HPE Shadowbase ZDM Achieves Zero Downtime Migration for Large Bank Datacenter

A Gravic, Inc. Case Study

Executive Overview

A large bank operates one of the biggest ATM/POS networks in North America, using the BASE24™ product from ACI (https://www.aciworldwide.com/), running on HPE NonStop servers. BASE24 is a major application used by banks globally for this purpose. Should this ATM/POS service go down, much of the region's retail commerce would come to a halt. For example, at peak times this application services almost 2 million ATM/POS transactions per hour.

Continuous availability of this system is therefore a critical requirement. To that end, the bank modernized its active/backup datacenter architecture and reengineered it into an active/active network using HPE Shadowbase data replication and integration solutions from Gravic, Inc.[1]

The ATM/POS service is geographically distributed between two datacenters, with HPE Shadowbase bi-directional data replication between the two centers. By using this active/active architecture, the bank runs the BASE24 ATM network application simultaneously across both of its HPE NonStop nodes. Transactions are routed to the surviving node if one processing node fails for any reason. As a result, planned outages for system upgrades are reduced from hours to minutes, and recovery times from unplanned outages are reduced by more than 95%. Most importantly, when an outage occurs, the bank's ATM/POS application services are restored to customers much faster, in many cases without the customer even realizing that an outage has occurred.

When it came time for the bank to migrate one of its datacenters, the bank investigated several alternate approaches, from the classic planned downtime outage window to the more customer-friendly and safer zero downtime migration model offered by Shadowbase technology. The bank chose the Shadowbase model, as it eliminates application downtime while the migration takes place. However, the bank also wished to retain continuous application service availability during the migration phase in case a disaster was to strike. It accomplished this by adding a third node into the active/active application network while the migration was in process. In this way, while one node was being migrated, there were two remaining nodes actively performing application processing, providing continuous application availability and backing each other up should a disaster or unplanned outage occur.

> ***"To add the third node we simply entered it into the Shadowbase configuration tool and an optimized configuration file was generated and deployed to all three servers. Within 10 minutes, we went from two nodes to three nodes, running Shadowbase in full active/active mode between each of them. Once the migration was complete, we simply reran the configuration tool and in a few minutes were running in active/active mode on the two remaining nodes, and retired the old production server. It was that easy, totally effortless."***
>
> **Bank Project Manager**

[1] Please see the Gravic white paper, *Choosing a Business Continuity Solution to Match Your Business Availability Requirements*.

Project Overview

One of the datacenters for this active/active ATM/POS application was located downtown in a major metropolitan city (Figure 1). The bank found that this real estate was becoming very expensive to maintain, and gaining physical access to this section of the city could be very difficult (cordoned-off and congested streets) due to major events, such as an international conference or an emergency. Furthermore, the building had an underground parking garage beneath it, and street parking in front, so the bank felt that the building was vulnerable to terrorist activities, and difficult to secure. Of course, it was at exactly such times when emergencies occurred that access to the building would be most critical and most difficult to achieve. Consequently, the bank decided to relocate this datacenter to a brand new, state-of-the-art (and less-expensive to maintain) facility in a smaller town a few hundred miles away, and close the original datacenter. Given the critical availability requirements of this application, this datacenter migration had to be performed with the least amount of downtime.

In order to avoid outages, it was not feasible and risky to simply establish the new datacenter and instantly switch all users from the old to the new (the so called *big bang* approach). It was not possible to adequately test beforehand using such an approach, since there were many, many opportunities for the migration to go wrong. Rather, it was decided that as users were gradually migrated to the new datacenter, an incremental migration was required with no decrease of availability protection, and with the option to quickly fallback to the original datacenter should problems arise. To achieve this migration, the bank turned to HPE Shadowbase Zero Downtime Migration (ZDM) solutions from Gravic, Inc.

