World-class High Availability and Disaster Recovery with IBM GDPS 4.8

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Agenda

GDPS Level-set

GDPS 4.8 Overview

GDPS 4.8 Highlights

Statements of Direction (SOD)

Summary

GDPS LEVEL-SET

Balanced solutions (including features) designed to address different requirements

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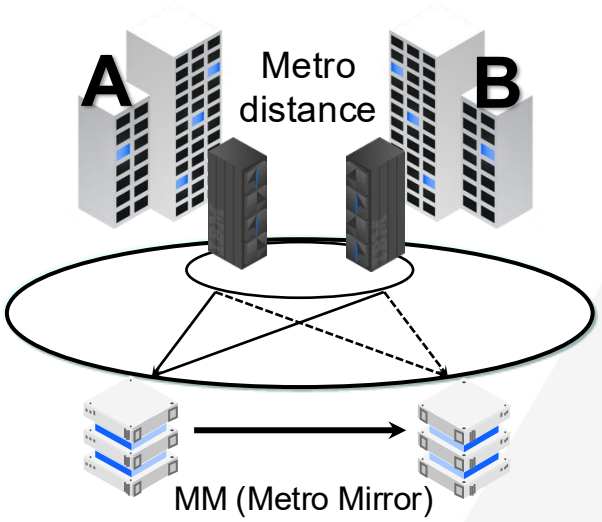
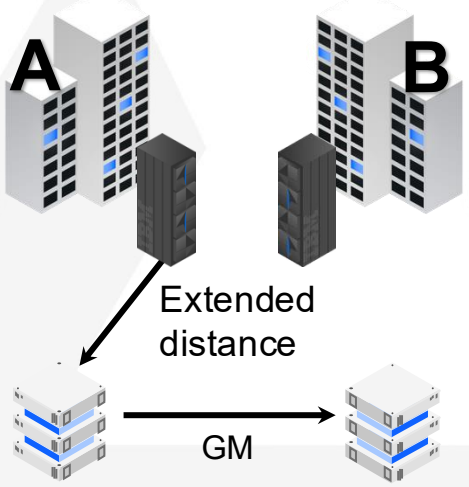
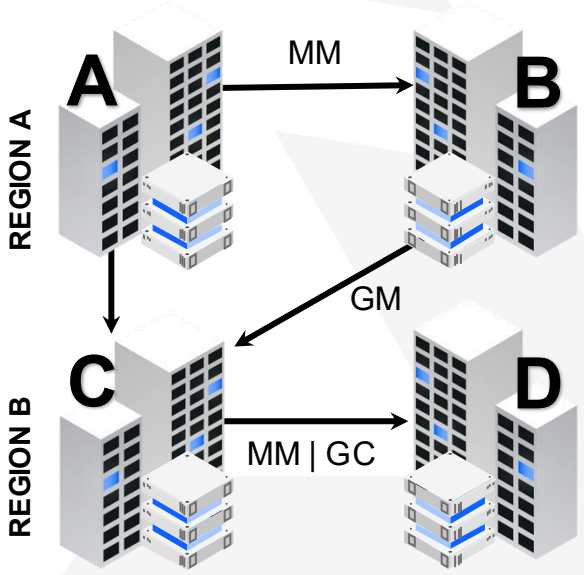
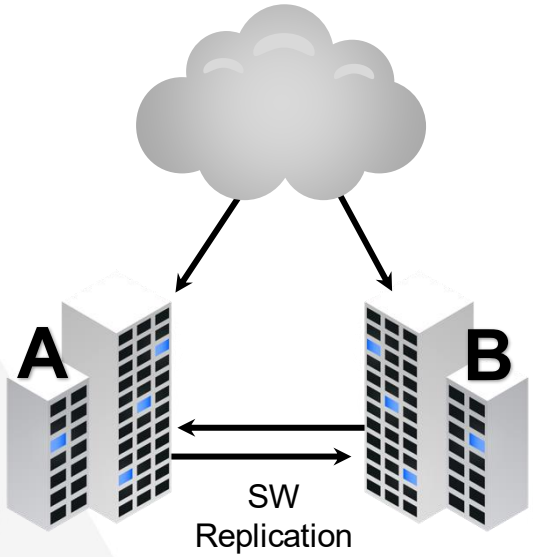
GDPS Metro	GDPS Global	GDPS Metro Global	GDPS Continuous Availability
Near-continuous availability and recovery at metro distances	**Disaster recovery at extended distance**	**Near-continuous availability regionally & recovery for 3, 4 , & 6 sites**	**Near-continuous availability, recovery & workload balancing**
Systems remain active Multisite workloads can withstand site and storage failures	Rapid systems DR with "seconds" of data loss	Metro near-continuous availability and out of region disaster recover	Continuous availability at unlimited distances
			
RPO 0 & RTO <60 min	***RPO 3-5 sec & RTO <60 min***	***RPO 3-5 sec & RTO <60 min***	***RPO 3-5 sec & RTO <60 sec***

Balanced solutions (including features) designed to address different requirements (cont)

- **z/OS proxy** – provides CA / DR for mono-plexes & sysplexes and disk sharing with systems outside the sysplex
- **Logical Corruption Protection (LCP) Mgr** – protects against cyber attacks
- **Test Copy Manager** – creates a consistent copy of data for testing (can be used in conjunction with zBUrST for application stress testing)
- **SSC / IDAA** - provides CA / DR for IDAA instances
- **Dual Leg** – provides two synch legs for maximum metro CA / DR
- **GDPS GM2SITE Bi-directional** - provides region switch enhancements including the capability to independently switch the replication direction of GM sessions where multiple sessions (or consistency groups) are being managed in a single GDPS instance.
- **GDPS Continuous Availability Zero Data Loss (ZDL)** – provides no data loss capability at metro and unlimited distance topologies
- **zKVM** – provides CA / DR for zKVM instances
- **GDPS Solution Manager (GSM)** – reduces the number of k-sys for clients with multiple GDPS MGM4SITE or GDPS MGM6SITE configurations

GDPS 4.8 OVERVIEW (INCLUDING CONTENT DELIVERED BY CONTINUOUS DELIVERY SINCE 4.7 BECAME GENERALLY AVAILABLE)

GDPS Metro Highlights – Summary

(and HM where appropriate)

- **GDPS Security enhancements**
  - Role-based security enhancements
    - New profiles for GDPS Scripts
  - GEOSEC tool updated for GDPS Scripts
  - Change Role Based Security setting SECURITY default to SAF

- **New Standard Actions panel to provide a LPAR (physical) view**

- **Change management**
  - Generate reports when testing or loading a new dasd configuration
  - Generate reports when testing or loading a new site table

- **Identification of active CC session(s) during a planned HyperSwap**

- **Support for GDPSIOST in Metro for post-HyperSwap host access cleanup and managing Utility device dynamic path grouping**

Note: xDR supported versions for z/VM proxy or production cluster in GDPS 4.8

- Linux: RHEL 8, RHEL9 and SLES15
- TSAMP: 4.1.1.1

GDPS GM and MGM Highlights – Summary

- **GDPS Security enhancements**
  - Role-based security enhancements
    - New profiles for GDPS Scripts
  - GEOSEC tool updated for GDPS Scripts
  - Change Role Based Security setting SECURITY default to SAF

