

Customer Event Hub

The Modern Customer 360° View

Guido Schmutz – 4.12.2017



@gschmutz



guidoschmutz.wordpress.com

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■ Guido Schmutz

Working at Trivadis for more than 21 years

Oracle ACE Director for Fusion Middleware and SOA



Consultant, Trainer Software Architect for Java, Oracle, SOA and Big Data / Fast Data



Head of Trivadis Architecture Board

Technology Manager @ Trivadis

More than 30 years of software development experience

Contact: guido.schmutz@trivadis.com

Blog: <http://guidoschmutz.wordpress.com>

Slideshare: <http://www.slideshare.net/gschmutz>

Twitter: [@gschmutz](https://twitter.com/gschmutz)

Kafka Connect & Kafka Streams/KSQL

gschmutz 21:08 on April 18, 2017

Tags: flink (1), kafka (59), kafka-connect (4), kafka-streams (17), spark-streaming (5), storm (30), streams (4)

Last week in Stream Processing & Analytics – 18.4.2017

This is the 62nd edition of my blog series blog series around Stream Processing and Analytics!

Every week I'm also updating the following two lists with the presentations/videos of the current week:

- [Presentations from SlideShare](#)
- [Videos from YouTube](#)

As usual, find below the new blog articles, presentations, videos and software releases from last week:

News and Blog Posts

General

- [Multi Master Replication For Geo-Distributed Data: It's more than you think by Ellen Friedman](#)
- [Understanding Indicators of Attack \(IOAs\): The Power of Event Stream Processing in CrossStrike Falcon by Dan Brown](#)
- [Stream processing and messaging systems for the IoT age by Ben Lorica](#)

Apache Kafka / Kafka Streams / Confluent Platform

- [Creating a Data Pipeline with Kafka Connect API – from Architecture to Operations by Alexandra Wang](#)
- [Streaming Spring Boot Application Logs to ELK Stack—Part 1 by ksadayanamthu](#)
- [Streaming Spring Boot Application Logs to Apache Kafka—ELK Stack—Part 2 by ksadayanamthu](#)



■ Our company.

Trivadis is a **market leader** in **IT consulting, system integration, solution engineering** and the provision of **IT services** focusing on **ORACLE®** and **Microsoft** technologies

in Switzerland, Germany, Austria and Denmark. We offer our services in the following strategic business fields:



Trivadis Services takes over the interacting operation of your IT systems.

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- 200 Service Level Agreements
- Over 4,000 training participants
- Research and development budget: CHF 5.0 million
- Financially self-supporting and sustainably profitable
- Experience from more than 1,900 projects per year at over 800 customers

■ Agenda

1. Customer 360° View – Introduction
2. Customer 360° View – What's wrong with traditional approach?
3. Customer 360° View – Graph Database to the rescue ?
4. Customer 360° View – Implementation

Customer 360° View - Introduction

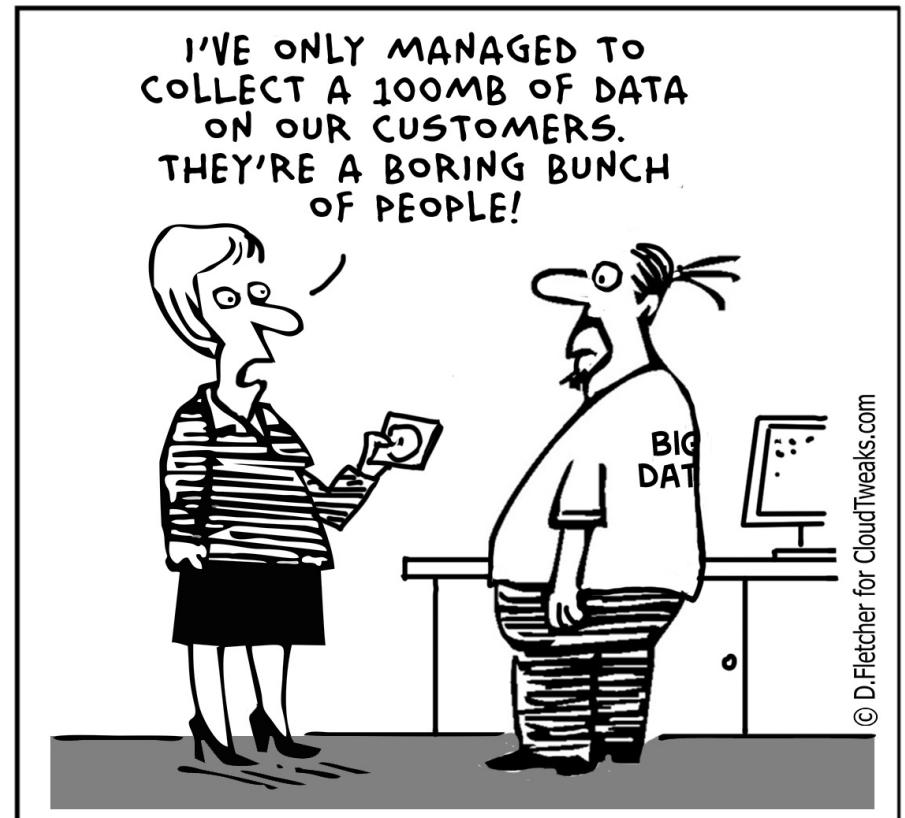
Customer Event Hub - The Modern Customer 360° View



■ Why Customer 360° View?

“Get closer than ever to your customers. So close that you tell them what they need well before they realize it themselves.”

Steve Jobs, Apple



■ Customer 360 – Key Use Cases

Target Marketing & Personalization

- Customer micro segmentation
- Next Best Offer
- Campaign Analytics
- Geo-Location Analytics
- Recommendation Models

Churn Prevention & Customer Retention

- Churn Modeling & Prediction
- Rotational / Social Churn
- Customer Lifetime Value
- Sentiment Analytics
- Price Elasticity Modeling

Proactive Care

- Proactive Care Dashboard
- Customer Lifetime Value
- Subscriber Analytics
- QoS Analytics
- Real-Time Alerts

Customer 360°: Experience Expectations

Browsing history

Manage history

Your Recently Viewed Items and Featured Recommendations

Inspired by your browsing history

Page 1 of 6

NETFLIX

Browse | Taste Profile | KIDS | DVDs | Search | Justin |

Recently Watched | My List | See All

PLAYLISTS | New | Recommended | Exclusive | Show all >

	Preis(CHF)	Versandpreis	Verfüg.	Händler
Foodsniffer Schnellensor - weiß (2015-136)	117.90	117.90 (0.00)		PC-Dtschweiz Bewertungen 5.6 (8159)
FOODsniffer FOODsniffer Weiss (2015-136)	119.00	119.00 (0.00)		netshop.ch Bewertungen 5.6 (5140)
Küchengerät Zubehör FOODsniffer Weiss (17.04.9012)	119.00	119.00 (0.00)		GALAXUS Bewertungen 5.4 (824)
Foodsniffer Schnellensor - weiß (2015-136)	128.00	128.00 (0.00)		PCP.CH AG Bewertungen 5.7 (2538)
Foodsniffer Schnellensor - weiß (2015-136)	129.90	129.90 (0.00)		STEG Bewertungen 5.5 (368)
Foodsniffer weiß, USB APP für Android und iOS (2015-136)	157.80	157.80 (0.00)		tod Bewertungen 5.5 (2794)

Seltenfang | Inhalt drucken | Fehler melden

Customer Event Hub - The Modern Customer 360° View

■ “The Amazon effect” – why can’t I do as easy as buying a product on Amazon

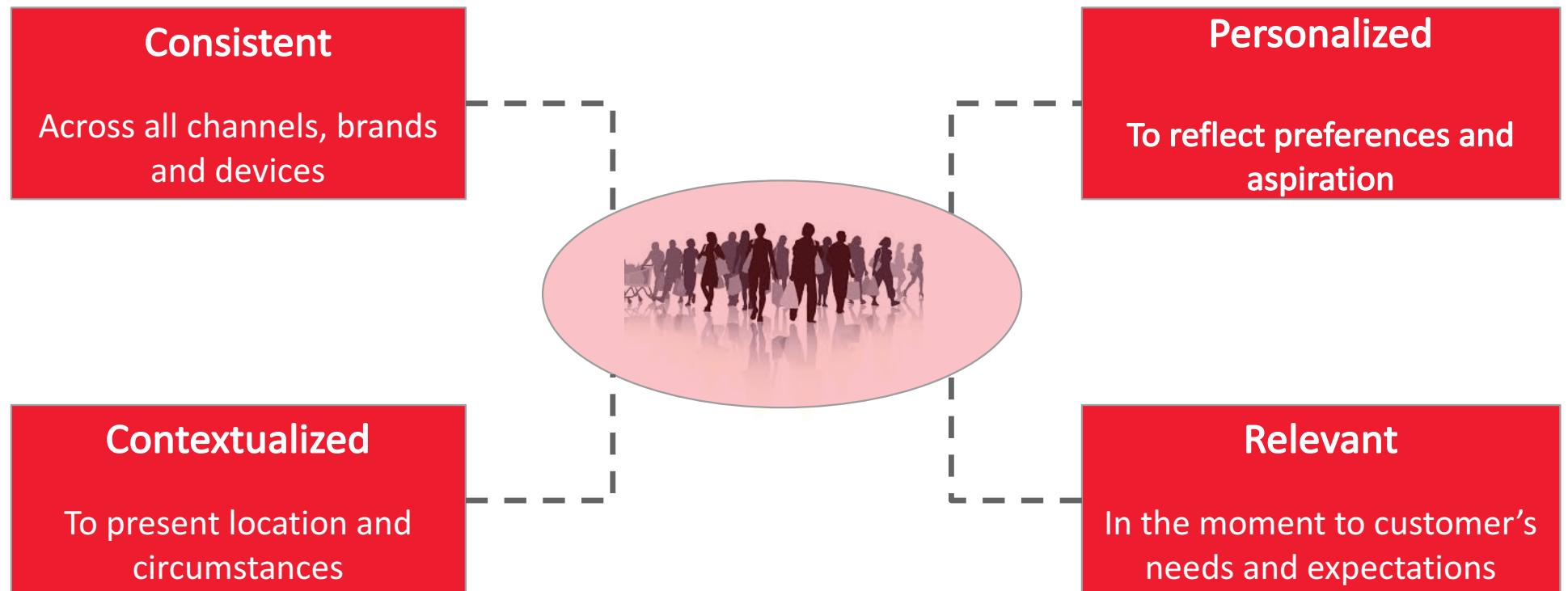
Each time a customer is exposed to an improved digital experience, their engagement expectations are reset to a new higher level.

Source: Forrester



Customer Event Hub - The Modern Customer 360° View

■ Customer 360°: Experience Expectations



■ Customer 360° - What do I need to know?

Who are you?

Where are you?

What have you purchased?

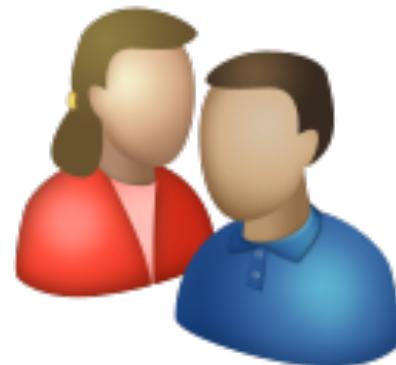
What content do you prefer?

Who do you know?

