

SMART DATA FAST.<sup>TM</sup>



# In-Memory Database Drives Business Innovation

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# OUR SPEAKERS



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**Business growth and speed are changing the need for real-time data access....**

# Data is the new ....



**Currency**



**Oil**



**Bacon**

**Is driving todays  
business strategy..**

However data explosion means more cost, slower data access and increasing data challenges...



Video



sensors



IOT

**3.5ZB**

of data is on the  
public net

BIG DATA



social



Cloud



mobile

A photograph of two men in an office environment. One man, wearing glasses and a blue shirt, is pointing at a computer monitor. The other man, also in a blue shirt, is looking towards the screen. The background shows office cubicles and fluorescent lighting.

Challenge

**Businesses think of analytics as a set of boring historical reports and dashboards... they don't want yesterdays data tomorrow...**

Real-time has been evolving over the years to support many use cases.. but has been challenging to develop and deploy....

Stock market



Ticketing



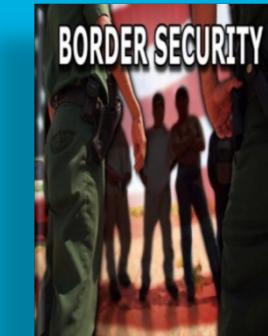
Banking



eCommerce



Fraud Detection

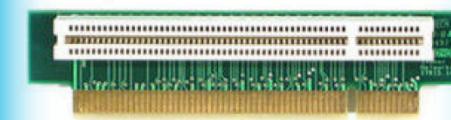


# What is driving the need for faster real-time access to information?

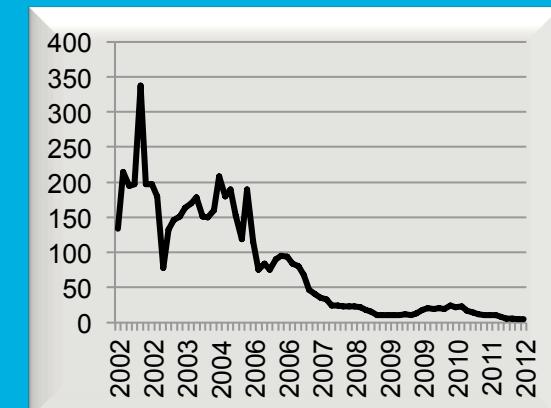
- Mobile devices – we need data now!
- New sensors that tracks information in real-time
- Competitive pressure – to act more quickly
- Push from business to support real-time data access
- New insights, advanced analytics
- And others...

# What technology has changed that's helping with real-time?

- Falling memory (DRAM) prices – from over \$100K/GB in 1990 to less than \$1/GB today.
- Support for SSD/Flash along with Disks
- Organizations are already running a few Terabytes of in-memory and we are heading to petabytes by 2018+