- **New GDPS priced feature: GDPS Solutions Manager (GSM)**
  - Simplified systems management for clients with multiple sysplexes managed by GDPS
  - Consolidate up to 3 GDPS controlling system pairs into a single SYSPLEX(2 LPARs) to reduce complexity and lower system management overhead
  - Initial support for MGM 4-site topologies only

- **New GDPS Topology: GDPS Metro Global Mirror 6-site (MGM 6-site)**
  - Enhanced resiliency by enabling 3 copies of data to be managed synchronously in the active region

GDPS XRC and MzGM - Summary

- **GDPS XRC and MzGM have been deprecated in GDPS 4.8**

- GDPS 4.7 is the final release to support XRC

LCP Enhancements

- New LCP Scheduler
- LCP Quiesce/Resume (PH63301)
- Recovery of open capture
- Consistency of filtering across all GDPS products
- Stand-Alone LCP Manager (PH66265)
- Threat Detection (PH63451)
- Application roll forward (PH63451)
- Misc 4.8 SPEs

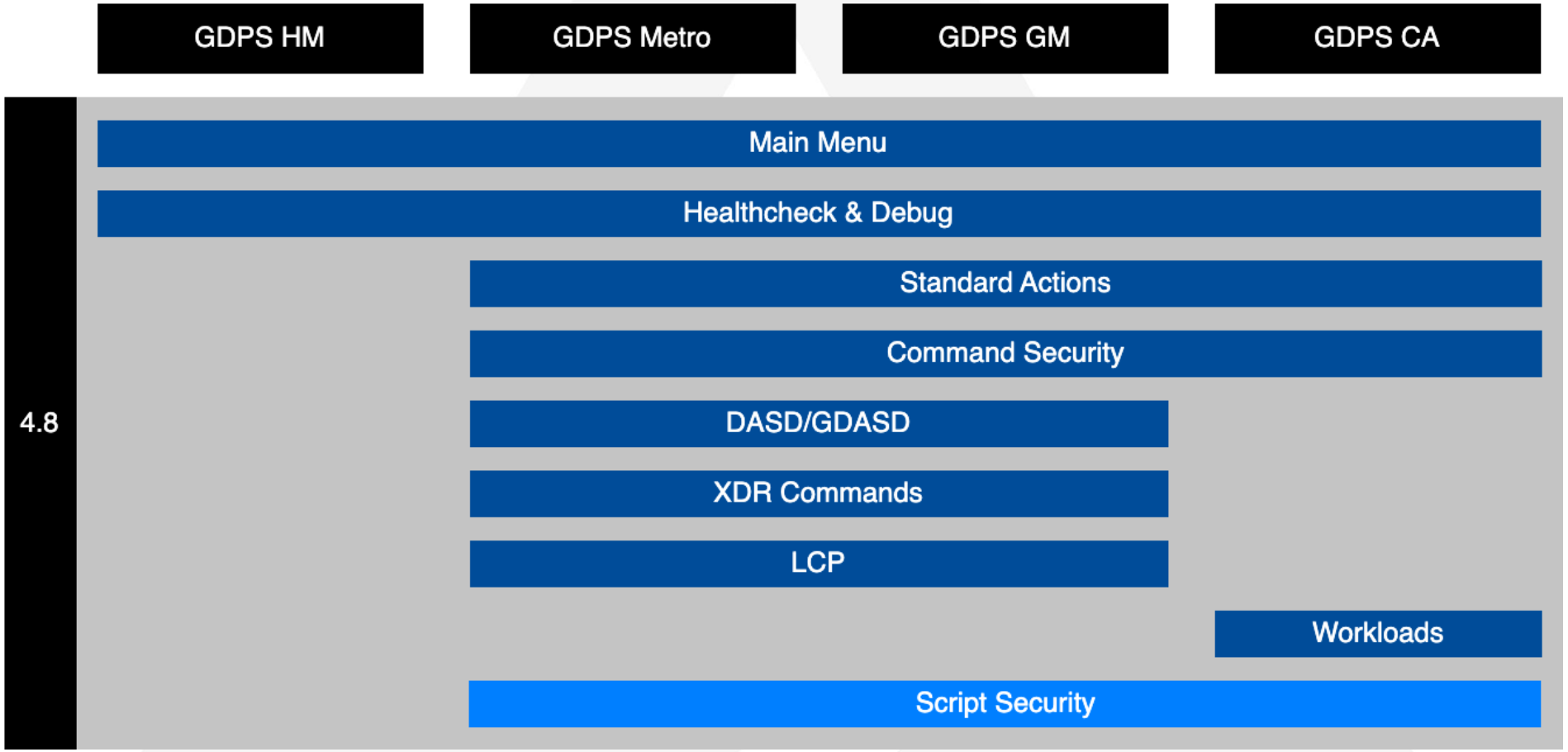
CA Highlights

- **GDPS Security enhancements**
  - Role-based security enhancements
    - New profiles for GDPS Scripts
  - GEOSEC tool updated for GDPS Scripts
  - Change Role Based Security setting SECURITY default to SAF

- **Workload degradation detailed messages (GEO1149E)**
  - In the event of workload degradation, new GDPS messages and SDF alerts are now created with information that is relevant to the cause of the workload degradation. Previously this information was only available in System Automation and a high level of SA knowledge was required to interpret the information.

GDPS 4.8 HIGHLIGHTS

Role-Based security



★ **Default Setting**
SECURITY= GDPS OPTION has been changed from NOSAF to SAF

NEW PANELS AND REPORTS

Standard actions enhancement (LPAR View)

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Improve Standard Actions panel to provide a LPAR (physical) view
Solution: GDPS Metro

Idea

- Offering a way to visualize all the LPARs that are associated with GDPS.
- Being able to easily answer a question like:
  « What are all the GDPS systems that are currently running on a given CEC? »
- Reduces the chance of an operator taking action on the wrong system from the GDPS standard actions panel.

