

Hewlett Packard
Enterprise

HPE Shadowbase Digital Resilience for HPE NonStop Systems

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Gravic, Inc.

May 2025



NYTUG

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About Gravic

- **Leaders in HPE NonStop data availability**
 - Strong commitment to HPE NonStop and other servers
 - 100+ patents
 - Hundreds of customers use Shadowbase worldwide
- **High Availability for mission-critical solutions**
 - Data replication, streaming, and validation
- **HPE's strategic, go-forward partner**
 - HPE Shadowbase has been globally sold and supported by HPE since 2014
 - Close collaboration between Product and Engineering groups



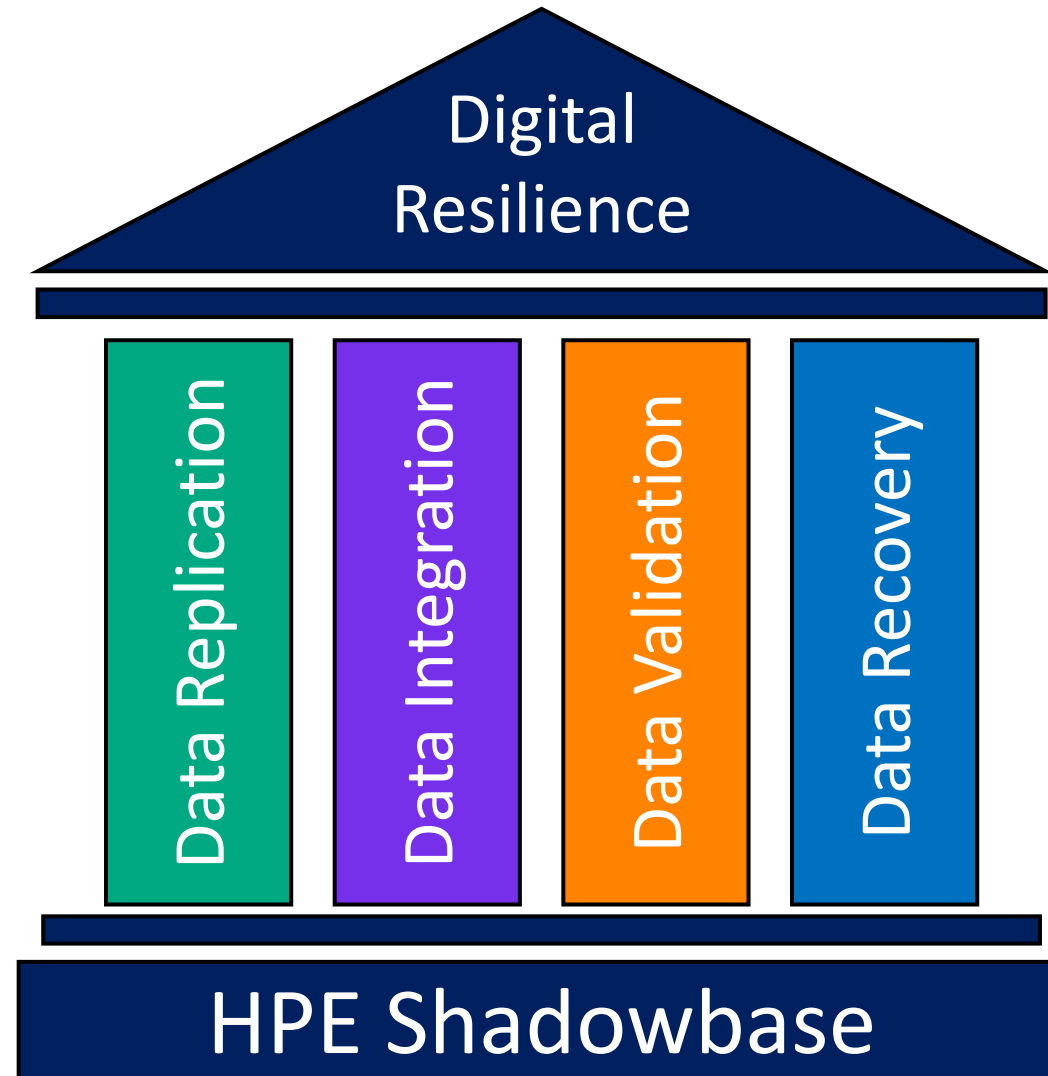
Gravic HQ in Pennsylvania, USA



Momentum Technology
Partner of the Year 2019

Agenda

- How long can your business tolerate an outage?
- How do you distribute your NonStop data across the enterprise?
- How do you know your Production and Backup databases match?
- How would you recover from a cyberattack?



HPE Shadowbase

Key pillars

Replication

- **Eliminate downtime**
 - **Active / Passive** DR
 - **Active / Almost-active** “Sizzling-Hot-Takeover”
 - **Active / Active** continuous availability
 - **Zero Downtime Migration** for HW upgrades / refreshes and moving datacenters
- **Eliminate data loss**
 - Shadowbase Zero Data Loss (ZDL) provides synchronous replication technology

Integration

- **Eliminate data and application silos**
 - Like-to-like and dissimilar environments
 - Unlimited data transformation
 - Extend with embedded application logic
- **Popular uses**
 - Fraud detection
 - Data streaming and change data capture
 - Data warehouse feeds
 - Real-time business intelligence

Validation

- **Ensure source and target DBs match**
 - Make sure backup is ready for an immediate takeover
 - Verify data for migrations, refreshes, etc.
 - Create timeline of when DBs match
- **Capabilities**
 - Works with all data replication engines
 - Runs online and on-platform
 - Supports Enscribe, SQL/MP, and SQL/MX
 - Repair function

Use Case

ZDM

Zero Downtime Migration for California Credit Union



Use Case

AI BC DI

Real-Time Fraud Detection and Resolution for Financial Switch



Use Case

C ZDM

Massive Datacenter Migration for Money Transfer Firm



How long can your business tolerate an outage?

Large Australian Bank's Active / Active CONNEX Migration

How long can your business tolerate an outage?

Situation

- ATM/POS services on 4 NonStops
- Looming license expiration dates

Problems

- Significant relicensing fees
- Looming license expiration

Outcomes

- Zero service outage
- Audited files

Feedback

- *Business Analyst:* "...the euphoria I was experiencing after pushing it over the finish line, the business side couldn't understand it, but they were absolutely ecstatic that we didn't affect our customers, the biggest thing was that we did it without customer impact..."
- *Senior Software Engineer:* "We recently had a disk issue with space. With Shadowbase, you can move Q Files online in real-time off to a different disk that has more space, so 1 of the disks was down to 1% at one point in time; the ability to do that with Shadowbase is great. When we migrated the data...the SB tools helped us resolve issues, plus we were able to do it in real-time."

How do you know your Production and Backup databases match?

Large Australian Bank's Active / Active CONNEX Migration

How do you know your Production and Backup databases match?

The old way

- FUP INFO, STAT to compare record counts?
- Comparing EOF/byte counts?
- Something else???

The new way

- *Principal Software Engineer: "...using Compare to validate the files was a big thing* vs. the old software we had..."

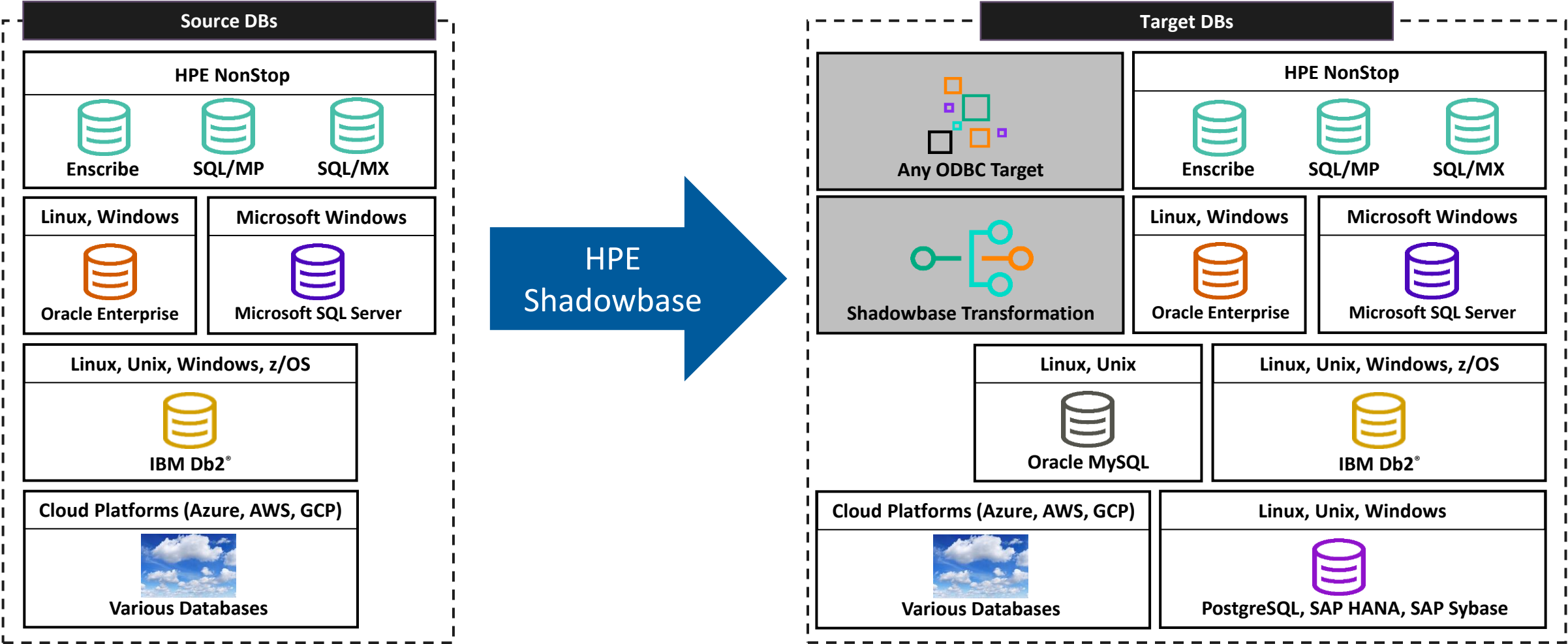
***“The collaboration
was brilliant”***

The Bank’s Business Analyst

How do you distribute your NonStop data across the enterprise?

