Geographically Dispersed Parallel Sysplex (GDPS®) Update & Implementation

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System z Availability Spectrum

End-to-End Application & Business Resilience w/ GDPS® and Policy Based Workload Mgt.

- GDPS Overview

- GDPS V3.8 enhancements
  - Availability
  - Scalability
  - Simplified System Management
  - New & Improved GDPS tools

- Summary

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Automated recovery removes people as Single Point of Failure

GDPS Policy Based Automation Actions
- D/R team dependencies?
- Network connectivity
- Travel to D/R site
- Remove systems from Sysplex
- Perform disk reconfiguration
- Perform tape reconfiguration
- Perform CF reconfiguration
- Perform CDS reconfiguration
- Perform capacity backup & On/Off capacity on demand activation.
- Shut down discretionary workload on site 2

- Modify activation profile on HMC
- Target server
- IPL Address
- IPL Prod LPARs
- Respond to NIP messages
- Initiate application startup

What is GDPS?
- Integrated / Automated solution
- Manages application and data availability in and across sites
- Monitors systems, disk & tape subsystems
- Manages planned and unplanned activities
  - System/disk maintenance / failure
  - Site maintenance / failure
- Builds on proven high availability technologies
  - Clustering
  - Remote copy (disk and tape)
  - Automation
- Easy to use interface
  - Intuitive panel interface
  - Simple scripting

GDPS family of offerings

GDPS®: An end-to-end disaster recovery solution to enable:
- Automated recovery removes people as Single Point of Failure
- A single point of control automating D/R for heterogeneous systems
Simplified Freeze Policy

- Provides GDPS with more accurate information about the cause of a disk freeze event.
- Together with improved policy options, helps provide more options to achieve zero RPO (no data loss).
- DS8000 provides GDPS with the ability to query the secondary disk subsystem in order to understand what caused the freeze and take the appropriate action.
- New “freeze” policy – based on additional information on DS8K PPRC Suspend reason.
  - PRIMARYFAILURE=[SWAP|GO|STOP]
    - SWAP means Freeze&HyperSwap
    - GO means Freeze&Go
    - STOP means Freeze&Stop
  - PPRCFAILURE=[GO|STOP|COND]
    - GO means Freeze&Go
    - STOP means Freeze&Stop
    - COND means Freeze&Go if not a DR event and Freeze&Stop if a potential DR event

Consistent handling of triggers:
- Always treated as primary failure trigger:
  - IOS002A no paths available
  - IEA491E with primary device write failure indication

Prereqs
- GDPS - PM24113 SPLIT FREEZE POLICY & FALSE FREEZE SUPPORT
- z/OS / DFDSS - OA33031 & OA31313 SUPPORT FOR QUERY STORAGE CONTROLLER STATUS FOR GDPS
- DS8K - R5.1 & above

xDR extended monitor function
- GDPS monitors native Linux and xVM guest xDR environments for conditions that would prevent a HyperSwap from succeeding.
  - Orphaned pointers
  - Channel paths to secondary disks online (Native & Guest)
  - Proxy system disk not PPRCed (Guest)
  - Minidisk caching must not be enabled (Guest)
  - Mdraid disks must be synchronized (Native)
  - Root file system must not be read-only (Native)
- Extends GDPS HyperSwap monitoring to xDR environment
- Raises alerts if a HyperSwap is not able to complete
- Facilitates situation analysis before responding to WTORs
- Review PPRC status
- Review status of other resources
- Removes ‘guessing game’ about whether safe and which systems to restart
- Keys continues to perform normal SFM actions

Improved Recovery Time
Reduced Operator Intervention
### Timer Automation enhancements

**GDPS/PPRC, GDPS/PPRC HM**

- Server Time Protocol (STP) and Sysplex Timer recovery and network management
  - Automatically reply to disabled console WTORs when loss of synchronization is detected
  - Automatically reconfigure an STP Coordinated Timing Network (CTN).
- Provides:
  - Improve recovery times
  - Simplify operations
  - Helps prevent potential subsystem and application time outs
  - Potentially preventing a production outage.