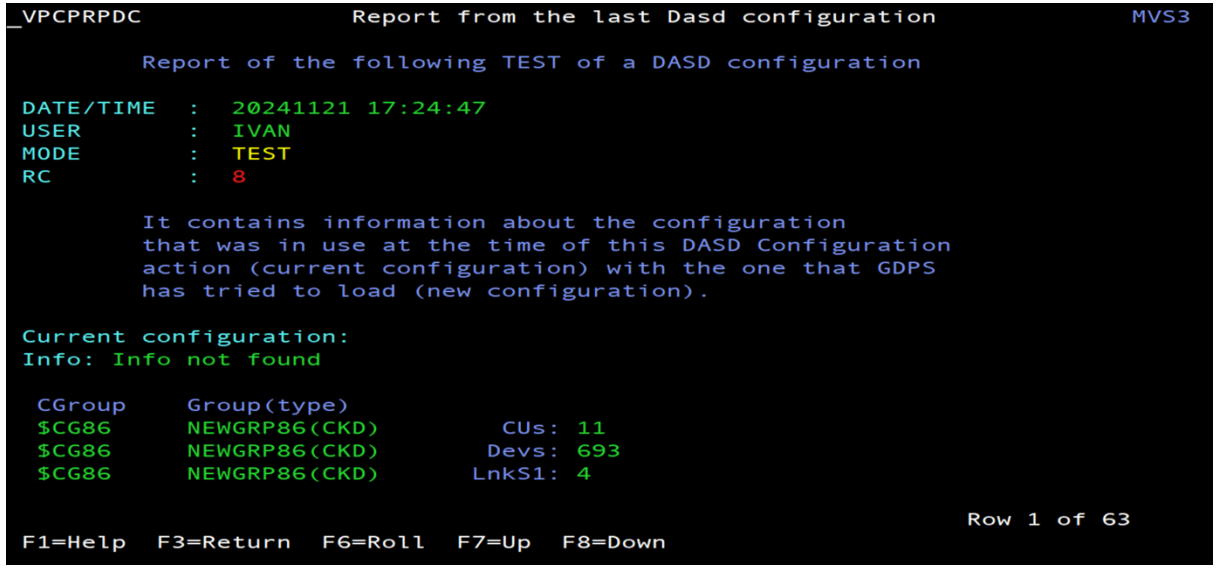
```
VPCPLR00            Standard Actions - LPAR View                         MVS3

   Actions:  I Info

                       HMC                                   GDPS
   SITE.CPC     LPAR          System    System    GDPS      GDPS      GDPS
     LPAR Name  Status        Type      Name      System    Status    Type
_  SITE1.ST01
_    CF1             OPERATING     CFCC       CF1       CF1    MANUAL       CF
_    GDPSSSC2   NOT_ACTIVATED      NULL      NULL
_    LINUX1          OPERATING    LINUX      NULL  LINUX1IL    ACTIVE    Linux
_    LINUX2          OPERATING    LINUX      NULL  LINUX2KV    ACTIVE     z/VM
_    TSMVS1          OPERATING      MVS    TSMVS1    TSMVS1    ACTIVE     GDPS
_    TSMVS4          OPERATING      MVS      MVS3      MVS3    ACTIVE     GDPS
_    TSMVS5          OPERATING      MVS      MVS4      MVS4    ACTIVE     GDPS
_    XDRCSE8    NOT_ACTIVATED      NULL      NULL   XDRCSE8     RESET     z/VM
_    XDRCSE9    NOT_ACTIVATED      NULL      NULL   XDRCSE9  DEACT-ED     z/VM
_    XDRCSE4         OPERATING       VM   XDRCSE4   XDRCSE4    ACTIVE     z/VM
_    XDRCSE3         OPERATING       VM   XDRCSE3   XDRCSE3    ACTIVE     z/VM
_    XDRSSI1         OPERATING       VM   XDRSSI1   XDRSSI1    ACTIVE     z/VM

Command/Filter ===>                                            Row 1 of 24
F1=Help  F3=Return  F5=Refresh  F7=Up  F8=Down  F9=Toggle  F10=Left  F11=Right
```

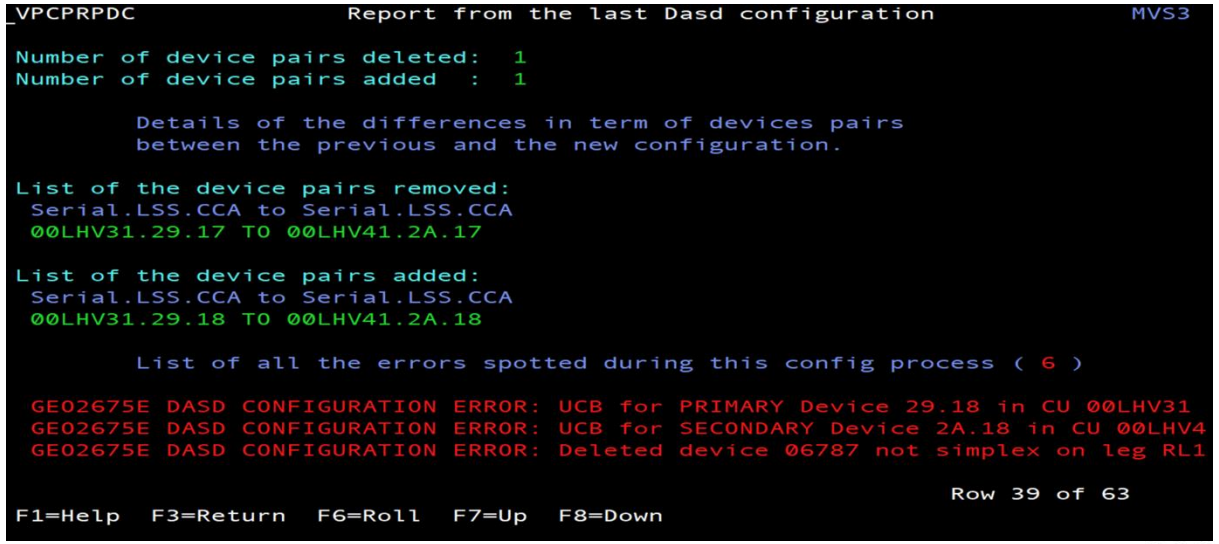
DASD Config report

Better control and visibility on the changes that we are about to make
Solutions: GDPS Metro, HM, Global

Idea:

- Logging the update done to the config during a real or test DASD Config.
- That would offer a way for the client to:
  - Validate if the changes they are about to done match with their expectation. Concept of “What you see is what you get”
  - Log the changes that were done during the last DASD Config.
  - Log key action such as “who did” and “when was” the last DASD config.
- As of today, you can only rely on the log to retrieve this information.



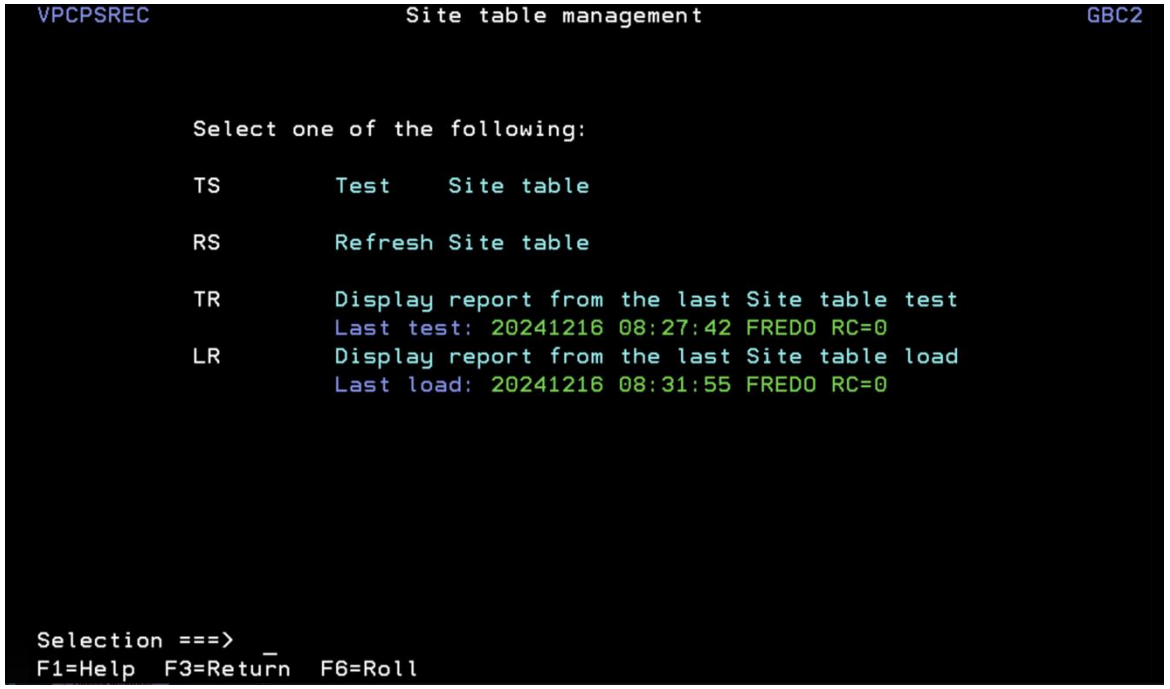


Site Table refresh report

Better control and visibility on the changes that we are about to make
Solutions: GDPS Metro, HM, Global, MGM

Idea:

- Logging the update done to the config during a real or test SITE TABLE Refresh
- That would offer a way for the client to:
  - Validate if the changes they are about to done match with their expectation. Concept of “What you see is what you get”
  - Log the changes that were done during the last SITE TABLE REFRESH.
  - Log key action such as “who did” and “when was” the the last SITE TABLE REFRESH.
- Today you can only rely on the log to retrieve this information.



