



Golden 1 Credit Union Improves BASE24™ Classic Application Availability

By Upgrading to HPE SHADOWBASE SIZZLING-HOT-TAKEOVER Solution

TBC I NOVEMBER 2018

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Golden1
Credit Union

Agenda

- Introduction to Golden 1
- Original Environment
- Main Project Goals
- New Business Recovery Concept/Environment
- Steps to Reach Business Recovery Goals
- Summary



Introduction to Golden 1 Credit Union



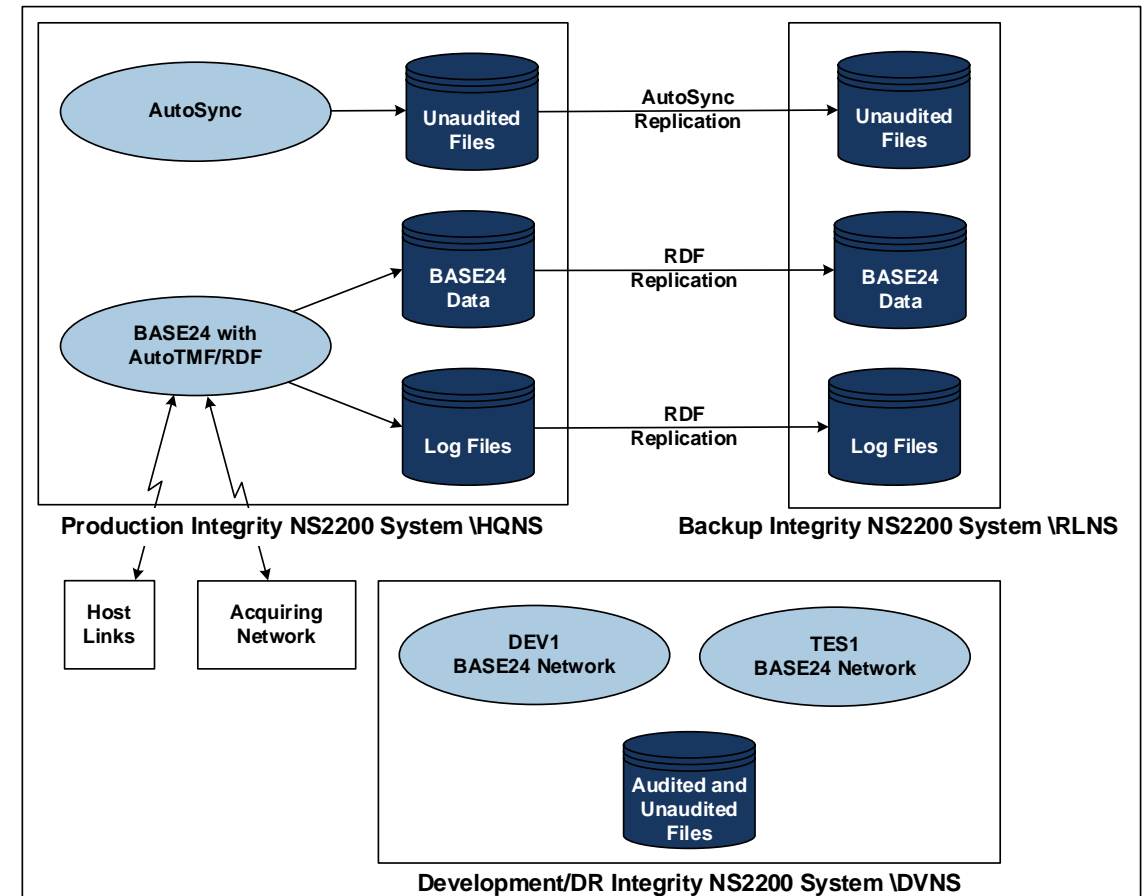
Golden 1 Credit Union:

- Founded in 1933 in Sacramento
- California's leading credit union
- Membership is open to all Californians
- \$12 billion in assets
- Nearly 1 million members
- Mission is to deliver financial solutions
 - Value
 - Convenience
 - Exceptional service



