High Availability and Disaster Recovery architectures for z Systems

GDPS solutions, what are their objectives, how they are implemented by the customers and we’ll also talk about the future of the solution with the newest features added to GDPS version 3.12.

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Agenda

Introduction
Configurations for 2 sites
  Metro distance
  Extended distance
Configurations 3 & 4 sites
Heterogeneous platform
What’s new and Roadmap
Most of large companies in the world have GDPR installed

2 Sites METRO
- Air France
- ARZ
- Bancaja
- Banca Popolare di Milano
- Bankinter
- Bank of Montreal
- BIT
- BRZ
- Deutsche Bank
- EQUENS
- La Caixa
- Central Bank of Turkey
- Credit Suisse
- Danske Bank
- Deere & Company
- Finanz Informatik
- GAD
- Generali Informatik Services
- Lloyds Banking Group
- Monte Paschi di Siena
- Postbank
- Royal Bank of Scotland
- Sparda Bank (SDV)
- Svenska Handelsbanken
- Toronto Dominion Bank
- UBS
- ZIVIT

2 Sites Distants
- **XRC**
  - Jack Henry
  - Sun Trust Bank
- **GM**
  - American Express

- **Active-Active**
  - Large Chinese Bank

3 sites (2 Metro + 1 Distant)
- **XRC**
  - Barclays Bank
  - British Telecom
  - Cedacri S.p.A.
  - Garanti Bank
  - HMLR
  - ICBC
  - Regions Financial Corp.
  - Royal Bank of Canada
  - Large US Bank

- **GM**
  - Baloise
  - BPVPN
  - Charles Schwab
  - BNP Paribas
  - Itau
  - Intesa Sanpaolo
  - Six Group
  - Unicredit

2 Regions - Symetric
- **JPMC**
- **Nationwide**

More than 790 licenses in 46 countries
Dozens of references
Multiple pressures on IT Services to improve availability

- Business Growth
- Reduce incident impacts
- 24*7*365 access
- Demographic

- Reduce Planned Outages
- New Apps New Products
- New rules

- Entreprise Data

- Governments

- Reporting & Documentation

- BASEL II
  - Pillar 1
  - Pillar 2
  - Pillar 3
  - Minimum Capital Requirements
  - Supervisory Review Process
  - Market Discipline
<table>
<thead>
<tr>
<th>Global disaster</th>
<th>Local disaster</th>
<th>Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Hurricane</td>
<td>- Fire</td>
<td>- Hardware &amp; software update.</td>
</tr>
<tr>
<td>- Earthquake</td>
<td>- Power supply problem</td>
<td>- Switch to a new datacenter</td>
</tr>
<tr>
<td>- Power plants failure...</td>
<td>- Unplanned IT Failure</td>
<td>- Test</td>
</tr>
</tbody>
</table>

**Do we have safe backup?**
Do we have system ready to start outside of the region?

**Could we avoid downtime and data loss?**
Is there a procedure to restart systems?

**Can we do that transparently?**
How to reduce the risk of a rolling problem during a maintenance scenario?
The added value for...
... high availability and disaster recovery

- **Automation**

GDPS based on Netview and System Automation is able to manage and automate actions and to react to events.

This key point has a lot of benefits:

- Reduce risk
- Reduce dependency on people.
- Enhance recovery performance
- Help you to be consistent across all your environment
The added value for…
… system monitoring and management

- **Single point of control**
  - Clear view of your systems and storages devices status
  - Simply presents faults and warnings

- **System management and maintenance**
  - Introduction of a system of script to manage their complex environment
    - Simple
    - Flexible
    - Easy to use
The added value…
… in an heterogeneous environment

- **Heterogeneous type of storage**
  - GDPS can manage a configuration with a mix of multiple kind of storage platform such as **IBM DS8K**, **Hitachi/HDS Disks**, **EMC disk**…

- **Heterogeneous platform**
  - GDPS includes solution designed for platform such as **zVM**, **Linux**, Aix, Windows with additional capability.
    - DCM – Distributed Cluster Management (Since 2008)
    - xDR – Extended Disaster Recovery (Since 2005)

