Hewlett Packard Enterprise

HPE Shadowbase – Digital Resilience, Data Integration, and Data Validation for HPE NonStop Systems

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April 2023

NYTUG
New York/New Jersey Area Tandem User Group

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Agenda

- About Gravic
- Key technology trends and challenges
- Business continuity approaches
- HPE Shadowbase solutions
- Looking ahead and wrap-up

About Gravic

About Gravic

Shadowbase Products Group

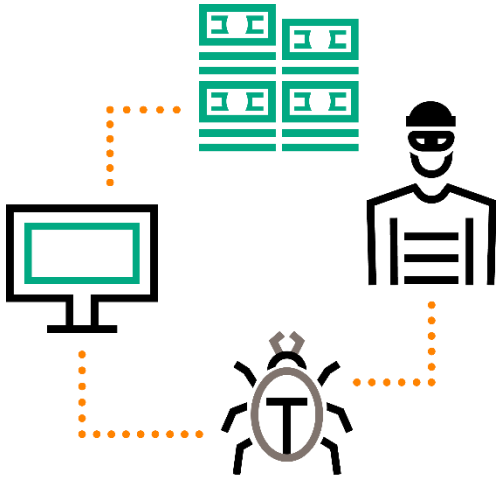
- **NonStop innovation for a nonstop world**
  - Award-winning software
  - Commitment to HPE NonStop and other servers
  - 70+ technology patents
- **Mission critical solutions**
  - Data replication, streaming, and validation
  - High and continuous availability for digital resiliency
- **HPE's strategic, go-forward partner**
  - HPE Global Sales, Support, and Professional Services
  - HPE's regional resellers and partners

Momentum Technology Partner of the Year 2019

Key technology trends and challenges

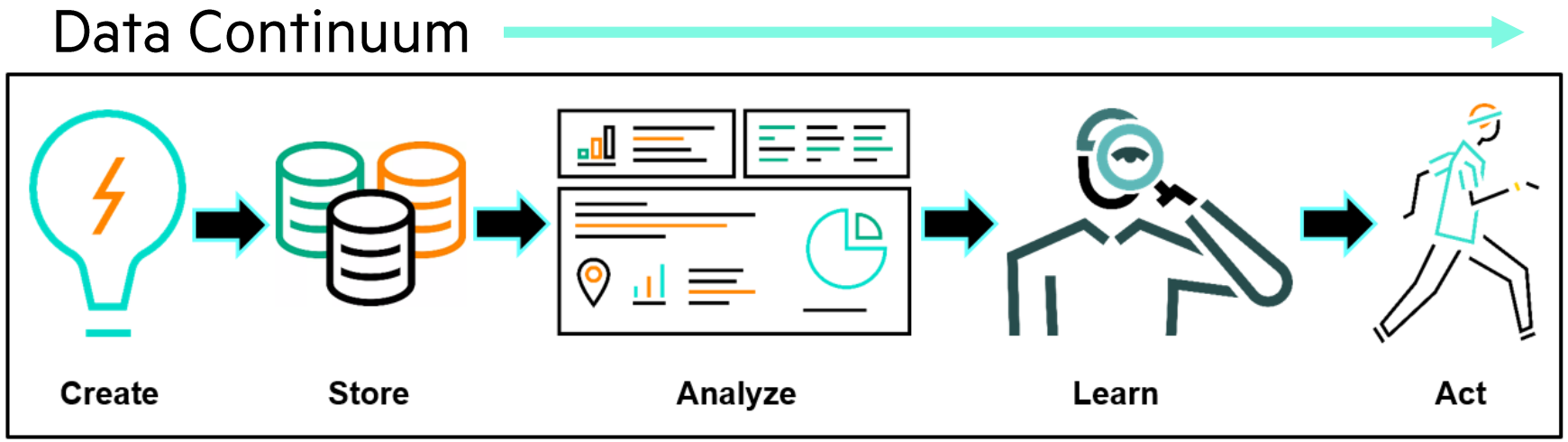
Key technology trends

- **Digital resiliency**
  - Protection, detection, containment, recovery and repair capabilities against information and communication technology (ICT) related incidents
  - Government regulations underway
- **Ransomware protection**
  - Global business concern
  - New approaches (e.g., “immutable” backups and “air-gapped” systems)
  - **Value of TMF-audited applications cannot be overstated**



Key technology trends

- **Cloud integration and data analytics**
  - HPE Shadowbase provides high-volume, performant data streaming for HPE NonStop cloud integration and online analytical processing (OLAP)
- **Virtualization**
  - HPE Shadowbase fully supports HPE NonStop virtual environments including Google Cloud Platform, Azure Skytap, and Private Cloud instances
- **HPE GreenLake**
  - HPE Shadowbase fully supports HPE GreenLake deployments

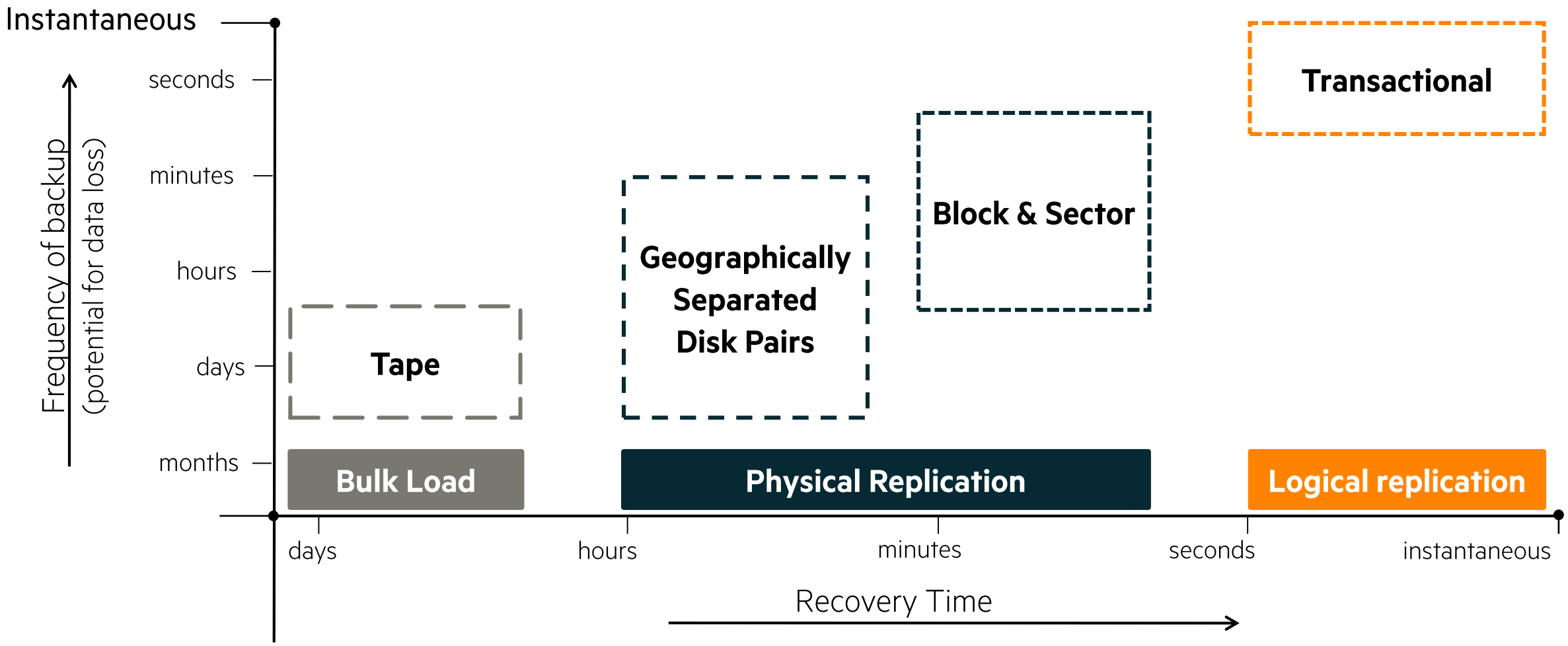


Common IT challenges (past, present, and future)

- **Ensuring continuous application availability**
  - Protecting brand reputation
  - Avoiding costly downtime
  - Recovering rapidly after disasters
- **Migrating online applications**
  - Adopting new IT infrastructure
  - Upgrading HPE NonStops via *platform refreshes*
  - Migrating datacenters
- **Eliminating data and application silos**
  - Streaming data across the enterprise
  - Maximizing data and its value
  - Enabling real-time business intelligence
  - Meeting regulatory and audit compliance
- **Modernizing**
  - Transforming Enscribe files into SQL databases
  - Upgrading from Attunity, GoldenGate, RDF, and other "mature" solutions