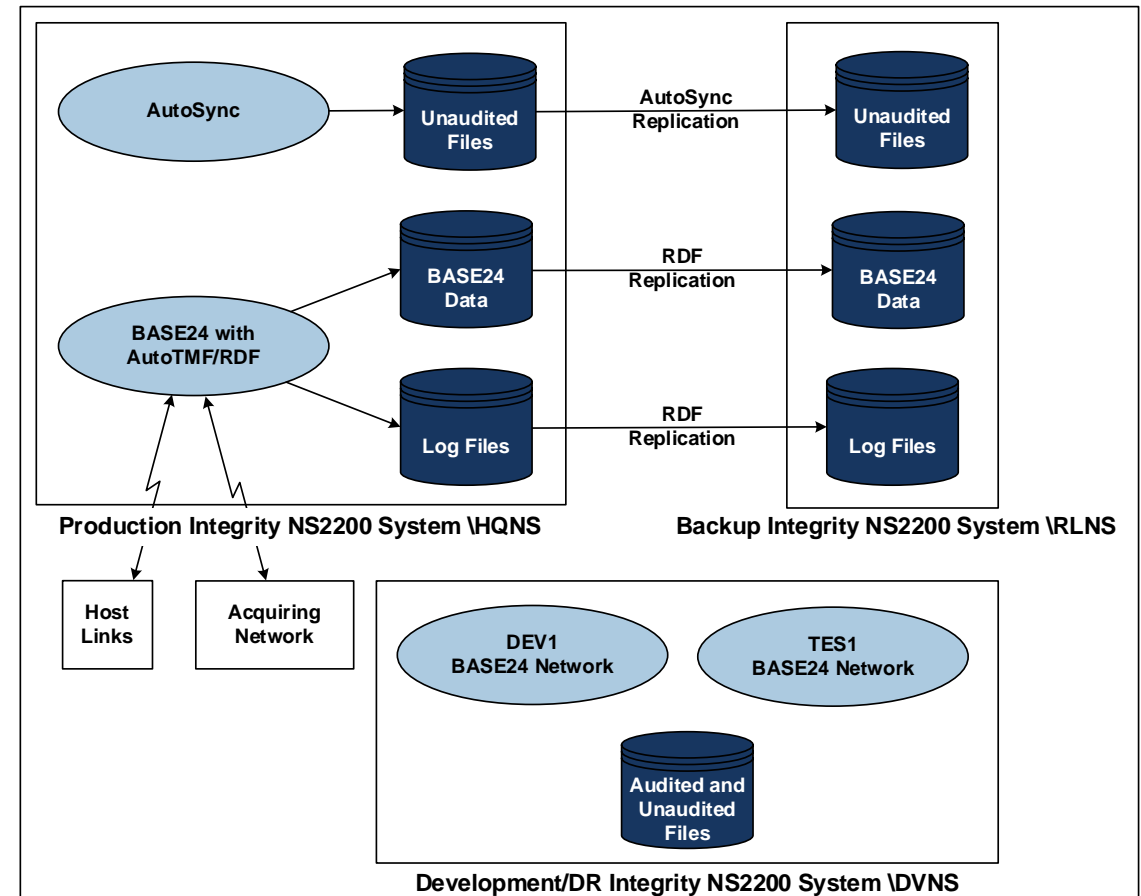
Original Processing Environment

- **ACI BASE24 Classic – issuer only**
 - ATM driving is outsourced but routed to BASE24
 - ATM/POS transactions, no settlement
 - Current at time of system upgrade
- **Three NS2200 systems**
 - Production (\HQNS) – Sacramento CA Headquarters Data Center
 - Passive Backup (\RLNS) – Sacramento CA Regional Backup Data Center
 - Development and cold backup (\DVNS) – DR site, Austin Texas
- **BASE24 running at Headquarters only**
- **HPE AutoTMF – in use for audited files**
 - RDF to update the backup system



Original Processing Environment

- **HPE AutoSync** was in use for non-audited files on both remote systems
- **HPE Netbatch**
 - Only in use at Headquarters
 - Used to keep BASE24 Network Environment File (NEF) updated on remote systems
- **Concept and Method**
 - Keep HQNS system name if failover needed
 - Required system name change for both remote locations (“personality change”)
 - Difficult to move back after failover



Golden 1 CU's Main Project Goals

- **Drivers behind Nonstop System upgrade project goals:**
 - NS2200 systems past End-of-Life and End-of-Support
 - Historical Disaster Recovery concepts and methods were inadequate
- **Business Continuity – replace the production system/backup system disaster recovery concept with production at both Sacramento datacenters**
 - One is Production/Active, while one is Production/Backup
 - Run BASE24 on all 3 systems
 - Resolve stale data dilemma for Cardholder and Balance files
- **Replace in-house file transmission method**
- **Replace expensive performance monitoring**

