Major UK Bank
Migrates its BASE24™ Application to Active/Active for Continuous Availability

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Introduction

- **My profile**
  - Yogesh Teli, AVP, BASE24™ Development at Barclays Bank
  - Chairman and Board Director of ITUG/BITUG
  - Extensive experience in payments technology
    - ATM / POS / EftPos / Switches
    - Card systems – debit / credit / smart cards
    - National and international payment systems

- **Disclaimer**
  - These are my views and not those of Barclays Bank
  - This information is based on my experience on the project over the past few years
  - My work for this Active/Active project was based around BASE24 environments
  - Other aspects of the Barclays Active/Active project will not be discussed

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Agenda

1. About Barclays
2. Project background
3. Proof of concepts (POCs)
4. Implementation
5. Summary and next steps

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About Barclays

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About Barclays

- Major, diversified global financial institution
- Wide range of products and services
- Barclays UK providing retail banking to UK market, including ATM and POS
- c.20 million customers through Barclays UK
- 87,400 employees worldwide (44,000 in UK)

Reference: https://home.barclays/content/dam/home-barclays/documents/investor-relations/reports-and-events/annual-reports/2022/AR/Barclays-PLC-Annual-Report-2022.pdf

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HPE NonStop environment

- **Hardware**
  - ATM devices: 4,700
  - HPE NonStop systems: four servers
    - Production: two NS7s (quad core), six CPUs each
    - Test: one NS3 with four CPUs (dual core) and one NS3 with two CPUs (dual core)
- **Applications**
  - BASE24™: six environments
  - Transaction Security Services (TSS): three environments
  - HPE NonStop Shadowbase: three instances
- **Transactions (2022)**
  - ATM: 475 million
  - POS: 5,500 million
- **Transaction peak (2022)**
  - ATM: 60 tps
  - POS: 450 tps

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Project Background

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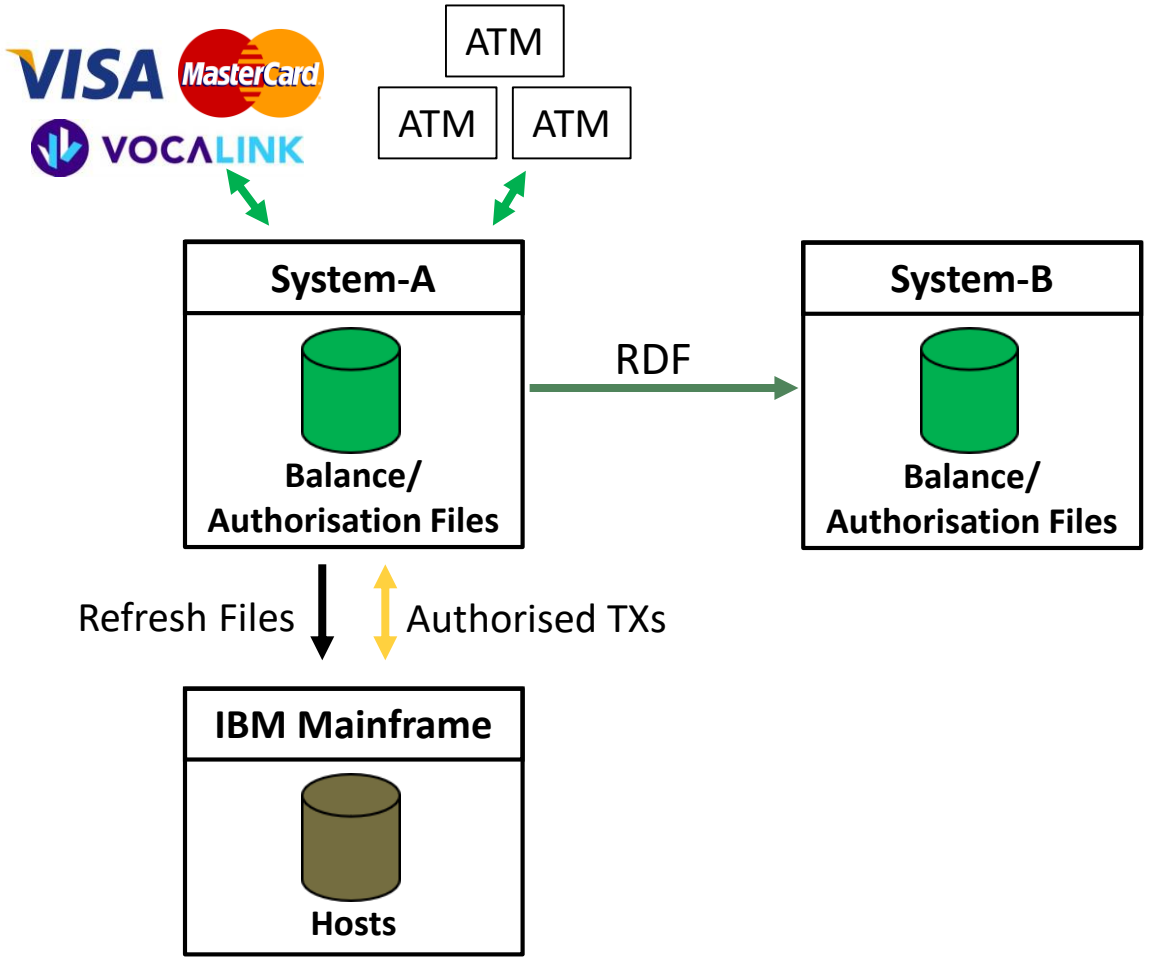
Old architecture and need for action

