SITE-FOUR HIGH AVAILABILITY PROGRAM REVIEW
EVENT DATE(S): 10/08/2017, 11/05,2017 – 11/08/2017

SUMMARY:

As part of an ongoing business continuity program, Site-Four, LLC actively maintains a high-availability (HA) core-processing environment with real-time CU*Base/GOLD data replication between identical servers located at two geographically dispersed, state-of-the-art datacenters. Regular HA rollover events are scheduled to redirect core-processing and operations to the secondary/backup datacenter (located in Kentwood, MI) for up to 7 business days. At the completion of each event, core-processing is redirected back to the primary location (located in Yankton, SD). These rollover exercises are invaluable to validate procedures and ensure the ability of recovering CU*Base/GOLD core processing in an effective and timely manner.

The scope of this rollover event was expanded to include the installation of new IBM server equipment to replace the existing PROD server located in Yankton, SD and the HA server located in Kentwood, MI. The first phase of the event was performed on the morning of October 10th to rollover from the old production server to the new production server which had been installed and inserted into the replication pool during the previous week. The second phase of the event was performed on November 5th to rollover CU*BASE/GOLD core-processing to the new HA server installed at the Kentwood data center. On November 8th, the rollback was performed to bring core-processing back to Yankton and completing the server replacement project.

This event was performed with the collaboration of recovery teams from Site-Four, CU*NorthWest, CU*SOUTH, and CU*Answers as part of a reciprocated colocation agreement with CU*Answers dating back to 2014. As a proactive measure to minimize disruptions at credit union branch locations, a communications campaign was performed to announce the planned event and encourage credit unions to test connectivity to the secondary data center in advance of the rollover.

Notable characteristics regarding this rollover event include:

- This rollover event was performed as part of a server hardware replacement project at both the primary data center in Yankton, SD, and the secondary data center in Kentwood, MI.

- To assist in the installation of the new IBM server equipment, staff from the CU*Answers iSeries Administration team participated on-site during both the rollover to the new PROD server in Yankton, and the rollover to the new HA server in Kentwood. On the rollback performed on November 8th, staff from the CU*Answers, representing the OpsEngine Business Development team participated at the Yankton data center to assist in job automation scheduling and tuning.

- The CU*Answers Operations Team performed the rollback procedures on November 8th, standing in for the Site-Four Operations Team, to ensure that in an actual incident where Site-Four staff is unable to participate in the recovery process, teams at CU*Answers are able to perform the necessary steps to bring core-processing back online at the secondary data center.

As highlighted in this report, the mutual colocation agreement between Site-Four and CU*Answers not only includes shared facility space within a state-of-the-art data center, but also network and operations support throughout the rollover event. The end goal in this agreement is to provide seamless support and a level of readiness that allows the party experiencing the disaster time to focus on recovery and resumption while the unaffected party oversees daily operations from the high-availability data center.

The following sections identify other details, challenges observed, lessons learned, and recommendations for consideration.

EVENT DETAILS:

On the morning of October 8th, beginning at 5:15 AM CT, recovery teams brought CU*BASE/GOLD offline and began the role swap process to redirect core-processing to the new PROD server in Yankton, SD. CU*BASE/GOLD was back online by 7:45 AM with all issues resolved by 8:18 AM.

On the morning of November 5th, beginning at 5:00 AM CT, CU*BASE/GOLD was taken offline once again to redirect core-processing to the new HA server in Kentwood, MI. CU*BASE/GOLD was once again online at 5:50 AM with all issues resolved by 6:30 AM.

The rollback was performed on November 8th, beginning at 9:59 PM, to redirect core-processing back to the new PROD server in Yankton, SD, completing the rollover event. CU*BASE/GOLD was back online at 10:48 PM with all issues resolved by 11:09 PM.

CHALLENGES:

As we continue to expand and improve our products and services to a growing client network, systems and environments experience an increased number of changes at a very rapid pace. Performing these rollover exercises in a planned, controlled setting during non-peak business hours is a small investment to better prepare for a situation that is less ideal.

Maintenance windows necessary to perform these rollover exercises continue to shrink as more routine tasks are required of system operators and users of the system. It is important that we continuously seek ways to improve processing efficiency through automated and managed productivity, while at the same time becoming more creative in testing our operational resilience.