Project Details

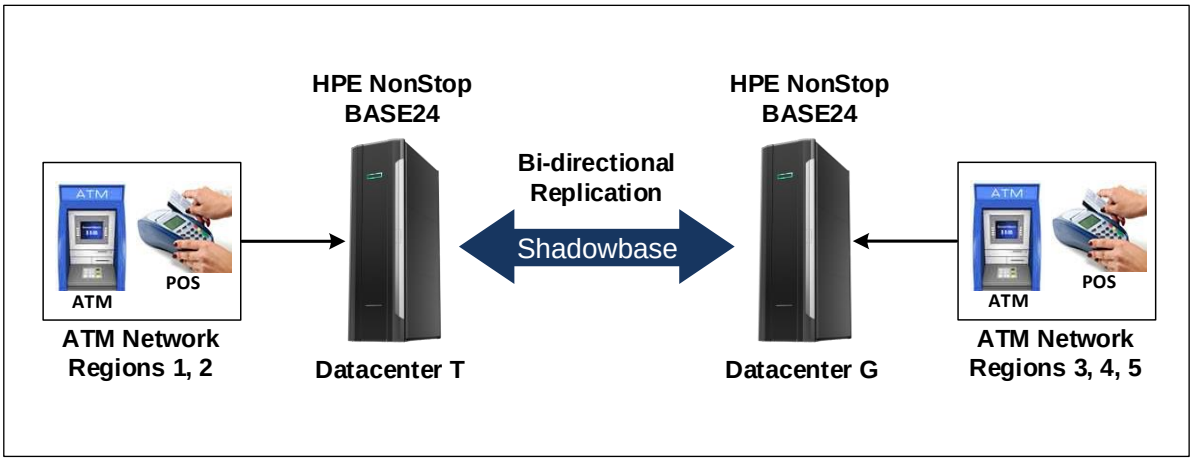

Figure 1 – The Bank's Bi-node Active/Active ATM/POS Application Before the Migration

The bank first established the new datacenter (including systems, applications, and network). Using Shadowbase ZDM, it then set up tri-directional replication between each of the three datacenters (Figure 2). The new datacenter is shown as Datacenter S and the datacenter planned for shut-down is shown as Datacenter T.

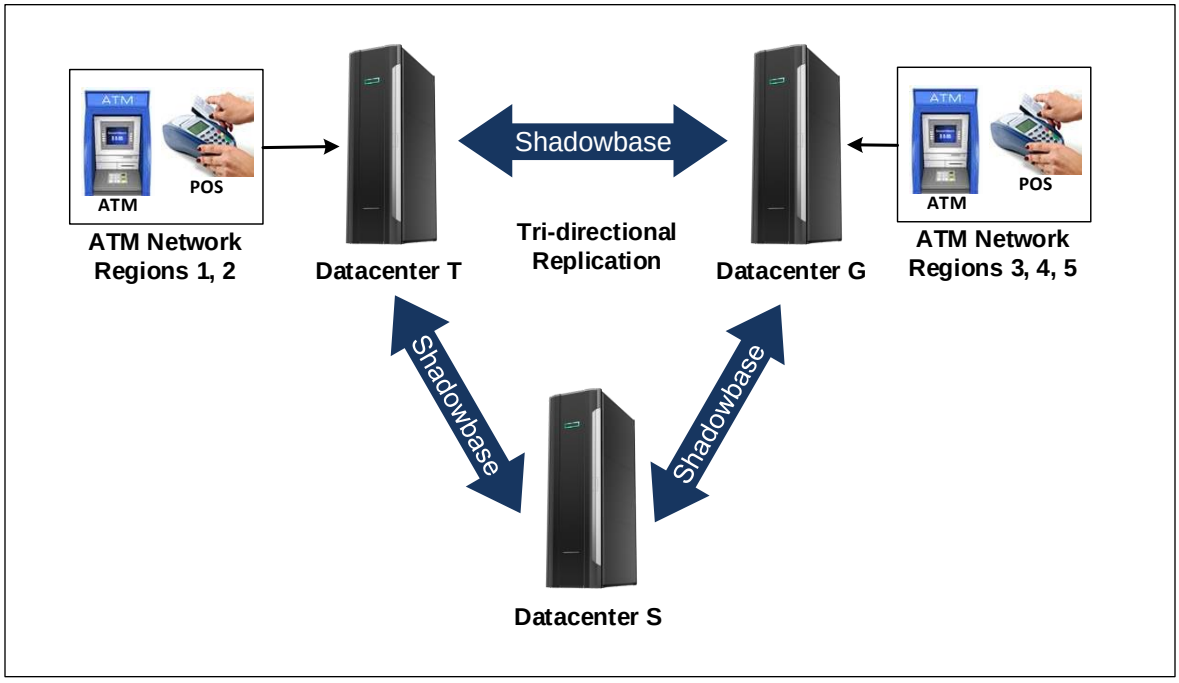

Figure 2 – The Bank's Tri-node Active/Active ATM/POS Application During the Migration Phase

This tri-directional replication configuration achieves several important objectives:

- It brings the new database into synchronization with the database to be replaced while the existing database remains online.
- It enables the incremental migration of users from the old datacenter to the new datacenter (all three systems are actively processing transactions), while still providing the required availability levels should a failure occur with any system. It especially provides a fast and reliable fallback position should any problems arise with the new system.
- It enables Datacenters G and S to provide active/active backup for each other ready for the time that Datacenter T is retired.

After the new datacenter was online and tri-directional replication in place between all three systems, users were continually serviced by the original datacenters while the new database was populated. Once the new database was synchronized, users from Regions 1 and 2 connected to Datacenter T were incrementally migrated to the new datacenter while users in Regions 3, 4, and 5 continued to be serviced by Datacenter G. If any problems arose, it was easy to move the migrated users back to the old datacenter with no loss of service. Since the original Datacenters T and G were still current and backing each other up with active/active bi-directional replication during this interim phase, there was no loss in overall availability protection should one of them fail before the new datacenter went into full production.

