Prescription Drug Fraud Prevention – An HPE Shadowbase Data Integration Case Study

William Holenstein
Sr. Manager, Product Delivery
Shadowbase Products Group
Gravic, Inc.

November, 2017

Introduction

William Holenstein
Sr. Mgr. of Product Delivery
Shadowbase Products Group
Gravic, Inc.

Corporate HQ
Malvern, PA USA

Disclaimer

This presentation contains forward-looking statements regarding future operations, product development, product capabilities and availability dates. This information is subject to substantial uncertainties and is subject to change at any time without prior notification. Statements contained in this presentation concerning these matters only reflect Gravic, Inc.'s predictions and/or expectations as of the date of this presentation and actual results and future plans of Gravic, Inc. may differ significantly as a result of, among other things, changes in product strategy resulting from technological, internal corporate, market and other changes. This is not a commitment to deliver any material, code or functionality and should not be relied upon in making purchasing decisions.

Specifications are subject to change without notice and delivery dates/timeframes are not guaranteed…purchasing decisions should not be made based on this material without verifying the desired features are available on the platforms and environments desired.

All trademarks mentioned in this presentation are the property of their respective owners.

Agenda

- **Prescription Drug Fraud**
  - **Introduction**
- **Prescription Drug Claims Adjudication System**
  - **Overview and Architecture**
- **Initial Database Load with No Application Outage**
  - **Shadowbase SOLV**
- **HPE Shadowbase for Data Integration**
- **HPE Shadowbase for Application Integration**
- **Summary**
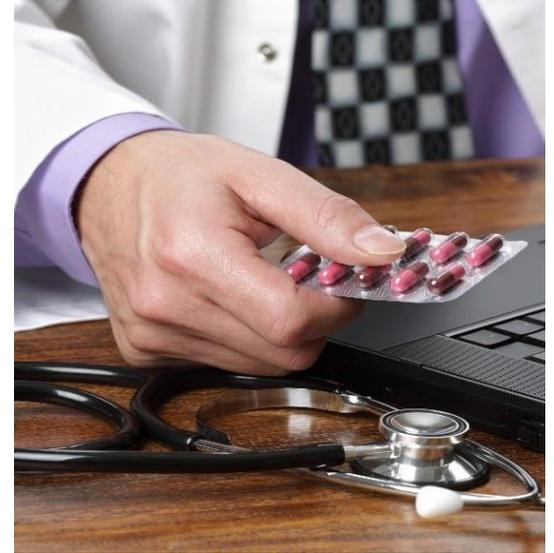
Questions? Please ask as we go along…

GRAVIC Shadowbase

Shadowbase®

Prescription Drug Claims Adjudication System:

Introduction

GRAVIC®
Shadowbase

"In Canada, one pharmacist cheated taxpayers $471,000 (USD) in an elaborate methadone-billing scheme[2]"

[2]Howlett, K. and Andreatta, D. (2013, December 23). Rampant Canadian Pharmacy Fraud Sign of a Broken System, theglobeandmail.com

"In the U.S., one fraudulent scheme involved 243 people and 46 health professionals and defrauded Medicare of $21.2 million (USD) [1]"

[1]Ornstein, C. (2015, June 23). Fraud Still Plagues Medicare's Prescription Drug Program, npr.org

"In England, patient prescription fraud costs the country about $6.7 billion (USD) per year[3]"

[3]Agency (2015, September 24). NHS Losing Billions to 'Fraud by Doctors and Dentists', telegraph.co.uk

According to the World Health Organization, $415 billion (USD) is lost to healthcare fraud worldwide every year[4]


[4]World Health Organization (December, 2011). Prevention Not Cure in Tackling Health-Care Fraud, http://www.who.int

