CLICKSTREAM ANALYSIS WITH SPARK – UNDERSTANDING VISITORS IN REAL-TIME

Dr. Josef Adersberger
QAware GmbH, Germany

SPARK SUMMIT EAST
DATA SCIENCE AND ENGINEERING AT SCALE
FEBRUARY 16-18, 2016 NEW YORK CITY

THE CHALLENGE

One Kettle to Rule 'em All

Web Tracking

- Clicks & Views
- Conversions

Ad Tracking

- Ad Impressions
- Ad Costs

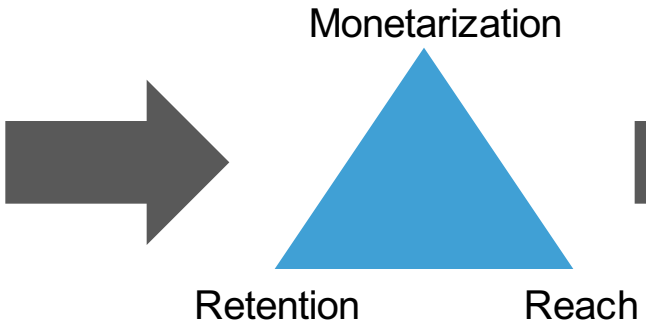
- Products
- Inventory
- Margins

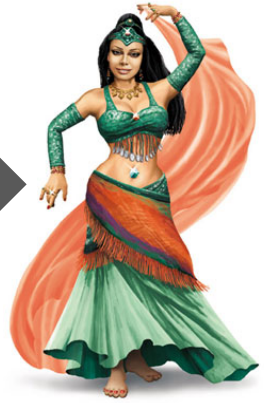
ERP

- Customer
- Orders
- Creditworthiness

CRM