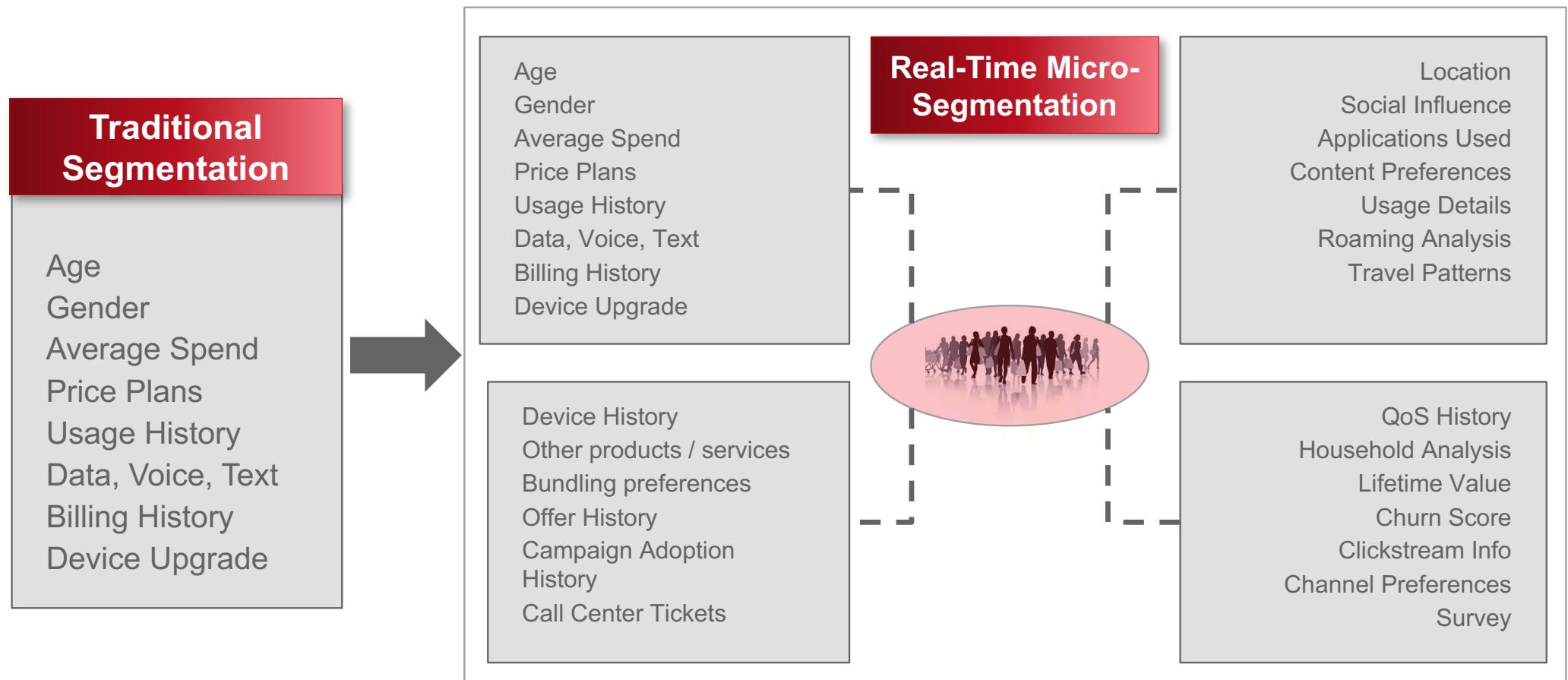
What can you afford?

What is your value to the business?

How / why have you contacted us?



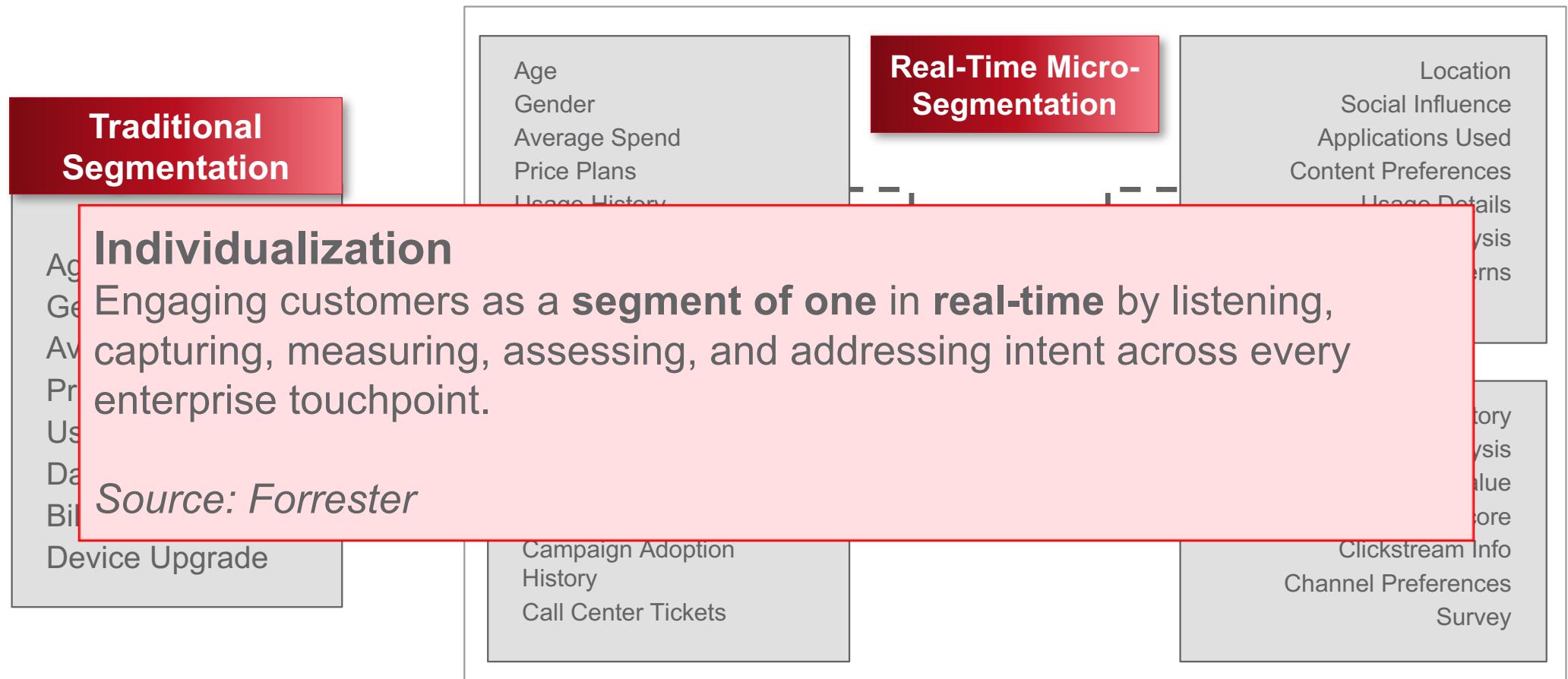
From Static to Dynamic, Real-Time Micro-Segmentation



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From Static to Dynamic, Real-Time Micro-Segmentation

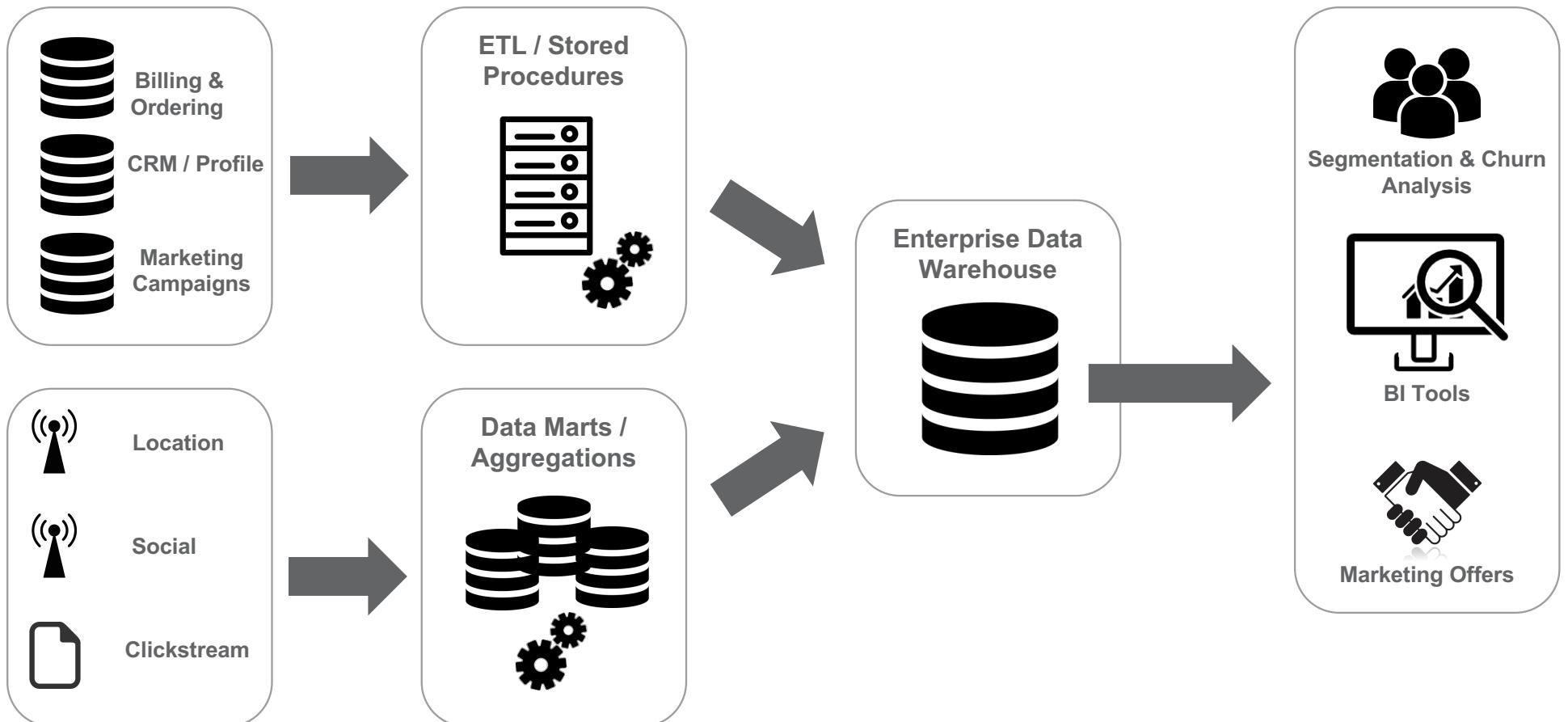


Customer 360° View – What's wrong with traditional approach?

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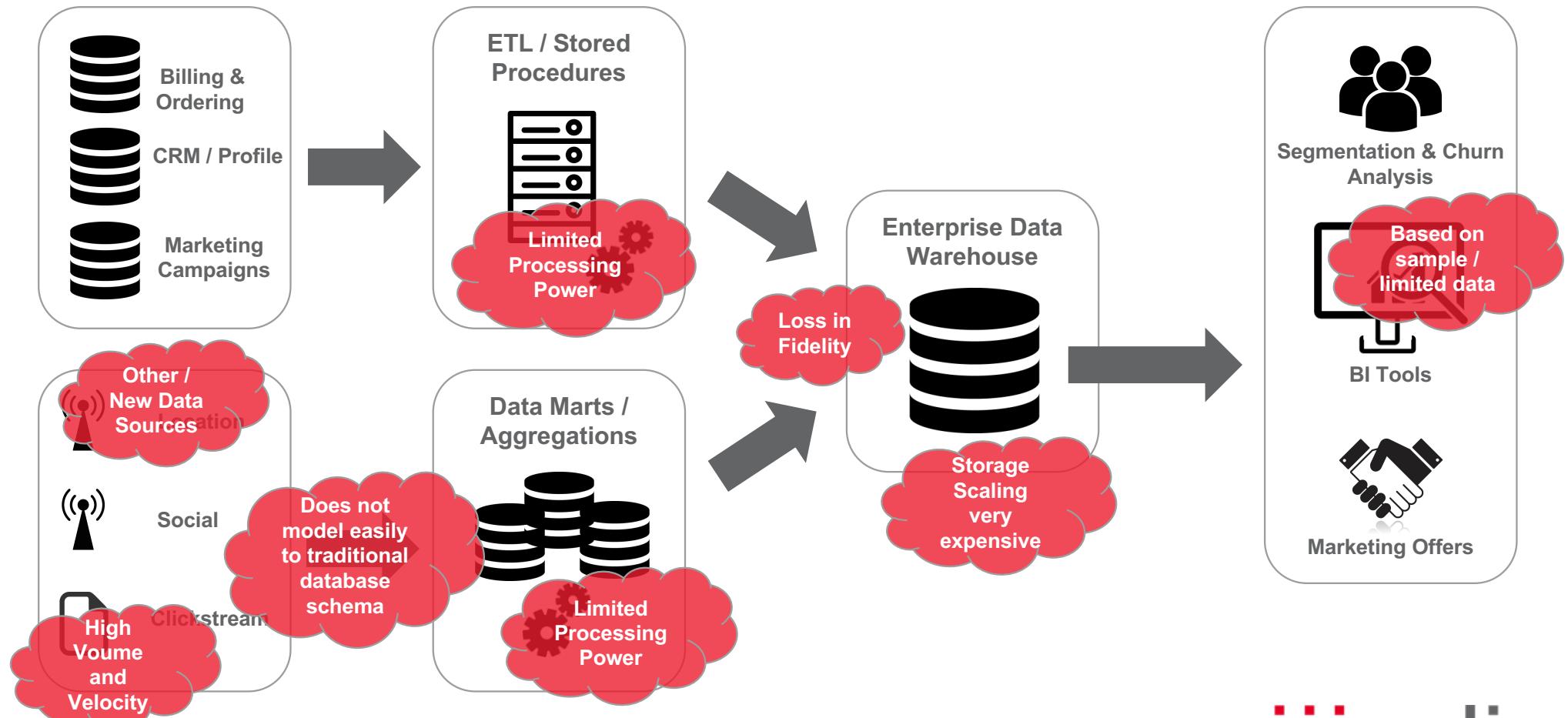