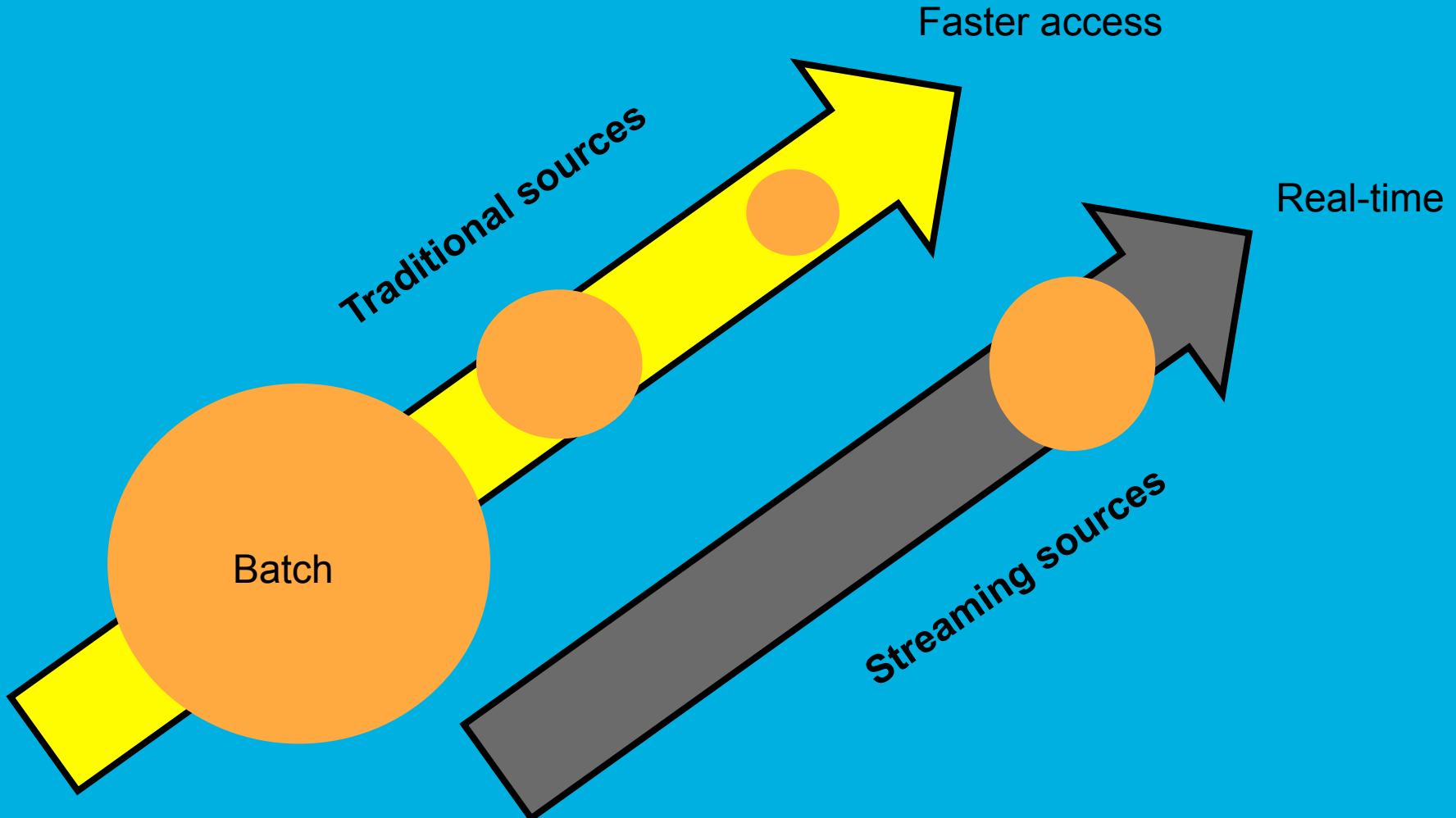


memory



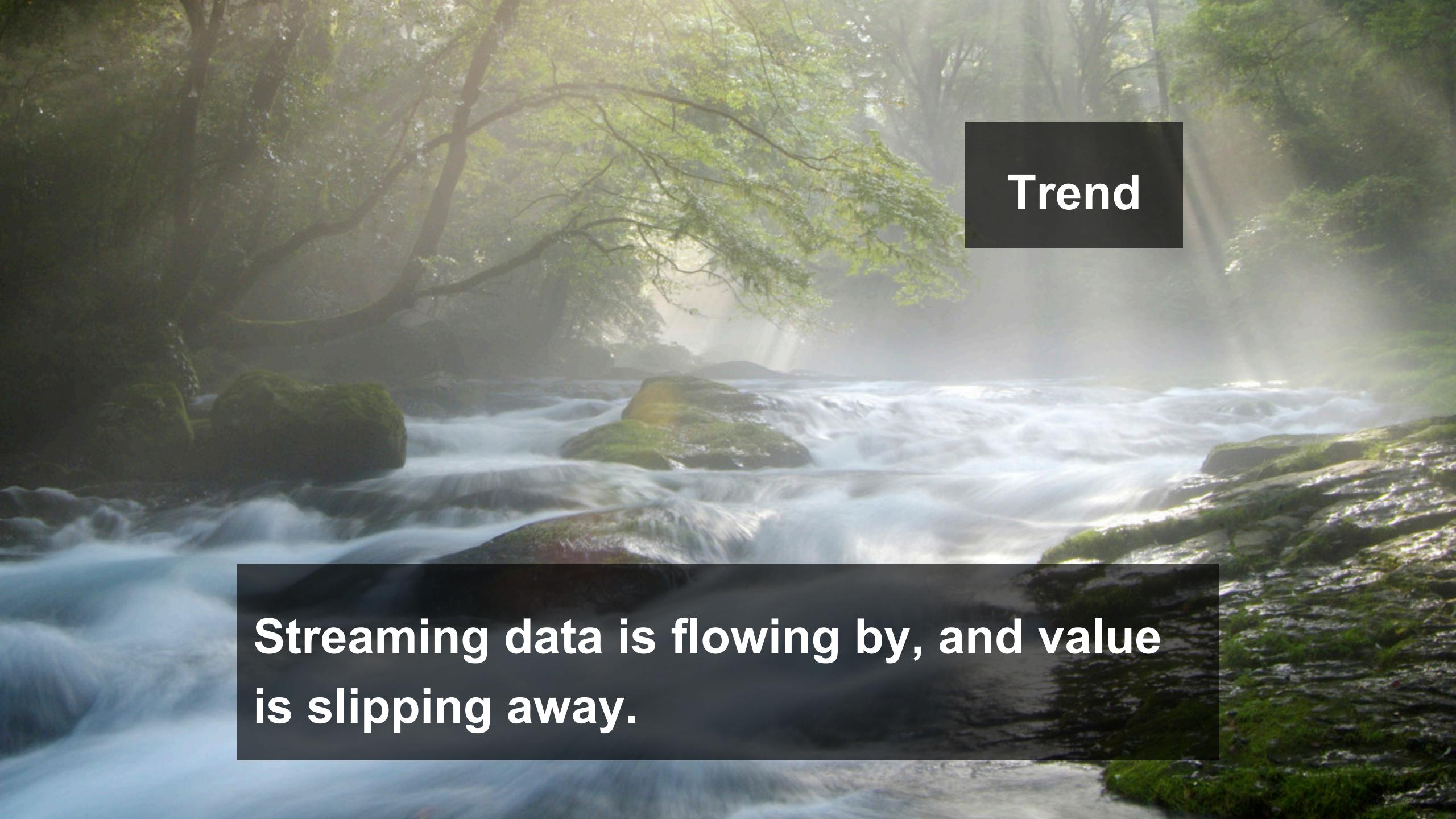
Falling memory prices

TREND: Two tracks support various real-time data access needs...



