GDPS Overview: Availability, Disaster Recovery, and Cyber Resiliency for z/OS, z/VM, and Linux on Z

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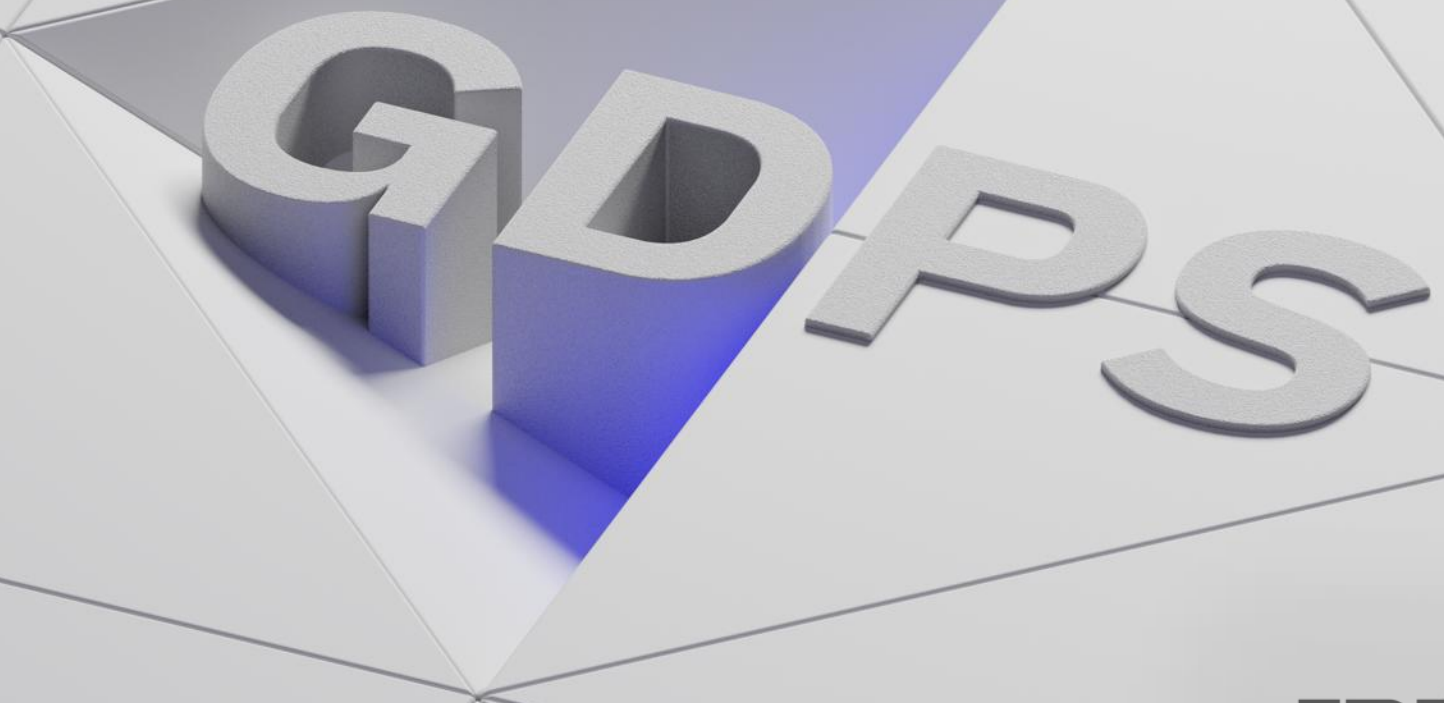


VM Workshop
June 10-12, 2026

IBM

Agenda

Early solutions that exploited mirroring to provide HA and DR

Catalyst for change

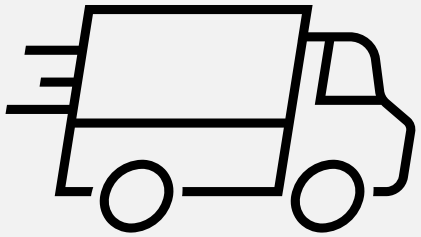
New requirements for even higher levels of resilience

What’s next?

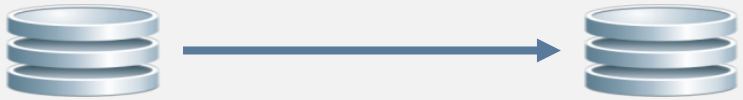
Early solutions that exploited mirroring to provide DR

Disaster Recovery prior to mirroring

Prior to mirroring, there was PTAM (Pickup Truck Access Method)



In the late 90's, mirroring was introduced



- Significantly reduced RPO – dictated by mirroring latency vs. backup frequency
- Significantly reduced RTO – hauling tapes to the DR site and restoring the entire environment from tape eliminated

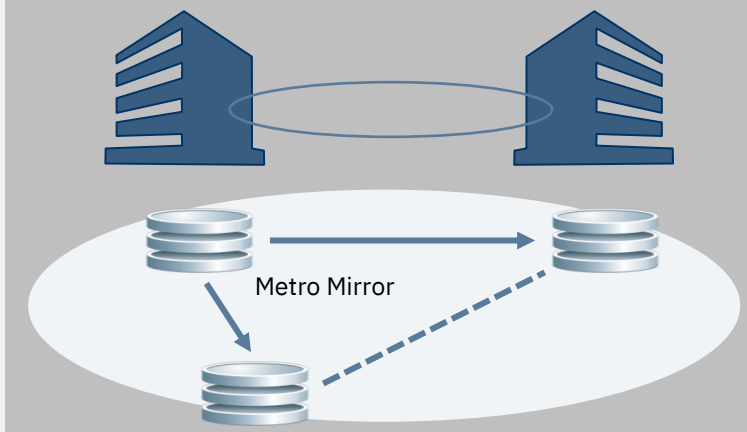
GDPS Metro

- Maintains up to three copies of data synchronously replicated
- Provides near-continuous availability and DR in a single data center or in a two data center environment within Metro Mirror distances
- Supports RTO of about 2 minutes (Multi-Site Workload) / less than one hour (Single-Site Workload) and RPO of zero
- Provides autonomic recovery for primary disk failures and CEC failures
- Provides Sysplex and server management in addition to storage replication and recovery management
- Automates management of temporary capacity on demand (Flexible Capacity for Cyber Resiliency, CBU, OOCoD, CPE, BOOST)
- Provides FlashCopy capabilities for resync protection and offline backup
- Protects Linux on IBM Z environments (z/VM, KVM, and native in LPAR) as well as Secure Service Containers
- Monitors the environment and reports on events that could prevent rapid recovery

Continuous availability (CA) and disaster recovery (DR) within a metropolitan region

Two/three data centers (2 server sites, 3 disk locations)

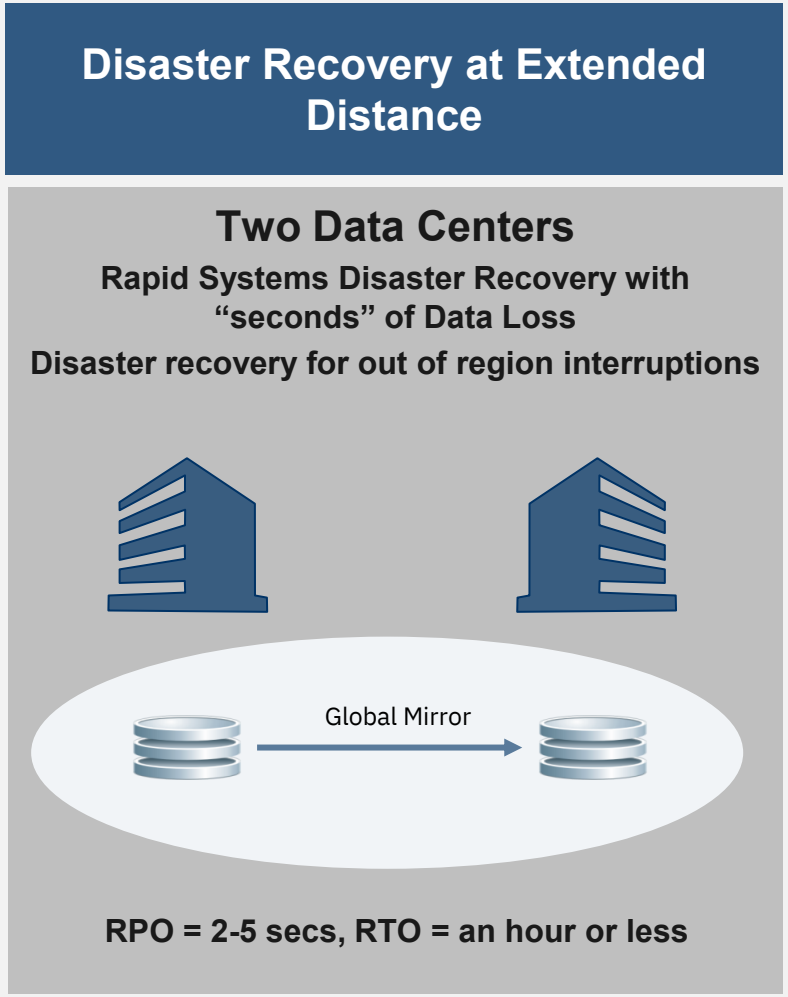
Multi-site workloads can withstand site and/or storage failures



