Real World Transformation with Z Digital Integration Hub

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Digital shift in financial services underway

Integration and Interaction with Core Systems of Record is key to Successful Transformation

**Pre-Digital Transformation vs. Post**

- **AVERAGE COST TO ACQUIRE NEW CURRENT ACCOUNT CUSTOMERS**
- **DAYS FROM APPLICATION TO CURRENT ACCOUNT FUNCTIONALITY BEING ACCESSIBLE**
- **TIME TO LAUNCH A NEW FEATURE**
- **RETAIL BANKING CUSTOMERS PER FTE**
- **EMPLOYEES RATING THEIR COMPANY AS A 5-STAR EMPLOYER**

**Competitive Pressures**
- Non-traditional FIs
- Customer experience expectations
- Digital interaction & social media driven complaints

**Regulatory Pressures**
- Increasing regulations
- Changes in regulations
- Personnel shortages
- Non-common data standards

**Profitability Pressures**
- More inspection of marketing budgets
- Limited insights across entire organization (cross product, cross region, …)

**Business Operations Risk**
- Transformation disruption
- New business model agility
- Flexibility to leverage new technologies
- Skills

**Source:** Oliver Wyman Analysis: Press Releases
## The Challenge

<table>
<thead>
<tr>
<th><strong>Limited cloud integration</strong></th>
<th><strong>Information Delays</strong></th>
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<tbody>
<tr>
<td>Core systems which run the business today are the source of highly valuable information — yet there is limited integration between new cloud applications and existing core transactional and batch systems.</td>
<td>Existing data access methods, such as ETLs to a data lake for off-platform consumption, delay information flow to cloud applications which often require more up to date, accurate information.</td>
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<tr>
<th><strong>Complex information needs</strong></th>
<th><strong>Tightly coupled applications</strong></th>
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<td>To meet business requirements and client expectations, consuming applications require information which is composed and aggregated across data from multiple systems of records.</td>
<td>New cloud applications consuming information from core systems are required to know the underlying data format and contexts from systems of record -- resulting in elongated cloud development cycles and barriers to application changes.</td>
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Raw Data vs. Information Flow

Needs:
- faster cloud application development
- agility to leverage event driven approach
- decouple from core data contexts
- blend information from multiple systems

Provides:
- Compute engine & efficient memory store
- Data abstraction
- Current and real-time data
- Separately auditable and governed instances

Components in Hybrid Clouds of Choice

- Computed Information
- Decoupled from data context

Digital Integration Hub

Information: computed / derived from data

- Subset of raw data & events
- Multiple data sources

Core Transactional & Batch Applications

Raw Transaction / core systems data

TXNS  ACH  Member  Card

Applications that require access to full scope of raw data, e.g.
- Existing Reporting Applications
- Model Training processes
- Archiving

Access or move raw data

APIs for transactional interaction

Data Access, e.g. via Data Virtualization

Existing ETL / ELT processes & tools

Warehouses, Data Lakes, Other Full Copies of Raw Data
Z Digital Integration Hub technical details

- **OMNI-CHANNEL OPERATIONS**
  - Internet
  - Mobile
  - IoT
  - ATM
  - Branch

- **DISTRIBUTION & PRODUCT SERVICE**
  - Marketing
  - Sales
  - Servicing
  - Product Mgmt
  - Customer Mgmt

- **SYSTEMS OF RECORD**
  - Transactions
  - Products
  - Customer
  - General Ledger

- **Z DIGITAL INTEGRATION HUB**
  - Interface Options: REST, JDBC, EVENT

- **Hybrid Clouds of Choice**

- **Internal Integration**
  - Enterprise Service Bus + Microservices based API Management leveraging API Connect, MuleSoft, Apigee

- **Insights: Real-Time & Pervasive**

- **Hybrid Clouds of Choice**
  - Multiple Context specific in-memory information instances, not raw data
  - Integrate across the enterprise
  - Performant & Efficient
  - Prevalent interfaces for cloud
  - Technology: rich in-memory compute & SQL engine (GridGain for z/OS) plus z/OS data virtualization,
  - Methods to keep information current:
    1. Recurring pulls at small time intervals
    2. Custom application exits to write to Z Logstream
    3. Change capture of raw data to drive recompute of business logic

- **Ecosystem Partners**
  - IBM Data Virtualization Manager + optional: Rocket Industry Templates
Today’s Landscape
• Many enterprise clients are modernizing core, but doing so progressively to mitigate risks
• A number of core applications have not been modified in 20 years or more, leading to complex and long modernization journeys

Parallel Paths to Modernization
• Modularize core applications, introduce APIs for interaction and re-write as possible
• Modernize DevOps processes and tool chains
• Introduce Z DIH for agile & simplified information flow between core systems & hybrid cloud

Benefits
• Facilitates the co-existence & interchange between components deployed in hybrid cloud and existing applications
• Does not first require application or data restructure, leading to faster ROI
Z Digital Integration Hub With Multi-Cloud Cache

Systems of Record:
- Db2 z/OS
- VSAM
- IMS
- ... PS
- Warehouses / Lakes

Non-Z Systems to Integrate

Z Digital Integration Hub With Multi-Cloud Cache

Data Virtualization & Financial Data Templates

Info Variant 1:
Transaction Activity
By Client Category

Info Variant 2:
Loans by Product,
by Client

Info Variant 3:
High Value Transactions
per Day

Ignite In-Memory Compute Engine

Interface Choices: REST APIs, Kafka Events

In-memory Cloud Caches
- Information from multiple Systems
- Current information based on use cases

Digital, Cloud Native Apps & Fin-techs

Call Center, Loyalty, Etc.