### Planned actions
- Deactivate of the server hosting the Stratum 1.

### Unplanned actions
- Define a server to be the clock source in the recovery site

### Improved RTO and system management

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### CPC and LPAR awareness in z/OS

- Enables GDPS to track the CPC and LPAR locations where GDPS systems are running.
- Allows GDPS to better control recovery situations.

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### GDPS 3.8 Scalability

- **IPL Protection Support**
  - Helps prevent system from being IPL'd on wrong set of disks
- **z/VM XRC time stamping support**
- **GDPS/XRC UCB Constraint Relief**
- GDPS/XRC can be paired with up to 7 GDPS/PPRC Configs

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### IPL Protection

**GDPS/PPRC, GDPS/PPRC HM**

- Prevents a system to be IPLed on the wrong set of disks
  - After a HyperSwap followed by DASD RECOVER or DELPAIR
  - Disk on both sites are "PPRC primary Suspended"
- IPL done only from GDPS primary site
  - Helps prevent overlaying production data when mirroring restarted
- **Environments**
  - GDPS/PPRC HyperSwap Manager
  - Verify Load and IODV volume addresses are on GDPS primary site
  - Quiesce system if IPLed from wrong set of disk
  - GDPS/PPRC IPL protection
    - Enhanced protection prevents loading from wrong set of disk.
    - Checks z/OS, z/VM and native zLinux systems

**Protects environment after HyperSwap**

**Helps prevent data overlays**
XRC timestamping support for z/VM guests
GDPS/XRC, GDPS/MzGM

- Provides cross platform consistency between one or more z/VM LPARs and their guests with z/OS LPARs.
  - z/VSE
  - z/TPF
  - z/VM
  - z/OS
- Allows z/VM and guests to participate in GDPS/XRC solutions
  - Data managed by multiple coupled SDMs
  - Provides support for large z/VM environments.
- Exploits Server Time Protocol (STP) facility to ensure time consistency.

UCB Constraint Relief
GDPS/XRC

- Removes restriction that all devices in a GDPS/XRC configuration be defined and identified with unique device addresses.
- GDPS can bypass checking for unique device addresses
  - Allows duplicate device addresses to be used across SDM systems
  - Increases the number of devices that can be managed in a GDPS/XRC configuration.
- Additional UCB constraint relief provided with
  - Allows the FlashCopy target devices to be defined only in the GDPS Controlling system but not to be defined in the SDM systems.
  - Support for a 'no UCB FlashCopy' where the FlashCopy targets need not be defined to any systems in the GDPS.

GDPS/XRC 3.8 Can be Paired with up to 7 GDPS/PPRC Systems under GDPS/MzGM

- The Number of nodes that can be defined to the GDPS/MzGM SNA Communication Facility has been increased from 10 to 15.
- Can now define up to seven GDPS/PPRC environments, each with two control systems to be managed by a single GDPS/XRC environment.

GDPS 3.8 - Simplified Systems Management

- FlashCopy Suspend support for incremental FlashCopy
- Persistent reserve Clean up for Open Systems
- HyperSwap Concurrent Copy
- Session Cleanup
Zero Suspend for incremental FlashCopy  
GDPS/XRC

- Improved FlashCopy performance
- Less data to copy
  - Persisting FlashCopy relationship is created between the source and target devices.
  - Changes to the source device since the last FlashCopy are tracked.
  - Only tracks changed since the last copy are flashed.

Can reduce impact of a FlashCopy on SDM operations

Persistent RESERVE cleanup for Open LUNs  
GDPS/PPRC and GDPS/PPRC HM

- Persistent reserves prevent resynchronization of PPRC when these disks are the secondary, target devices for PPRC. GDPS will now, optionally reset any persistent reserve on Open LUN (FB) target devices when a PPRC resynchronization is performed.