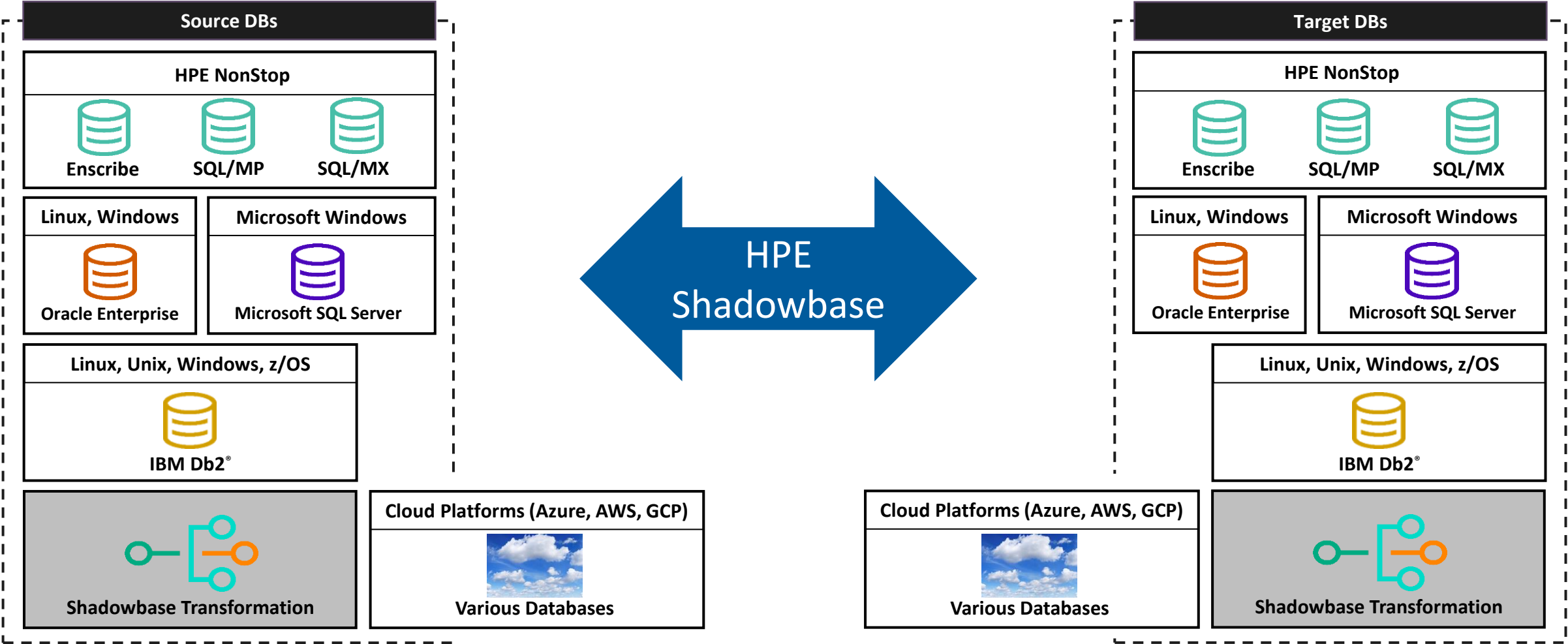
Homogeneous and heterogeneous uni-directional data replication and streaming

All combinations supported



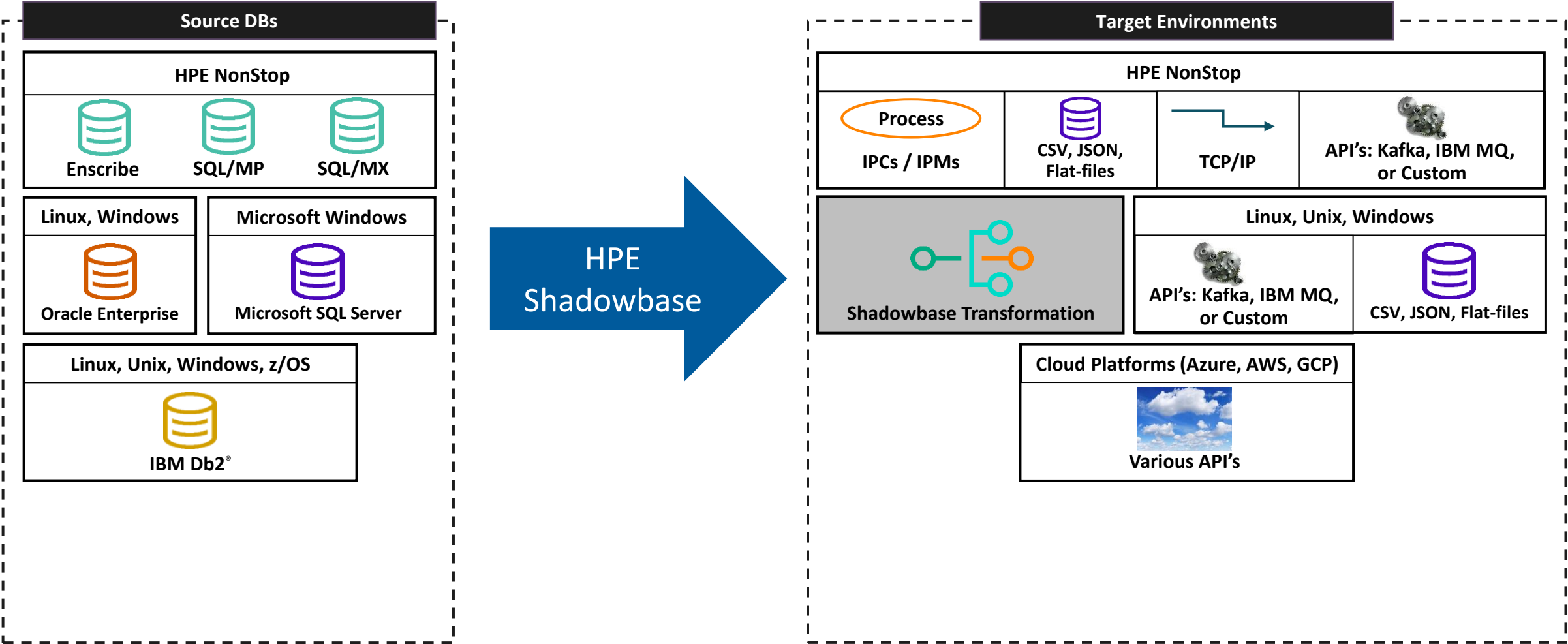
Homogeneous and heterogeneous bi-directional data replication and streaming

All combinations supported



Heterogeneous uni-directional application integration (DB changes streamed into API's)

All combinations supported

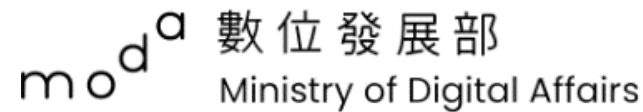


How would you recover from a cyberattack?

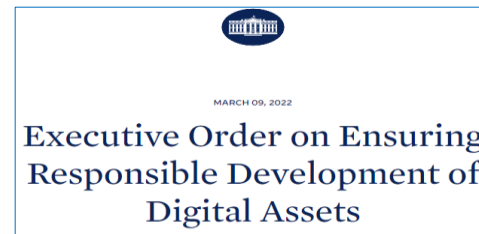
Digital Resilience

- What is it?