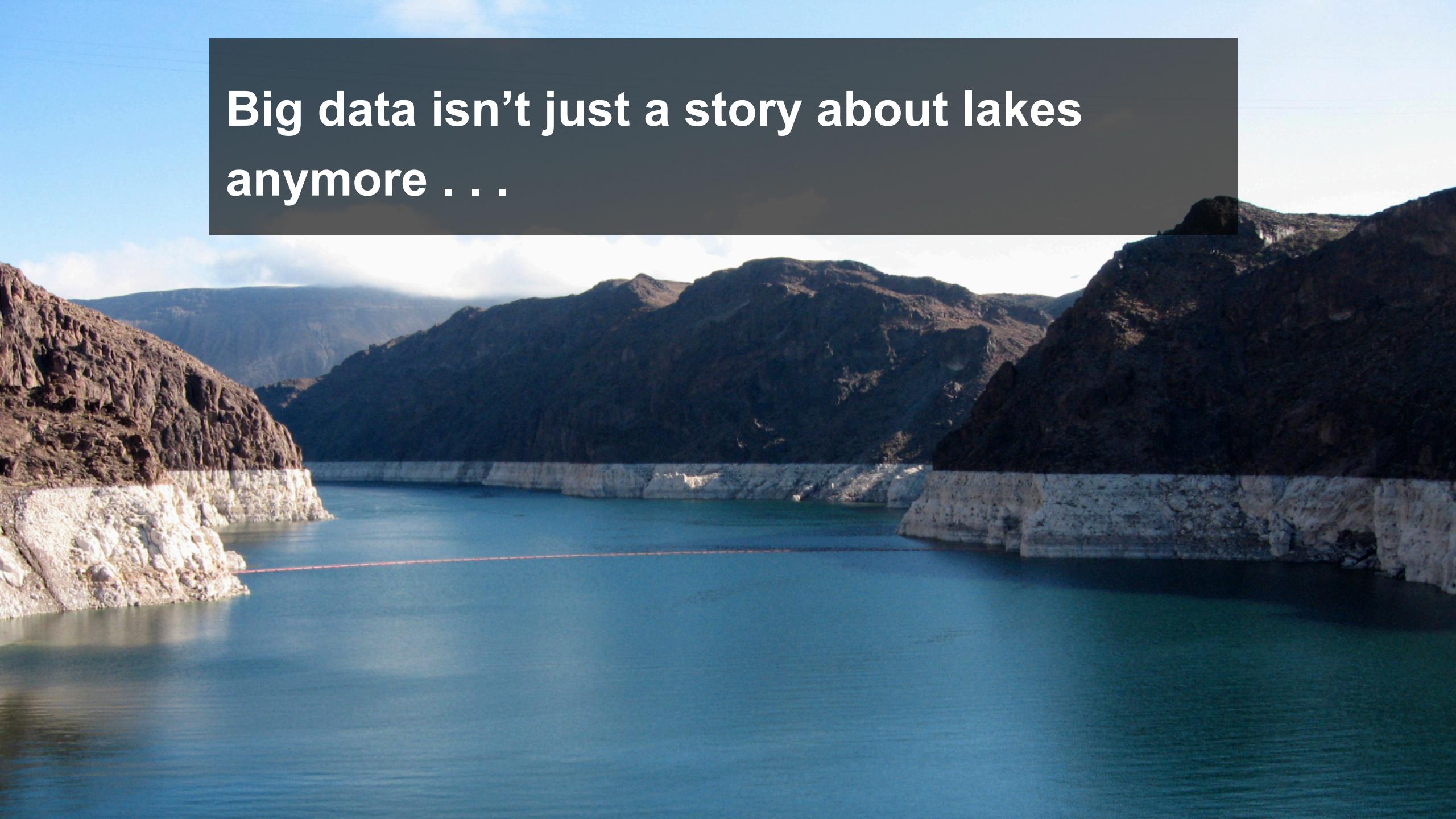
# Streaming Analytics

Software that can filter, aggregate, enrich, and analyze a high throughput of data from disparate live data sources to identify patterns to visualize business in real time, detect urgent situations, and automate immediate actions

A photograph of a river flowing through a dense forest. Sunlight filters through the trees, creating bright rays and a hazy atmosphere. The water is clear and flows over mossy rocks.

Trend

Streaming data is flowing by, and value  
is slipping away.

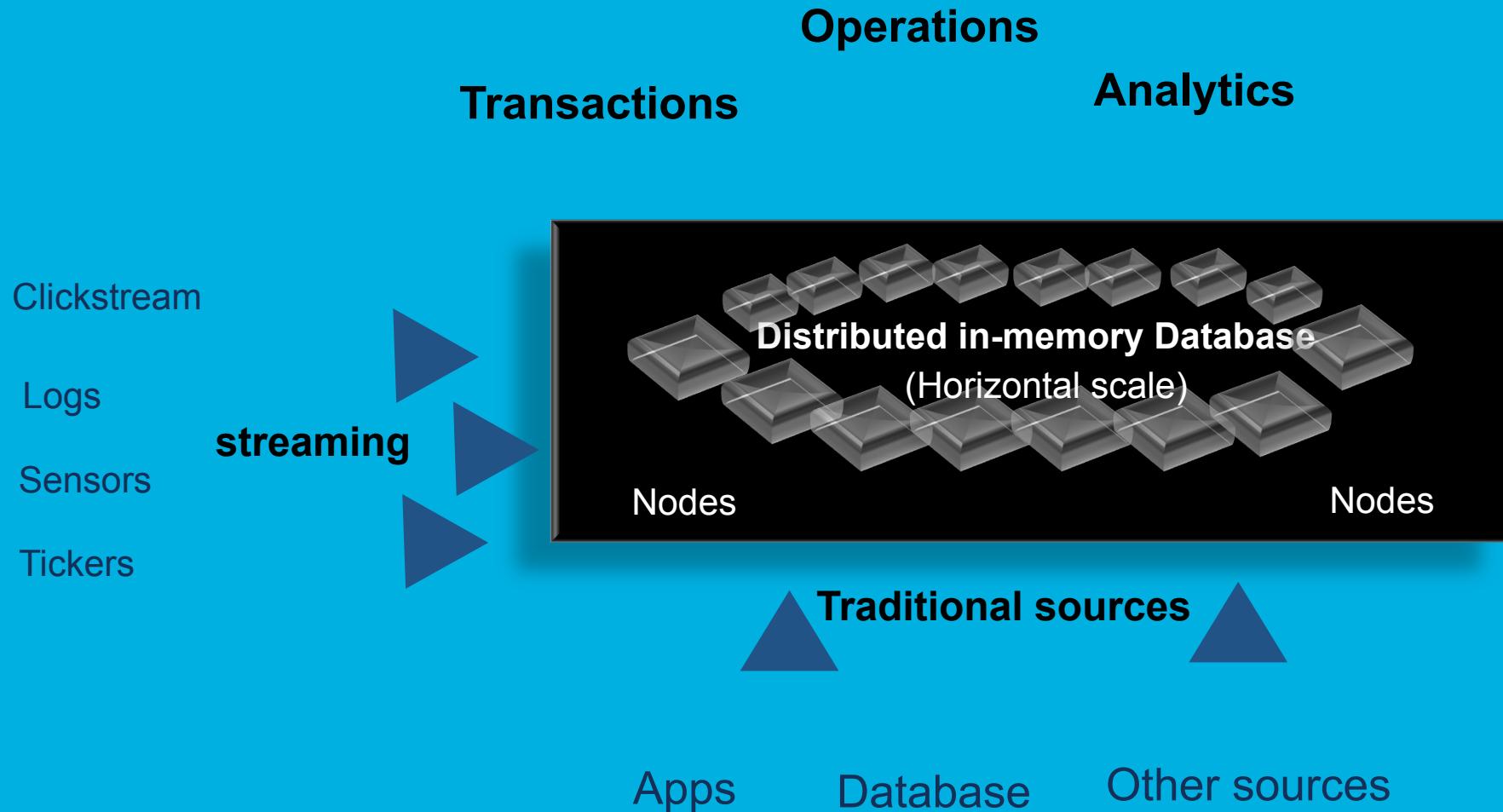


Big data isn't just a story about lakes  
anymore . . .



. . . It's about streams and raging torrents  
of information driving real-time Apps

# Distributed in-memory technology helps support much broader use cases



What use cases do in-memory databases support? Some of these cannot be done by just caching data...