Prescription Drug Fraud

Introduction

- For the largest agencies, billions of dollars (USD) change hands daily, so controlling these transactions is a complex task.
- The top two primary issues are:
  1. Identifying fraudulent prescription claims and reimbursements
  2. Preventing narcotic addiction and abuse
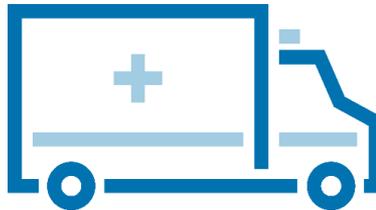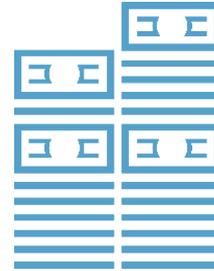
Shadowbase®

Prescription Drug Claims Adjudication System:

Overview and Architecture

GRAVIC®
Shadowbase

11

Prescription Claims Adjudication System

Overview

- A government healthcare agency is handling all medical insurance and prescription drug claims for the country

- An application running on a pair of HPE NonStop servers processes the prescription drug claims

- The pair of systems are located in geographically separated datacenters (DC1 and DC2)
  - These run in an active/passive disaster recovery configuration, using HPE RDF to keep both databases synchronized
  - If the active system fails, a failover is performed and online processing is switched to the backup system

DC1

Claims

\ACTIV
Prescription Drug
Claims Processing

SQL/
Enscribe

RDF Expand

DC2

SQL/
Enscribe

\BKUP
Prescription Drug
Claims Processing
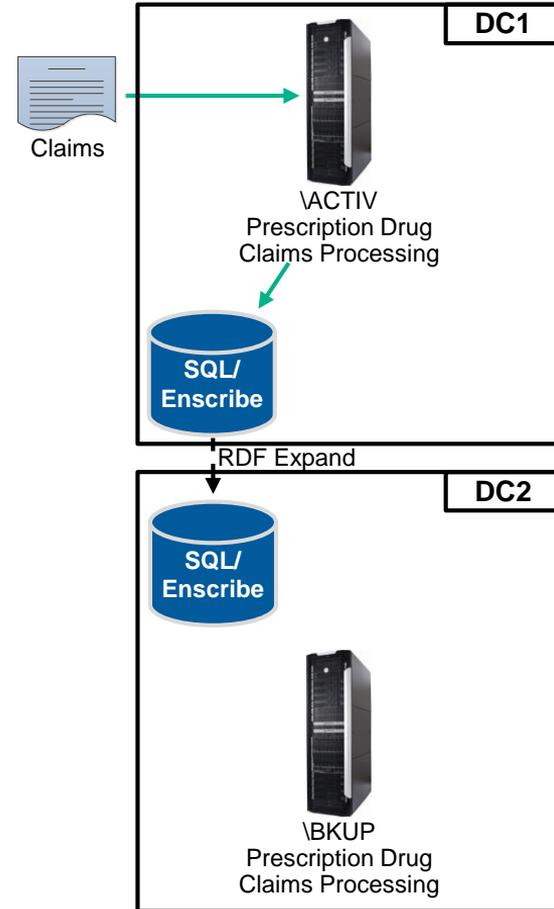
Prescription Drug Claims Adjudication System

Overview

- To address the prescription fraud problem, a centralized claims adjudication system was needed to consolidate and analyze all claims across the country's regional jurisdictions

  - Unfortunately, the RDF target database on the backup system could not be used for this new analytical application
    - The RDF target database does not maintain transactional (read) consistency while RDF replication is running
  - RDF also requires the target database to match the source database in format and structure
    - Additional query features such as new index paths and data structure formats can not be added to an RDF target database

Prescription Drug Claims Adjudication System

Overview

- Isolating the claims decision support system adjudication logic on a separate platform from the claims processing system was necessary
  - The NonStop pair is managed by a service provider, and the new claims adjudication application is managed by the government healthcare agency
  - Different parts of the system needed to be independent so one entity could not "peek" into the other parts of the system (isolation reduces potential "snooping")
- A new analytical database on a separate platform was designed
- **HPE Shadowbase Data Integration** software was selected to replicate the prescription drug claims information to it

