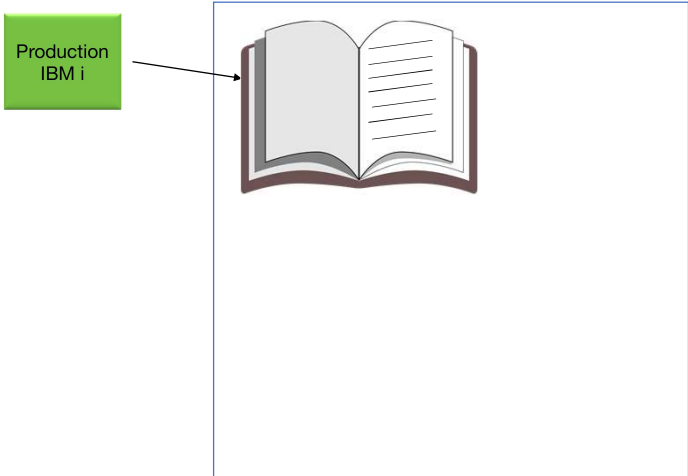
Production IBM i

Storage Controller (DS8000, SVC, etc.)

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This diagram illustrates a production IBM i system connected to a storage controller. The storage controller is represented by a large blue-bordered box containing three blue cylinders, which are standard icons for data storage. An arrow points from a green box labeled 'Production IBM i' to the storage controller. The text 'Storage Controller (DS8000, SVC, etc.)' is positioned below the box. The slide footer includes the number '93', the text 'HelpSystems Corporate Overview. All rights reserved.', and the 'helpsystems' logo.

Instantaneous...?

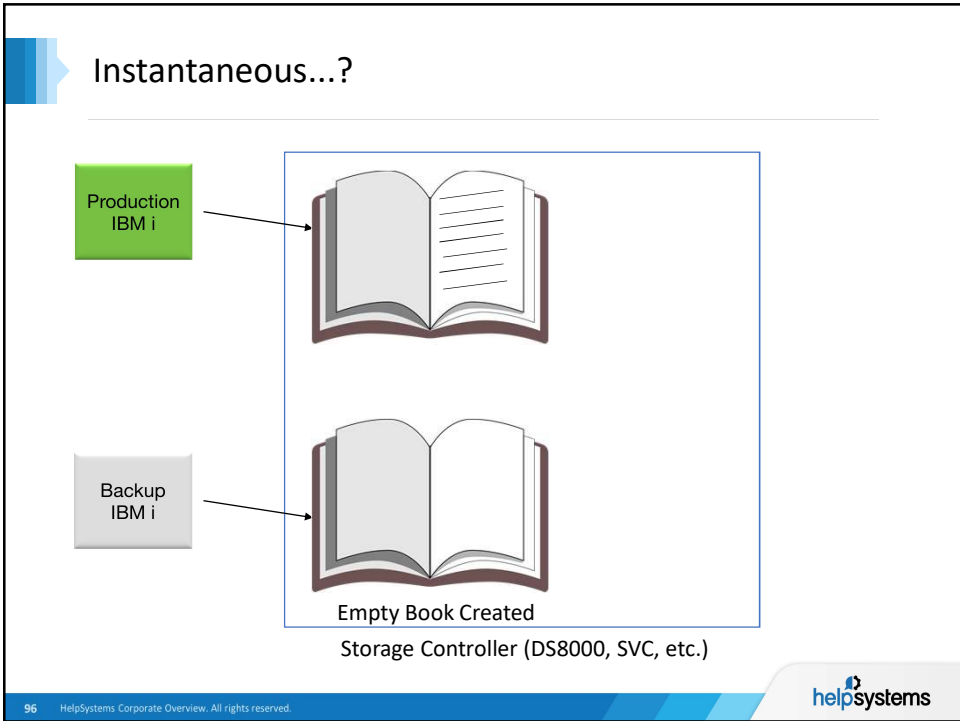
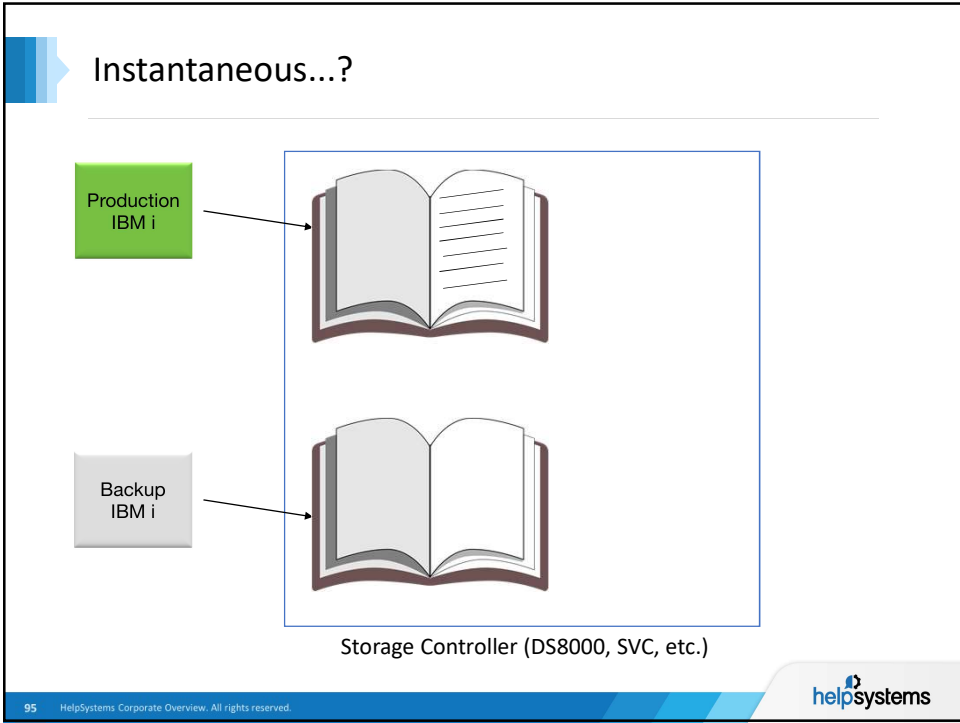


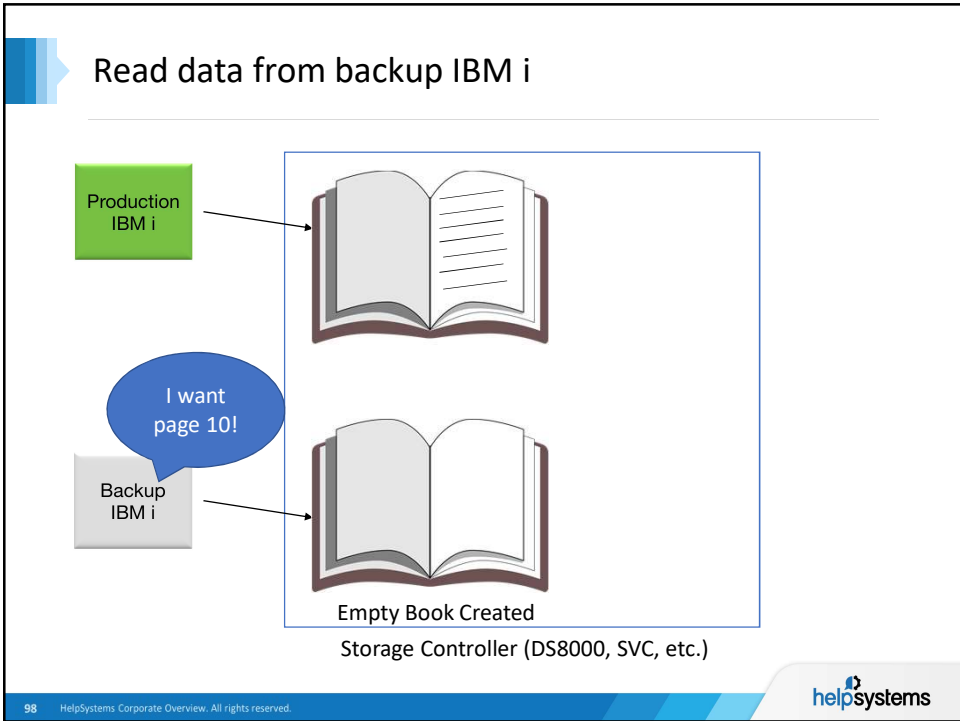
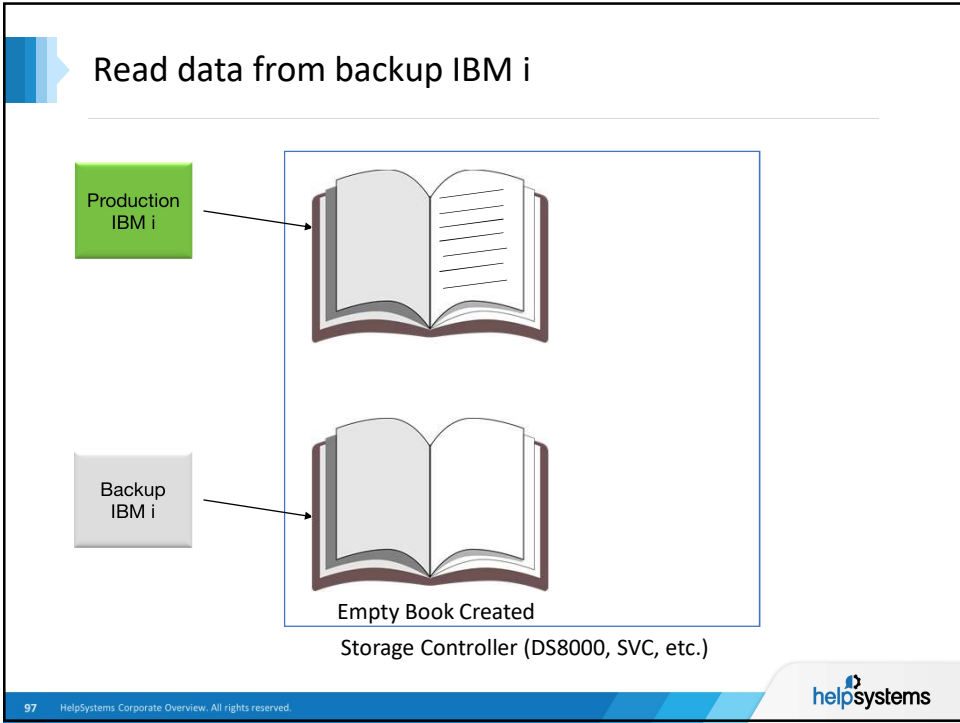
Production IBM i