RPO = 0 and RTO ≈ 2 mins / < 1 hour

GDPS Global – GM

- Automates management of the Global Mirror technology
- Manages multiple consistency groups (scalable)
- Automates recovery of the IBM Z applications at the recovery site
- Supports RTO of less than one hour and a RPO as low as two seconds
- Uses FlashCopy management for data protection and to facilitate data recovery testing with minimal impact to DR position
- Automates management of temporary capacity on demand (Flexible Capacity for Cyber Resiliency, CBU, OOCoD, CPE, BOOST)
- Monitors the environment and reports on events that could prevent rapid recovery



catalyst for change

Catalyst for change

- In the late 1990's, early 2000's, a large majority of GDPS clients used GDPS Metro across two metro sites, many within 10 KMs due to ESCON limitations
- Interagency Paper on Sound Practices to Strengthen the Resilience of the U.S. Financial System [Docket No. R-1128] (April 7, 2003):
  - *Maintain sufficient geographically dispersed resources to meet recovery and resumption objectives*
  - *Routinely use or test recovery and resumption arrangements*

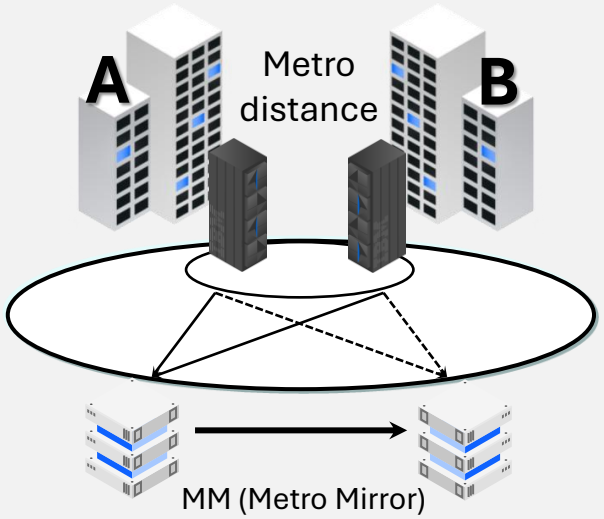
IBM GDPS Portfolio

GDPS Metro

Near-continuous availability and recovery at metro distances

Systems remain active

Multisite workloads can withstand site and storage failures

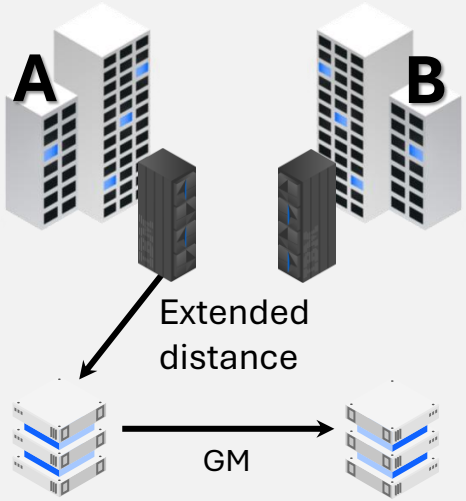


RPO 0 & RTO <60 min

GDPS Global

Disaster recovery at extended distance

Rapid systems DR with "seconds" of data loss

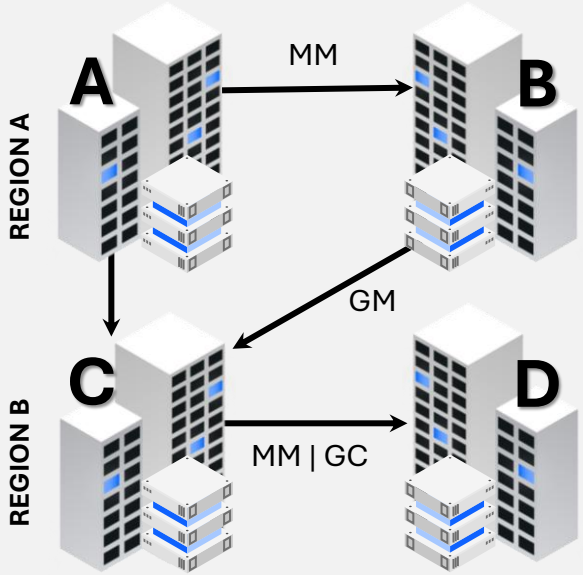


RPO 3-5 sec & RTO <60 min

GDPS Metro Global

Near-continuous availability regionally & recovery for 3-4 sites

Metro near-continuous availability and out of region disaster recover

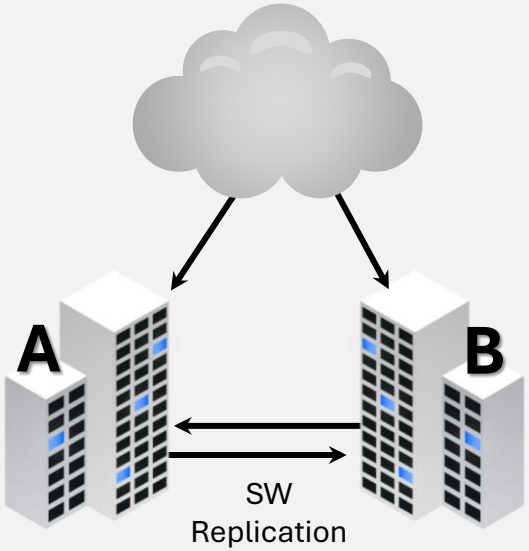


RPO 3-5 sec & RTO <60 min

GDPS Continuous Availability

Near-continuous availability, recovery & workload balancing

Continuous availability at unlimited distances



RPO 3-5 sec & RTO <60 sec

Basic functions

User Interface: 3270 & GUI and enterprise portal

OS / LPAR / CECs Management: Activate / Deactivate / Load LPARs (including CF & SSC), Start / STOP OS instances

Replication Management: start, stop, resynch, & reconfiguration for site / region switching / synch & asynch disk replication

Sysplex Management: Couple Datasets (CDS) & Coupling Facilities (CF) (including structures)

Workflows – orchestrates a set of actions to provide repeatable results (e.g., planned / unplanned site / region switch)

Monitoring & Heath Checks – verify that the environment is healthy and optimized for best practices

RESTful API – programmatically pass policy to GDPS, tell GDPS what to do, and get status from GDPS

Additional features designed to address different requirements

z/OS proxy – provides CA / DR for mono-plexes and disk sharing with systems outside the sysplex

GDPS Hyperswap manager(HM) - Entry level solution, cost-effective for DR without systems management and automation

Logical Corruption Protection (LCP Manager) – protects against cyber attacks through

Safeguarded Copy Management and verification

Testcopy Manager (TCM) – creates a consistent copy of data for testing (can be used in conjunction with zBUrST for application stress testing)

Dual Leg – provides two synchronous legs for maximum metro CA / DR

GDPS Continuous Availability ZDL – provides no data loss capability at metro and unlimited distance topologies

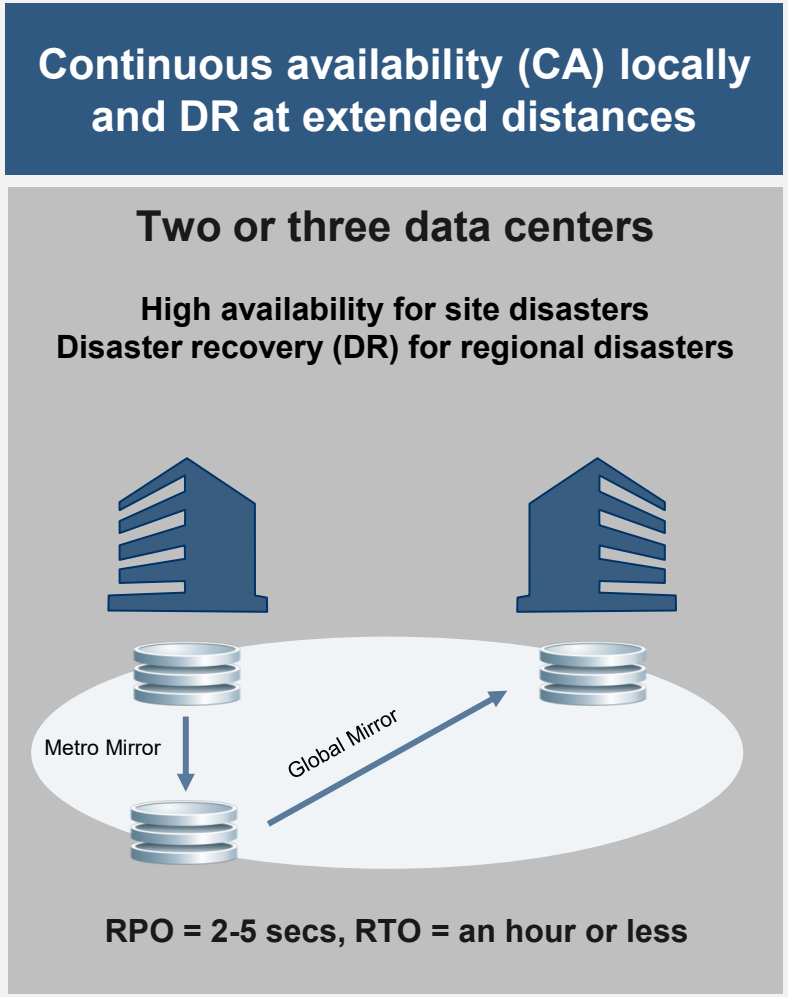
Multiplatform Resiliency (xDR)

- Extends CA and DR capabilities that are provided by GDPS Metro to other platform/operating systems, running on IBM Z servers.
- Supports z/VM, KVM, Linux in LPAR, SSC/IDAA , Red Hat OpenShift

GDPS Metro Global – GM 3-site
(aka MGM 3-site)

