Solving Time-to-Market and Data Flexibility problems with IMDG

Appar Singh
IT Architect
Agilent Technologies Inc
About Agilent

Agilent is a leader in life sciences, diagnostics and applied chemical markets. The company provides laboratories worldwide with instruments, services, consumables, applications and expertise, enabling customers to gain the insights they seek. Agilent’s expertise and trusted collaboration give them the highest confidence in our solutions.

Agilent focuses its expertise on six key markets, where we help our customers achieve their goals:

- **Diagnostics**
  - Agilent gives doctors a head start in the fight against cancer and other diseases.

- **Pharmaceutical**
  - From disease research and drug discovery, to drug development, manufacturing and quality control.

- **Environmental and Forensics**
  - We provide fast, accurate and sensitive methods for monitoring contaminants.

- **Research**
  - Instruments and S/W help Research with Scientists across Globe.

- **Chemical and Energy**
  - Help customers maximize their production of fuels and predict failures.

- **Food**
  - Helps to ensure our food supply remain free of contaminants.
Outline

• Agility and Data Flexibility
  • Time to Market for Products
  • Data Flexibility and its complexity

• Digital Data Touchpoints

• Normalized Data Catalog
  • Product Catalog
  • Regular Data Access Patterns

• Leveraging Skinny Integrations and IMDG
  • Skinny Integrations with Web/e-Store
  • Data Flexibility using Data Grid

• De-Normalized Access
  • In-Memory Data Grid Design
  • Access from Downstream Apps
  • SLA's post IMDG

• Architecture post IMDG
• Recommendations Engine
Agility & Data Flexibility
Agility Measured through Time to Market

- Increasingly, Agility of a Digital Team is being measured through time to markets for products and product related changes.
- Whether we talk about new features for customers or the addition of new product portfolios for a company.
- Digital Edge on competition can really be achieved if we can manage and reduce time to market SLA’s.
Data Flexibility and its Complexity

- Really means Relational Data Schema Flexibility.
- Schema changes to product and related content attribution from Upstream systems.
- **Integrate product data models to propagate** attribution structure changes to downstream targets.
- Agile adaptability of attribution for downstream systems.
- Complete Normalization helps to focus on core customer needs and product portfolios.

![Pie chart showing the distribution of tasks: Data Model changes (30%), Test and Build (25%), Design and Coding (15%), Brainstorming (10%), Administrative Tasks (20%).]
Digital Data Touchpoints

Application Stack

Experience & Delivery Layer
- CMS / CXM
- Preview & Catalog Import
- Search Indexes
- Content & Data Delivery
- E-Store Delivery
- Content & Data Delivery
- Full Data Model Copy

Processing & Analysis Layer
- ETL Dataflow
- MDM + Non-MDM Catalog Publish
- Catalog Publish

Data Sources
- Digital Asset Management
- Product Data Management / MDM
- ERP / CRM

Full Data Model Copy

Standard Devices
HTTPS
MDM-to-Web SLA’s

TIME TO MARKET SYSTEM SLA’S

Marketing Updates   | Product Enrichments   | New Product Intro   | Support Material Additions

Time to Market SLA’s (Hours)
Normalized Data

Selling Points and its Problems
Product Catalog Normalized

Product

Classification/ Catalog
- Digital Assets
- Marketing Assets
- Support Content

Parts
- Specifications

Attribute Groups
- Attributes
Data Fetch for Product Involves…
What if we could…

- Accelerate Time to Market for Products
- Avoid chasing MDM data model changes for Downstream
- Dynamically Upgrade Experience for Newer Products
- Avoid Spending time in integrations with MDM repeatedly.
- Focus on Customer Innovation and data driven experience.
Leveraging Skinny Integrations and IMDG