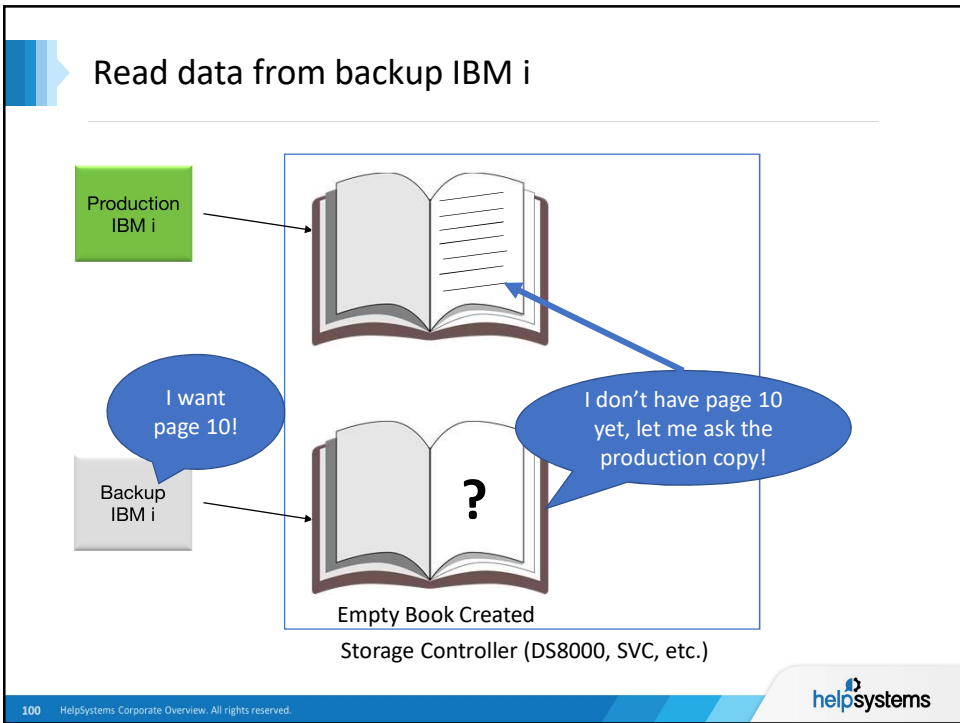
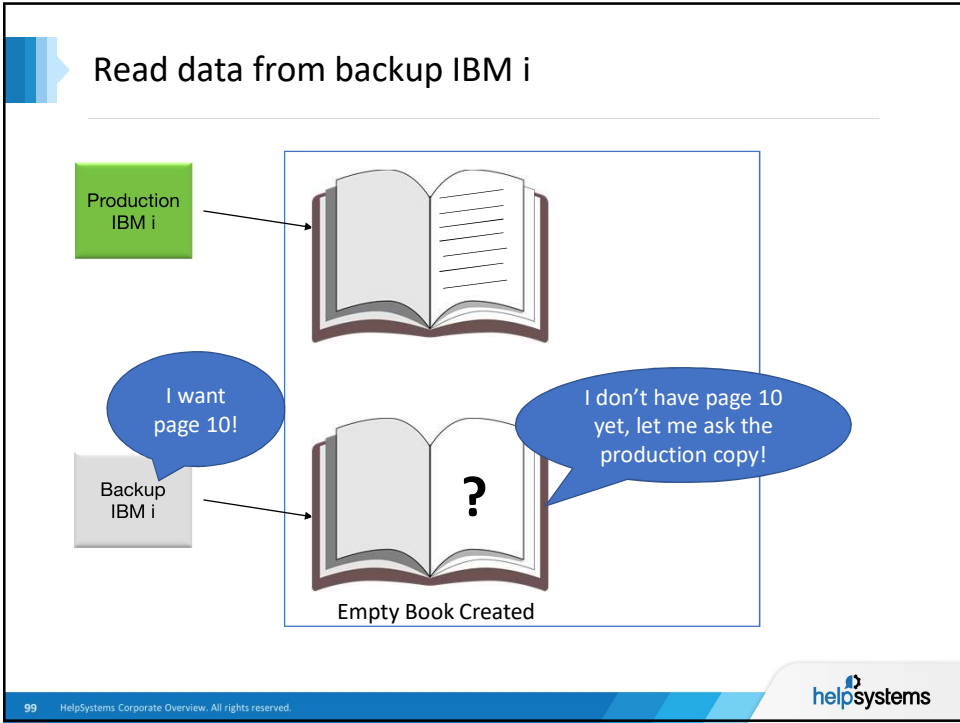
Storage Controller (DS8000, SVC, etc.)

