



# GridGain In-Memory Computing Platform: Empowering Insurance With In-Memory Computing

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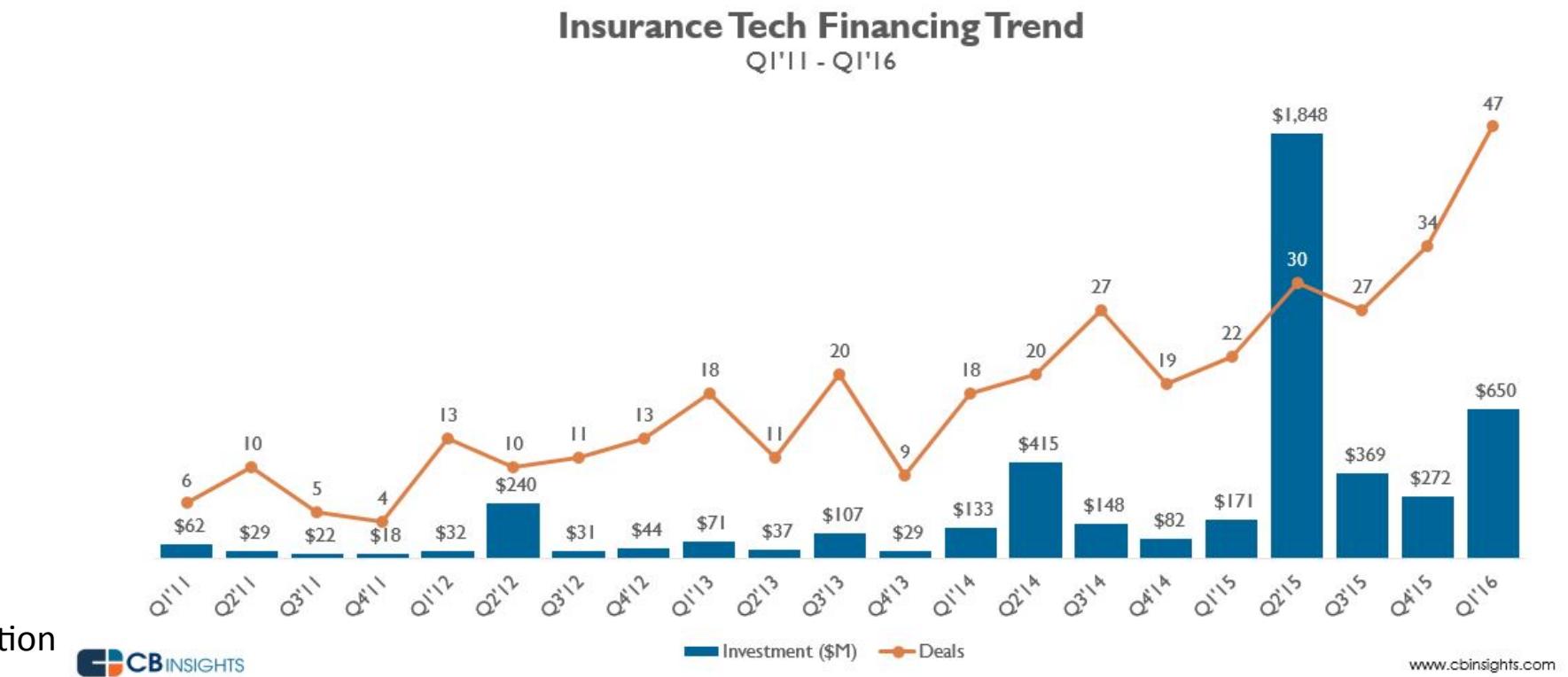


#gridgain



# Insurance Industry Is Growing

- Net premiums written totaled \$1.2 trillion in 2015
- Life/Health – 55%, Property/Casualty (auto, home, commercial) – 45%
- Almost 6,000 insurance companies in the United States
- 2.6% of US GDP
- Increasing number of catastrophes (from 31 in 2014 to 39 in 2015)
- Housing market boost
- Growth in vehicle sales
- M&A activity
- Sharing economy
- New regulatory regime
- Expense reduction
- Efficiency enhancement
- Insurance-linked securities
- Shift to Digital
- Increased competition
- Customer rewarding/bundling
- User friendly
- Affordable technology
- Innovative services
- Reduction of steps and time to complete transaction
- Better and faster analytics
- Cloud and subscription-based computing
- Outsourcing



# Top Trends in Insurance

## Life/Health/Annuity

- Digital insurance
- Digital marketplace
- Cognitive computing
- Health monitoring
- Instant payments
- Mobile and wearables apps
- IoT
- Social media and commerce integration (PSD2)

## Property & Casualty

- Robotic process automation (RPA)
- Smart homes
- IoT
- New safety technology
- Autonomous vehicles
- Ride sharing
- Commercial/personal use
- Usage-based insurance
- Cyber insurance

# Challenges

- Global and regulatory uncertainty
- Slowly growing economy
- Low interest rates
- Reduced investment income
- Disruptive technologies
- Customer retention
- Reputational risk
- Cyber risk
- Culture/generational change
- Regulations
- Customer service
- Performance
- Limitations of legacy technology
- Security concerns

# Evolving Regulations

- New insurance standards
- Likelihood of changes to the Dodd-Frank Act
- Regulations on investments, asset reserves, investment advice, consumer protection
- Additional documentation requirements
- Cyber risk management
- Anti-fraud regulation
- Tax code changes

# Technology Trends

- Open source
- Blockchain and smart contracts
- Software as a critical component of business
- Businesses make data-driven decisions
- Data: open, streaming, data lakes
- Open architecture
- Open APIs
- Artificial Intelligence
- Predictive analytics
- Machine learning
- Performance, stability, security, scalability
- Distributed systems
- Containers
- Microservice based architectures
- Machine learning
- Complex event processing

# Why In-Memory Now?

## Digital Transformation is Driving Companies Closer to Their Customers

- Driving a need for real-time interactions

## Internet Traffic, Data, and Connected Devices Continue to Grow

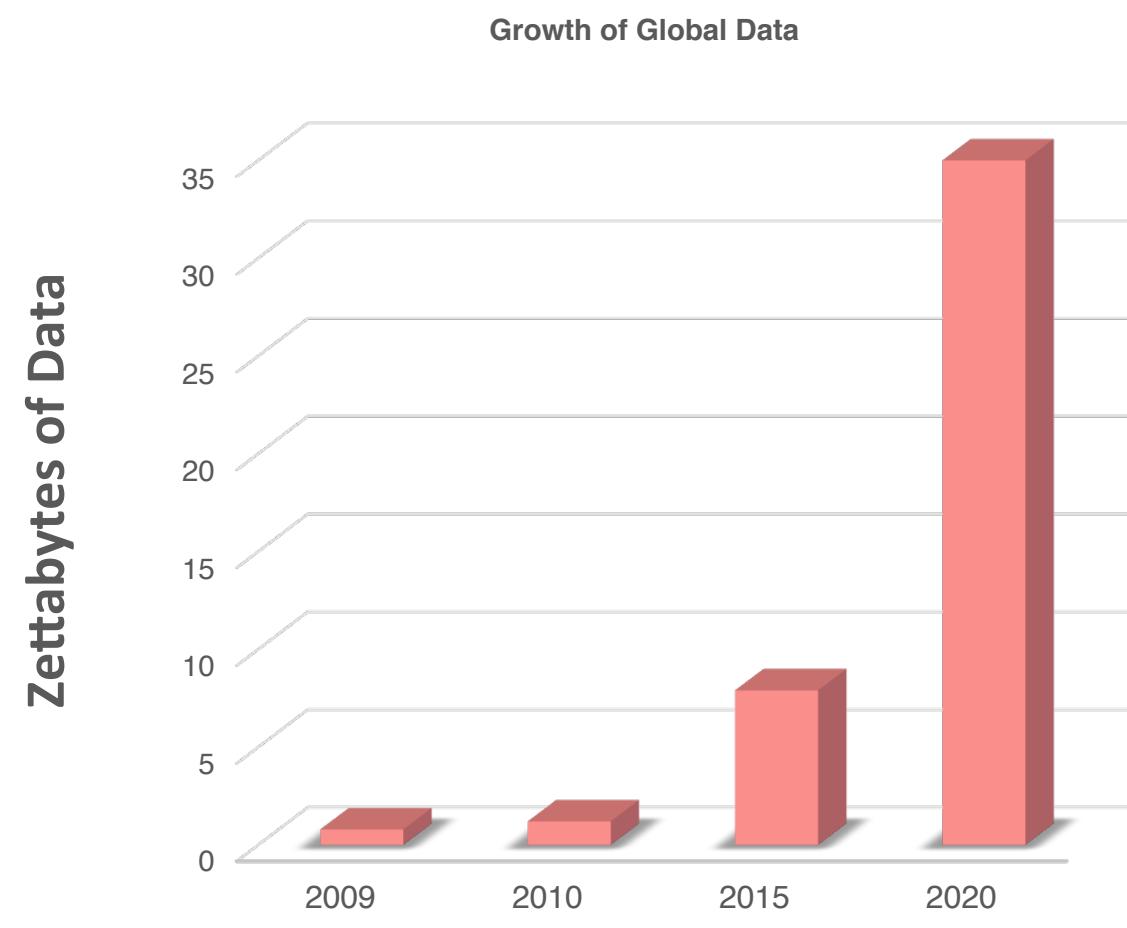
- Web-scale applications and massive datasets require in-memory computing to scale out and speed up to keep pace
- The Internet of Things generates huge amounts of data which require real-time analysis for real world uses