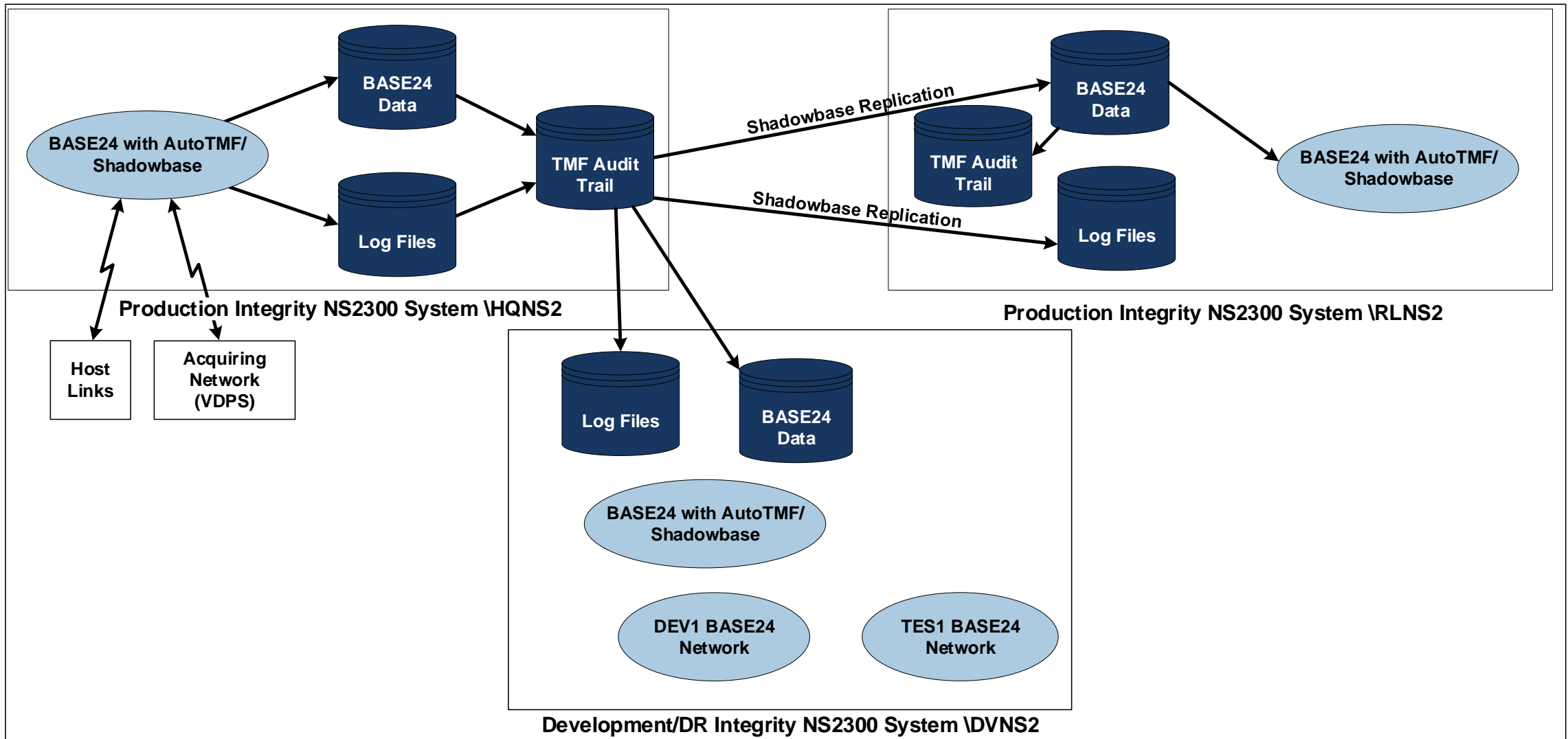


New Business Recovery Environment

- 3 new Nonstop Integrity NS2300 systems
- BASE24 running on all 3 nodes
- Replace RDF with HPE Shadowbase for all 3 nodes
- Utilize HPE AutoTMF Rename features
 - Enable auditing for Cardholder (CAF) and Balance (PBF) File Updates
- Enable HPE Shadowbase configuration:
 - BASE24 Assign and Parameter File (LCONF) Filtering
 - BASE24 Users Security File Replication
- Use HPE Shadowbase Sizzling-Hot-Takeover (SZT)
 - Migrate systems within 15 minutes