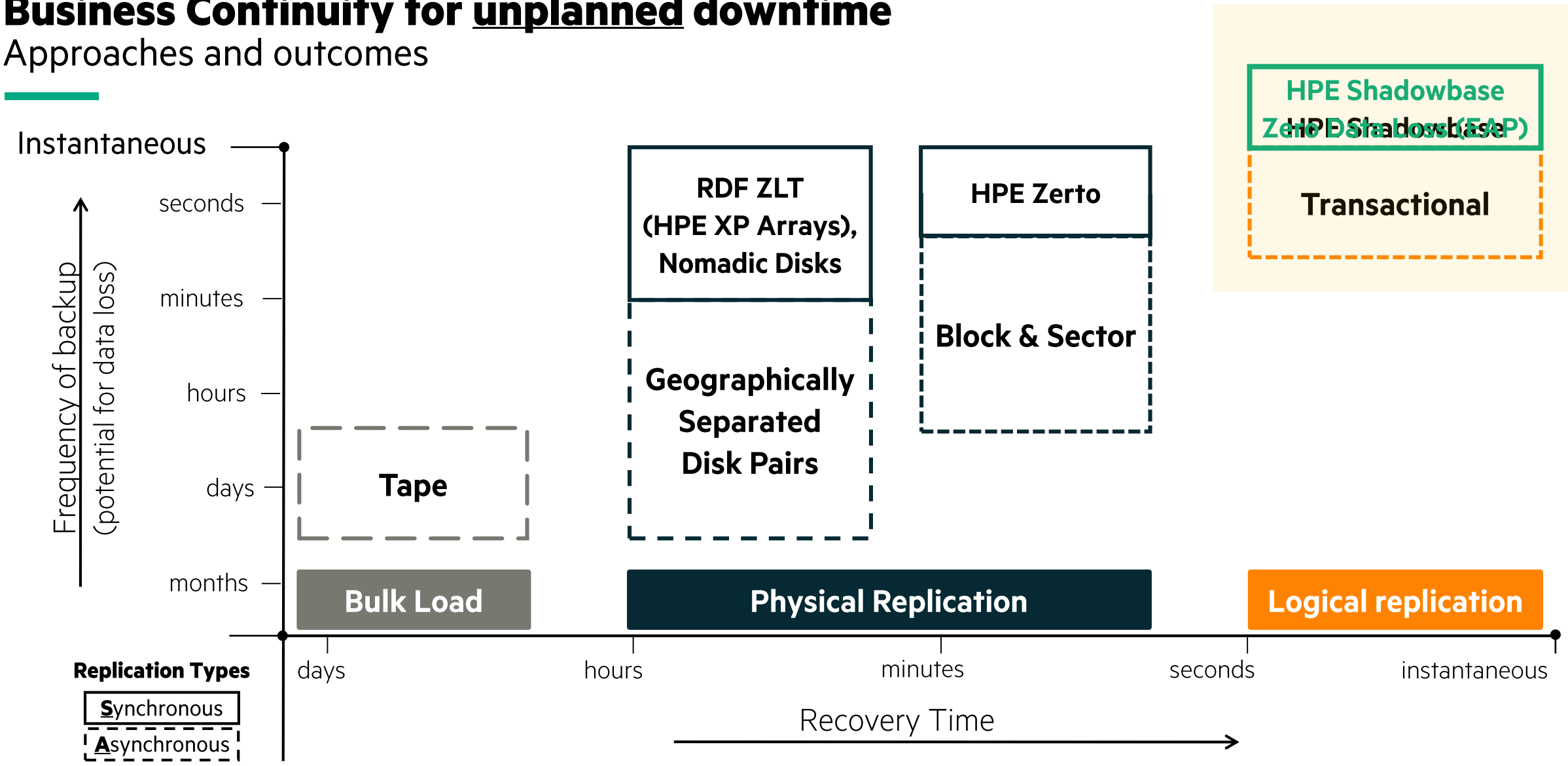
Business continuity approaches

Business Continuity
Approaches and outcomes



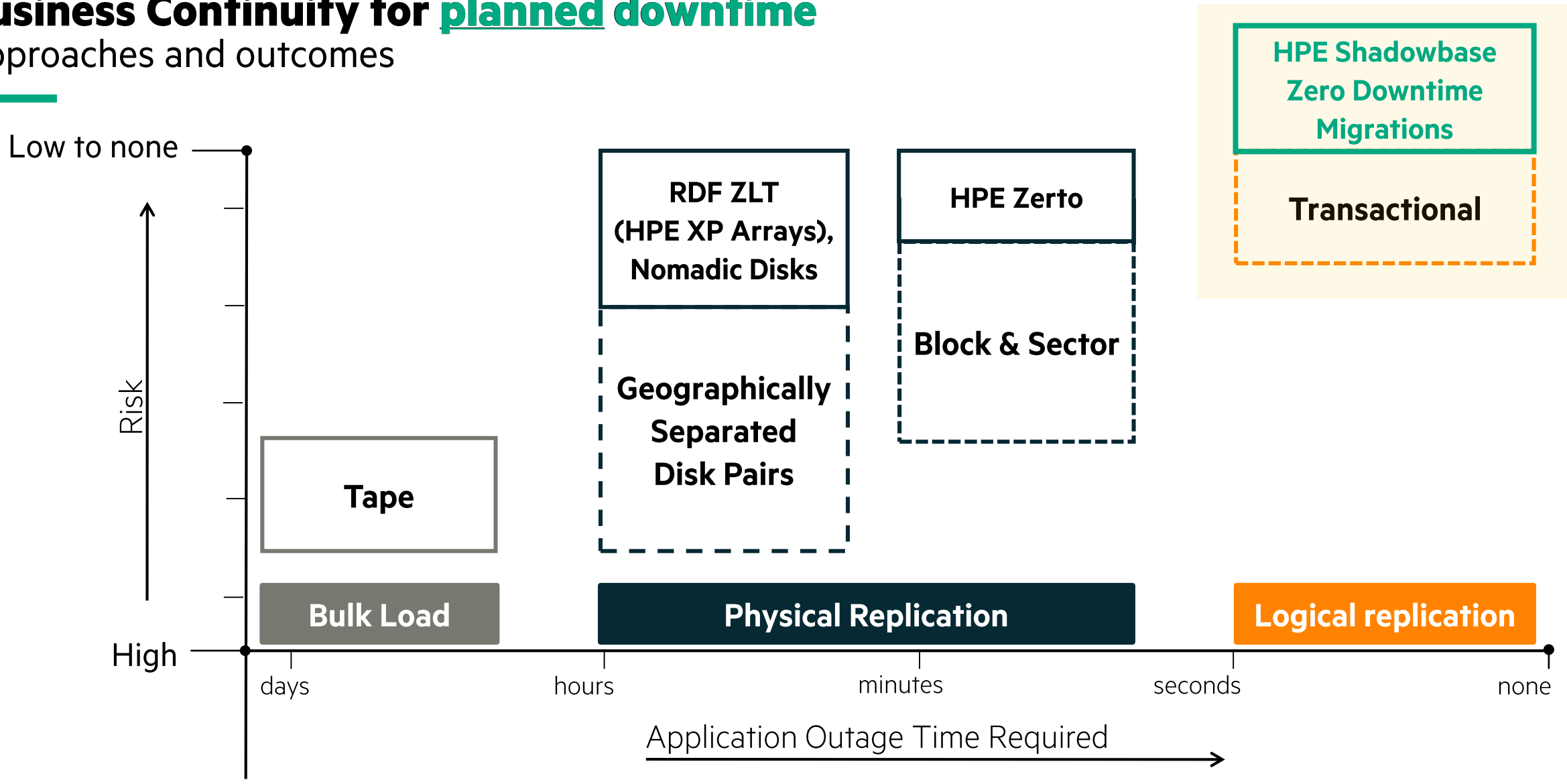
Business Continuity for unplanned downtime

Approaches and outcomes



Business Continuity for planned downtime

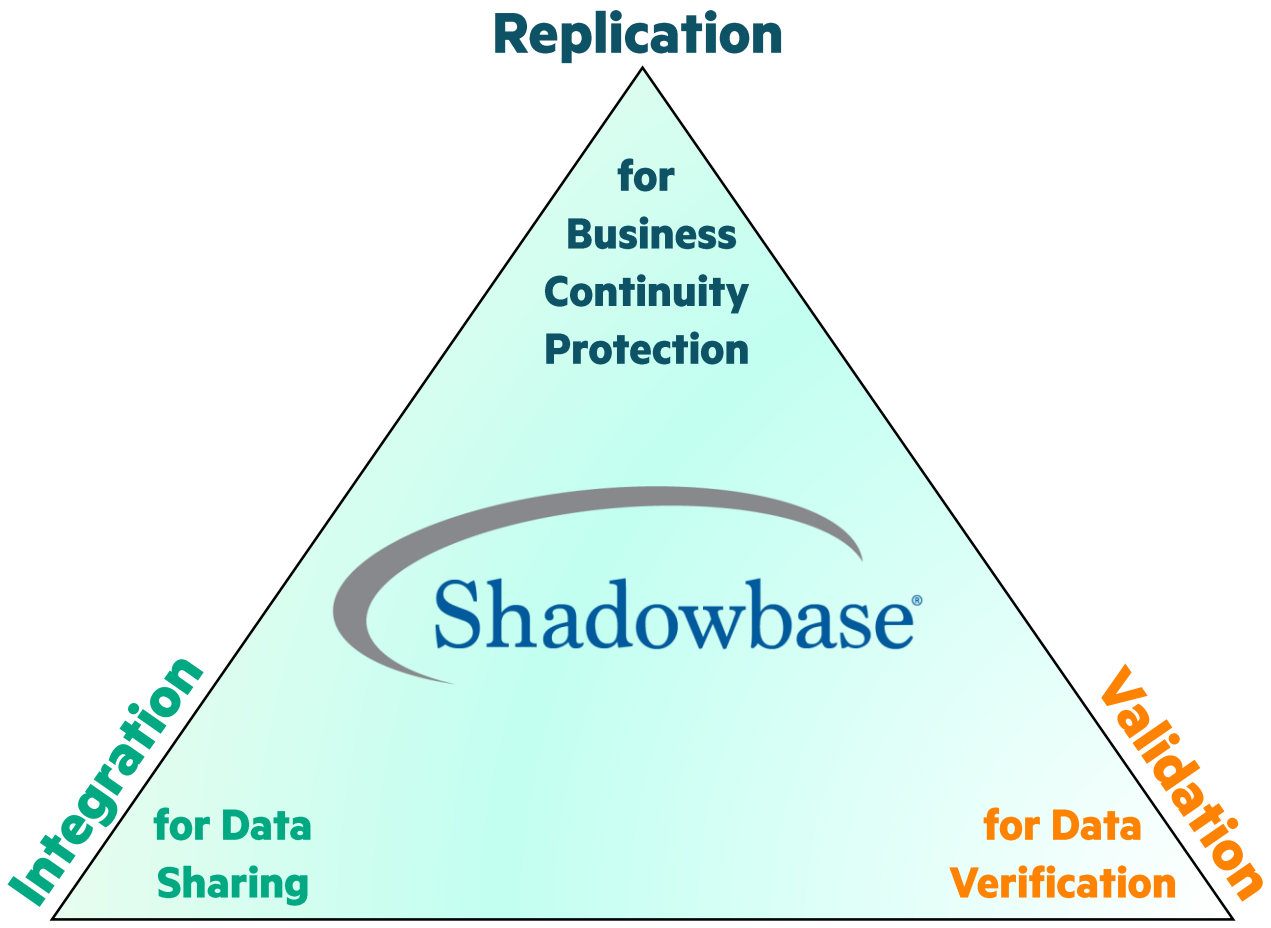
Approaches and outcomes



HPE Shadowbase solutions

HPE Shadowbase data solutions

3 pillars: Replication, Integration, and Validation



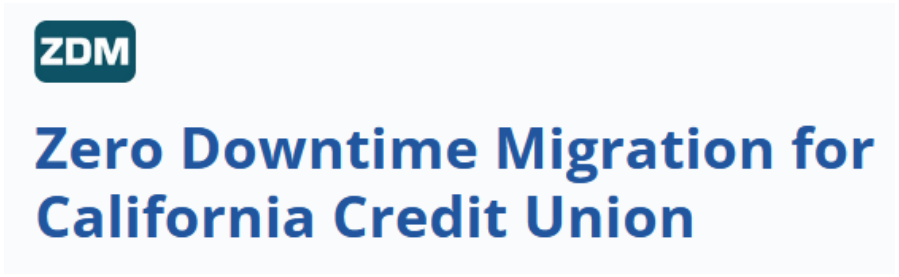
HPE Shadowbase
Business Continuity solutions