Due to the nature of the rollover exercise (redirecting live production traffic from 80+ credit union locations to our HA/DR location), some challenges are to be expected. For this event, these challenges included the following:

- The rollover process was postponed by 15 minutes (on the morning of October 8th) to allow time for the replication audits to completed. The actual HA rollover process began at 5:15 AM CT.
    - This condition occurs more frequently during a morning rollover as opposed to those performed during evening hours, likely due to the close proximity to EOD/BOD processing.
- Following the rollover to the new PROD host on October 8th, error messages were generated by an application used in the transmission of card transactions with third-party EFT vendors.
    - Teams quickly identified restricted authority permissions on the object CRVL001. Once the permissions were set to match those on the former production server, the application began processing transactions properly.
- During the rollover November 5th, web servers in the ItsMe247 server pool were not able to communicate with the new HA host.
    - Teams updated the new server database (DB) name and restarted the application on the web servers to restore connectivity.
- During the rollover on November 5th, errors were generated from the OPAL console (Operator Assistance Language) when compiling tasks for the automated job scheduler (ROBOT).
    - It was determined that the ROBOT environment had not fully loaded prior to the attempt to launch the first automated job. Once the system identified ROBOT as active, the jobs were completed without error.
    - Teams also identified that the outqueues required for ROBOT had not been created (due in part to the installation of the new host). Manually created the ROBOTQ allowed the application to function properly.
- Following the rollover on November 5th, the new host was unable to send system alerts via Email.
    - A new SMTP server had been recently installed requiring a configuration change to the NTALERTS application.

- Also during the rollover on November 5th, the new host was not able to communicate with third-party vendor, CUSC.
  - This was due to a missing host table entry on the new HA server. Once this entry was created, connectivity was restored.
- During the HA rollback performed on November 8th, there was a brief period (few minutes) where network communications between the new PROD and HA hosts was interrupted.
  - This occurred during the role-swap process, after network changes had been performed (DNS and firewall rule changes). The root cause of the interruption has not been determined.
- Following each rollover event, restoring network connectivity with third-party EFT vendor ELAN requires that recovery teams contact the vendor and instruct them to recycle services and ports on their host.
  - This is an ongoing issue with this vendor hosting applications that are sensitive to brief disruptions and require user intervention after changing production servers (i.e.; PROD to HA).

CONTINUING EFFORTS AND RECOMMENDATIONS:

Each recovery test and high-availability rollover exercise provides us the opportunity to continually improve the process and adjust the needed procedures accordingly. The best way to accomplish this is to "Practice. Learn. Document. Repeat". The following is a list of action items and projects that we are pursuing to get us closer to that goal:

- Considering that the rollover events performed in October and November, as detailed in this report, centered around the migration of new IBM server equipment, this presented a unique opportunity that only occurs every three to four years. In addition to maintaining documentation for performing regular rollovers every six months, developing and documenting the procedures and checklists to introduce new equipment is critical to the future success of the high-availability program.
  - The accuracy of those procedures will be put to the test during the next planned (or unplanned) rollover event.
- As noted above, HA rollovers that are performed during the early morning hours have been more prone to delays due to replication audits following EOD/BOD processing. To date, this has been considered acceptable due to the benefit of having a limited number of credit unions open on Sunday, giving recovery teams additional time to troubleshoot and resolve any issues that surface, while incurring limited impact to the network at large.
  - Given the progress made over the past two years and maturity of the high-availability program, the decision has been made to schedule all future rollover events during the late evening hours. This will require that applications are fully tested and that support teams are geared up for a potential increase in call volumes on the morning following each rollover event.
  - During the roll-back event on November 8th, teams experienced a brief network interruption between the PROD and HA hosts during a critical stage in the role-swap process.
    - Although it was not determined that the network configuration changes made around the same time actually caused the disruption (directly or indirectly), it is recommended that teams postpone the network changes until the role-swap process has completed.

During the May 2017 HA rollover event, an issue occurred as a result of the DNS host advertising different IP addresses for PROD (rotating back and forth between primary and secondary) creating service disruptions for applications that communicate with the production host. To resolve the issue at that time, teams temporarily modified a configuration setting (TTL) to stabilize the network.

Although the DNS issue did not reoccur during this rollover event, the root cause has not been determined to have been resolved and the modified TTL setting remains as it was. This will be addressed prior to the next scheduled rollover.

Respectfully,

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