GRAVIC®
Shadowbase

Prescription Claims Adjudication System

Overview

- Initial prescription reimbursement claims are processed by an active NonStop server (DC1 \ACTIV)

- RDF replicates database changes to a backup NonStop server (DC2 \BKUP)

- The government agency installed intermediate staging systems (Oracle Solaris with an Oracle RAC database) into a third datacenter to feed the new decision support system running the claims adjudication application

Prescription Claims Adjudication System
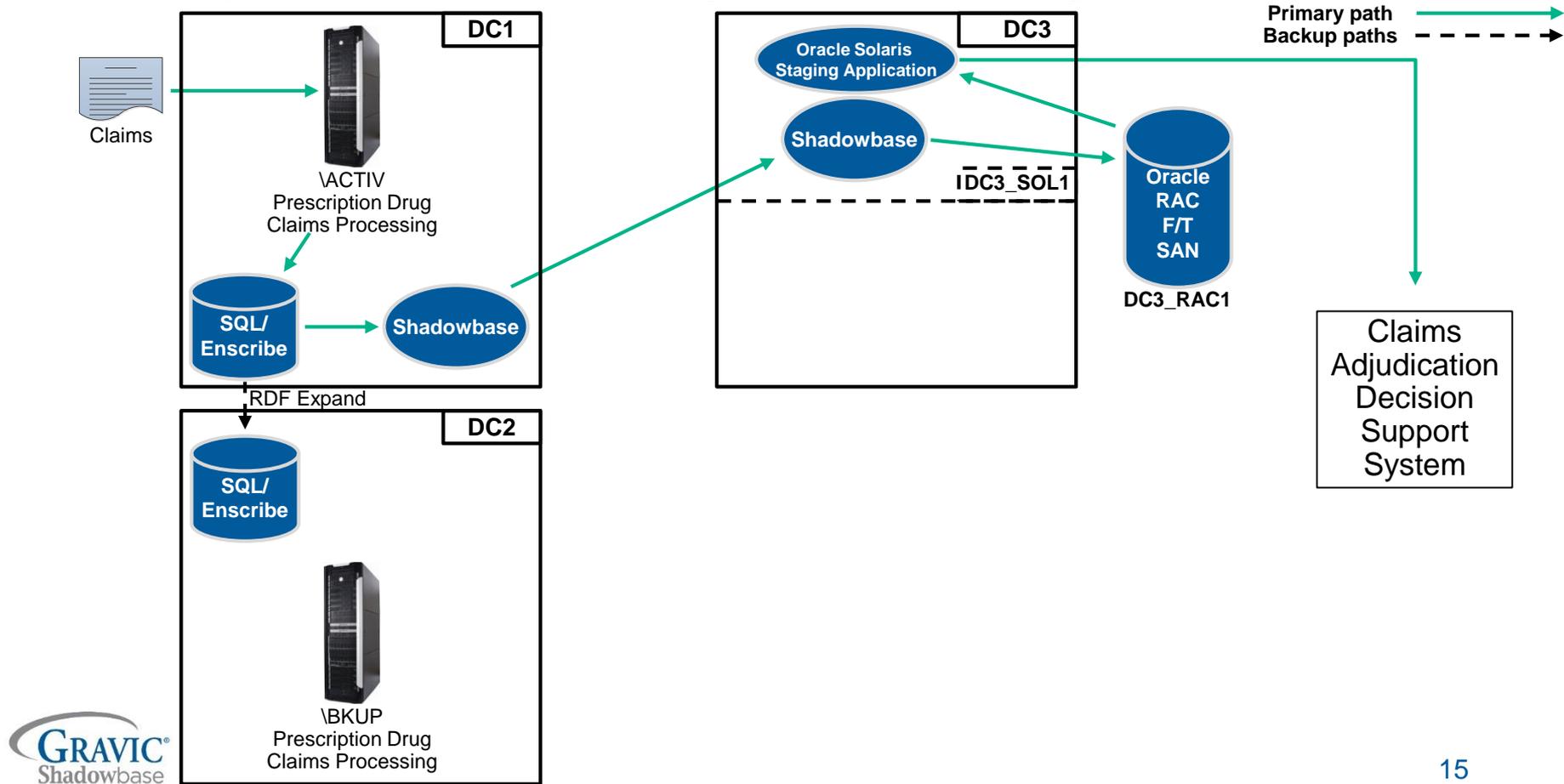
Prescription Claims Adjudication System