## The Cost of RAM Continues to Fall

- In-memory solutions are increasingly cost effective versus disk-based storage for many use cases

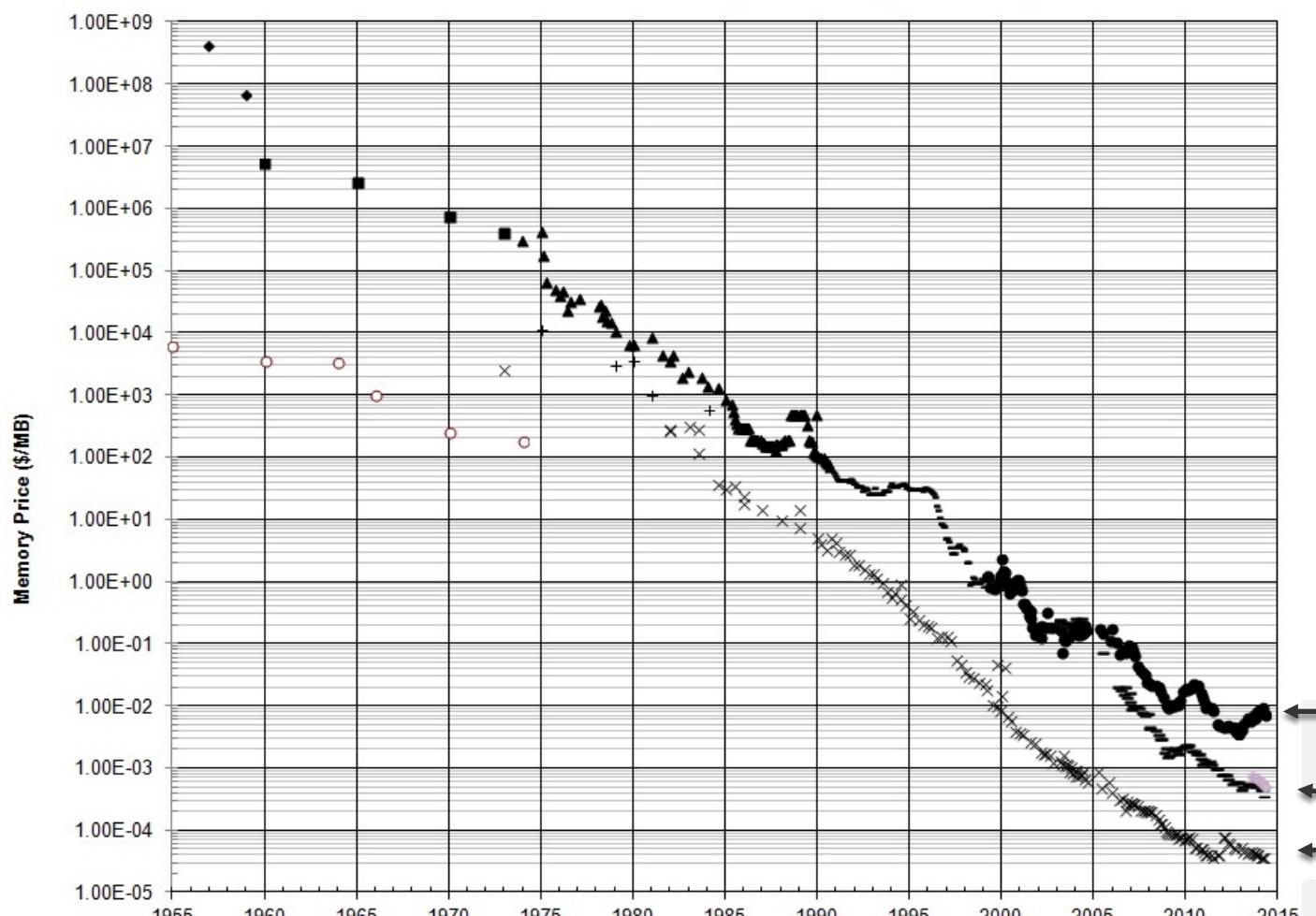
# Why Now?

## Data Growth and Internet Scale Driving Demand



8 zettabytes in 2015 growing to 35 in 2020

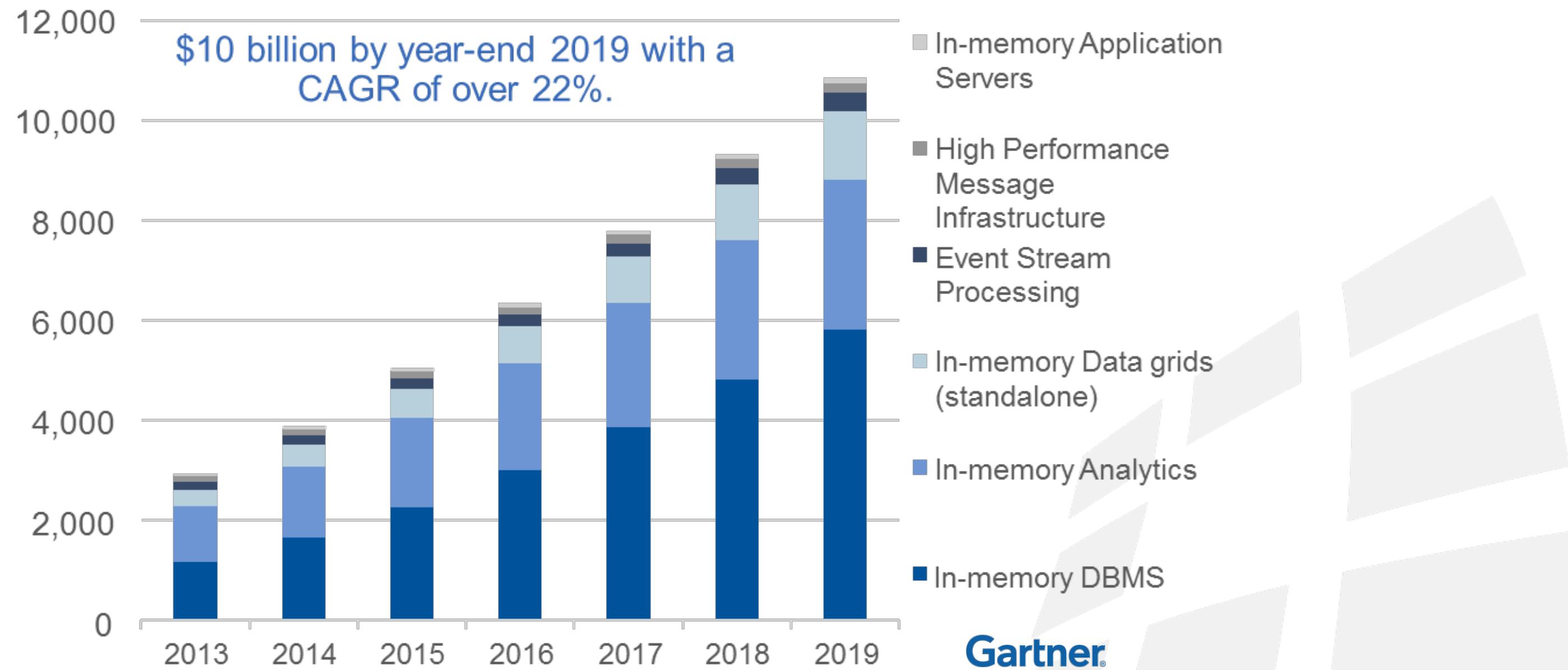
## Declining DRAM Cost Driving Attractive Economics



Cost drops 30% every 12 months

# The In-Memory Computing Technology Market Is Big — And Growing Rapidly

## IMC-Enabling Application Infrastructure (\$M)



# Evolution of In-Memory Grid Computing

- Move from Disk to 100% In-Memory (RAM)
- Leverage Clustered Memory and Parallel Distributed Processing
- Results: 1000x Faster, 10x ROI Improvement
- Making “Big Data” Fast

“In-memory will have an industry impact comparable to web and cloud.”

“RAM is the new disk, and disk is the new tape.”