- **Previous environment**
  - BASE24™ supporting ATM and POS transactions in Active/Passive architecture
  - Regular DR exercises to build confidence which increased system downtime
  - Active/Passive architecture using RDF did not provide level of availability desired
  - RDF limitations
    - RDF works in uni-directional, Active/Passive mode only and is configured for volume/subvolume-based replication
    - RDF is in “mature” status and will not be enhanced to meet future requirements



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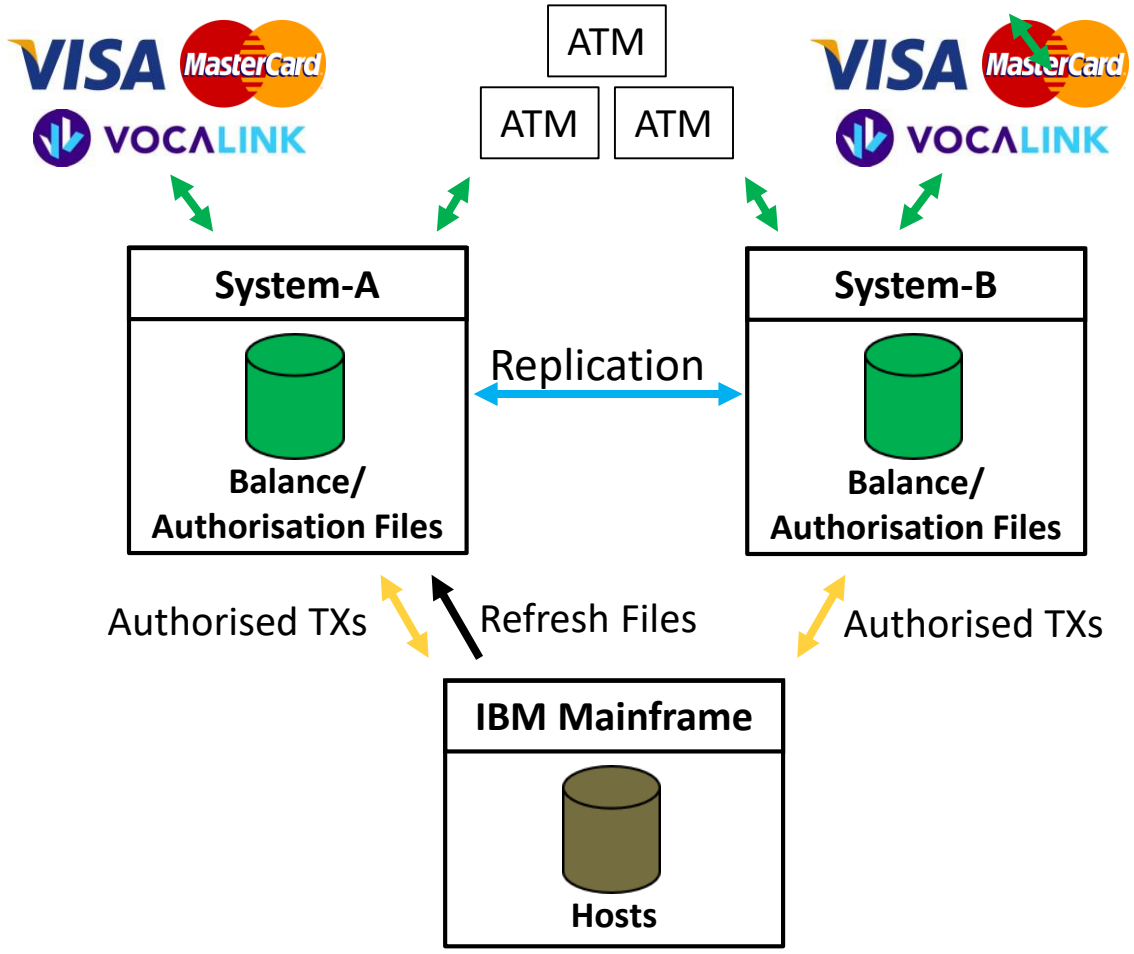
New architecture