■ Customer 360° View - Traditional Flow Diagram



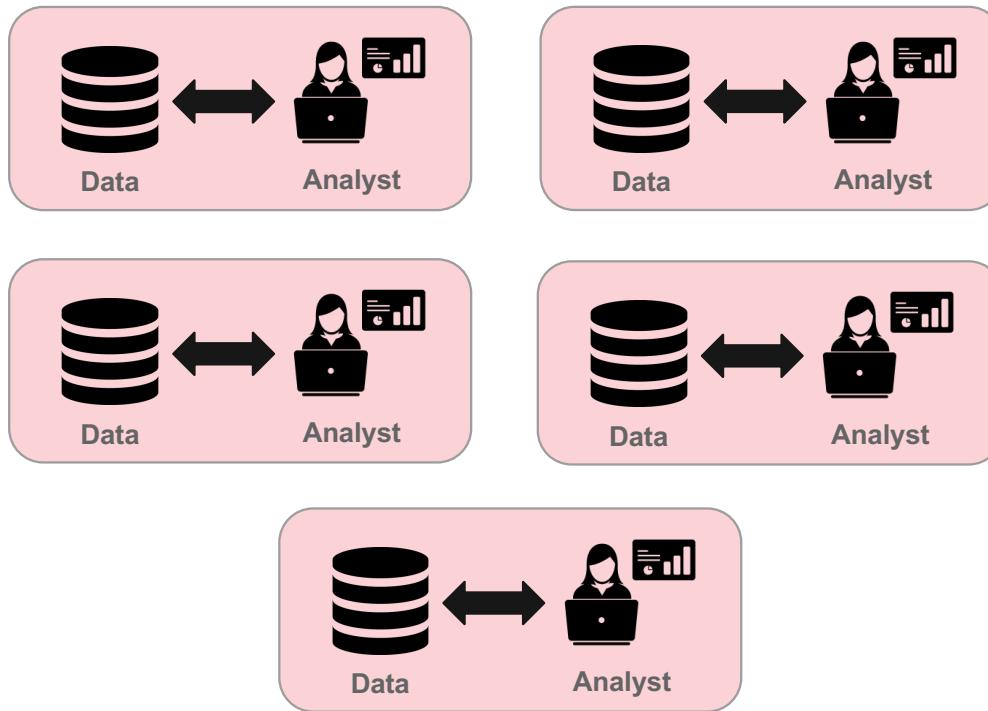
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Customer 360° View - Traditional Flow Diagram



Customer Event Hub - The Modern Customer 360° View

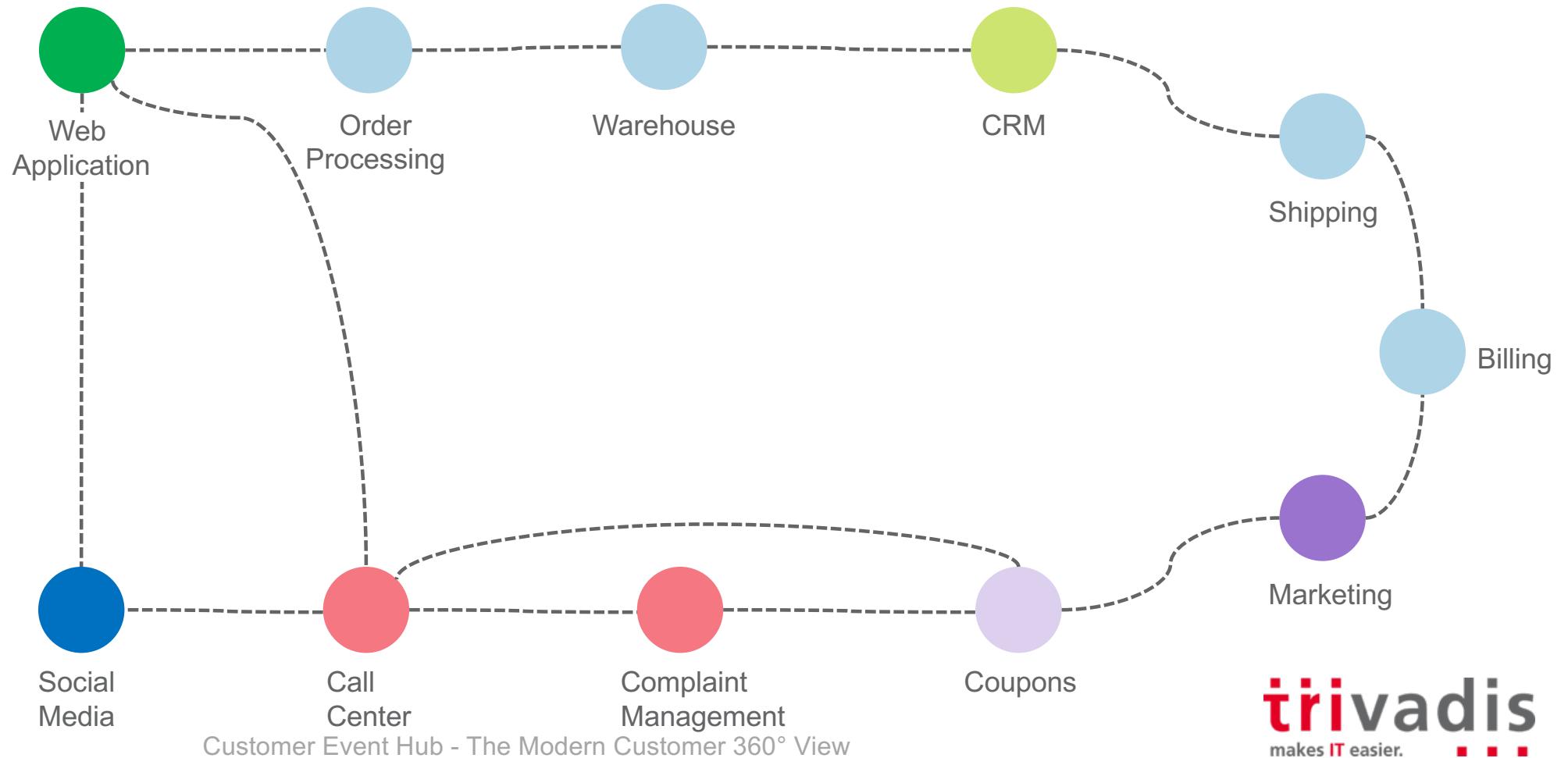
■ Customer 360° View: Why status quo won't work?



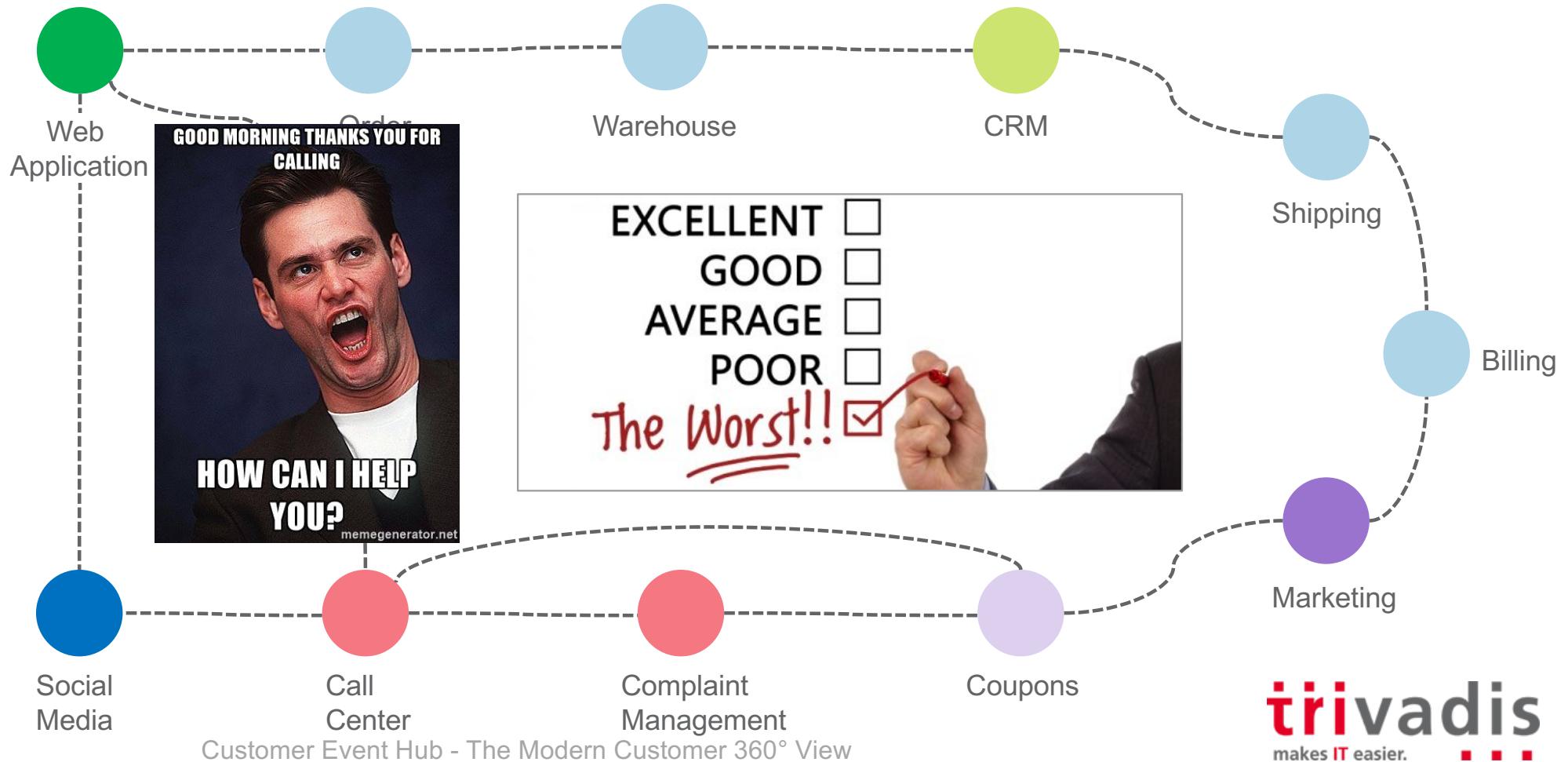
- **static version** of the customer profile in their data warehouse
 - Mainly **structured** data
 - Only **internal** data
 - Only “**important**” data
 - Only **limited history**
- Activity data – clickstream data, content preferences, customer care logs are **kept in siloes or not kept at all**

Detailed Customer Activity Data sits in silos!

