Digital Experiences and Architectures in Financial Services

Nadeem Asghar
Field CTO Financial Services - Hortonworks
Arindam Choudhury
Vice President - Global Big Data Practice Leader – Capgemini

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Financial Services and Big Data

Focused around business and technology vectors:

**Technology vectors**
- Cloud computing (OpenStack)
- DevOps and PaaS
- Mobility
- Big Data and analytics
- BPM and Microservices
- Software-defined datacenters

**Business vectors**
- Regulation and risk management
- Compliance and regulation
- Trading systems
- Omni-channel wealth management
- Payments systems
- Bank 3.0
- Cyber Security

Digital Bank
Bank 3.0s
Key focus areas within the financial services industry

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<th>Segments of Banking</th>
<th>Common Focus Areas</th>
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<td>Cyber Security</td>
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<td>Securities Processing</td>
<td>AML Compliance</td>
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<td>360 degree view</td>
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<td>Corporate Banking and Lending</td>
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<td>Wealth &amp; Asset Management</td>
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<td>360 degree view</td>
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Data Inhibitors for Digital in Banking

- Fragmented Book of Record Transaction systems
  - Lending systems along geographic and business lines
  - Trading systems along desk and geographic lines

- Fragmented enterprise systems
  - Multiple general ledgers
  - Multiple Enterprise Risk Systems
  - Multiple compliance systems by business line
    - AML for Retail, AML for Commercial Lending, AML for Capital Markets...

- Lack of real time data processing, transaction monitoring and historical analytics

- Typically proprietary vendor and in-house built solutions that have been acquired over the years building up a significant technological debt.

- Unable to keep pace with the progress of technology

- Data Silos - Move to combine Fraud (AML, Credit Card Fraud & InfoSec) into one platform

- Issues with flexibility, cost and scalability
Customers using Hortonworks to Meet FSI Priorities

### Top Priorities

- **Agile, Low Cost, Regulatory Compliance**
- **360 View of Entities**
- **Infrastructure Cost Reduction**
- **Cyber Security**

### Key Business Requirements

- Single source of transaction data that drives Finance and Risk
- Provide a complete audit trail from Board and Regulatory reports back to the book of record lending, trading, collateral management and collections systems
- Ability to reproduce results for any point in time
- Ability to react quickly to new regulations.
- Understand what entities buy what products
- Provide profitability reporting by entity by product
- Product Recommendation Engine (Consumer and Advisor)
- Advisor/Sales productivity reporting.
- Operations error and productivity reporting.
- Reduce hardware and software costs
- Streamline reconciliation processes to reduce operational costs
- Reduce IT data loading costs
- Reduce audit costs
- Reduce analytic development costs
- Reduce analytic vetting costs
- Reduce market data and credit bureau costs

### Relevant Banking Use Cases

- **Transaction Data Lake**
- **360º Degree Customer Profitability**
- **Market, Securities and Risk Rating Data Lake**
- **Analytic Development Framework**
- **Risk Reconciliation and Reporting Framework**
- **Displace expensive relational systems, Cyber security systems and BMA\'s**
Digital Banking Use Cases are available at different levels of maturity

<table>
<thead>
<tr>
<th>No</th>
<th>Use Case Name</th>
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<tbody>
<tr>
<td>1a</td>
<td>Increase Customer Penetration (Cross-Sell/Upsell)</td>
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<tr>
<td>1b</td>
<td>Increase Customer Penetration (Cross-Sell/Upsell)</td>
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<td>2a</td>
<td>Improvement in loyalty and customer advocacy</td>
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<tr>
<td>2b</td>
<td>Improvement in loyalty and customer advocacy</td>
</tr>
<tr>
<td>3</td>
<td>Enhanced collections and recovery</td>
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<tr>
<td>4</td>
<td>Automation of Client Due Diligence for consumer onboarding</td>
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<td>5</td>
<td>Enhanced Transaction Monitoring</td>
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<td>6</td>
<td>Enhance SAR Accuracy</td>
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<td>Credit Risk Calculation</td>
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<td>8</td>
<td>Regulatory Risk Calculations – Basel III &amp; CCAR</td>
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<tr>
<td>9a</td>
<td>Analyze Portfolio Risks</td>
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<tr>
<td>9b</td>
<td>Analyze Portfolio Risks</td>
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<tr>
<td>10</td>
<td>Retail Banking Fraud Detection</td>
</tr>
<tr>
<td>11a</td>
<td>Payment Card monitoring for fraud detection</td>
</tr>
<tr>
<td>11b</td>
<td>Payment Card monitoring for fraud detection</td>
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<tr>
<td>12</td>
<td>EDW Offload</td>
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Financial Services Journey: Top 5 International Bank