- **Requirements**
  - Active/Active data centre
  - Both sites are fully active, but tightly coupled
  - Both systems process ATM/POS transactions
  - Databases actively accessed
  - Full utilization of data assets
  - Data collisions may occur but will automatically be resolved
  - Faster RTO using bi-directional replication
  - Eliminate need for planned downtime



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Selecting a solution for the Active/Active architecture

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Proof of Concepts (POCs)

- Several POCs undertaken at various times
- Additional steps
  - Upgrade HPE NonStop systems
  - Work with Schemes to become Active/Active
- Considerations
  - Replication speed and reliability
  - Ability to identify types of updates and collision management
  - Ability to resynchronise following a system failure
  - Database creation from existing PROD/DR systems

Timeline

2018	Compare several replication products available in the market
2020	Evaluate and performance test identified replication products
2021/2022	Confirm the chosen product meets the requirements
2022/2023	Design, test, train and implement

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Technical evaluation

- **Evaluation scorecard based on key factors were rated**
  - 8 main criteria
  - 29 sub-criteria
- **Other considerations**
  - Corporate relationship
  - Long-term support
  - Knowledgeable staff still at company
  - Future enhancements
  - Sunset or active roadmap?

Criteria	Prod A	Prod B	Prod C	Comments
DOCUMENTATION				
LEARNABILITY				
COMMUNITY SUPPORT				
USABILITY				
FUNCTIONALITY				
INTEGRATION WITH B24				
PERFORMANCE				
PRICE				

0 - Not Supported
1 - Poor
2 - Fair
3 - Good
4 - Very Good
5 - Excellent

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Solution choice: HPE Shadowbase

- **Why HPE Shadowbase was selected**
  - Strong technical evaluation and POC results
  - Excellent long-term relationship with HPE and focus on HPE NonStop systems
  - HPE markets, sells, and supports Shadowbase products
  - Gravic provides very good additional support and professional services
  - HPE is a known entity and an approved vendor, which reduced procurement time
  - No need for new procurement procedure (which would have impacted project timeline)

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Implementation

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Implementation considerations

- **ACI BASE24™**
  - BASE24 Dual Site functionality
  - Utilize standard (P)TLFs

- **HPE Shadowbase**
  - Supports key aspects of BASE24 functionality
  - Enhanced to enable BASE24 Dual Site functionality
  - Works in both uni-directional and bi-directional mode
  - File level replication which allows full control of files that need to be replicated
  - More complex configuration, but with better management
  - Innovative design to create copies of merged (P)TLFs

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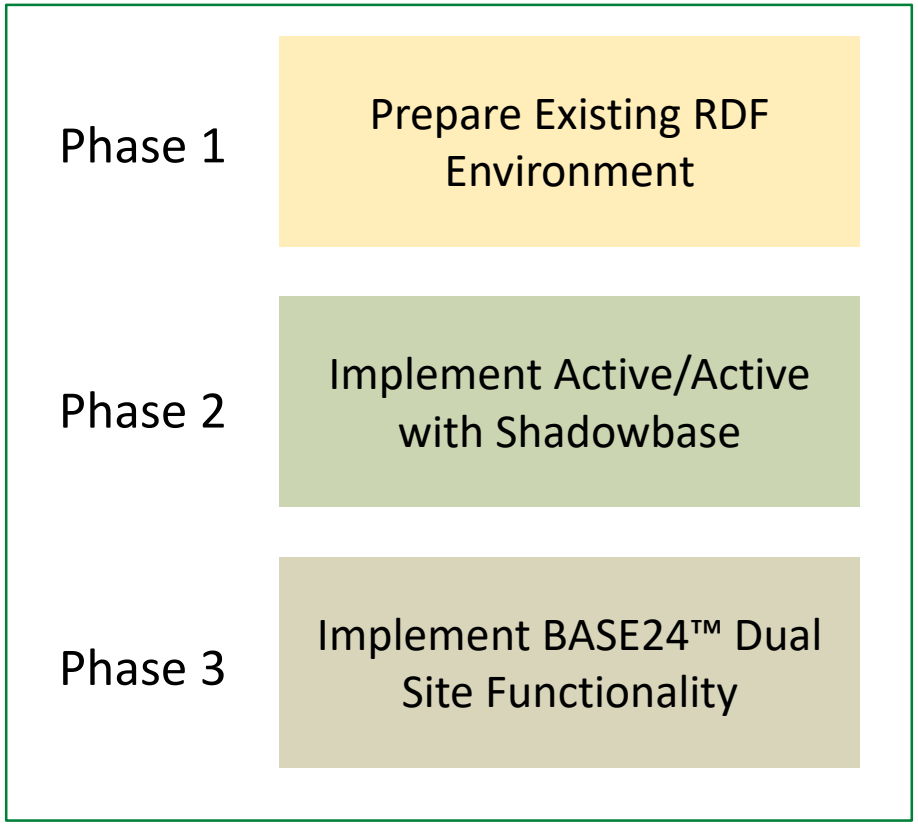
Implementation approach