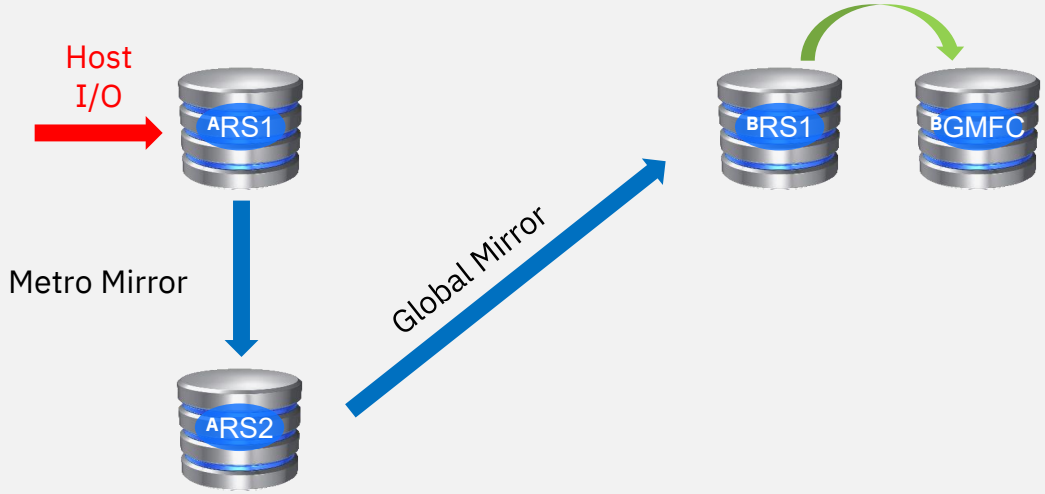
- Provides continuous availability and long-distance DR in a two or three data center environment
- Supports RTO of less than one hour and RPO of zero for local failure events
- Supports RTO of less than one hour and RPO as low as two seconds* for regional failure events
- Monitors and manages all sites from a single point of control
- Powerful scripting commands that highly automate recovery operations
- Automated DR testing with minimal impact to RPO