After about seven weeks of incremental migration, all users from Regions 1 and 2 were finally connected to and serviced by the new datacenter. Maintenance of the tri-directional replication configuration continued long enough for the new datacenter to accumulate the required amount of historical data (about 60 days). Once that amount was attained, the old Datacenter T was shut-down and Datacenters G and S serviced all users, replicating between them with Shadowbase bi-directional active/active replication as had been the case with the original two datacenters. The final configuration is the same as shown in Figure 1, except one of the datacenters is now in a different physical location.

The bank has stringent operational requirements which needed to be maintained throughout this process. One way in which Shadowbase architecture was able to comply with these requirements was via configuration utilities included with the product. These utilities greatly simplified the configuration and operational process when moving from two nodes to three nodes and then back again to two nodes. By supplying a few parameters such as the number of nodes, and the files to be replicated, Shadowbase utilities automatically generated all

the necessary configuration definitions to implement the required system architecture, thereby reducing complexity and eliminating errors. If necessary, customization of the output configuration definitions is also possible.

Project Results

By using an HPE Shadowbase ZDM solution, the bank was able to successfully and incrementally migrate one datacenter in an active/active ATM/POS application to a different physical location, with no intermediate decrease in availability protection (Figure 3). Because of the continuously available ZDM architecture employed, the maximum outage period experienced by any user during this whole process was four minutes. This planned outage was due to the time for the BASE24 application to drain its outstanding request queue and for the operators to switch the network routers of direct users to the new datacenter address. No unplanned outages occurred at all. If any serious issues had arisen during this migration, the bank had exactly the same levels of availability protection as it did for the original configuration, and could easily have recovered to an alternate system with little to no user outage.

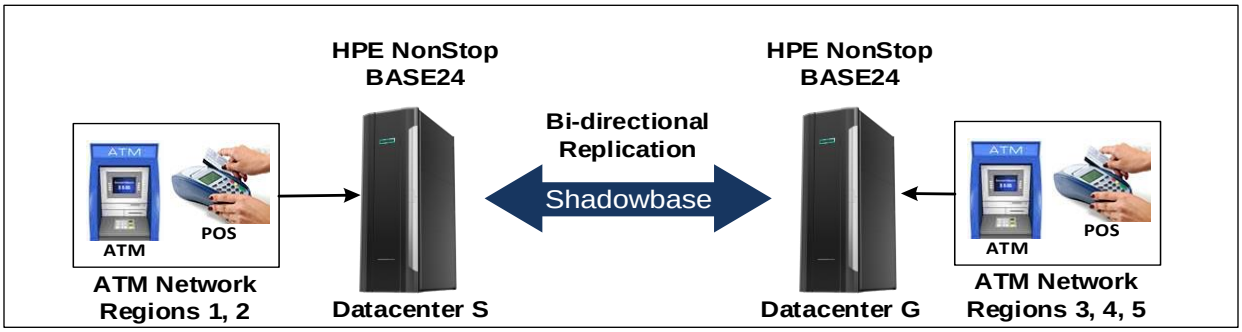

Figure 3 – The Bank's Bi-node Active/Active ATM/POS Application After the Migration

While the Shadowbase ZDM methodology used in this case was for a geographic system relocation, this same methodology can be employed to execute hardware, application, or database upgrades with no service outage. Since Shadowbase technology supports bi-directional replication across heterogeneous platforms, it can even migrate from one platform (type, vendor, operating system, database), to another completely different platform with zero downtime.[2]

Note: In addition to the ZDM capabilities described here, the HPE Shadowbase line of data replication products provides additional solutions for business continuity, data integration and synchronization, as well as application integration.[3] The subject bank uses these other Shadowbase solutions for application and data integration, automatically feeding data to downstream wealth management applications.

[2]Please see the Gravic white paper, *Using HPE Shadowbase to Eliminate Planned Downtime via Zero Downtime Migration*.

[3]For more information on HPE Shadowbase business continuity solutions, please visit: ShadowbaseSoftware.com/Solutions/Business-Continuity/.

International Partner Information

Global

Hewlett Packard Enterprise
6280 America Center Drive
San Jose, CA 95002
USA
Tel: +1.800.607.3567
www.hpe.com

Japan

High Availability Systems Co. Ltd
MS Shibaura Bldg.
4-13-23 Shibaura
Minato-ku, Tokyo 108-0023
Japan
Tel: +81 3 5730 8870
Fax: +81 3 5730 8629
www.ha-sys.co.jp

Gravic, Inc. Contact Information

17 General Warren Blvd.
Malvern, PA 19355-1245
USA
Tel: +1.610.647.6250
Fax: +1.610.647.7958
www.shadowbasesoftware.com
Email Sales: shadowbase@gravic.com
Email Support: sbsupport@gravic.com

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