Designed for Linux on z consolidation
GDPS Topologies and solutions
GDPS Topologies
GDPS/HM & GDPS/PPRC – Synchronous replication

Distance max: <200km

HyperSwap technology

Added value / Key features
- Minimal impact in case of failure
- No data loss!
- Simplified maintenance and test
- Planned outage support
- More automated operation

Protection against:
- Storage/disk failure
- Partition failure
- Site failure
- RPO = 0, RTO = seconds
HyperSwap technology

- Substitutes Metro Mirror secondary for primary device
  - Automatic – No operator interaction
  - Fast – Can swap large number of devices
  - Non-disruptive – applications keep running
  - Includes volumes with Sysres, page DS, catalogs

- Disk no longer Single Point of Failure
GDPS/XRC and GM – Asynchronous replication

Added value / Key features
- Unlimited distance support.
- Performance impact negligible.
- Automated recovery

Protection against:
- Site failure
- Major disaster (Powerplant failure, natural disaster, …)

RPO = seconds or minutes
RTO < 1 hour
MGM & MzGM, why moving to these solutions?

Added value / Key features
- Local high availability (Site 1 + 2)
  - No dataloss!
- Disaster recovery (Site 3)
  - Automated recovery within a minimal period of time in case of major issue.
- Incremental resync capability

Protection against:
- Site failure
- Major disaster (Powerplant failure, natural disaster, …)
Perceived benefits

- Fire drills and real recovery always from the practice FC copy (F)
- Planned operations (site maintenance, code /storage upgrade)
- No service disruption due to site power failure or primary subsystem failure

<table>
<thead>
<tr>
<th>GDPS/PPRC # LPs</th>
<th>Number PPRC Volumes</th>
<th>Planned HS Suspend [UIT]</th>
<th>Unplanned HS [UIT]</th>
<th>Number GM Volumes</th>
<th>Average Data in Flight (remote RPO)</th>
<th>Simulated Regional D/R (remote RTO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16+2</td>
<td>14,716 pairs 149 LSS</td>
<td>16 sec</td>
<td>19 sec</td>
<td>14,719 pairs 149 LSS</td>
<td>30 sec</td>
<td>&lt; 4hrs</td>
</tr>
</tbody>
</table>

**Note:** All times are in seconds.
### XRC (MzMG) or Global Mirror (MGM)?

<table>
<thead>
<tr>
<th></th>
<th>GDPS/XRC</th>
<th>GDPS/Global Mirror</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Replication</strong></td>
<td>Asynchronous. No app. impact</td>
<td></td>
</tr>
<tr>
<td><strong>Distance</strong></td>
<td>Virtually unlimited distance</td>
<td></td>
</tr>
<tr>
<td><strong>Type of disk managed</strong></td>
<td>System z data only</td>
<td>System z &amp; <strong>distributed data</strong> (ckd + scsi)</td>
</tr>
<tr>
<td></td>
<td>• z/OS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Linux on system z (LPAR or Guest)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• zVM</td>
<td></td>
</tr>
<tr>
<td><strong>Requires…</strong></td>
<td>…additional MIPS &amp; LPARs on secondary site to support SDMs (zIIP)</td>
<td>…additional disk for additional FlashCopy version</td>
</tr>
<tr>
<td><strong>Scalability</strong></td>
<td>Highly Scalable. Up to 182 coupled SDMs</td>
<td>Max 8 subsystems (w/o RPQ) 17 subsystems (with RPQ)</td>
</tr>
<tr>
<td><strong>Work with…</strong></td>
<td><strong>Supported by multiple vendors</strong> (IBM, Hitachi, EMC,…)</td>
<td>Currently supported on IBM disk</td>
</tr>
</tbody>
</table>

![Green Check Mark](image)
Linux on z consolidation with xDR!

xDR

Capability to manage **Linux on z** and **z/VM** partition
Manage CDK + **SCSI disks**
Manage SSI cluster (zVM clustering)
End to end continuous availability
Support Live Guest Reallocation
**Hyperswap** capability
What’s new?
MGM 4-site & MzGM 4-site

Added value / Key features
- Symetrical architecture
- No “pure DR region” but two regions that are equivalent.
- High Availability in both region