*RPO (Data loss) is workload and bandwidth-dependent

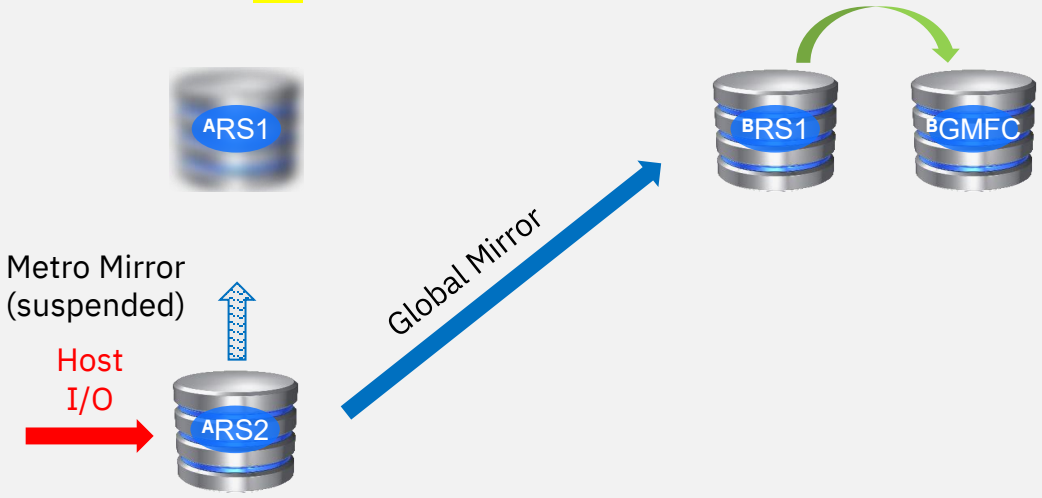


Scenarios – HyperSwap while running cascaded

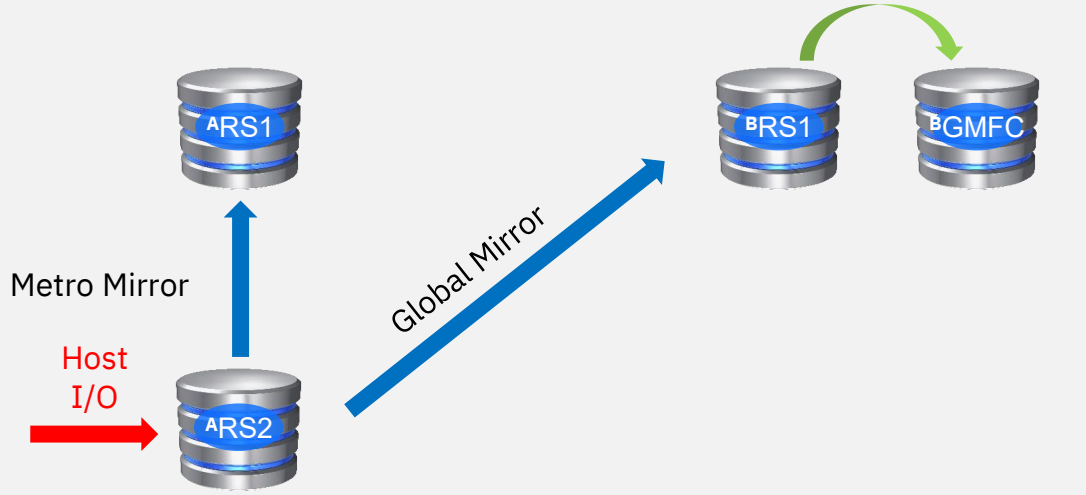
1. Starting config - cascaded



2. After HyperSwap

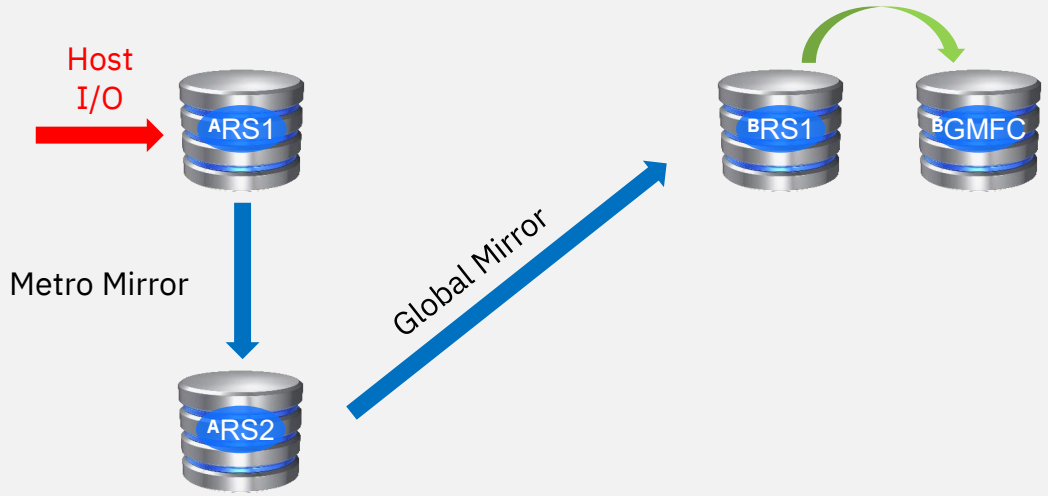


3. After resync – multi-target config



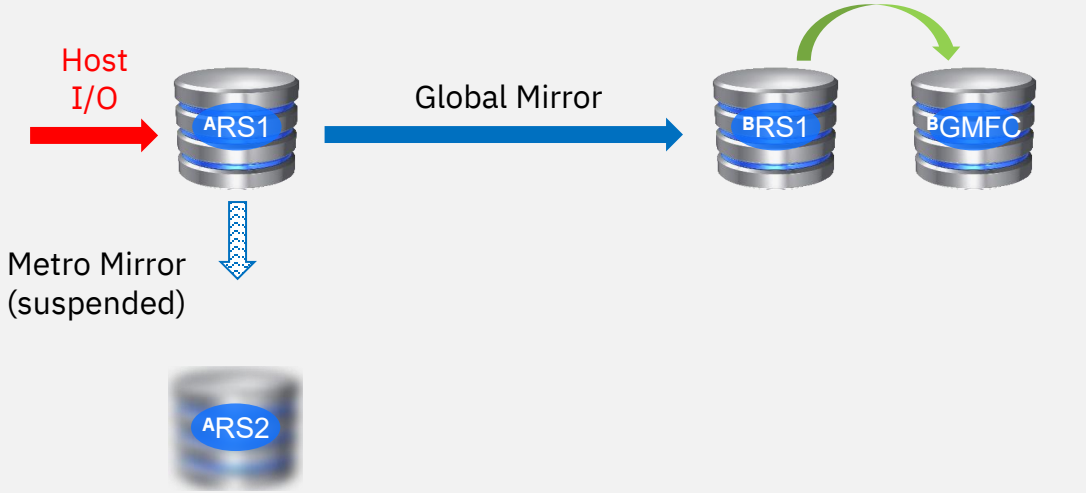
Scenarios – Loss of A.RS2

1. Starting config - cascaded

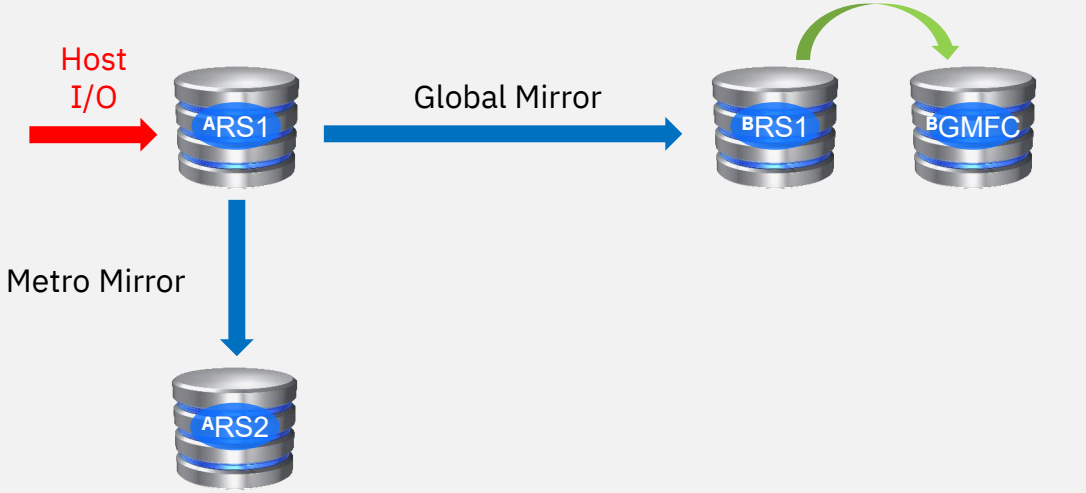


2. ARS2 is lost

3. After GM incremental resync



4. After MM resync – multi-target



New requirements for even higher levels of resilience

Requirements become more stringent

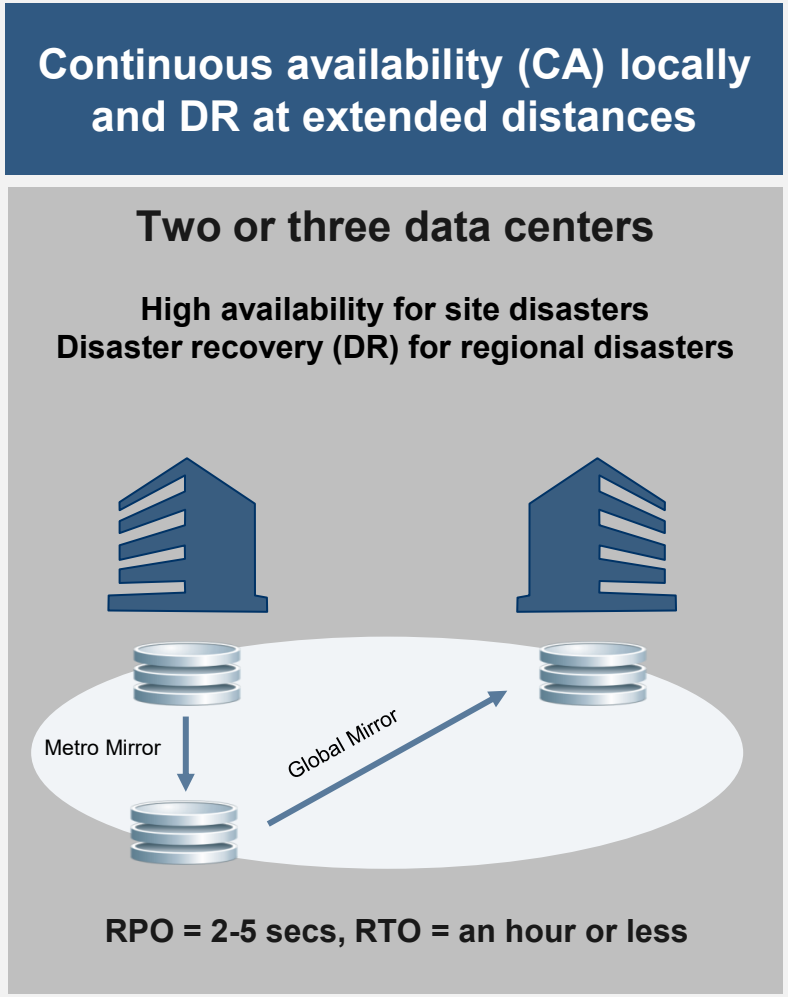
- Clients hesitant to declare DR…

  DR testing doesn’t provide sufficient confidence that production can actually run in the DR region under peak workloads

- Financial services sector clients being encouraged by regulators perform regular region toggles that verify DR capability, that prove production can run in the DR region under peak workloads, and that demonstrates ability to return home after a DR event…Region Toggle (aka “switch and stay”)
- DORA in Europe

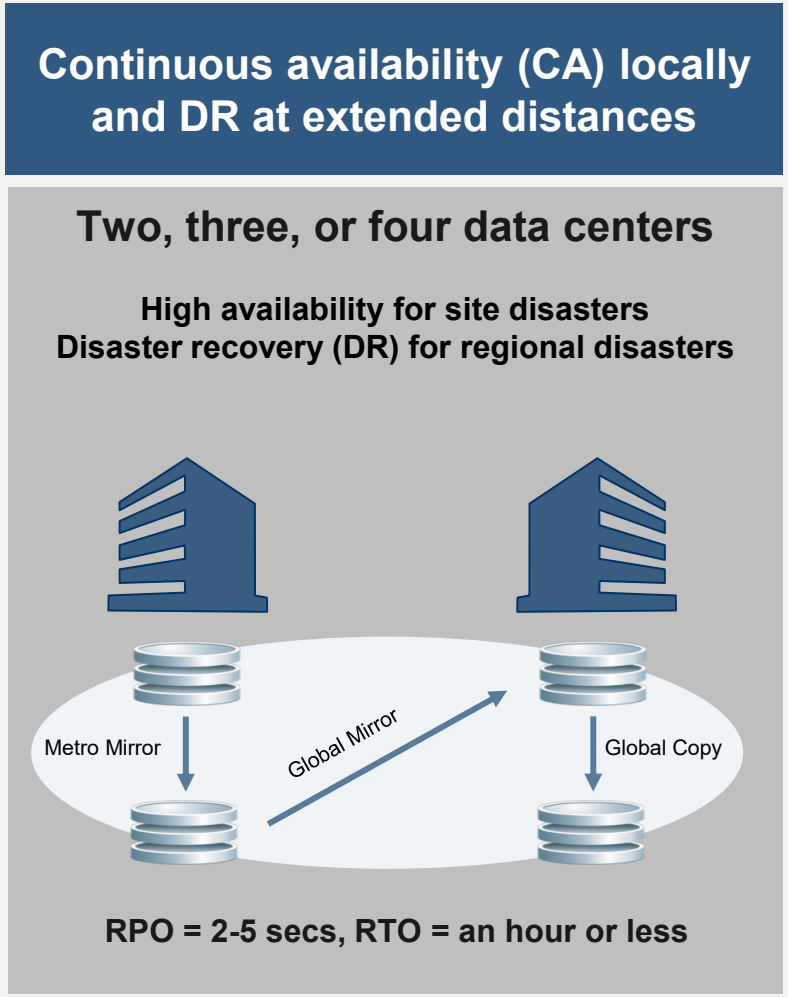
Switch and stay in a GDPS Metro Global – GM 3-site environment not desirable

- DR data center does not provide the same level of resilience as the production data center
  - Only one copy of data, no HA for storage
- Different operational procedures
  - GDPS Metro running and managing systems and sysplex resources in production data center, no GDPS Metro running in the DR data center
- No DR protection while running in the DR data center



GDPS Metro Global – GM 4-site
(aka MGM 4-site)

- Provides continuous availability and long-distance DR in a two, three, or four data center environment
- Supports RTO of less than one hour and a RPO as low as two seconds*
- Monitors and manages all sites from a single point of control
- Powerful scripting commands that highly automate recovery operations
- Symmetric configuration provides same levels of resilience and same operational procedures in both regions – facilitating region toggle (“switch and stay”)