■ Customer Journey through multiple “Siloed Systems”



■ Customer Journey through multiple “Siloed Systems”



Customer 360° View – Graph Database to the rescue

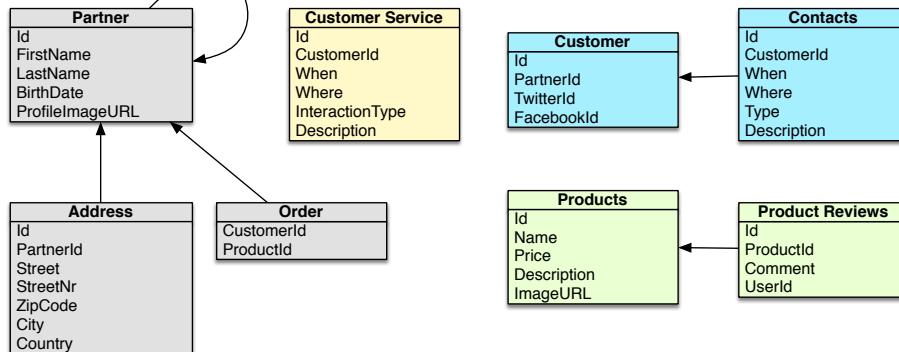
Customer Event Hub - The Modern Customer 360° View



■ Why using Graph for Customer 360° View

Traditional RDBMS

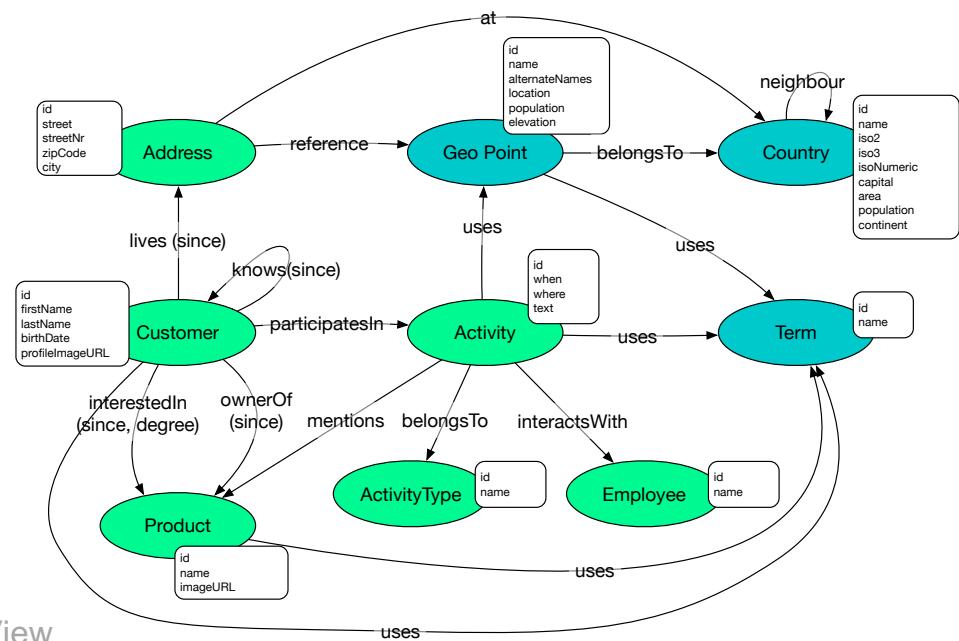
- Multiple Data Locations => siloes
- Not all information related
- difficult to access all information and relate to each other



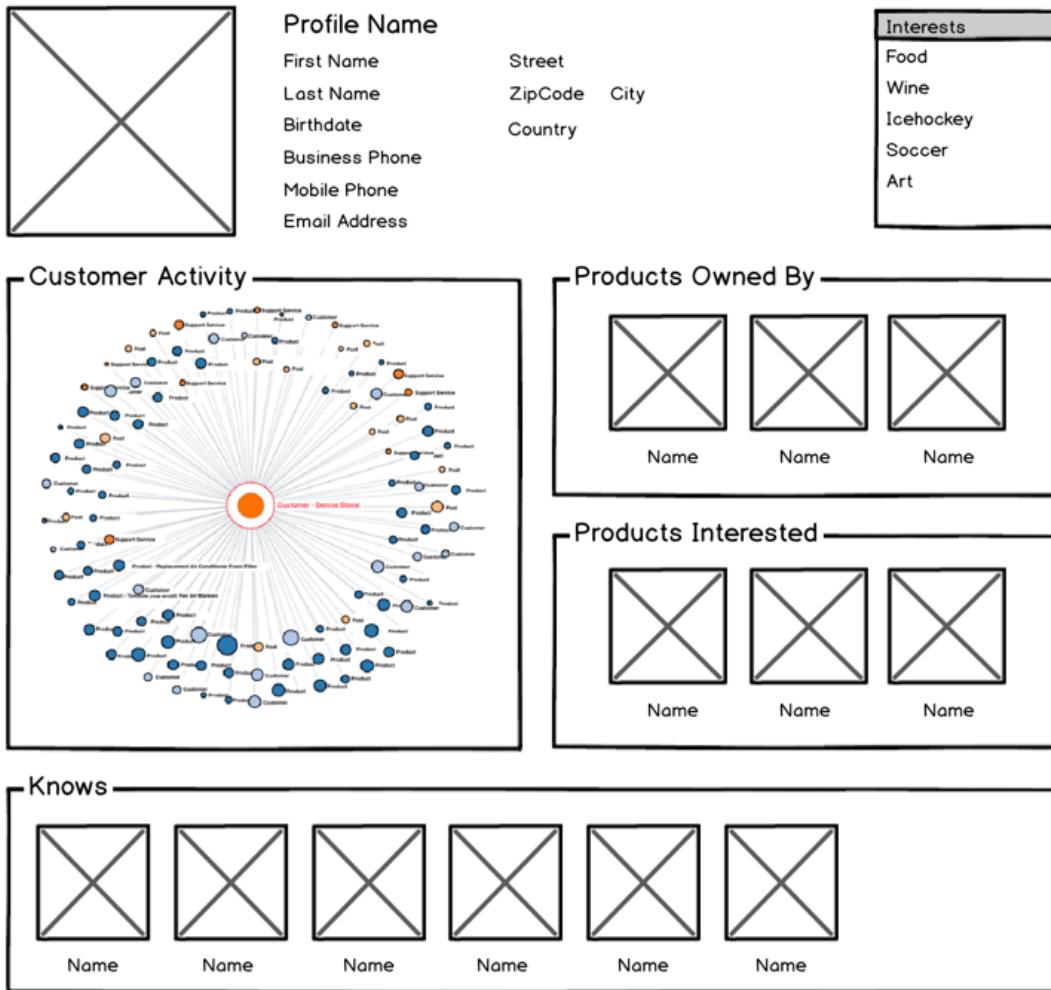
Customer Event Hub - The Modern Customer 360° View

Graph Database

- Connect all customer-related information in one central place
- Support for analytics on graph
- Performance & Scalability

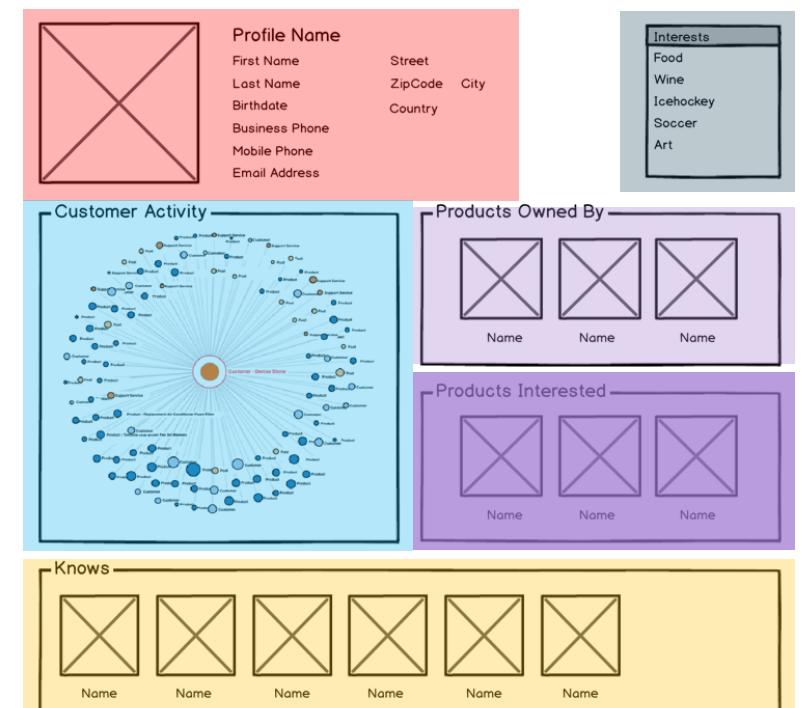
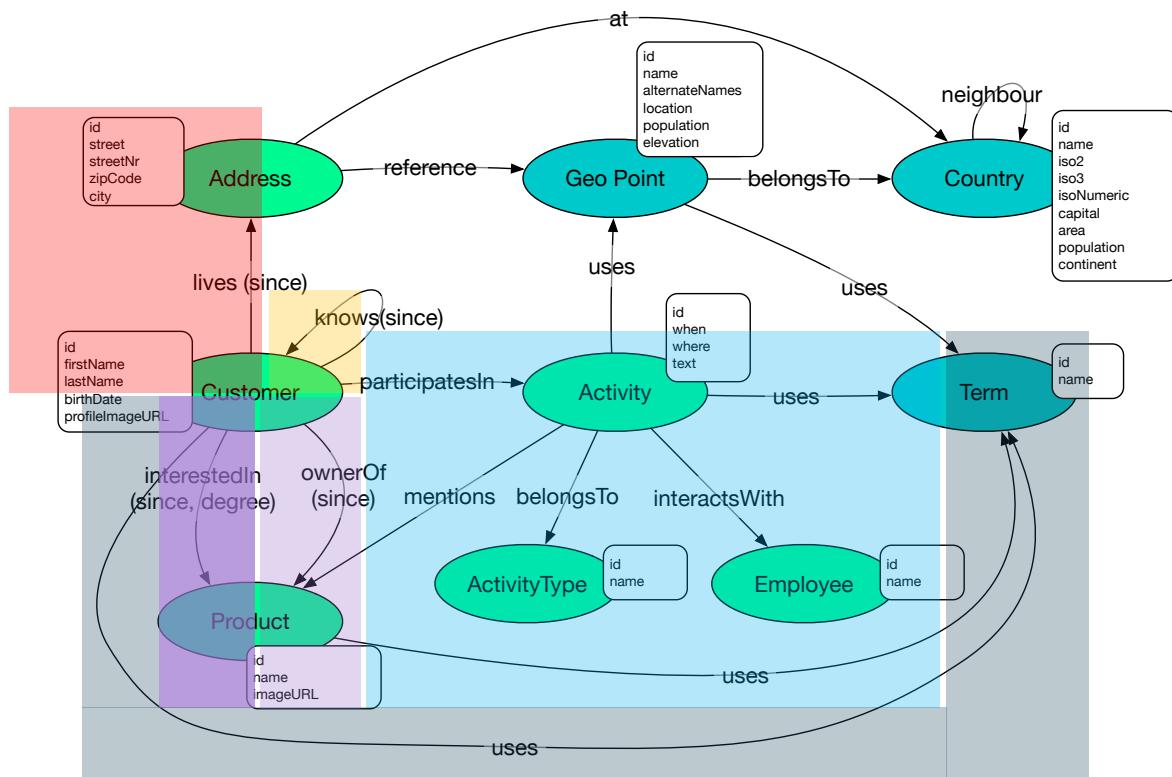


Customer 360° View - Example



Customer Event Hub - The Modern Customer 360° View

Customer 360° View - Example



Customer Event Hub - The Modern Customer 360° View

■ Questions which can **only** be answered by Graph

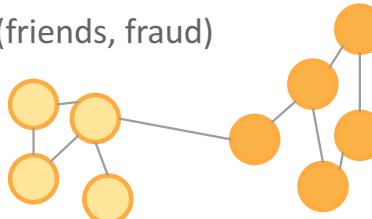
Dependencies

- Failure chains
- Order of operation



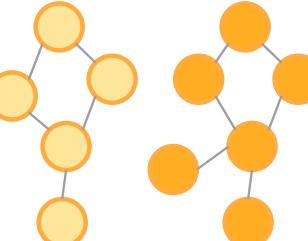
Clustering

Finding things closely related to each other (friends, fraud)



