GDPS Active-Active

GDPS/ActiveActive, the newest generation of GDPS solution and a fundamental paradigm shift to near continuous availability solutions.

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Multiples pressures on IT Services to improve availability

Business Growth → Reduce Planned Outages

Reduce incident impacts

24*7*365 access

Entreprise Data

New Apps
New Products

New rules

Governments

BASEL II

Pillar 1
Pillar 2
Pillar 3

Minimum Capital Requirements
Supervisory Review Process
Market Discipline

Reporting & Documentation

Demographic

Reduce Costs
<table>
<thead>
<tr>
<th><strong>Global disaster</strong></th>
<th><strong>Local disaster</strong></th>
<th><strong>Maintenance</strong></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 & dependency on people.
- Enhance recovery performance

- **Single point of control**

- Clear view of your systems and storages devices status
- Simply presents faults and warnings
Agenda

• **Concept**
• Solution overview
• Typical cases
• New v1.4 & 1.5 features
• Conclusion & roadmap
Evolving customer requirements

We create Active-Active to answer to the following need.

Sites separated by unlimited distances,
Running the same applications,
Having the same data,
Provide cross-site Workload Balancing,
Continuous Availability,
Disaster Recovery.

“Active-Active Sites is positioned as the next generation of GDPS”
From High Availability to Continuous Availability

<table>
<thead>
<tr>
<th>GDPS/PPRC</th>
<th>GDPS/XRC GDPS/GM</th>
<th>GDPS/Active-Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failover model</td>
<td>Failover model</td>
<td>Near Continuous Availability model</td>
</tr>
<tr>
<td>Recovery time &lt; 1 min</td>
<td>Recovery time &lt; 1 hour</td>
<td>Recovery time &lt; 1 min</td>
</tr>
<tr>
<td>Distance &lt; 20 KM</td>
<td>Unlimited distance</td>
<td>Unlimited distance</td>
</tr>
</tbody>
</table>

**Important:**
Active-Active is NOT intended to substitute for local availability solutions such as Parallel SYSPLEX
Active-Active concept

- Cross-site Workload Balancing
- Continuous Availability
- Disaster Recovery
- Monitoring
What is an Active-Active Workload?

- A workload is the aggregation of these components
  - **Software**: user written applications and the middleware run time environment
  - **Data**: related set of objects that must preserve transactional consistency and optionally referential integrity constraints
  - **Network connectivity**: one or more TCP/IP addresses & ports
Active-Active Sites Configurations

- Configurations
  - Active/Standby – Since June 2011
  - Active/Query – October 2013
  - Active-Active – Intended direction
- A configuration is specified on a workload basis
Agenda

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What is a GDPS/Active-Active environment?

- **Two Production Sysplex environments (also referred to as sites) in different locations**
  - Software-based replication between the two sysplexes/sites
- **Two Controller Systems**
  - Primary/Backup
- **Workload balancing/routing switches**
  - Must be Server/Application State Protocol compliant (SASP)
    - RFC4678 describes SASP
  - **What switches/routers are SASP-compliant?**
    - Cisco Catalyst 6500 Series Switch Content Switching Module
    - F5 Big IP Switch
    - Citrix NetScaler Appliance
    - Radware Alteon Application Switch (bought Nortel appliance line)
GDPS Active-Active solution overview

Active Production
- **z/OS**
  - Lifeline Agent
  - Workload
  - IMS/DB2
  - Replication Capture
  - TCPIP
  - MQ
  - NetView
  - SA & BCPii
  - GDPS/A-A
  - Tivoli Monitoring
  - Other Automation Product

WAN & SASP-compliant Routers used for workload distribution

Standby Production
- **z/OS**
  - Lifeline Agent
  - Workload
  - IMS/DB2
  - Replication Apply
  - TCPIP
  - MQ
  - NetView
  - SA & BCPii
  - GDPS/A-A
  - Tivoli Monitoring
  - Other Automation Product
1. Transaction committed
2. Capture read the DB updates from the log
3. Capture put the updates on the send-queue
4. Apply received the updates from the receive-queue
5. Apply copied the DB updates to the target databases
Active/Standby Configuration

Workload A (green – Cash withdrawal) use an Active/Standby configuration
Workload B (blue – HR Management) use an Active/Standby configuration

GDPS detects the failure
And asks WD to redirect transaction
Active/Query Configuration