New Business Recovery Environment



Project Scope

- No changes to BASE24 needed as it was up-to-date
- AutoTMF and AutoSync configuration changes due to concept change
- Current replication file sets were reviewed and updated
- New replication software (Shadowbase) installation and methods
- New CAIL terminal emulation software
- Golden 1 teams replaced file transmission method
- Replaced performance monitoring
- Golden 1 internal network design changes
- HPE/G1 teams redesign of virtual tape controller system



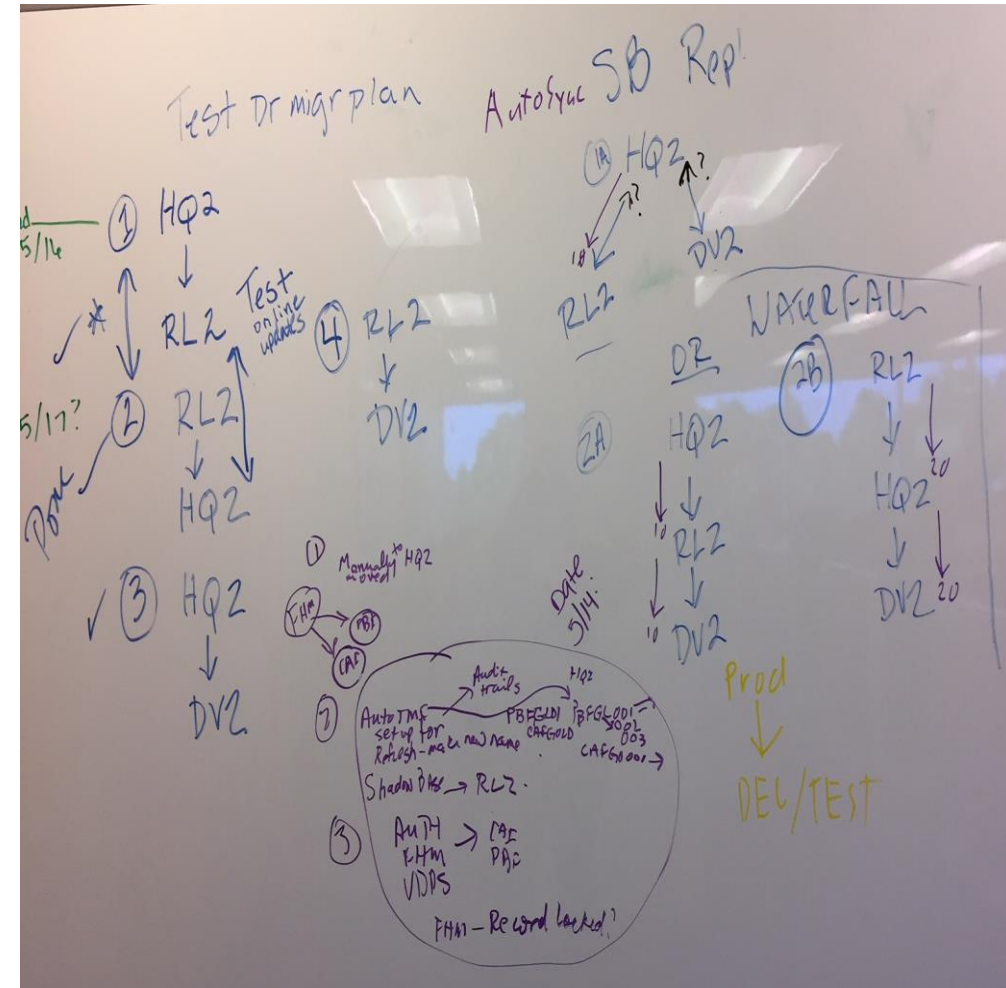
Project Challenges

- Time constraints – system delivery to go live was 3 months, 1 week
- Small Golden 1 technical staff
- Card (CAF) and Balance (PBF) information were refreshed monthly, requiring renames
 - Did not have these files audited, as TMF doesn't allow audited files to be renamed
- Running BASE24 on 3 systems – cutover considerations
- Over 60 Netbatch and stand-alone TACL routines required changes
- Support of password requirement changes
- Learning curve for Shadowbase and new monitoring system HPE Web Viewpoint



