Reducing Downtime for Planned Outages

...with IBM Multi-site Workload Lifeline

Planned outages for critical z/OS workloads

Scenario

While IBM Multi-site Workload Lifeline (Lifeline) is a key component of the GDPS active/active continuous availability solution, it can also be used outside of the solution to "gracefully" switch workloads from one z/OS site to another for planned outages.

You can use a software data replication product to keep a remote site's data in sync with the workload data on the local site. Using Lifeline, you can redirect a workload's connections to this remote site and bring down the workload's applications or even the whole local site for maintenance activities.

After all activities have completed and the workload applications on the local site are available again, you can use Lifeline to restore the original environment by switching the workload back to the local site.

Benefits

- Workload availability: Keep your critical workloads available during planned outages.

- No configuration changes:
  - When switching sites, there are
    - no application changes
    - no client configuration changes
    - no server configuration changes
    - no network topology changes
  - Let your staff focus on the planned site maintenance, not on migrating critical workloads.

- Greater flexibility: Planned outage not going quite as you planned? You can extend your maintenance window without impacting your critical workload availability.

- Simple to verify: Don't wait for something to go wrong before you validate your disaster recovery procedures. Since no application or configuration changes are needed, you can test your procedures with minimal impact to your critical workloads.

Key Components for Planned Outages

- IBM Multi-site Workload Lifeline

- Software-based data replication – could be any of the following:
  - IBM InfoSphere Data Replication for DB2 for z/OS
  - IBM InfoSphere Data Replication for IMS for z/OS
  - IBM InfoSphere Data Replication for VSAM for z/OS
  - Other replication products

- External Load Balancer
  - Must support Server Application State Procotol (SASP) (see RFC 4678)
  - e.g. F5 BigIP, Citrix NetScaler

- Two active z/OS sysplexes (sites)
  - No distance limitations
  - Server applications for your critical workloads should be active on both sites
    - Workload connections are routed to only one of the sites
    - Alternate site may be used for read-only work, if desired

Software Data Replication

- What is software data replication?
    - A solution for copying data between databases, typically residing in different sites
    - Emphasizes the copying of only changed data.
        - For example, an application makes updates to a database, and these changes are captured locally and applied to a remote database
    - Replication scope
        - An entire database
        - A subset of the database - A subset of tables or subset of columns or rows within a table

- Why use software data replication?
    - Live Reporting - Offload query workloads to replicated database (Read-only database provides near-real time reporting)
    - Continuous (High) Availability - Failover to replicated database during disaster recovery

- IBM offers several replication products, but this graceful switch solution doesn't require a specific vendor
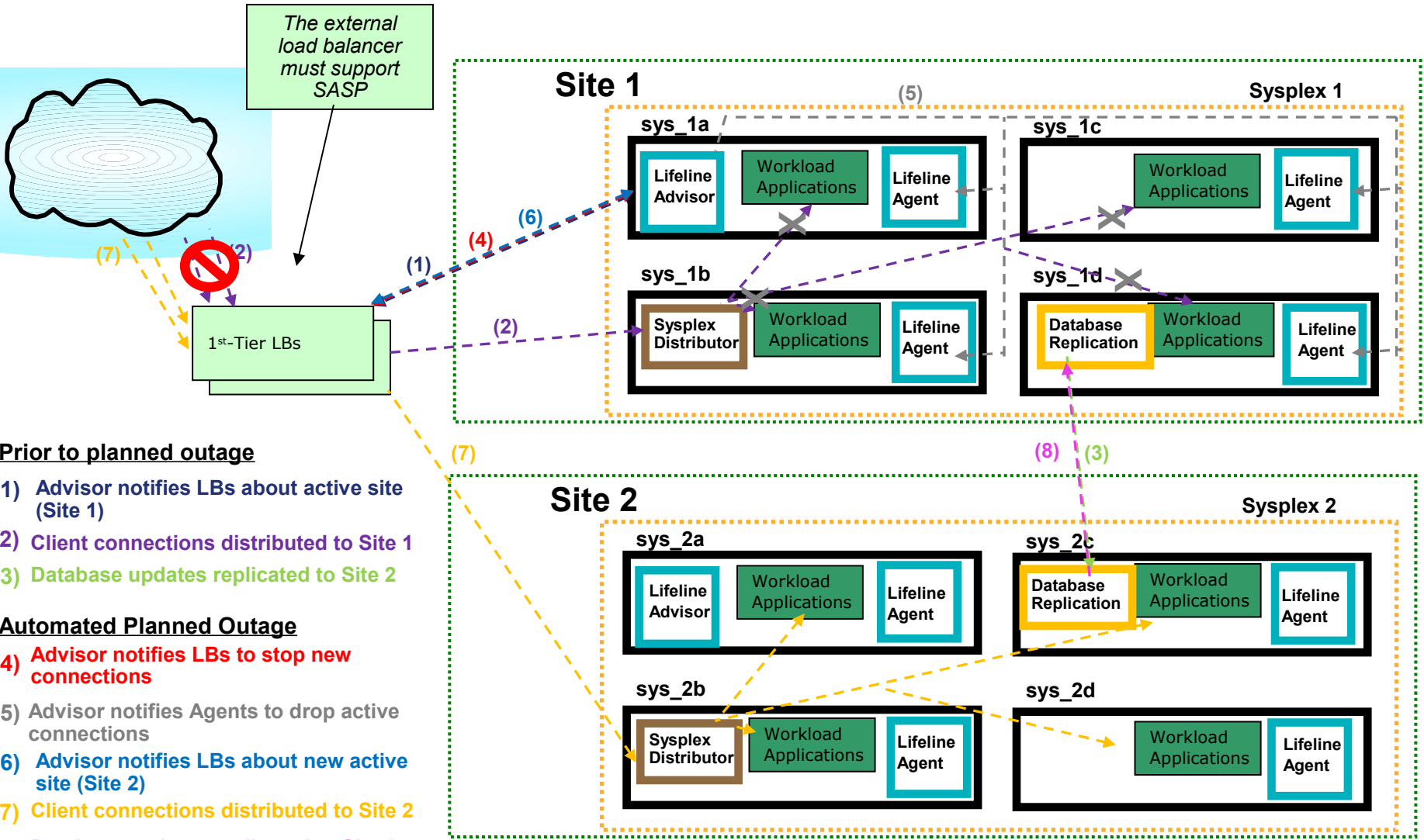
IBM Multi-site Workload Lifeline's role