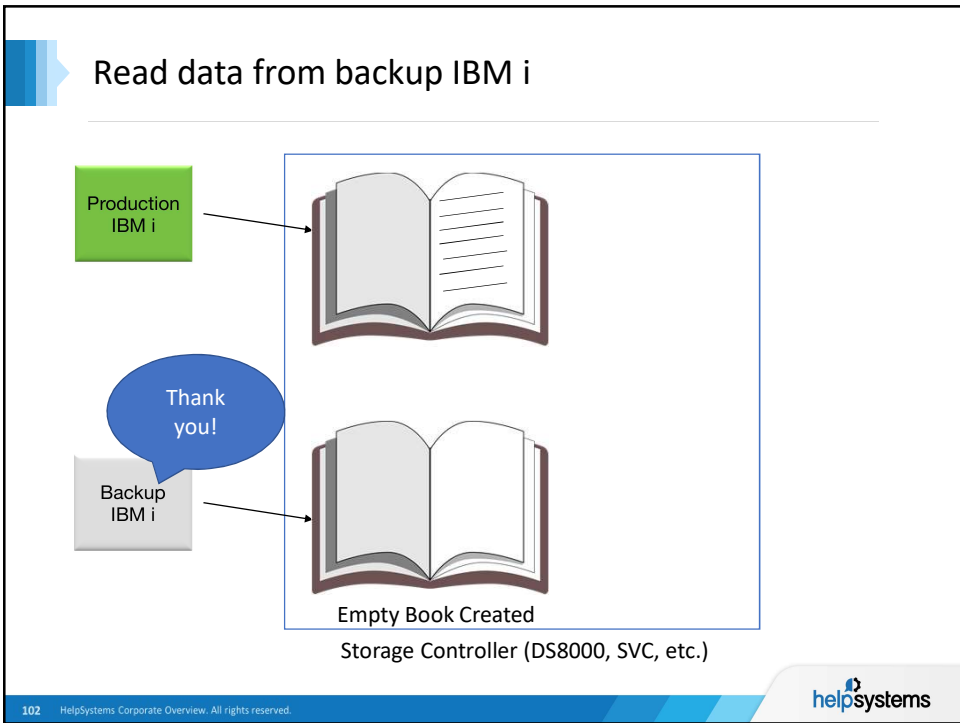
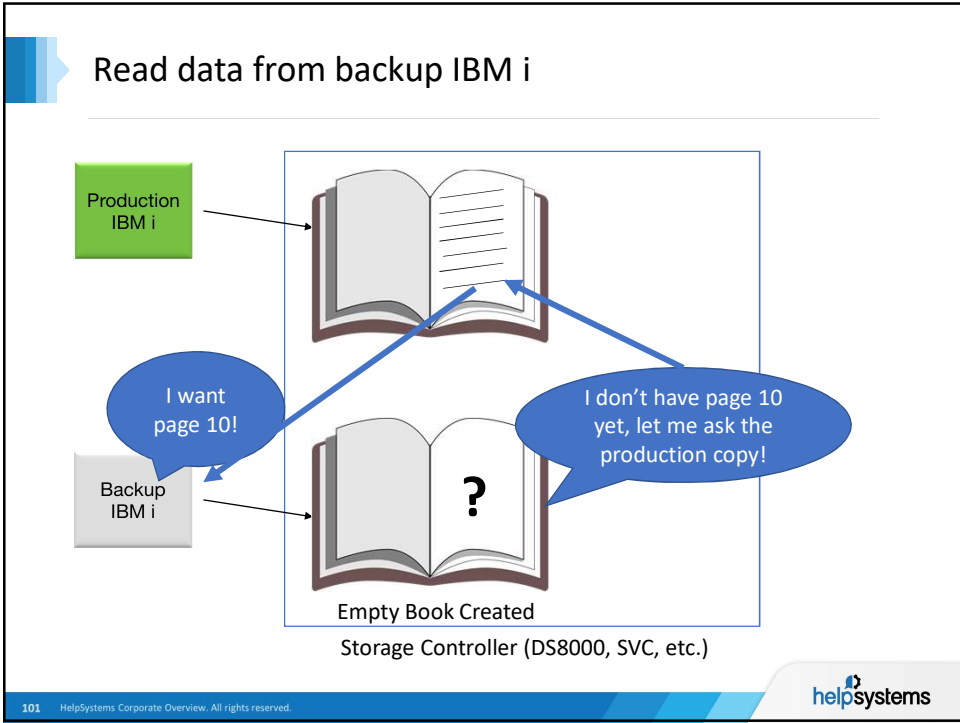
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This diagram illustrates a production IBM i system connected to a storage controller. The storage controller is represented by a large blue-bordered box containing an open book icon, which is a metaphor for data or information. An arrow points from a green box labeled 'Production IBM i' to the storage controller. The text 'Storage Controller (DS8000, SVC, etc.)' is positioned below the box. The slide footer includes the number '94', the text 'HelpSystems Corporate Overview. All rights reserved.', and the 'helpsystems' logo.









Change data on production

Production IBM i

Backup IBM i

Empty Book Created
Storage Controller (DS8000, SVC, etc.)

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Change data on production

Here is the new page 24!

Production IBM i

Backup IBM i

Empty Book Created
Storage Controller (DS8000, SVC, etc.)

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Change data on production

Here is the new page 24!

Production IBM i

Backup IBM i

Empty Book Created
Storage Controller (DS8000, SVC, etc.)

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Change data on production

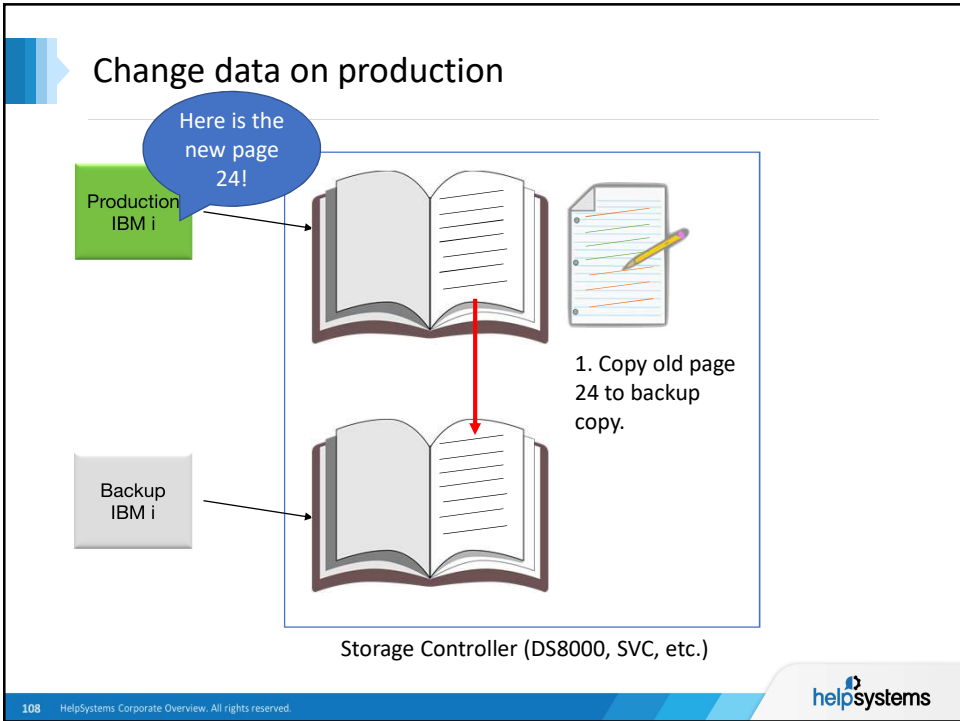
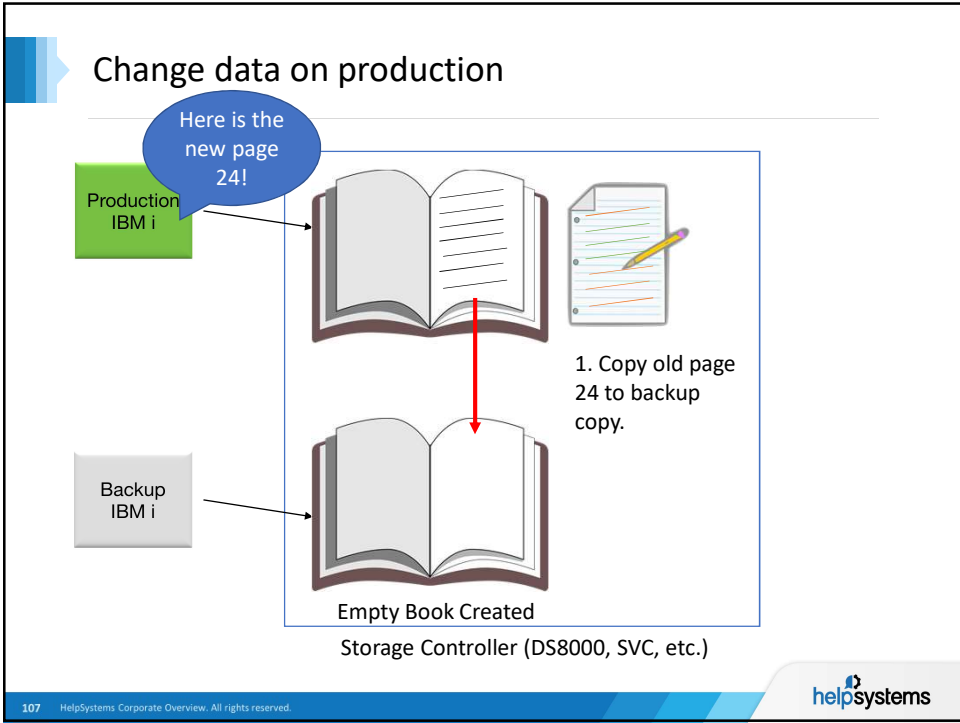
Here is the new page 24!

