CU*ANSWERS HIGH AVAILABILITY PROGRAM REVIEW

EVENT DATE(S): 9/15/2024 – 9/22/2024

SUMMARY

As part of an ongoing business continuity program, CU*Answers actively maintains a high-availability (HA) core processing environment with near real-time data replication between identical hosts located at two geographically dispersed, state-of-the-art data centers. A minimum of twice each year, live HA rollover events are scheduled to redirect CU*BASE production and operations to the secondary data center (located in Yankton, SD) for a period of one full business week or longer. At the conclusion of the rollover event, core processing is redirected back, and operations resumed at the primary data center (located in Kentwood, MI).

These live production HA rollover events are invaluable to ensure the ability to recover CU*BASE GOLD core processing in an effective and timely manner when unexpected incidents occur that threaten to disrupt business operations. A secondary benefit of regular scheduled rollovers is to allow time to bring production systems offline without incurring downtime for users, so that planned maintenance tasks can be performed. This helps to ensure peak system performance and the application of applicable software and security updates.

The CU*Answers Fall HA rollover was performed as planned, starting on Sunday, September 15th through Sunday, September 22nd, lasting one week with minimal challenges or issues observed.

The objectives of the fall HA rollover centered around three primary goals:

1. Planned system maintenance to address informational system errors observed on the IBM SAN,
2. Beta testing of the new location for the CTE (Custom Training Edition) library environment, previously unavailable during HA rollovers, and
3. Additional testing of the soon to launch CBX environment with core processing production from the secondary data center in Yankton, SD.

All of these objectives were met, in addition to testing the changes made in response to the four-week rollover performed this past spring.

The remainder of this report reflects the details of the event, challenges observed, and continuing efforts to improve the HA rollover process, given the significance it plays in ensuring availability of CU*BASE core processing during potentially disruptive scenarios.

All times noted in this report are Eastern Time.

EVENT DETAILS AND TIMELINE

One objective not mentioned in the section above but included all in rollover and recovery exercises is the understanding that any disruption or downtime has a unique impact for credit unions and their members across each time zone. For this HA rollover, bringing systems offline even briefly early Sunday morning at 3:00 AM EDT means a disruption late Saturday evening at 8:00 PM HST. For this purpose, we seek to minimize any downtime while at the same time ensuring the integrity of data and systems across all systems. This is also a driver for the 2025-2026 initiative to install a second production data center west of the Rockies to serve credit unions in the regions where they operate.

For the purpose of this report, the event unfolded as follows:

Timeline of events:

Sunday, September 15th

On the morning of Sunday, September 15th, beginning at **3:00 AM ET**, teams initiated the procedures to bring CU*BASE subsystems offline and start the process for the high availability rollover. At 3:15 AM, after pre-roll checks were completed, the official role-swap process began. Due to changes implemented in late 2023, a role-swap process that once took 60-90 minutes to complete can now be completed in 20 minutes or less. This is the stage of the rollover process where PROD and HA (aka Source and Target) trade places. The server at the Yankton, SD, becomes the CU*BASE production host, and all core processing network traffic is directed at it for the duration of the rollover period.

At **4:05 AM**, all data integrity checks were completed and subsystems back online. Teams began performing application testing. By **4:15 AM**, all tests had completed, and nightly processing (EOD/BOD) resumed for all time zones at the secondary data center in Yankton, SD.

Monday, September 16th

On the morning of Monday, September 16th, it was reported that select Data Warehouse files were not available from the previous business day. It was discovered that the procedure to clear the file queues (process performed after each rollover) was executed after the daily snapshot files had been created. Due to the timing of the incident and discovery, teams were not able to recover or recreate the files. This did not impact any production library files.

Sunday, September 22nd

On the morning of Sunday, September 22nd, beginning at **3:00 AM ET**, teams initiated the procedures to perform the HA rollback. At 3:20 AM, after pre-roll checks were completed, the official role-swap process began. At **3:55 AM**, all data integrity checks were completed and subsystems back online. Teams began performing application testing. By **4:10 AM**, all tests had completed, and nightly processing (EOD/BOD) resumed for all time zones at the primary production data center in Kentwood, MI.