Similarity

Similar paths or patterns



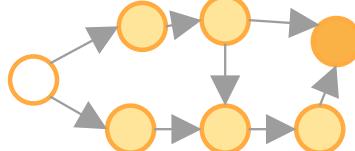
Matching / Categorizing

Highlight variant of dependencies



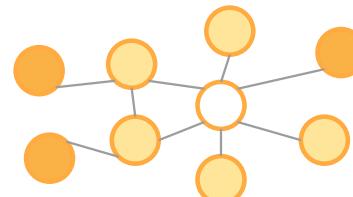
Flow / Cost

Find distribution problems, efficiencies



Centrality, Search

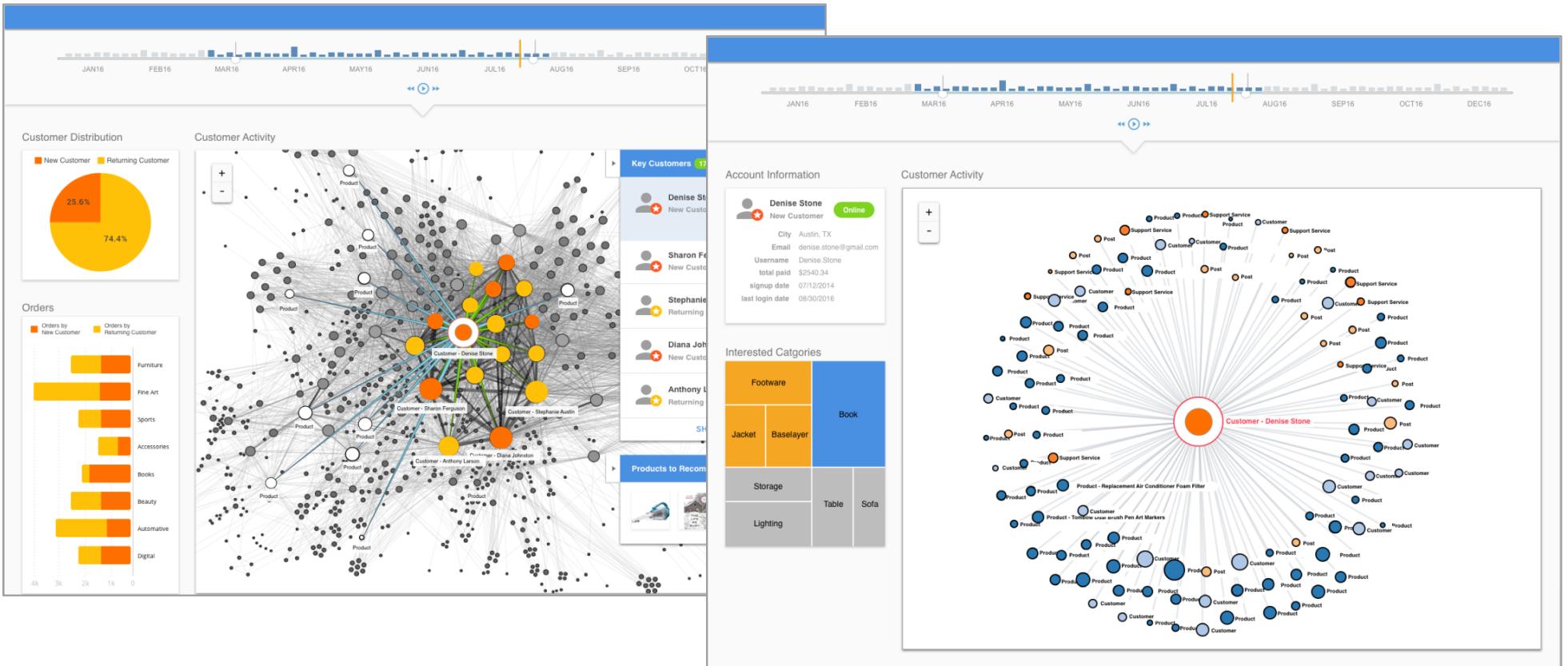
Which nodes are the most connected or relevant



Source: Expero

Customer Event Hub - The Modern Customer 360° View

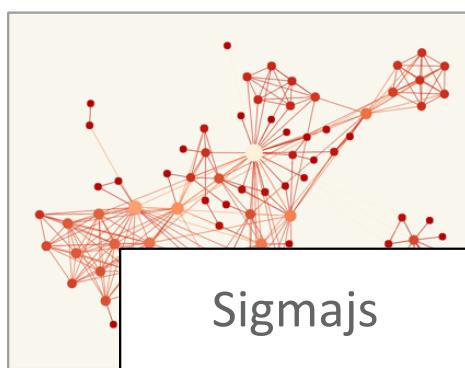
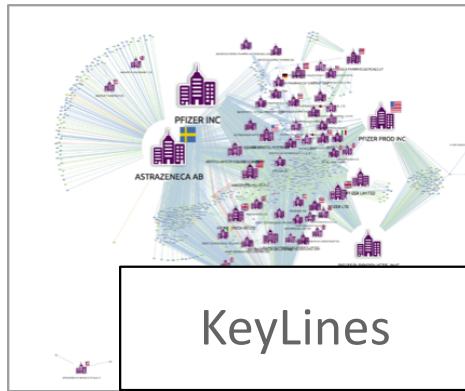
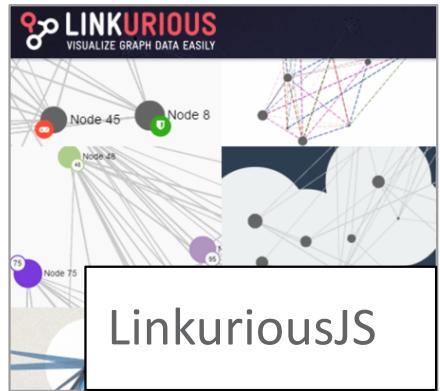
Questions which can **only** be answered by Graph - Visualize Customer 360



Source: Expero

Customer Event Hub - The Modern Customer 360° View

■ Questions which can **only** be answered by Graph - Visualize Customer 360



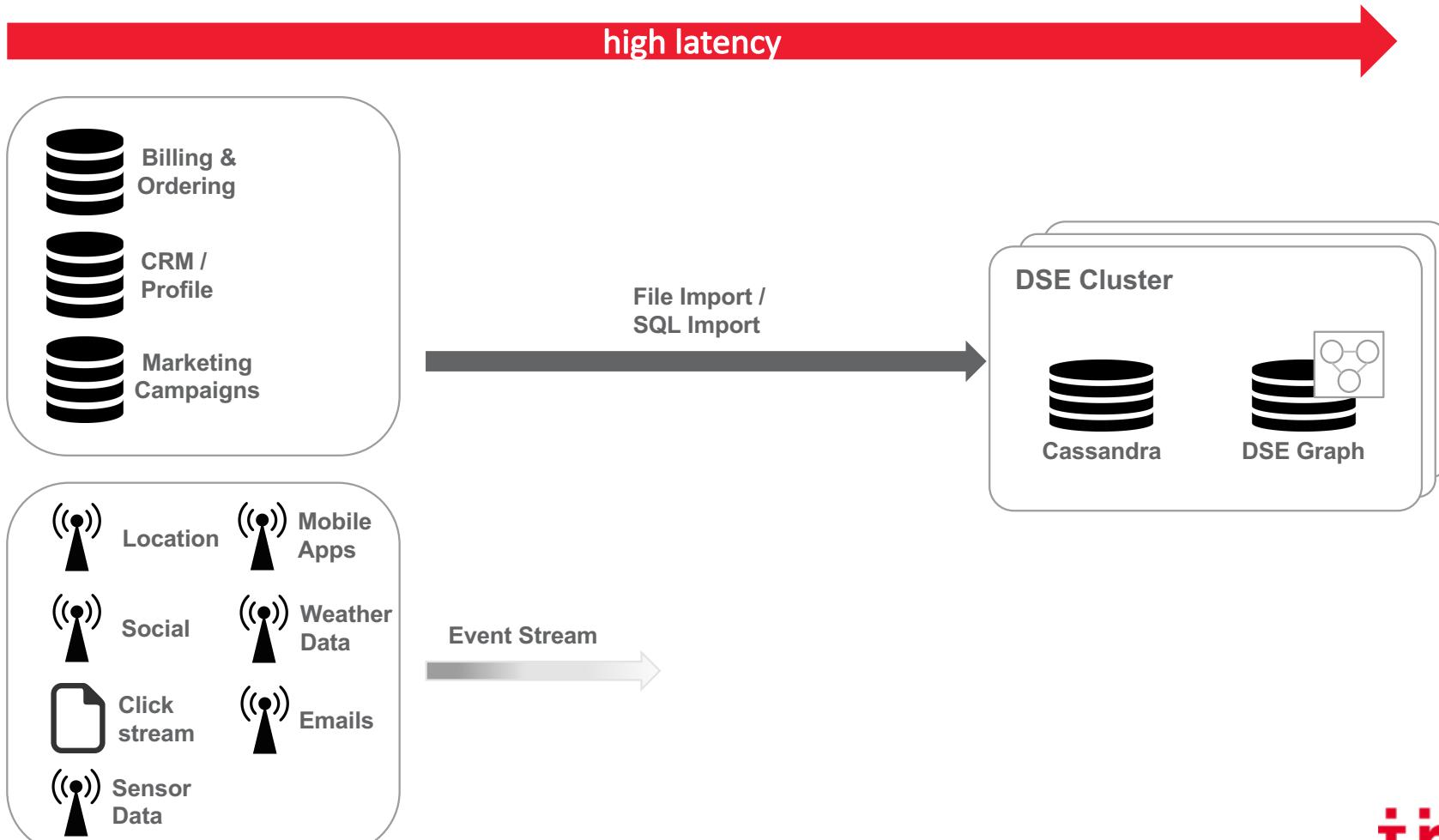
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Customer 360° View - Implementation

Customer Event Hub - The Modern Customer 360° View

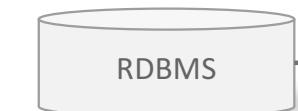
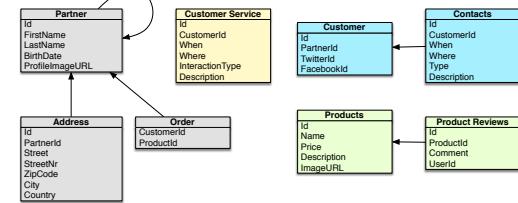


Batch Data Ingestion into Customer Hub



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Batch Data Ingestion into Customer Hub