- **Testing and implementation time**
  - Phased approach based on number of BASE24™ environments vs Shadowbase instances
  - Migration/testing about 12 months elapsed time
  - Implementation about 4 months elapsed time

Phased Approach



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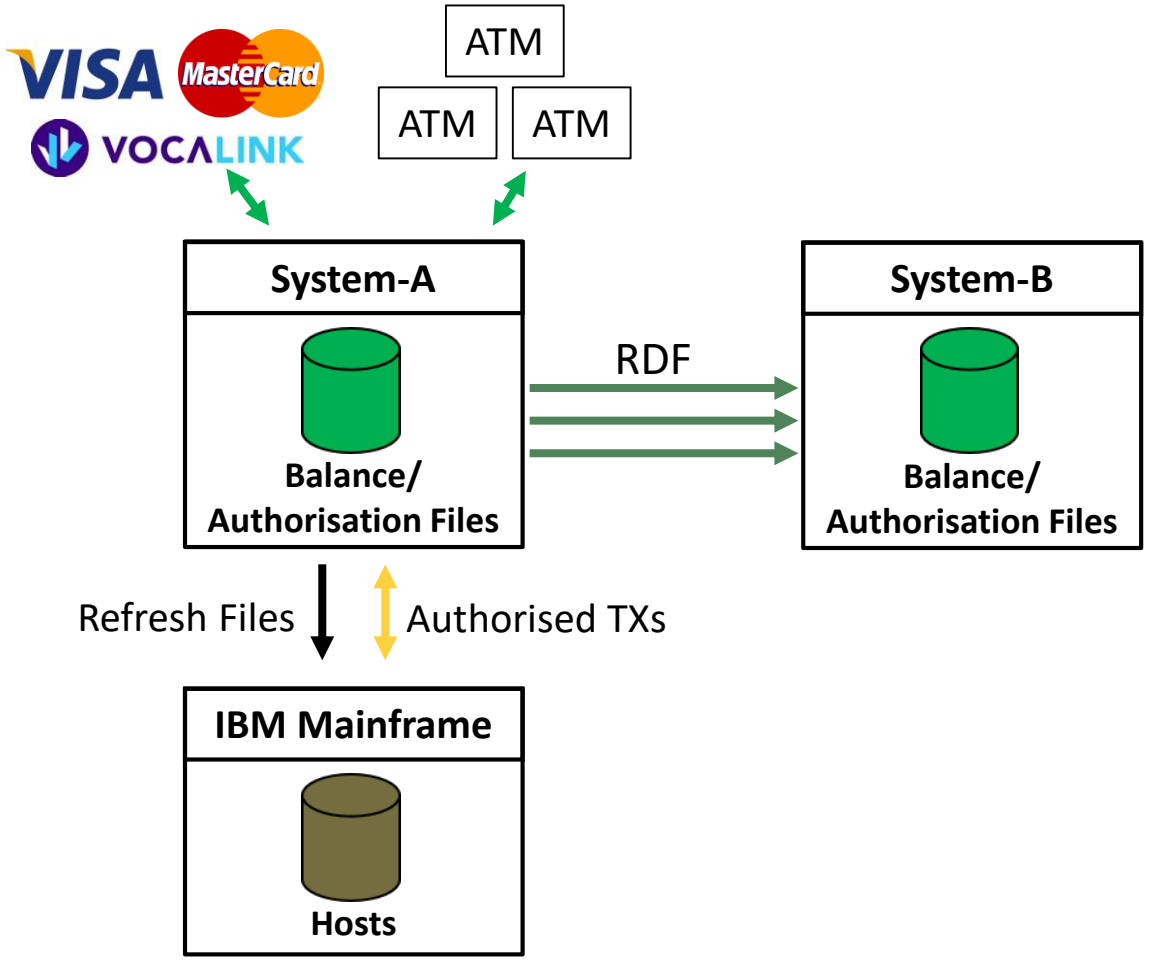
Migration Phase 1