Simplifies removal of persistent reserves

HyperSwap / Concurrent Copy Session Clean-up  
GDPS/PPRC and GDPS/HM

- Automates cleanup of control information pertaining to concurrent copy operations on the former primary disks.
- Cleanup is required before the former primary disk can be established as the PPRC mirroring target.
- Concurrent Copy (CC) allows point-in-time backup of data sets or volumes with a minimal update serialization window.
- Control information kept in storage subsystem cache
- Removal of “orphaned” CC control information prevents:
  - Failure of planned HyperSwaps
  - Failure of future CC tasks
  - Failure of “Start Secondary”

Automates cleanup of control information pertaining to concurrent copy operations on the former primary disks.

Simplified system management

GDPS 3.8 - New & Improved Tool Support

- GDPS/MGM Incremental Resynchronization (IR) tool – Phase 3
  - Supports planned HyperSwap of data between two local copies of the data, which enables you to toggle between the two synchronous copies of the data.
- GDPS/PPRC Preserve Mirror Tool – Alternate subchannel support toleration
  - PPRC secondary devices can be defined in an alternate subchannel. This tolerates failures of any two components in a PPRC, enabling you to continue your operations in the event of a failure.
- GDPS/PPRC Configuration Checker Tool
  - Identifies devices defined in production systems that are not under GDPS management control.
- Global Mirror Monitor integrated into GDPS/GM
- GDPS Console Interface Tool
  - Allows operators to issue GDPS script commands or execute GDPS scripts from the systems console.
- GDPS/GM Copy Once
- Query Services
Optimal CFs / Prod systems in Site2
Non-z: UNIX®, Linux, Linux on z, Windows®

Global Mirror

• Continue to have DR protection while restoring B copy
• Incremental copy when B disk available
• Can avoid full volume copies
• Reduces exposure from hours to minutes
• Re-introduce Site 2 w/Inc Copy Only

As is” tool for GDPS/MGM Incremental Resync Tool support for alternate Subchannel sets
GDPS/PPRC and GDPS/PPRC HM

• Extended to support PPRC secondary devices defined in an alternate sub-channel.
• Facilitates GDPS configuration changes when exploiting alternate sub-channel.

The Preserve mirror tool is designed to:
• Start PPRC
• Bring new devices to duplex state
• Add them to the GDPS configuration
• Monitor progress
• Keeps disk Free during an initial copy.

“as-is” tool for GDPS/MGM Incremental Resync Tool

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“as-is” tool for GDPS/MGM Incremental Resync Tool

Global Mirror
GDPS/PPRC 3.8 - Configuration Checker tool

- Identifies devices defined in production systems that are not under GDPS management control.
- Devices may be accidentally left out from the GDPS configuration so regularly running this tool would help installations to catch and correct such errors.
- This can help verify that the entire production environment is protected, avoiding possible data integrity issues.

Configurations:
- (2-site) GDPS/PPRC, GDPS/HM
- (3-site) GDPS/MzGM or GDPS/MGM running with GDPS/PPRC or GDPS/HM

Global Mirror Monitor integrated into GDPS/GM
GDPS/GM and GDPS/MGM

- Integrates existing Global Mirror Monitor tool into GDPS/GM
- Capabilities include:
  - Generates alerts and messages based on a defined policy
  - Creates detailed performance and behavioral data
  - Problem diagnosis and performance reporting
  - View recent performance data for a Global Mirror session
  - Take automatic actions based on particular events or situations.
  - Statesave to gather diagnostic information
  - Pausing Global Mirror

- Both CKD and FB disk supported

GDPS/GM 3.8 - Copy Once

- Targeted for volumes with heavy updated datasets but not critical for recovery
  - Paging datasets,
  - temporary datasets
- Disk can be mirrored only on user initiated occasions
- Only mirror the volumes when new datasets are allocated
  - Establish a Global Copy session between the production and recovery site.
  - First pass of replication allocates datasets on the recovery site volumes
  - After first pass, terminate the Global Copy session
- CKD or FB formatted disk
- 3.8 SPE. Target 2Q 2011

Console Interface (GCI) tool

- Allows operators to issue GDPS script commands or execute GDPS scripts from the systems console.
- Allows operators to issue GDPS script commands or execute GDPS scripts from the systems console.
- Provides an additional alternative when performing GDPS operations.
New GDPS V3.8 Health Checks

- Helps ensure best practices are adhered to
- Helps identify setup changes as environment changes
- GDPS/PPRC xDR Installation Health Checker
  - Checks the setup of the xDR environment
  - Helps ensure required installation and customization tasks have been performed correctly.
  - xDR native Linux and guest Linux on System z environments.