LOGICAL CORRUPTION PROTECTION (LCP) MANAGER ENHANCEMENTS

LCP Manager Enhancements

- **New LCP Scheduler**
  - Capture scheduler
    - Ability to use LCP to schedule captures rather than using an external scheduler
    - GDPS to auto allocate schedule times based on frequency and number of profiles or set manually if preferred
  - Monitor scheduler
    - Scheduler granularity now at minutes, down from hours in previously releases
    - If preferred, can now set specific start time rather than immediate start time
  - New panel to show up to 1 weeks worth of capture events
  - Includes support for RBS and Dual Control
- **LCP Quiesce/Resume (PH63301)**
  - Suspends capturing / releasing, optionally can stop mirroring into the vault
  - Includes support for RBS and Dual Control
- **Recovery of open capture**
  - Performing a recover of an open capture will no longer take an additional ‘invalid’ capture
- **Consistency of filtering across all GDPS products**
  - Enhanced filtering capability on some specific panels
- **Stand-Alone LCP Manager (PH66265)**
- **Threat Detection (PH63451)**
  - Integration with IBM Threat Detection for z/OS (TDz)
- **Application roll forward**
- **Misc 4.8 SPEs**

LCP Manager Capture Scheduler (Manual)

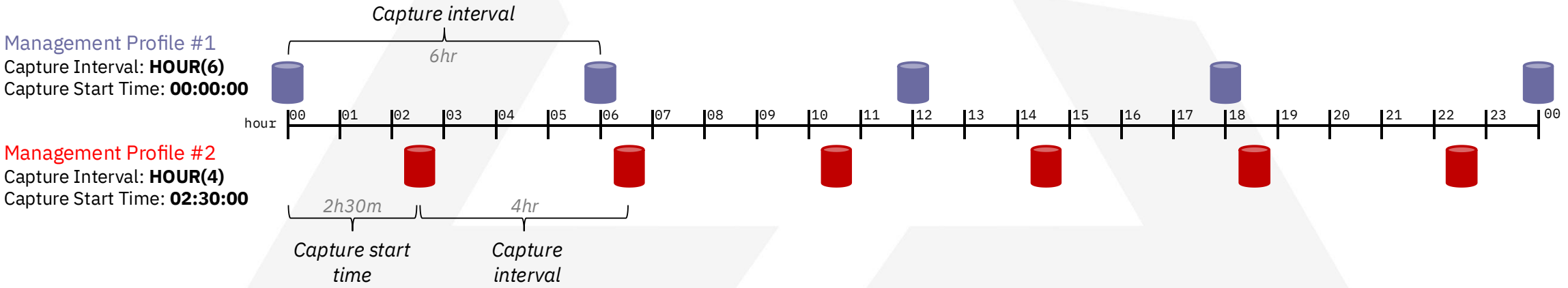
Automated SGC captures using NetView timers with new autooperator *GEOLCP2*

Capture Interval *(management profile field)*

- Time between automated captures
- Must be a factor of 24
- A value of **NO** (default) means automatic capturing is disabled.

Capture Start Time *(management profile field)*

- Added as a management profile field
- **hh:mm:ss** user specified time

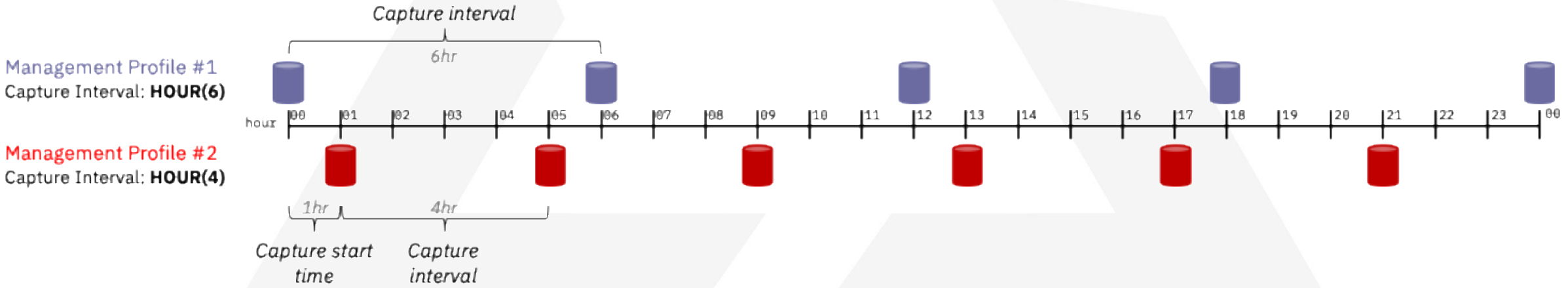


LCP Manager Capture Scheduler (Automatic)

Capture Scheduler *(applies to all SGC profiles)*

- **MANUAL** Capture Start Times are manually specified
- **AUTOMATIC** Capture Start Times are automatically calculated to spread captures as much as possible

Capture Start Time is automatically calculated to spread captures as much as possible



SGC Monitor Scheduler

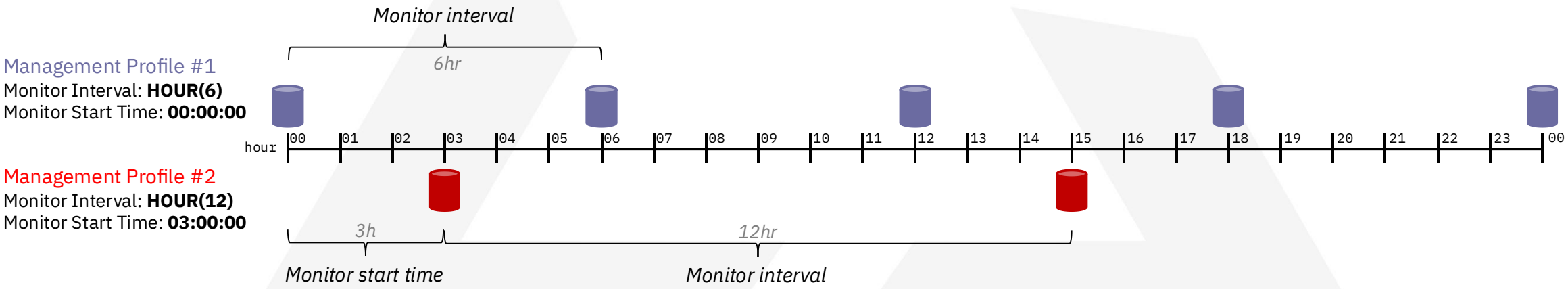
SGC Monitor using NetView timers with autooperator *GEOLCP1*