Shadowbase Business Continuity

Digital Resiliency

- Extreme application availability: achieving century uptimes
- Extreme data resiliency with zero data loss and rapid recovery

Use Case



ShadowbaseSoftware.com/Publications/Use-Cases/ZDM-for-Credit-Union/

Capabilities

- Eliminate unplanned downtime
  - **Active / Passive** Disaster Recovery (DR)
  - **Active / Almost-active** “Sizzling-Hot-Takeover” (SZT)
  - **Active / Active** Continuous Availability (Hot-Hot)
- Eliminate planned downtime
  - Use Zero Downtime Migration (ZDM) for upgrades, migrations, and platform refreshes
  - Provide **continuous application availability** and **eliminate business risk** while the migration occurs
- Eliminate data loss
  - **Shadowbase Zero Data Loss** (ZDL, EAP)
  - Synchronous replication technology

HPE Shadowbase
Data and Application Integration solutions

Shadowbase Application Integration

Data Streaming

- Eliminate data and application silos
- Integrate data from one database into a different database or application for competitive advantage

Capabilities

- Like-to-like and dissimilar environments
- Unlimited data transformation, scrubbing, filtering, cleansing, and scalability
- Extend replication capabilities with embedded application logic

Use Case

AI BC DI

Real-Time Fraud Detection and Resolution for Financial Switch

ShadowbaseSoftware.com/Publications/Use-Cases/Fraud-Detection-for-Financial-Switch/

Popular uses

- Analytical processing
- Cloud integration
- Data streaming and change data capture
- Data warehouse feeds
- Fraud detection
- Real-time business intelligence

HPE Shadowbase
Data Validation: Compare and Repair

Shadowbase Compare & Repair

Source and target data validation

- Find and resolve data discrepancies
- Helps meet regulatory requirements
- Proves data consistency to key stakeholders

Use Case

C ZDM

Massive Datacenter Migration for Money Transfer Firm

ShadowbaseSoftware.com/Publications/Use-Cases/Massive-Datacenter-Migration-for-Money-Transfer-Firm/

Capabilities

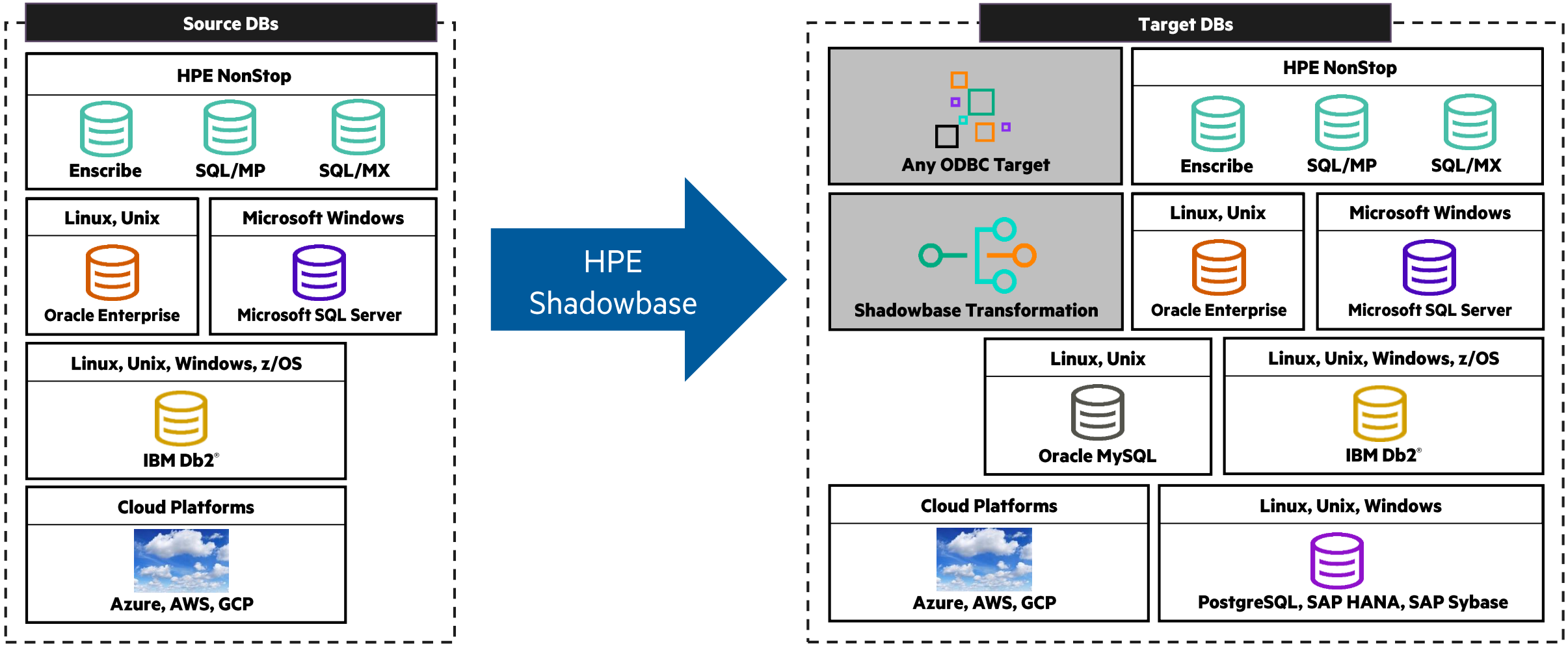
- A Business Continuity “must have”
- Runs online and on-platform
- Supports Enscribe, SQL/MP, and SQL/MX
- Repair function
- Works with all data replication engines

Key benefits

- Ensures backup is ready for an immediate takeover
- Verifies data for migrations, platform refreshes, etc.
- Creates timeline of data points when the DBs matched

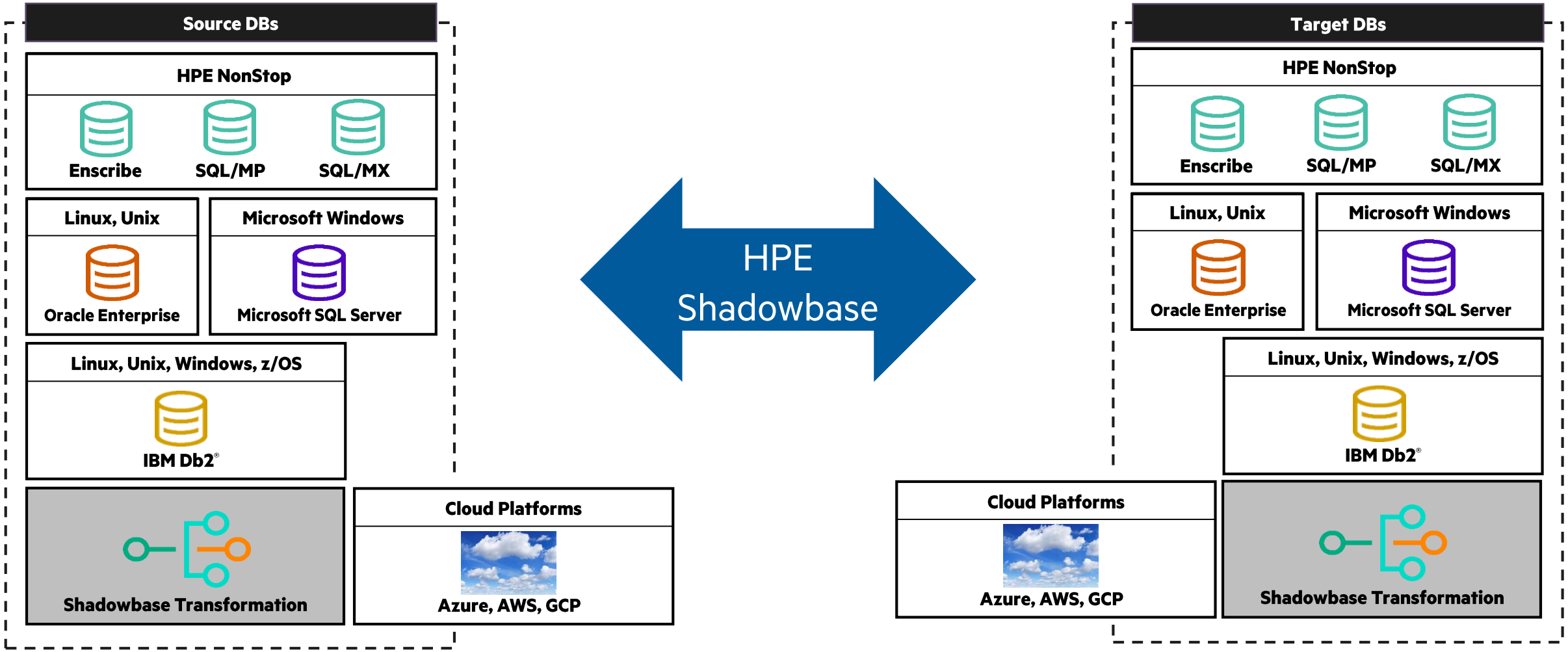
Homogeneous and heterogeneous uni-directional data replication and streaming