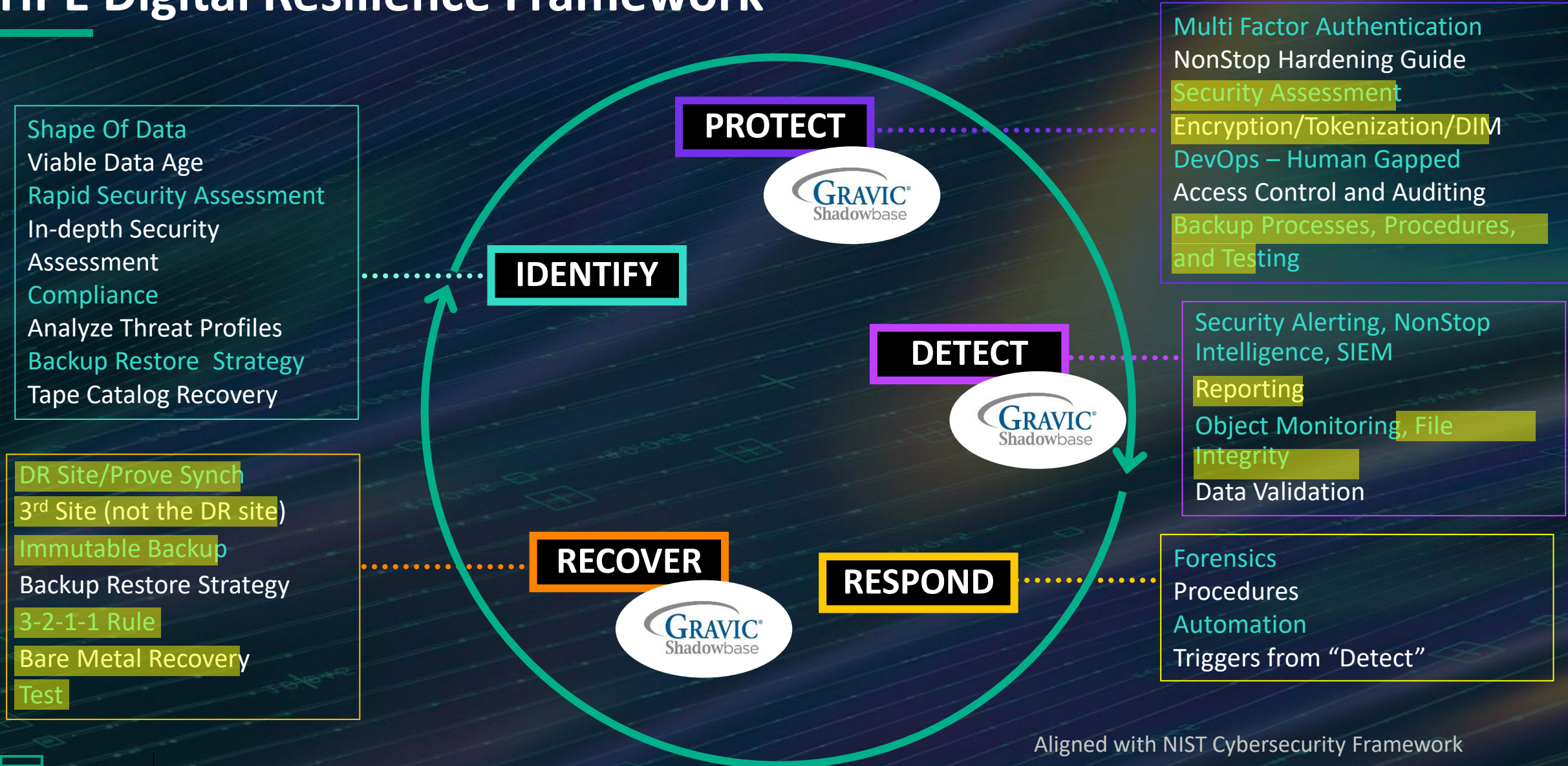
- “Protection, detection, containment, recovery and repair capabilities against information and communication technology (ICT) related incidents”
 - **EU Digital Operational Resilience Act (DORA)**
- Other government regulations are underway



Ministry of Science, ICT
and Future Planning

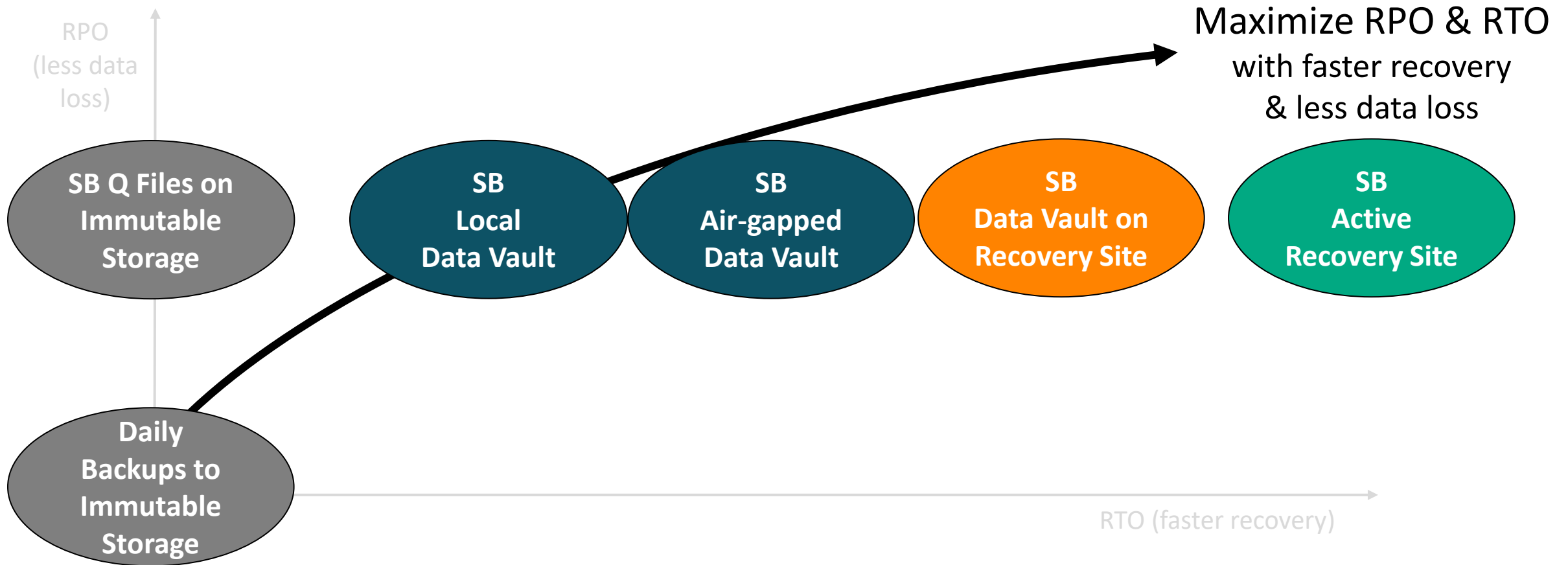


HPE Digital Resilience Framework



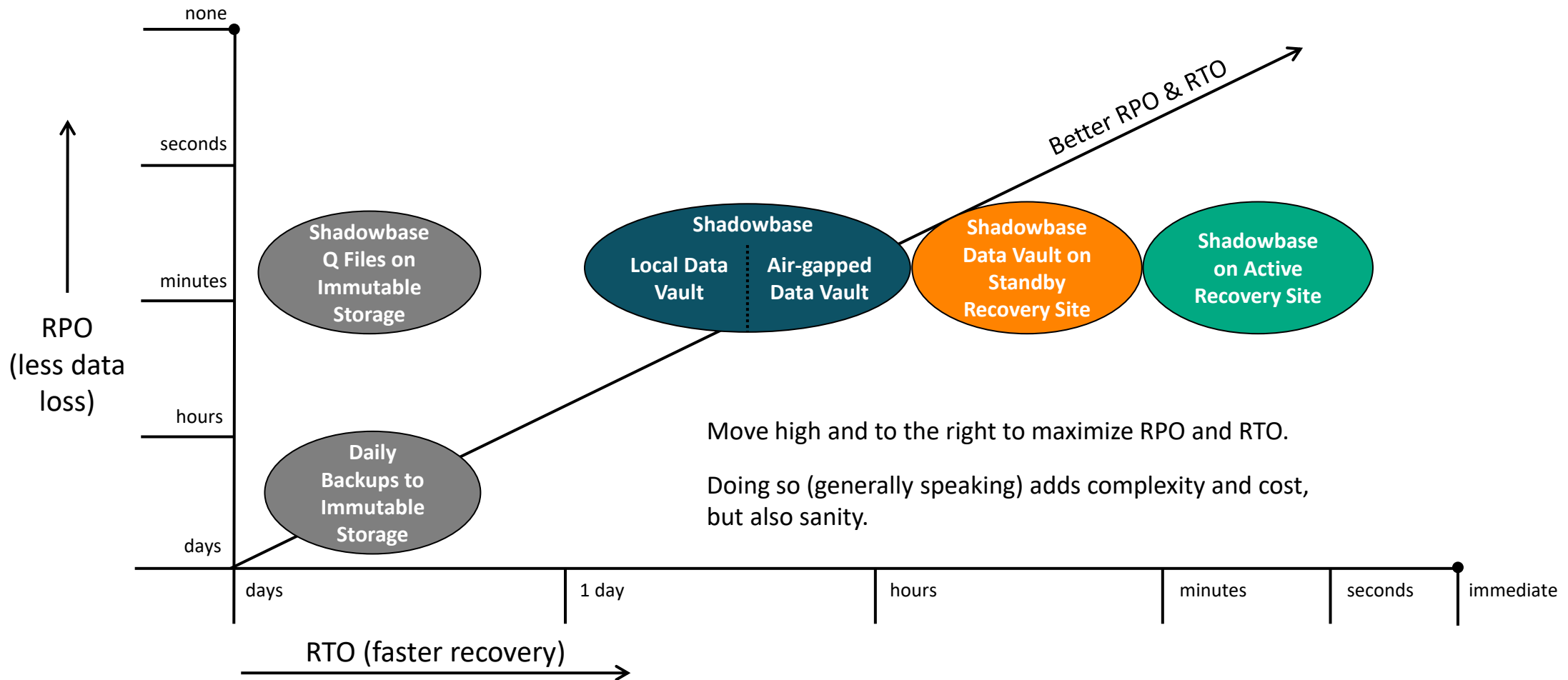
HPE Shadowbase Digital Resilience Continuum

Match your RPO & RTO requirements with the right architecture



HPE Shadowbase Digital Resilience Continuum

Match your RPO & RTO requirements with the right architecture



Why HPE Shadowbase for Digital Resilience?