Beginning state

- Activities
  - Modify RDF to allow for a 3-phased Shadowbase replacement
  - Complete Shadowbase training
  - Create Shadowbase BASE24™ environments
  - Run RDF and Shadowbase side-by-side uni-directionally to prove each phase works
  - Replace each RDF phase with Shadowbase uni-directionally



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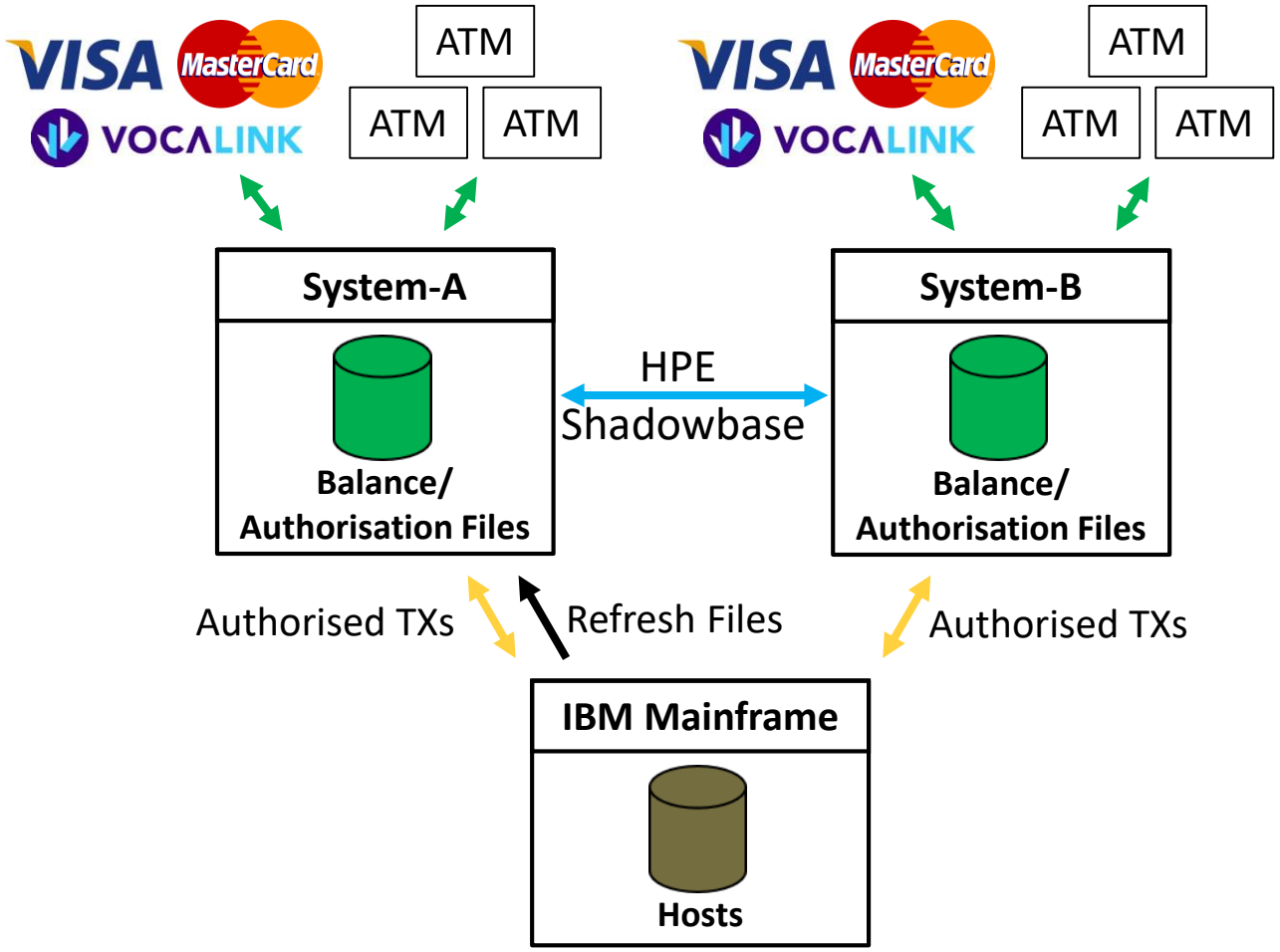
Migration Phase 2