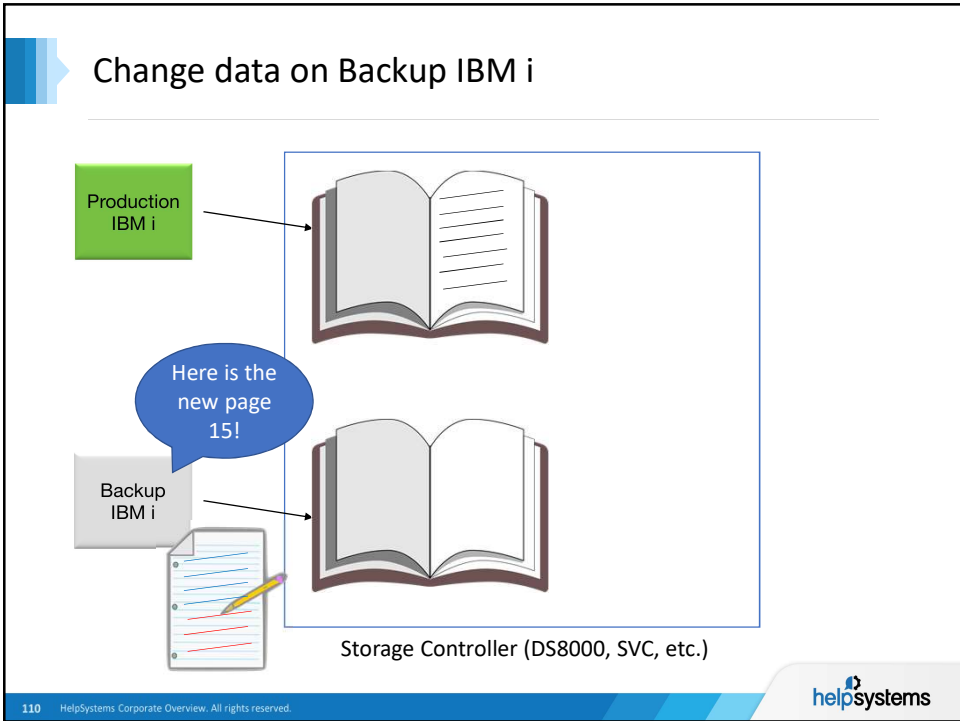
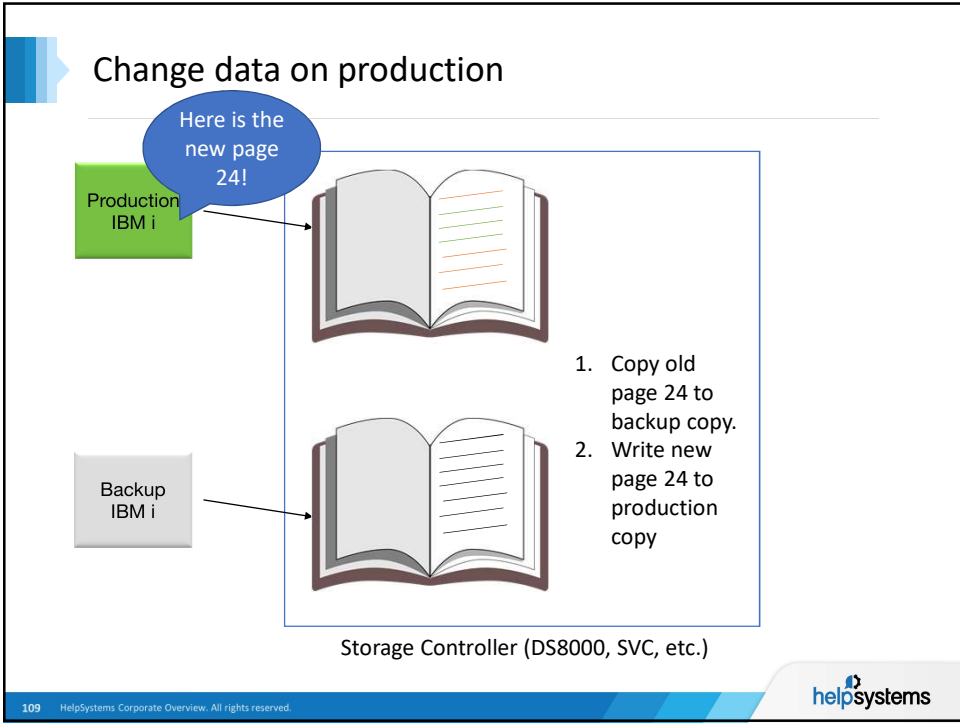
Production IBM i

Backup IBM i

Empty Book Created
Storage Controller (DS8000, SVC, etc.)

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Change data on Backup IBM i

Production IBM i

Here is the new page 15!

Backup IBM i

Storage Controller (DS8000, SVC, etc.)


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- ▶ With thin provisioning in the storage, you only use as much space as what has changed between the copies!

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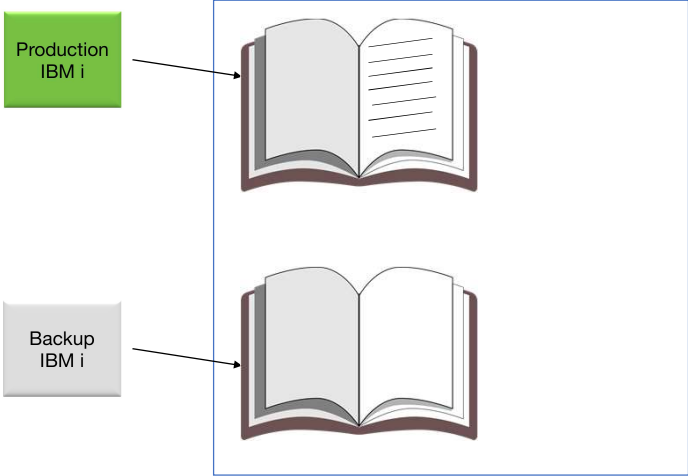
What does this mean for performance?

- Copy vs. No Copy (DS8000)
- Copyrate (SVC/Storwize)


 UP NEXT

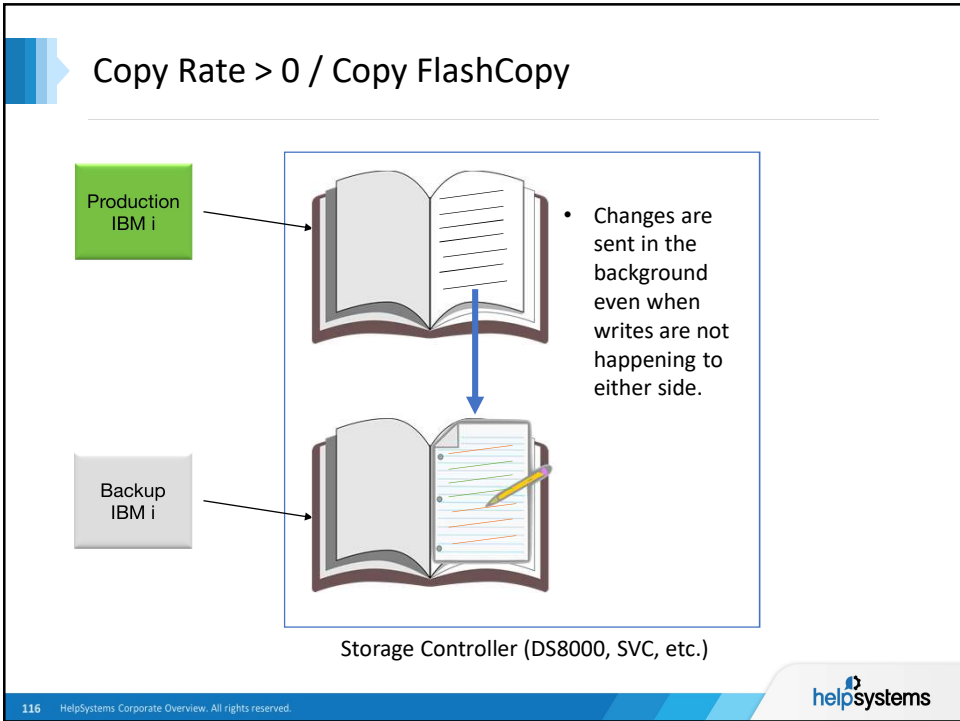
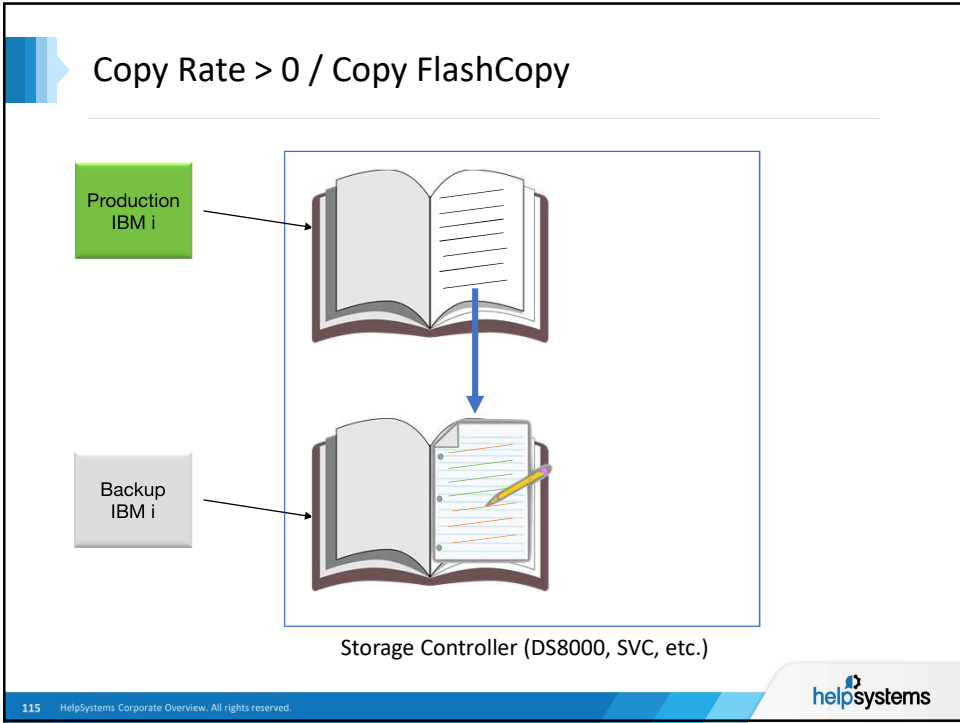
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Copy Rate > 0 / Copy FlashCopy



The diagram illustrates a data replication process. On the left, a green box labeled 'Production IBM i' has an arrow pointing to an open book icon. Below it, a grey box labeled 'Backup IBM i' has an arrow pointing to another open book icon. Both book icons are contained within a larger blue-bordered box. Below this box is the text 'Storage Controller (DS8000, SVC, etc.)', indicating that the books represent data being managed or copied by the storage controller.