Key advantages



- **Enables best practices**
 - TMF auditing for ACID transactional protection
 - 3-2-1-1 rule for data protection and recovery
 - Immutable storage and Air-gapping
- **Accelerates RPO (recovery point) & RTO (recovery time) objectives**
 - Local and/or remote data vaults
 - 3rd-site, Rapid, and Bare Metal recoveries
- **Ongoing innovation to avoid data corruption**
 - Isolates data using logical air-gapping
 - Helps detect data tampering (e.g., MitM attacks)
 - Quarantines untrusted data until threat window has passed
 - UNDO or REDO database changes to a trusted recovery point

This space is rapidly evolving: stay tuned for news headlines, regulations, and corporate mandates.

Technology Partnership

Collaboration brings the best of both partners in a standardized way



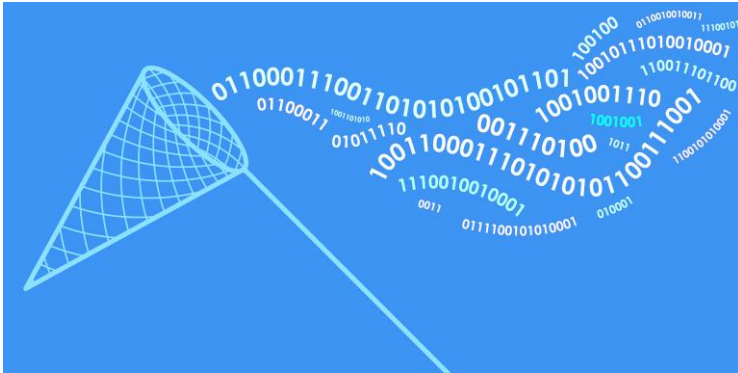
Backbox, QoreStor, and Shadowbase integration

- Safeguard data against Malware and Ransomware attacks
- Standardization to meet immutability compliance requirements
- Improved RPO and RTO levels

New Innovations

HPE Shadowbase Zero Data Loss (ZDL) solution

When you can't lose any data



- **Synchronous data replication**
 - Zero data loss (RPO = 0)
 - Zero downtime (RTO → 0) with A/A configuration
 - Minimizes application latency
- **Standard comms, storage, and geographic data resilience**
 - Leverages existing / proven HPE Shadowbase technology

Controlled Availability since December 2024

New HPE Shadowbase features

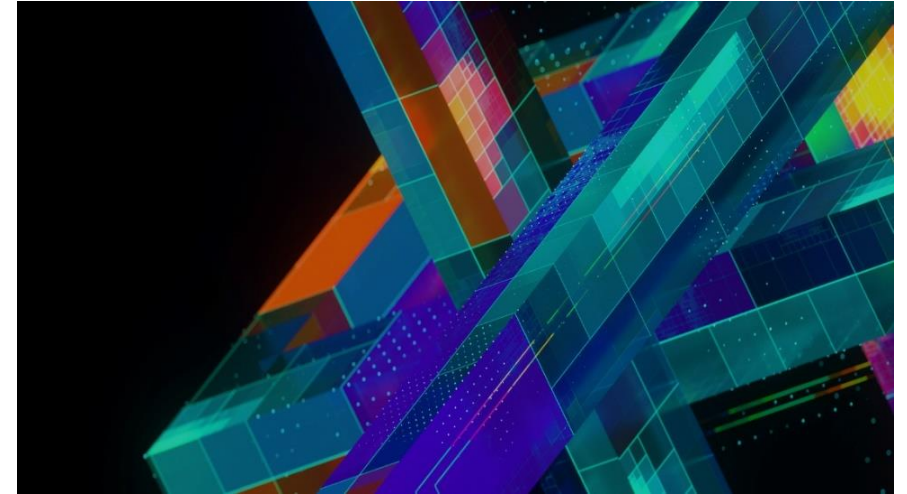
Available now on HPE NonStop

Business Continuity Replication

- Faster troubleshooting with more granular and enhanced statistics
- Easier data loading
- Simplified management for EXACT SYSKEY replication
- Alternate key / index positioning for Entry-Sequenced data

Compare Data Validation

- Faster and easier Data Validation with Wildcarding functionality
- Improved support for Entry-sequenced Enscribe files
 - Ability to chunk massive partitions into smaller batches



Plus others, review the SOFTDOCs
for the full details:



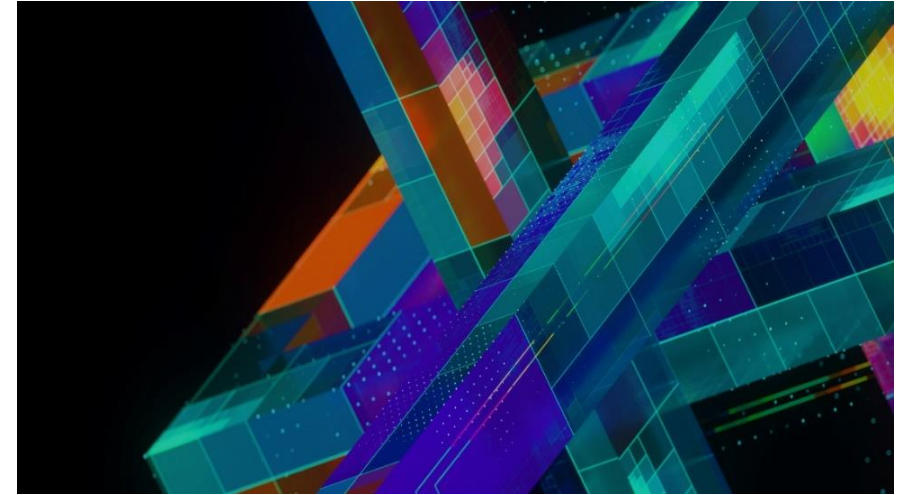
ShadowbaseSoftware.com/Releases/

New HPE Shadowbase features

Available now on Other Servers

Data Streaming and Application Integration

- New target adapters for integrating NonStop with:
 - Kafka, IBM MQ, JSON output, flat-files
- 10x faster using array-based replication
- Improved SLA management with enhanced latency monitoring and alarm thresholding
- Faster troubleshooting with more granular and enhanced statistics and operation tracing
- Windows platforms – multiple SB installs allows for easier upgrades and ZDMs



Plus others, review the SOFTDOCs
for the full details:

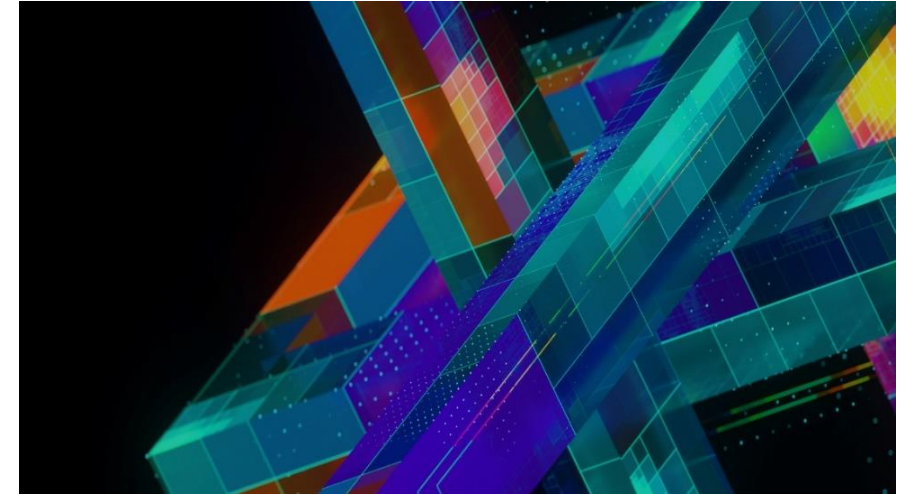


ShadowbaseSoftware.com/Releases/

Future HPE Shadowbase features

In-plan

- Additional Data Recovery architectures for Digital Resilience
- *Blistering Fast* Compare and Repair enhancements
- Heterogeneous Database Compare
 - e.g., NonStop vs Oracle, SQL Server, DB2, Sybase, MySQL, PostgreSQL, etc.
- Native Splunk target support
- **HPE Shadowbase DoLockStep synchronization**



Plus others, review the SOFTDOCs
for the full details:



ShadowbaseSoftware.com/Releases/

HPE Shadowbase Customer Examples

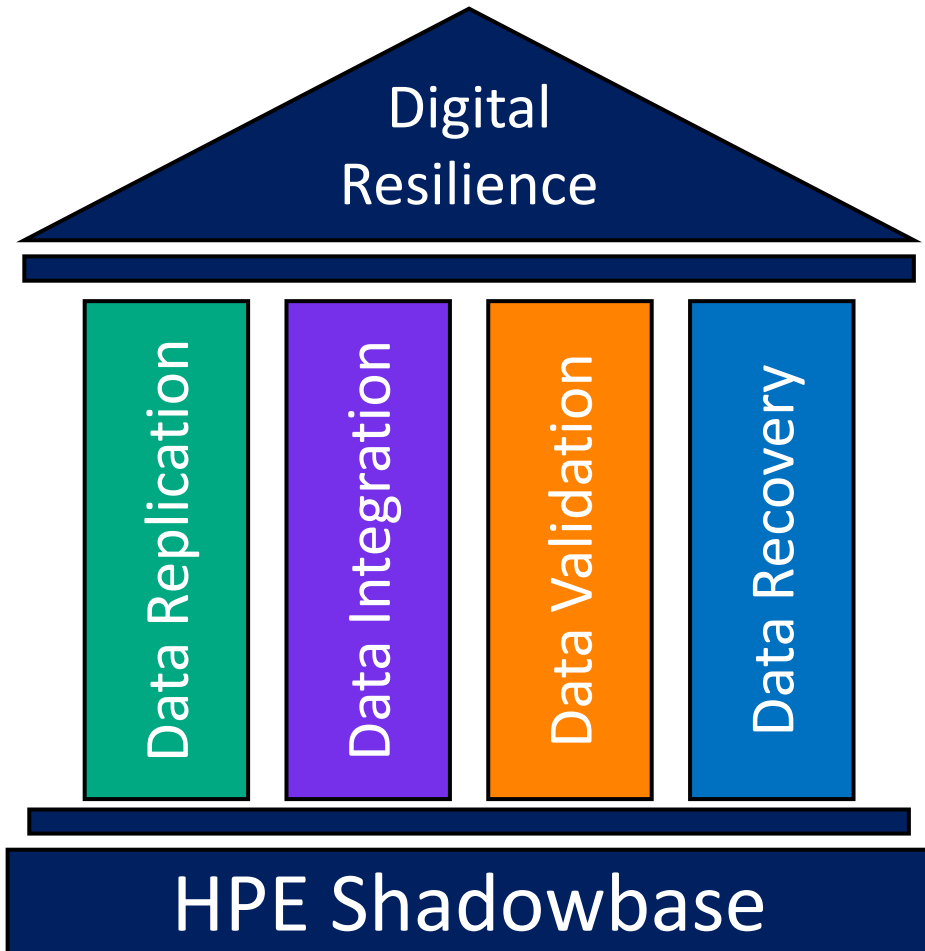
Recent HPE Shadowbase customer successes



- **UK Government Agency**
 - SB Data Integration into SQL Server for analytics
- **European payments processor**
 - Home-grown POS app, RDF Active / Passive migration to SB Active / Active
- **Middle East central bank**
 - BASE24-eps SB Zero Downtime Migration for platform refresh
- **3 Asia-Pacific banks**
 - All OGG BASE24-eps Active / Passive replacements to HPE Shadowbase SZT
- **Australian bank**
 - Replaced CONNEX banking app's existing Active / Active replication using SB Zero Downtime Migration for platform refresh
- **Large retailer (USA)**
 - 45-day Active / Active migration that improved data latency from hours / days to seconds
- **Large petroleum company**
 - SB Data Integration into SQL Server for Decision Support
- **U.S. Not-for-profit Bank**
 - BASE24™ SB Zero Downtime Migration for platform refresh
- **U.S. home goods manufacturer**
 - Existing SB Data Integration customer that added SB Business Continuity during a Zero Downtime Migration

Wrap-up

Why HPE Shadowbase?



Customers say:

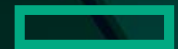
- **HPE Shadowbase provides tremendous value**
 - Licensing and support aligned with NonStop (including GreenLake flexible capacity models)
 - Typically much less expensive
- **HPE Shadowbase has advanced features**
 - Ongoing innovation, including Data Recovery for Cybersecurity
- **HPE Shadowbase has outstanding support**
 - GNSC provides global, 24x7 coverage (with Gravic backup)
- **HPE Shadowbase is committed to NonStop**
 - Robust roadmap for NonStop and Other Servers
 - HPE's strategic, *go-forward* NonStop data replication solution

Going to TBC?

Sneak Peak

- Be on the lookout for HPE Shadowbase Training and several deep dive sessions





**Hewlett Packard
Enterprise**



Thank you for attending

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What about the performance?

HPE Shadowbase has met all customer performance requirements

High-volume, low latency



- **High performance using scalability**
 - Unlimited parallelism for massive scaling
- **Highly tunable**
 - Latency metrics: SB environment metadata, SB process metrics, user-configurable latency thresholding and alarms

Given sufficient configuration and infrastructure, we believe we can meet your requirements, too.

HPE NonStop Shadowbase enables robust architectures

- **Decouple replication from application processing for online upgrades**
 - Rapid filtering
- **TMF auditing changes everything: performance, data integrity, and resilience**
 - Bedrock of HPE NonStop Data Integrity
 - Lower risk of data corruption vs. unaudited files
 - HPE Shadowbase amplifies power of audited data
- **Optimize Change Data Capture (CDC)**
 - Record what was changed, where, and when
 - More resilient transactions
 - Increase scalability with multi-record change data operations
- **Faster application, database, file system, and I/O response times**
 - Flush less frequently
 - Improve capacity



HPE Shadowbase Data Replication for Business Continuity

Eliminate planned and unplanned downtime



- **Shadowbase supports all Business Continuity architectures**
 - Active / Passive Disaster Recovery (DR)
 - Active / Almost-active “Sizzling-Hot-Takeover” (SZT)
 - Active / Active Continuous Availability (Hot-Hot)
- **Shadowbase Zero Downtime Migrations (ZDM) for upgrades, migrations, and platform refreshes**
- **Many financial services customers use Shadowbase (e.g., BASE24™, etc.)**

Use Case

ZDM

**Zero Downtime Migration for
California Credit Union**

[ShadowbaseSoftware.com/Publications/
Use-Cases/ZDM-for-Credit-Union/](https://ShadowbaseSoftware.com/Publications/Use-Cases/ZDM-for-Credit-Union/)



HPE Shadowbase Data Validation

Find and resolve data discrepancies



- **Source and target data validation**

- Supports Enscribe, SQL/MP, and SQL/MX
- Runs online and on-platform
- Works with all data replication engines
- Avoids false positive mismatches due to replication latency
- Provides repair function
- Validates backup database is ready for an immediate takeover

Use Case



**Massive Datacenter Migration for
Money Transfer Firm**

[ShadowbaseSoftware.com/Publications/
Use-Cases/Massive-Datacenter-Migration-for
Money-Transfer-Firm/](https://ShadowbaseSoftware.com/Publications/Use-Cases/Massive-Datacenter-Migration-for-Money-Transfer-Firm/)



HPE Shadowbase Data and Application Integration

Eliminate data and application silos



- **Unlimited data transformation, scrubbing, and filtering**
 - Like-to-like and dissimilar environments
 - Customize replication to meet your needs
- **Popular use cases**
 - Fraud detection
 - Data warehouse feeds
 - Real-time business intelligence and analytics

Use Case

AI BC DI

Real-Time Fraud Detection and Resolution for Financial Switch

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



HPE Shadowbase with BASE24 and BASE24-eps

Many ACI customers around the world use HPE Shadowbase



A few examples:

- **Major international bank (UK)**
 - BASE24 Dual-site A/A environment
 - RDF replacement
- **Leading Not-for-Profit Bank (USA)**
 - BASE24 A/A/P environment
 - [Oracle GoldenGate replacement](#)
- **Regional bank (EU)**
 - BASE24 and BASE24-eps app Active-Near Active (“Sizzling Hot Takeover” (SZT))
 - RDF replacement
- **Several large central banks (Middle East)**
 - BASE24 app SZT environment
- **Major Bank (Canada)**
 - BASE24 app SZT environment
 - [RDF replacement](#)
 - [Evaluated Oracle GoldenGate but it didn’t meet their needs](#)

HPE Shadowbase works with all types of applications

HPE Shadowbase is used by 100's of customers with many types of applications



A few examples:

- **Large retailer (USA)**
 - Customer with custom payments app in “Sizzling-hot Takeover” (SZT) environment
- **Major bank (APAC)**
 - Connex payment app in A/A environment
- **Large retailer (USA)**
 - AJB payment app in SZT environment
- **Large government healthcare provider (Canada)**
 - Funds transfer app in SZT environment
- **Large auto manufacturer (EU)**
 - Manufacturing execution system app in SZT environment
- **Large government agency (APAC)**
 - Immigration app in A/A/A environment
- **Large steel producer (EU)**
 - Manufacturing process control app in A/P environment

HPE Shadowbase replacing Oracle GoldenGate

Many Oracle GoldenGate customers have switched to HPE Shadowbase



A few examples:

- **Major Payments Processor (EU)**
 - Custom payment app A/A environment
 - [Oracle GoldenGate replacement](#)
- **Leading Not-for-Profit Bank (USA)**
 - BASE24 A/A/P environment
 - [Oracle GoldenGate replacement](#)
- **Regional bank (Asia)**
 - BASE24 A/P environment
 - [Oracle GoldenGate replacement](#)
- **Regional bank (EU)**
 - BASE24 app SZT environment
 - [Oracle GoldenGate replacement](#)
- **Regional bank (Eastern Europe)**
 - BASE24 A/P environment
 - [Oracle GoldenGate replacement](#)



Global NS Services Provider

- UK Based
- HPE NonStop Platform experts
- Core focus on Managed Services
- Also provide Professional Services:
 - Health Checks
 - Security (Including PCI-DSS)
 - Data Replication (HPE Shadowbase, RDF, GoldenGate, DRNet, Autosync, AutoTmf)
 - Platform Migrations (Itanium to Itanium, Itanium to NSX)
 - BASE24 Migrations and Support (Classic and EPS)

TCM have performed many HPE Shadowbase installations and upgrades

NEW ETI-NET & Gravic Technology Partnership

Collaboration brings NonStop Backup Immutability to Shadowbase Q-Files



"ETI-NET is proud to partner with Gravic to enhance BackBox support for HPE Shadowbase replication. This collaboration provides NonStop clients with a standardized, fully supported solution to meet immutability compliance requirements more effectively."