One Kettle to Rule ‘em All



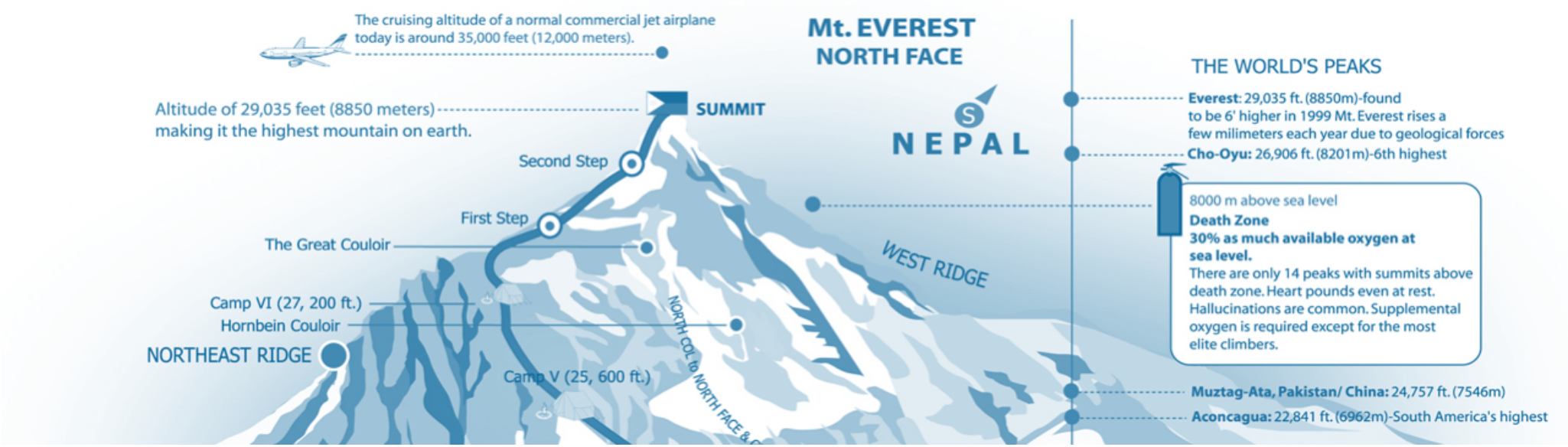


steer …

- Campaigns
- Offers
- Contents

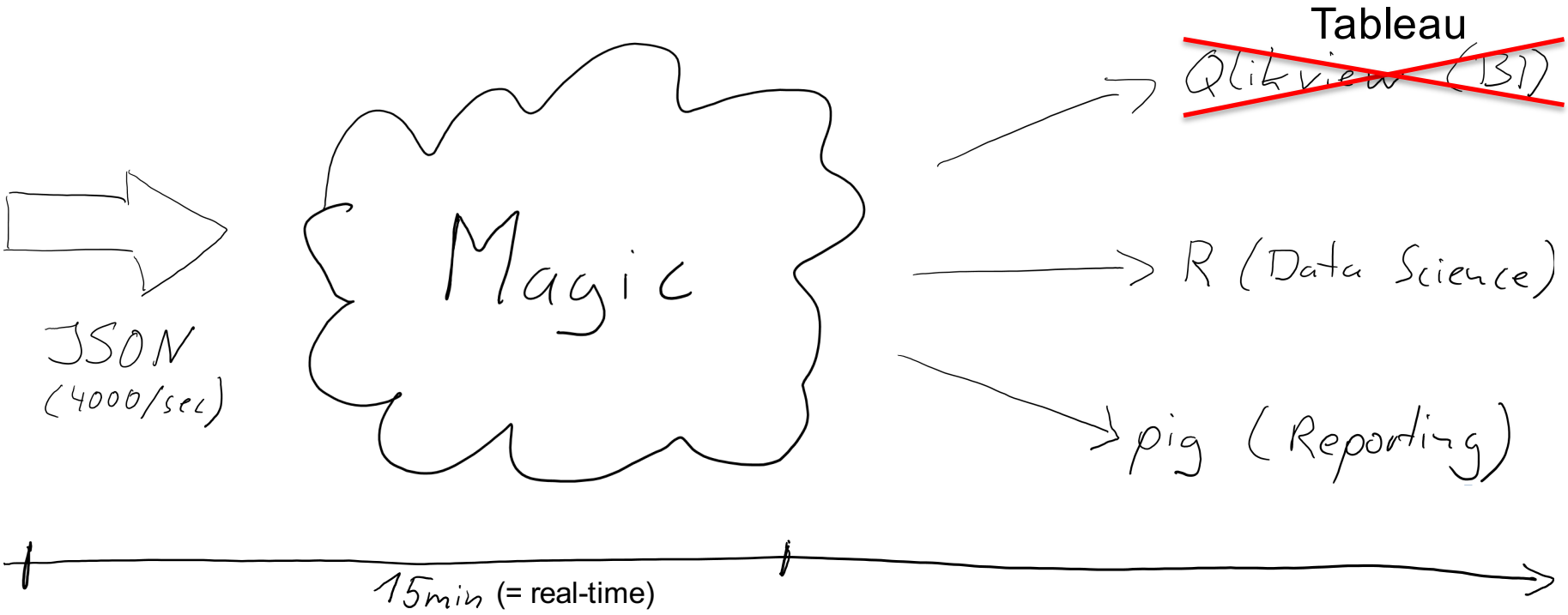
. . . in real-time

THE CONCEPTS



by Randy Paulino

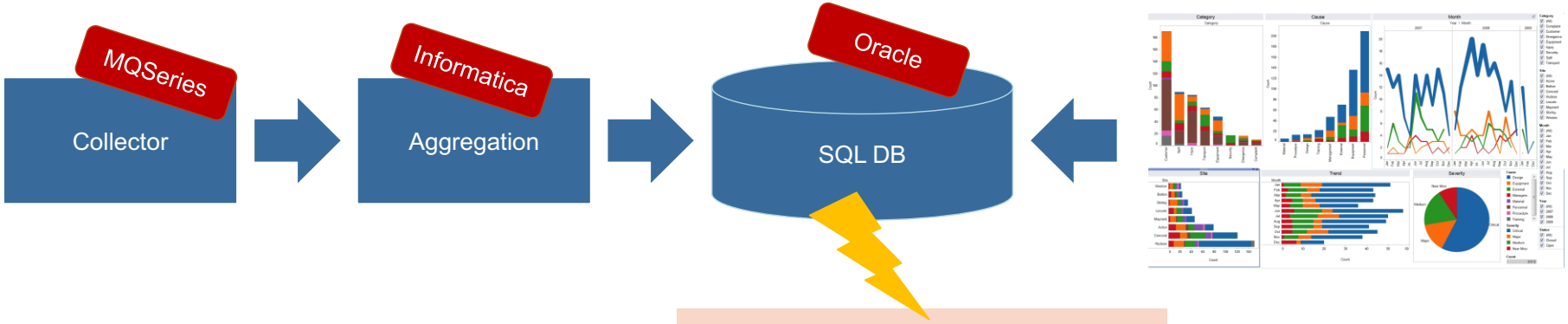
The First Sketch




Magic

THE ARCHITECTURE

„Larry & Friends“ Architecture

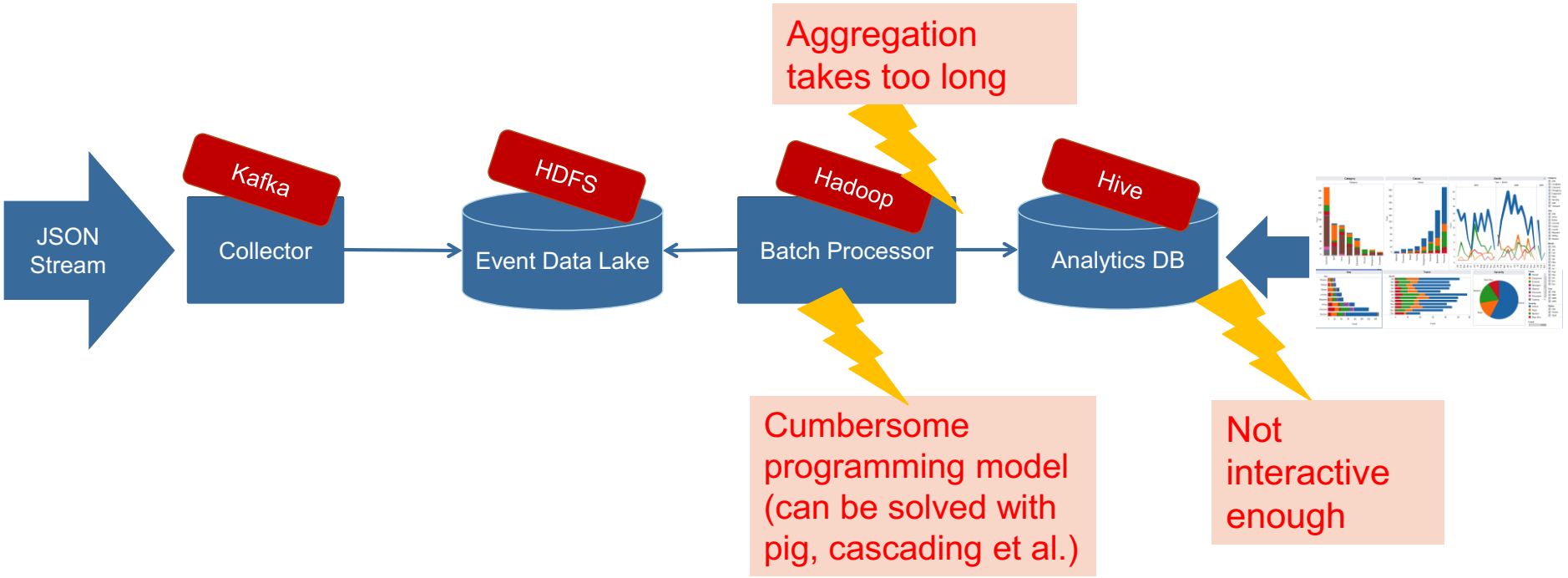


Runs not well for more than 1 TB data in terms of ingestion speed, query time and optimization efforts

Nope.
Sorry, no Big Data.