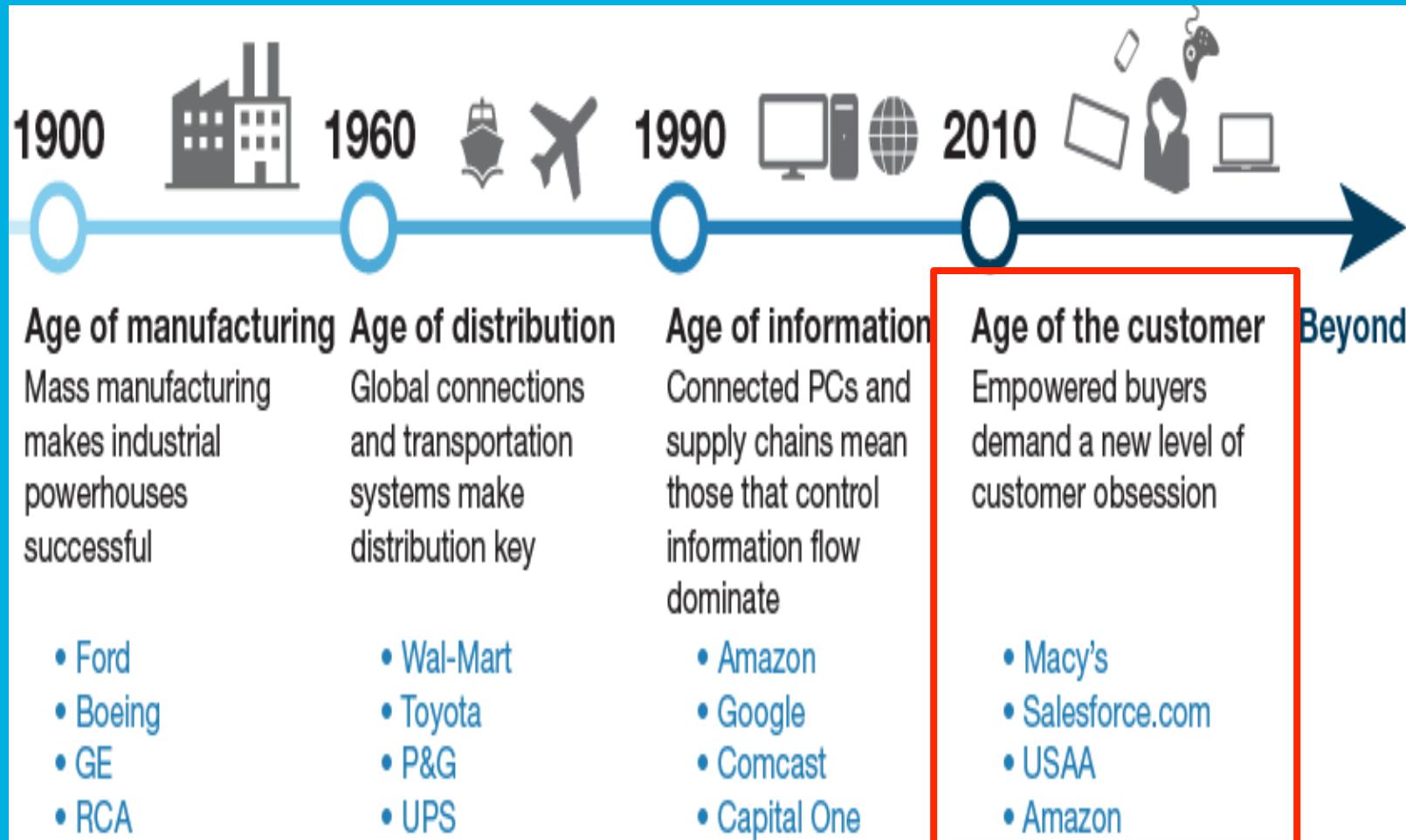
- **Age of the Customer – personalization**
- **IOT – machine analysis, proactive maintenance**
- Gaming – scores, ratings, store
- Fraud Detection – risk management, online trading
- Mobile Apps – Hotel reservations, inventory tracking
- And others...

A photograph of two young women with blonde hair, smiling broadly. They are holding shopping bags; one bag is light blue and white striped, and the other has a colorful, abstract pattern. The woman on the left is wearing a yellow and orange patterned top, and the woman on the right is wearing a red and yellow patterned top. The background is blurred, suggesting an indoor setting like a store.