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Copy Rate > 0 / Copy FlashCopy

The diagram illustrates the Copy FlashCopy process. On the left, a green box labeled 'Production IBM i' and a grey box labeled 'Backup IBM i' have arrows pointing to two open book icons representing storage volumes. A blue arrow points from the top book to the bottom book, indicating data transfer. The entire process is enclosed in a blue-bordered box labeled 'Storage Controller (DS8000, SVC, etc.)' at the bottom.

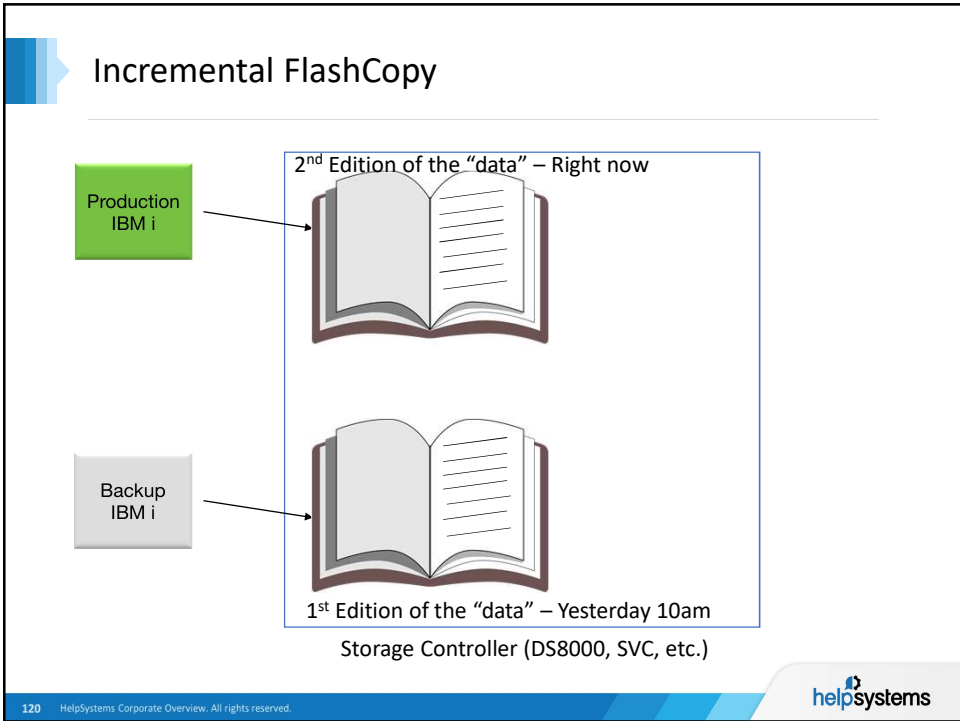
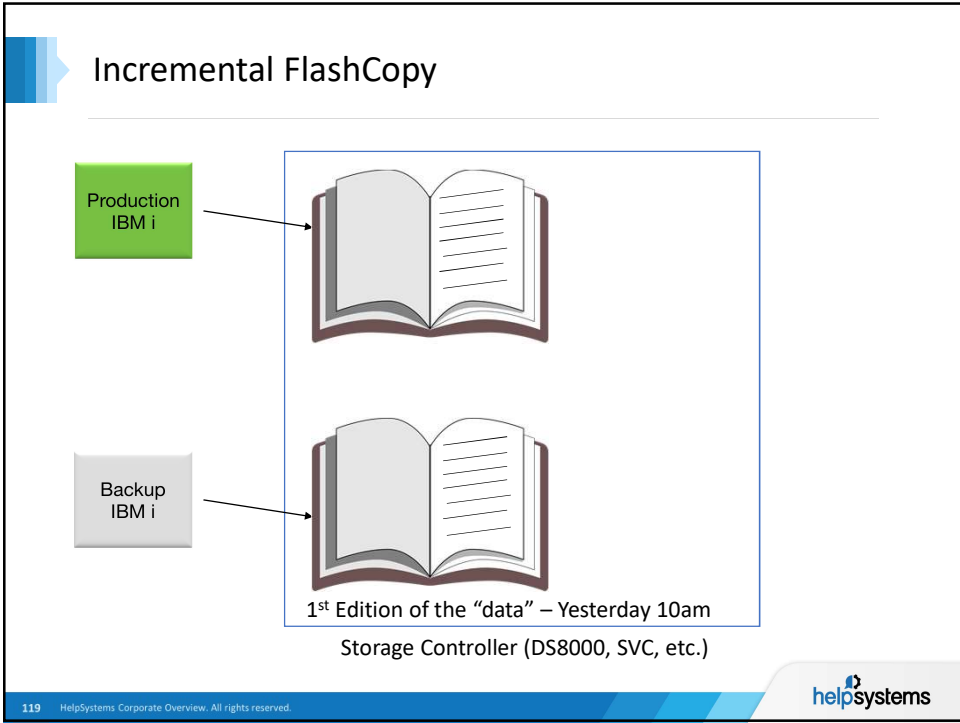
- Changes are sent in the background even when writes are not happening to either side.
- Faster the copy rate, the more potential impact on immediate performance.