Monitor Interval *(management profile field)*

- **MINUTE(n)** Value between 10 and 9999
- **HOUR(n)** Value between 1 and 999
- **DAY(n)** Value between 1 and 999
- **NO** SGC Monitor timer is disabled

Monitor Start Time *(management profile field)*

- **hh:mm:ss** User specified UTC time
- **IMMED** Starts the monitor intervals immediately, then saves the start time *(default)*



LCP Quiesce/Resume

New management profile actions:

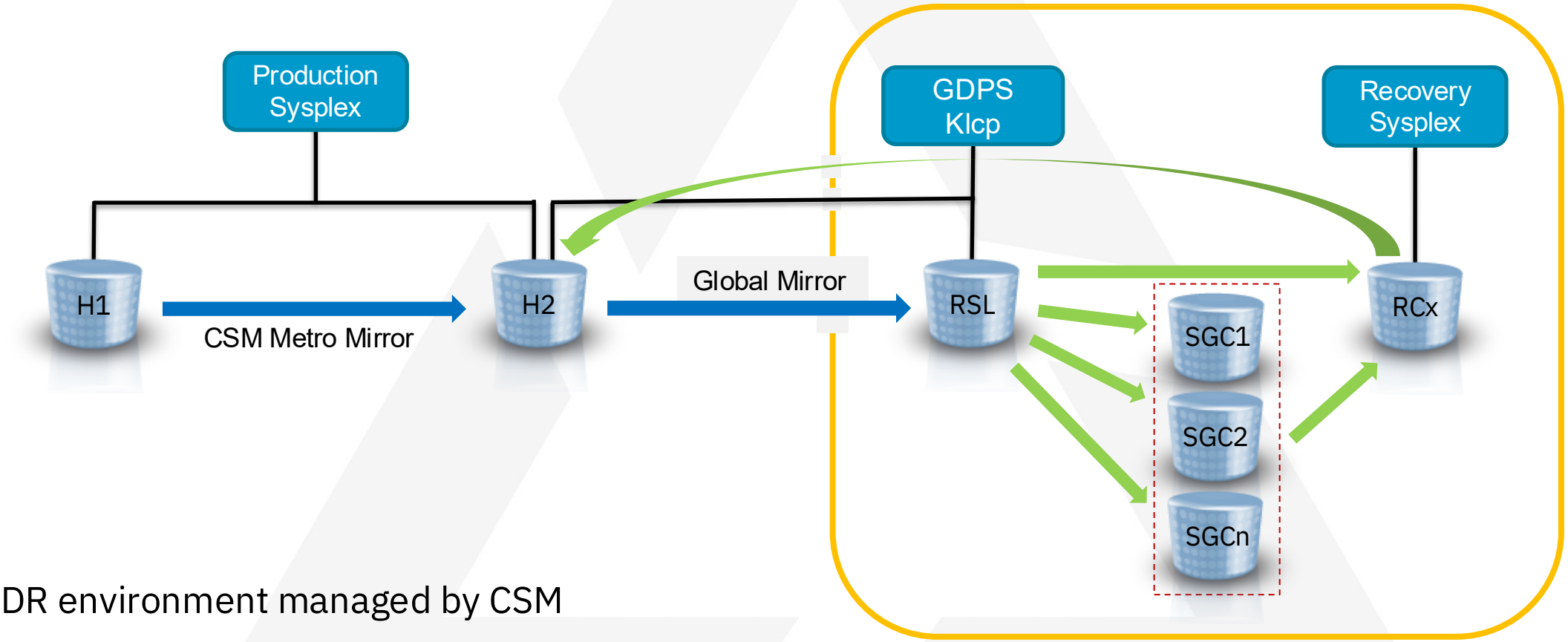
Quiesce

- Quiesces LCP operations to preserve the current state of the capture environment
- All LCP capture and release processing is suspended until a decision is taken to resume operations
- Option to stop mirroring to vault when vault is in secondary site (physical or virtual isolation)

Resume

- Resumes LCP operations

Stand-alone LCP Manager (PH66265)



HA/DR environment managed by CSM

Cyber Vault operations, including automated validation, managed by GDPS

IBM Threat Detection for z/OS (TDz)

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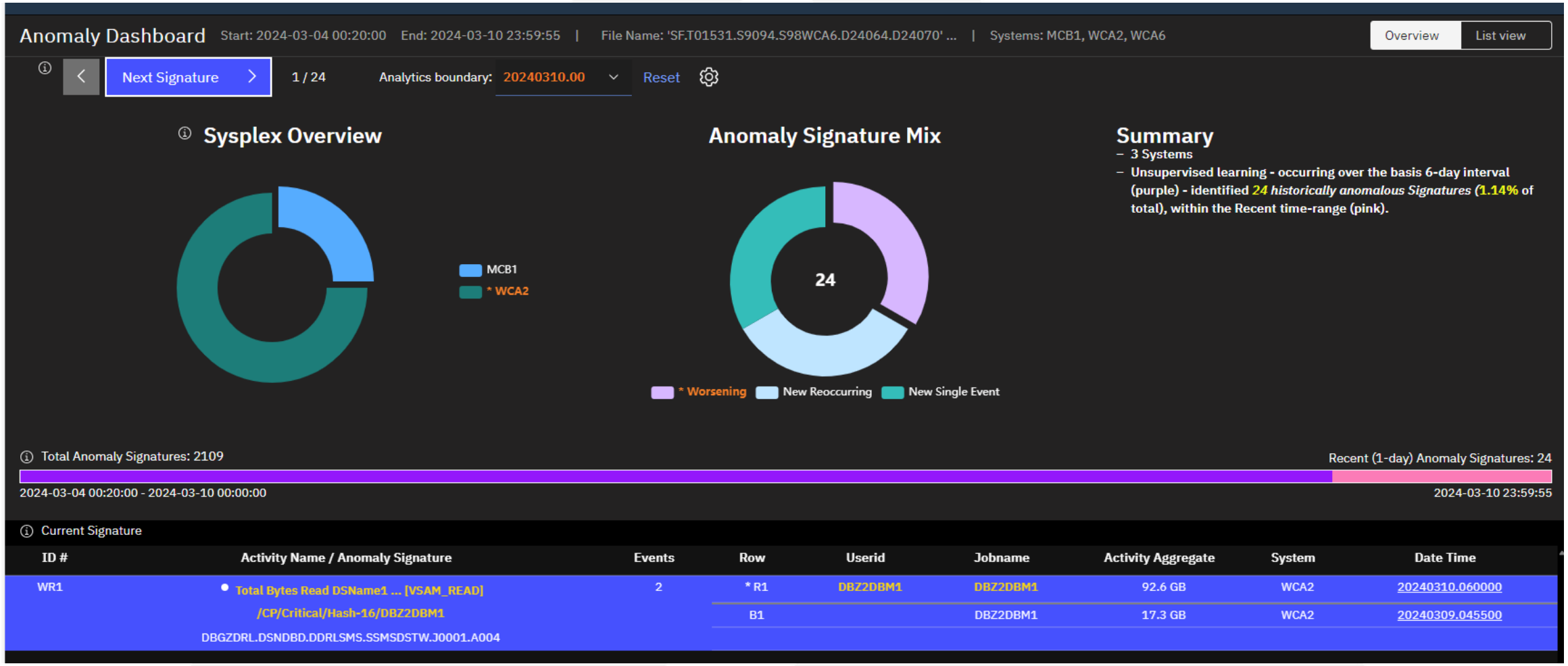
Uses AI to detect z/OS anomalies across a sysplex in near-real time