All combinations supported



Homogeneous and heterogeneous bi-directional data replication and streaming

All combinations supported

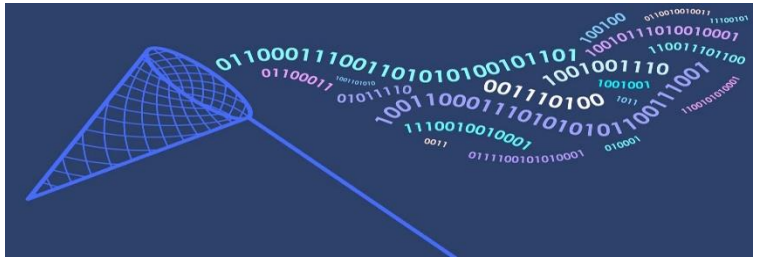


Summary

Looking forward & wrap-up

Looking forward

What's coming down the road



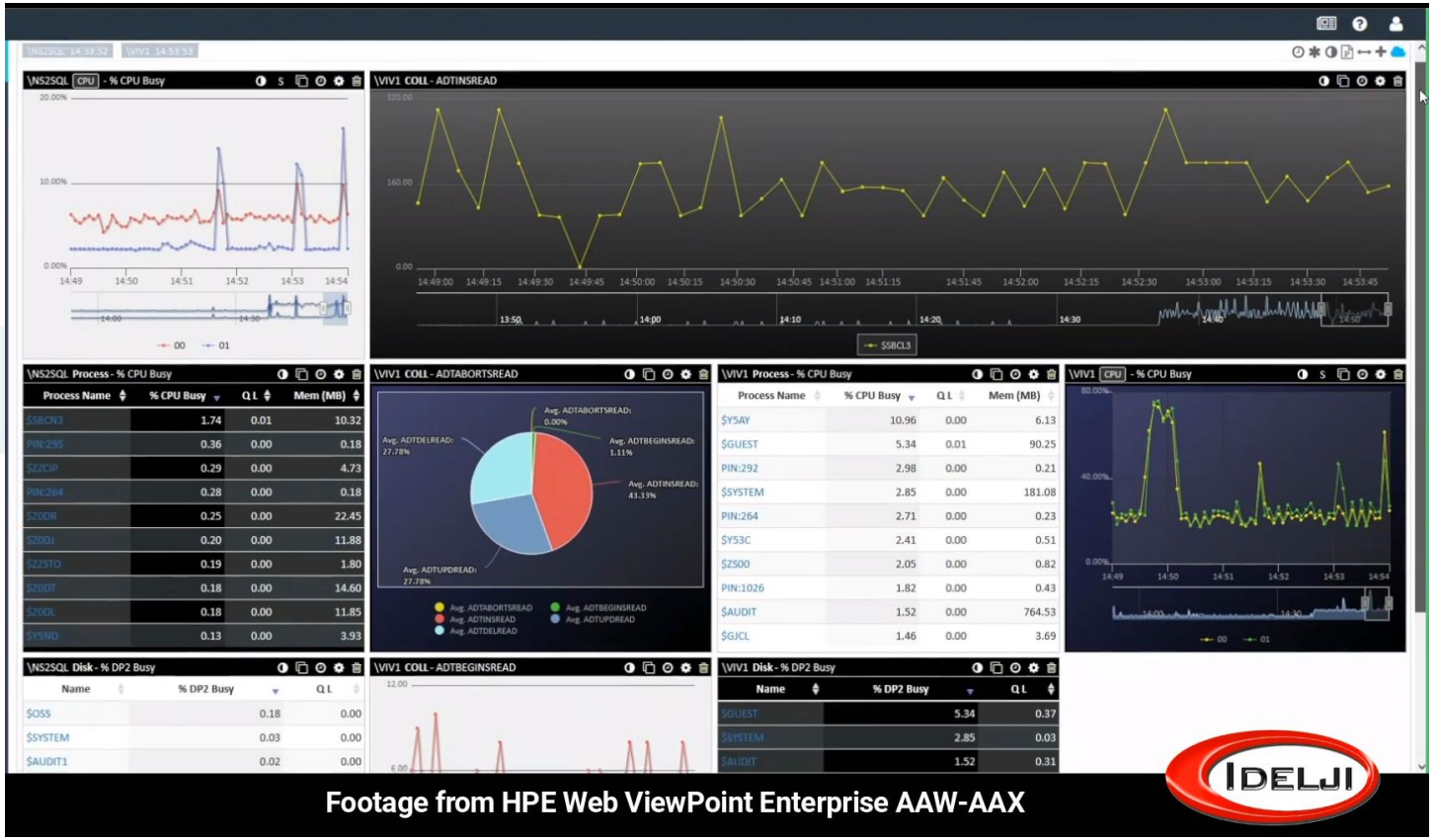
1. **Synchronous Replication – Shadowbase Zero Data Loss (ZDL)**
   - We are seeking additional early-adopter customers, please speak with us
   - New *ZDL Implementation* Professional Services offering
2. **Ransomware, air-gapped systems, Digital Resilience, and "cold" DR defense mechanisms**
   - Speak with us to discuss new/evolving architectural solutions using Shadowbase
3. **New Validation Architecture Module (VAM)**
   - Provides real-time data integrity problem detection
   - Verify transactional integrity and accuracy for mission critical processes
   - Speak with us and/or come to HPE DISCOVER 2023 to learn more!

Remark INNOVATIONS

4. **Heterogeneous Compare – leverage your existing HPE Shadowbase NonStop Compare License!**
   - E.g., NonStop vs Oracle, SQL Server, DB2, Sybase, MySQL, PostgreSQL, and others
5. **Native Shadowbase port on IBM Mainframe z/OS to support Db2 as a source and target**

HPE Shadowbase Monitoring via Idelji Web ViewPoint Enterprise Plug-in

https://vimeo.com/815503116



HPE Shadowbase videos

Quick and simple overviews

Solutions Overview
- Vimeo.com/345756852 (2 mins)

Business Continuity
- Vimeo.com/369785276 (3 mins)

Compare & Repair
- Vimeo.com/523995684 (3 mins)

Zero Downtime Migrations
- Vimeo.com/475133622 (4 mins)

Data and Application Integration
- Vimeo.com/382625428 (4 mins)

Essentials Bundle
- Vimeo.com/735455234 (5 mins)

Wrap-up

- HPE Shadowbase is HPE's strategic *go-forward* data replication and streaming solution
- Globally sold and supported by HPE
- Use HPE Shadowbase to achieve Zero Application Downtime and Zero Data Loss
- The right people + the right solutions: *that's where the magic happens*

GRAVIC®
HPE Shadowbase

Hewlett Packard Enterprise
Technology Partner
SILVER PARTNER

Momentum Technology Partner of the Year 2019

Thank you

Product-related questions: ask your HPE Sales team

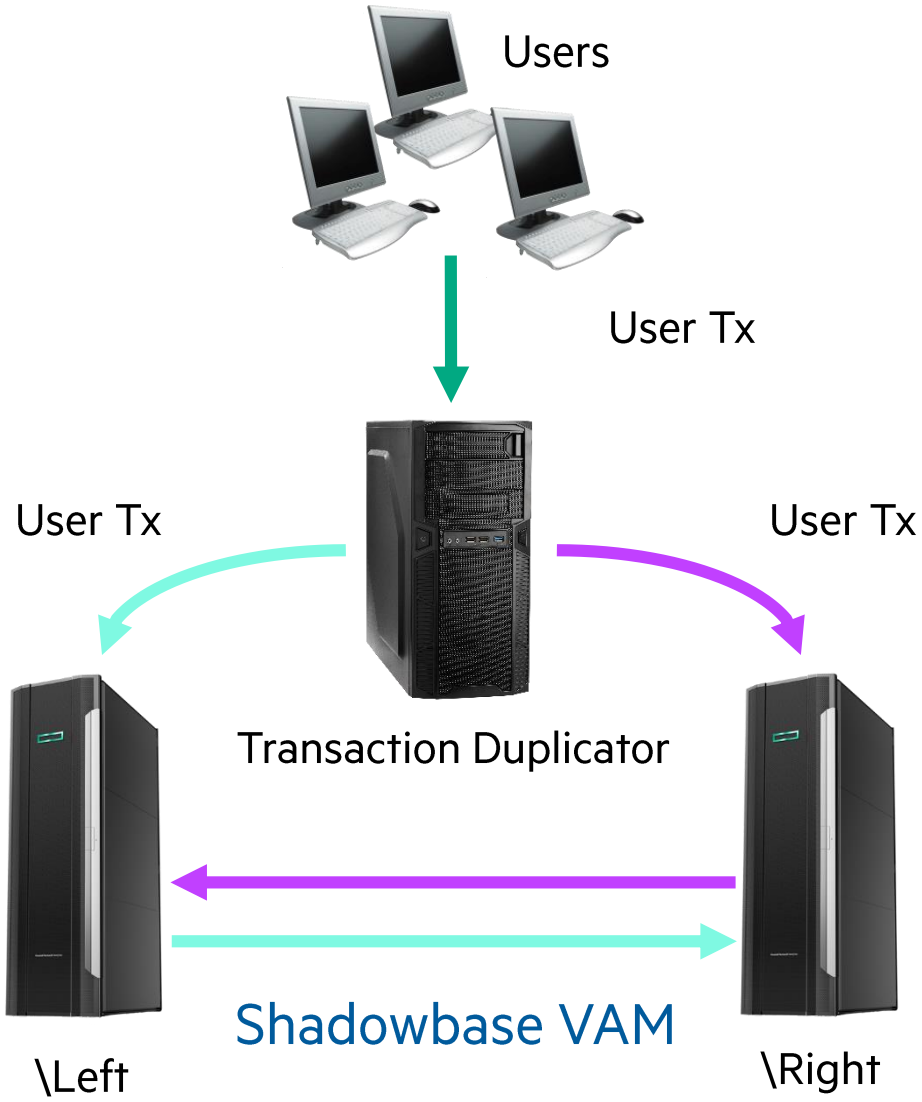
Technical-related questions: SBProductManagement@Gravic.com

Marketing-related questions: PRHolenstein@Gravic.com

Shadowbase Validation Architecture Module (“VAM”)