Architecture

- For local and geographic fault tolerance, two Solaris servers were installed in each target datacenter (DC_3_SOL1 / 2, DC4_SOL1 / 2), accessing an Oracle RAC database via a shared fault tolerant SAN

  - At any one time, only one of the Solaris servers is actively processing requests, with the other three acting in local and remote backup roles

- A *bespoke* application feeds data from the staging system into the claims adjudication decision support system

Prescription Claims Adjudication System

Architecture

− Prescription drug claim transactions are processed on the active NonStop server, writing the necessary claims information into TMF audited NonStop SQL and Enscribe databases

  − At any one time, only one Solaris server is actively processing requests, the other three act in local and remote backup roles

− **HPE Shadowbase** is installed on both NonStop servers and all four Solaris systems

Prescription Claims Adjudication System

Architecture

- Shadowbase is configured for uni-directional replication from each NonStop system to each Solaris system and its Oracle RAC database
  - Only one path is active at a time; the others are backup

- Shadowbase replicates change data as it is generated by the NonStop claims processing application to the primary active Solaris/Oracle RAC system
  - Keeps the database of record and the staging database synchronized

- Oracle Data Guard maintains synchronization between the two Oracle RAC databases running in DC3 and DC4

Prescription Claims Adjudication System

26
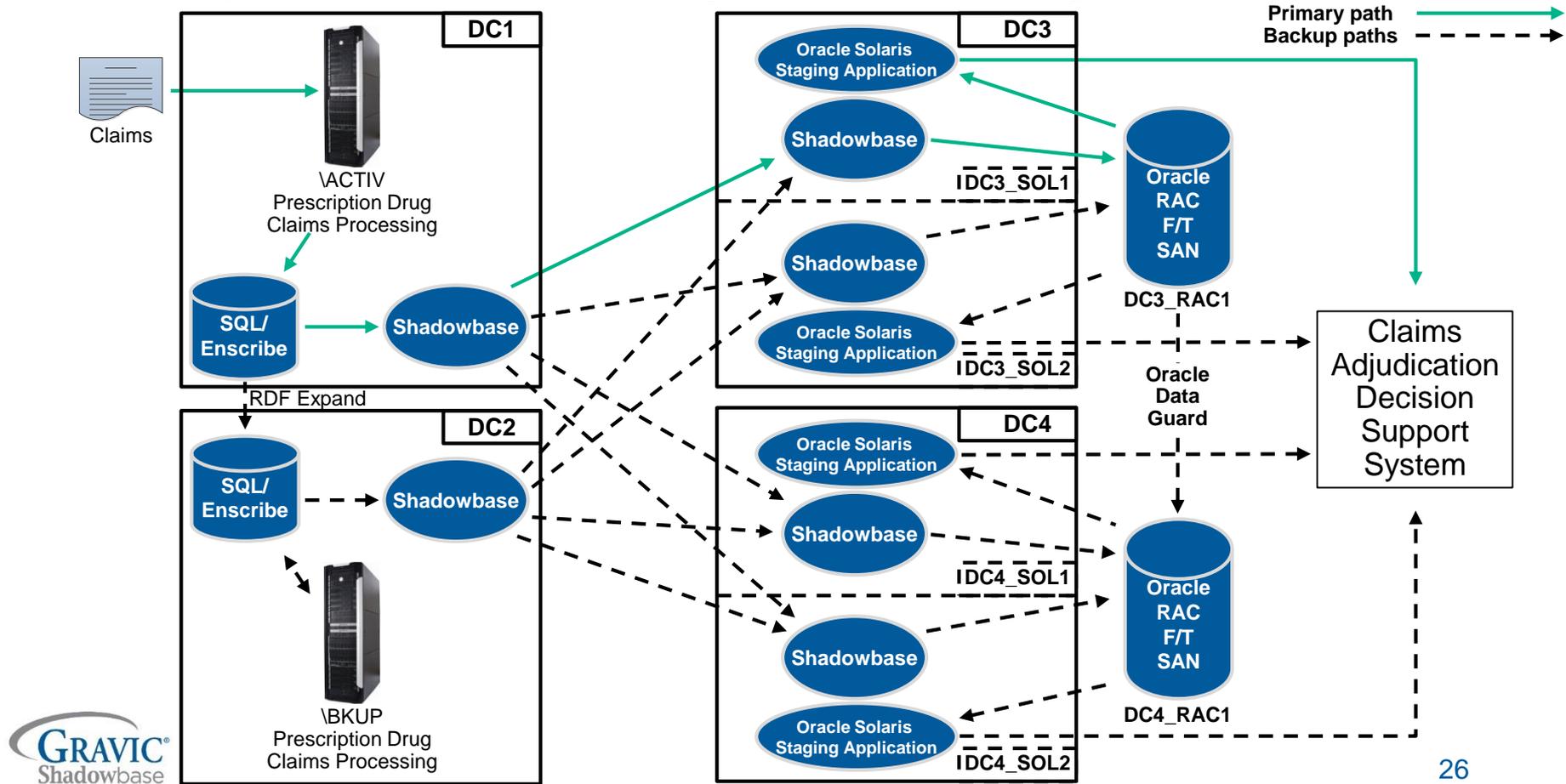
Highly Available, Secure System Architecture