Migration Overview

- Required seamless cutover for zero member impact
- Timeline constraints meant some steps had to be accomplished in parallel
- Requirements included going live at Headquarters (HQ2), failing over to the new Regional (RL2) system, and staying there
- The multi-team effort consisted of internal credit union teams and professional services support:
 - HPE installed the hardware and OS, provided system software support, virtual tape controller reconfiguration, and cutover support
 - Gravic for Shadowbase product installation, configuration, and cutover support, and Shadowbase training
 - ACI installed BASE24 on the 3 systems, and was available for cutover



System Configuration – Same to Same

Consistency from old to new systems and across all new systems was leveraged to simplify replication

Consistency is the last refuge of the unimaginative. – Oscar Wilde, 1885

- All 3 new systems are the same NS2300 NonStop servers identically configured at the hardware level: same number of CPUs, amount of memory, network connections (3) used in the same way, and number of disk drives
- Leads to volume/subvol and file names are the same across all 3 systems
- The old NS2200 systems had these attributes, which we found worked well, so we continued with those approaches
- Preserving the same volume, subvolume, and file names between the old and new systems made the Shadowbase configuration much less tedious to describe, and it simplified the overall configuration mapping from the source to the target environments



Interesting production system configuration details

The problem with being consistent is that there are lots of ways to be consistent, and they're all inconsistent with each other. – Larry Wall , 2005, creator of the Perl programming language

- HQNS2 and RLNS2 use Shadowbase bi-directional replication: any BASE24 transaction is replicated to the other system, which allows either system to be production, but we allow only one at a time
- The VISA DPS(VDPS) network connection is only enabled by Golden 1 Networking to one NonStop system via Network Address Translation (NAT): VDPS only ever sees one IP address, either NonStop only sees one VDPS address, and traffic only flows between VDPS and one system
- Three NICs: ZTC0 is used for terminals and FTPS file copies. ZTC1 is VDPS transactions only; ZTC2 is NPI compliant used for EXPAND (Shadowbase) and From Host Maintenance (FHM) (updates from the core system)



Interesting test/development and DR system configuration details

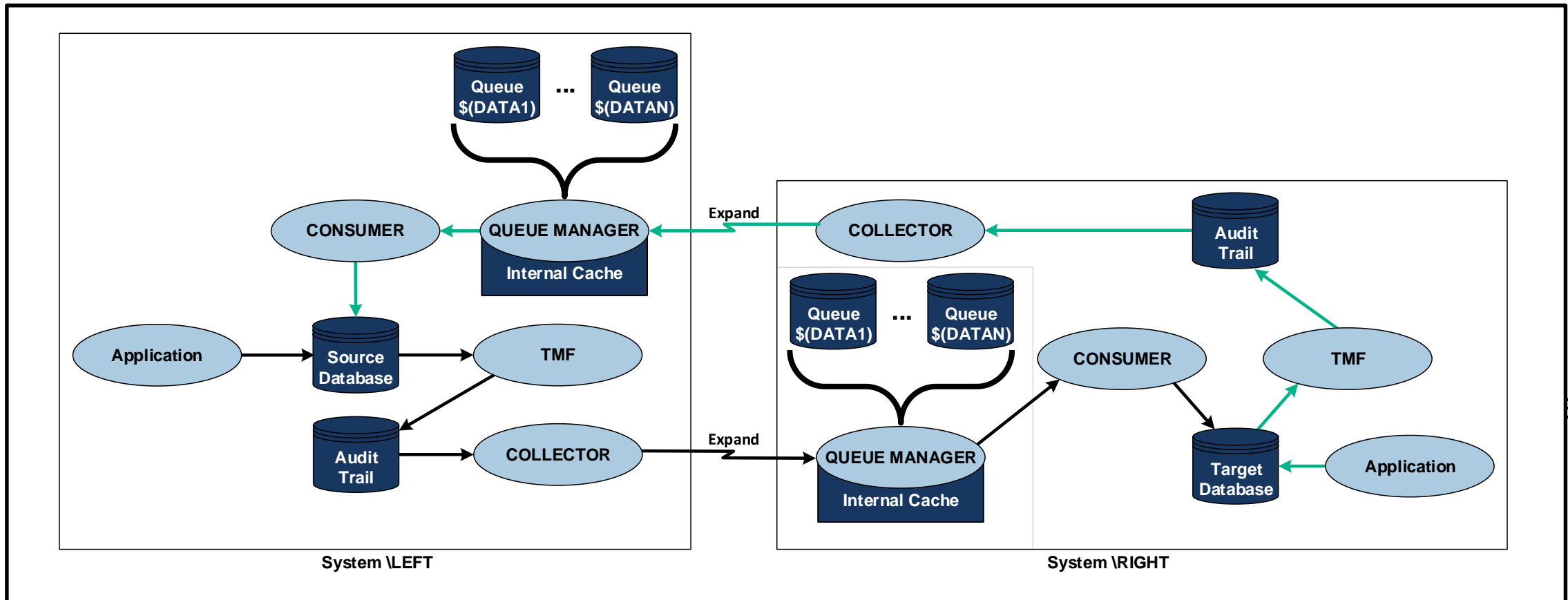
- DVNS2 only receives replication from both production systems at all times, which follows from our conclusion that application testing and development and Disaster Recovery use should remain local
- All disks are partitioned into 2 equal-sized volumes on all systems and encrypted
 - Volumes names on the first partitions are the familiar \$DATA, \$DATA1, etc... and are involved in replication, where the second partitions are the corresponding \$PDATA, \$PDATA1, etc... and are referred to as the partitioned volumes and are not replicated
- On DVNS2, test and development lives on the partitioned volumes, where on production they are used for storage for reports/files we choose to keep but are not part of the regular production files.