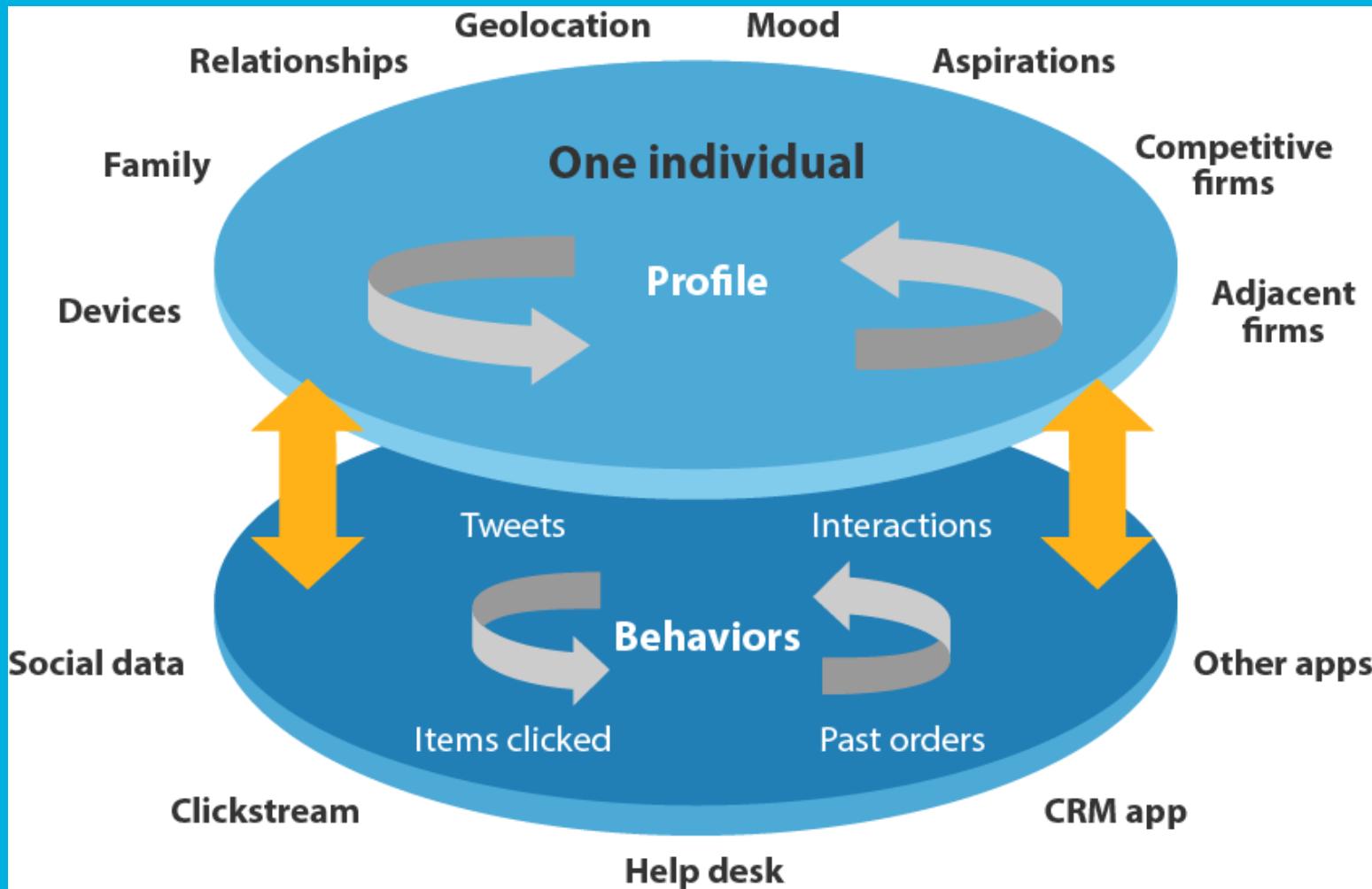
TREND

## Age of the Customer

# Age of the customer is driving the need for a real-time data platform....

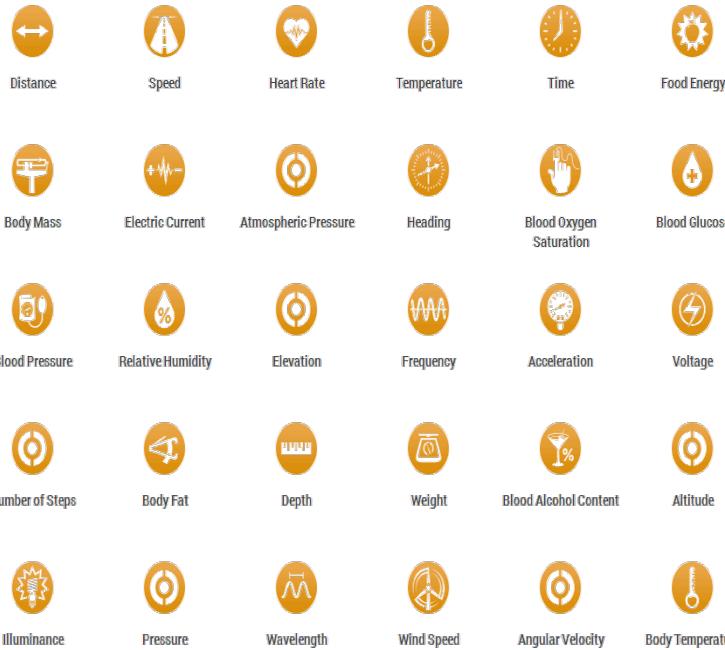


# Personalization needs real-time data..



Source: March 6, 2013, “The Future Of Customer Data Management” Forrester report

# IOT drives new types of use cases but requires a real-time data platform



IOT

**Cisco predicts 50 billion devices will be connected by 2020.**

**Forrester estimates 30% usage of IOT in manufacturing, will double by 2019.**

IOT Applications continue to grow – need for real-time data platform is critical for these Applications...

**Fleet management – Monitoring condition, location, and usage of vehicle fleets**

**Inventory management - Tracking inventory levels and managing operations**

**Facility management**

**Customer order and delivery tracking - Enabling customer visibility**

**Energy management - Monitoring, usage of water, electricity, and other resources**

**Smart products**

**Supply chain management - Managing supply chain relationships**

**Smart home management**

**Industrial asset management**

**Security and public safety monitoring or surveillance**

IOT adoption strong in APAC and with many planning in the next 24 months...

What are your firm's plans to adopt/implement M2M/Internet of Things solutions or applications?	APAC	Global
Implementing/Implemented	18%	10%
Piloting	5%	7%
Planning to implement in next 12 months	15%	12%
Planning to implement in next 12 to 24 months	20%	16%
Interested but no plans yet	21%	30%
Don't know/not interested	21%	25%

## What it means to the Business and IT?

Business

- Use in-memory data platform to innovate and become a disruptor.
- Intensify individualized digital experiences and look for new use cases
- Look for solutions that can support your current and near-term requirements

IT

- Look closely at vendor solutions that are low-cost, scalable and support broader use cases
- Focus on new use cases that need real-time data such as IOT, mobile, and analysis.
- Expand in-memory to support more data and use cases...it's a journey

# Thank you

**Noel Yuhanna**

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Twitter: @nyuhanna

SMART DATA FAST.<sup>™</sup>



VOLTDB

IN-MEMORY DATA PLATFORM FOR FAST  
DATA APPLICATIONS

# VOLTDB OVERVIEW

Co-founded by winner of the 2014 ACM Turing Award

Mike Stonebraker



Other Stonebraker Companies



## Technology

- In-Memory (but data is durable to disk)
- Scale-Out shared-nothing architecture
- Reliability and fault tolerance
- SQL + Java with ACID
- Hadoop and data warehouse integration
- Open source and commercially licensed (24X7)

## FAST

World Record Cloud Benchmark:

YCSB (Yahoo Cloud Serving Benchmark) - 2.4 million tps (transactions per second)

### Customers



# VISION

All businesses will compete on a new dimension – the ability to make decisions “in the moment” on Fast Data.

(Grab real-time data and output recommendations, decisions or analyses in milliseconds)

# PROBLEMS

Companies are not tapping the inherent value in fast data because it's too difficult/expensive.

*We make it simple, easy.*

# PROBLEMS

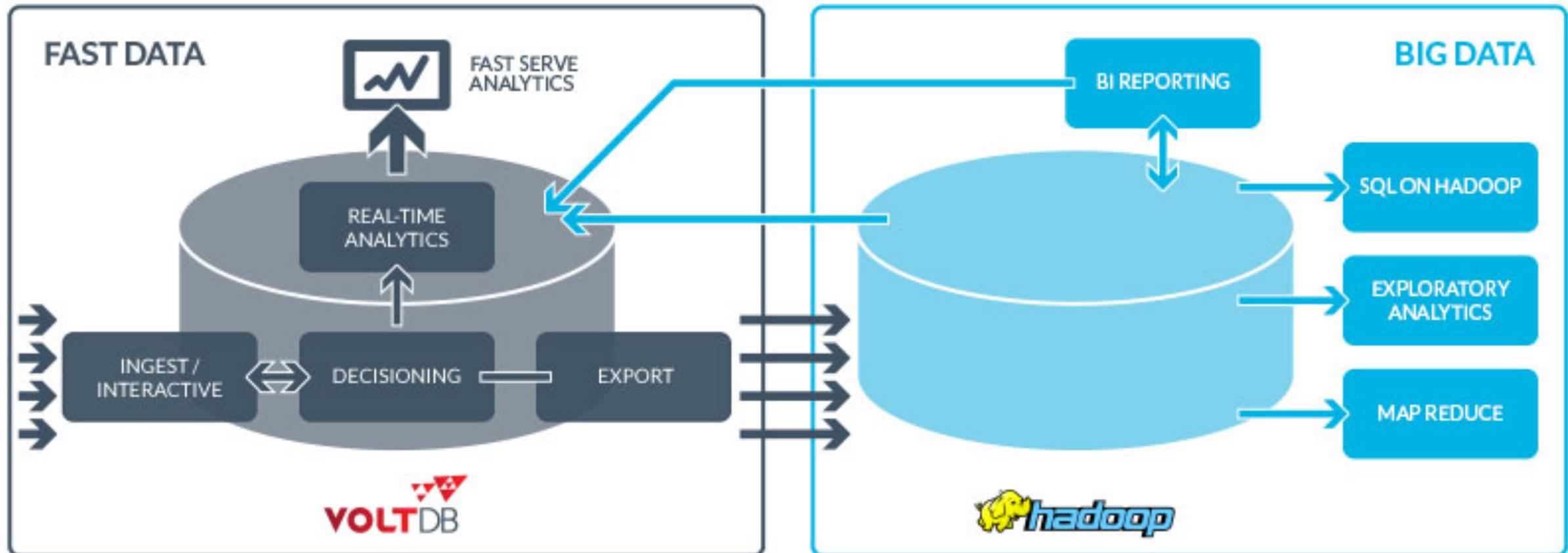
Companies hack together a bunch of different products that each sort of do different things, tinker and tinker with it, and only realize a small part of the opportunity.

