

## CU\*ANSWERS HIGH AVAILABILITY PROGRAM REVIEW

EVENT DATE(S): 9/12/2021 – 9/26/2021

### 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. 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 validate procedures and ensure the ability to recover CU\*BASE GOLD core processing in an effective and timely manner when incidents occur that threaten to disrupt business operations.

As mentioned in [previous reports](#), these rollover events provide the opportunity for performing regular system maintenance to update or replace hardware and software components on production equipment with minimal impact or downtime. During the [Spring 2021 HA rollover](#), a total of 96 disk drives were replaced on the production host as a precautionary measure due to a potential manufacturing quality defect and to ensure future performance. During this Fall 2021 HA rollover, a maintenance window was also scheduled to perform an upgrade to the core network infrastructure at the production data center.

To accommodate the planned maintenance, the HA rollover was extended to two weeks instead of the normal one-week period. On Sunday, September 12, beginning at 3:00 AM ET, recovery teams initiated the HA rollover to bring CU\*BASE core processing online at the systems in the Yankton, SD data center. After observing a full week on the HA host, teams began the maintenance project which involved upgrading the firmware/software on all core network backbone switch appliances at the production data center in Kentwood, MI. To ensure minimal impact to online banking users during the event, **It's Me 247** and mobile banking applications were delivered by servers at the secondary data center in Grand Rapids, MI.

The planned network maintenance project began on Saturday, September 18 at 10:00 PM and completed at 6:00 AM ET on Sunday, September 19. During that window, portions of the network infrastructure at the production data center were taking offline while switch appliances were upgraded. As a precautionary measure, all virtual servers were powered down to ensure data integrity and avoid connectivity issues with the storage area network (SAN) when rebooting multiple switch appliances. This proved to be an effective strategy as teams completed the project ahead of schedule with minor issues reported.

On the morning of Sunday, September 26, beginning at 3:00 AM, teams performed the HA rollback process to bring CU\*BASE online at the primary production data center as the final step of the Fall 2021 rollover event.

As observed and reported during the previous Spring 2021 HA rollover, the amount of time required to complete the "role-swap" process had grown from 45-60 minutes to 90-120 minutes. As a result of changes made in the

months leading up to the Fall 2021 HA rollover, teams were able to reduce the amount of time required by 40 minutes.

The following sections identify challenges observed, lessons learned, and recommendations for consideration related to this event.

*\*All times noted in this report are Eastern Daylight Time.*

## EVENT DETAILS

Careful consideration and strategic planning are applied in the design of the data center and the IT infrastructure to allow for flexibility and scalability when planned maintenance is required. This helps to provide an environment where most system and network maintenance projects can be completed during non-peak hours with minimal impact or downtime to users. The scope and complexity of this planned event put that strategy to the test, pushing up against the boundaries of the available maintenance window.

Multiple teams worked together to prepare in advance a playbook detailing the steps required to isolate and upgrade the firmware on a group of network switch appliances that collectively make up the core backbone for connecting all systems and networks in the production data center. The devices on the network were categorized and steps prioritized based on criticality. Once the plan was approved, the date was scheduled and announced.

The event described below is divided into three phases:

1. **CU\*BASE HA Rollover** (September 12 through September 26)
  - To provide CU\*BASE/GOLD from the HA data center in Yankton, SD
2. **Online and Mobile Banking Rollover** (September 18-19)
  - To provide online and mobile banking from the secondary data center in Grand Rapids, MI
3. **Network Maintenance Project** (September 18-19)
  - To upgrade the firmware on the core network switch stack at the primary production data center in Kentwood, MI.

On **Sunday, September 12<sup>th</sup>**, beginning at 3:00 AM, teams began the HA rollover process to bring CU\*BASE core processing online at the secondary data center in Yankton, SD. The rollover event completed by 4:50 AM with connectivity to all third-party EFT vendor networks confirmed by 5:00 AM. During each rollover process, all third-party EFT vendors function in “stand-in” mode adhering to predefined settings on transaction types and amounts (set by the credit union). Once all post-roll application testing was completed, the Operations Team performed normal EOD/BOD processing to prepare for processing on Sunday, September 12<sup>th</sup>.

To minimize downtime for members accessing their accounts through online and mobile banking platforms during the maintenance period, a rollover was performed to bring **It's Me 247** and **CU\*Publisher** applications online at the secondary data center in Grand Rapids, MI.

On **Saturday, September 18<sup>th</sup>**, beginning at 10:00 PM, teams initiated the changes to redirect traffic for online and mobile banking. The process primarily involves making necessary domain name server (DNS) record changes for the web sites involved. A small number of issues were observed (as detailed later in this report) but overall traffic redirection was completed by 10:15 PM.