Query Services Enhancement

- Queries on GDPS monitored resources.
  - Systems z/OS images within this GDPS-Plex
  - DASD Primary and secondary disk and SSIDs
  - HyperSwap HyperSwap related information
  - Monitors Monitor statistics
  - Environment General information about the GDPS environment
  - All All of the above

- Returns information about the GDPS 'environment'
  - GDPS product, Version/Release
  - GEOPARM dataset/member name Freeze action
  - CKD/FB disk last config load time etc.
  - GDPS/PPRC, GDPS/PPRC HM, and GDPS/GM

Removal of functions

- The following were removed in GDPS Release 3.8
  - P/DAS support in GDPS/PPRC and RCMF/PPRC
  - GDPS network management functions for SNA
  - ACTIVATE command for IPLing systems.
  - LOAD will remain as the only supported method to IPL systems.

Agenda

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GDPS V3.8 – Enterprise-wide HA & D/R

- Availability
  - Reduced impact of false freezes
  - STP and Sysplex Timer recovery
  - HyperSwap support for FR disk
  - Extended Monitoring
  - LPAR and CEC Awareness

- Simplified system management
  - Zero Suspend FlashCopy for Incremental FlashCopy
  - Automated cleanup of persistent reserve and Concurrent Copy data

- New & Improved GDPS tools
  - GDPS/MGM Inc. ReSync tool – Ph 3
  - Preserve Mirror Tool – Alt. Subch. sets
  - GDPS/PPRC Configuration Checker
  - GM Monitor integrated into GDPS/GM
  - Copy Once - Device support
  - GDPS Console Interface tool
  - Installation verification program for xDR
  - Query Services

- Scalability
  - UCB Constraint Relief for GDPS/XRC
  - XRC timestamping support for z/VM guests

- IPL Protection
  - GDPS

The Enterprise-wide Continuous Availability and Disaster Recovery Solution

ibm.com/systems/z/gdps

GDPS Demographics (thru YE10)

One or two site GDPS installations by product type

<table>
<thead>
<tr>
<th>Product Type</th>
<th>Annual</th>
<th>Cumulative</th>
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<tbody>
<tr>
<td>GDPS/PPRC</td>
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<td>GDPS/GM</td>
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<tr>
<td>GDPS/PPRC/GM</td>
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</tbody>
</table>
| GDPS solution by industry sector
  - Communications 36 6.3%
  - Distribution 36 4.6%
  - Finance 419 77.7%
  - Indiscipl. 29 5.3%
  - Interim GM 30 5.7%
  - GM 10 1.7%
  - Total 172 18.8%
  - GDPS solution by geography
  - AU 147 25.7%
  - CA 36 11.6%
  - EMEA 169 32.8%
  - Total 551 100.0%
Additional Information

- Web sites:
  - GDPS: www.ibm.com/systems/z/gdps
  - Parallel Sysplex: www.ibm.com/systems/z/pas
  - Bus Resiliency: www.ibm.com/systems/z/resiliency
  - Storage: www.ibm.com/systems/storage
  - Redbooks®: www.redbooks.ibm.com

- GDPS Web Site White Papers and Presentations
  - GDPS Family: An Introduction to Concepts and Capabilities
  - IBM Implementation Services for GDPS/Global Mirror
  - GDPS Business Continuity Solutions
  - Consistency Groups in a Nutshell
  - DS6000™ / DS8000™ Data Replication
  - GDPS Solutions

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