*We're a single, integrated platform.*

# OUR COMPETITIVE ADVANTAGE

VoltDB is a new database platform designed to uniquely power fast data applications in a way not possible with existing technologies.

# NEW ENTERPRISE ARCHITECTURE: FAST + BIG



# ARCHITECTURE IS IMPORTANT....



Fast data requires a  
different architecture.

# VOLTDB: A SUPERIOR ARCHITECTURE FOR FAST DATA

- ✓ In-Memory performance
- ✓ ACID & SQL & Java
- ✓ Scale-out, shared nothing
- ✓ Reliability and fault tolerance
- ✓ Real-time analytics
- ✓ Hadoop integration



# FAST DATA INTEGRATIONS FOR IMPORT & EXPORT

## Importers

- Kafka Loader
- JDBC Loader
- Vertica Udx
- Apache Hive and Apache Pig



## Exporters

- HDFS Export to Hadoop via WebHDFS and HttpFS
- HTTP Export
  - Delivery and Alerting via HTTP post/get
- Message queue delivery: Kafka Export, RabbitMQ Export
- Export format configurable
  - Avro, CSV, TSV, and more...



# VOLTDB MANAGEMENT CENTER

## Admin

**VOLTDB**

DB Monitor Admin Schema SQL Query Help

Cluster Pause Promote Save Restore Shutdown Download Configuration Server

### Overview

Sites Per Host	8
K-Safety	0
Partition Detection	<input checked="" type="checkbox"/> On
▶ Security	<input type="checkbox"/> Off
▶ HTTP Access	<input checked="" type="checkbox"/> On
▶ Auto Snapshots	<input type="checkbox"/> Off
▼ Command Logging	<input checked="" type="checkbox"/> On
Log Frequency Time	200 ms
Log Frequency Transactions	2147483647
Log Size	1024 MB
▶ Export	

### Network Interfaces

Port Name	Server Settings	Cluster Settings
Client Port		21212
Admin Port		21211
HTTP Port		8080
Internal Port		3021
Zookeeper Port	127.0.0.1	7181
Replication Port		0

### Directories

Root (Destination)	voldboot
Snapshot	snapshots

## Query

**VOLTDB**

DB Monitor Admin Schema SQL Query Refresh

Tables Views Stored Procedures

AREA\_CODE\_STATE  
CONTESTANTS  
VOTES

Query

select \* from contestants;