Also, that evening, beginning at 11:00 PM, teams began to power down more than 200 virtual servers as a precautionary measure to minimize the risk of data integrity errors and connectivity issues with data volumes located on the SAN. Due to the number of virtual servers involved, they were grouped into three categories and prioritized based on impact to end users and operations. Once the virtual servers were safely powered down, teams began the process of upgrading the firmware on each network switch appliance.

With a deadline of 9:00 AM on **Sunday, September 19<sup>th</sup>**, teams were able to complete and verify systems by 6:00 AM. The final step involved redirecting traffic for online and mobile banking applications back to the production data center. This was completed and tested by 6:30 AM.

On the morning of **Sunday, September 26<sup>th</sup>**, beginning at 3:00 AM, recovery teams started the process to roll-back CU\*BASE production to the primary data center. This was completed by 4:45 AM with all services back online.

## CHALLENGES AND CONTINUING EFFORTS

Every rollover event, planned or unplanned, provides an opportunity for a valuable learning experience. Even those that appear relatively smooth on the surface often require decisions to be made and resolutions to apply behind the scenes. Every recovery team member gives their all to minimize the impact to clients and members, while performing their job with an intense focus. Challenges observed during this rollover event include the following:

### CU\*BASE HA Rollover

1. Continued expanding window required for completing the HA rollover for CU\*BASE core processing.
  - It was noted in the report for the [Spring 2021 HA rollover](#) that the amount of time required for the role-swap process from primary to secondary host had expanded to as much as 120 minutes.
  - Over time, the rapid growth in the number of transactions processed and data stored eclipses the benefits of increased speed acquired with new hardware and technology investments. With continuous efforts to shrink downtime, recovery teams must continue to balance the risk when planning and executing a safe and effective rollover exercise.
  - With changes made to the system since the prior rollover, including the suspension of replication for low-priority, non-critical data files (i.e., custom training libraries, etc.), teams were able to shave 40 minutes off the time required for this HA rollover event.
  - Teams will continue to research options for reducing downtime and enhancing resilience and our capacity to restore systems in a prompt and effective manner during disruptive events.
2. CTE libraries (Custom Training Edition)
  - As noted above, to optimize real-time data replication and minimize downtime during the rollover process, data files for CTE (Customized Training Edition) services are no longer replicated from the primary to secondary host. As a result, CTE services are not available during the HA rollover period (conducted twice a year for 1-3 weeks).
  - While the decision to suspend data replication for CTE library files was announced earlier in the year, it was not clearly communicated how that change would impact the availability while operating on the secondary host. Some stakeholders held an assumption that the CTE services would still be available with data from the previous rollover event.

- As an alternative, credit unions who subscribe to CTE services were directed to utilize the common “Bedrock Credit Union” test member database for training purposes until the conclusion of the HA rollover period when production is returned to the primary host.
  - Communications for future HA rollover events will include the appropriate detail and explanation for services that may not be available during these exercises. HA rollovers are by nature an exercise of the disaster recovery program. In the event of a true disaster scenario, non-critical services may not be available for a period of time.
3. Last RDC run on Saturday PM was delayed until Sunday AM due to the network maintenance project.
    - On the evening of the scheduled Network Maintenance event (9/18), the last run for Remote Deposit Capture transactions did not complete before the initial batch of servers were powered down, causing an interruption. As a result, the final RDC run was completed the following morning (9/19).
    - Plans for future network maintenance projects of this scope will include a closer look at upstream and downstream system activities that are part of the entire workflow process.
  4. Request to load EOM tape while on the HA host.
    - Periodically, client credit unions will request that a file from a monthly archived tape be restored for a range of purposes (audits, queries, etc.). When live CU\*BASE production is performed from the HA data center, there is an extended period required and cost to process the request. Typically, the request is suspended until CU\*BASE production returns to the primary data center.
    - This is another example of an opportunity to expand communications prior to the HA rollover event to clarify which services may not be available during the rollover period.
  5. A second request received to load three years of historical data for a credit union while on the HA host.
    - A second request was received to have data from multiple monthly archived tapes restored and provided as a separate data set. The nature of this request was rated as high priority.
    - To avoid the delay of shipping the tapes to the HA data center, support teams worked to restore the data on the development host, encrypt the data for secure transfer to the requesting credit union, and provide the data within the allotted deadline.
  6. Future HA rollovers may become less like a mirror of production (for lower priority features).
    - As new features and services are added to the core processing platform, it is becoming necessary to prioritize those that will be available during a disaster recovery scenario (high priority), and those that will be restored later (low priority).
    - The purpose of performing the HA rollover exercise is to validate procedures and confirm our capabilities to recover should an unplanned disruptive event occur. To properly balance the effort required to minimize downtime and recover less critical features and services, prioritization must occur. That may mean that some services are not available during the brief rollover windows conducted twice each year.
    - Teams will continue discussing methods to optimize this process and find the balance that best meets the corporate goals and objectives.