Failure Scenarios

- Because of the redundancy of systems and Shadowbase replication paths, the staging database is kept synchronized with the database of record for the following failures
  - All were rigorously tested and passed the agency's acceptance criteria
  1. ***Failure of the active NonStop system*** – Shadowbase on the backup NonStop system detects this condition and automatically takes over, continuing replication to the primary Solaris system (DC3_SOL1)
     - Shadowbase on the backup NonStop system recognizes that RDF is replicating to the configured files and tables, and does not replicate these changes to the Solaris staging database until it detects an RDF takeover
     - Possible to have Shadowbase software up and running on both NonStop systems simultaneously, ready for a fast and reliable failover

Highly Available, Secure System Architecture

Failure Scenarios

2. ***Failure of active Solaris system (local)*** – Shadowbase is automatically switched to the backup local Solaris system (DC3_SOL2 or DC4_SOL2, as appropriate)

   – Shadowbase software is running in standby mode on the alternate Solaris systems

   – When the primary Solaris system fails, an automatic switchover activates via the use of an intelligent network aliasing method, and the IP address of the target system switches to the alternate Solaris system

   – Whenever replicated data appears on the backup Solaris system, Shadowbase software will automatically begin applying it to the Oracle RAC database

3. ***Failure of Solaris staging system pair*** *(e.g. whole target datacenter outage)* – Shadowbase replication switches to the remote staging system (DC4_SOL1)

   – Achieved the same way as a local system failover – leveraging an intelligent network router

GRAVIC®
Shadowbase

Highly Available, Secure System Architecture

Encryption & Security

− The claims data being processed contains sensitive information (patient names, addresses, medical history, etc.), and must be protected against unauthorized disclosure

− All of the data at rest and in motion is encrypted as it moves across this entire application chain

− The project's complexity is increased as multiple layers of encryption and key management are in effect

Highly Available, Secure System Architecture

Encryption & Security

- The encryption process includes the data:
  - Entered into the active NonStop system
  - Replicated by RDF to the backup NonStop system
  - Replicated by Shadowbase to the staging systems
  - Forwarding of the data to the decision support system
- For additional protection, once the data is replicated to the decision support system, it is deleted from the staging database and the disks are scrubbed with binary zeros