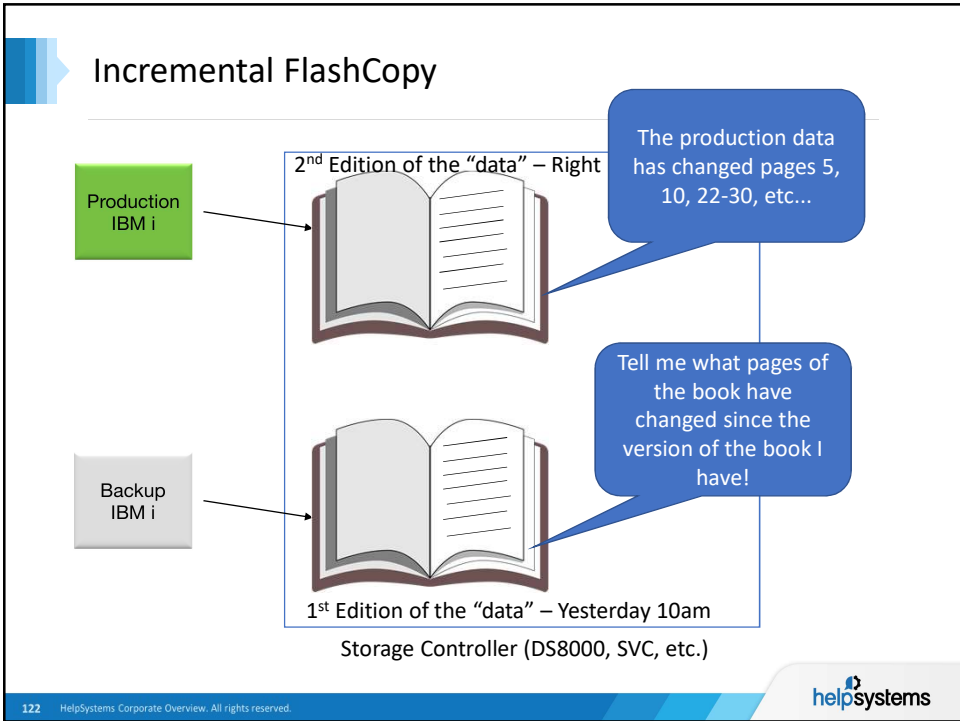
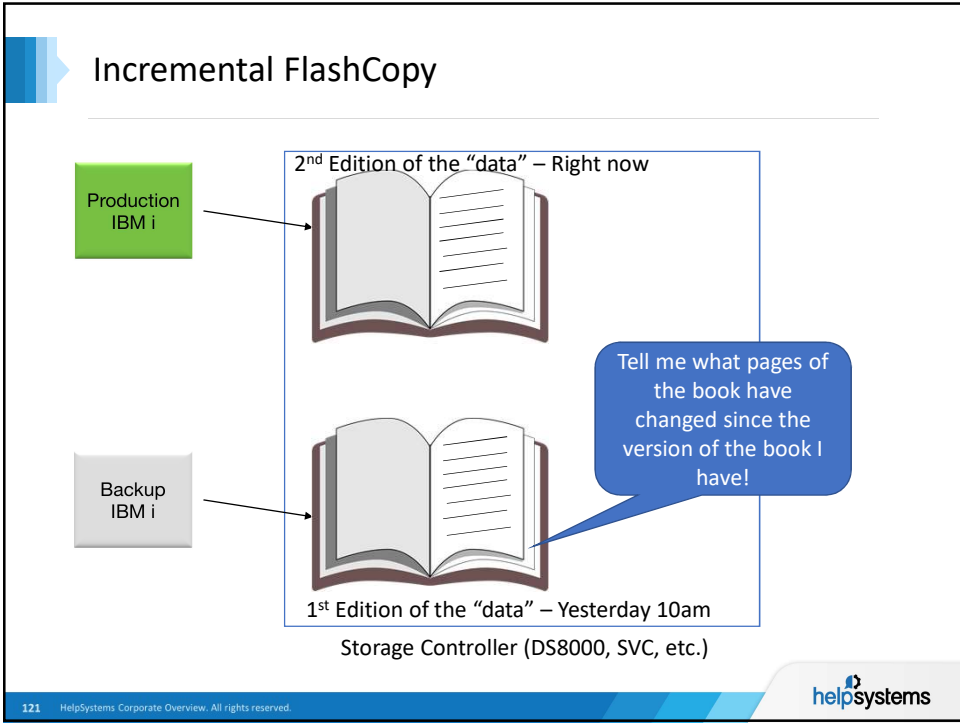
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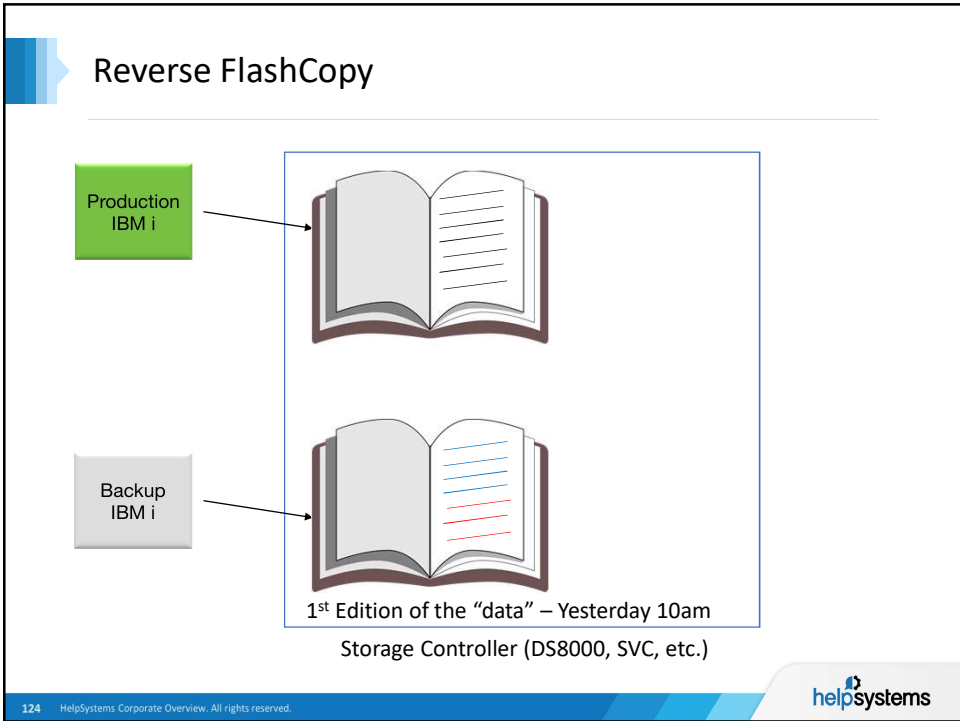
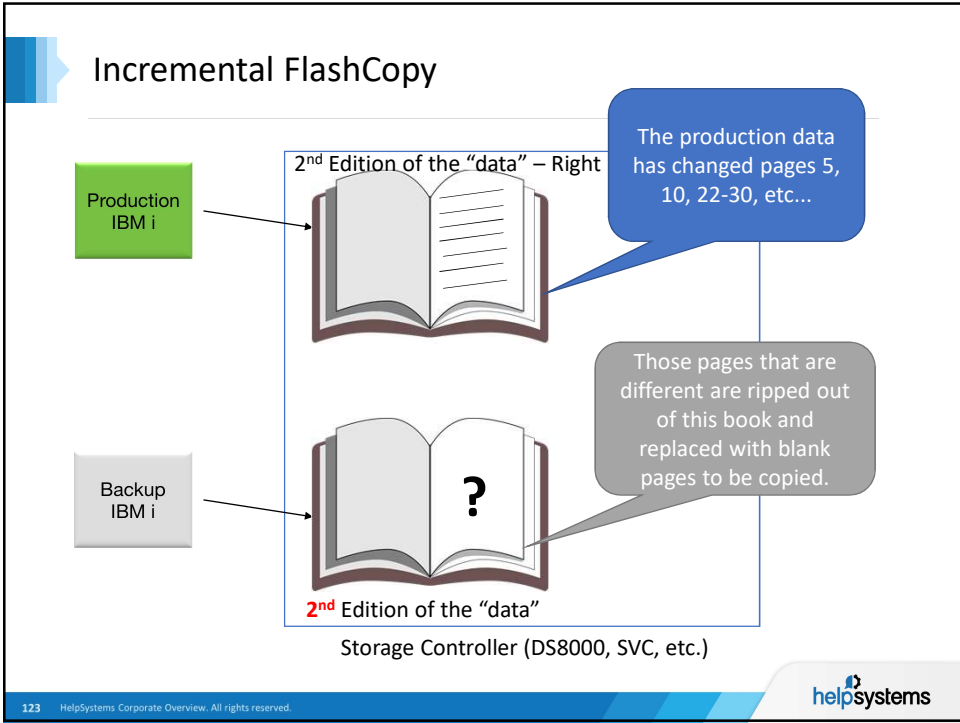
Incremental FlashCopy