Journey to a data-driven business
- Digital Transformation
- 100+ Use Cases since original project
- In-house talent + SI + HWX PS
- 100s of PBs & 40 million+ customer accounts across LOBs
- Gradual replacement of legacy solutions
- $100M+ annual savings due to lower-cost storage and compute

Cost Reduction & Capital Markets
- Teradata Augmentation & Replacement
- Started with a range of use cases across Capital Markets – single view of customer/risk

Cards & Wealth Management
- Single View of customer
- Customer segmentation
- Automated Investment Advisory

Risk Management
- Credit
- Market
- Basel & CCAR
- Operational Risk
- InfoSec & Fraud Detection
- Cyber Security
- Trading floor surveillance

Digital Transformation
- Real-time analytics
- Predictive analytics
- Customer Journey
- Micro & Macro persona marketing in real time to increase yield by 35%
- Mine Customer emails, CDRs, other core banking data to provide functionality across retail lines of business

Data Products - FinTech
- Cross Company Data Lake
- Being leveraged across mortgage banking, InfoSec, as a service to the US Govt etc
- Credit Watch
- Robo-Advisors
- Payments
- AML Compliance
- More use cases emerging
Some Common Big Data Use Cases
Wealth & Asset Management

**ADVISOR MANAGEMENT**
- Advisor Dashboards
- Investment Research
- Performance Management

**RISK & COMPLIANCE**
- Pre Trade and Post Trade
- AML Compliance Reporting
- Fraud Detection and Prevention
- Trade Surveillance and Monitoring
- Transaction Cost Analysis

**INVESTMENT RESEARCH**
- New Fund Creation
- Data discovery and market research
- Transaction Cost Analysis
- Trading and Portfolio Management

**CUSTOMER KNOWLEDGE**
- Unified View of Customer
- Customer Segmentation
- Customer Analytics and What if analysis
- Robo-Advisors

Big Data in wealth and asset management
Problem: Existing Cyber Security Solutions Don’t Scale to the Challenge

Current security tools installed in the data center can’t handle volume of data & threats from everywhere.

- 82% of breaches happened in minutes.
- 8 months: Average time an advanced security breach goes unnoticed.
- 70%-80% of breaches are first detected by a 3rd party.

2016 Verizon Data Breach Investigations Report
Cyber Security Customers using Hortonworks to Meet Security Priorities

Top 3 Priorities

- Improve Threat Detection
- Visualize Value of Security
- Improve Efficiency

Key Business Requirements

- Ability to detect compromised account activity.
- Ability to correlate and enrich threat activity for efficient triage.
- Enable rapid detection of new threat patterns
- Detect and contain compromise before loss occurs

- Ability to create and visualize cyber security KRI & KPI metrics
- Ability to tie metrics to top and bottom line business impact
- Ability to interactively drill from business metric to data source.
- Ability to quantify cyber security risk to normalize against business risk
- Provide single integrated view of security risk posture

- Transform cyber security program from point solutions to integrated platform
- Ability to automate metric data collection and presentation
- Enable efficient integrated security program workflow

Relevant Use Cases

- Actionable Intelligence
- Single View of Risk
- Prioritized Protection
- Visualize Value
Digital Banking Solution Architecture