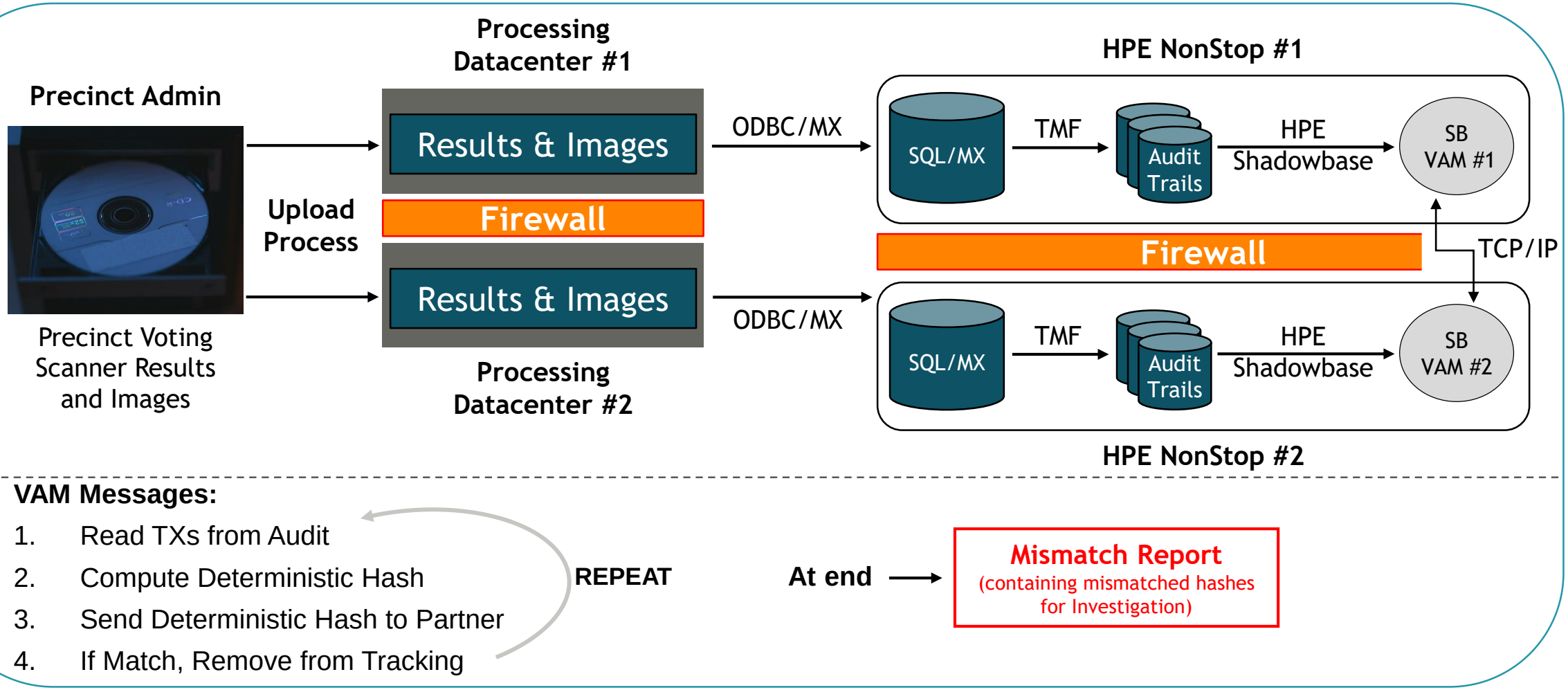
Real-time data integrity verification

- User transactions are sent to a Tx Duplicator
- The Tx Duplicator forwards the transaction to two separate processing centers
- Each processing center independently executes the transaction and the VAM produces a hash of the results
- The VAM exchanges the hash with its peer node, comparing it for accuracy
- When mismatches are detected, the VAM can trigger events such as firing alerts and / or aborting the transaction



VAM POC for election processing

Verify ballot results across dual processing systems



HPE Shadowbase videos

In various languages

HPE Shadowbase videos

Quick and simple overviews

Overview

- Real-time data replication and streaming for a NonStop world

Vimeo.com/345756852

Business Continuity

- Eliminate unplanned downtime for extreme availability

Vimeo.com/369785276

Zero Downtime Migration

- Eliminate planned downtime for upgrades, migrations, and platform refreshes

Vimeo.com/475133622

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Quick and simple overviews

Data & Application Streams

- Integrate one database/ application with another

Shadowbase Data Streams

Vimeo.com/382625428

Compare & Repair

- Source and target database validation

Shadowbase Compare & Repair

Vimeo.com/523995684

Essentials

- Manage, monitor, and transform your data

Shadowbase Essentials

Vimeo.com/475133622

HPE Shadowbase videos

Quick and simple overviews

Overview

- Real-time data replication and streaming for a NonStop world

Shadowbase

YouTube.com/Watch?v=pHu9qX3Pll0

Business Continuity

- Eliminate unplanned downtime for extreme availability

Shadowbase
Business Continuity

Youtube.com/Watch?v=cyoBd-iAPuc

Zero Downtime Migration

- Eliminate planned downtime for upgrades, migrations, and platform refreshes

Shadowbase
Zero Downtime Migration

Youtube.com/Watch?v=7MnmKr8a8zQ

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Quick and simple overviews

Data & Application Streams

- Integrate one database/ application with another

Shadowbase Data Streams

Youtube.com/Watch?v=3QtvqB3qtdQ

Compare & Repair

- Source and target database validation

Shadowbase Compare & Repair

Youtube.com/Watch?v=RFYjL_zhhAU

Essentials

- Manage, monitor, and transform your data

Shadowbase Essentials

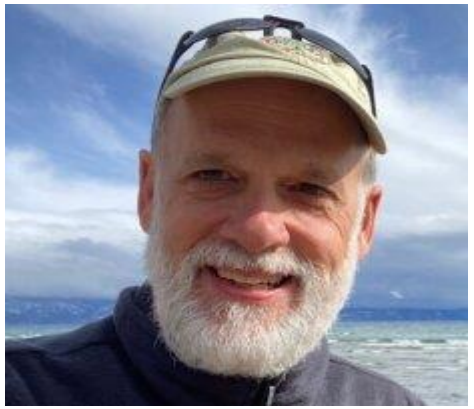
Youtube.com/Watch?v=5iU2o1JDo-c

Extra slides

If there’s time

New faces

Jonathan Sechrist



Director - Asia / Pacific & Japan Business Development

Ken Scudder

Vice President of Global Business Development

Alfredo Gonzalez

Product Deployment Analyst & Latin America Business Development

HPE NonStop Shadowbase Compare

Why is Compare necessary?
How does Compare work?
Benefits of Compare

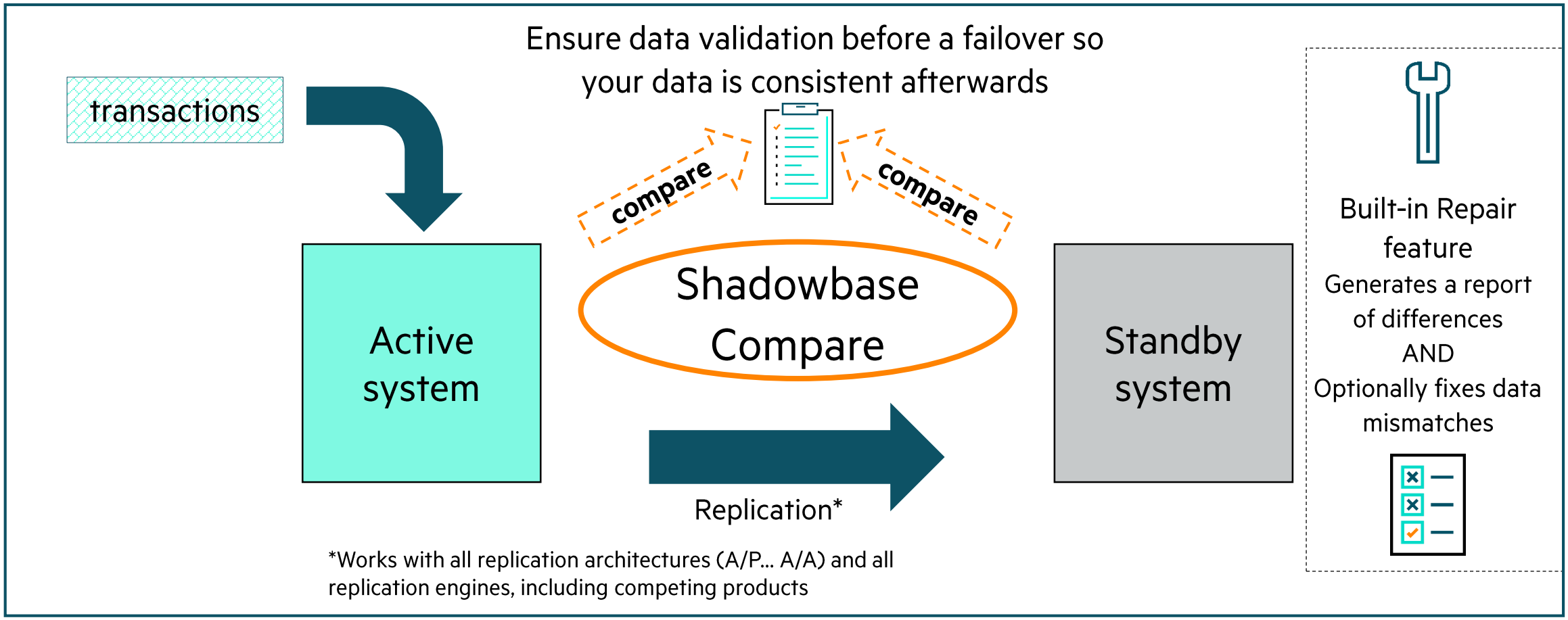
Why is Compare necessary?
Ensuring your Disaster Recovery DB matches Production

- Mismatches are more common than you might think

- Administrator actions that affect replication
  - Application changes the target DB instead of the source DB
  - Disables TMF – even momentarily
  - Delete (scratch) necessary audit trails
  - DBA changes the target DB structure instead of the source DB
- Lack of coordination between the App & Infrastructure teams
  - Adding new files or tables to the DB but not to the replication configuration
  - Forgetting to enable the TMF Audit flag
    - After adding new files or tables to the DB and replication configuration
  - Forgetting to link non-audited intercepts into the application programs
    - After rebuilding a non-audited application

How does Compare work?

Find and fix data mismatches between databases



Benefits of using Compare

Key features to validate, restore, and report

Key capabilities

- **Data validation** ensures source and target DBs match
- **Repair data function** corrects inconsistencies
- Supports Enscribe, SQL/MP, and SQL/MX

Built-in Repair function

Automatic reporting

Key features

- **Prove** backup database is consistent to management and auditors
- **Ensures** backup is ready for an immediate recovery
- Creates timeline of data points that the DBs matched
- Includes false-positive mismatch filtering
- Works regardless of replication engine

Data validation is a best practice!