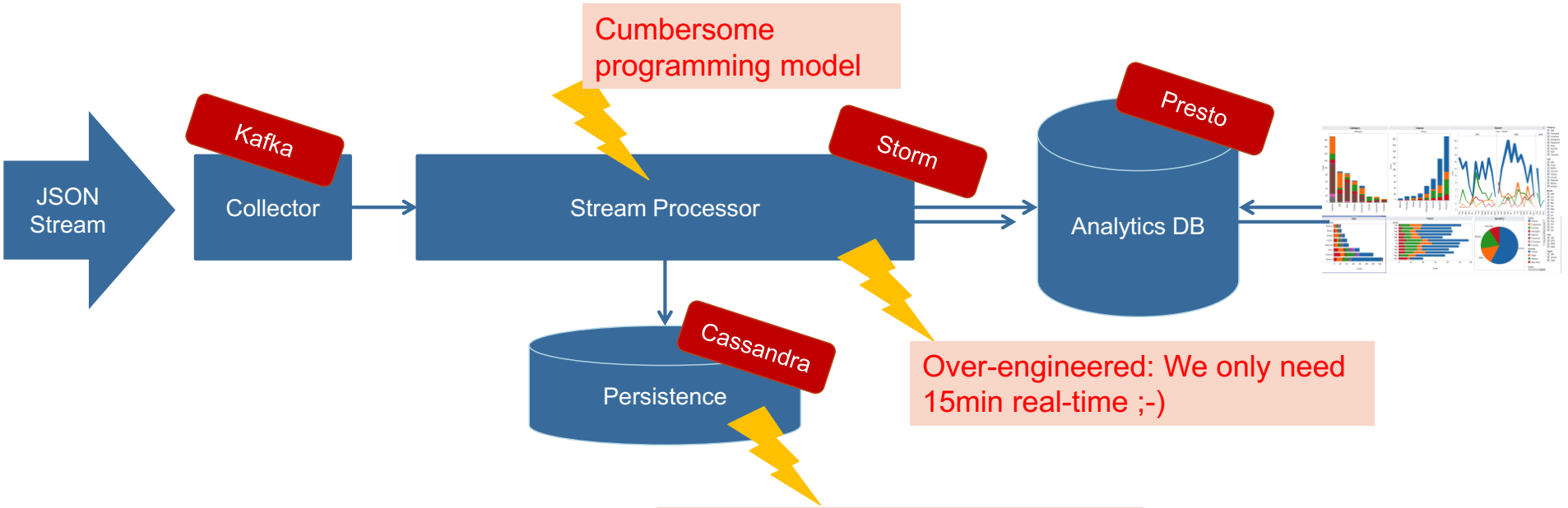
by adweek.com

„Hadoop & Friends“ Architecture

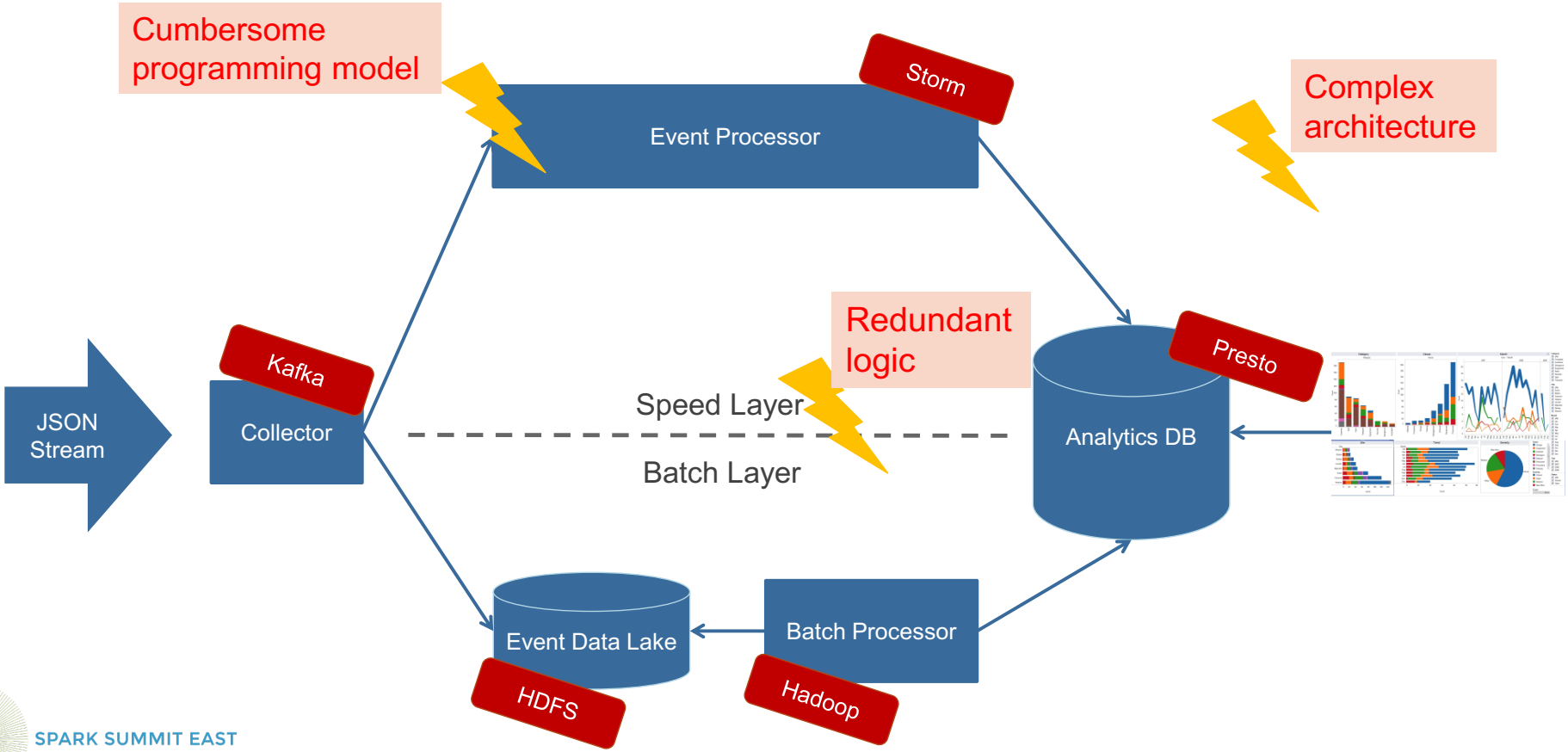



Nope.
Too sluggish.