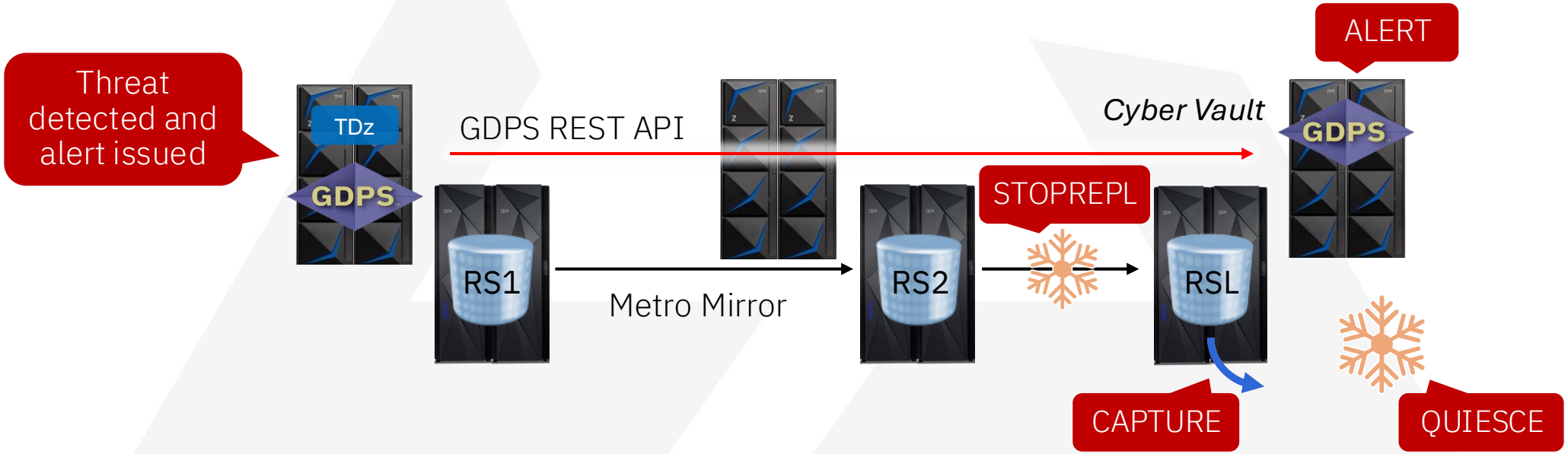


IBM Threat Detection for z/OS (TDz)

Policy governing GDPS's actions in response to threat detection notifications and validation failure events

Possible actions:

- ALERTS - SDF alerts issued for each event
- CAPTURE - Take a new capture for forensic analysis
- QUIESCE - Suspend all LCP capture and release operations
- STOPREPL - Stop replication into the vault to prevent out-of-space events forcing DS8000 internal roll offs

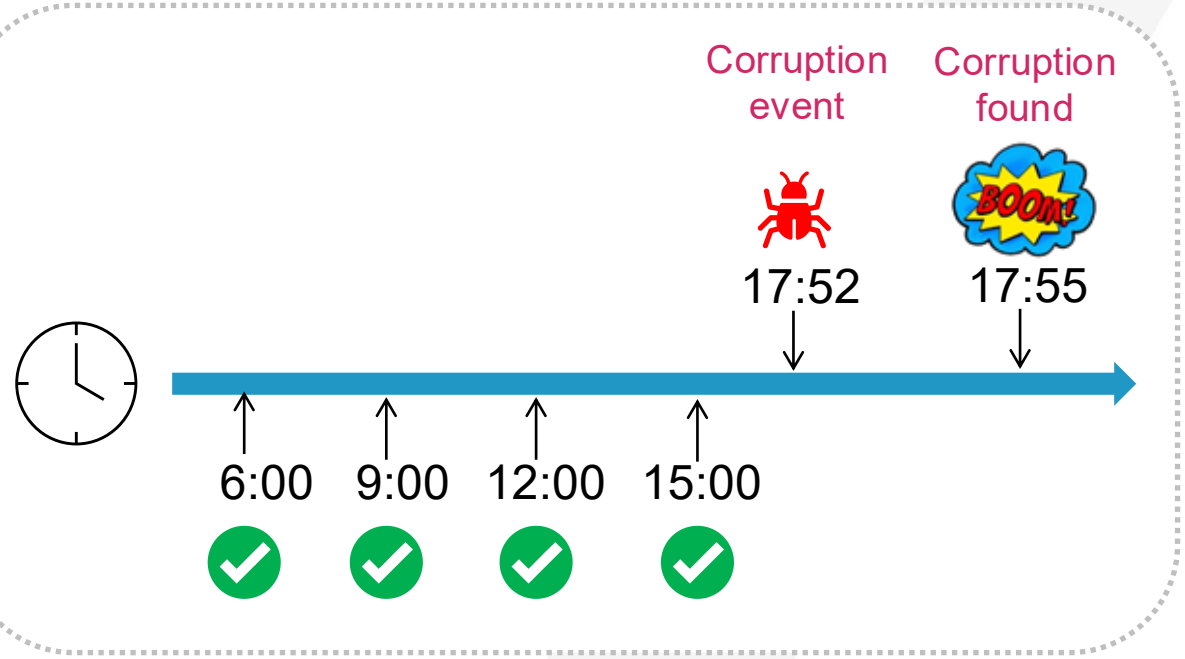


Application Roll Forward

With a standard approach, there may be minutes or hours of good data that isn't captured in the most recent 'good' Safeguarded Copy.

Are there any techniques or technology that can make available that good data as close to the point of corruption as possible?

Application Roll Forward



- System was corrupted at 17:52
- Most recent good SGC captured at 15:00
- Corruption identified at 17:55 in Production