- Benoit Charon, COO at ETI-NET



"The Gravic Shadowbase team is excited to announce a new technology partnership ETI-NET. This partnership leverages ETI-NET's BackBox and QoreStor technology to ensure customer's mission-critical data meets data immutability regulations and safeguards against Malware and Ransomware attacks. We look forward to working closely with the ETI-NET team to meet customers' digital resilience requirements to help customers reduce their RPO and recover with a faster RTO."

- Paul J. Holenstein, Chief Technologist at Gravic

Partnership is key

Gravic and TCM partnership

TCM has extensive experience implementing HPE Shadowbase



- **TCM team are experts in Shadowbase**

- Data replication and multiple architectures
- Data integration and data validation
- Zero Downtime Migrations
- Many BASE24 and BASE24-eps projects

- **A few examples**

- Shadowbase SZT with BASE24 for international bank (EU)
- Shadowbase SZT with BASE24/BASE24-eps for central bank (ME)
- Shadowbase SZT for BASE24-eps for national payment switch (ME)
- Shadowbase SZT for BASE24/BASE24-eps for regional bank (EU)
- Shadowbase DIAI for NonStop to SQL Server integration for government agency (UK)
- ...

Partnership is key: TCM's extensive Shadowbase experience

- TCM has worked with Gravic on many
- Gravic and TCM's recent collaboration on HPE Shadowbase Projects
 - 2 Central Banks of Middle Eastern Countries
 - 2 International European Banks
 - Regional Middle Eastern Bank
 - Eastern European Bank
 - Government Police Organization
 - Island Resort Bank
 - Regional Bank in Gulf Country



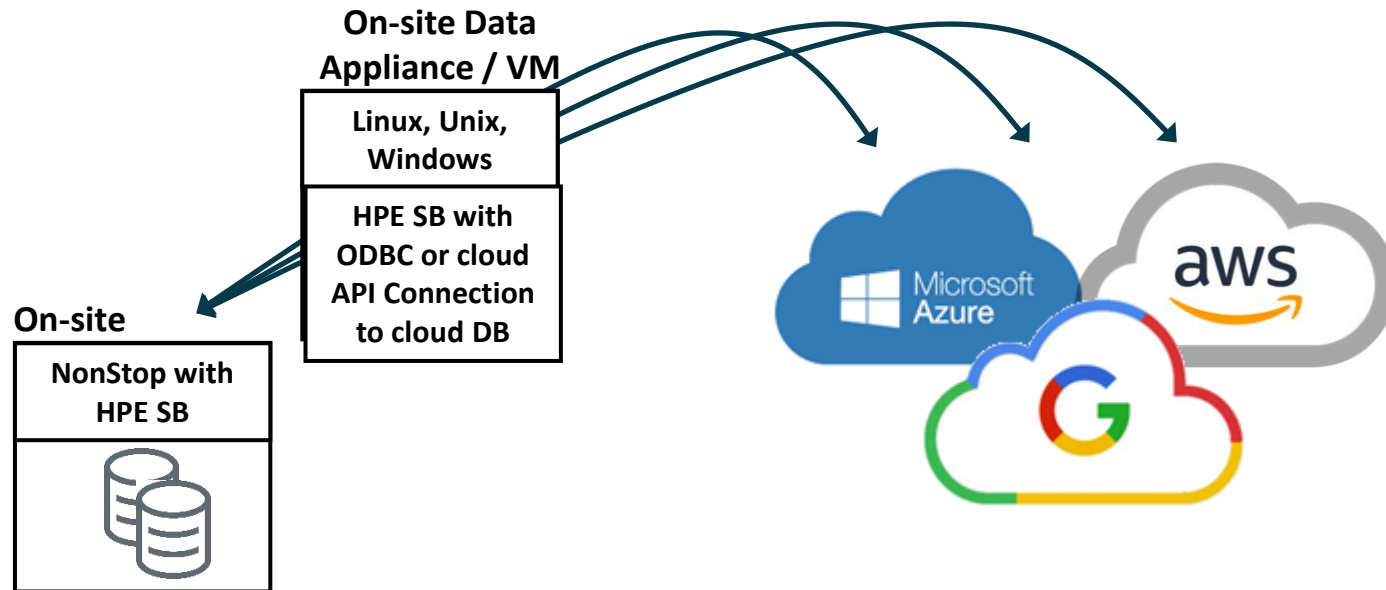
Extra Slides

HPE Shadowbase Data Integration

High-performance Public Cloud Integration – Option 1

- **HPE Shadowbase Data Integration with public cloud database environments**

1. NonStop to Cloud database via local on-site Data Appliance running HPE SB with high performance ODBC connection to the database
 - For example, Azure SQL, AWS Aurora (PostgreSQL), Google Cloud SQL, or any HPE SB target
 - Latency should not be an issue
2. NonStop to Cloud API via local on-site Data Appliance running HPE SB with API access to cloud environment
 - However, when using a Cloud API, latency may be an issue

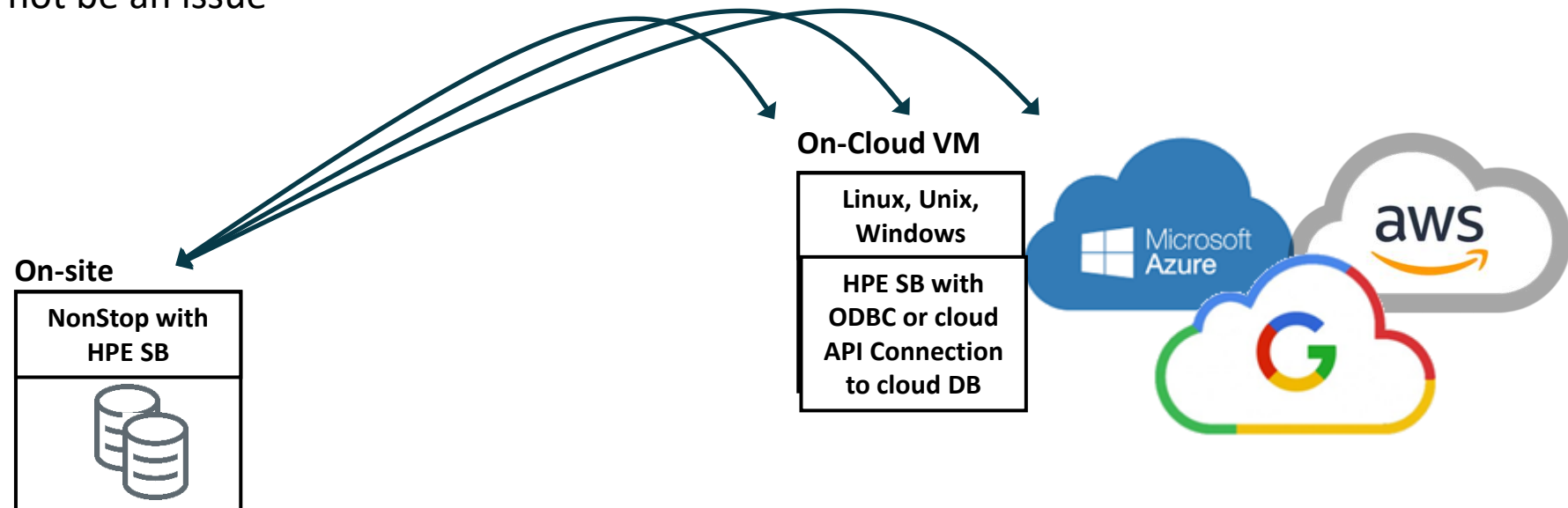


HPE Shadowbase Data Integration

High-performance Public Cloud Integration – Option 2

- **HPE Shadowbase Data Integration with public cloud database environments**

1. NonStop to Cloud database via on-cloud VM running HPE SB with high-performance ODBC connection to database
 - For example, Azure SQL, AWS Aurora (PostgreSQL), Google Cloud SQL, or any HPE SB target
 - Latency should not be an issue
2. NonStop to Cloud API via on-cloud VM running HPE SB with API access to cloud environment
 - Latency should not be an issue