Gartner®

In-Memory Computing Market:

- \$10B in 2019
- CAGR 22%

Gartner®

# What is an In-Memory Computing Platform?

## • Multi-Featured Solution

- Supports data caching, massive parallel processing, in-memory SQL, streaming and much more

## • Does Not Replace Existing Databases

- Slides in between the existing application and data layers

## • Supports OLTP and OLAP Use Cases

- Offers ACID compliant transactions as well as analytics support

## • Multi-Platform Integration

- Works with all popular RDBMS, NoSQL and Hadoop databases and offers a Unified API with support for a wide range of languages

## • Deployable Anywhere

- Can be deployed on premise, in the cloud, or in hybrid environments

# The GridGain In-Memory Computing Platform

- A high-performance, distributed, in-memory platform for computing and transacting on large-scale data sets in real-time
- Built on Apache® Ignite™

## Features

• Data Grid

Compute Grid

SQL Grid

Streaming

Service Grid

Hadoop Acceleration

## Architecture

Advanced Clustering

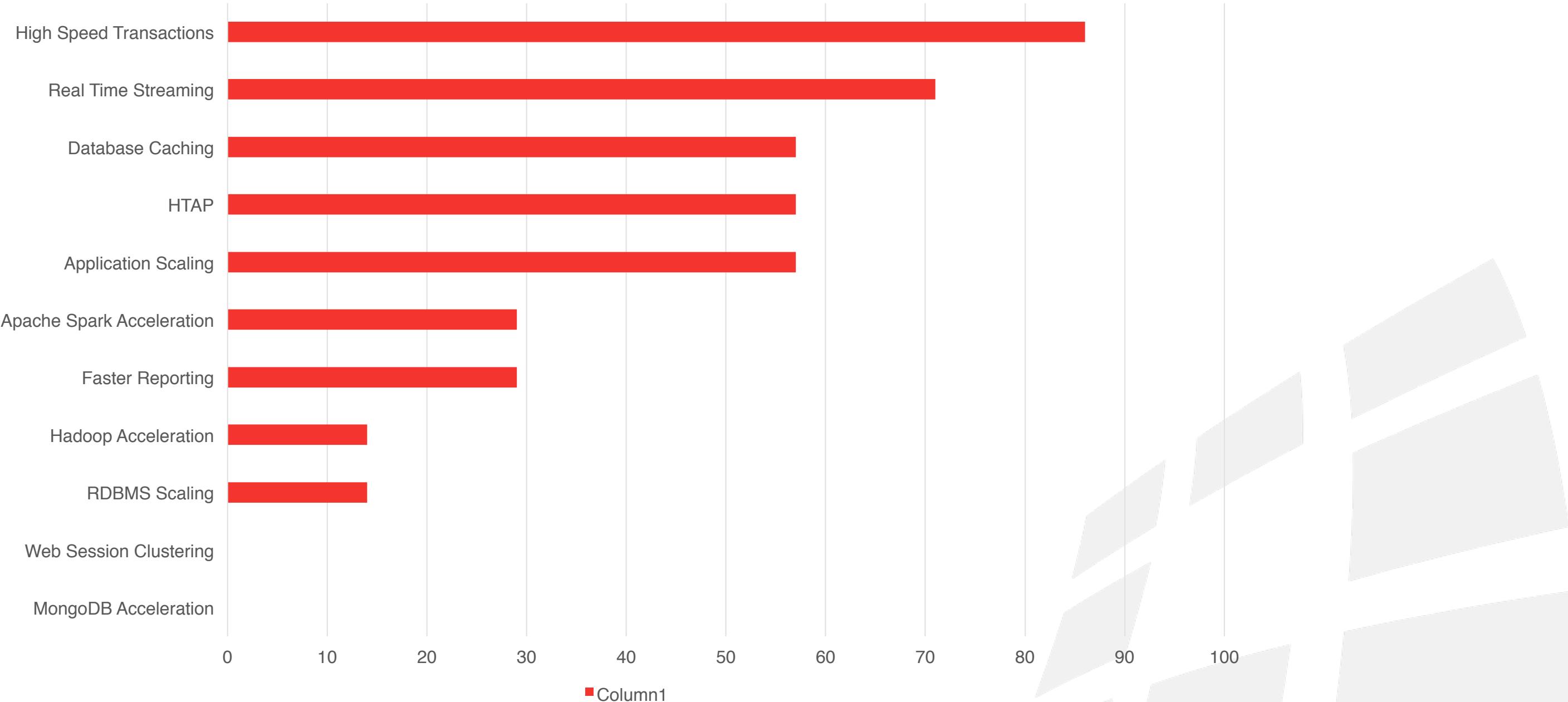
In-Memory File System

Messaging

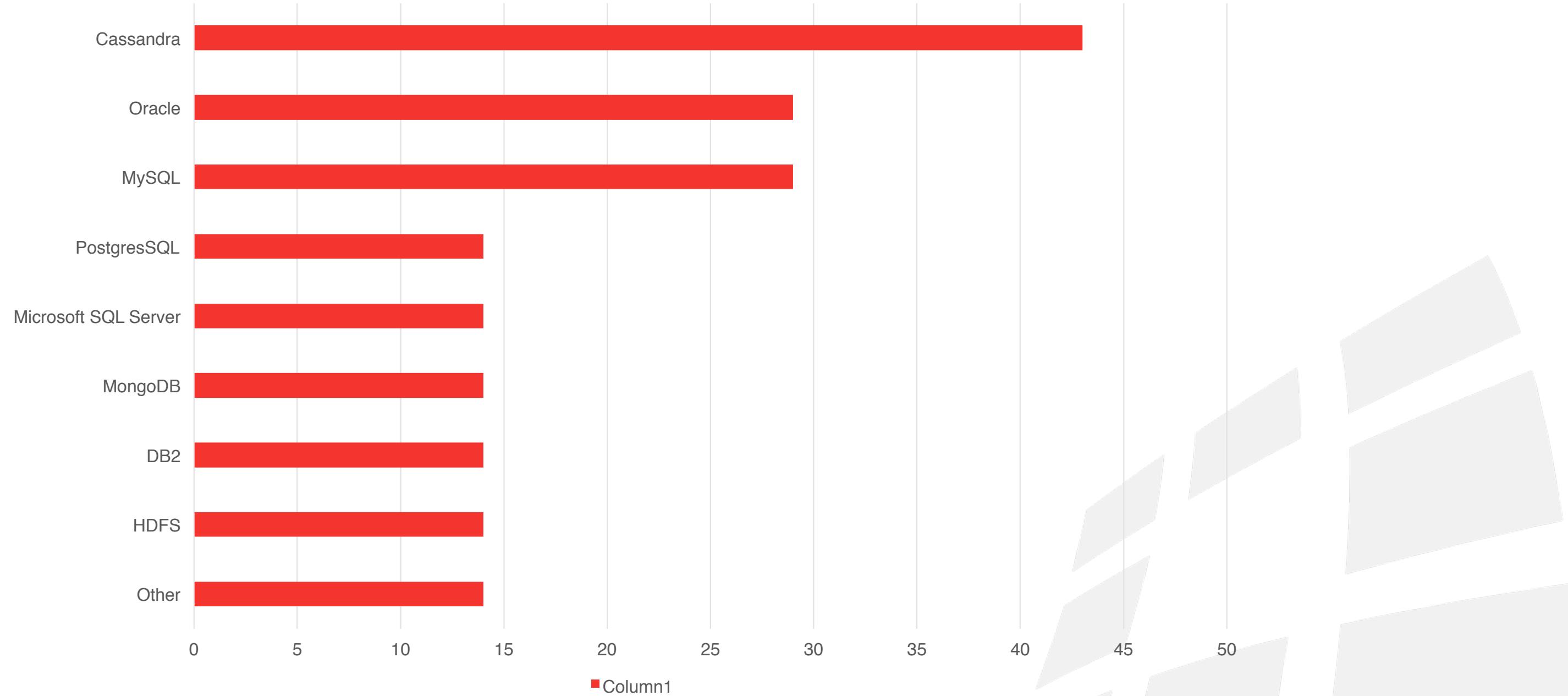
Events

Data Structures

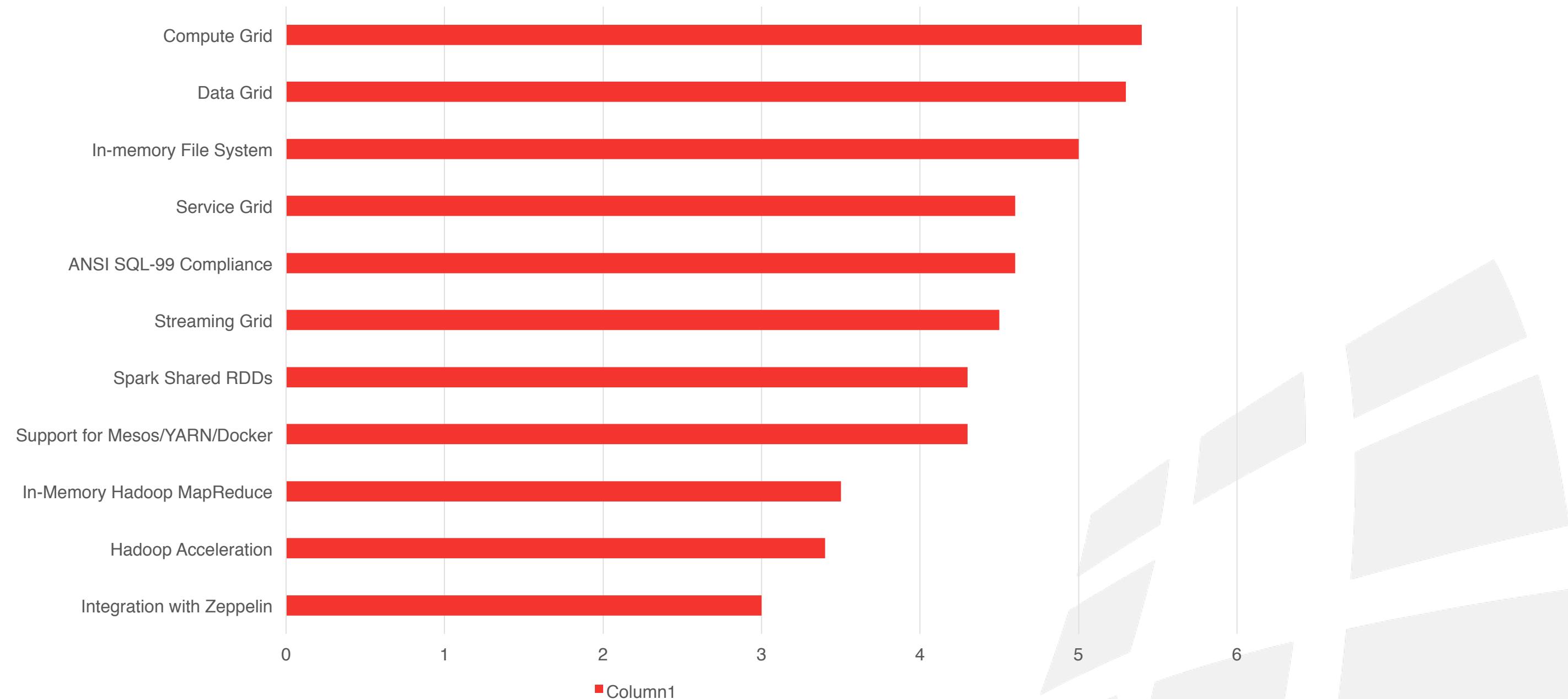
# Survey Results: What uses were you considering for in-memory computing



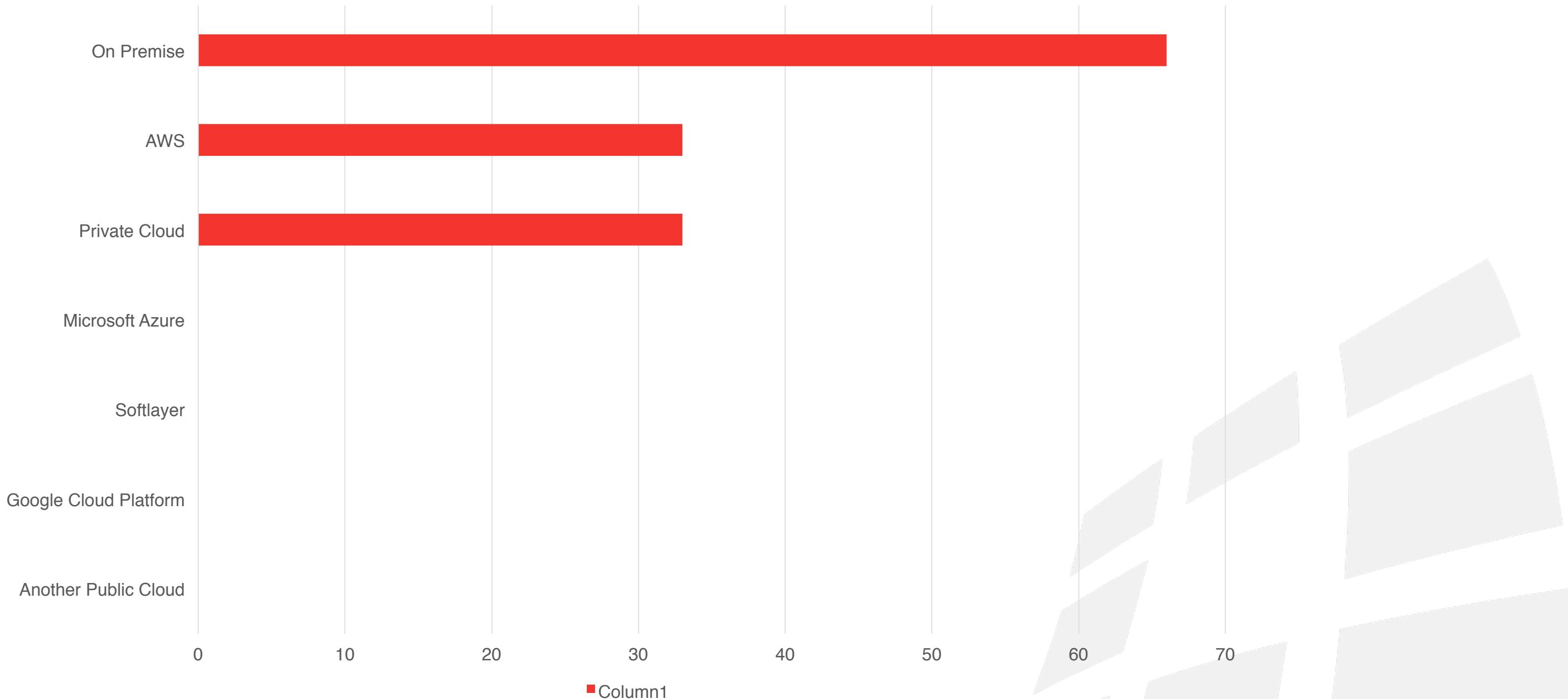
# Survey Results: Which data stores are you/would you likely use with GridGain/Apache Ignite?



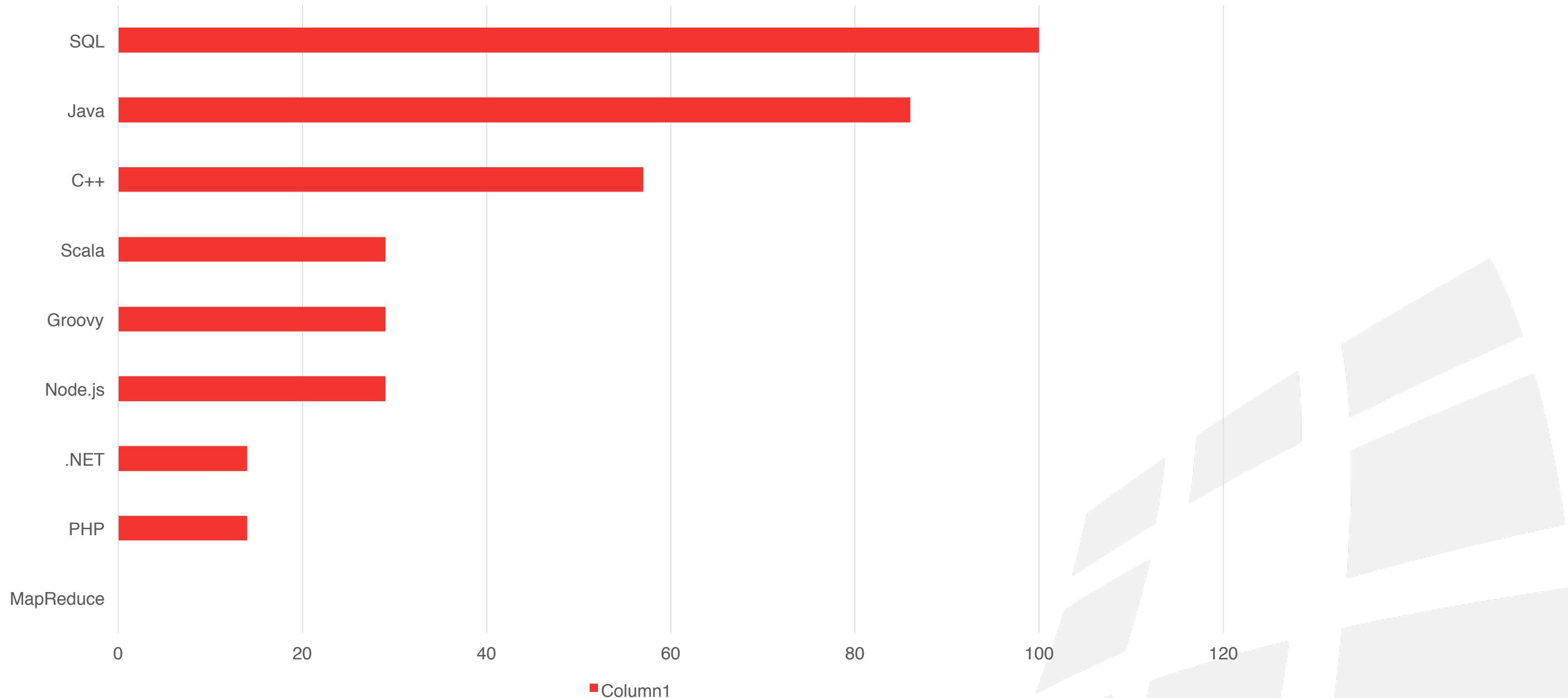
# Survey Results: How important are each of the following product features to your organization?