Current state

- Activities
  - Implement Shadowbase A/A partitioned architecture
  - Implement Merged and Exact TLF processes
  - Create three Shadowbase instances per system
  - Utilise six BASE24™ environments per system
  - Work on interchanges to ensure all support A/A
  - Reconfigure device connectivity
  - Reconfigure IBM Mainframe connectivity



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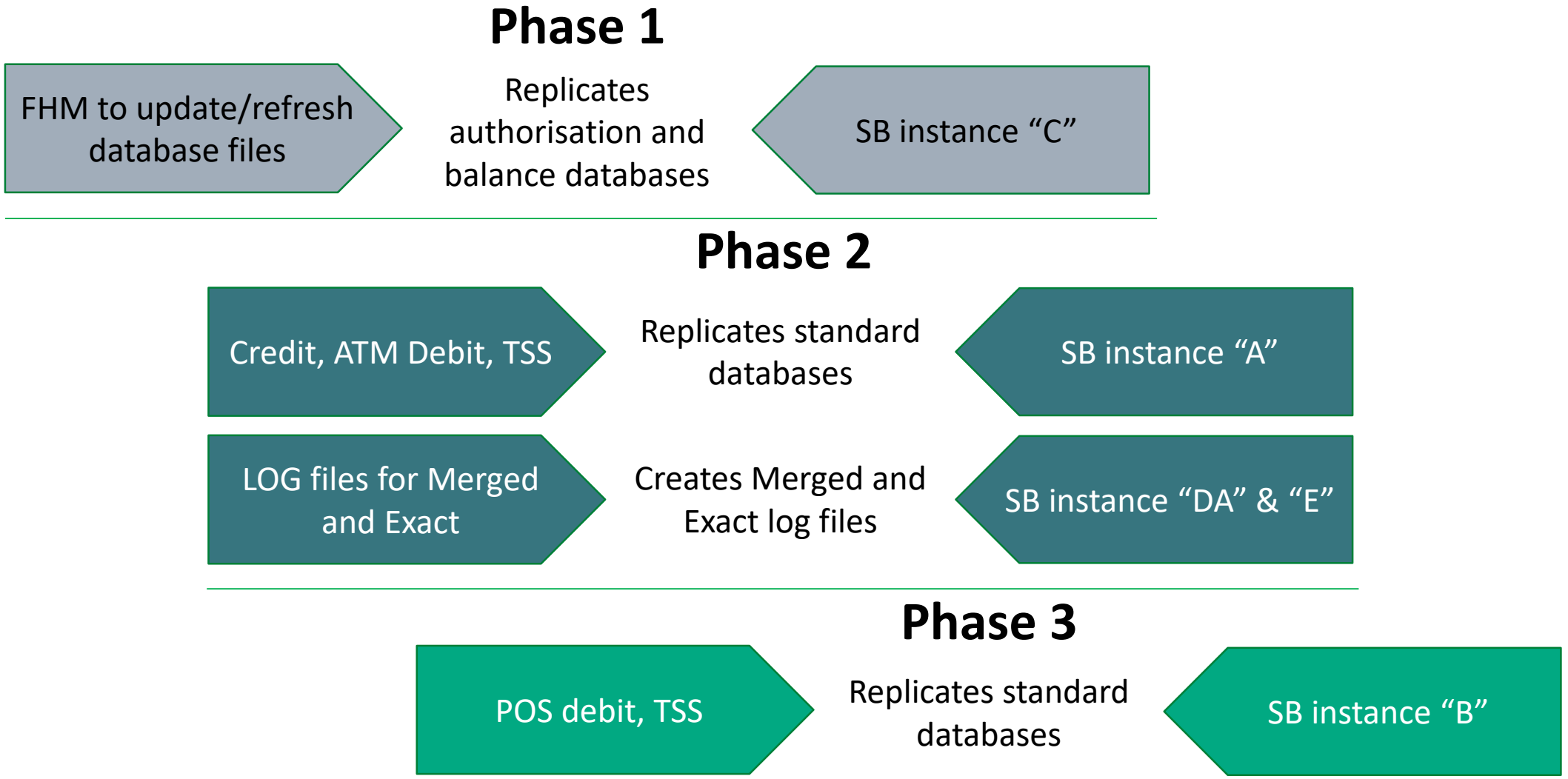
BASE24™ environments vs. Shadowbase instances