### **Online and Mobile Banking Rollover**

7. Beta.itsme247 (not in load balancing pool across sites, TTL default at 1 hour instead of 5 mins)
  - One hour prior to starting the network maintenance project, teams conducted a rollover for online and mobile banking applications. The [previous rollover for It's Me 247](#) was conducted on September 15, 2020.

- At the time of the HA rollover, roughly half of CU\*BASE credit unions had been migrated to the new version of **It's Me 247** platform. The remainder were operating on the previous version. During the online banking rollover, it was discovered that the temporary URL (beta.itsme247.com) used for the new version, was not configured for load balancing across data centers. In addition, the TTL for the DNS record was set to one hour (instead of five minutes for www).
  - Teams worked to correct the configuration issue observed during the rollover process, resulting in a slightly extended interruption for online banking for credit unions. Access for users of the new version of **It's Me 247** was available by 11:00 PM, once the DNS propagation had completed.
  - A second online and mobile banking rollover will be scheduled and announced once after all credit unions have been migrated to the new version (later this fall) to confirm all configuration changes.
8. Some credit unions using outdated login widgets and links for **It's My Biz 247** on their web sites for the online banking application.
- During the rollover for **It's Me 247**, teams discovered some credit union web sites that had still deployed older login widgets for access to the online banking platform, causing connectivity issues when accessing the application on servers at the secondary data center.
  - Also discovered were links from some credit union web sites to a previous version of OLB for Businesses. Now called **BizLink 247**, some credit union web sites still contain links to the old application (**It's My Biz 247**). In the production environment, a script had been configured to redirect traffic to the correct URL.
  - Prior to the next scheduled OLB rollover, a campaign will be conducted to identify and communicate the need to update the code for those credit union web sites that are using outdated links and login widgets.
9. Mobile banking code to detect when biometrics is not available (MACO/DAON).
- The network maintenance event on 9/19 involved an interruption to the servers that host the MACO biometric authentication capabilities for the mobile banking platform. The software was updated to include the ability to detect when the MACO servers were offline and prompt the member for the username and password for authentication. While confirmed in a test environment, during the rollover for mobile banking, this code modification did not function properly, presenting an error message for users on Android devices.
  - Teams were able to remedy the error during the rollover period and will confirm functionality during the next rollover for online and mobile banking later this fall.
10. Member profile images while on HA (one-way replication).
- A feature of the latest version of online and mobile banking platforms is the ability to upload profile images as part of the member experience. Replication of these images is a one-way transfer (primary to secondary). When functioning on the secondary servers, profile images are not replicated back to the primary server.
  - Teams are reviewing options for profile images prior to the next OLB rollover this fall. One option is to disable the feature to upload a new image while on secondary servers. Another is to manually synchronize profile images prior to the rollback process.

### **Network Maintenance Project**

The challenges and continuing efforts specific to the Network Maintenance Project are outside of the scope of this report, other than how they may have impacted the planned rollover activities as noted above. The project was

completed successfully and within the scheduled time window. The scope of this project allowed teams to gain additional knowledge and understanding relative to how the different systems and networks interact and the interdependencies they have with each other.

## CLOSING REMARKS

Whether planned or unexpected, each recovery test and high-availability rollover exercise provides the opportunity to continually improve the process. The value and significance of these exercises are multiplied when we consider the ever-changing threat landscape from hardware component failures, dependency on third-party vendors and supply chains, and the frequency and scope of today's natural disasters including global pandemics.

Just as significant is the ever-changing technology environment that makes up the CU\*BASE core-processing platform. Increased complexity in application development, vendor integration, and network infrastructure requires more frequent reviews and assessments of the business continuity strategies in place to meet recovery time objectives and a shrinking tolerance for downtime. Regular rollover exercises help us measure our progress and adjust accordingly.

The investment made over the past two decades in building and testing its Business Continuity Program has positioned the CUSO to navigate the storms on the horizon and enable it to reach for new opportunities and serve its owners and client credit unions in innovative ways.

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Unless otherwise noted, all times noted in this report are Eastern Time.