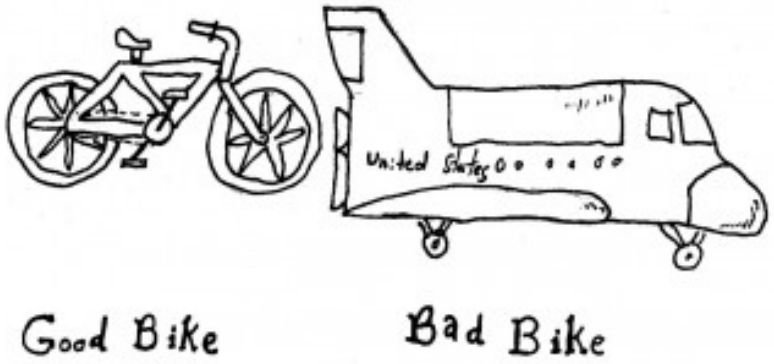
κ-Architecture



λ-Architecture



Feels Over-Engineered…



http://www.brainlazy.com/article/random-nonsense/over-engineered


The Final Architecture*
*) Maybe called µ-architecture one day ;-)

Functional Architecture

- Fault tolerant message handling
- Event handling: Apply schema, time-partitioning, De-dup, sanity checks, pre-aggregation, filtering, fraud detection
- Tolerates delayed events
- High throughput, moderate latency (~ 1min)

- The representation of truth
- Multidimensional data model
- Interactive queries for actions in realtime and data exploration

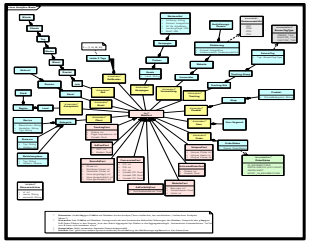
Master Data Integration

Collection → Raw Event Stream → Ingestion → Atomic Event Frames → Data Lake (*Events*, *Strange Events*) → Processing → Fact Entries → Analytics Warehouse

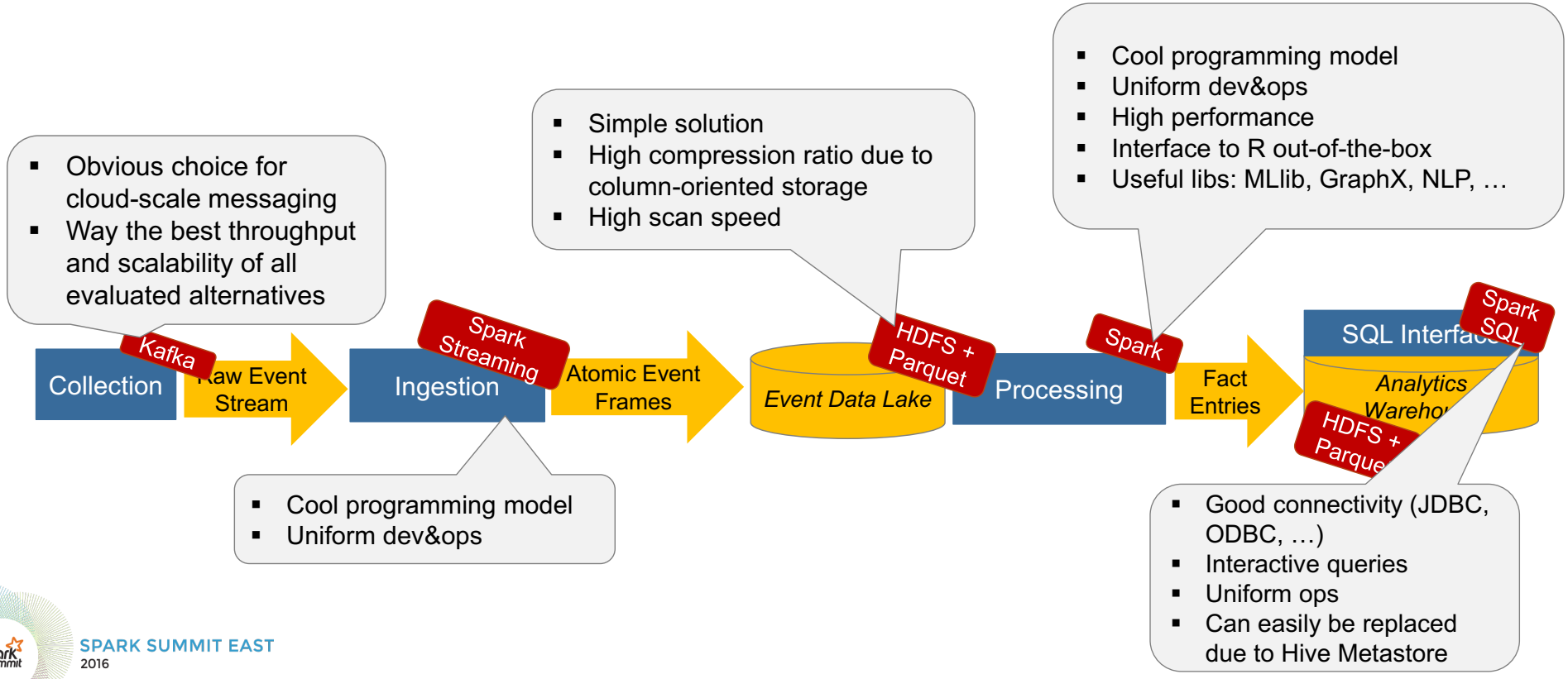
- Buffers load peeks
- Ensures message delivery (fire & forget for client)

- Eternal memory for all events (even strange ones)
- One schema per event type. Time partitioned.