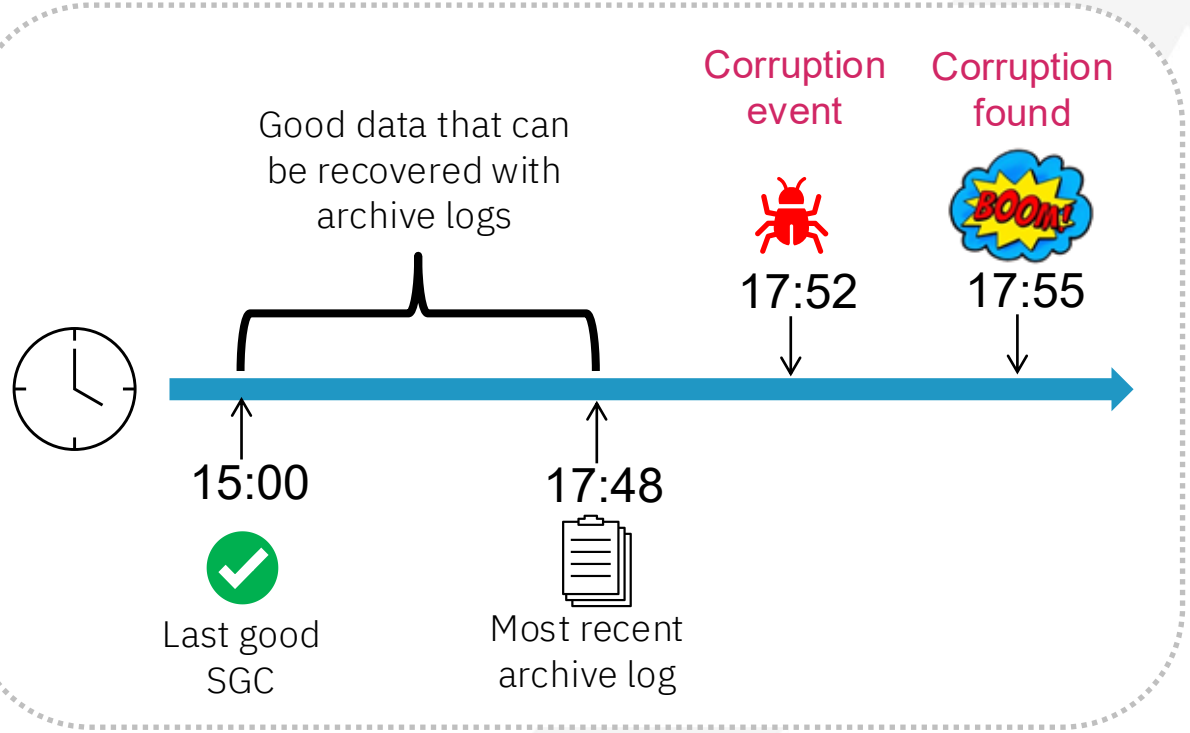
Use Data Validation to identify the most recent good SGC

- When Data Validation was run on the 15:00 SGC it was verified as good

Last good back up is 2 hours and 55 minutes before corruption found in production

However, 2 hours and 52 minutes of that time is before the corruption event, and this data could potentially be used if it could be recovered

Application Roll Forward



- Most recent good SGC at 15:00
- Archive logs available up to 17:48
- An additional 2 hours and 48 minutes of good data are potentially available reducing RPO to minutes

Capture and store Db2 archive logs

- Configure Db2 to archive logs as frequently as possible
- Depending on number of Db2 data sharing members, archive logs should be generated every 4 to 8 minutes
- ***IBM Db2 Recovery Expert Pro for z/OS*** creates immutable copy of the archive logs
  1. Move to secured cloud storage
  2. Separate mirroring and capture sessions (future)
  3. Write to WORM on TS7700 (future)

The combination of the restored SGC plus the stored archive logs should bring the ***RPO down to single digit minute range***

NOTE: Db2 used for illustrative purposes. Similar tools/techniques are available for other subsystems

Miscellaneous enhancements – 4.8 SPEs

- Consistency of filtering across all GDPS products (PH63348)
  - Enhanced filtering capability on some specific panels
- LCP - Recovery of open capture (PH63301)
  - Performing a recover of the latest capture will no longer take an additional ‘invalid’ capture
- Support for DS8K 1024 SGC backups (PH64296)

NEW TOPOLOGY – GDPS MGM 6-SITE

MGM 6-site overview - requirements

Background for MGM 6-Site

- Customer requirement:

  Production can only run if and only if 2 local synchronous copies and one remote consistent copy (DR copy) are available.

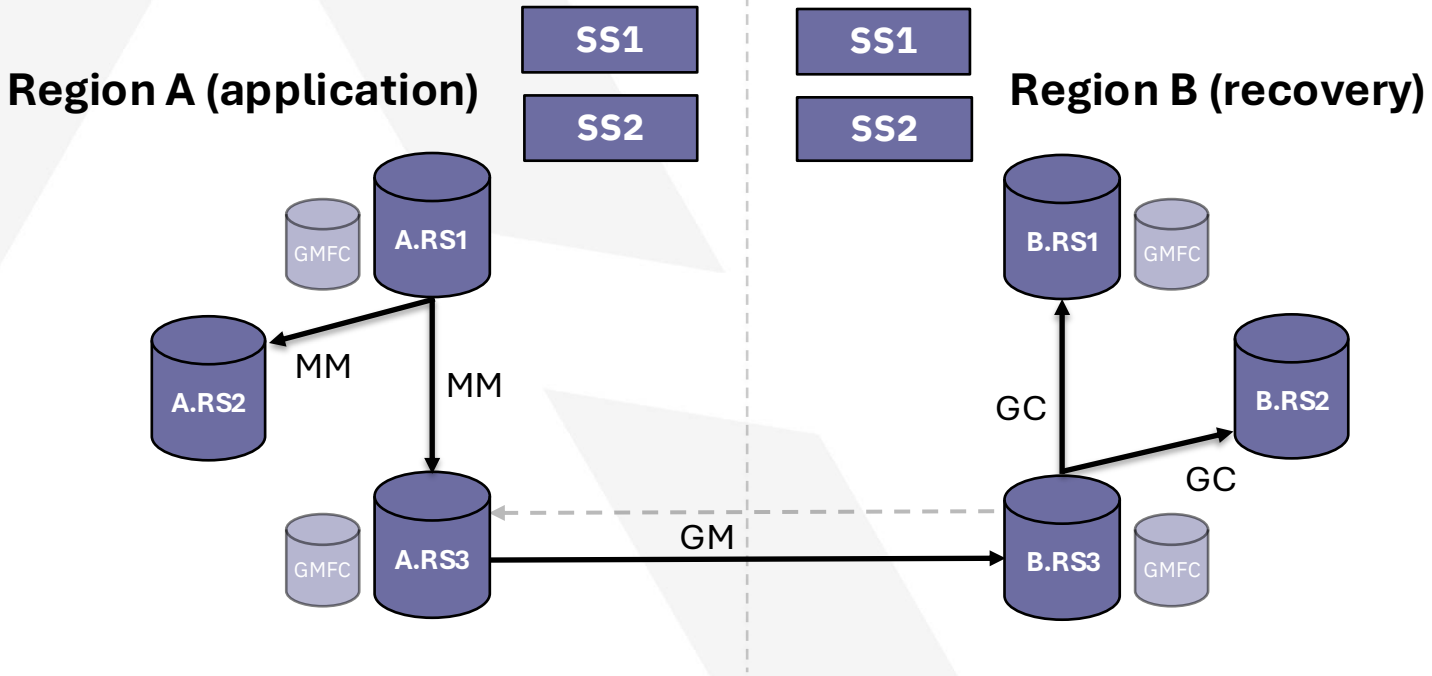
- Production cannot be maintained with MGM 4-site in case of a Metro primary failure (1 local copy left) or GM secondary failure (no DR copy). Failure of the RS2 DR copy prevents region switch (1 local copy left).

- IBM Statement Of Direction (SOD) to address the requirement:

  IBM intends to extend support for 6 replication copies where a Multi-Target Metro Mirror (MM3SITE) topology in one region is connected via Global Mirror to a second Multi-Target Metro Mirror environment in a second region.