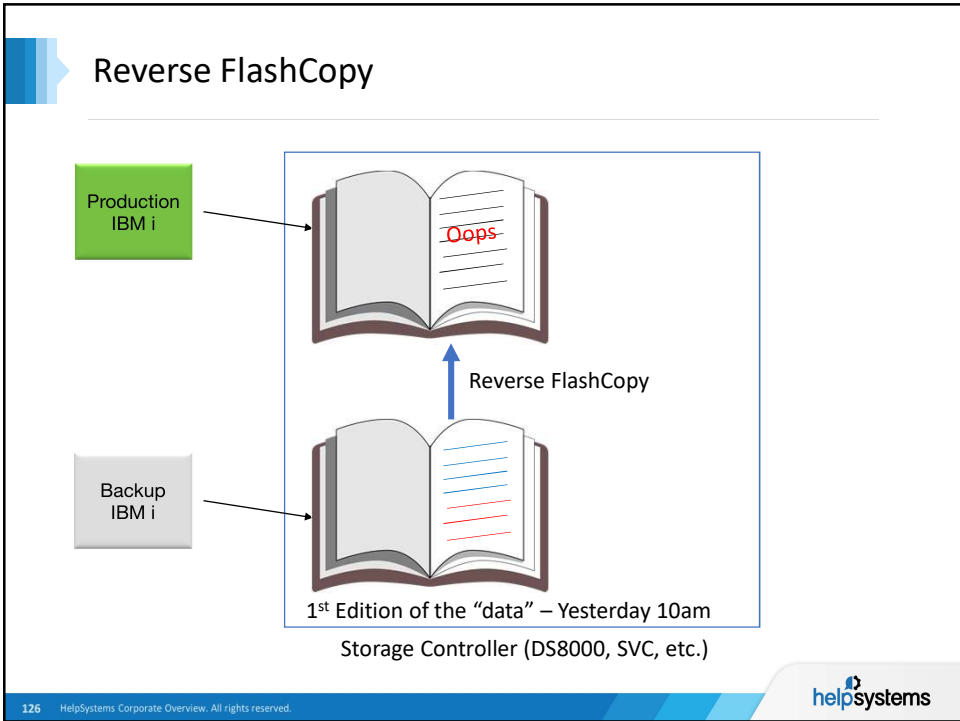
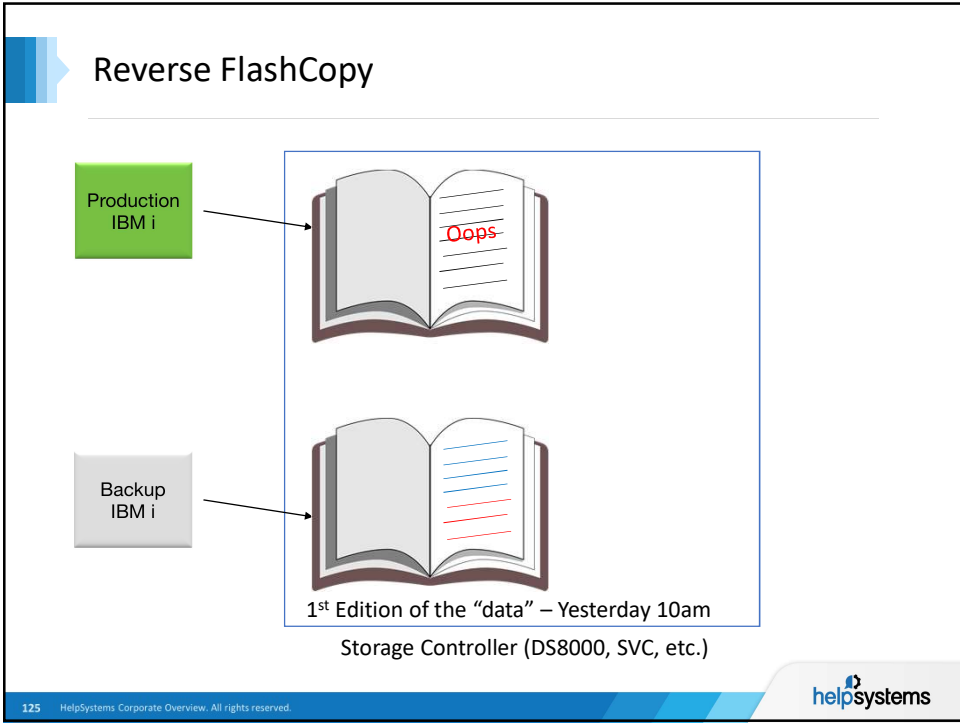
The diagram illustrates the Incremental FlashCopy process. On the left, a green box labeled 'Production IBM i' and a grey box labeled 'Backup IBM i' have arrows pointing to two open book icons representing storage volumes. The entire process is enclosed in a blue-bordered box labeled 'Storage Controller (DS8000, SVC, etc.)' at the bottom.

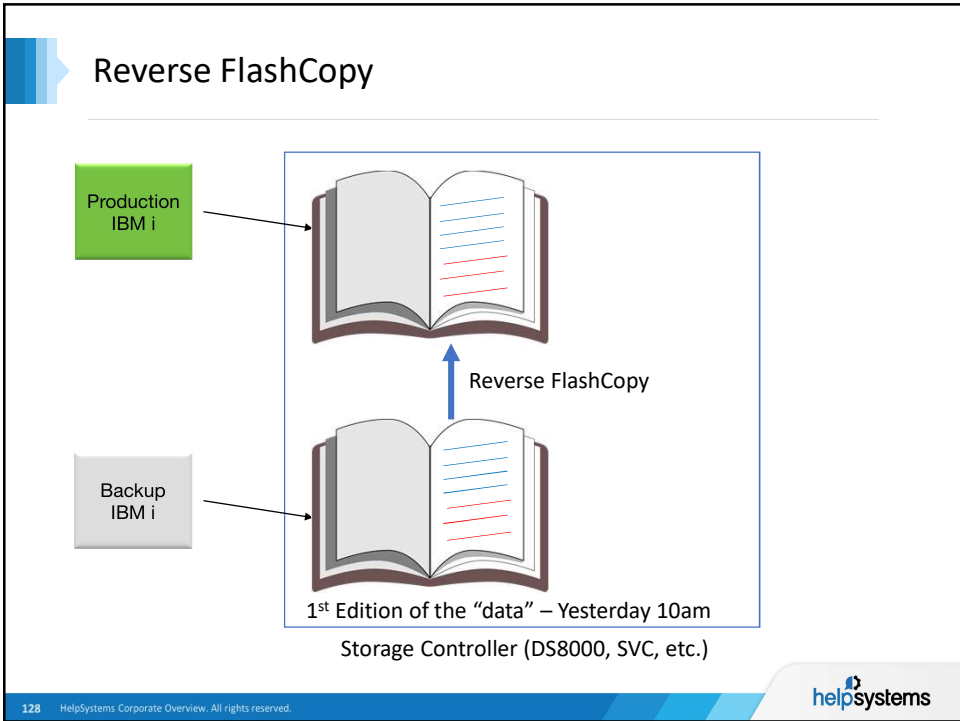
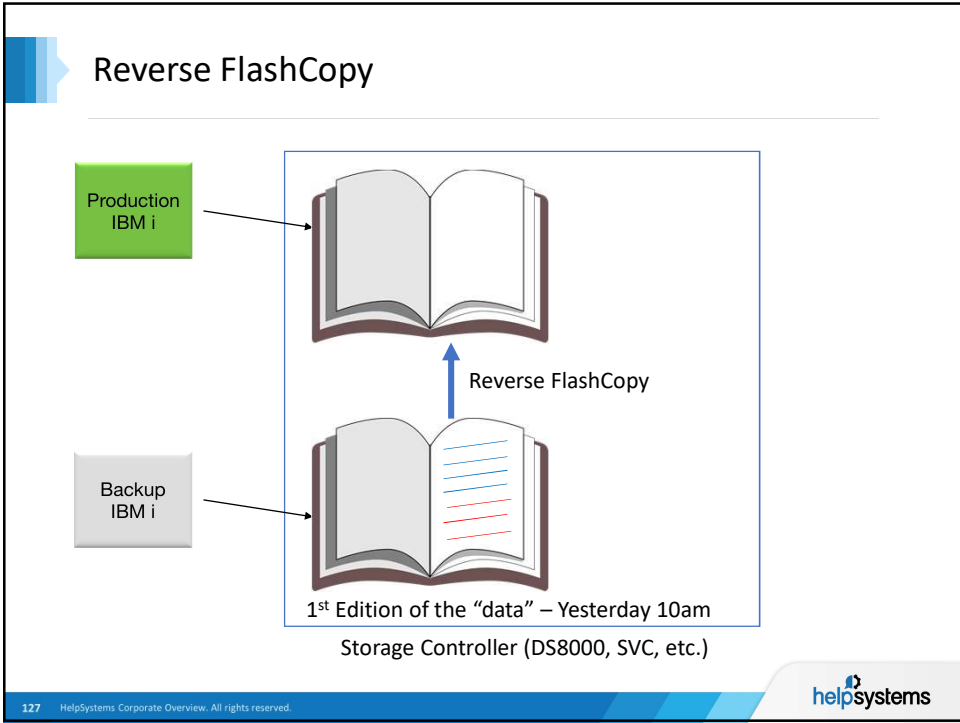
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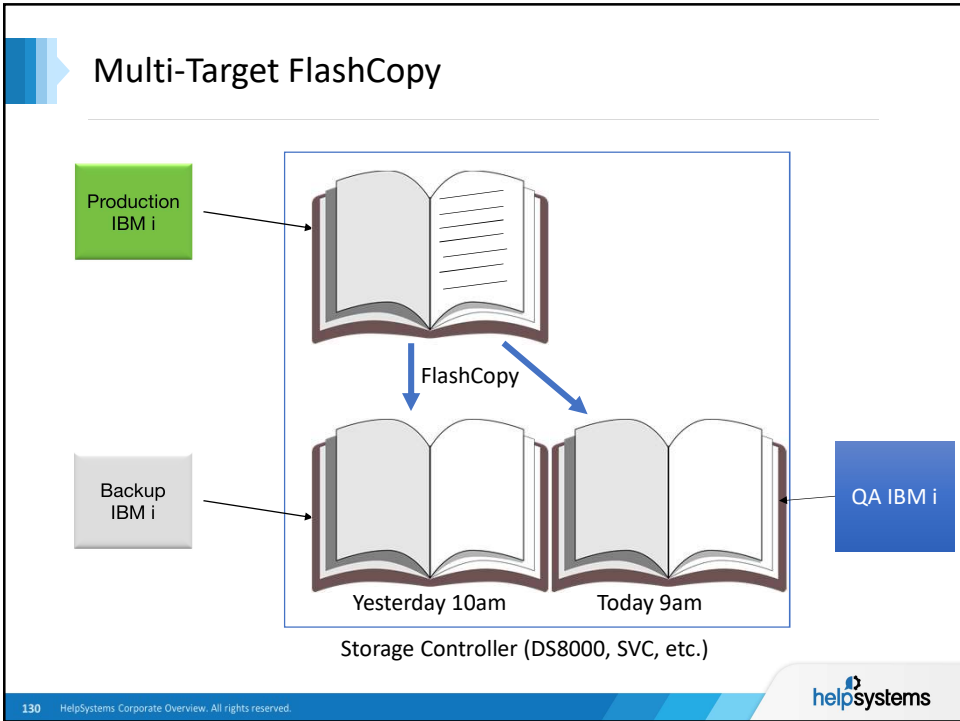
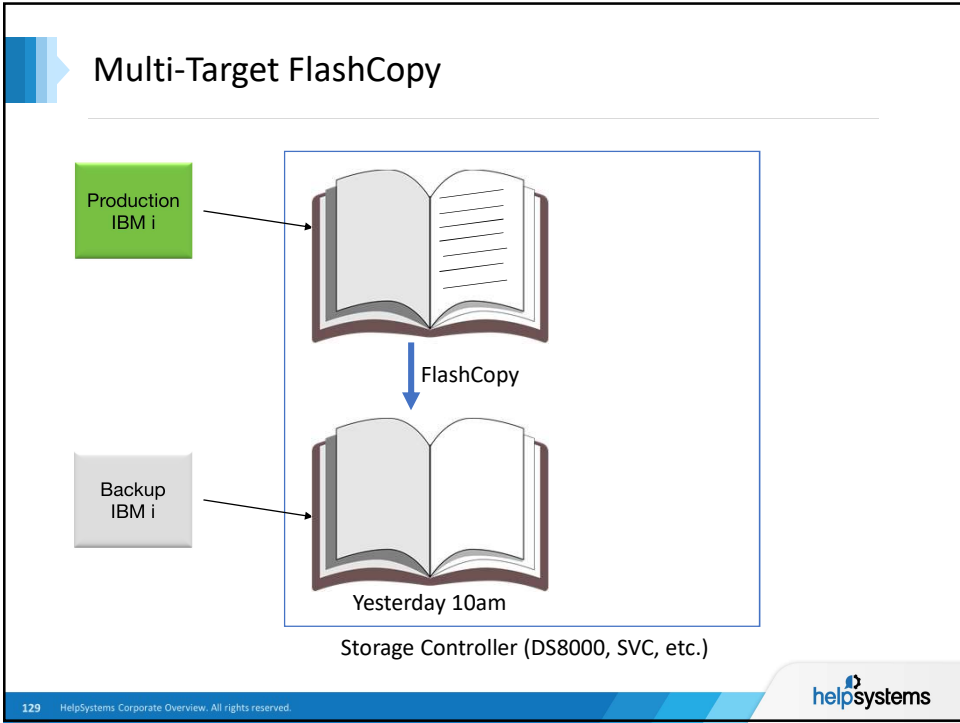