Run Clear

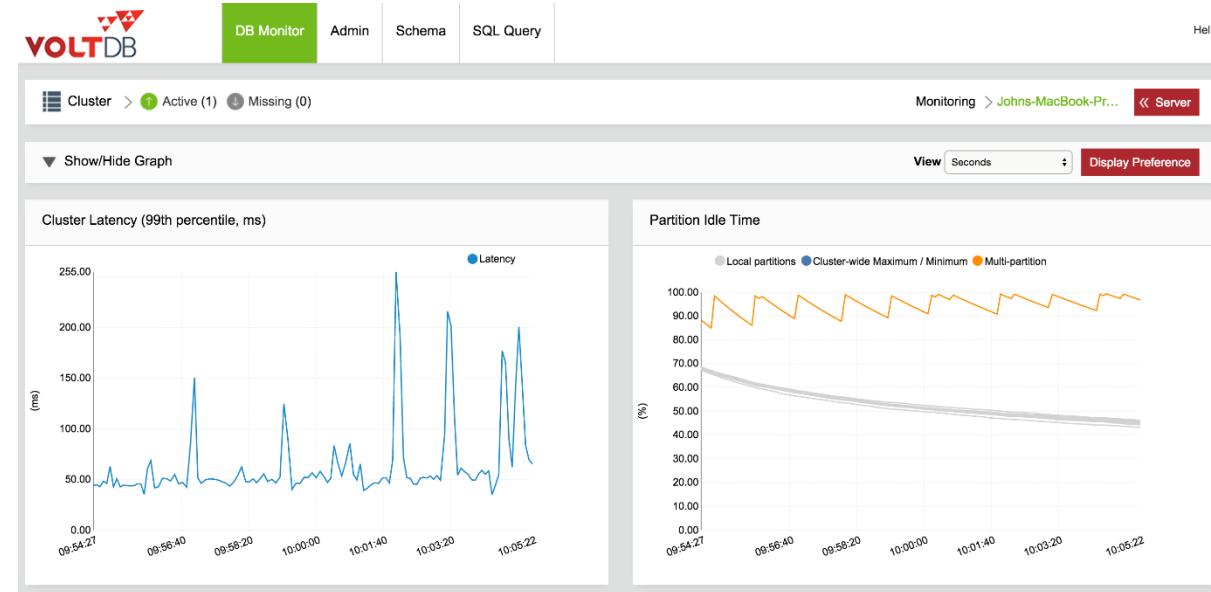
Query Result

CONTESTANT\_NUMBER CONTESTANT\_NAME

1	Edwina Burnam
2	Tabatha Gehling
3	Kelly Clauss

HTML

## Monitor



## Monitor - Stored Procedures

Show/Hide Data

Stored Procedures (Cluster) Search Stored Procedures

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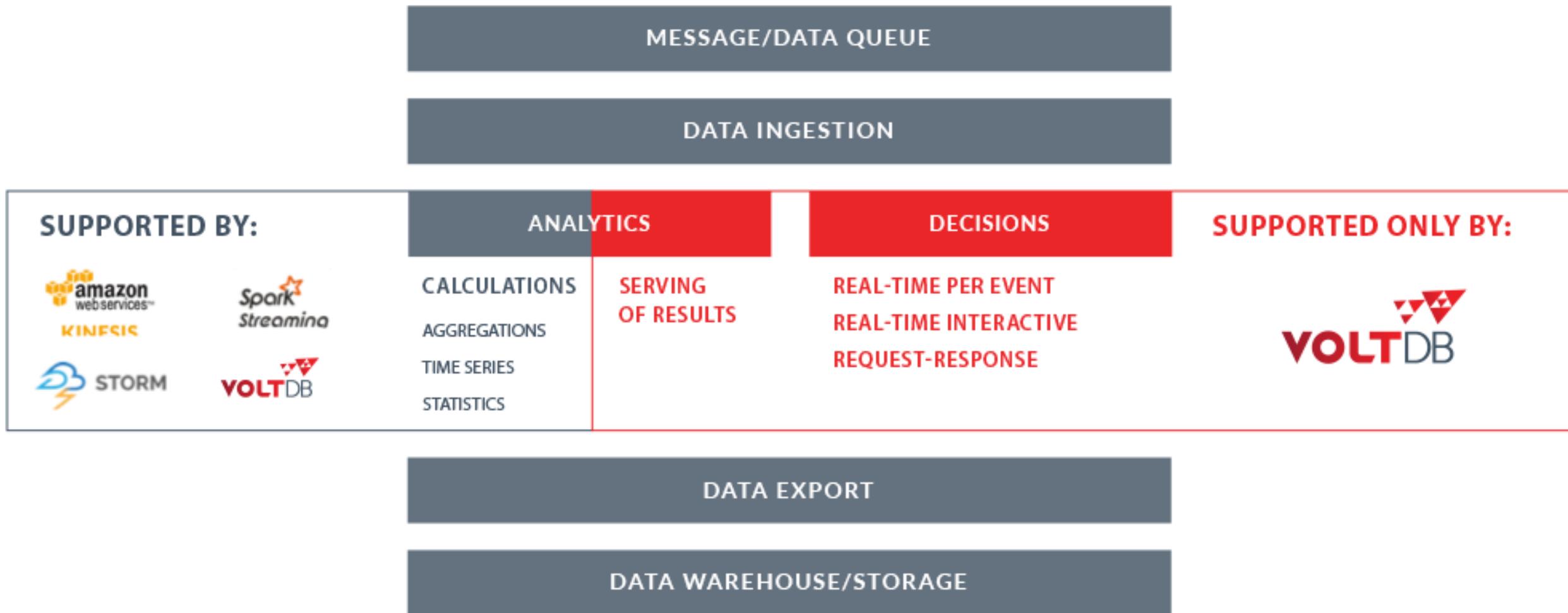
Stored Procedure	Invocations	Min Latency (ms)	Max Latency (ms)	Avg Latency (ms)	% Time of Execution
voter.Vote	93377993	0.01	45.98	0.04	100
voter.Initialize	7	215.74	215.74	215.74	0
org.voltdb.sysprocs.SnapshotSave	13	17.93	17.93	17.93	0
voter.Results	6	4.92	4.92	4.92	0
org.voltdb.sysprocs.AdHoc_RO_SP	1	2.44	2.44	2.44	0

Database Tables Search Database Tables

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Table	Row Count	Max Rows (per partition)	Min Rows (per partition)	Avg Rows (per partition)	Type
AREA_CODE_STATE	305	305	305	305	REPLICATED
CONTESTANTS	6	6	6	6	REPLICATED
VOTES	92321898	11553706	11533537	11540237	PARTITIONED
V_VOTES_BY_CONTESTANT_NUMBER_STATE	2448	306	306	306	PARTITIONED
V_VOTES_BY_PHONE_NUMBER	90952036	11381281	11361947	11369005	PARTITIONED

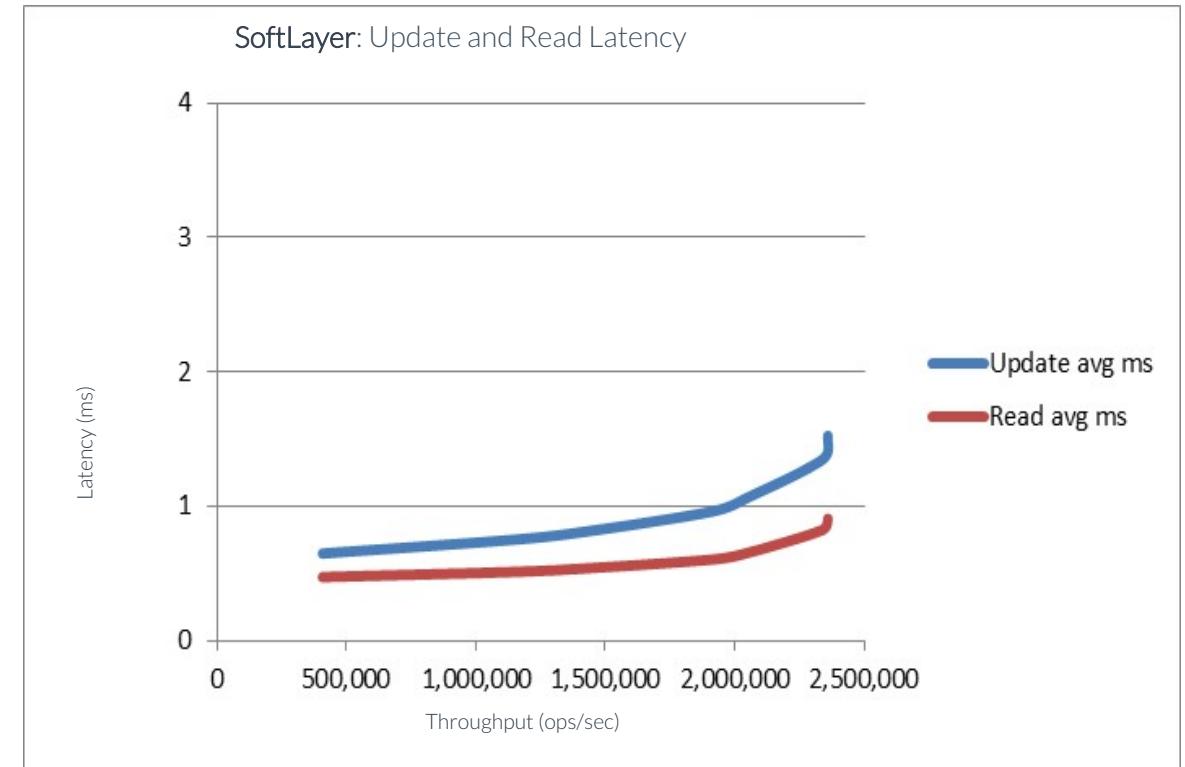
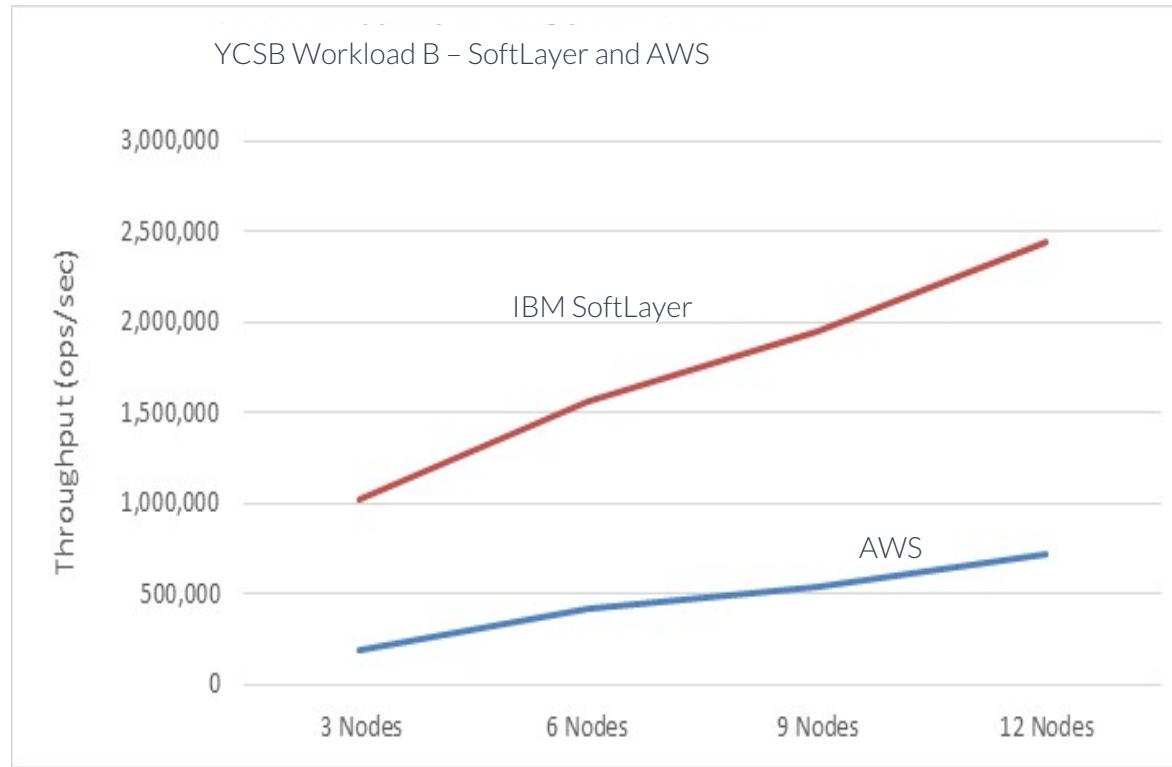
# FAST DATA STACK