# Survey Results: Where do you run GridGain and/or Apache Ignite?



# Survey Results: Which of the following languages do you use to access your data?



# Financial Customer Use Cases

**Data Velocity, Data Volume, Data Consistency, Real-Time Performance and Analysis**

- Core Banking and Trading Platforms

Treasury systems, payment hubs, order management systems, algorithmic trading, high volume transactions, ultra low latencies.

- Risk Management

Modeling, financial engineering, pricing, hedging, what-if analysis, reporting.

- Financial Analytics

Real time analysis of trading positions, trending, market data analysis, sentiment analysis, complex event processing, hedging, transaction cost analysis, time series, volatility analysis, Monte Carlo simulations, Black-Scholes, derivatives pricing.

- Big Data Analytics

Customer and counter party 360 view, master data management, securities masters, reference data, real-time analysis of P&L, up-to-the-second operational BI.

- Compliance and Monitoring

Fraud, AML, KYC, market manipulation and abuse, pre and post trade compliance modeling.

- Financial SaaS Platforms

High performance next-generation architectures for Software as a Service Application vendors.



Julius Bär



CAMBRIDGE



SBERBANK



THOMSON REUTERS



Jefferies



# Case Study:



- Financial services software
  - Retail and corporate banking
  - Lending
  - Treasury
  - Capital markets
  - Investment management
  - Enterprise risk
- More than 2,000 customers in 130 countries
- Used by 48 of the world's 50 largest banks
- The Challenge: Eliminating Data Processing Bottlenecks
  - Huge amounts of trade and accounting data
  - Customers need
    - High-speed transactions
    - Real-time reporting
  - New Java-based IT stack with data lake support
  - Global regulatory compliance

# Case Study:



**MISYS**  
FINANCIAL SOFTWARE

- Commodity servers (256GB RAM)
- Data stored in memory
  - Transactions
  - Market data
- Parallel processing across cluster
  - Calculation heavy reporting for regulatory compliance

# Case Study:



## FusionFabric.cloud

- Integrates trading systems with cloud-based components
  - OTC derivatives
  - Exchange traded derivatives
  - Inflation
  - Fixed income
  - FX/MM
  - Hybrids
  - Developing additional modules

“With GridGain, we have achieved real-time processing of massive amounts of trade and transaction data, eliminating bottlenecks and enabling us to offer next-generation financial services to our customers.”

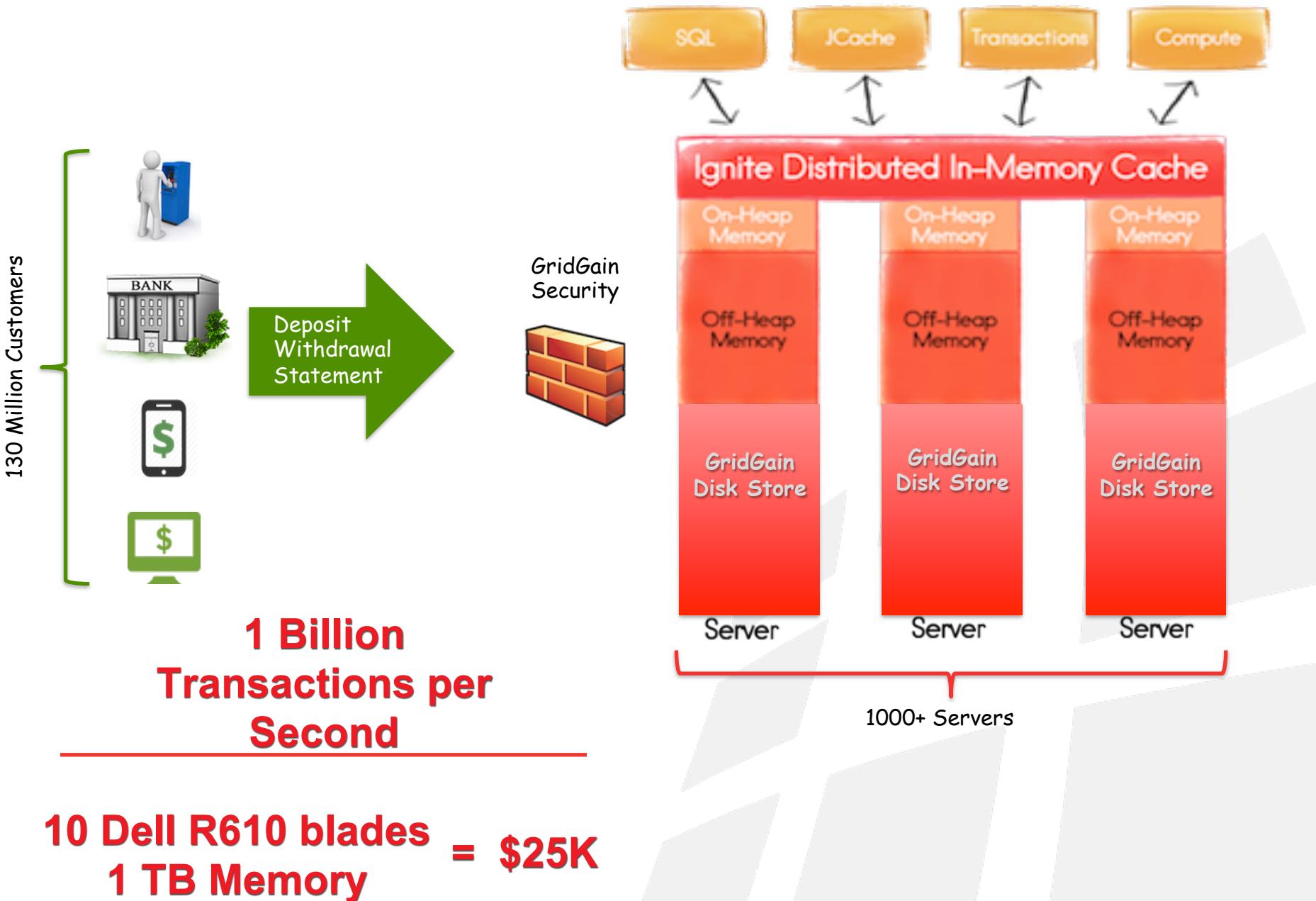
-Felix Grevy, Director of Product Management for FusionFabric.cloud at Misys

# Use Case:



Largest bank in Russia and Eastern Europe, and the third largest in Europe

- Sberbank Requirements
  - Expect significant transactional volume growth
  - Migrate to data grid architecture to build next generation platform
  - Minimize dependency on Oracle
  - Move to open source
- Why GridGain Won
  - Best performance
    - 10+ competitors evaluated
  - Demonstrated best
    - Fault tolerance & scalability
    - ANSI-99 SQL Support
    - Transactional consistency
  - Strict SLAs
    - Less than 5 min cluster restart (regulatory requirement)
    - Fully Operational from disk & memory
    - Compliance with personal data law and cyber-security regulations