Shadowbase®

Initial Database Load with No Application Outage:

Shadowbase SOLV

GRAVIC®
Shadowbase

Initial Database Load with No Application Outage

Shadowbase SOLV

- Before the new claims *adjudication* application is deployed, all data residing in the NonStop database of record is made available on the staging system (Oracle RAC database)
- Since the claims *processing* application is in production and cannot be taken offline, the initial load is done while the application is active
  - The initial load and online replication have to be performed in parallel
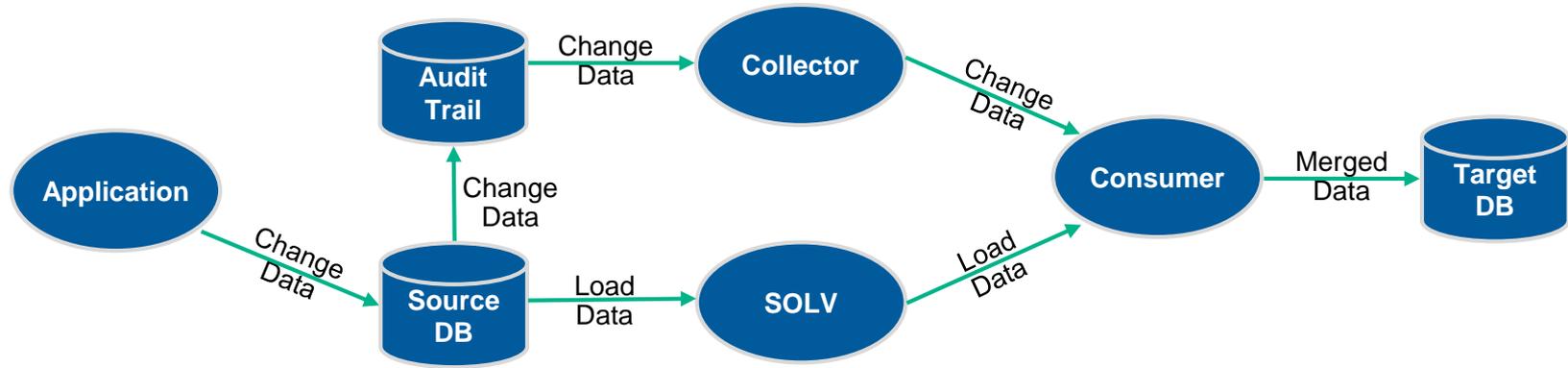
Initial Database Load with No Application Outage

Shadowbase SOLV

HPE Shadowbase Online Loading (SOLV) is designed for this very task

- SOLV supports online loading of a source database into a target database
    - The source and/or target databases can be open for reading and updating while the load occurs
- No need to take either the source or target databases offline and make them inaccessible to applications while load occurs
- SOLV automatically handles the merging of the data being loaded with the data being replicated
- The staging database is fully loaded while the claims processing application on the active NonStop system remains available and processing transactions

Initial Database Load with No Application Outage – Shadowbase SOLV Architecture

Initial Database Load with No Application Outage

Shadowbase SOLV

- SOLV achieves zero application outage while the load synchronizes by tight integration with the Shadowbase data replication engine

- SOLV is reading and replicating load data from the source application database while the Shadowbase data replication engine is replicating change data from the audit trail

- The magic happens when the SOLV data and the change data are merged together and applied to the target database (in this case, the Oracle RAC staging database)

  - Any changes made by the claims processing application to the SOLV load data while it is in transit are identified and applied properly into the target database

Initial Database Load with No Application Outage

Shadowbase SOLV

- Data in the target database is a current and consistent copy of the source database, as it is being loaded (by SOLV) and updated (by the online claims processing application)

- Powerful approach since there is no 'outage' of the target environment required, and the target data is fully consistent with the source data as it loads