- Create user journeys and unique user sets
- Enrich dimensions
- Aggregate events to KPIs
- Ability to replay for schema evolution



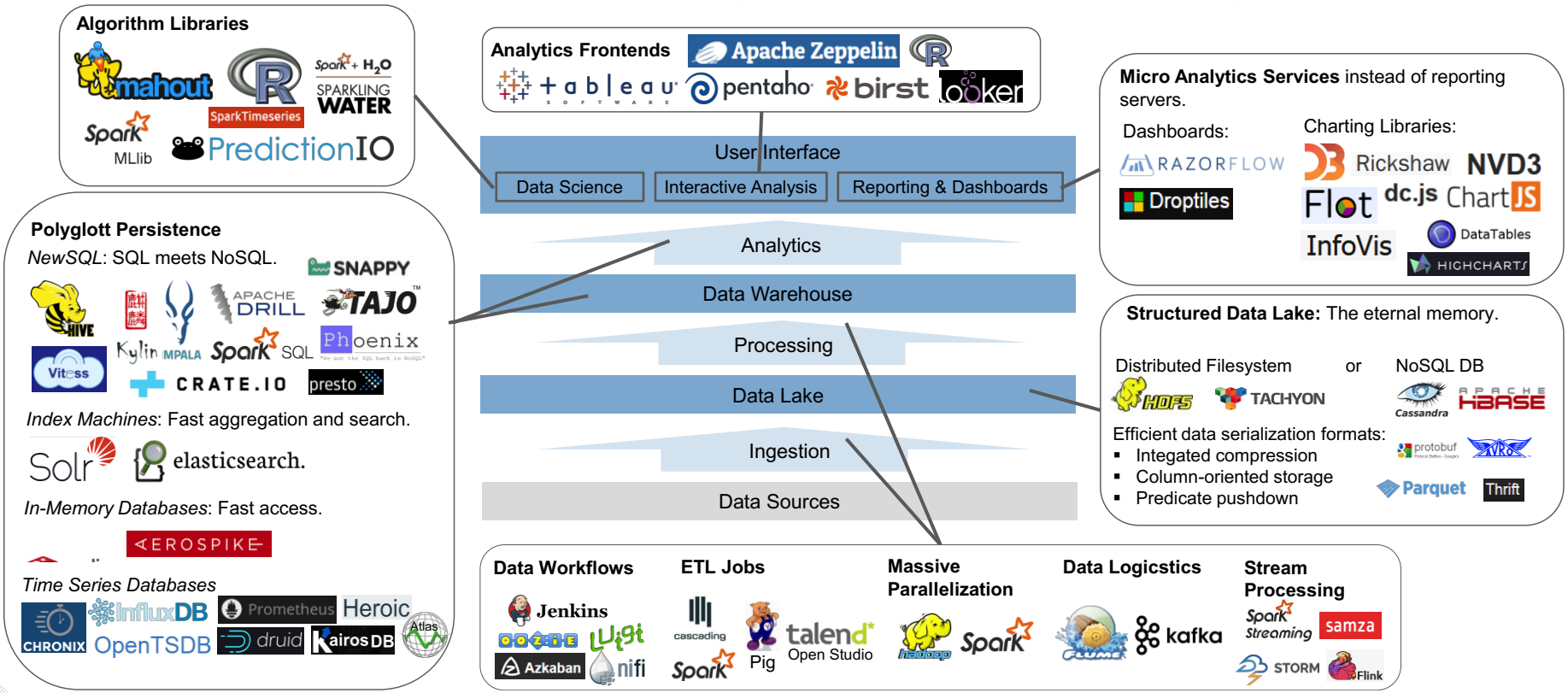
Series Connection of Streaming and Batching - all based on Spark.