Retail Banking Enterprise Data & Compute Lake

Business Logic Layer

- Banking Sources
  - Social
  - RDBMS
  - Mainframe
  - Document Mgmt Systems
  - Data Silos
  - Core Banking
  - Industry Ref.
  - Web Logs

- Retail Banking Apps
- Marketing Apps
- Customer Journey
- SVC
- NBA

Governance & Integration
- Batch
- Search
- In-Memory
- Real-Time
- SQL
- Predictive
- Pivotal HAWQ

Enterprise Security

Business Workflow

Data Operating System
- Multi-purpose platform enablement

Distributed File System
- Staging, Database, Structured, Unstructured, Archival, Document

Cloud Computing Stack (Public or Private)
- Public Cloud, Private Cloud, Hybrid Cloud supporting a full stack of VMs and Docker
Digital transformation Journey--360 degree view
Customer segmentation process

Data Sources
- Social media data
- Customer Master
- Trade Systems
- Other finance systems

Data Ingestion
- Account
- Portfolio
- Digital Transactions
- Ancillaries
- Preferences

Data Processing
- Discover Segments
  - Ultra High net worth
  - Platinum
  - Gold
  - Silver
- Customer Assignment Rules
- Assign Customers to Segments

Actionable Insights
- Visual Analytics
- Pattern Discovery
- Recommendations:
  - Customer Realignment
  - Design targeted promotions to improve performance in specific markets

Calibration on Historical Data
Incrementally add new Data
Identify and personalize combinations of markets, segments and media tactics to adjust integrated marketing efforts to optimize market-specific channel effectiveness.

Personalization features should leverage explicit consumer feedback as well as implicit feedback from closed-loop consumer responses and be flexible to changing behaviors and attitudes.

Customization should extend to integration with relevant tools, relationships and touch points.

Move from generalized segmentation to personalized customer demographics, providing a ‘segment of one.’

Determine customer affinity through individualized understanding of customer insights coming from interactions, enterprise assets, dark enterprise assets and external assets, not just observations. Use these assets and customers’ behaviors to truly understand your customer and drive personalization.
Customer Journey Mapping

The Customer Journey

Example: Drill into Average calls per caller
Example: Payment Success Rate by Collection Type
Example: Failed Collection to Successful Collection, across channels
Example: Journey to Churn, Upsell Success
Example: Customer Retention Strategies
Major North American bank uses GPU-accelerated deep learning for next-best-action marketing

Problem
- Top 10 USA Bank required unbiased guidance regarding a platform for massive amounts of data (~10TB) and deep learning development for marketing genomes across all LOBs (Personal, Wholesale, Investment banking)

Solution
- GPU-Accelerated Platform accessible by business analysts and Python developers enhanced query performance by 10x
- Capgemini guided the data lake architecture, platform requirements, evaluation, Enterprise integration

Impact
- “The Genome program targets improved personalization for our customers, driving better engagement through tailored experiences, enabled by a strong foundation in data and insights”
Business Problem

- Banks interact with customers across many channels and points in time -- Omni-Channel
- Many call center agents are also overwhelmed with offering complexity and struggle to translate the breadth of the product portfolio.
- They lack insight into the customers needs to offer them the right products and gauge their mood.
- Data about those interactions is stored in silos.
- Difficult to correlate data about customer interactions, marketing campaign results, and online browsing behavior.
- Problem is exacerbated by recent company acquisitions and a proliferation in the volume and type of customer data.
- Merging that data in a relational database structure is slow, expensive and technically difficult to mine with new unstructured data.

Value Realized

- Enterprise-wide data lake of several petabytes
- 360-degree unified view of the customer (or household) life time value based on usages patterns across time, products and channels.
Financial Services Transformation

Security Risk Mitigation
- 94% reduction in time to process suspicious transactions by using algorithmic insights to largely automate review

New Account Growth
- 10,000 more new accounts added via improved target marketing analytics vs. previous processes

Spend Per Customer
- 25% more accounts per customer after implementation of enhanced cross-sell offers delivered “just in time”

Customer Satisfaction
- 20% reduction in churn rates observed through proactive customer outreach powered by advanced analytics
Thank You