Initial Database Load with No Application Outage

Shadowbase SOLV

− Desirable since there is no large queue of change data that builds up while the load takes place (that must later be replayed) to bring the target consistent

  − The queue of change data is actually consumed while the load occurs

− The SOLV load can run in parallel with full source (and target) application processing for a continuous (and extended) timeframe

  − The load/merge operation can be set up and run in parallel until the load completes

− Massive quantities of data can be loaded, with no outage required of the application environment

HPE Shadowbase for Data Integration

32

HPE Shadowbase for Data Integration

Shadowbase Data Integration Capabilities

Shadowbase Streams

- Change Data Capture (CDC) technology
- Reformat and transfer large amounts of data between heterogeneous databases and applications in real-time
- Build real-time, event-driven data-distribution feeds

Master Data Management (MDM)

- Transform, filter, cleanse, and consolidate data between heterogeneous environments
- Uni- and bi-directional support

Eliminate Data Silos by Sharing Data Between Applications

- See HPE LIVE DEMO for an example

Shadowbase®

HPE Shadowbase for Application Integration

GRAVIC®
Shadowbase

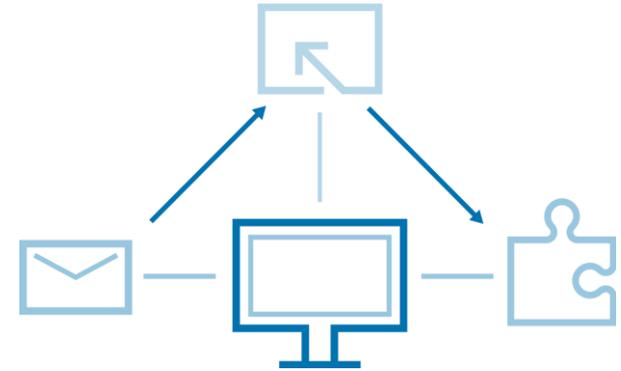# HPE Shadowbase for Application Integration

Integrate Applications to Create Powerful Systems

Shadowbase Enables Event-driven Architectures

- Shadowbase monitors the transaction log and can "trigger" on all DML or DDL database activity (e.g., inserts, updates, or deletes)
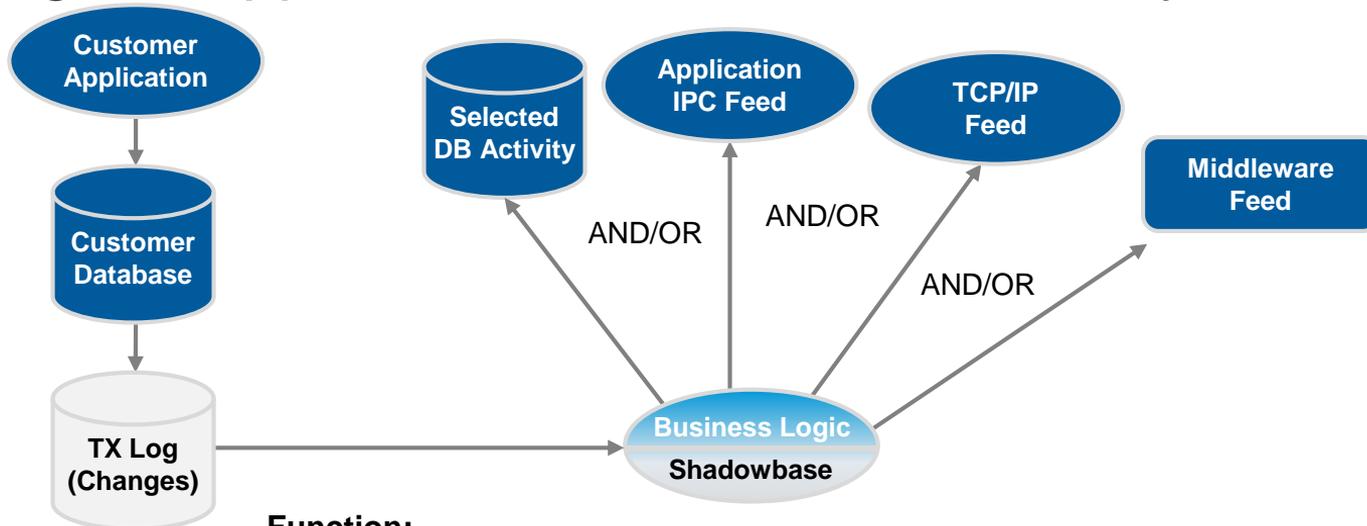 - Avoid inefficient polling for changes