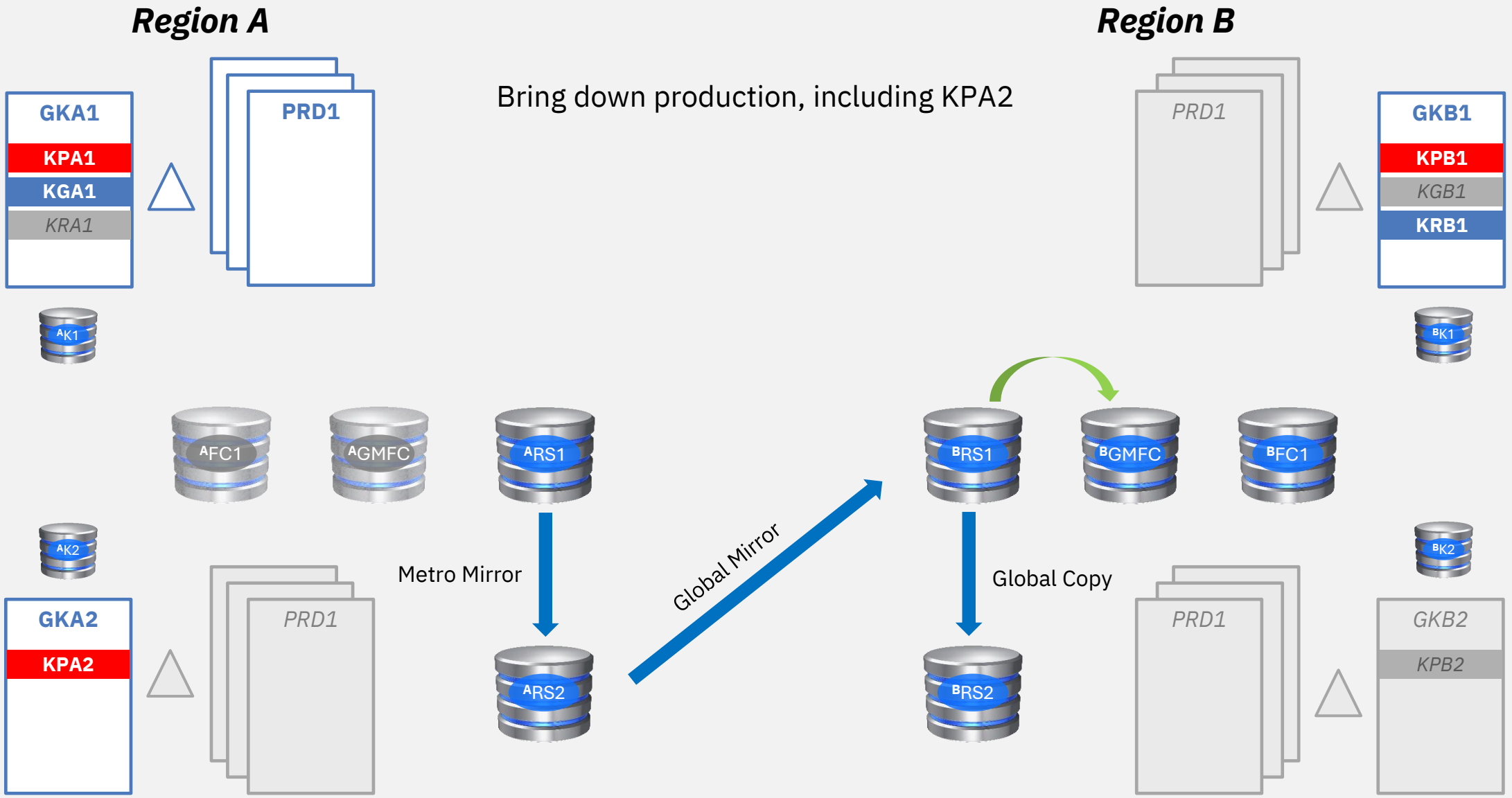


*RPO (Data loss) is workload and bandwidth-dependent

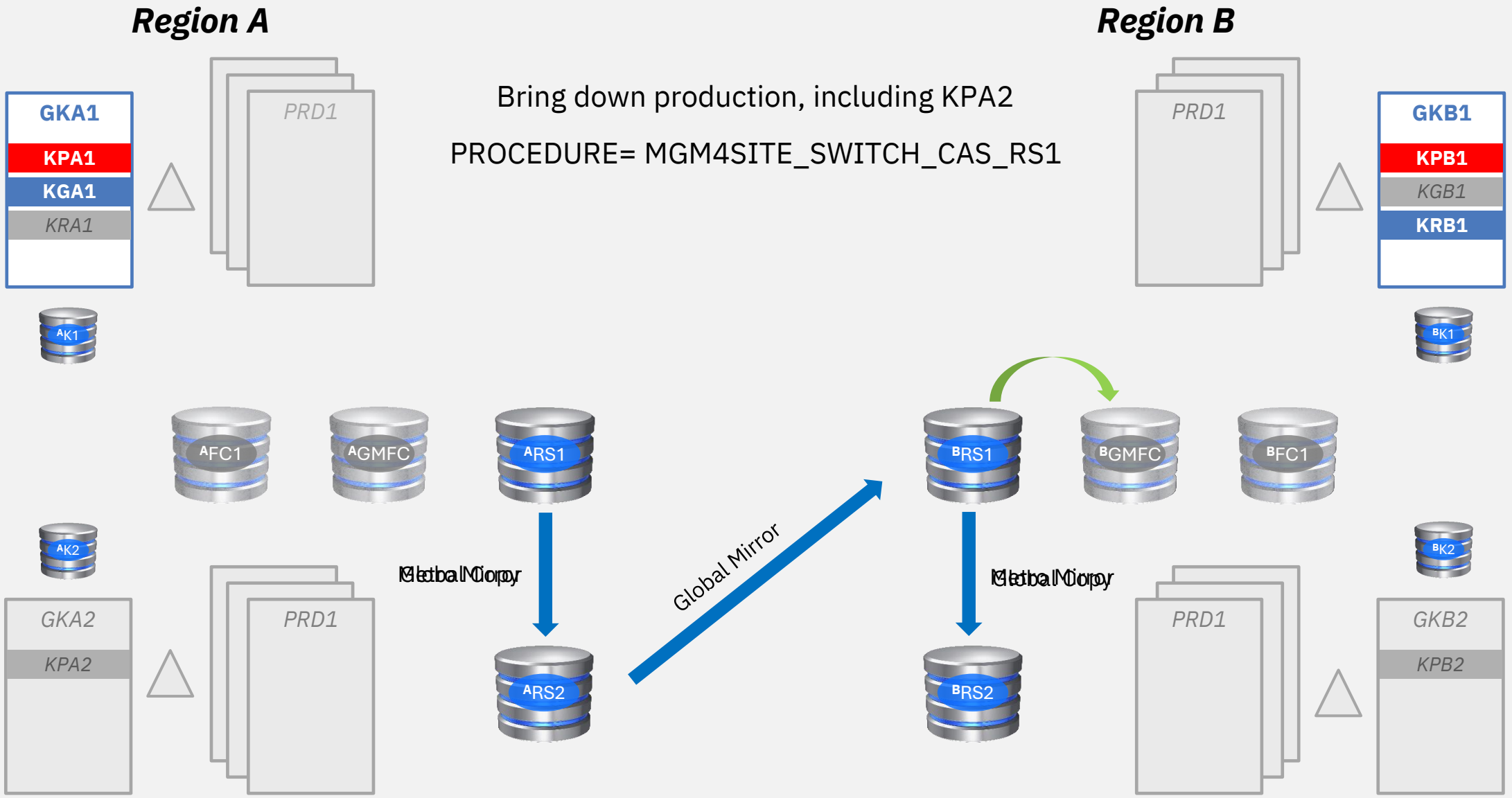
4-site scenarios

- All the 3-site scenarios, regardless of which region production is running in
- Region toggle (switch and stay)