Protection against:
- Site failure
- Major disaster (Powerplant failure, natural disaster,...)
What’s new? – z/OS Proxy

z/OS Proxy

Capability to manage z/OS system that are outside of the sysplex.
This system will act as « satellite » connected via CTC to the controlling system.
Up to 24 systems can be managed with this feature.
What’s new? - GDPS Appliance

Use the One UI web interface
- View z/VM System and xDR Proxy
- HyperSwap planned/unplanned
- Site Switch planned/unplanned
- Freeze planned/unplanned
- Start/Stop z/VM image
- Start/Stop z/VM guest
- Manage Linux clusters

Common interface across IBM storage systems
- Intuitive actions
- Reduces learning curve

Disk vendor independent

Provides non-z/OS customers the same benefits of high availability and D/R which were only available to z/OS customers

Provides additional benefit for moving workloads to Linux on z System
GDPS Appliance – What do we have in the box?

**Step1.** Download the package and install it from a Linux on z partition on disks that will be dedicated to the appliance.

**Step2.** Load the new partition via the HMC

**Step3.** Access to the appliance via a dedicated command line interface (for updates, etc...)

**Step4.** Admin can manage his GDPS control system via the new dedicated interface!
What’s new?

**GDPS/MTMM (MultiTarget MetroMirror)**

- Primary disk is mirrored to two disks instead of one
- HyperSwap capability to both secondaries
- Protection against primary failure even during maintenance

Application writes to H1.
Data are replicated in SYNC to H2 and H3
GDPS/MTMM, what is new?

- New interface & options

<table>
<thead>
<tr>
<th>Locations</th>
<th>HyperSwap</th>
<th>Mirror</th>
<th>Preferred policies</th>
<th>PRIMARYFAILURE policy</th>
<th>PPRCFailure policy</th>
</tr>
</thead>
<tbody>
<tr>
<td>RL1</td>
<td>H1-H2</td>
<td>ENABLED</td>
<td>OK</td>
<td>PREF,RPFC</td>
<td>SWAP,GO</td>
</tr>
<tr>
<td>RL2</td>
<td>H1-H3</td>
<td>ENABLED</td>
<td>OK</td>
<td>SWAP,GO</td>
<td>GO</td>
</tr>
<tr>
<td>RL3</td>
<td>H2-H3</td>
<td>MTIR</td>
<td></td>
<td>SWAP,GO</td>
<td>GO</td>
</tr>
</tbody>
</table>

Primary device: H1
Device number: 05200
Vendor: PX1RS1

Number of PPRC relations: 2
SSID: 520A
LSS: 57
CCA: 00
SERIAL: 00FGLP1

PPRC state to: H2
State: PRIMARY DUPLEX

PPRC state to: H3
State: PRIMARY DUPLEX

One source, two targets
What’s new?

GDPS/Active-Active v1.5

Sites separated by unlimited distances, Running the same applications, Having the same data, Provide cross-site Workload Balancing, Continuous Availability, Disaster Recovery.
Conclusion
Improving his HA/DR capability

I’m already using GDPS/PPRC

...to manage z/VM and z/Linux partition?

I want ...

...to improve my availability

Enable xDR feature

GDPS/MTMM

...a Disaster Recovery region

GDPS/3sites

I want HA capability in both region?

GDPS/4sites
Benefits of GDPS

• Central point of control
  • System z (z/OS, z/VM and Linux for System z) and distributed servers
  • Replication infrastructure
  • 1, 2, 3, and 4 sites

• Real time monitoring and alert management

• Automated Recovery
  • HyperSwap for Continuous Availability
  • Planned and unplanned outages

• Automated provisioning
  • CBU and sysplex components
Values of GDPS

• Lowest RPO and RTO possible
  • No downtime or minimal downtime in case of disaster
  • Minimal recovery time if you need to use your disaster recovery site

• Automated procedures reduce dependencies on people during incident or disaster

• High level of synergy with the disks
  • High performance level

• End to end continuous availability solution
  • Manage z/OS, z/VM, Linux on z and even distributed servers
Thank you for your attention!

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