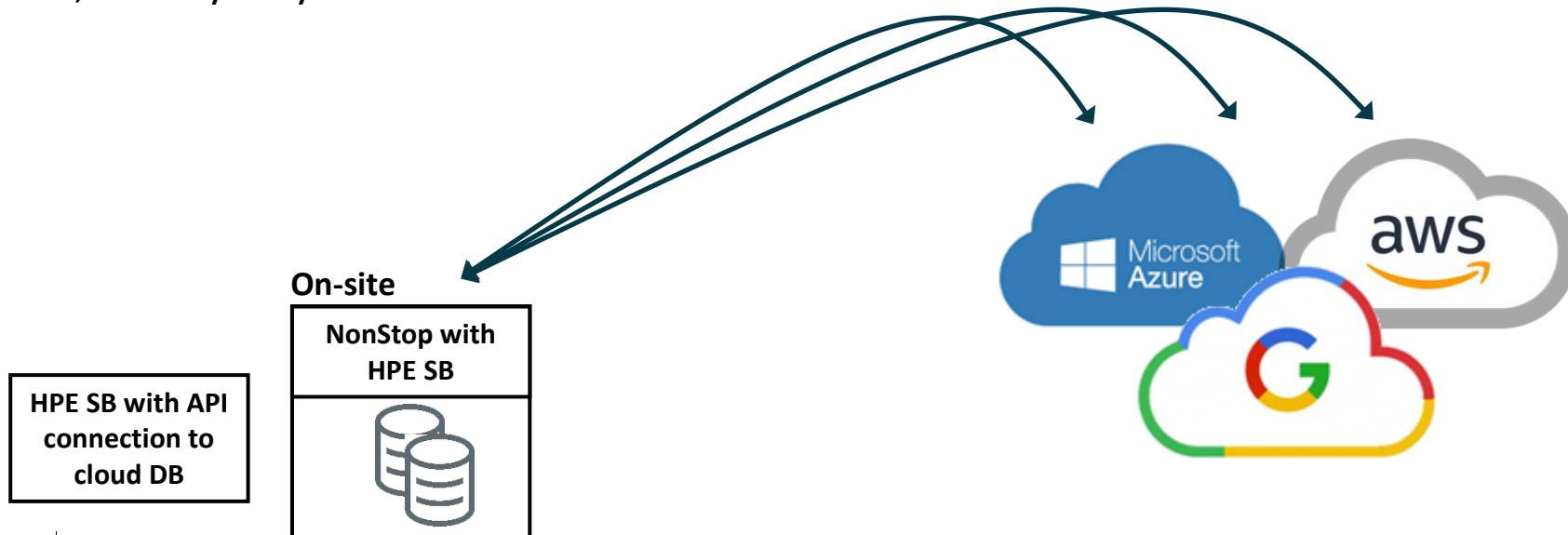


HPE Shadowbase Data Integration

High-performance Public Cloud Integration – Option 3

- **HPE Shadowbase Data Integration with public cloud database environments**

1. Can HPE SB running on the NonStop directly interface to a Cloud database or Cloud API?
 - Only if an ODBC connection or an API for that cloud database is available on the NonStop (in Guardian or OSS space)
 - Since no ODBC connection to the cloud (Azure, AWS, GCP) is available on the NonStop, the HPE SB API would currently be limited to use a TCP/IP connection (or possibly a new HPE SB ETL Toolkit Adapter – see later)
 - And, latency may be an issue



HPE Shadowbase

Key pillars

Replication

- **Eliminate downtime**
 - **Active / Passive** DR
 - **Active / Almost-active** “Sizzling-Hot-Takeover”
 - **Active / Active** continuous availability
 - **Zero Downtime Migration** for HW upgrades / refreshes and moving datacenters
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Use Case

AI BC DI

Real-Time Fraud Detection and Resolution for Financial Switch



Use Case

C ZDM

Massive Datacenter Migration for Money Transfer Firm



Large Australian Bank's Active / Active CONNEX Migration

ATM/POS services on 2 different NonStop pairs

Challenges

- Looming license expiration dates
- Zero service outage
- Unaudited files

Outcomes

- ACID transaction protection
- Met target deadline and avoided significant relicensing fees
- Sourced replication sales, support, and procurement through HPE

Post-project Customer Feedback

“Collaboration was brilliant”

— Business Analyst



HPE Shadowbase is architected for high performance

Customers use Shadowbase in high-volume, low latency environments



- **High performance**

- Scaling easily to handle **thousands** of TPS in banking and payment processing environments
- Experience handling **tens of thousands** of I/O's per second

- **Key architecture characteristics**

- Bulk reading from source audit trails
- Rapid filtering to eliminate extraneous data and accelerate replication
- Unlimited parallelism for massive scaling
- Latency metrics: SB environment metadata, SB process metrics, user-configurable latency thresholding and alarms
- Highly tunable



TMF auditing and HPE Shadowbase replication has many advantages

It changes everything: performance, data integrity, and resilience



- **Optimized file and table change data activity**
 - Record what was changed, where, and when
 - More resilient transactions
- **Better I/O performance**
 - Audit trail cached in memory and safe-stored on disk
 - DB operations can be cached
 - Less need for frequent disk flushing
- **Faster application, database, and file system response times**
 - Enables more efficient file system with improved I/O and capacity
 - Improved multi-record change data operations for increased scalability
- **Increased data integrity and resilience**
 - TMF has built in ACID transaction properties (Atomicity, Consistency, Isolation, and Durability)
 - Audited files have lower risk of data corruption



HPE Shadowbase is a great choice for new NonStop applications

Shadowbase is designed to work with any TMF audited application



- **Decouple replication from application processing**
 - No need to manually bind third-party replication intercept libraries into your application
 - Shadowbase replication can be updated without the need for an application outage (which is necessary with an intercept library-based replication)
- **Enhanced DB management capability**
 - Rollback to fix errors or partially applied (or failed) transactions
 - Roll-forward through sequence of change data to restore or recover DB
- **Non-audited applications can be TMF protected**
 - HPE NonStop AutoTMF automates TMF protection for non-audited applications (BASE24™ and CONNEX)
 - No application changes required



Digital Resilience for Ransomware data recovery

HPE Shadowbase innovations for Digital Resilience against cyber attacks



- **Supporting best practices for Data Protection and Recovery**
 - TMF auditing
 - 3-2-1-1 rule, including Immutable storage and Air-gapped systems
- **New architectures to meet recovery time requirements**
 - Local or remote data vaults
 - 3rd-site recovery separate from existing Disaster Recovery site
 - Supports Rapid Recovery and Bare Metal Recovery architectures
- **New HPE Shadowbase functionality for Data Recovery**
 - Capture and store queued DB change data in “Q Files”
 - Securely transfer Q Files to Data Vault, 3rd-site and / or Immutable Storage to isolate data
 - Validate Q Files to detect tampering (e.g., MitM attacks)
 - Hold Q Files in suspension until rolling threat window has passed
 - Apply (or roll-back) Q Files to a trusted point on a clean system

What about the performance?

HPE Shadowbase is architected for high performance

Customers use Shadowbase in high-volume, low latency environments



- **High performance**

- Scaling easily to handle **thousands** of TPS in banking and payment processing environments
- Experience handling **tens of thousands** of I/O's per second

- **Key architecture characteristics**

- Bulk reading from source audit trails
- Rapid filtering to eliminate extraneous data and accelerate replication
- Unlimited parallelism for massive scaling
- Latency metrics: SB environment metadata, SB process metrics, user-configurable latency thresholding and alarms
- Highly tunable

TMF auditing and HPE Shadowbase replication has many advantages

It changes everything: performance, data integrity, and resilience



- **Optimized file and table change data activity**
 - Record what was changed, where, and when
 - More resilient transactions
- **Better I/O performance**
 - Audit trail cached in memory and safe-stored on disk
 - DB operations can be cached
 - Less need for frequent disk flushing
- **Faster application, database, and file system response times**
 - Enables more efficient file system with improved I/O and capacity
 - Improved multi-record change data operations for increased scalability
- **Increased data integrity and resilience**
 - TMF has built in ACID transaction properties (Atomicity, Consistency, Isolation, and Durability)
 - Audited files have lower risk of data corruption

HPE Shadowbase is a great choice for new NonStop applications

Shadowbase is designed to work with any TMF audited application



- **Decouple replication from application processing**
 - No need to manually bind third-party replication intercept libraries into your application
 - Shadowbase replication can be updated without the need for an application outage (which is necessary with an intercept library-based replication)
- **Enhanced DB management capability**
 - Rollback to fix errors or partially applied (or failed) transactions
 - Roll-forward through sequence of change data to restore or recover DB
- **Non-audited applications can be TMF protected**
 - HPE NonStop AutoTMF automates TMF protection for non-audited applications (BASE24™ and CONNEX)
 - No application changes required

HPE Shadowbase Zero Data Loss (ZDL)

Groundbreaking, patented HPE NonStop replication technology



HPE Shadowbase Zero Data Loss (ZDL) solution

- **Controlled Availability Release December 2024**
- **Synchronous data replication**
 - Enables zero data loss (RPO = 0)
 - Enables zero downtime (RTO ~ 0) in A/A configuration with no data collisions
 - Minimizes application latency
- **Technical advantages**
 - No interconnect or distance limitations
 - Standard comms and storage technology
 - Leverages existing / proven HPE Shadowbase technology