Transformation

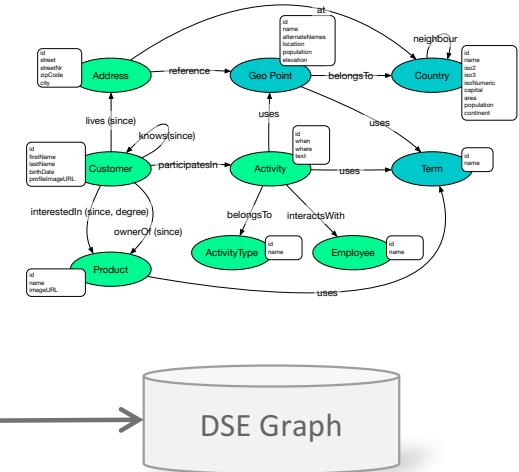


CSV / JSON

Click Stream

Groovy Script

DSE GraphLoader

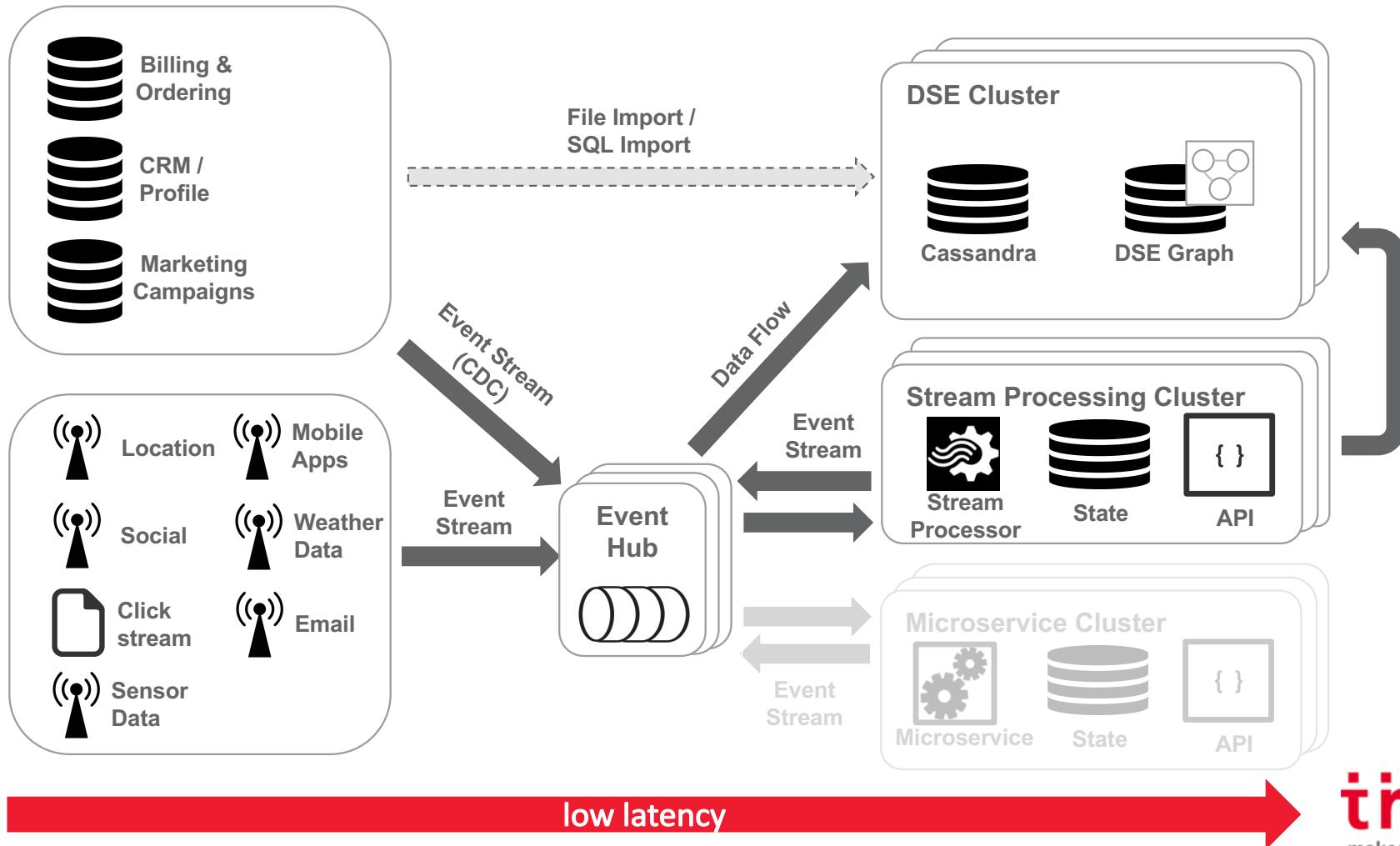


Real-Time Insights?

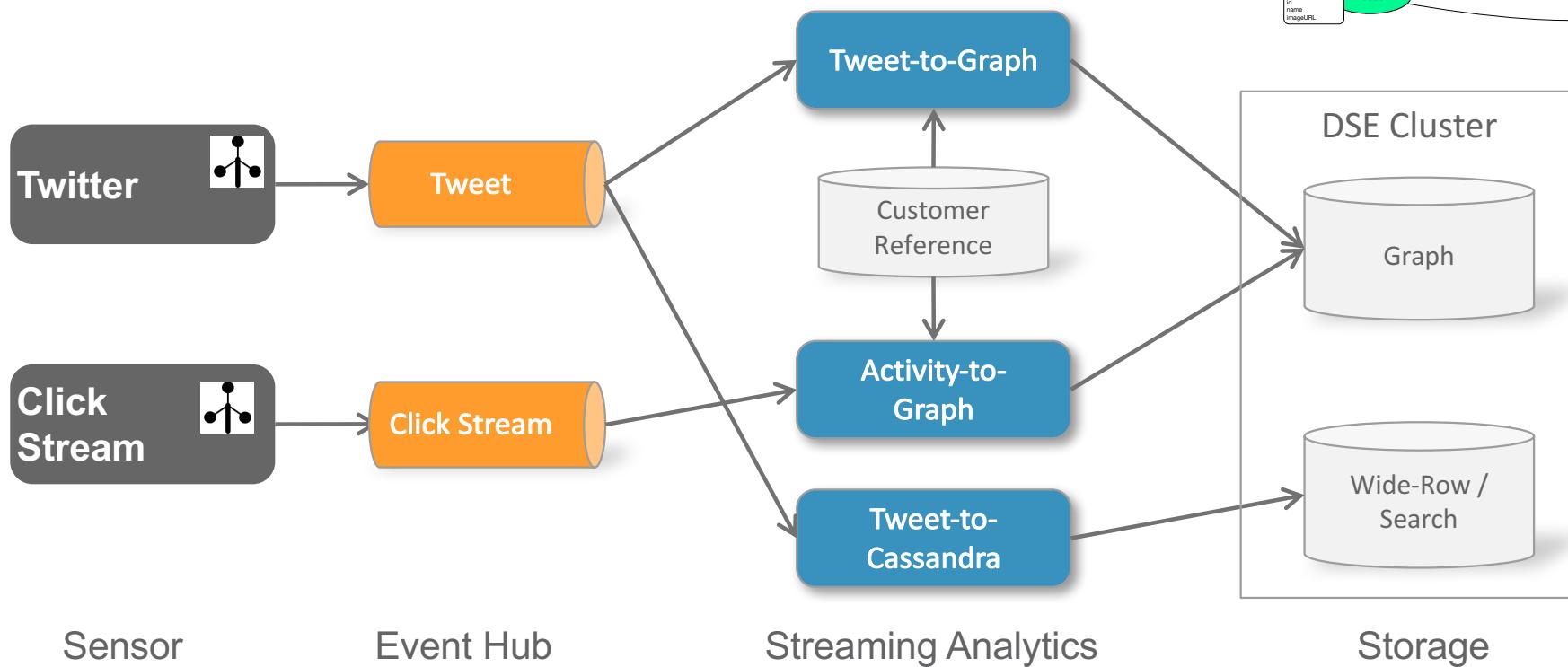
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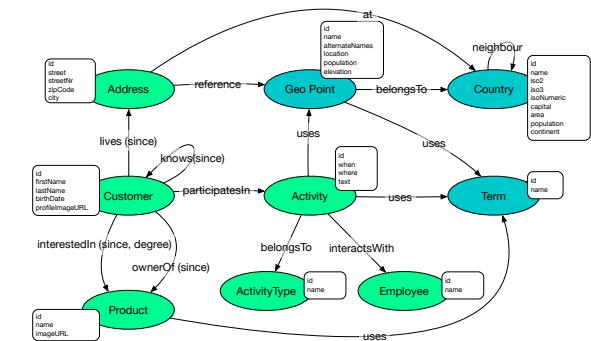
Real-Time Data Ingestion into Customer Event Hub