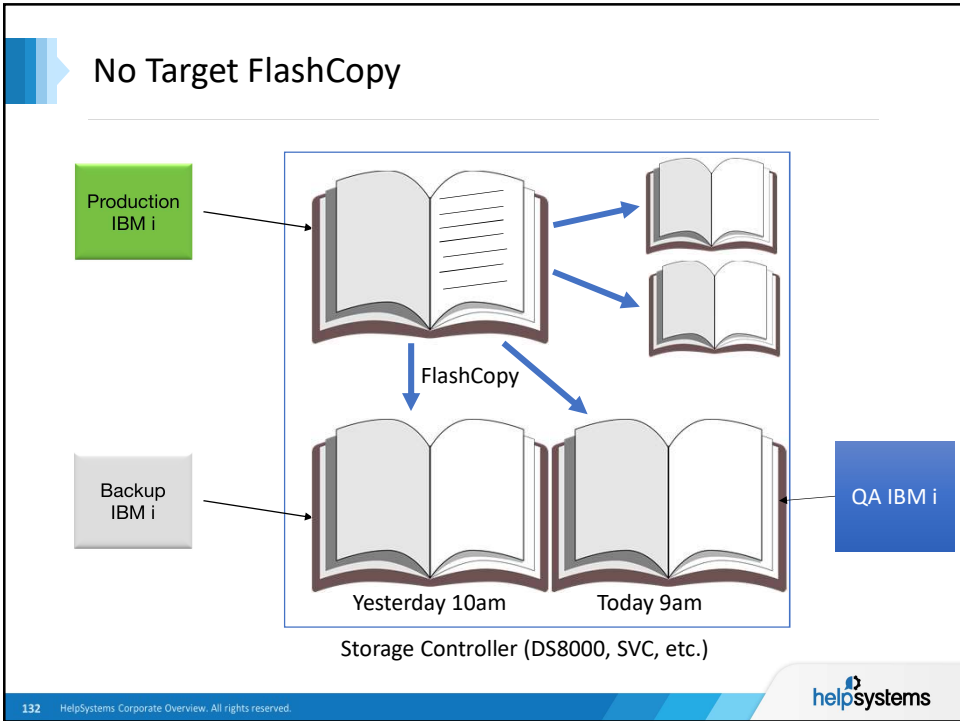
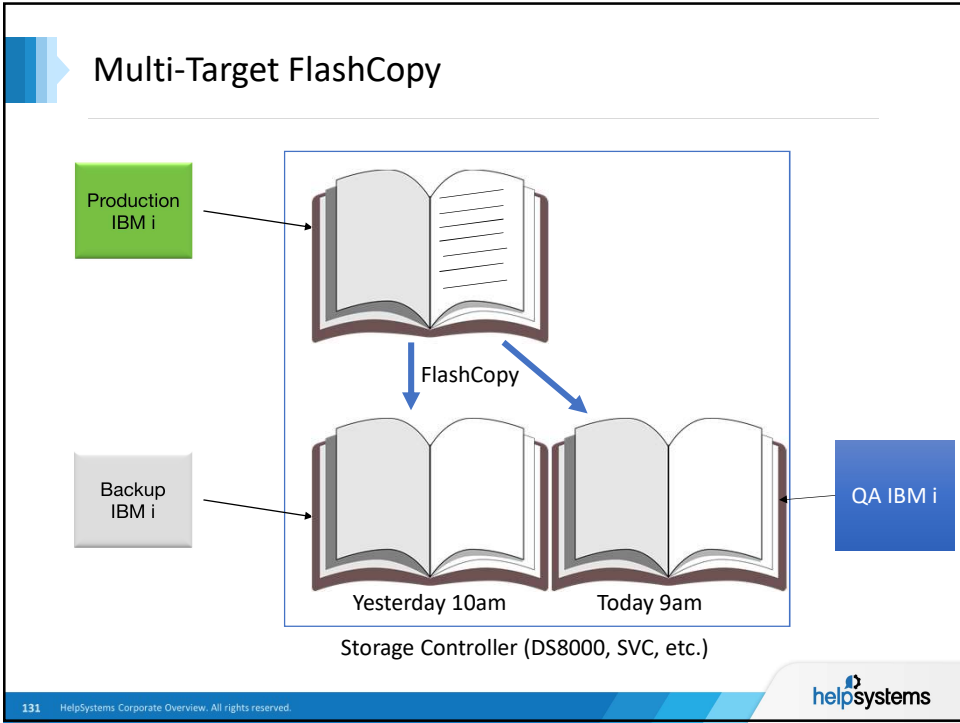














▶ A note on PTFs....

<http://www-01.ibm.com/support/docview.wss?uid=nas8N1020998>

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References

- ▶ PowerHA wiki: www.ibm.com/developerWorks/ibmi/ha
- ▶ Lab Services Full System Copy Services Manager (FlashCopy) Information:
[https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20i%20Advanced%20Copy%20Services/page/Full%20System%20Flashcopy%20\(FSFC\)](https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20i%20Advanced%20Copy%20Services/page/Full%20System%20Flashcopy%20(FSFC))
- ▶ BRMS Full System FlashCopy information:
[https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20Backup,%20Recovery%20and%20Media%20Services%20\(BRMS\)%20for%20i/page/Full%20System%20Flash%20Copy](https://www.ibm.com/developerworks/community/wikis/home?lang=en#!/wiki/IBM%20Backup,%20Recovery%20and%20Media%20Services%20(BRMS)%20for%20i/page/Full%20System%20Flash%20Copy)

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Summary

- ▶ RTO is important, so is RPO – you need them for every outage type.
- ▶ Talked about the different flavors of PowerHA
 - ▶ Geographic Mirroring, Metro Mirror/Global Mirror, LUN Switching, etc.
- ▶ FlashCopy for Full System or IASPs

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Questions?



 UP NEXT

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