Workload B (HR Management) has Active/Standby configuration

- Workload Q (HR Display) has Active/Query configuration
- Dependent on Workload A (Max Latency 5, Reset Latency 3)
- Preferred site: Paris

Diagram:
- Paris: Workload B standby
- Budapest: Workload B active
- Transaction: Q→B
- Log: [A] latency = 2
- MQ: Replication B
- [A] latency = 0
Agenda

• Concept
• Solution overview
  • **Testing results**
• New v1.4 & 1.5 features
• Conclusion & roadmap
Preliminary testing results*

Configuration:
- 9 * CICS-DB2 workloads + 1 * IMS workload
- Distance between site 300 miles (≈500 kms)

Test1:
Planned site switch *

<table>
<thead>
<tr>
<th>GDPS Active-Active</th>
<th>GDPS/XRC GDPS/GM</th>
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<tbody>
<tr>
<td>70-80 seconds</td>
<td>≈ 1-2 hour</td>
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Test2:
Unplanned site switch
After a site failure
(Automatic)

<table>
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<tr>
<th>GDPS Active-Active</th>
<th>GDPS/XRC GDPS/GM</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30 seconds</td>
<td>≈ 1 hour</td>
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*Test1: Gracefull Switch with fast switch and fence at database level
* IBM laboratory results; actual results may vary.
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• **New v1.4 & 1.5 features**
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Version v1.4

A/A Sites – v1.2
- Active/Standby config
- Base Content
- DB2 and IMS support

A/A Sites – v1.4
- Active/Query config
- Co-existence with GDPS/PPRC and GDPS/HM
- VSAM replication
- Q-rep MCG
- Disk integration
- Graceful switch
- DB2/IMS connect extensions
- Requirements
Co-existence with GDPS/PPRC or GDPS/HM

- Manage coexistence between PPRC or HM and Active-Active
- Prevent Active-Active to perform load on the wrong set of disks
Disk integration

Active Sysplex A

Transactions

Standby Sysplex B

GDPS/A/A Soft Replication

Disk replication
GDPS/XRC or GDPS/GM

DR Sysplex A

Two options for Sysplex A problems …

Workload Switch – switch to SW copy (B); once problem is fixed, simply restart SW replication
Region Switch – switch to SW copy (B) and restart DR Sysplex A from the disk copy
VSAM Workload

New type of workload used mainly for CICS workload and batch

Infosphere VSAM Replication
**Graceful Switch**

**Current region switch**

- We stop all new connection at the distributor level
- We wait 10 sec and we move the workload to the new region

**Graceful switch**

- We stop all new transaction at the distributor level
- We verify if there is no batch running
- We switch to the new region
- We set the former primary region in «read + replication only» mode
Multiple Consistency Groups (MCGs)

• Before MCGs
  1 Workload = 1 db2group = n tables = 1 capture / 1 apply
• With MCGs
Multiple Consistency Groups (MCGs)

• Higher flexibility
  • A single workload can replace multiples workload
  • Apply engines use the capability to perform synchronized commit of the update they have done in the secondary site.

• Higher scalability
  • Support more than 100 000 updates/seconds for a specific workload.
A/A Sites – 1.4
- Active/Query config
- Co-existence with GDPS/PPRC and GDPS/HM
- VSAM replication
- Q-rep MCG
- Disk integration
- Graceful switch
- DB2/IMS connect extensions
- Requirements

A/A Sites 1.5
- Extend A/A Sites to support legacy SNA appl
- Scalability enhancements
- DB2/IMS connect extensions
- Requirements
Extend A/A Sites to support legacy SNA appl

- SNA APPLID could now be specified under GDPS to monitor the SNA application.
- Better performance and better control.
- Workload failure capability for these applications

- Legacy application (3270) are often based on SNA
- SNA-based workload support – A/A Sites applications are currently based upon TCP/IP based networks; however, some clients still have applications based upon SNA based networks. This will extend A/A Sites capability to TN3270, remote API, & message broker SNA based applications.
Scalability enhancements

- Taking advantage of Lifeline 2.5 to improve scalability and performance
- Less contention → More Workload can be managed
DB2/IMS connect extensions

- Support of DB2 connect and IMS connect application.
- DB2 API only, no COBOL application
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Summary

- Eliminates planned outages and reduces impact of unplanned outages
- Provide cross-site Workload Balancing
- Unlimited distances, can handle heavy workload
Thank you for your attention!

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