# From article – January, 2016



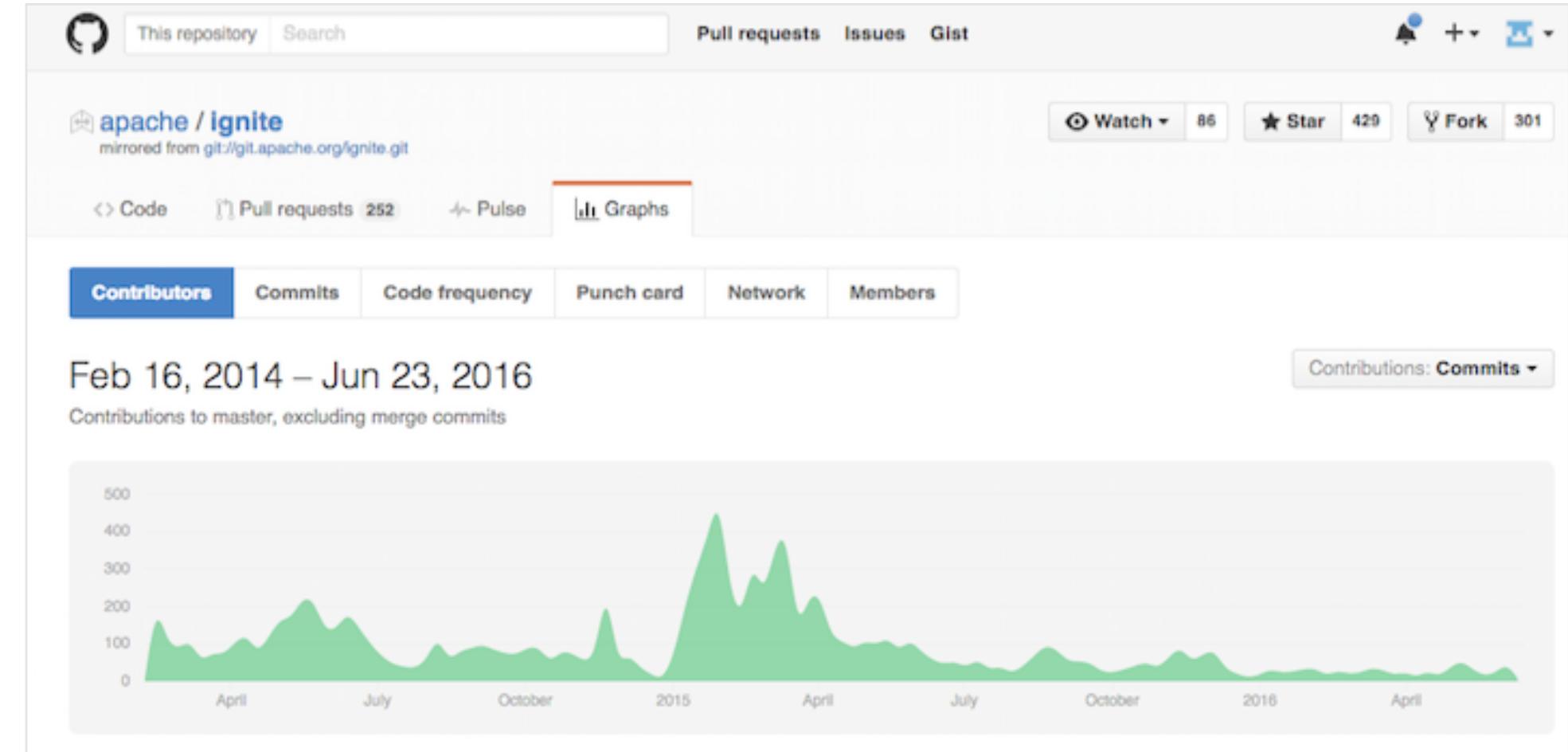
Herman Gref  
CEO & Chairman, Sberbank

“The new Sberbank IT plan is to create a platform that enables the bank to introduce new products in hours, not weeks. The platform will have virtually unlimited performance and very high reliability. It will be much cheaper and will significantly reduce human interaction during customer transactions. The system will use machine-learning, flexible pricing, and artificial intelligence,” said Herman Gref, head of Sberbank.

“The new system will use technology from GridGain, which won the tender from Oracle, IBM and others, and turned out to deliver an order of magnitude higher performance than those of the largest companies,” he added.

# Apache Ignite Project

- 2007: First version of GridGain
- Oct. 2014: GridGain contributes Ignite to ASF
- Aug. 2015: Ignite is the second fastest project to graduate after Spark
- Today:
  - 60+ contributors and rapidly growing
  - Huge development momentum - Estimated 192 years of effort since the first commit in February, 2014 [\[Openhub\]](#)
  - Mature codebase: 1M+ lines of code

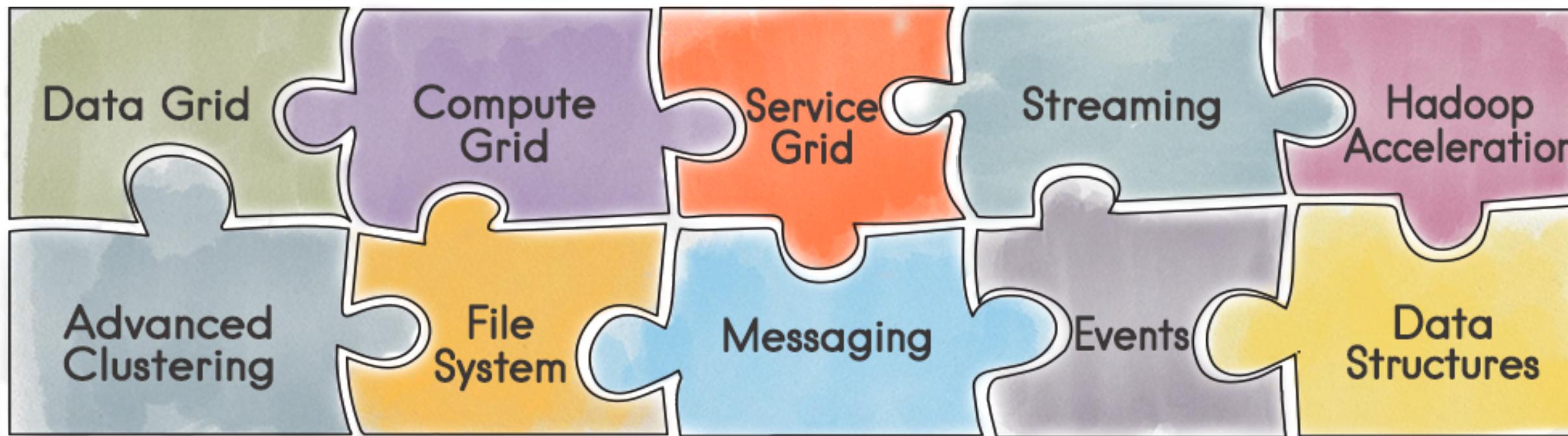


# GridGain Enterprise and Open Source Strategy



- GridGain Enterprise Edition is based on Apache Ignite
- Open source is intended to provide an easy entry point for learning, testing and non-critical use
- Enterprise Edition customers benefit from many exclusive enterprise-class features along with support and indemnification

# What is an In-Memory Computing Platform?



High-performance distributed in-memory platform for computing and transacting on large-scale data sets in near real-time.

# GridGain In-Memory Computing Use Cases

## Data Grid

Web session clustering

Distributed caching

Scalable SaaS

## Compute Grid

High performance computing

Machine learning

Risk analysis

Grid computing

## SQL Grid

In-memory SQL

Distributed SQL processing

Real-time analytics

## Streaming

Real-time analytics

Streaming Big Data analysis

Monitoring tools

## Hadoop Acceleration

Faster Big Data insights

Real-time analytics

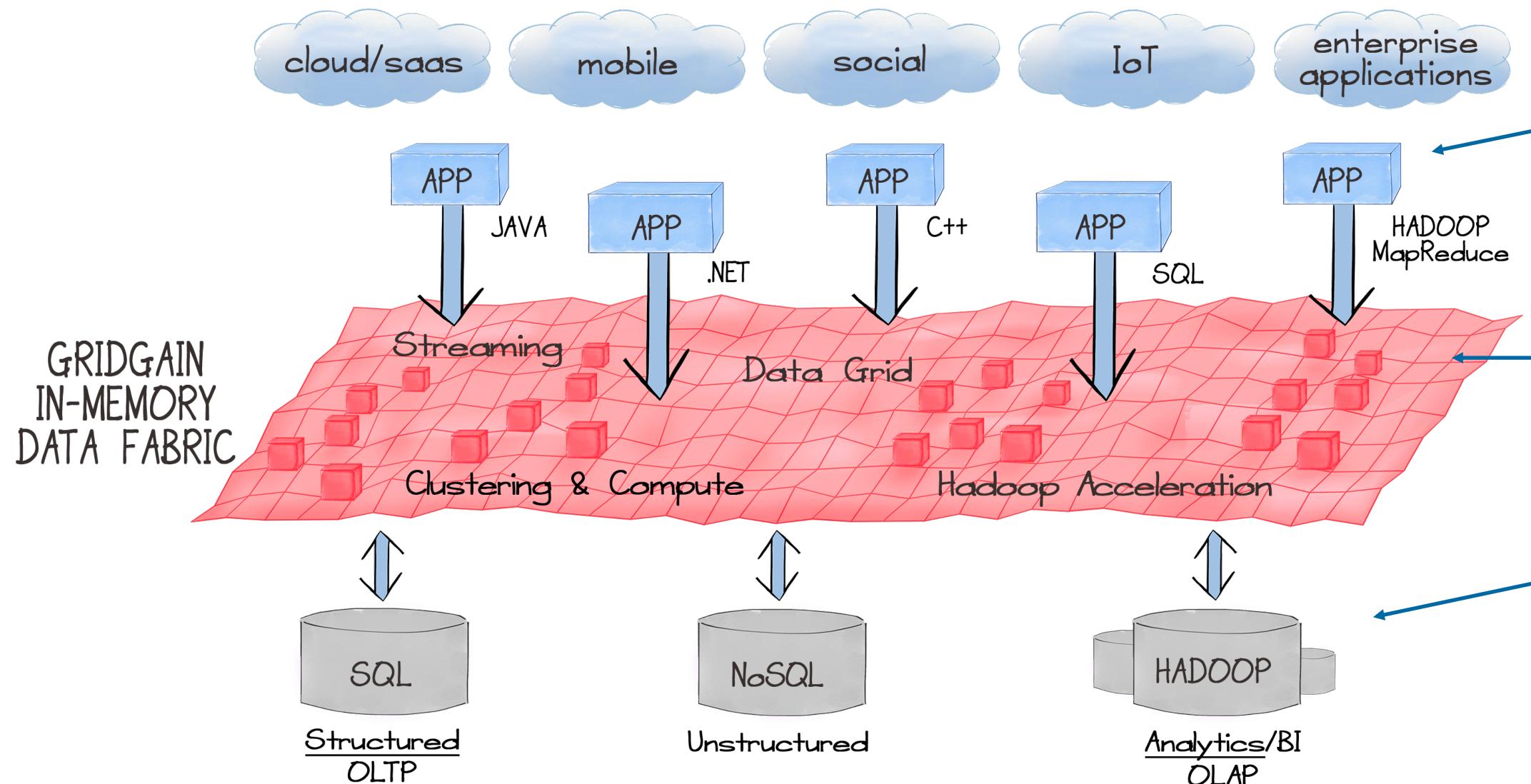
Batch processing

## Events

Complex event processing (CEP)