Shadowbase Provides Real-time Event Delivery

- As soon as the event occurs in the database, Shadowbase sees it and can processes it
  - Avoid processing "stale" data

GRAVIC®
Shadowbase

HPE Shadowbase for Application Integration

Integrate Applications to Create Powerful Systems

Function:

Shadowbase "sees" all changes to the customer's database…and can act on them in real-time.

Uses:

Shadowbase acts as a *capture process* for change events from the database/audit trail and notifies or delivers them to downstream files, applications, or middleware.

Shadowbase®

Summary

GRAVIC®
Shadowbase

Summary

- Prescription drug claims fraud is big business, costing the country billions of dollars

- To help stem the losses, a claims adjudication decision support system is implemented

- The decision support system relies upon data gathered from a primary claims processing application running on an HPE NonStop system

- **HPE Shadowbase** was chosen to integrate the NonStop-based claims processing database with the new claims adjudication decision support system, providing a new and rapidly implemented service to thwart prescription drug fraud

GRAVIC®
Shadowbase

For More Information – White Papers (1)

Preparing for Your HPE Shadowbase Experience

If you are interested in:	Please read these White Papers:
A General Overview About HPE Shadowbase	• HPE Shadowbase Total Replication Solutions for NonStop • HPE Shadowbase Total Replication Solutions for Other Servers • HPE Shadowbase Total Replication Solutions Product Datasheet
Building a Business Continuity Environment	• Choosing a Business Continuity Solution to Match Your Business Availability Requirements • Achieving Century Uptimes with HPE Shadowbase Active/Active Technology • Fingers Crossed? Or What is Your Business Continuity Plan for the Inevitable?
Performing a Zero Downtime Migration	• Using HPE Shadowbase Software to Eliminate Planned Downtime via Zero Downtime Migration
Implementing a Data Warehouse Feed	• HPE Shadowbase Streams for Data Integration
Building a Real-Time Business Intelligence System	• The Evolution of Real-Time Business Intelligence and How to Achieve It Using HPE Shadowbase Software • HPE Shadowbase Streams for Application Integration

For More Information – White Papers (2)

Preparing for Your HPE Shadowbase Experience

If you are interested in:	Please read these White Papers:
Building a Converged Infrastructure	• HPE Shadowbase Solutions for the Converged Infrastructure • HPE Shadowbase Solutions and Pathway Domains—Perfect Together!
Shadowbase in a Big Data Environment	• HPE Shadowbase Solutions in a Big Data World
Shadowbase in the Cloud	• HPE Shadowbase Solutions for the Cloud
Recovering/Restoring Corrupted Data	• HPE Shadowbase Data Recovery Software
Shadowbase Articles, Case Studies, Data Sheets, News, Upcoming Tradeshows, and White Papers	• Shadowbase Articles • Shadowbase Case Studies • Shadowbase Datasheets • Shadowbase News • Shadowbase Tradeshows • Shadowbase White Papers

GRAVIC
Shadowbase®

Shadowbase®

Thank you

Gravic, Inc.

17 General Warren Blvd.
Malvern, PA 19355 USA

SBProductManagement@gravic.com
www.ShadowbaseSoftware.com

Or contact your local HPE account team

Phone: +1.610.647.6250
Fax: +1.610.647.7958

Find us on…

GRAVIC®
Shadowbase

Hewlett Packard
Enterprise

Silver
Partner