Replication Migration – Initial Shadowbase

Shadowbase configuration choices (1 of 2)

A sympathy in choice. – William Shakespeare, A Midsummer Night's Dream



Shadowbase configuration choices (2 of 2)

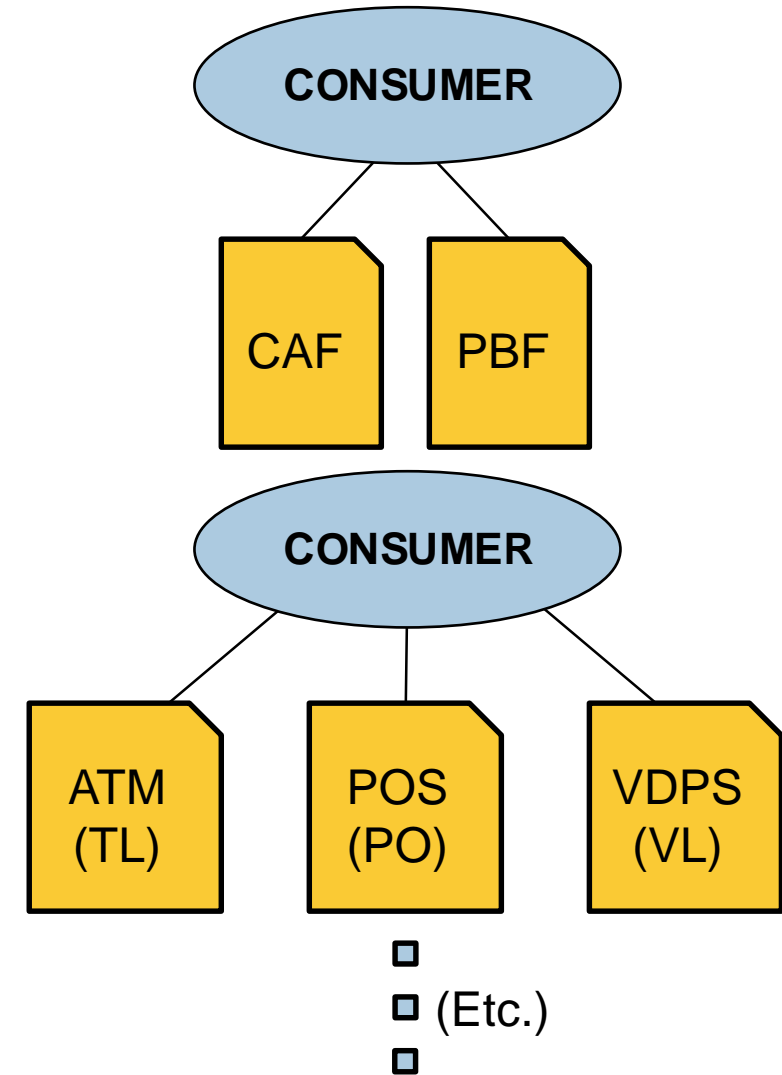
- Additionally, a separate replication was set up from the old production system, HQNS, to one of the new systems, HQNS2, that populated data files with current values and updated with current transactions; Bi-directional replication then updated RLNS2, and DVNS2 through its update only replication
- We would stop and restart replication, updating files as testing of BASE24 progressed; a week before go live, we stopped testing and did a final update so that at the moment of cutover, old and new production systems had the same transaction data