Event driven design

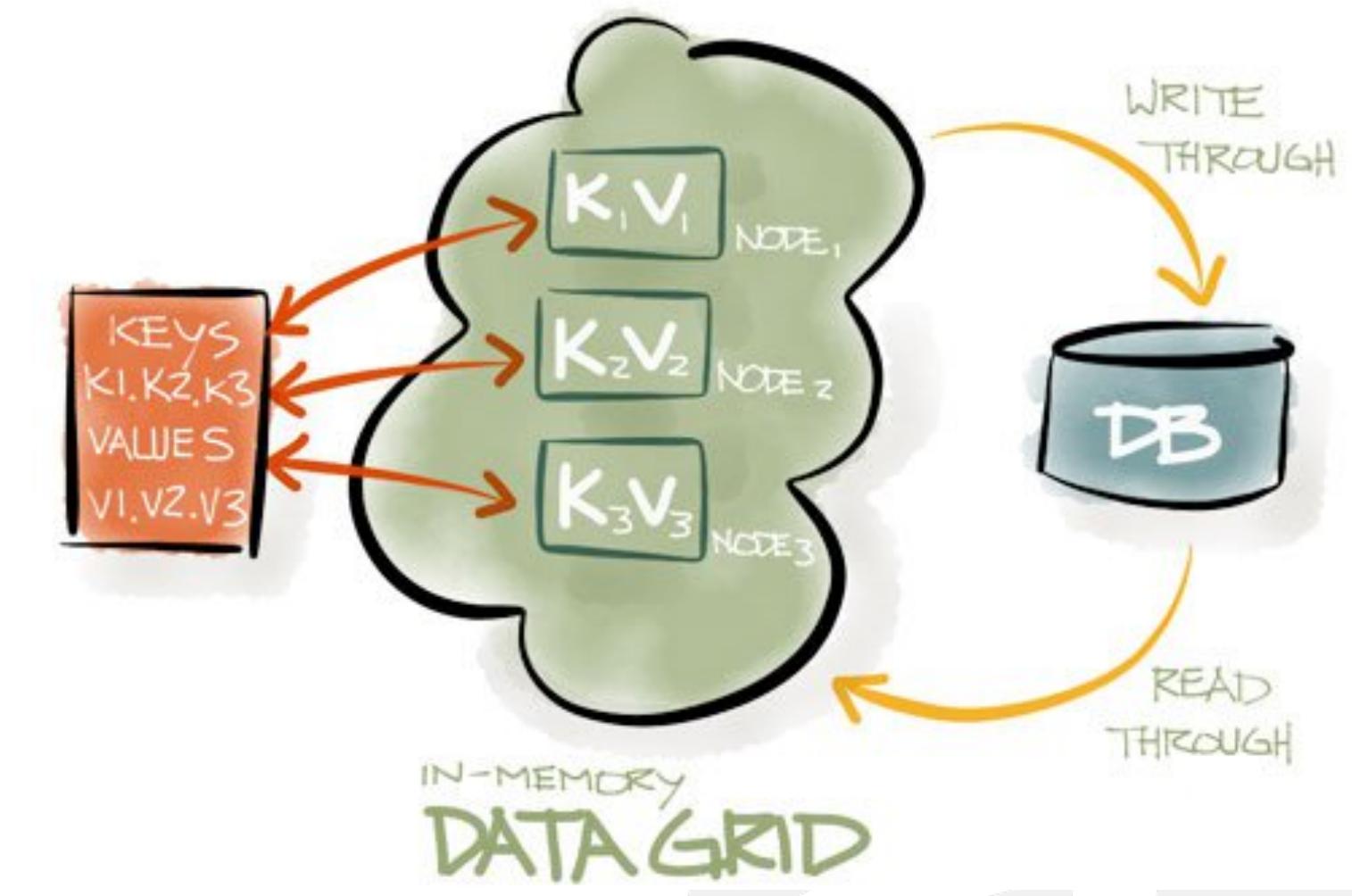
# Flexibility and Enterprise Breadth of In-Memory Computing Platform



- Supports Applications of various types and languages
  - Open Source – Apache 2.0
  - Simple Java APIs
  - 1 JAR Dependency
  - High Performance & Scale
  - Automatic Fault Tolerance
  - Management/Monitoring
  - Enterprise Security
  - Runs on Commodity Hardware
- Supports existing & new data sources
  - No need to rip & replace

# In-Memory Data Grid

- Inserted between the application and data layers. Moves disk-based data from RDBMS, NoSQL or Hadoop databases into RAM
- **Features:**
  - Distributed In-Memory Key-Value Store
  - Replicated and Partitioned Data Caches
  - Lightning Fast Performance
  - Elastic Scalability
  - Distributed In-Memory Transactions (ACID)
  - Distributed In-Memory Queue and Other Data Structures
  - Web Session Clustering
  - Hibernate L2 Cache Integration
  - On-Heap and Off-Heap Storage
  - Distributed SQL Queries with Distributed Joins

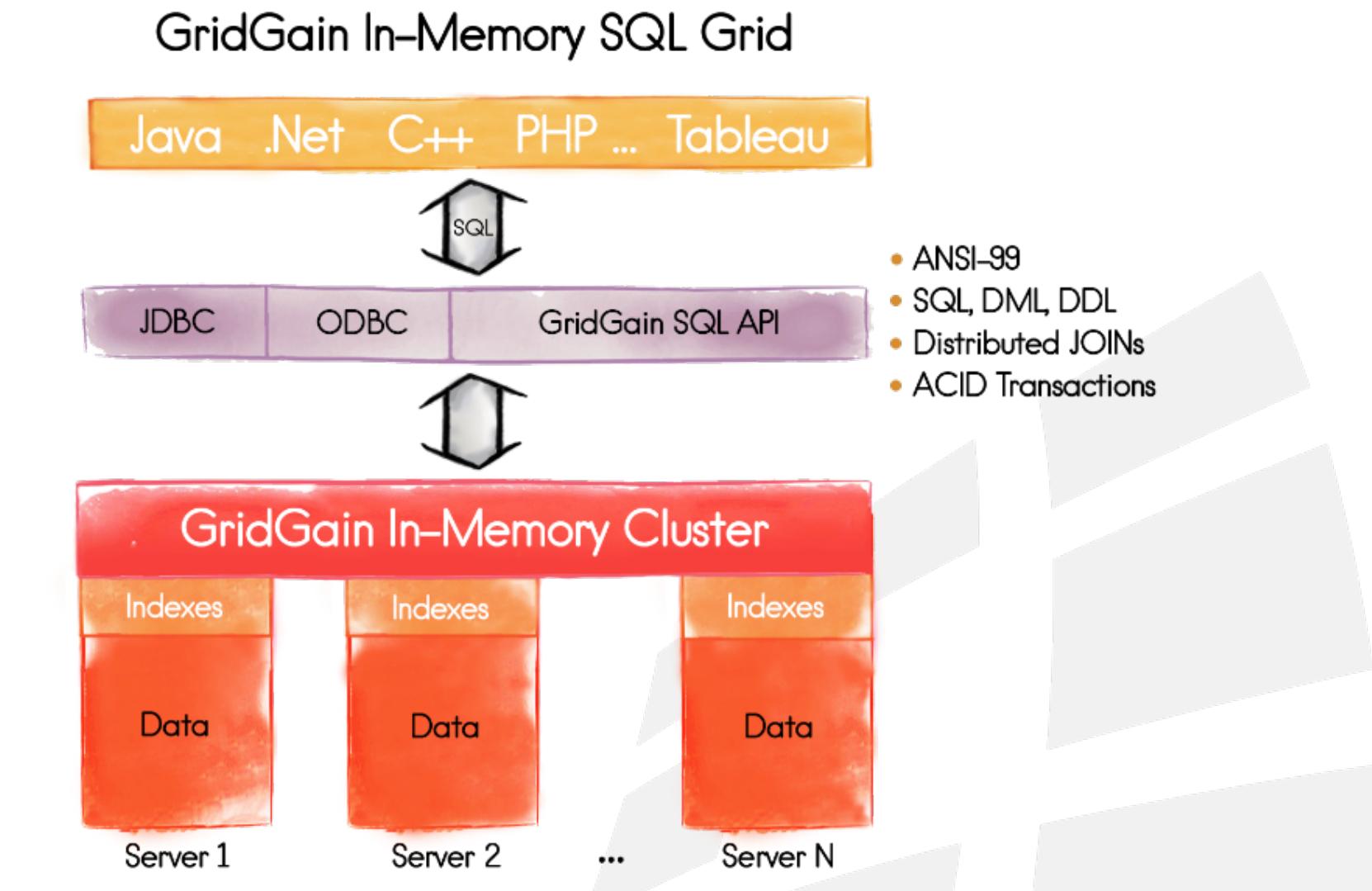


# In-Memory SQL Grid

- Horizontally scalable, fault tolerant, ANSI SQL-99 compliant, and fully supports all SQL and DML commands