LESSONS LEARNED

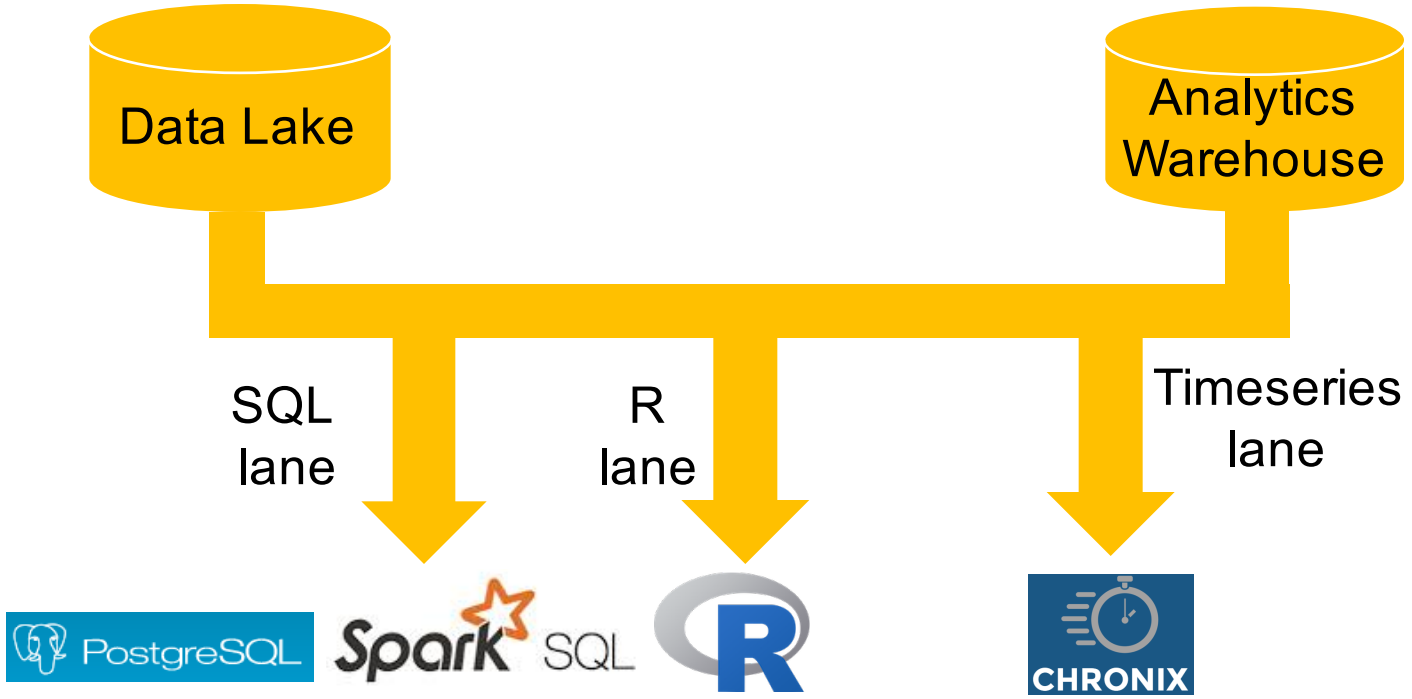
by: http://hochmeister-alpin.at

Technology Mapping

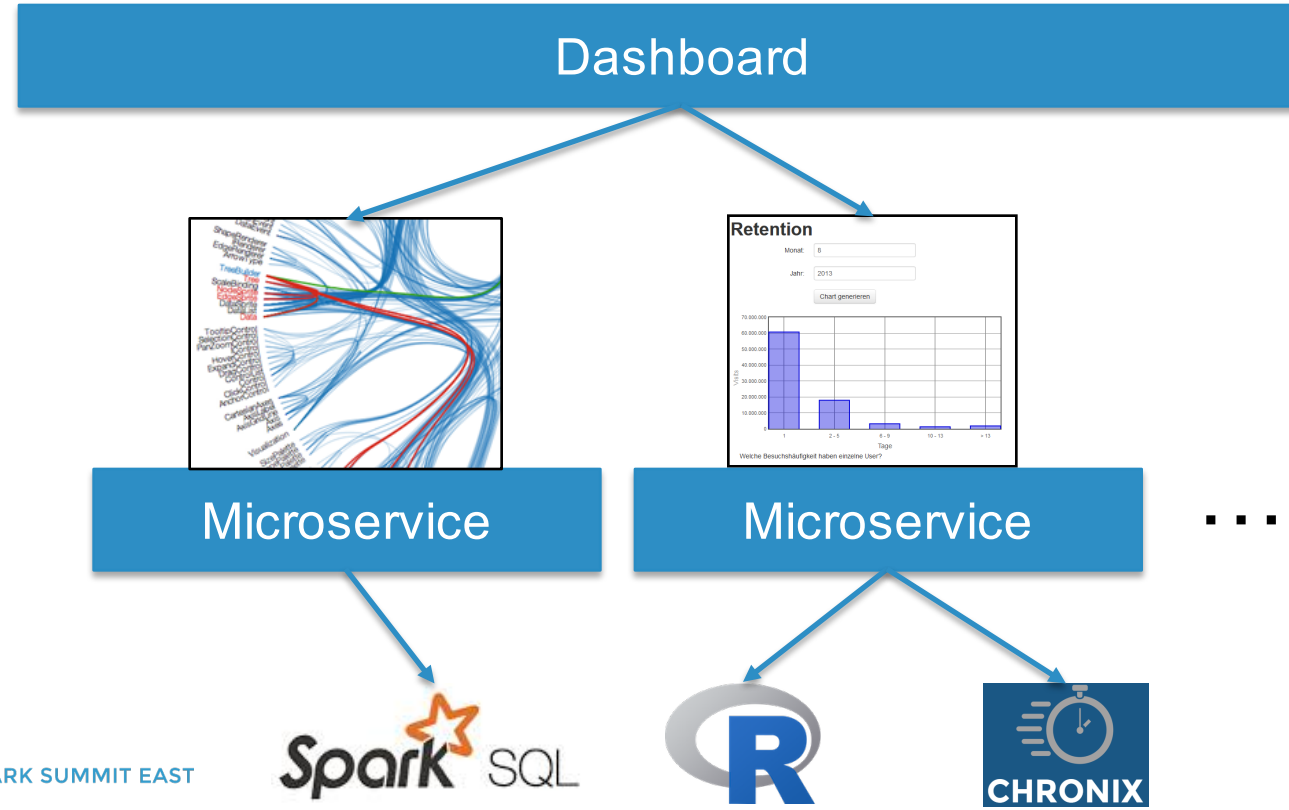


https://github.com/qaware/big-data-landscape

Polyglott Analytics

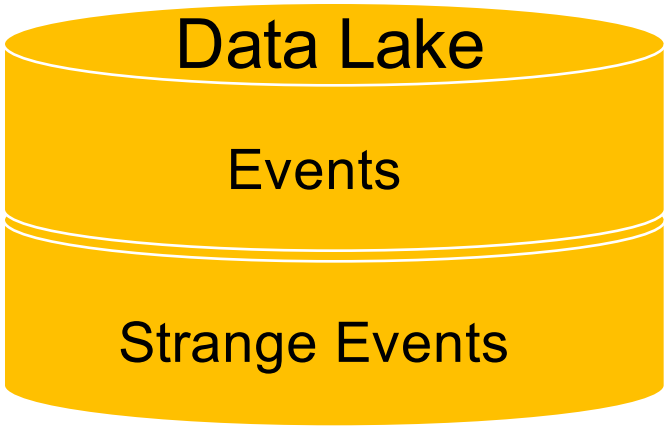


Micro Analytics Services



RAZORFLOW
Droptiles
Rickshaw
NVD3
Flot
dc.js
ChartJS
InfoVis
DataTables
HIGHCHARTS
spring boot