- "Must have" for all Nonstop Business Continuity architectures
- Excellent for migrations, platform refreshes, upgrades to new systems, etc.

Benefits of Shadowbase Compare

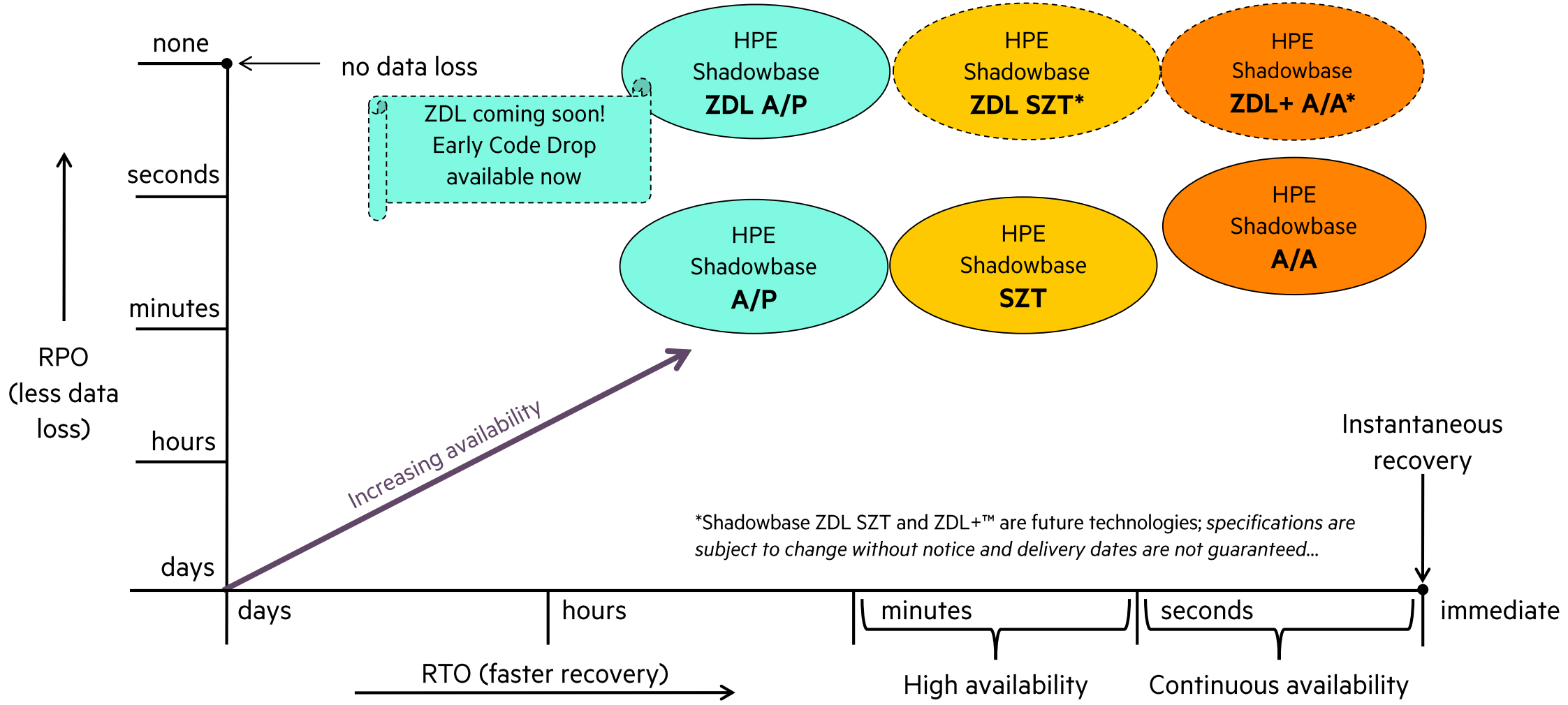
HPE Shadowbase Basic Business Continuity + Compare & Essentials

- HPE Shadowbase Compare enables customers to automatically certifying the Production & Backup databases match
- This provides customers with peace of mind and satisfies their stakeholders
- Helps monitor that both the production and backup systems are properly working
- Notifies the customer when mismatches occur, alerting that there may be a problem between the two systems
  - Replication insurance

Databases with *consistent data*

HPE Shadowbase Business Continuity continuum

Transactional replication



HPE NonStop Shadowbase Essentials

Why is Essentials necessary?
How do Essentials work?
Benefits of Essentials

Why is Essentials necessary?

Simplifying audit requirements, restoration, and transformation

Save time and eliminate risk of human error

- Shadowbase Audit Log and Audit Reader (SAL and SAR)
  - Audit and investigate database changes
  - Support audit requirements and expedite troubleshooting
- Shadowbase UNDO and REDO
  - Recover from database corrupting events
  - Quickly fix database errors
- Shadowbase DDL Command Replication (DCR)
  - Ensure DR and Production table/file structures match
  - Helps prevent errant DDL commands, data loss, and application issues
- Shadowbase Map (SBMAP), Shadowbase Schema Conversion (SBDDLUTL and SBCREATP), and Shadowbase ETL Toolkit
  - Simplify data transformation, filtering, and cleansing
  - Converts HPE NS table formats (Enscribe, SQL/MP) into target SQL formats
  - Extract, transform, and load data into Cloud, Data Analytics platforms, etc.

- Critical for both Business Continuity and Data and Application Integration

Introduction to Audit Log

HPE Shadowbase Audit Log for Other Servers

- Audit Log also pertains to Shadowbase Data and Application Integration for non-NonStop, AKA “Other Servers”
- This is the “sister” product to HPE NonStop Shadowbase Audit Log
  - It should be ordered when Shadowbase Data and Application Integration is ordered for a non-NonStop system
  - It marries the NonStop Audit Log capability with the non-NonStop Audit Log capability

QMS configuration rules are changing
HPE Shadowbase Audit Log for Other Servers

- **HPE Shadowbase Audit Log (SAL) Other Servers**
  - Why?
    - Helps achieve regulatory compliance
    - Obtain maximum benefit from use of Shadowbase Data and Application Integration Other Server data replication products
  - How?
    - Sends all change events to a normalized archival database on a non-NonStop database for querying and reporting (e.g., Oracle, SQL Server, etc)
    - This provides a timestamp and trail of who did what, when, and what data they did it to
    - Otherwise, this information is lost as soon as the source transaction commits against the source database and TMF audit rolls off the NonStop
  - Key Benefits
    - Prove what data was accessed, when, and by whom in order to meet regulatory and audit requirements

Benefits of selling Shadowbase Audit Log (SAL)

HPE Shadowbase Data and Application Integration for Other Servers + SAR & SAL

- **HPE Shadowbase Audit Log (SAL) and Audit Reader (SAR)** greatly enhances Shadowbase replication's event tracking capability
  - Supports sophisticated immediate and post-mortem analysis
  - No application changes necessary

- SAR provides the interactive interface to mine the TMF audit trails to answer questions
  - But what if that information rolls off the system or scratches?

- SAL provides the historical, archival database to record the TMF audit trail activity to answer latent/historical activity questions
  - Retention duration is now the customer's choice
  - Minable using the latest data analytics tools

- Increased revenue

Create 4 how slides

- SAL-SAR
- UNDO-REDO
- DCR
- SBMAP/SBDDLUTL-SBCREATP/ETL

Benefits of selling Essentials

Business Continuity and Data/Application Integration + Compare & Essentials

- HPE Shadowbase Essentials Bundle includes 8 solutions in one relatively low license fee and greatly enhances Shadowbase replication's effectiveness
- Keep the customer's application online
- Shadowbase Audit Log and Audit Reader (SAL and SAR) – record who changed what and when
- Shadowbase UNDO-REDO – easily fix corrupted databases without taking application offline
- Shadowbase DDL Command Replication (DCR) – mirror the Production system's database structure at the target
- Shadowbase Map – easily transform, filter, and cleanse data with a SQL-like script instead of manual coding
- Shadowbase ETL – extract, transform, and load data into generic DB formats to load cloud environments, data analytics platforms, etc.
- Increased revenue

Data *auditing*

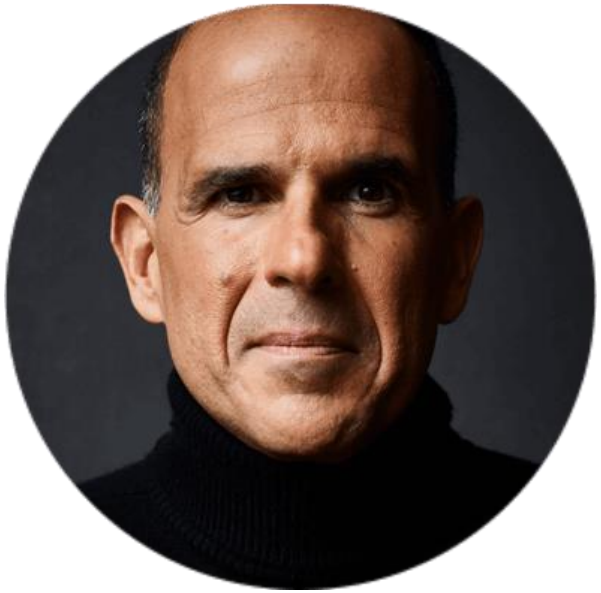
Data *restoration*

Data *transformation*

“I invest in 3 things:

people, process, and product”

MarcusLemonis.com



Marcus Lemonis
Entrepreneur & Philanthropist
“The Profit”

Most companies fail

Source: JPMorganChase.com/Institute/Research/
small-business/small-business-dashboard/longevity

"GRAVIC PREVAILS"