MGM 6-site overview – new topology

- New GDPS topology: **MGM6SITE**
- 2 server sites (SSn) per region, same as MGM4SITE and MM3SITE
- Expands MGM4SITE from 2 to 3 replication sites (RSn) in each region
  - Metro dual-leg instead of single-leg
- Provides two possible GM secondary sites
  - Incremental resynchronization used when changing GM secondary site (*new functionality provided in DS8K R9.4*)



NEW FEATURE - GDPS SOLUTIONS MANAGER (GSM)

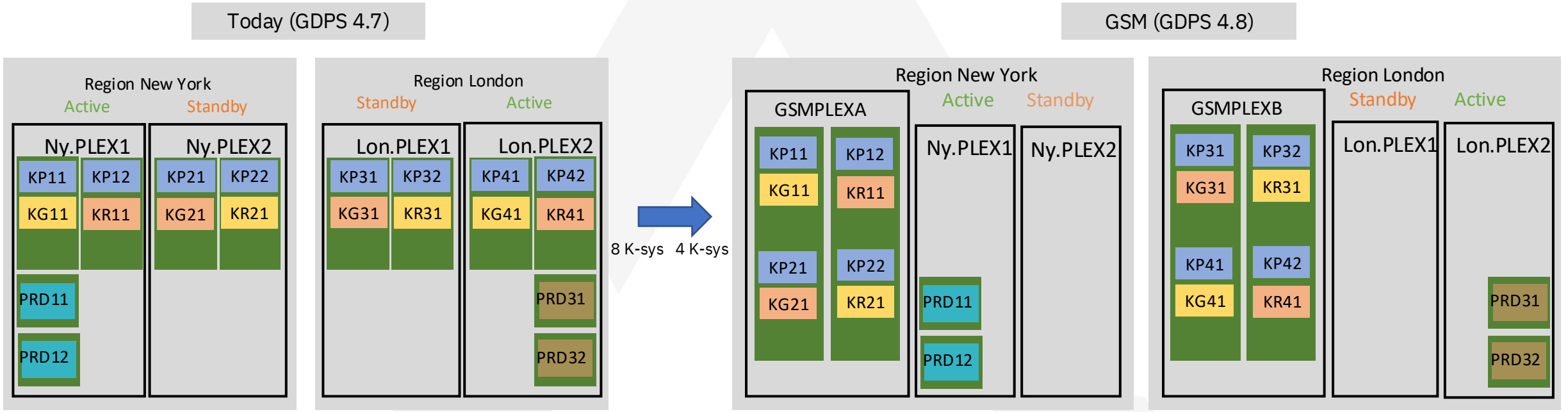
The challenge: GDPS Management complexity

- **Description:**
- Number of K-sys (controlling systems) adds to complexity and support effort of environment
- Overhead in keeping K-sys LPARs current on maintenance (z/OS, NetView, SA, GDPS etc.)
  - Same lifecycle as a traditional LPAR
  - IODF configuration
  - Network configuration
  - Local Build process overhead
- Additional LPARS needed to manage external functions
  - TestCopy Manager
  - LCP Manager

- **Use Case:**
- Reduce the Number of K-sys LPARs required to manage multiple GDPS environments
- Maintain GDPS LPAR with a fraction of the upkeep needed for a traditional z/OS LPAR

New GDPS Solutions Manager (GSM) feature

Example: 2 MGM4SITE environments moved to GSMPLEXes



- **2 x MGM 4-site license**
  - 1 each for Plex1 & Plex2
- **No GDPS license restrictions on the number of LPARs in each sysplex**
  - It's two (e.g. PRD11, PRD12) in this case but it could be 1 or 5…. No change to the GDPS license required

- **2 x MGM 4-site license (No change to today)**
  - 1 each for Plex1 & Plex2
- **2 x NEW GSM features licenses**
  - 1 GSM feature per sysplex, up to 3 sysplex per GSM Plex
- **Allow use of z/OS Proxies within GDPS licensed sysplex (no charge)**
  - The client would have to deploy 2 z/OS proxies in both Plex1 & Plex2
  - There will be no additional license required for these proxies
- **Limitations at GA**
  - LCP Management functions not available
  - GDPS GUI not available for GSM agents
  - Health check restrictions
  - Limited protection when IPLing from HMC

STATEMENTS OF DIRECTION

Statements of Direction

- **GDPS will introduce Dual Control for GDPS LCP Manager to provide a maker/checker function for pervasive changes, on top of the role elevation capability that is possible with the existing role-based security controls.**
- **GDPS will be enhanced to support clients who have the requirement for MM3SITE in both regions as opposed to MM2SITE (MGM6SITE)**
- GDPS will provide an automation framework as part of the LCP Manager for regular Data Validation in the IBM Z Cyber Vault.
- GDPS plans to extend the Logical Corruption Protection (LCP) Manager capabilities to integrate with CSM – to deliver a Cyber Vault automation platform for clients using CSM for replication management.
- IBM intends to extend GDPS LCP Manager to consume event notification from the IBM Threat Detection for z/OS product (5698-CA1).This will enable automated, policy-driven actions to be taken based on identified anomalies.
- IBM intends to extend the integration between GDPS LCP Manager and the IBM Z Backup Resiliency product (5698-BR1) specifically in surgical recovery of data sets in an IBM Z Cyber Vault context to automate the process of extracting specific versions of datasets from a Safeguarded Copy backup to make them available for restoration into production.
- **IBM intends to enhance the IBM Z Cyber Vault solution with 'Application Roll Forward' capability. The initial capability will be for Db2 with support for other subsystems such as IMS to follow later. This new capability will enable clients to leverage secured Db2 archive logs to roll forward from their last good Safeguarded copy closer to the point in time of data of corruption to reduce their RPO.**

Green text: Delivered in GDPS 4.7
Blue text: Delivered in GDPS 4.8
Black text: GDPS 4.8 SOD

SUMMARY

What value can the IBM GDPS solution offer your organization?

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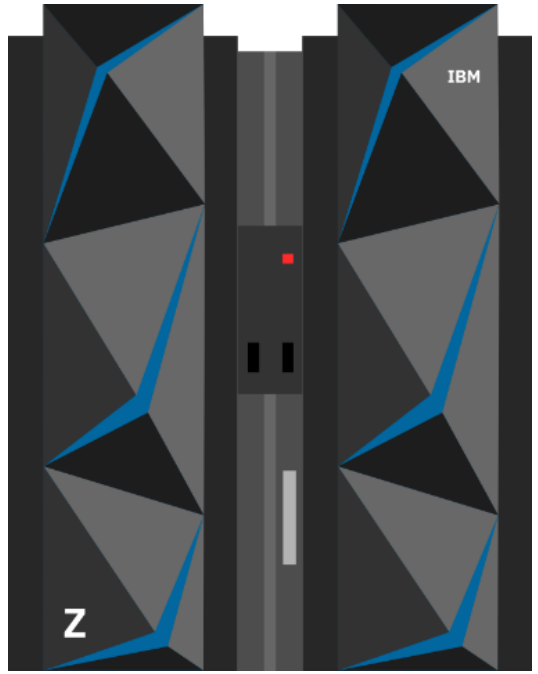
Experience	Commitment		Value		Vision
Client acceptance	**Open industry standards**	**Investment protection**	**Product maturity**	**Client focus**	**IBM support**
– Approaching 1300 GDPS licenses installed in 51 countries worldwide – Tested technology to support automated and repeatable results – Complete 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 – HA, DR, & cyber resiliency 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

Web sites:

- 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 Web site resources

- GDPS: The Enterprise Continuous Availability / Disaster Recovery Solution white paper
- GDPS pre-requisite information
- GDPS training schedule links
- GDPS hardware qualification letters

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