Replication Configuration Tuning

Current replication configuration (1 of 2)

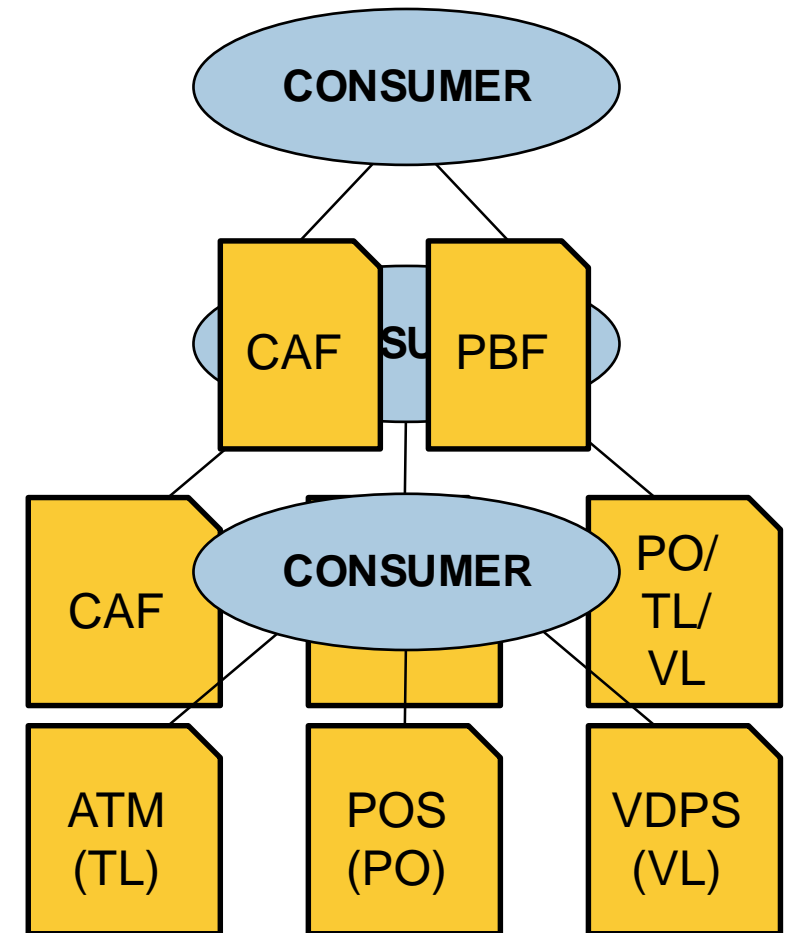
- **One consumer supports two files:**
 - Cardholder Account File (CAF)
 - Positive Balance File (PBF)
- **A second consumer supports three Transaction file types:**
 - ATM (TL) Transaction Log Files
 - POS (PO) Transaction Log Files
 - VDPS (VL) Interchange Log files
- **The third consumer supports the remaining 50 or so audited files** that describe the Golden 1 BASE24 configuration



Replication Configuration Tuning

Current replication configuration (2 of 2)

- Initially, the CAF & PBF files were in the same Consumer as the BASE24 PO/TL/VL files, but when the monthly CAF & PBF refresh was run (which replaces all member data with current values from the core system of record and rebuilds the partitioned database files), the Consumer process was saturated, delaying production replication of transactions into the PO/TL/VL files
- By separating these sets of files, the CAF & PBF Consumer process is still saturated during refresh, but the PO/TL/VL Consumer is not, which avoids delaying production replication of transactions while still replicating the CAF & PBF as quickly as possible
- The BASE24 Assign/Parameter file (LCONF) could now be audited, but the records contain the system name; Gravic implemented a replication filter for Golden 1 that replaces the system name while replicating, replacing the source name with the target



AutoTMF overview

- AutoTMF (ATMF) enables applications for TMF without program changes
- Objects are “prepared” to call ATMF I-O routines
- Audited files are monitored and changes sent as TMF transactions
- As transactions execute, TMF logs all changes into the TMF Audit Trail Files
- RDF/Shadowbase reads the Audit Trail and replicates to another system