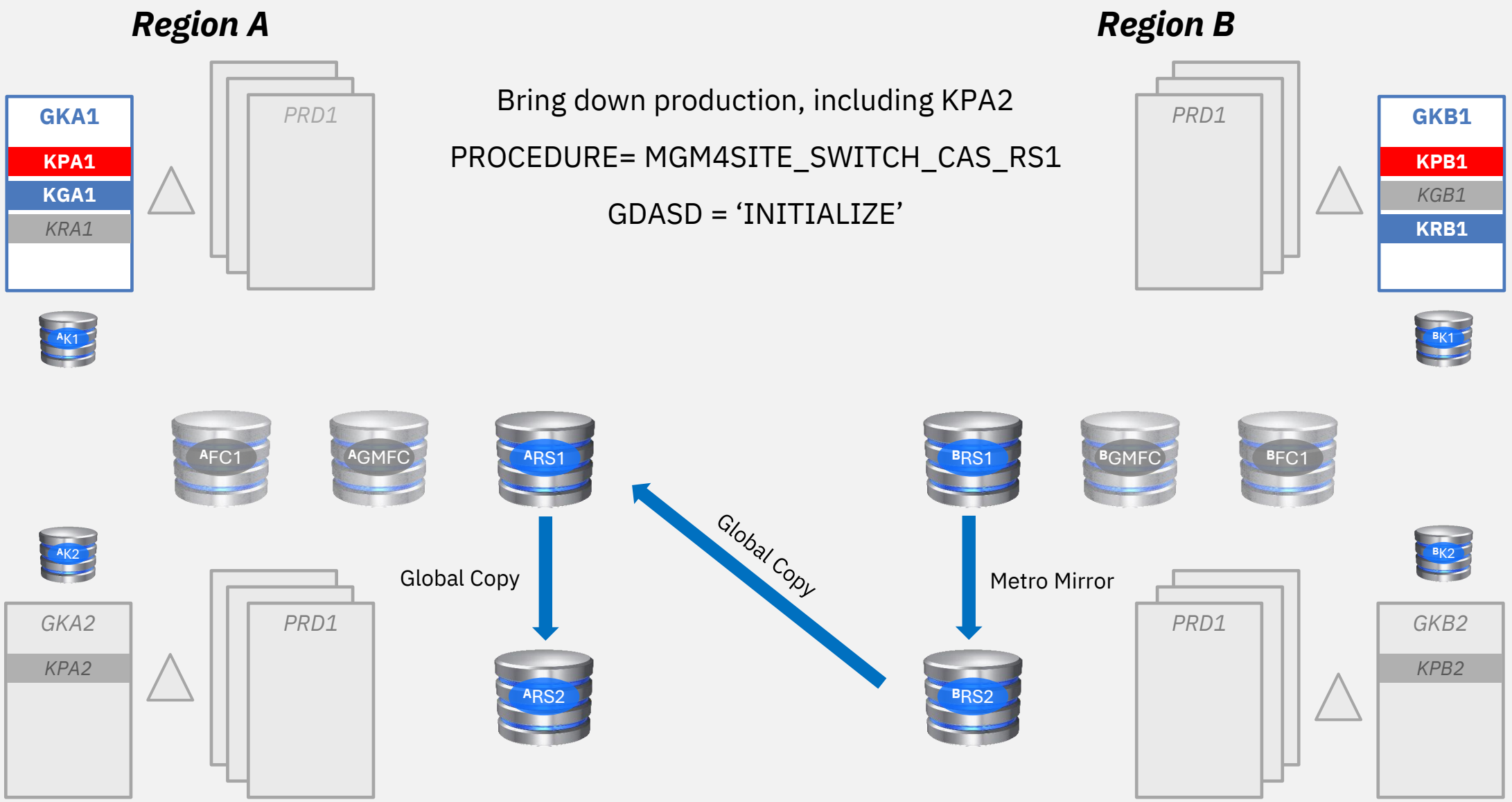
Planned region switch - MGM 4-site



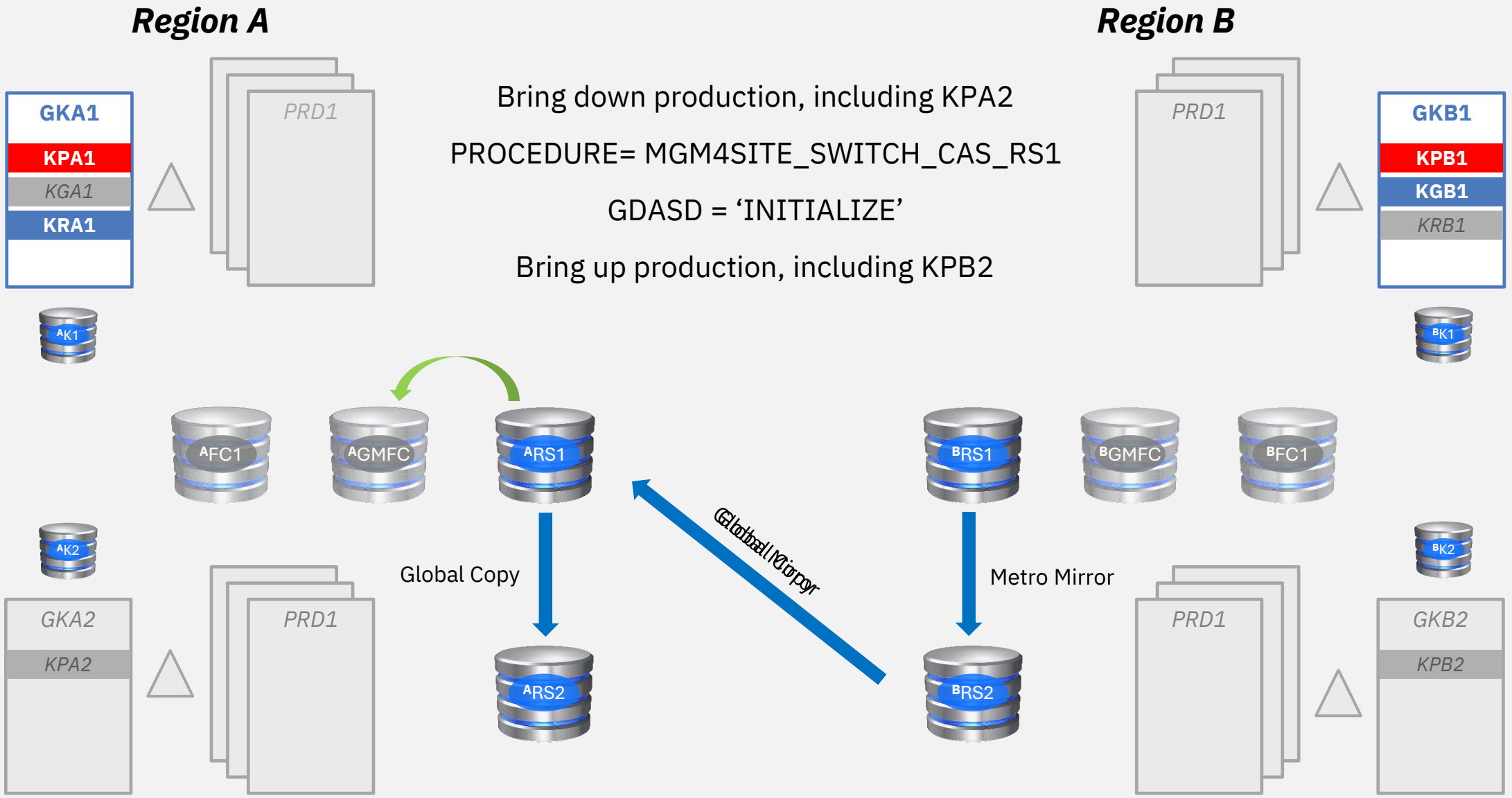
Planned region switch - MGM 4-site



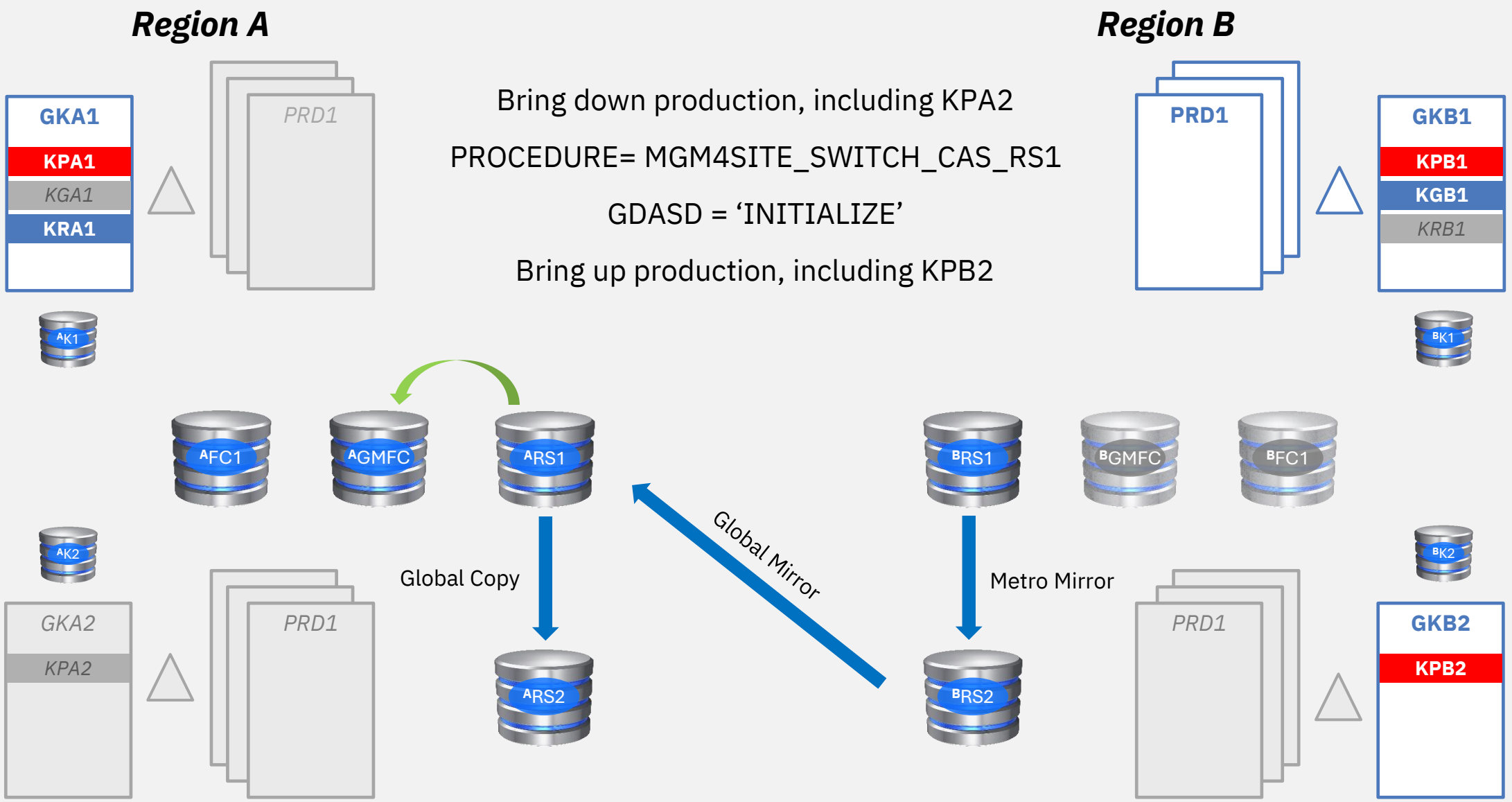
Planned region switch - MGM 4-site



Planned region switch - MGM 4-site



Planned region switch - MGM 4-site



Powerful scripting capabilities

- Script statements and procedures to manage disk reconfiguration
  - Intelligence to query the environment to determine starting position (cascaded or multi-target)
  - Perform required actions based on that position
- Procedures are provided to support a number of scenarios, for example
  - Planned region switch and return home
  - Unplanned recovery in Recovery Region (real DR event) and return home
  - DR validation test on Recovery Region FC1 or X-disk
  - Move GM sessions incrementally when GM primary is lost
- Distributed Systems Hardware Management Tool
  - Connect, monitor, manage any resource with a SSH connection capability

Resiliency requirements continue to get more stringent

GDPS Metro provides:
- Continuous availability
  ....BUT at limited distance

Clients need:
- UNLIMITED distance between sites for protection against regional failures

GDPS Global provides:
- Disaster recovery at unlimited distance
  ...BUT no continuous availability
  - Must switch whole site, impacting all business operations
  - Full recovery could take over an hour

Clients need the ability to:
- Switch a failed workload or all workloads in less than 30 seconds
- Keep critical workloads available during planned outages