- Dr. Bruce D. Holenstein
President & CEO

GRAVIC 40 2019
Improving Society Through Innovation®

44 Years+ and Still Going Strong!

Process

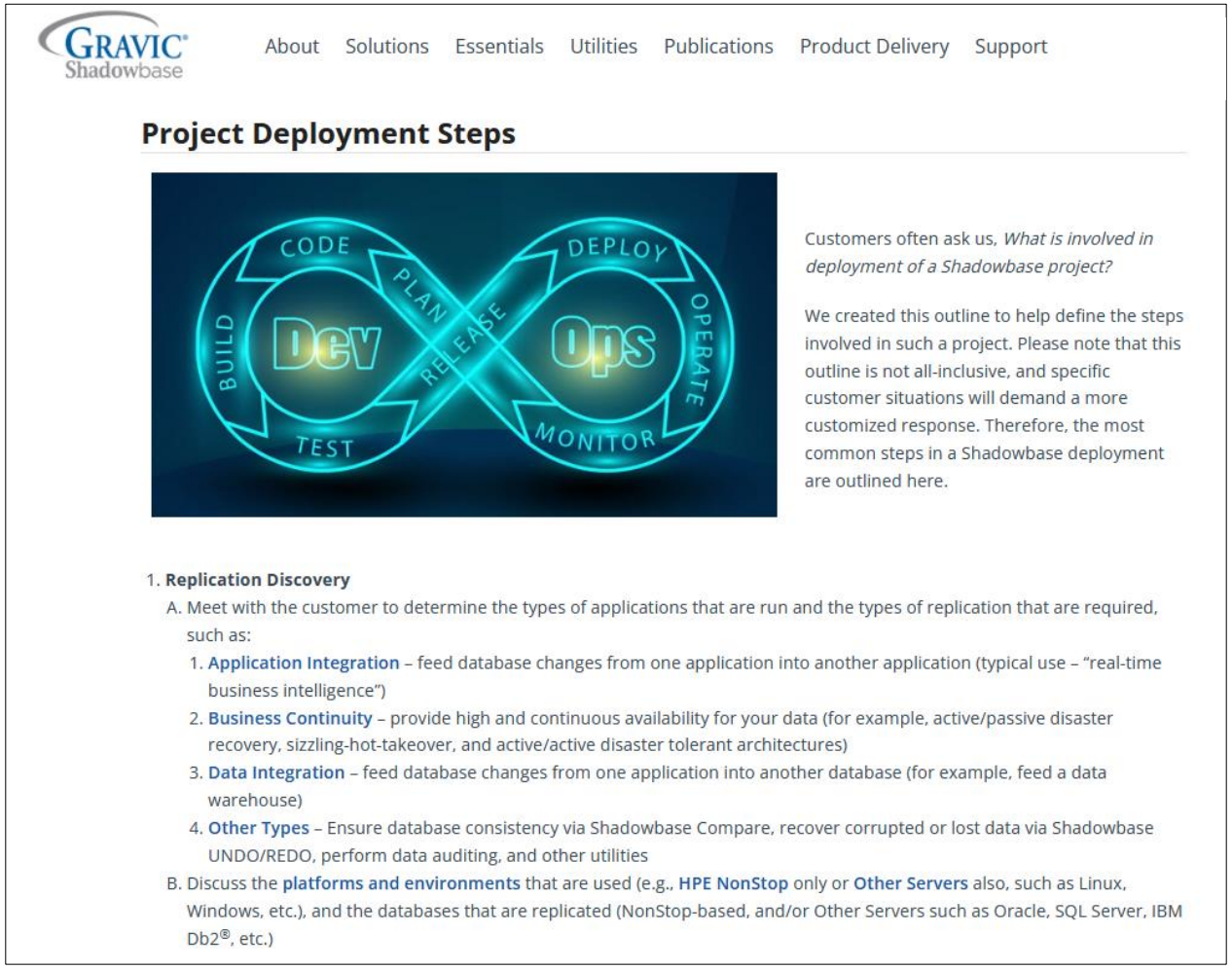
Project Deployment Steps

1. Replication Discovery
2. Solution Architecture
3. Customer Training
4. Production Planning
5. Production Implementation

Post Production Support

- *"I love how Gravic Support follows up with me the next day, after they answer my question, to make sure my problem is still resolved or if I have any questions."*

-Customer Director of HPE NonStop Systems



GRAVIC Shadowbase

About Solutions Essentials Utilities Publications Product Delivery Support

Project Deployment Steps

Customers often ask us, *What is involved in deployment of a Shadowbase project?*

We created this outline to help define the steps involved in such a project. Please note that this outline is not all-inclusive, and specific customer situations will demand a more customized response. Therefore, the most common steps in a Shadowbase deployment are outlined here.

1. **Replication Discovery**
   A. Meet with the customer to determine the types of applications that are run and the types of replication that are required, such as:
      1. **Application Integration** – feed database changes from one application into another application (typical use – "real-time business intelligence")
      2. **Business Continuity** – provide high and continuous availability for your data (for example, active/passive disaster recovery, sizzling-hot-takeover, and active/active disaster tolerant architectures)
      3. **Data Integration** – feed database changes from one application into another database (for example, feed a data warehouse)
      4. **Other Types** – Ensure database consistency via Shadowbase Compare, recover corrupted or lost data via Shadowbase UNDO/REDO, perform data auditing, and other utilities
   B. Discuss the **platforms and environments** that are used (e.g., **HPE NonStop** only or **Other Servers** also, such as Linux, Windows, etc.), and the databases that are replicated (NonStop-based, and/or Other Servers such as Oracle, SQL Server, IBM Db2®, etc.)

HPE Shadowbase Add-on Changes

Recent requirement

HPE Shadowbase Business Continuity (BC) Solutions

- **HPE NonStop Shadowbase Compare**
  - Confirms two databases match
- **HPE NonStop Shadowbase Essentials**
  - Saves time and eliminates risk of human errors

HPE Shadowbase Data & Application (DI&AI) Streaming

- **HPE NonStop Shadowbase Essentials**
  - Saves time and eliminates risk of human errors
- **HPE Shadowbase Audit Log for Other Servers**
  - Provide proof of performance
  - Integrates with NonStop Essentials

ZDM

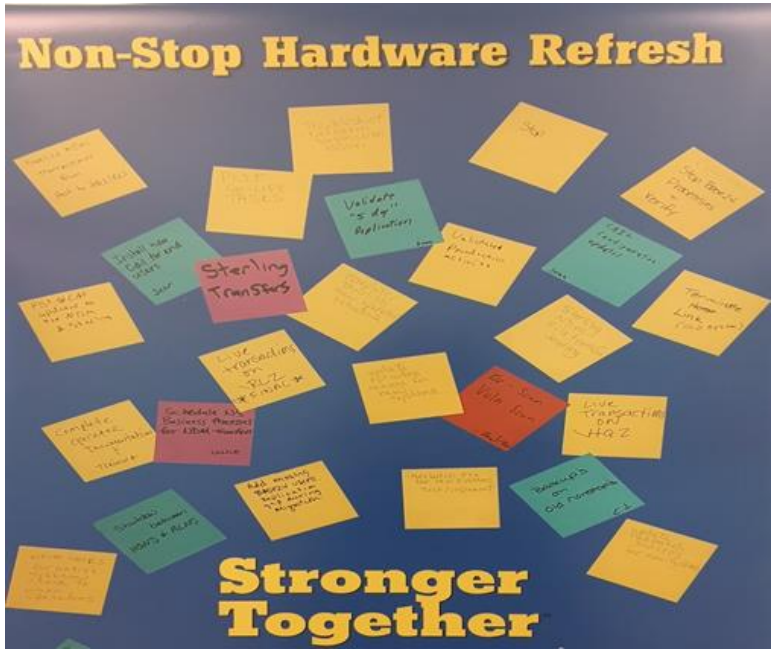
Migrate to HPE NonStop for Higher Availability

Zero Downtime Migration for California credit union

HPE Shadowbase for Zero Downtime Migration (ZDM)

Situation

- California credit union
- BASE24™ application
- Active / passive HPE NonStop systems



Problem

- End-of-life and end-of-support dates
- Inability to failover
- BASE24 only at headquarters
- Substantial license fee increases

Zero Downtime Migration for California credit union

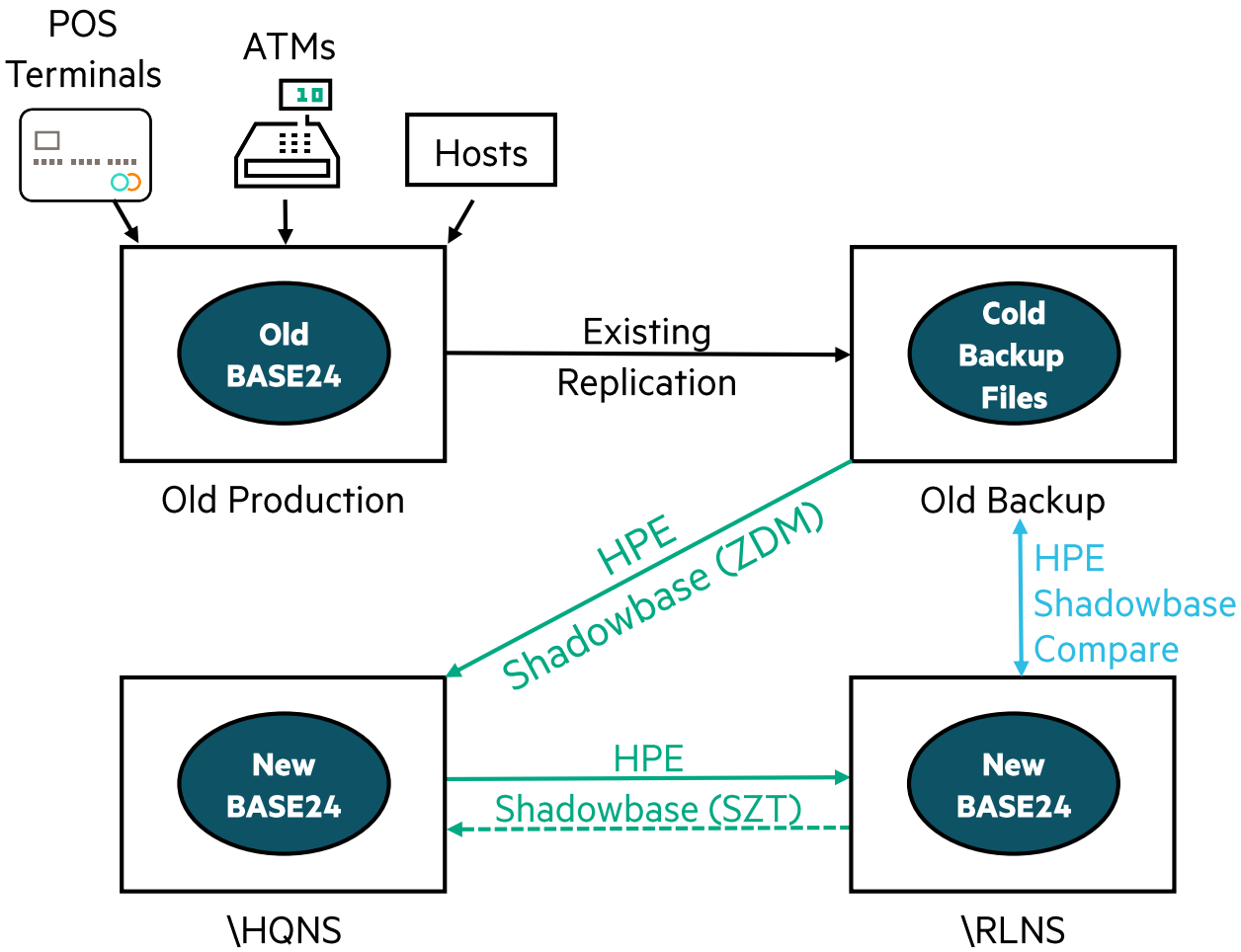
HPE Shadowbase for Zero Downtime Migration (ZDM)