- To prevent data corruption, all updates performed by a workload <u>must only occur on one site at a time</u>
  - Lifeline controls workload movement to ensure that workload connections for a given workload are directed to only one site (i.e. the active site)
  - Workload connections don't flow through Lifeline, they flow through the external load balancer. Lifeline sends the external load balancer information about how to route the workload's connections

- Prior to planned outage, Lifeline directs all workload connections to a single site
  - Operator issues a MODIFY ACTIVATE command against the Lifeline Advisor

- To switch to the alternate site, the following steps are taken:
  - Any new workload connections must be stopped from being routed to the active site
    - Operator issues a MODIFY QUIESCE command against the Advisor
  - Wait for any outstanding transactions on existing workload connections to complete
  - Reset any workload connections that are not completing in a timely manner
    - Operator issues a MODIFY DEACTIVATE command against the Advisor
  - Redirect all new workload connections to the alternate site
    - Operator issues a MODIFY ACTIVATE command against the Advisor

Walk-through of the workload switch procedure

The external load balancer must support SASP

Site 1   Sysplex 1

(5)

sys_1a   **sys_1c**

Lifeline Advisor | Workload Applications | Lifeline Agent

Workload Applications | Lifeline Agent

sys_1b   **sys_1d**

Sysplex Distributor | Workload Applications | Lifeline Agent

Database Replication | Workload Applications | Lifeline Agent

(1) (4) (6)

1st-Tier LBs

(2)

(7)

Site 2   Sysplex 2

sys_2a   **sys_2c**

Lifeline Advisor | Workload Applications | Lifeline Agent

Database Replication | Workload Applications | Lifeline Agent

sys_2b   **sys_2d**

Sysplex Distributor | Workload Applications | Lifeline Agent

Workload Applications | Lifeline Agent

(8) (3)

Prior to planned outage

(1) Advisor notifies LBs about active site (Site 1)

(2) Client connections distributed to Site 1

(3) Database updates replicated to Site 2

Automated Planned Outage

(4) Advisor notifies LBs to stop new connections

(5) Advisor notifies Agents to drop active connections

(6) Advisor notifies LBs about new active site (Site 2)

(7) Client connections distributed to Site 2

(8) Database updates replicated to Site 1

Use Case

- An existing customer currently schedules an outage for several hours each month to apply maintenance and updates to their applications. Using Infosphere Data Replication for DB2, the customer synchs up a remote site (geographically about 1km apart) with the current DB2 data. Then using Lifeline, the customer switches the workloads to this remote site and brings down the local site for its planned outage.

- After all application updates have been made and the local site is restored, the customer then re-synchs the DB2 data and switches the workload back to the local site.

> *By using IIDR for DB2 and Lifeline, the customer has brought their planned outage down from several hours to under 20 minutes.*

Frequently Asked Questions

- Can I use Lifeline with more than one workload?
  - Yes, Lifeline handles multiple workloads.

- Do all workloads have to be active on the same site?
  - No. The concept of an 'active' and 'alternate' site is on a per-workload basis.

- How far apart can the sites be?
  - There is no distance limitation. However, time needed for replication increases as the distance increases. If replication takes 2 seconds, the data on the alternate site is no more than 2 seconds old. This is pertinent in a scenario where you want to actually use the data on the alternate site (e.g. account balance queries, batch data analysis, etc).

- Why do I need an external load balancer as well as sysplex distributor?
  - The external LB is used to route a workload to the active site. The sysplex distributor is used to load balance connections within the active site. It is also possible to use additional external LBs in each site instead of sysplex distributor.

- Why does the sample configuration show two Lifeline Advisors?
  - All Lifeline Agents and external LBs connect to the primary Lifeline Advisor. A backup Lifeline Advisor should run in the other site to maintain workload availability in case of a site outage.

Links

- **IBM Infosphere Data Replication for DBS for z/OS**
  - http://www-03.ibm.com/software/products/en/infosphere-data-replication-db2-z/

- **IBM Infosphere Data Replication for IMS for z/OS**
  - http://www-03.ibm.com/software/products/en/infosphere-data-replication-for-ims-for-zos/

- **IBM Infosphere Data Replication for VSAM for z/OS**
  - http://www-03.ibm.com/software/products/en/infosphere-data-replication-vsam-z/

- **IBM Multi-site Workload Lifeline**
  - http://www-03.ibm.com/software/products/en/network-lifeline

- **Citrix NetScaler**
  - http://www.citrix.com/products/netscaler-application-delivery-controller/features/app-delivery/advanced-load-balancing.html

- **F5 BigIP LTM**
  - http://www.f5.com/products/big-ip/big-ip-local-traffic-manager/overview