Monday, September 23rd

It was reported that one credit union experienced a disruption of service for Instant Card Issue service during the HA rollover event. Service was restored once CU*BASE core processing was returned to the PROD host. Since this was reported after the rollback, teams were not able to recreate the conditions for troubleshooting. This problem typically results from the lack of IP address whitelisting on the credit union's network for the appropriate HA host

and port. This information was communicated to the credit union's IT support team and will be validated prior to the next HA rollover event.

CHALLENGES AND CONTINUING EFFORTS

Technology and system processes are always changing and evolving. As a result, there is an opportunity to learn and improve with each HA rollover performed. In this report, the challenges and continuing efforts are shared with all interested parties as evidence of the value received. During this exercise, the following challenges were observed:

1. Snapshot file cleared before data warehouse processing completed (September 16th).
   o Prior to each scheduled HA rollover, nightly EOD/BOD processing is paused until CU*BASE is operating live on the secondary host. This helps to reduce the amount of time required to complete the rollover process (and minimize downtime). It does, however, shrink the available window for completing nightly processing for each time zone after the rollover is finished and before credit unions open for the new business day.
     ▪ To address the compressed processing window, some flexibility is required in the job schedules to ensure all have completed on time. Rather than executing jobs in a purely sequential order, some manual intervention is necessary.
     ▪ In this case, one job was launched before an upstream job had completed, resulting in the clearing of the snapshot data file that was recently created. Teams were unable to recover the cleared file. This challenge did not impact credit union library files.
     ▪ As a result, documentation has been updated and additional controls put in place to remediate the risk for future HA rollover exercises.
2. Instant Card Issuance (ICI) services unavailable for one credit union
   o In a conversation with one credit union after the completion of the HA rollover, it was reported that ICI services were not available while operating on the HA host.
     ▪ Since this condition occurred during the rollover period but was not reported until after core processing was redirected back to the production data center, teams were unable to recreate the conditions.
     ▪ When this has occurred during previous rollover events, the cause of the disruption typically resulted from a misconfiguration on the credit union network. The appropriate IP address and application port numbers must be able to traverse the firewall and credit union network appliance. This information is documented in a CU*Answers AnswerBook article and communicated with credit unions during the onboarding process.
3. Custom Training Edition (CTE) library availability
   o As reported during previous HA rollovers, the availability of CTE library files for training at the credit union has become a growing challenge. Due to the number of credit unions who have subscribed to the service and amount of data stored, CTE files are not replicated to the HA environment. This means that credit unions are not able to access the training environment for the duration of each rollover period.
     ▪ This has typically been acceptable for one-week rollover exercises. After the extension of the 2024 spring HA rollover event to a four-week period, the decision was made to

move the CTE environment to an alternate server to ensure availability whether CU*BASE is live on the PROD or HA hosts.

- Teams worked to recreate the CTE environment on the CULEARN server prior to the scheduled HA rollover. One CTE credit union was selected for the beta test during this rollover period.
- After a successful beta test, teams will work to move all remaining CTE credit unions to the new environment by 11/30/2024.

CLOSING REMARKS

The 2024 fall HA rollover marks the 20-year anniversary of the CU*Answers High Availability program. Launched in 2004, the environment consisted of two systems, side-by-side, in the same data center. In 2005, the HA environment was moved a distance of five miles away from the production environment. In 2016, it was moved again, this time 750 miles away. In 2026, we plan to move it again. These gap analysis reports over the years reflect the maturing of the Business Continuity Program with the investment in High Availability technologies at the center.

In those 20 years, there have been dozens of planned HA rollovers, and a few unplanned events. While this September 2024 rollover may appear at first glance to be a run-of-the-mill exercise, several hours of planning and what-if scenarios were evaluated to gain maximum value from the experience. That investment is demonstrated with each successful exercise, whether planned or not.

As mentioned above, plans are underway for the expansion of the data center environment, resulting in the relocation of the high availability servers. Each change made will require testing to ensure resilience of operations and availability of the products and services delivered.

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