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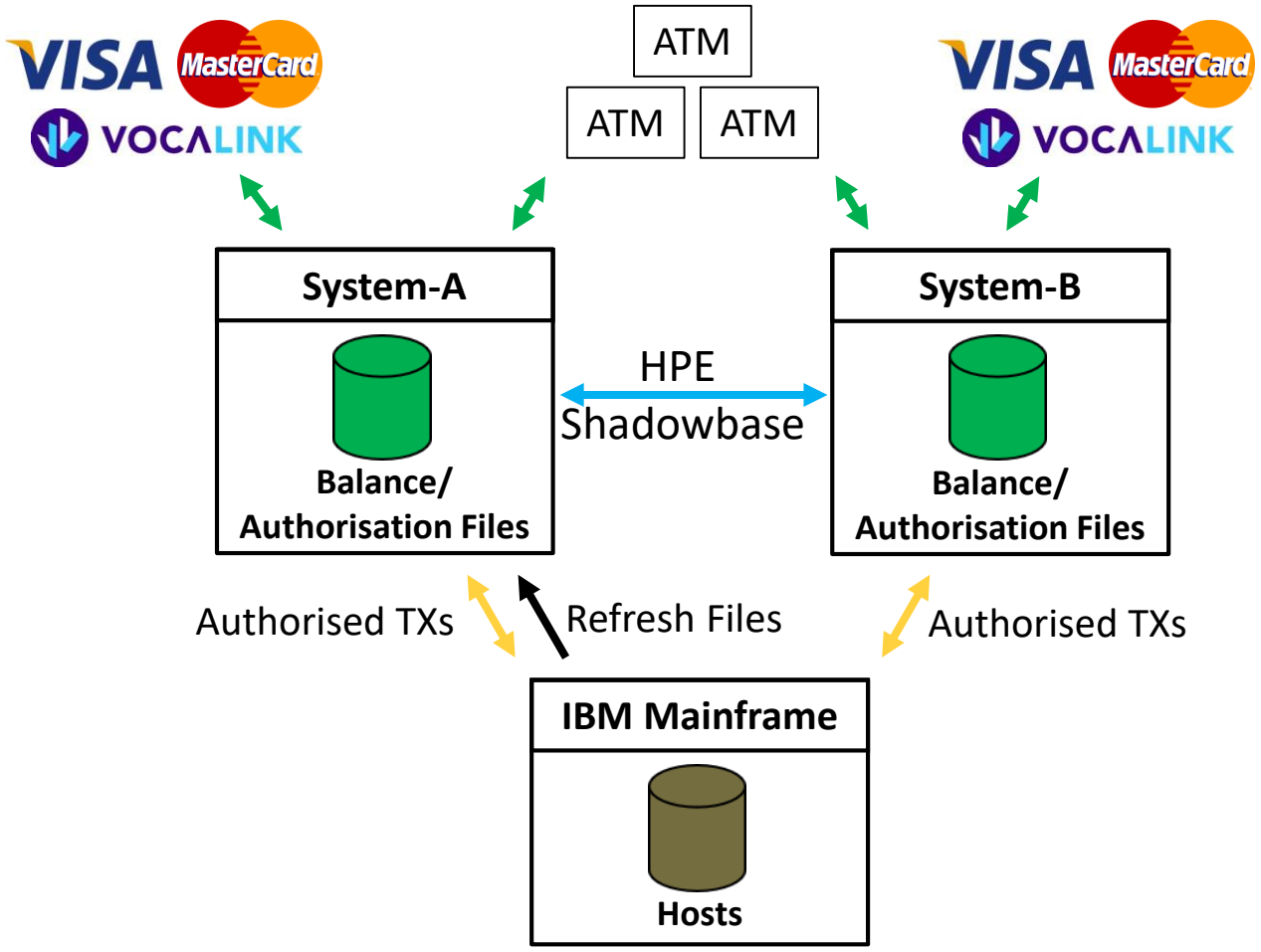
Migration Phase 3

Final state

- Activities
  - Utilise BASE24™ Dual Site functionality
  - Implement Shadowbase Dual Site functionality
  - Configure Shadowbase data collision resolution logic
  - Reconfigure device connectivity
- Target implementation date
  - Q3



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Summary and next steps

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Summary

Technical objectives met:

- ✓ Active/Active data centre
- ✓ Both sites are fully active, but tightly coupled
- ✓ Both systems process transactions
- ✓ Databases actively accessed
- ✓ Full utilisation of data assets
- ✓ Data collisions may occur but will automatically be resolved
- ✓ Faster RTO using bi-directional replication
- ✓ Eliminate need for planned downtime

Business outcomes met:

- ✓ Continuous availability: Active/Active payments engine
- ✓ Utilises full infrastructure
- ✓ Better resiliency: improved recovery service
- ✓ Increased capability
- ✓ Improved technical solution