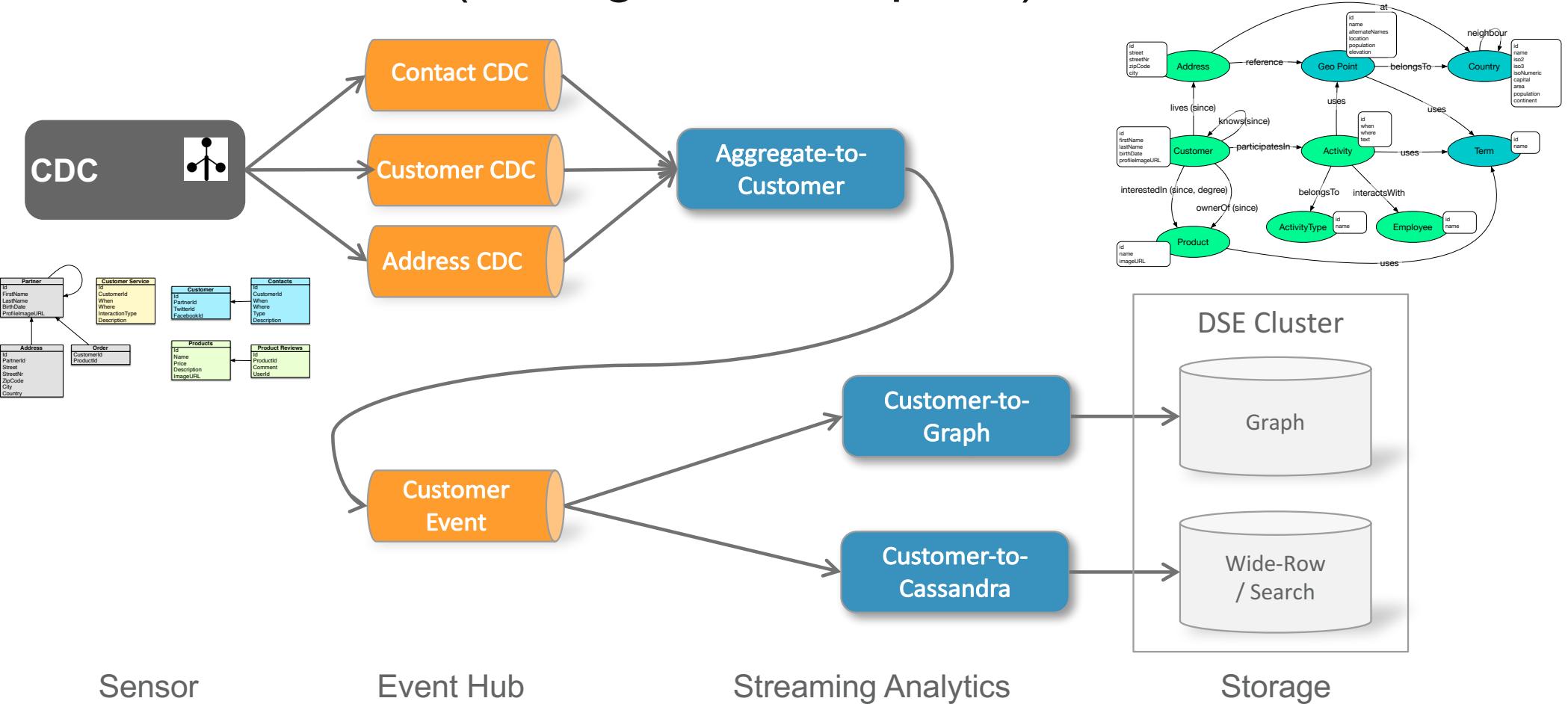
Process native Event Streams



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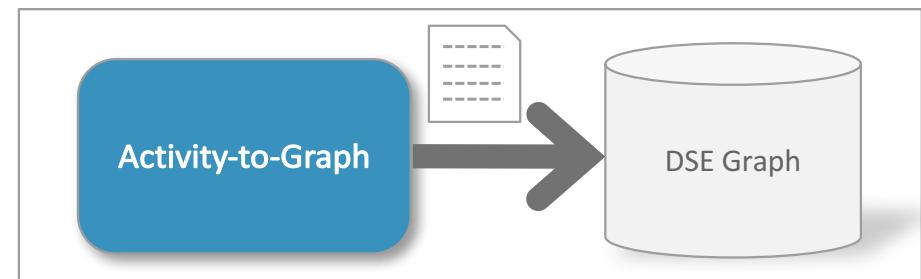
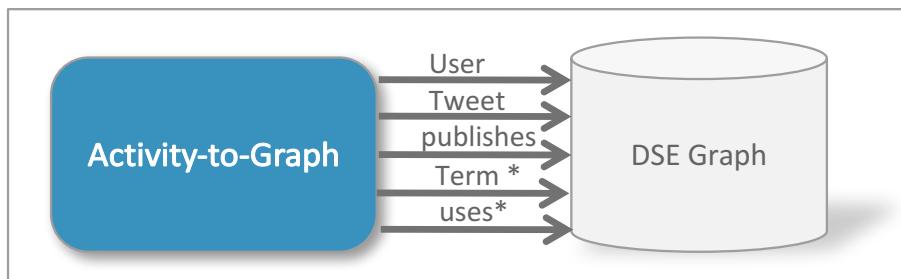
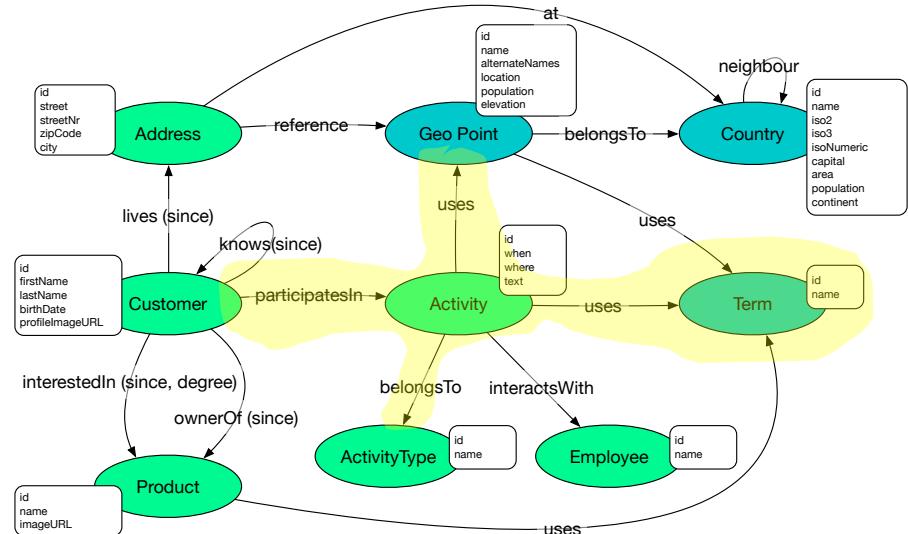
Process CDC (Change Data Capture) Events



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Single vs. Batch Insert

- One Event ends up in many modifications of vertex and edges
- many round-trips needed if done with single API calls
- Single “batched” API call using Groovy script provides 3 – 5x performance gains



Customer Event Hub - The Modern Customer 360° View

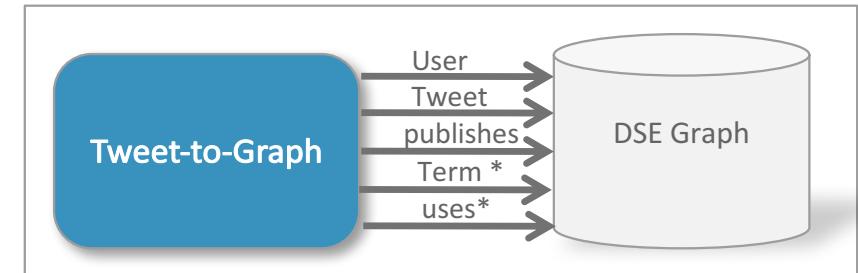
Single Insert into Social Network Graph

```
GraphTraversal gt = g.V().has(b.vertexLabel, b.propertyKey, b.propertyKeyValue)
if (!gt.hasNext()) {
    v = graph.addVertex(label, b.vertexLabel, b.propertyKey, b.propertyKeyValue)
} else {
    v = gt.next()
}
v.property("name",b.p
v.property("language"
v.property("verified"
v.property("timestamp",b.p
v.property("language",b.p
v.property("type",b.propertyParam0)
```

```
Vertex from = g.V(f).next(); Vertex to = g.V(t).next(); if
(!g.V(f).out(b.edgeLabel).V(t).hasNext()) { from.addEdge(b.edgeLabel, to) }

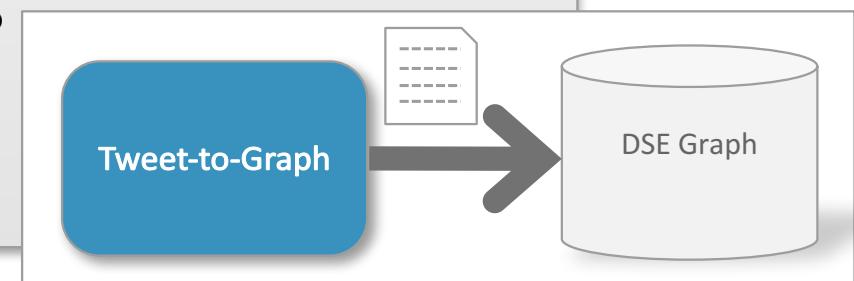
Vertex from = g.V(f).next(); Vertex to = g.V(t).next(); if
(!g.V(f).out(b.edgeLabel).V(t).hasNext()) { from.addEdge(b.edgeLabel, to) }

Vertex from = g.V(f).next(); Vertex to = g.V(t).next(); if
(!g.V(f).out(b.edgeLabel).V(t).hasNext()) { from.addEdge(b.edgeLabel, to) }
```

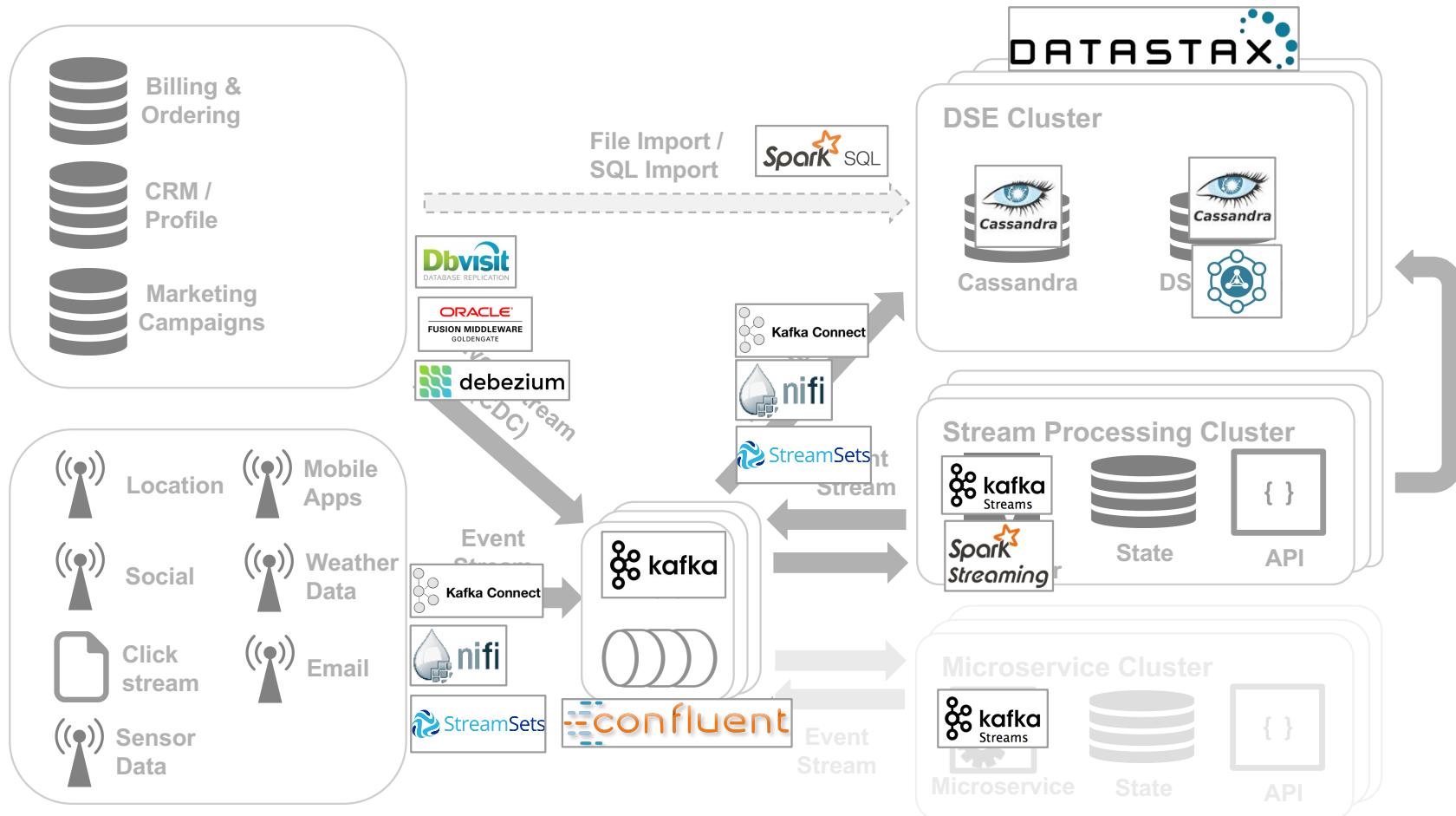


Batch Insert (Groovy Script) into Social Network Graph

```
user = g.V().has('twitterUser', 'id', bUser.id).tryNext().orElseGet { g.addV('twitterUser').property('id', bUser.id).next() }
user.property('name',bUser.name)
user.property('language',bUser.language)
user.property('verified',bUser.verified)
tweet = g.V().has('tweet', 'id', bTweet.id).tryNext().orElseGet { g.addV('tweet').property('id', bTweet.id).next() }
tweet.property('timestamp',bTweet.timestamp)
tweet.property('language',bTweet.language)
if (!g.V(user).out('publishes').hasId(tweet.id()).hasNext()) {
    publishes = g.V(user).as('f').V(tweet).as('t').addE('publishes').from('f').next()
}
i = 0
Vertex[] term = new Vertex[10]
for (Object keyValue : bTerm.propertyKeyValues) {
    term[i] = g.V().has('term', 'name', keyValue).tryNext().orElseGet { g.addV('term').property('name', keyValue).next() }
    Map<String, Object> params = bTerm.params[i]
    if (params != null)
        for (String key : params.keySet()) {
            term[i].property(key, params.get(key))
        }
    i++
}
Edge[] usesTerm = new Edge[10]
for (i = 0; i < bUsesTerm.count; i++) {
    if (!g.V(tweet).out('uses').hasId(term[i].id()).hasNext()) {
        usesTerm[i] = g.V(tweet).as('f').V(term[i]).as('t').addE('uses').from('f').next()
    }
    Map<String, Object> params = bUsesTerm.params[i]
    if (params != null)
        for (String key : params.keySet()) {
            usesTerm[i].property(key, params.get(key))
        }
}
return nof
```