No Retention Paranoia

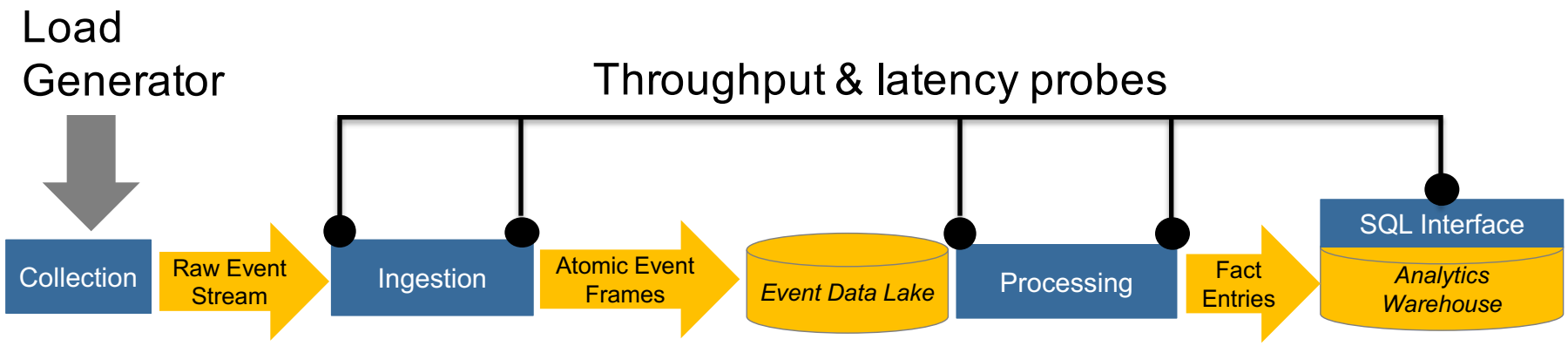


- Eternal memory
- Close to raw events
- Allows replays and refills into warehouse

Aggressive forgetting with clearly defined retention policy per aggregation level like:

- 15min:30d
- 1h:4m
- …

Continuous Tuning



In Numbers

Overall dev effort until the first release: **250 person days**

Dimensions: **10**

KPIs: **26**

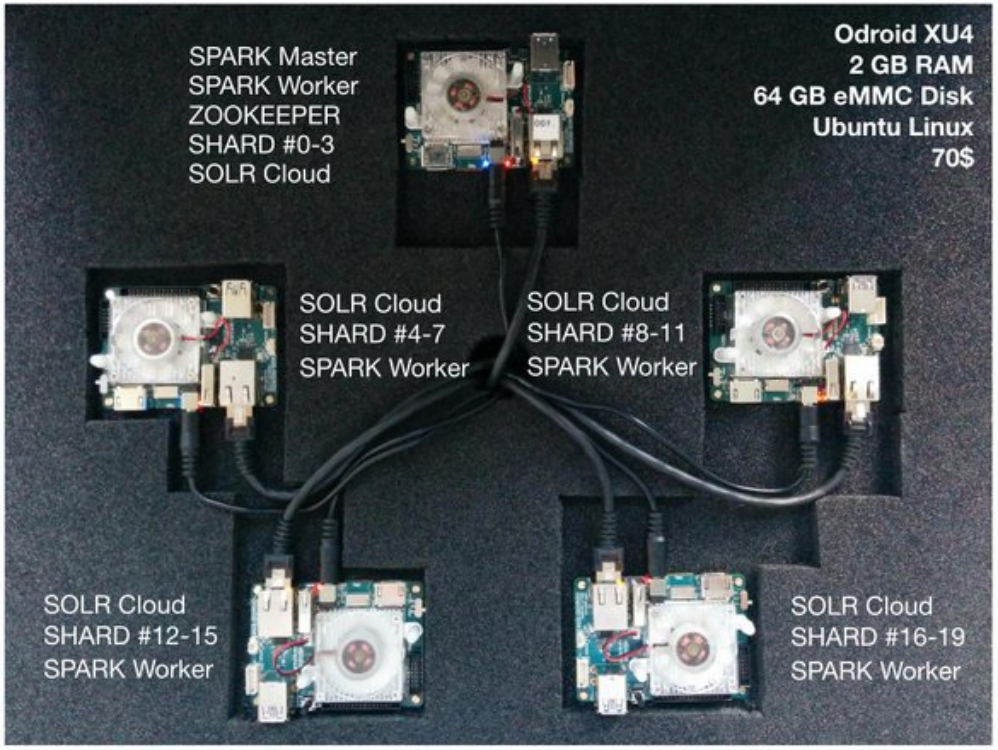
Integrated 3rd party systems: **7**

Inbound data volume per day: 80GB

New data in DWH per day: 2GB

Total price of cheapest cluster which is able to handle production load:

Your own Datacenter (less than 500$)



40 Cores
10 GB RAM
320 GB total disk

ODROID Hardkernel

Odroid XU4
2 GB RAM
64 GB eMMC Disk
Ubuntu Linux
70$

QAWARE SOFTWARE ENGINEERING

THANK YOU.