New features

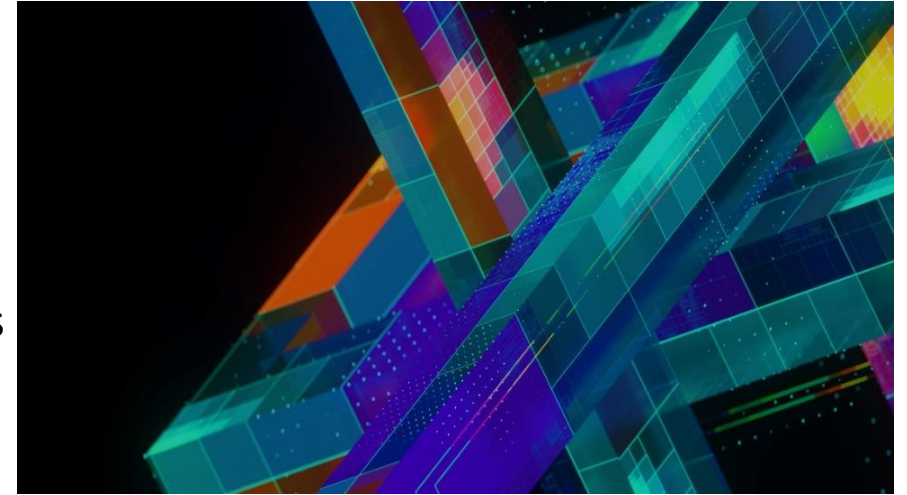
Available now on HPE NonStop

Business Continuity Replication

- Enhanced statistics
- HPE Shadowbase DoLockStep synchronization
- Empty transaction filtering
- Improved SOLV Loading ease-of-use
- Fanning out Enscribe files – e.g., normalizing files -> multiple table rows
- Entry-Sequenced files and tables using alternate key / index positioning
- SQL/MP & SQL/MX EXACT SYSKEY replication
- SQL/MX: Added SQL/MX DATE type2 columns and other fixes
- Queue Manager updates to more easily manage reading Q Files, output data to file, and filter results

Compare Data Validation

- Blistering Fast Compare
 - Support for Entry-sequenced (included partitioned) Enscribe
 - Wildcard support for Enscribe, SQL/MP, and SQL/MX
- COMPAREBATCHSIZE parameter for batch reads and comparisons
- Other enhancements



Plus others, review the SOFTDOCs
for the full details:



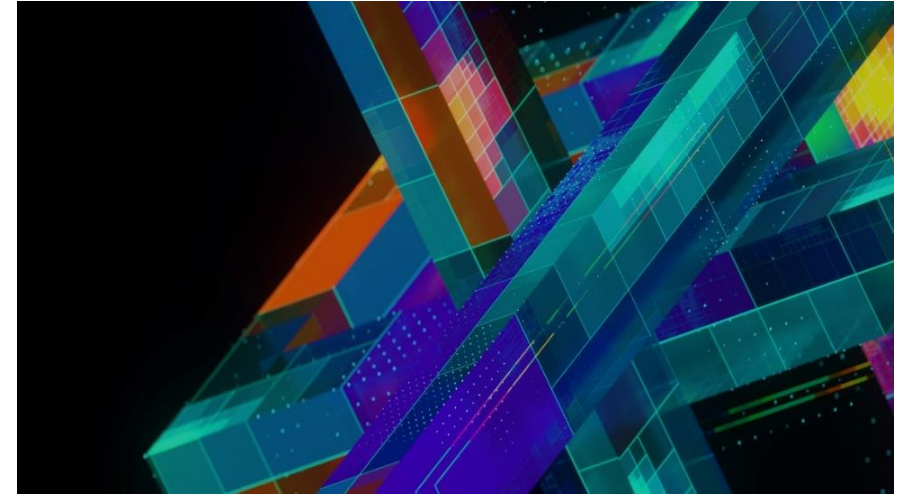
ShadowbaseSoftware.com/Releases/

New HPE Shadowbase for Other Servers features

Available now

Data Streaming and Application Integration

- Extract, Transform, and Load (ETL) Toolkit enhancements
 - Improved target flat-file performance (CSV, fixed position, etc.)
 - New target adapters: Kafka, IBM MQ, JSON output, flat-files
- Windows platforms – multiple SB installs allow easier upgrades and ZDMs
- Additional diagnostic and reporting features
- Latency thresholding
- Plus other enhancements and fixes



Plus others, review the SOFTDOCs
for the full details:

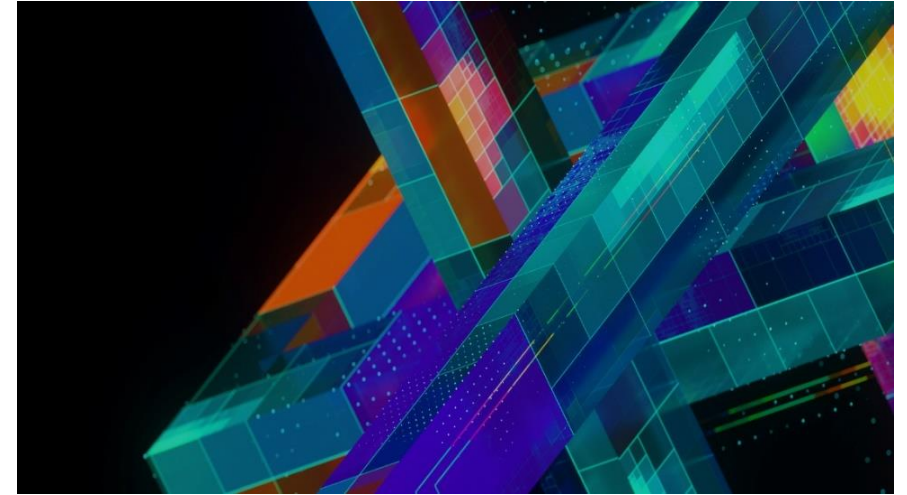


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Future HPE Shadowbase features

In-plan

- Additional Data Recovery architectures for Digital Resilience
- *Blistering Fast* Compare and Repair enhancements
- Heterogeneous Database Compare
 - e.g., NonStop vs Oracle, SQL Server, DB2, Sybase, MySQL, PostgreSQL, etc.
- Native Splunk API (under consideration)



Plus others, review the SOFTDOCs
for the full details:

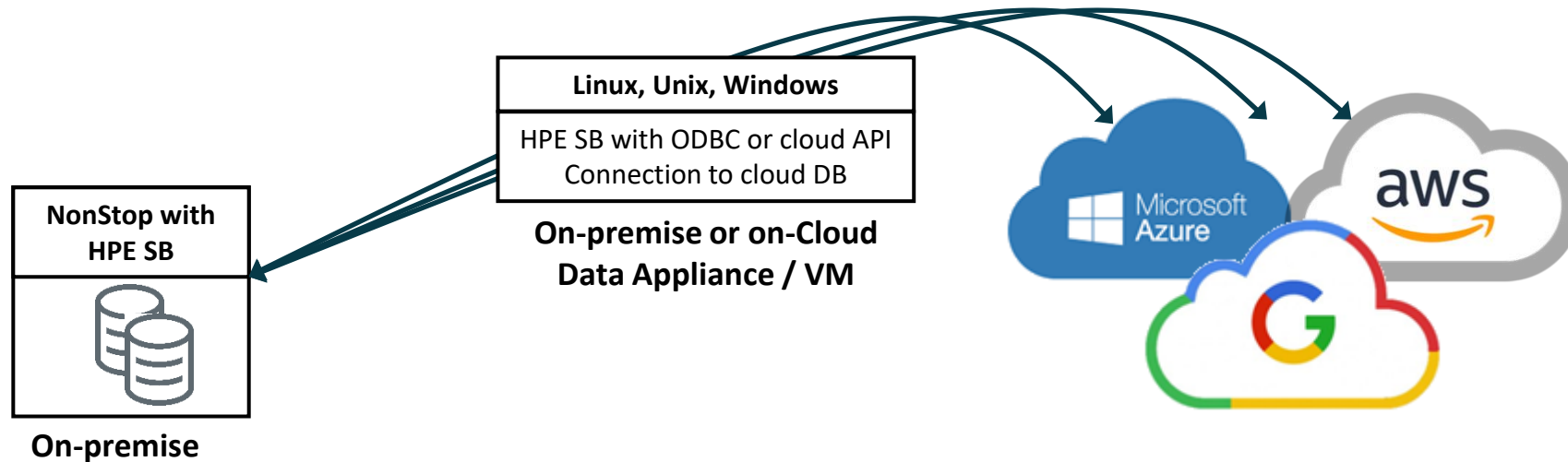


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HPE Shadowbase Data Integration

With high-performance public cloud database environments

1. NonStop to Cloud database integration via on-premise or on-cloud Data Appliance running HPE SB with high performance ODBC connection to the database
 - For example: Azure SQL, AWS Aurora (PostgreSQL), Google Cloud SQL, or any HPE SB target
2. NonStop to Cloud API via on-premise or on-cloud Data Appliance running HPE SB with API access to cloud environment



HPE Shadowbase: Robust architectures leveraging the best of HPE NonStop

- **Enhanced DB management capability**
 - Rollback to fix errors or partially applied (or failed) transactions
 - Roll-forward through sequence of change data to restore or recover DB
- **TMF auditing changes everything: performance, data integrity, and resilience**
 - Increased data integrity and resilience
 - TMF has built in ACID transaction properties (Atomicity, Consistency, Isolation, and Durability)
- **Protect non-audited applications using AutoTMF**
- **Better I/O performance**
 - Audit Trail cached in memory and safe-stored on disk
 - Cache Audit Trail DB operations can