Real-Time Data Ingestion into Customer Event Hub

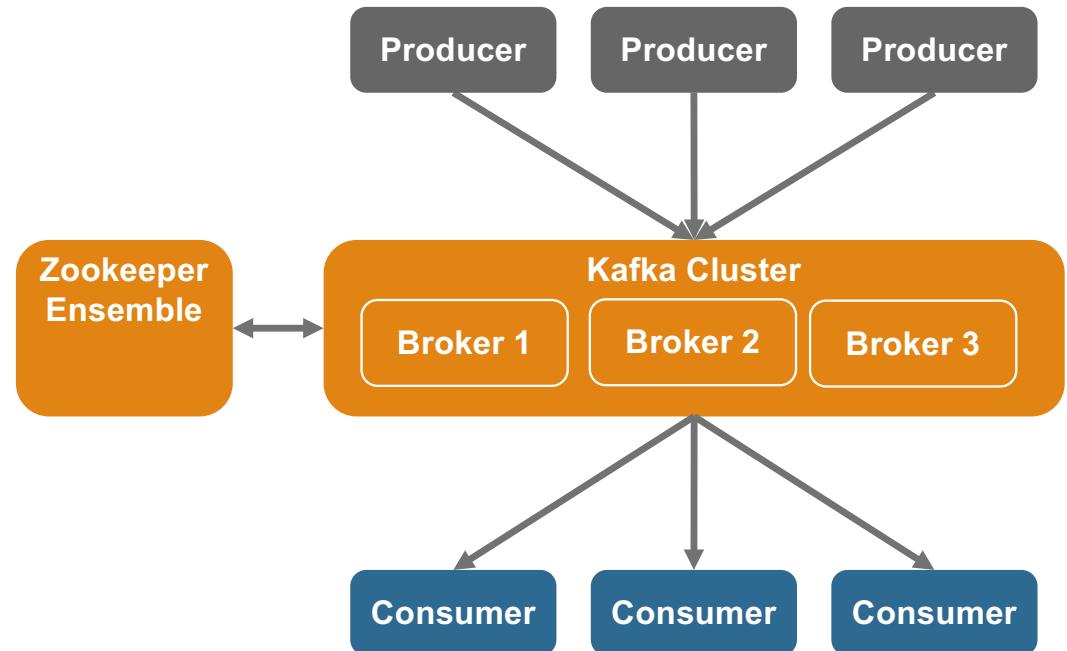


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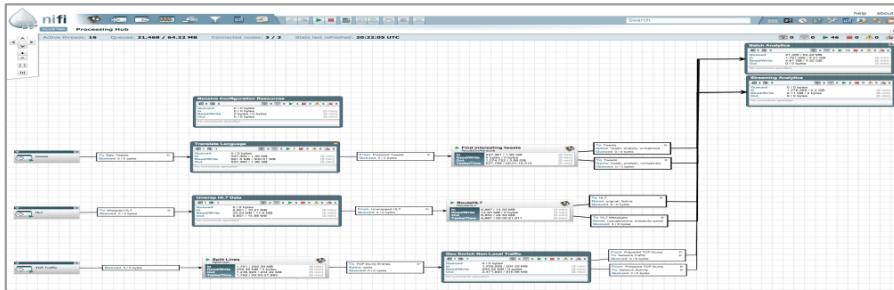
■ Event Hub with Apache Kafka

- Publish-subscribe messaging system
- Designed for processing high-volume, real time activity stream data (logs, metrics, social media, ...)
- Stateless (passive) architecture, offset-based consumption
- Initially developed at LinkedIn, now part of Apache
 - Peak Load on single cluster: 2 million messages/sec, 4.7 Gigabits/sec inbound, 15 Gigabits/sec outbound

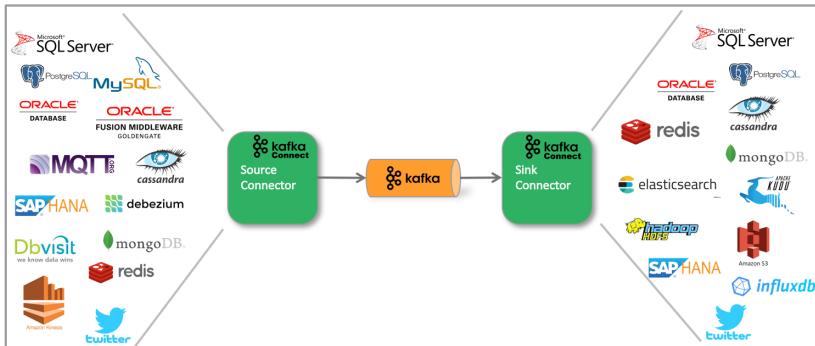


Declarative Dataflow Definition & Execution

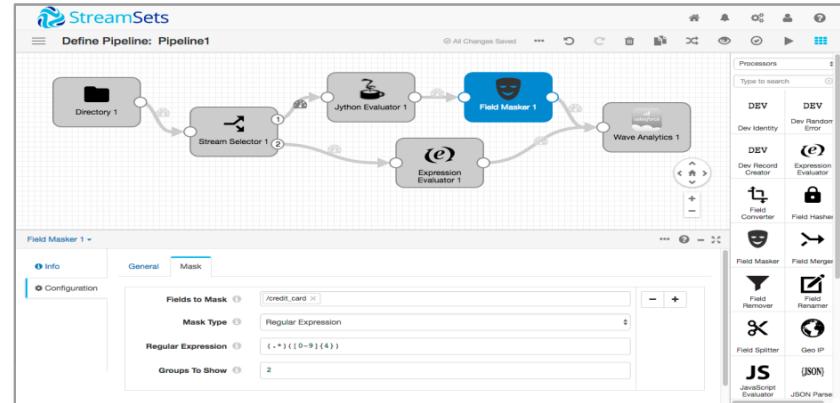
Apache NiFi



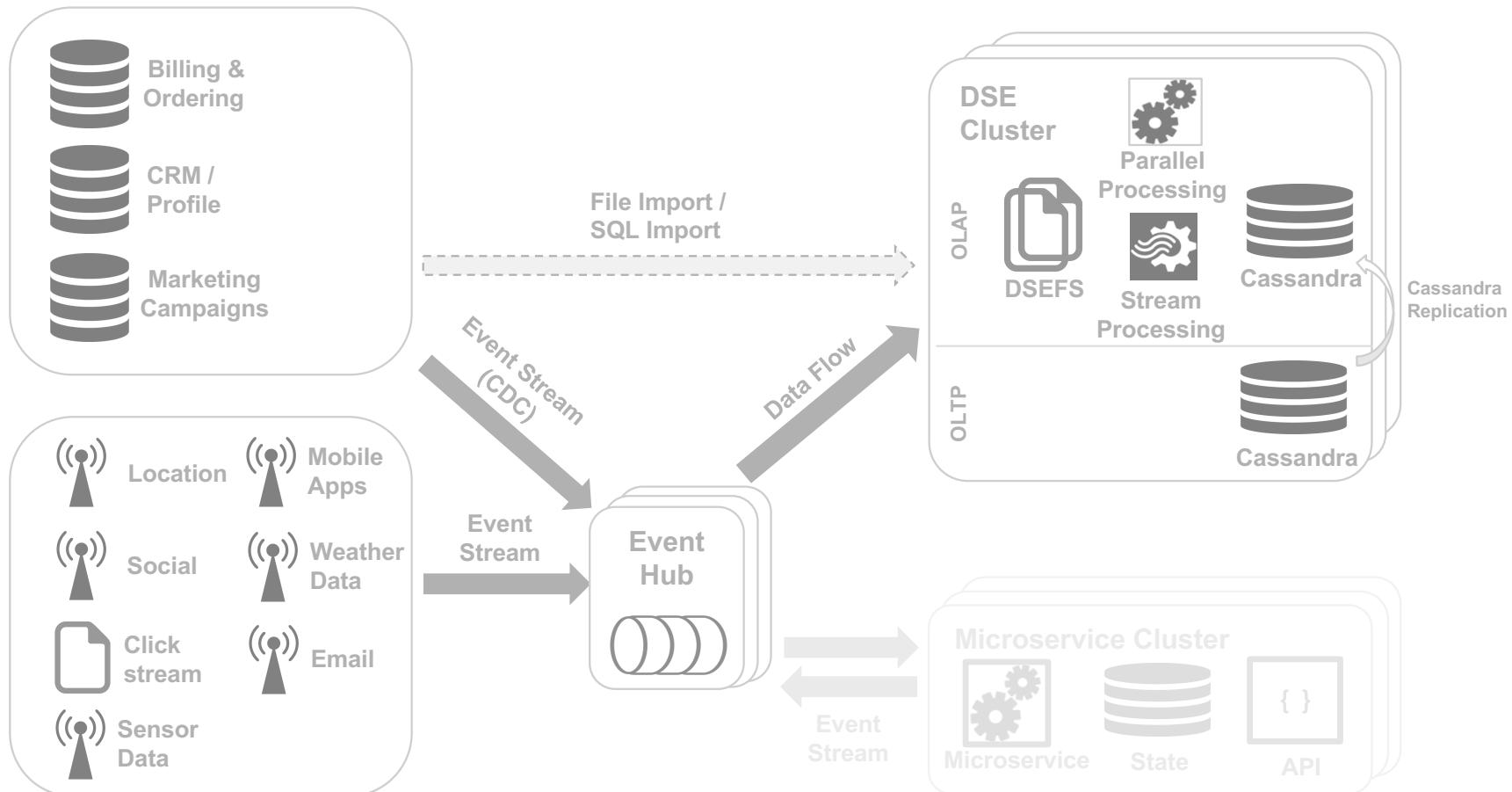
Kafka Connect



StreamSets

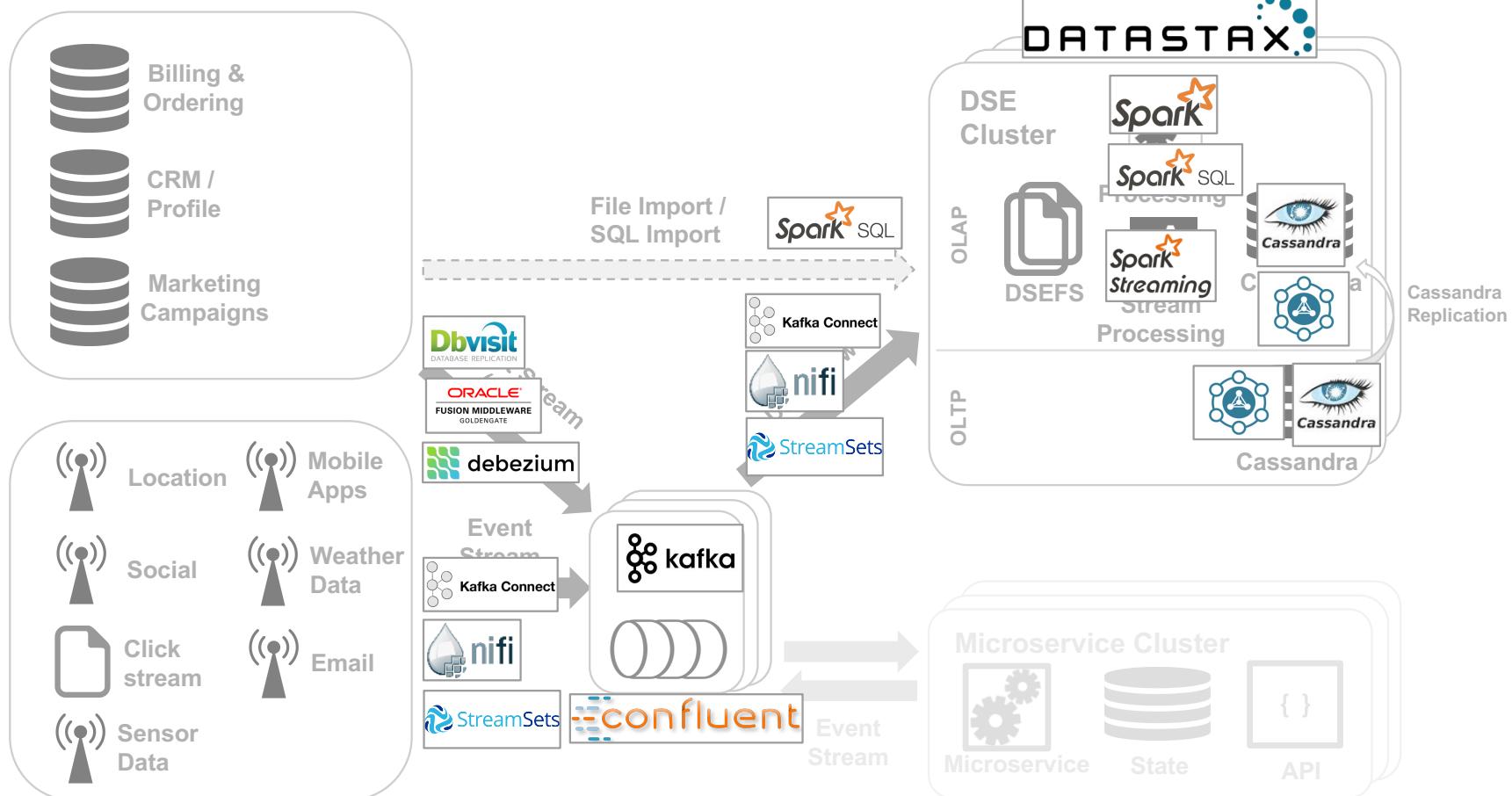


Real-Time Data Ingestion into Customer Event Hub



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Real-Time Data Ingestion into Customer Event Hub



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■ The End ...



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Guido Schmutz
Technology Manager

guido.schmutz@trivadis.com



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