RTO of seconds across unlimited distance not possible with the traditional failover model of recovery

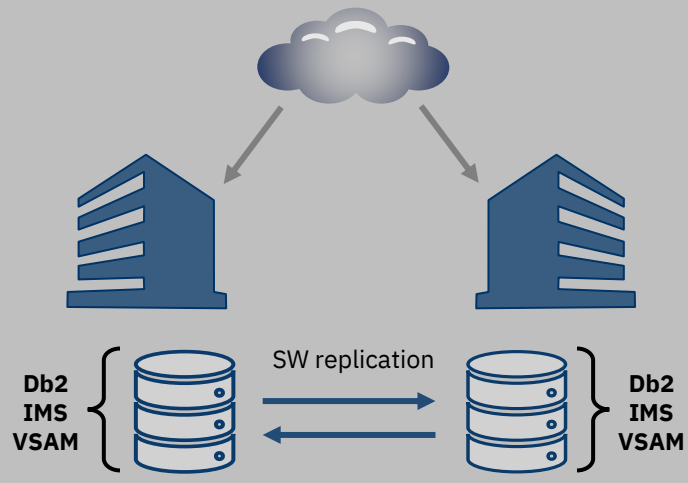
GDPS Continuous Availability
for OLTP workloads

- Manages availability at a workload level
- Provides a central point of monitoring and control
- Manages replication between sites at any distance
- Provides the ability to perform a controlled workload site switch
- Recovery time and recovery point objectives – measured in seconds
- Provides near-continuous availability and simplifies disaster recovery with an automated, centralized solution
- Facilitates better regulatory compliance management

Near continuous availability at extended distance

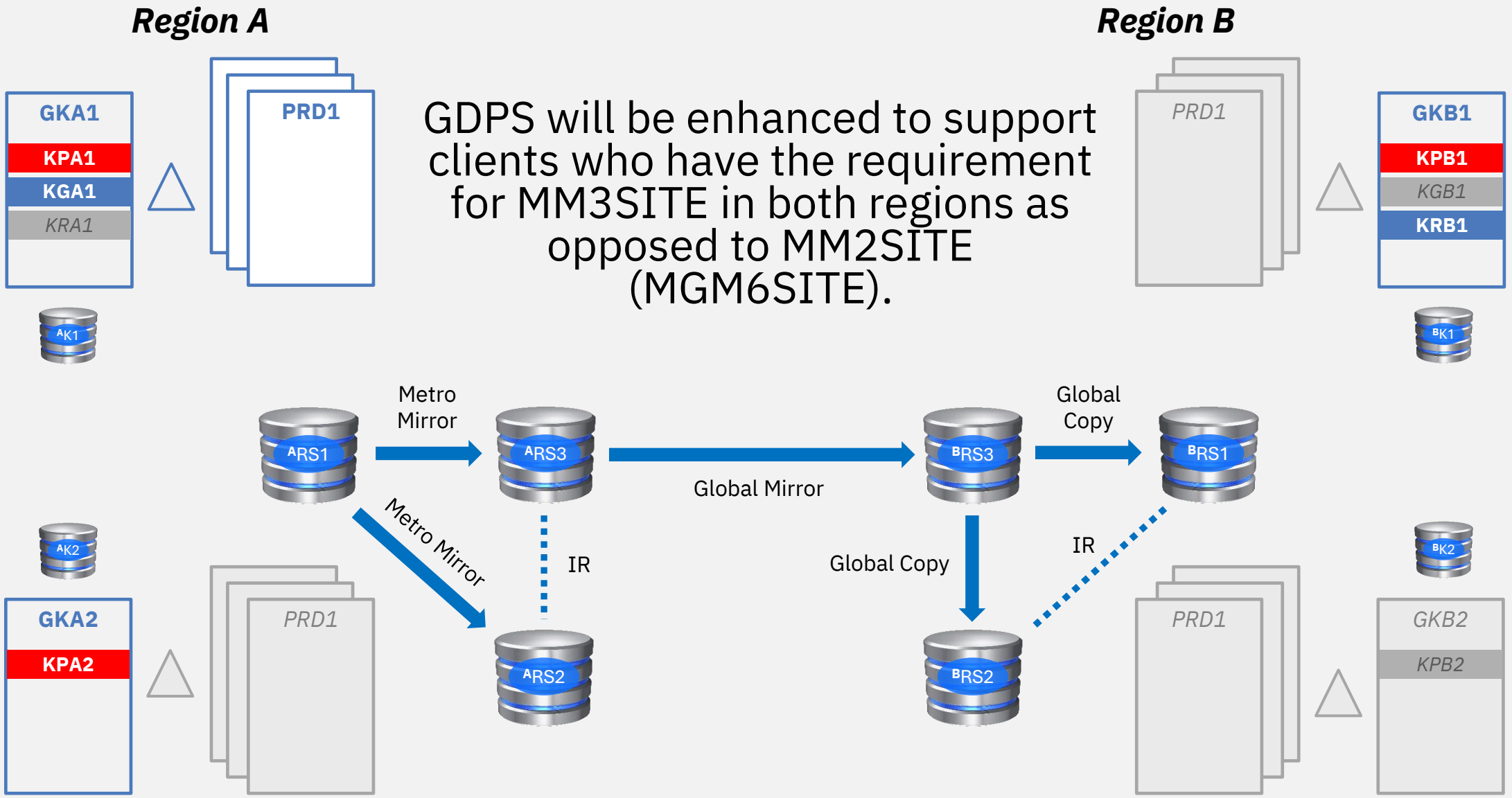
Two data centers, two distinct Sysplexes

Workload balancing, continuous operations and recovery for out of region interruptions

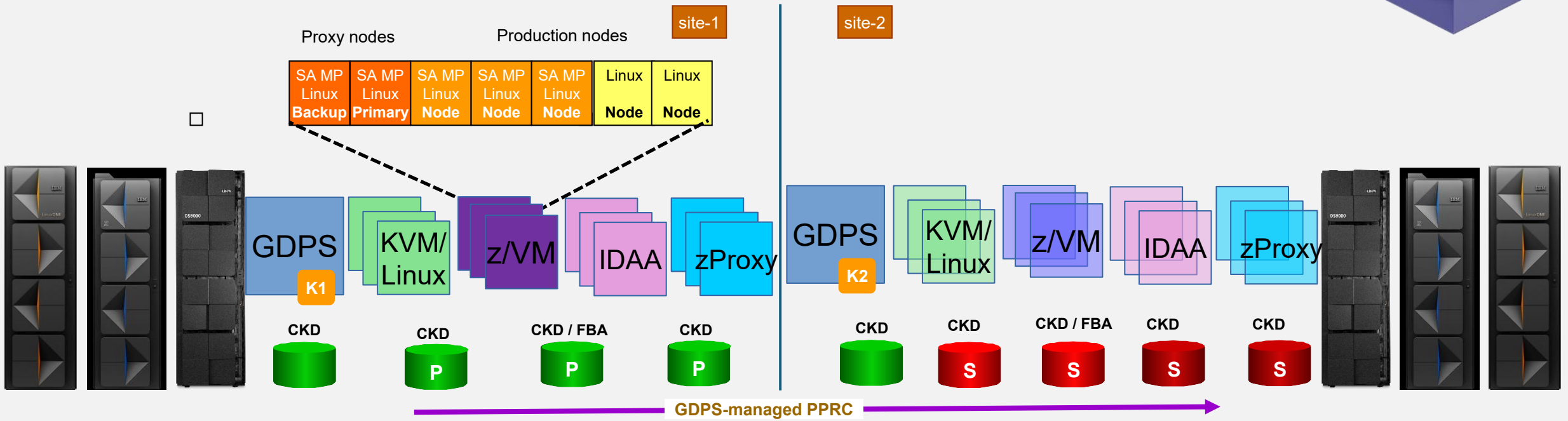


RPO = 0-5 secs, RTO = 20-30 seconds

MGM 6-site


Region A
Region B
GKA1
KPA1
KGA1
KRA1
PRD1
AK1
GDPS will be enhanced to support clients who have the requirement for MM3SITE in both regions as opposed to MM2SITE (MGM6SITE).
PRD1
GKB1
KPB1
KGB1
KRB1
BK1
Metro Mirror
ARS1
ARS3
Global Mirror
BRS3
Global Copy
BRS1
Metro Mirror
IR
Global Copy
IR
AK2
GKA2
KPA2
PRD1
ARS2
BRS2
PRD1
BK2
GKB2
KPB2
PRD1

GDPS xDR Multi-Platform support



- Management of all disks –--> control mirroring
- Management of all partitions and systems→ start/stop…
- HyperSwap – z/VM with its guests, z/OS Proxy
- Coordinated reboot with HyperSwap of KVM, Linux-in-LPAR, IDAA
- zVM SSI Live Guest relocation
- Graceful shutdown of z/VM, z/OS Proxy, Linux, KVM and IDAA
- Coordinated takeover in unplanned cases e.g. recovery from a node failure
- Coordinated takeover in planned cases for e.g. maintenance
- IBM Cyber Vault data corruption protection