# Performance – YCSB on Bare-Metal Servers and VMs

Yahoo Cloud Serving Benchmark (YCSB) is a popular industry-standard performance benchmark for cloud databases

- 2.4 million tps (transactions per second) on a 12-node SoftLayer cluster

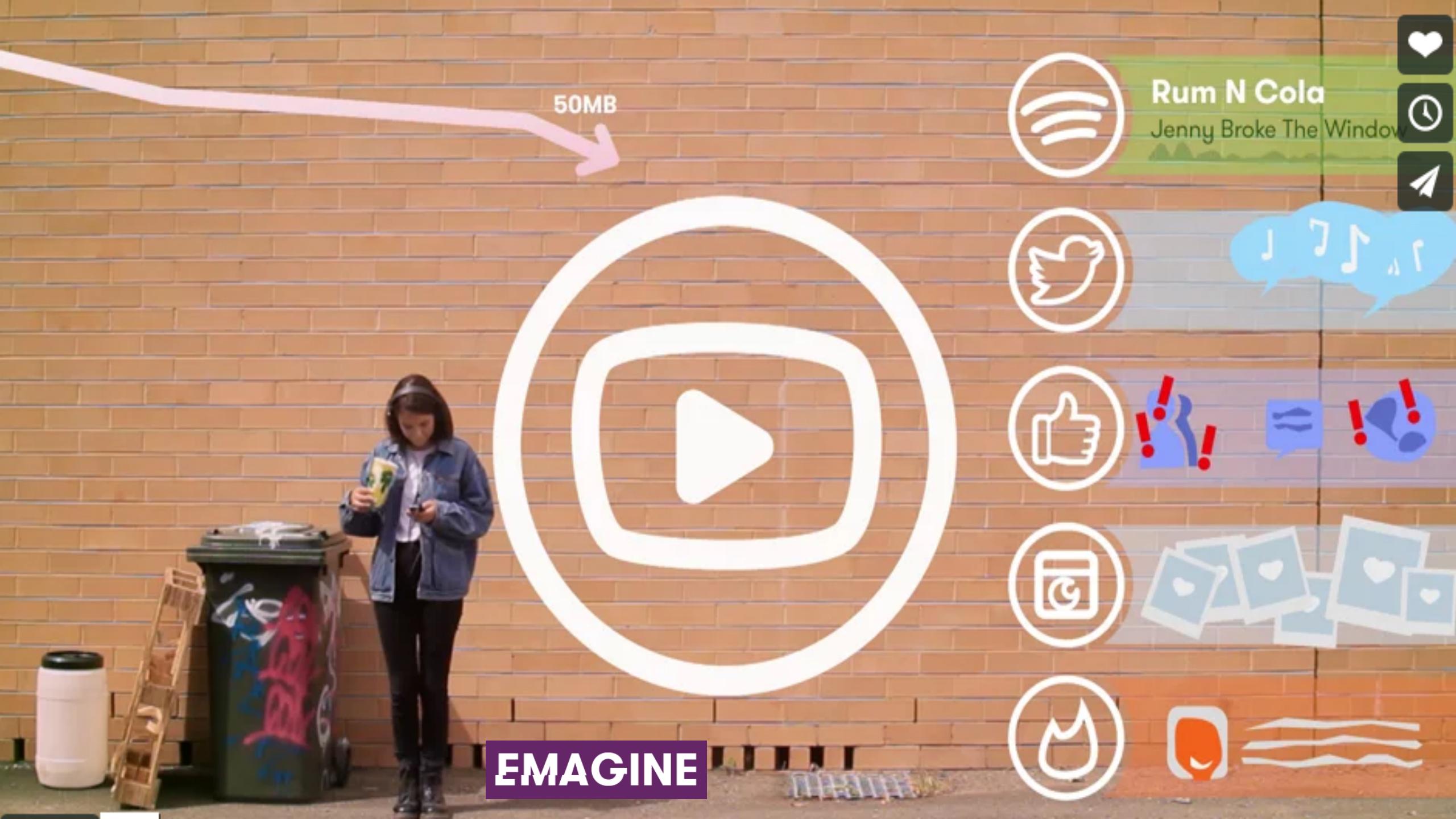




SMART DATA FAST.™



# CUSTOMER EXAMPLE



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The time it takes to win or  
lose a customer...

250 milliseconds

EMAGINE

# QUESTIONS?

- Use the chat window to type in your questions
- Try VoltDB yourself:
  - Free trial of the Enterprise Edition:
    - [www.voltdb.com/Download](http://www.voltdb.com/Download)
  - Try VoltDB in the Cloud
    - <http://voltdb.com/products/cloud>
  - Open source version is available on github.com
- Email us your question: [askanengineer@voltdb.com](mailto:askanengineer@voltdb.com)