Multi-Cloud Environment

Deposits
Loans
Cards
Transactions
Ledger

Call Center, Loyalty, Etc.
Z Digital Integration Hub Example: Accelerate Ecosystem

**Today's Landscape**
- Zafin is a financial product and pricing SaaS application for fees, rates, rewards, etc.
- Zafin services typically consume raw data originating from z/OS & stored off-platform = Data as of yesterday.
- Integration with core is custom and tied to specific data formats.

**Zafin + Z Digital Integration Hub**
- Pre-built APIs returning real-time computed information from core systems for Zafin services.
- Zafin services are decoupled from core data context, increasing flexibility.

**Benefits**
- Transform core incrementally by adopting industry best practices & ecosystem.
- Real time information for rates and pricing: Data as of yesterday vs Data as of now.
- Reduce risk by limiting raw data exposure.
- Ease of integration and maintenance through standard interfaces & data decoupling.
Many use cases benefit from continual refresh of information.
Change capture of all raw data to send off platform creates performance issues for many large clients.
Most clients want the captured change to re-drive business logic and update results to in-mem cache.
Z Digital Integration Hub: Key Value Propositions

- Faster ROI for Cloud Transformation Initiatives without impacting Core Processing
- Better agility to expand ecosystems & create new channels delivering faster time to value
- Leverage significant high-value investments in HW, SW, applications while modernizing and transforming incrementally
M&T Bank – Who we are

- Headquarters in Buffalo NY
- One of the 20 largest independent commercial bank holding companies in the U.S.
- $140 billion in assets
- $114 billion in assets under management
- $98 billion in loans and leases
- $115 billion in deposits
- Consistent profitability for the past 176 consecutive quarters
M&T Bank: Current Architecture/Challenges with integrating systems of record & hybrid environments

High-level Architecture
- Data - Majority applications use VSAM, think basic Key Value Data Store, no metadata
- Core Banking – CICS Transaction Processor, think Application/Web Server

Accessing Data
- ReST and MQ for Real Time
- FTP for non-Real Time

Challenges
- No streaming/event processing capabilities
- FTP is the only method to pull large amounts of data
- Raw Data is not intelligible – in application specific contexts
- Limited access methods
- Moving all raw data not viable based on transaction volumes
M&T Bank – Solution Objectives

**Event Centric**
Key objective is enabling z/OS applications to become more event driven, using modern familiar technologies and without disrupting our current Core Banking Transaction Processing environments.

**Data Delivery & Presentation**
M&T has a vast IT ecosystem made up of many different technologies. It is critical to be able to meet the needs of all, whether you are a Linux/.NET application, Data Scientist, Tester/Business Analyst.

**Performant and Cost Effective**
A solution that runs completely on z/OS, so data and compute can be co-located, ensuring lowest latency.

Workloads that are zIIP eligible (specialty Z processors) for greater cost efficiency and performance.
Z Digital Integration Hub runs 100% on z/OS and is 99+% eligible to run on specialty CPUs (zIIP), allowing for greater cost efficiency & performance.

Comprised of two components that allow for flexible design/architecture

IBM Data Virtualization Manager

- Virtualize any data asset on z/OS (VSAM, DB2, Sequential(GDG), logger) allows for highly parallelized access
- JDBC/ODBC
- ANSI SQL Compliant

GridGain for z/OS based on Apache Ignite

- In-memory Key-value/Relational DMBS with persistence option
- Feature rich runtime, which supports many different languages, API’s and access methods.
- ANSI SQL Compliant with secondary index support
• The payment decisioning application leverages various data for decisioning, including data from multiple core systems of record (SoR)
• Data transferred periodically and in formats specific to SoR applications
• As a result, payment decisioning application may not have current information (e.g. on account balances) and requires application dependencies on data formats
• This leads to tightly coupled applications that need to have awareness of application specific data formats.

• The Z Digital Integration Hub continually consumes transactions from core & blends overnight batch
• Only selected, relevant information is computed, results streamed via Kafka
• Payment decisioning application has continual, current account balances and other relevant account information to use during decisioning
• Results: Most current information to payments decisioning app & decoupled application dependency leading to faster new function development
# Key Advantages Leveraging Z DIH

<table>
<thead>
<tr>
<th>Results with Current Approach</th>
<th>Results with Z DIH</th>
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<tbody>
<tr>
<td>Payments Decisioning Application</td>
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</tr>
<tr>
<td>– Daily batch CDC 3hr increments</td>
<td>+ Continual CDC for real-time cache</td>
</tr>
<tr>
<td>Query via ReST API to source data</td>
<td>Query via SQL to Ignite Cache</td>
</tr>
<tr>
<td>– Avg elapsed time: 94ms</td>
<td>+ Avg elapsed time: 31ms</td>
</tr>
<tr>
<td>Data access via Batch Reporting Tools</td>
<td>Data access via IBM Data Virt Manager</td>
</tr>
<tr>
<td>– Accessing 4.3 Million records, average elapsed time: 3 min 54 secs</td>
<td>+ Accessing 4.3 Million records, average elapsed time: 41 secs</td>
</tr>
<tr>
<td>Price performance</td>
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</tr>
<tr>
<td>– Minimal use of specialty cores (cost disadvantage)</td>
<td>+ 99+% use of specialty cores (cost advantage)</td>
</tr>
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Performance measures derived from combination of M&T environment & IBM Lab Z DIH pilot for M&T.
M&T Bank – Architecture based on Z Digital Integration Hub

- Event streaming
- Real-time & current Information flow
- Limited data movement
- Consuming applications decoupled from underlying data contexts
Comments & Questions

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