Next steps:

- ○ Implement Shadowbase full active/active architecture
- ○ Reconfigure device connectivity

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HPE Shadowbase perspective

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One product, many solutions

Business Continuity

Zero Downtime Migration (ZDM)

Compare & Repair

GRAVIC®
HPE Shadowbase

Data Integration

Essentials Bundle

Application Integration

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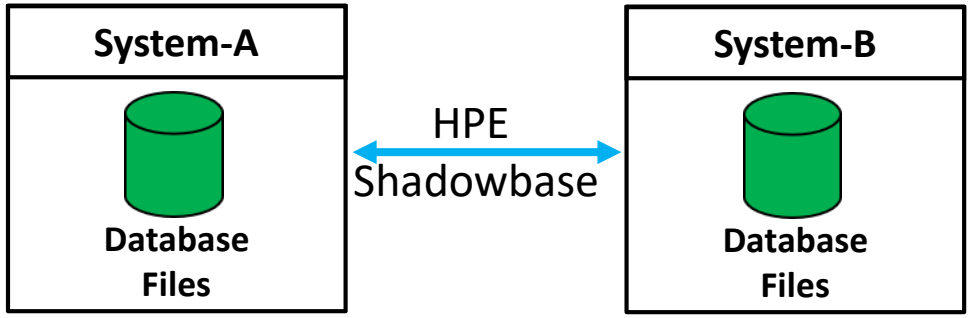
HPE Shadowbase bi-directional replication for Active/Active applications

- Modeled after well-known NonStop products, like Pathway
- No intercept library, so can be upgraded while application keeps running
- Bi-directional mode ensures files on both systems are kept in sync
- Ensures that replicated changes are not replicated back
- Bi-directional replication uses the same core components
- Highly customizable to meet customer requirements



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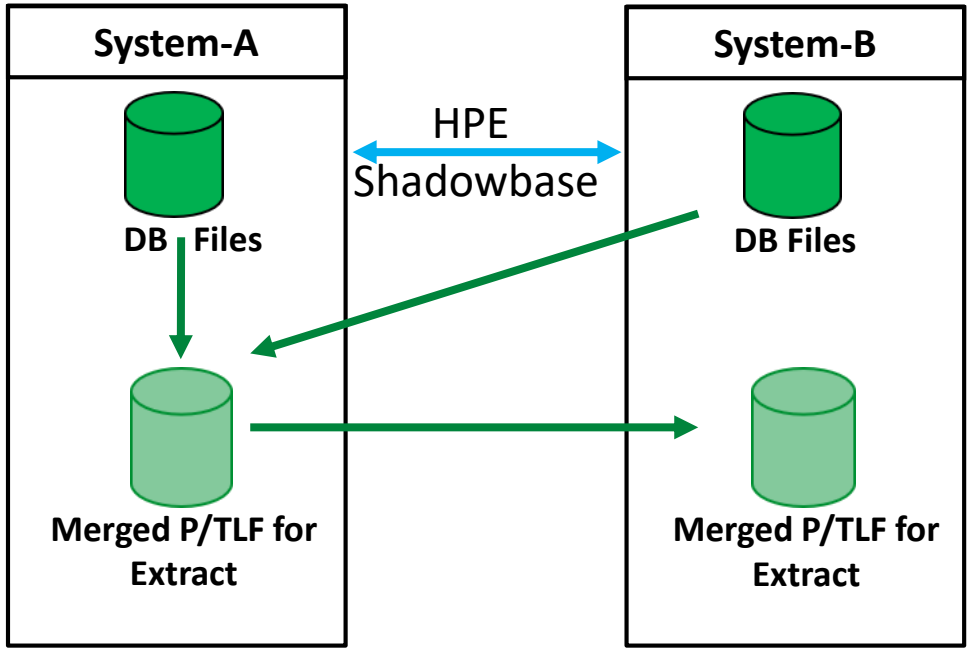
HPE Shadowbase settlement and extract processing

- Unique settlement and extract processing requirements
- General database files kept in sync
- Log files (P/TLF) needed to be merged from both systems and replicated back to meet:
  - The requirement to run multiple extracts on the NonStop
  - The ability to run on either node
  - The ability to resume from last point on either node regardless of place of last extract



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Keys to success

Close collaboration across multiple teams at Barclays, Gravic, and HPE

- Open exchange of ideas and approaches
- Thorough testing performed independently
- Open discussions of any issues uncovered during testing and all proposed solutions

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Thank You

Questions?

Contact info

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