Solution

- Shadowbase for Zero Downtime Migration
- Shadowbase for Business Continuity (in an Active Almost-Active “Sizzling-Hot-Takeover” (SZT) architecture

Outcomes

- Minimal application downtime and no risk
- Demonstrates to management that migration works



What made this project so successful?

Set Up the Team Properly

- “Management gave us broad brush strokes to make our own decisions”

Attack Problems Early

- “Use real data, real applications to find real problems early.”
- “You only find your weaknesses trying to fail.”

Eliminate Limiting Factors

- “We were able to do everything you see here [BASE24™ application, new hardware, and a new replication engine] for less [than the original replication vendor’s software upgrade fee].”

  – Credit Union System Technologist

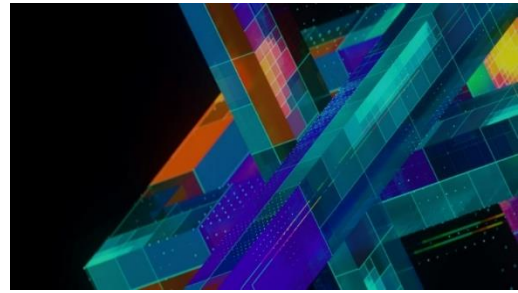
Use Great Software

- “When you do the project well, you get the results like this, without the cardholders knowing how much it helped them.”

GRAVIC®
HPE Shadowbase

HPE NONSTOP SHADOWBASE - New Features in Recent Releases

Current Release: NSB 6.700 series (T1122^AAV and newer)

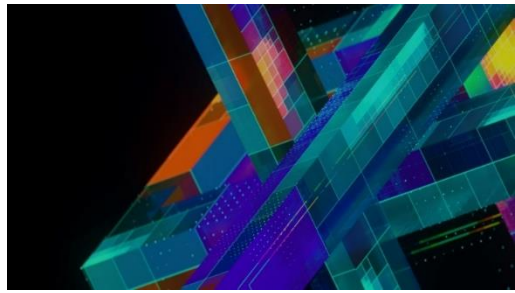


1. Simplified **RDF & Attunity migrations to HPE Shadowbase**
   - Use new conversion tools and architectures; ***training is available***
2. Additional **Shadowbase Compare enhancements**
   - **Must-have for any/all business continuity environments** regardless of replication engine in use
   - Improved **automated parallelism** for SQL environments
   - ***Blistering-fast*** *Entry-sequenced* file and table compare (10k/sec+ rates)
3. **Improved SBMAP data transformation scripting language** for Enscribe and SQL
4. New DDL Command Replication (DCR) for Enscribe and SQL
5. Reduced frequency of JULIANTIMESTAMP (JTS) procedure calls
   - ***Dramatically reduces CPU utilization for environments with a high arrival rate of audit trail events***
   - ***High volume x86 customers should consider upgrading for this reason***
6. **Internal IPC message 'consistency' checking feature to detect ("Man-in-the-Middle") tampering**
7. Miscellaneous usability items

HPE SHADOWBASE FOR OTHER SERVERS - New Features in Recent Releases

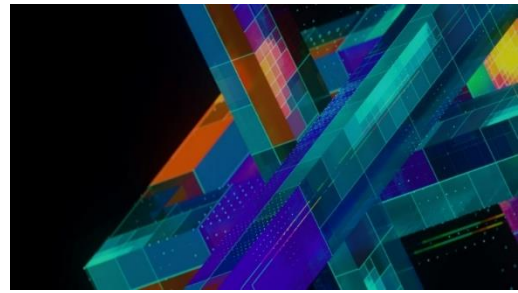
Current release: OSB 6.700 Series (T1124-T1130)

1. **New I/O TRACE capability** displays replicated transaction details
2. **Improved target-side latency reporting**, monitoring, and threshold alarming
3. **Massive performance boost for streaming data between platforms/environments**
   - ***Array Caching* event streaming** for bulk replication and columnar database support
   - **Achieve 10k+ per second data load rates into the cloud!**
   - **Improves data streaming rates into data analytics and data warehouse environments**
4. Support for **SQL/MX Sequence (Identity) Objects**
5. START *, STOP *, and STATUS * command wildcard support
6. Improved Windows installation and configuration
   - **Multi-version and multi-install support across same VM/physical system**
7. **New license request generation tool**
8. Miscellaneous usability items



HPE SHADOWBASE FOR OTHER SERVERS
Future Plans

1. **Additional performance measurement calculations** and reporting
   - Network & Communications, DOC File I/O, TCP/IP, etc.
2. New Datatype support for SQL/MX and other server databases (e.g., native BLOB/CLOB, VARBINARY, etc.)
3. **More pj…fill in**



NEW Shadowbase License File w/ VERSION 6.700+

Shadowbase 6.700 and newer (for both HPE NonStop & Other Servers)

HPE NonStop Shadowbase version 6.700 Released July 2022 (T1122^AAV)

HPE Shadowbase for Other Servers version 6.700 Released January 2022 (T1124-T1130)

Note

- For all Shadowbase releases, Gravic now provides a SHA1 checksum and the size of the release package (file) in bytes.
  - The purpose of this is so that the user can confirm that the release package they downloaded is valid and free from corruption/tampering.
- A new license file is required for Shadowbase version 6.700 & newer
- Contact the HPE License Manager to request a new license file before you upgrade

DO NOT INSTALL HPE Shadowbase version 6.700 until a new license file is obtained!

For full details, visit
ShadowbaseSoftware.com/Releases/

Virtual & physical Tape

For business-critical and mission critical applications

- Potential for massive data loss
- Recovery time is typically very long (unacceptable)
- Data is inconsistent until after the restore process (database unusable)

Placeholder for diagram on slide 4

Conclusion

- Not a valid DR solution for business-critical and mission critical applications

Best practices for HPE NonStop Business Continuity

Many storage solutions only provide a database mirror, not full data replication

Physical replication vs. logical replication

- Physical replication is not the same as software and transactional-based replication
  - Physical replication sends physical blocks and sectors
  - Logical replication sends logical transactions
- Additional disadvantages to physical replication
  - Failover and recovery is complex and time-consuming – requiring an extensive "fix-up" process to make the backup fully consistent and usable
  - Data corruption on the primary may be replicated to the backup system
  - The backup system and database is inconsistent and cannot be used until after failover
    - This includes read-only queries
- Transactional-based replication software, such as HPE Shadowbase
  - Provides higher quality data that is more easily usable
  - Maintains target database data consistency
  - Enables read-only queries on the backup system, even during replication
- Transactional-based replication is a must-have for HPE NonStop Business Continuity architectures
  - How do we know the backup database is accurate, consistent, and complete?

Physical vs. Logical replication

When is the backup database is accurate, consistent, and complete?

Physical Replication

- Transactionally **unawar**
- Hardware or device-dri
- Typically available in m
- Data is not usable/cons
  fix-up

- Other disadvantages
  - Long RTOs
    - Failover and recovery is
  - Block corruption on source can affect the target
  - While replication is active
    - The backup system / database is **inconsistent**
    - Cannot be used, even for read-only queries
    - Write operations are not supported

Logical Replication

- Transactionally **aware**

conds

ilable and consistent

automatic and fast

a will not corrupt the target

- While replication is active
  - The backup system / database is **consistent**
  - Can be used for read-write operations
  - This includes read-only querying

Consistent – source tx profile is maintained during replay at the target
Complete – does not break transaction into pieces
Correct – data integrity
Once committed, data is usable

Maintains target database data consistency
Enables read-only queries on the backup system, even during replication

- Be skeptical
  - Is your replication infrastructure perfect?

What is transactional-based replication?

- Replicating the source application workflow at the target
- Logical-based replication is aware of
  - Files / tables that are being changed
  - Record / row key information
  - Key structures – including – primary and secondary indices [should be combined with above]
  - INSERTs / UPDATEs / DELETEs
  - Column or field datatypes
  - Logical record or row data grouping
- Preserving logical units of work as a transaction during replay
  - BEGIN work
    - All steps or operations to perform a consistent business transaction
      - Data changes – being data-change aware – maintains data integrity
      - Maintains the database atomicity ACID (Atomic Consistent Isolated Durable)
      - Others are looking at changes at the sector or block level (not data aware)
  - COMMIT / ABORT work

- Capture what physical is aware of
  - Block and sector
  - Sector size
  - Something in the sector changed
    - Does not know what changed
    - Does not have context

What is transactional-based replication?

- What does it do?
- Mimicking the application work profile at the target (that occurred at the source)
- Logical concepts – units of work that are bracketed within
  - BEGIN work
    - All steps or operations to perform a consistent business transaction
      - Data changes – being data-change aware – maintains data integrity
      - Maintains the database atomicity ACID (Atomic Consistent Isolated Durable)
      - Others are looking at changes at the sector or block level (not data aware)
  - COMMIT / ABORT work

- CREATE TABLE
- INSERT Column
- DELETE Column
- DB Commands – replicating DB commands

- **Is your replication solution doing what you think**