TTM and Data Flexibility Solutions
Skinny Integrations with Web/e-Store

- Import attributes in downstream systems only if needed.
  - **Core Attributes**
    - Attributes absolutely needed inside of the platform
    - Contain channel specific attributes.
    - Contain attributes used for channel specific business logic.
    - Core attributes live in delivery apps like CXM and e-Store.
  - **Improved Performance of Imports by factor of 5.**
  - **Improved Internal Publishing performance of downstream apps.**
- Don’t disturb primary downstream apps for any updates.
  - **Creates Only**
    - New Product Introductions.
    - Complete new Product Portfolios.
    - Merger and Acquisitions.
    - Product Line Splits and Mergers.
Data Flexibility using Data Grid

- Import all your normalized data in GridGain’s Data Grid.
  - **Neighbor Attributes**
    - Attributes which are needed by the channel but can be referred in runtime.
    - Contain UI only attributes.
    - Contain omni-channel attributes which doesn’t need to be channel specific.
    - Neighbors live in Data Grid
  - **Heavy attribution imports through Streaming imports.**

- Do disturb Data Grid every time there is an update upstream.

  - **Creates and Updates**
    - Marketing Updates on products.
    - Digital Asset Associations.
    - Support Asset Additions.
    - Product Enrichments.
De-Normalized Access

Amalgamate data for Downstream
In-Memory Data Grid Design

Service Grid

Higher Level Caches

Content Products Cache

Store e-Catalog Cache

Content Classification Cache

More...

Computed Grid

Low Level Caches

MDM Products

MDM Marketing

MDM Parts

MDM Classification

MDM Digital Objects

50 More...
Access from Downstream Apps

- Access Patterns **bypasses any understanding of MDM Data Model Structure.**
- Downstream apps can **focus on customer experience.**
- As soon as Data changes, experience changes.
- **Improved performance** by accessing de-normalized data.
MDM-to-Web SLA’s post IMDG

TIME TO MARKET SYSTEM SLA’S

- Marketing Updates
- Product Enrichments
- New Product Intro
- Support Material Additions

Time to Market SLA’s (Minutes)
Architecture and Integrations
Recommendations Engine

Machine Learning and Data Delivery
Concept

- A scalable front end that records user interactions to collect data.

- Permanent storage that can be accessed by a machine learning platform. Loading the data into this storage can include several steps, such as import-export and transformation of the data.

- A machine learning platform that can analyze the existing content to create relevant recommendations.

- Storage that can be used by the front end, in real time or later, based on the timeliness requirements for recommendations.
Methodology

• Used Collaborative Filtering model, which generates recommendations based on the relationship between the visitors and products.

• No explicit information regarding the visitors or the products required in the approach.

• Implicit: Not as obvious in terms of preference, such as views, clicks, purchase.

• Solving the problem requires a matrix of user-item interactions.

• We utilized Matrix Factorization method to figure out the latent (hidden) features that relate them to each other in a much smaller matrix of user features and item features.
Recommendation Engine Design

- Ingest
  - Analytics

- Data Storage
  - Storage/Analysis
  - Standard Storage
    - Bucket
    - Cloud Storage

- Data Processing
  - ML Jobs
    - Compute
  - Processing
    - Dataproc

- Processing Pipelines
  - Nested Serverless functions
  - Data Grid
    - Fast Storage
    - Data ready
  - Serverless Functions
  - bucket with objects

- OnPrem Services
  - Localization
  - Entitlements
  - Pricing
Learnings

It's not for companies who:

• Have a hands off operations team.
• Want fully baked integrations through beautiful consoles like some of the Integrations Platforms provide.
• Rely on platforms to manage itself or are completely self managed.
• Want completely decoupled integrations.
• Enterprise grade security for the Grid.

It's for companies who:

• Likes to leverage utilize their internal dev and operations team to manage delivery capabilities.
• Want to be more hands on technology and integrations.
• Have better tools to monitor and diagnose problems with systems.
• Want to leverage fault tolerant clusters of compute and data.
• Data Security is taken care by the infrastructure vs the application.
Questions?

Email: appar.singh@agilent.com

Thank You!