Coordinated recovery for planned and unplanned events

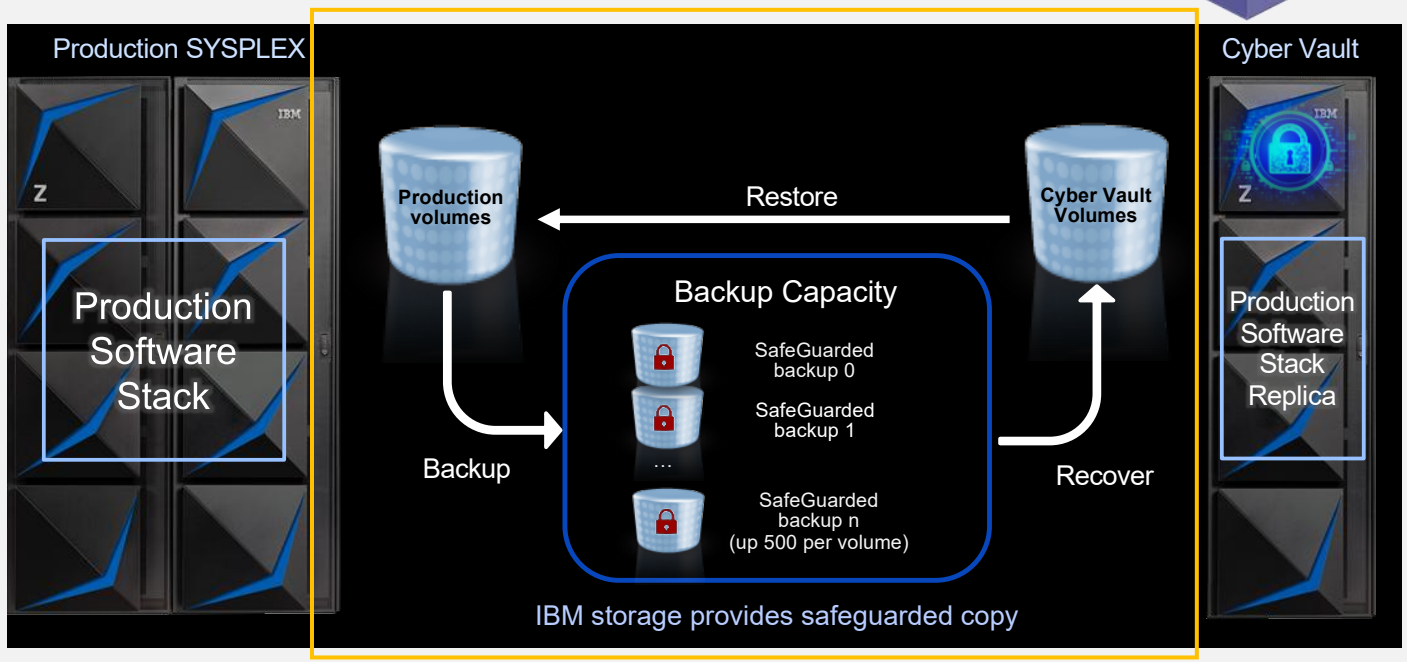
IBM Z Cyber Vault

Principle Idea:

Reduce the time to recovery from days to minutes, by implementing a Data Corruption Protection solution as part of your disaster recovery strategy

Cyber Vault Environment:

- IBM DS8K with Safeguarded Copy provides immutable, consistent point-in-time copies of data.
- GDPS LCP Mgr manages the creation, recovery, and restoration of the copies and provides automation to manage those processes.
- IBM zSystems hardware and software provides a secure, isolated environment to perform data validation, forensic analysis, and create offline backups.



Data Validation
Detect data corruption early or validate that the copy is clear

Forensic Analysis
Investigate the problem and determine the best recovery action

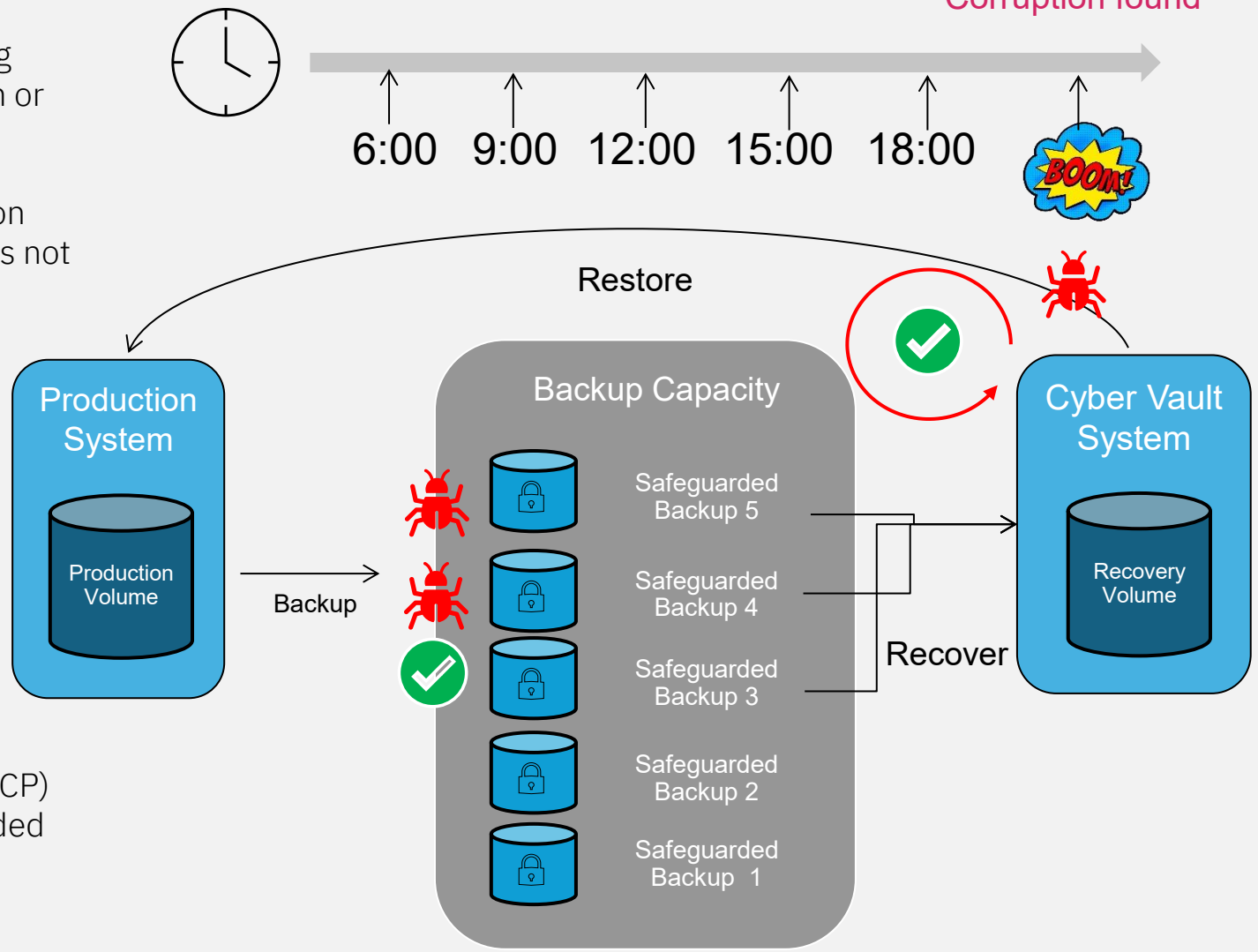
Surgical or Catastrophic Recovery
Extract data from the copy and logically restore back to production environment

Offline Backup
Backup copy of the clean environment to offline tape media

Offensive Security
Ethical hackers start a simulated, goal-oriented cyberattack on the organization

Protect your data with IBM Safeguarded Copy

- Prevent sensitive point in time copies of data from being modified or deleted due to errors, malicious destruction or ransomware attacks.
- Create up to 1024 Safeguarded Backups for a production volume stored in Safeguarded Backup Capacity, which is not accessible to any server.
- The data is accessible only after a Safeguarded Backup is recovered to a separate recovery volume.
- Recovery volumes are used with a data recovery system for:
  - Data validation
  - Forensic analysis
  - Restore production data
- IBM GDPS or IBM CSM (With/without IBM Standalone LCP) is required in order to create and manage the Safeguarded Backups



What value can the IBM GDPS solution offer your organization?

Experience	Commitment		Value		Vision
Client acceptance	**Open industry standards**	**Investment protection**	**Product maturity**	**Client focus**	**IBM support**
– Almost 1200 GDPS licenses installed in 51 countries worldwide – Tested technology to support automated and repeatable results – Complete implementation guided by experienced consultants	– IBM GDPS supports industry-accepted, open replication architectures (Metro Mirror, Global Mirror and Fibre Channel) – Architectures licensed by all enterprise storage vendors – GDPS qualification program for GDPS Metro (IBM, Hitachi)	– Designed to be easily upgradeable – Common code base for each product	– Generally available since 1998 – Suite of products – Enterprise-to-enterprise capability – Many years of IBM Z production experience – CA and DR best of breed – Continually enhanced	– GDPS Design Council – Synergy with IBM development labs – Incorporates several IBM patents – New release planned every year – GDPS advocate program	– Fully supported via standard IBM support structure – Fixes through normal IBM Z channels

Additional information

Additional Information

Websites:

- GDPS https://www.ibm.com/products/gdps
- IBM Z https://www.ibm.com/z
- IBM Z Resiliency https://www.ibm.com/z/resiliency
- Storage https://www.ibm.com/storage
- Redbook – GDPS Family: An Introduction to Concepts and Capabilities
  http://www.redbooks.ibm.com/abstracts/sg246374.html?Open

GDPS Website resources

- GDPS: The Enterprise Continuous Availability / Disaster Recovery Solution white paper
- GDPS Pre-requisite Information
- GDPS Training Schedule Links
- GDPS Hardware Qualification Letters
- E-mail: gdps@us.ibm.com


Thank you!