@adersberger

josef.adersberger@qaware.de

Download slides

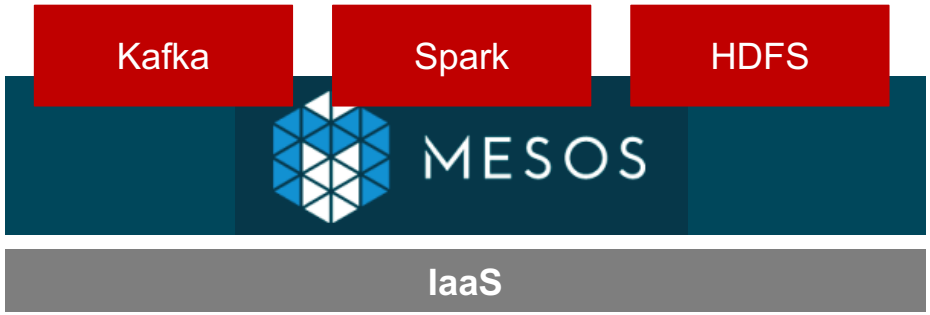
QAWARE

SPARK SUMMIT EAST

DATA SCIENCE AND ENGINEERING AT SCALE

FEBRUARY 16-18, 2016 NEW YORK CITY

Bonus Topic: Roadmap

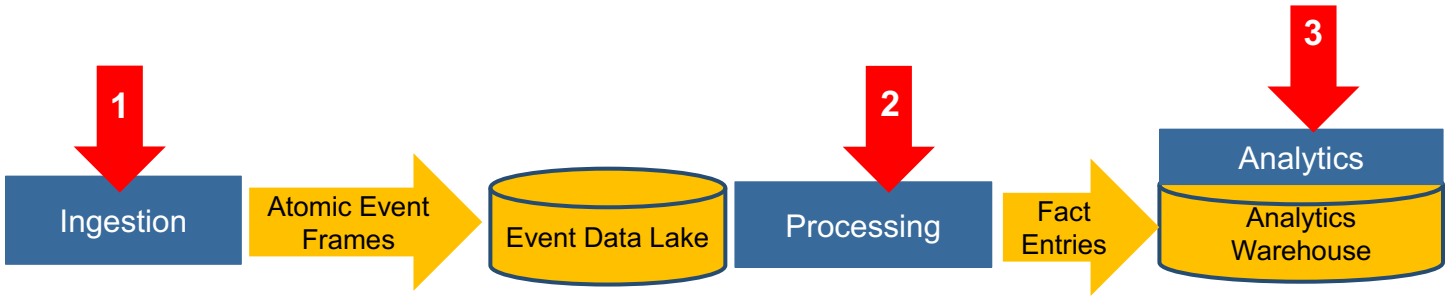


Simplify Ops with Mesos

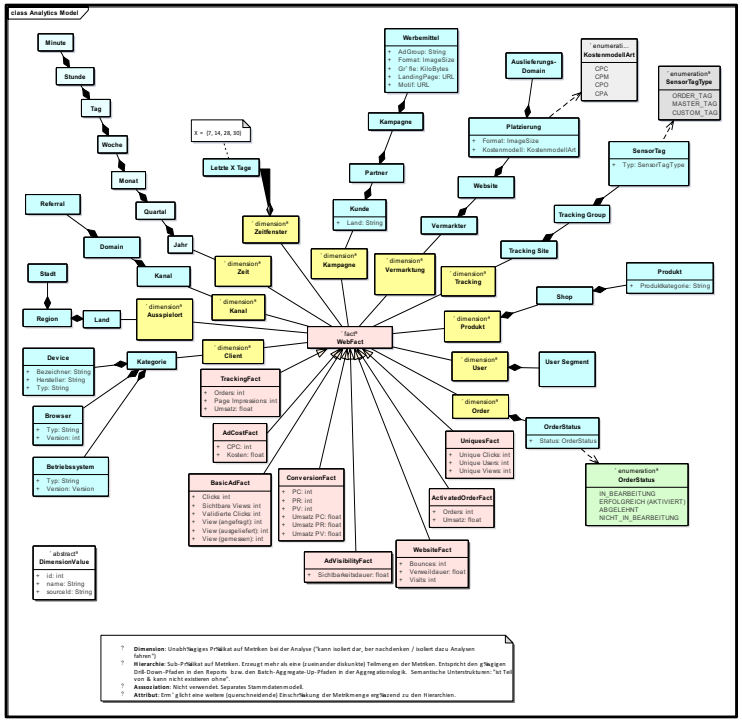
Faster aggregation & easier updates with Spark-on-Solr

http://qaware.blogspot.de/2015/06/solr-with-sparks-or-how-to-submit-spark.html

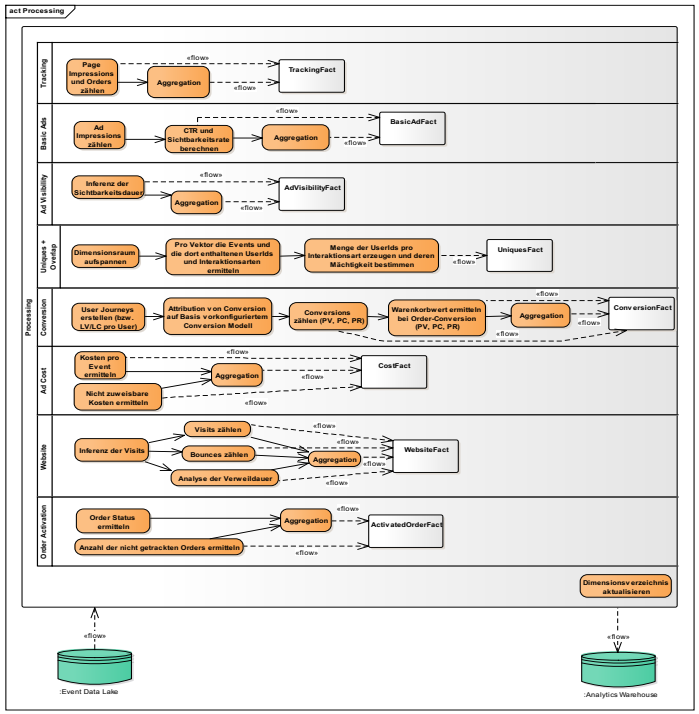
Bonus Topic: Smart Aggregation



Architecture follows requirements



Multidimensional Data Model



Data Processing Workflow

Sample results