The Cardholder (CAF) and Balance (PBF) stale data dilemma

- The file system rejects rename attempts of audited files with system error 80
- An audit flag cannot be removed on an open file
- BASE24 renames the CAF or the PBF during a full file refresh
- Golden 1 performs monthly file refreshes to reorganize the partitioned files
- Workaround was to save CAF/PBF copy daily and replicate with AutoSync

The Cardholder File (CAF) and Balance File (PBF) stale data solution (1 of 3)

- AutoTMF Version 18 (“ABE”) introduced audited file renaming features
 - We used the Replicaterename and Generations commands:
 - ADD ATMFF \$DATA.PRO1GOLD.CAF, GENERATIONS 3;
 - ADD ATMFF \$DATA.PRO1GOLD.CAF0*,
REPLICATERENAME;
 - When added, BASE24 opens the standard CAF name as before, then a NEWCAF is created; Current CAF is renamed to OLDCAF; CAF is not yet audited, so Rename works; when NEWCAF is renamed to CAF, CAF no longer exists, so AutoTMF renames it to generation file CAF000; the “Replicaterename” command causes the new CAF000 to be audited.



The Cardholder File (CAF) and Balance File (PBF) stale data solution (2 of 3)

- REPLICATERENAME requires a “Prepared” FUP (File Utility Program)
 - We created a separate location and prepared FUP using AutoTMF I-O library
 - We used the BASE24 Lconf assign for FUP to point to the “\$system.autopr” location
- Testing – initial record lock problem
 - From-Host-Maintenance (FHM) testing caused multiple problems with record lock errors (error 73)
 - Authorization processes would eventually “abend” after too many lock errors
- Employed New version 21 (ABH) AutoTMF (ATMF) setting
 - RECLOCKSPERTX allows configuration of the maximum number of locked records per RECORDTX transaction
 - Must be used with RECORDTX, as this option is ignored without it
 - For BASE24, the ATMF program settings are needed for the authorization processes



The Cardholder File (CAF) and Balance File (PBF) stale data solution (3 of 3)

- **New AutoTMF configuration:**

AutoTMF 2? INFO ATMFF;

AutoTMF FileSet

Attributes

\$DATA.PRODPBF.PBFGLD1

Generations 3

\$DATA1.PRO1GOLD.CAFGOLD

Generations 3

\$DATA.PRODPBF.PBFGL0*

RecordTX,ReplicateRename

\$DATA1.PRO1GOLD.CAFGO0*

RecordTX,ReplicateRename

AutoTMF 3? INFO ATMFP;

AutoTMF Programs

Attributes

\$DATA2.AT60OBJ.AUTHQ

RecordTX,RecLocksPerTx 30

\$DATA2.PS60OBJ.RTAUQ

RecordTX,RecLocksPerTx 30



Seamless cutover for zero member impact (1 of 2)

But look, you found the notice, didn't you?

*Yes, said Arthur, yes I did. It was on display in the bottom of a locked filing cabinet stuck in a disused lavatory with a sign on the door saying 'Beware of the Leopard.' – Douglas Adams, *The Hitchhiker's Guide to the Galaxy**

- At Go Live, two migrations were accomplished; the first moved from old to new systems:
 - VISA DPS was directed to go into Stand-in
 - HQNS BASE24 was logged off of VISA DPS
 - Shadowbase from HQNS to HQNS2 suspended updates to flush transactions to completion
 - Networking changed the NAT to point VDPS to HQNS2
 - HQNS2 BASE24 was logged onto VDPS
 - VISA DPS was briefly tested and then taken out of Stand-in
- Total stand-in time for VDPS was about 20 minutes, and we were off the old systems

Seamless cutover for zero member impact (2 of 2)

- With HQNS2 BASE24 in production, Shadowbase bi-directional replication was updating RLNS2, and after about an hour on HQNS2, we migrated to RLNS2:
 - Visa DPS was directed to go into Stand-in
 - HQNS2 BASE24 was logged off of VISA
 - Shadowbase from HQNS2 to RLNS2 suspended updates to flush transactions to completion
 - Networking changed the NAT to point VISA to RLNS2
 - RLNS2 BASE24 was logged onto VDPS
 - Visa DPS was briefly tested and then taken out of Stand-in
 - Shadowbase resumed updates from HQNS2 to RLNS2 (although there was nothing to replicate, since there were no transactions on HQNS2)
- Took about 10 minutes of stand-in, and production remains at RLNS2 today





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Thank You! Carolyn Vaughan
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