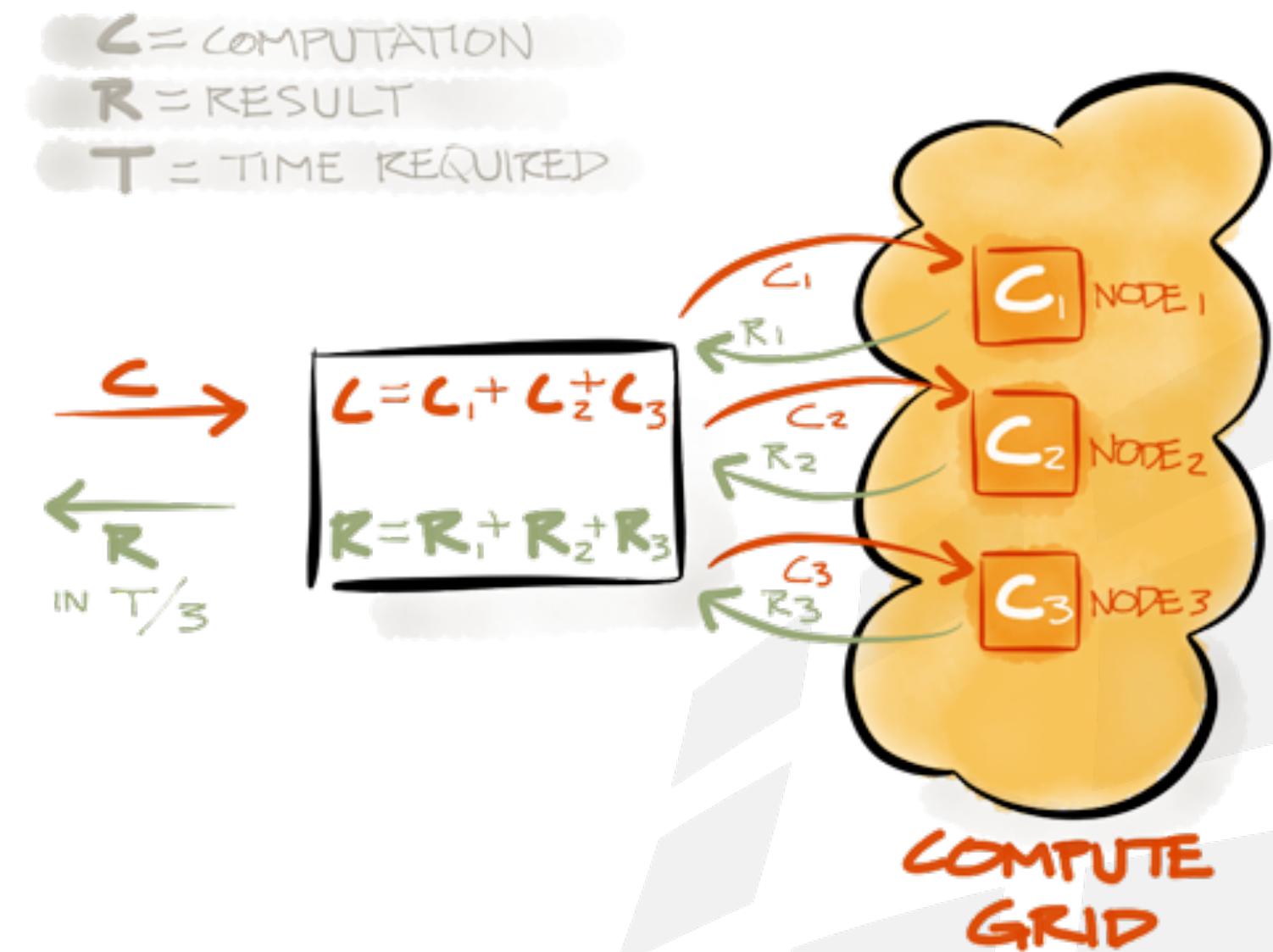
- **Features:**

- Supports SQL and DML commands including SELECT, UPDATE, INSERT, MERGE and DELETE Queries
- Distributed SQL
- Geospatial Support
- SQL Communications Through the GridGain ODBC or JDBC APIs Without Custom Coding
- ANSI SQL-99 Compliance



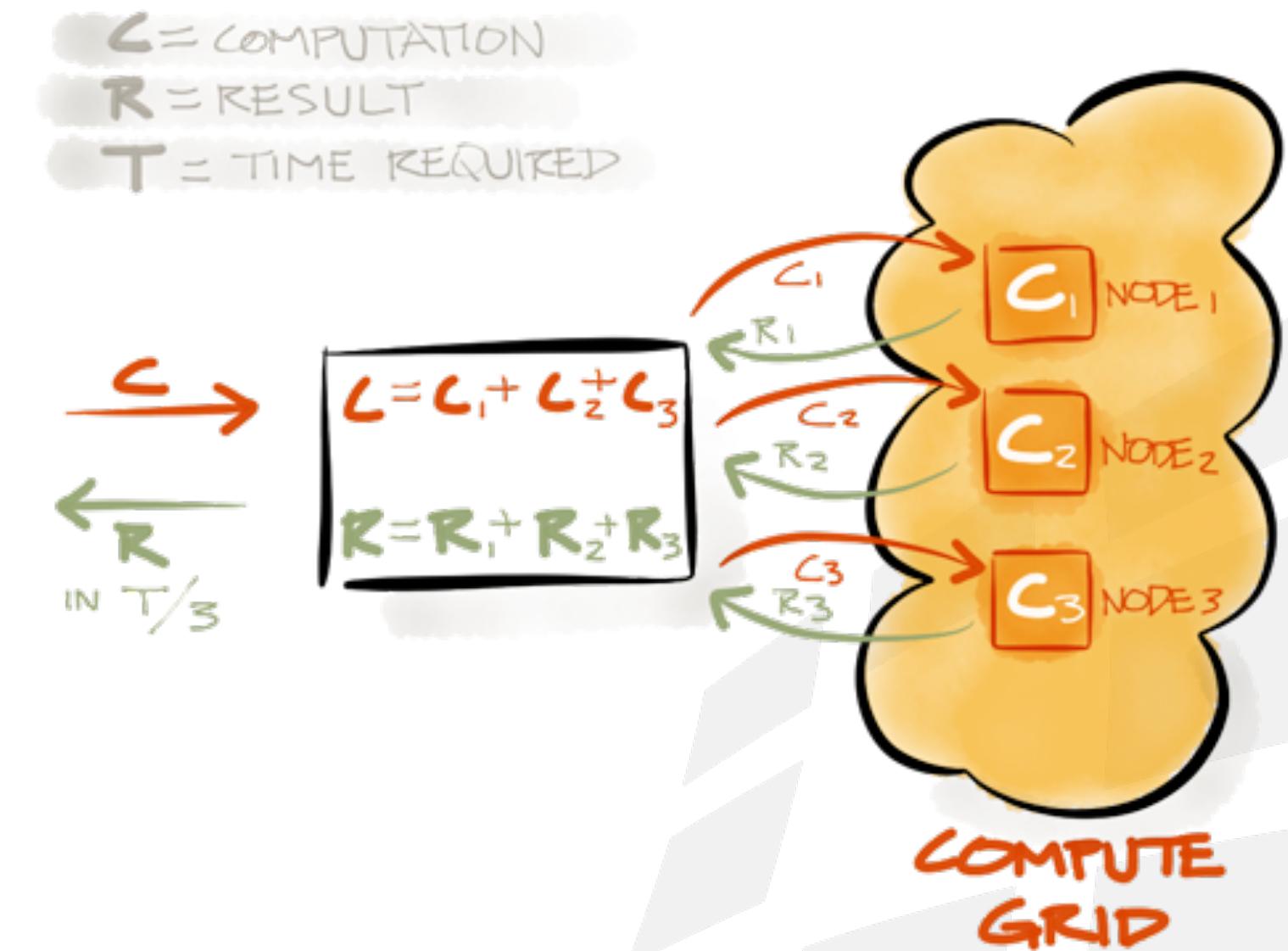
# In-Memory Compute Grid

- Enables parallel processing of CPU or otherwise resource intensive tasks
- Features:
  - Dynamic Clustering
  - Direct API for Fork-Join & MapReduce Processing
  - Distributed Closure Execution
  - Adaptive Load Balancing
  - Automatic Fault Tolerance
  - Linear Scalability
  - Custom Scheduling
  - State Checkpoints for Long Running Jobs
  - Pluggable SPI Design



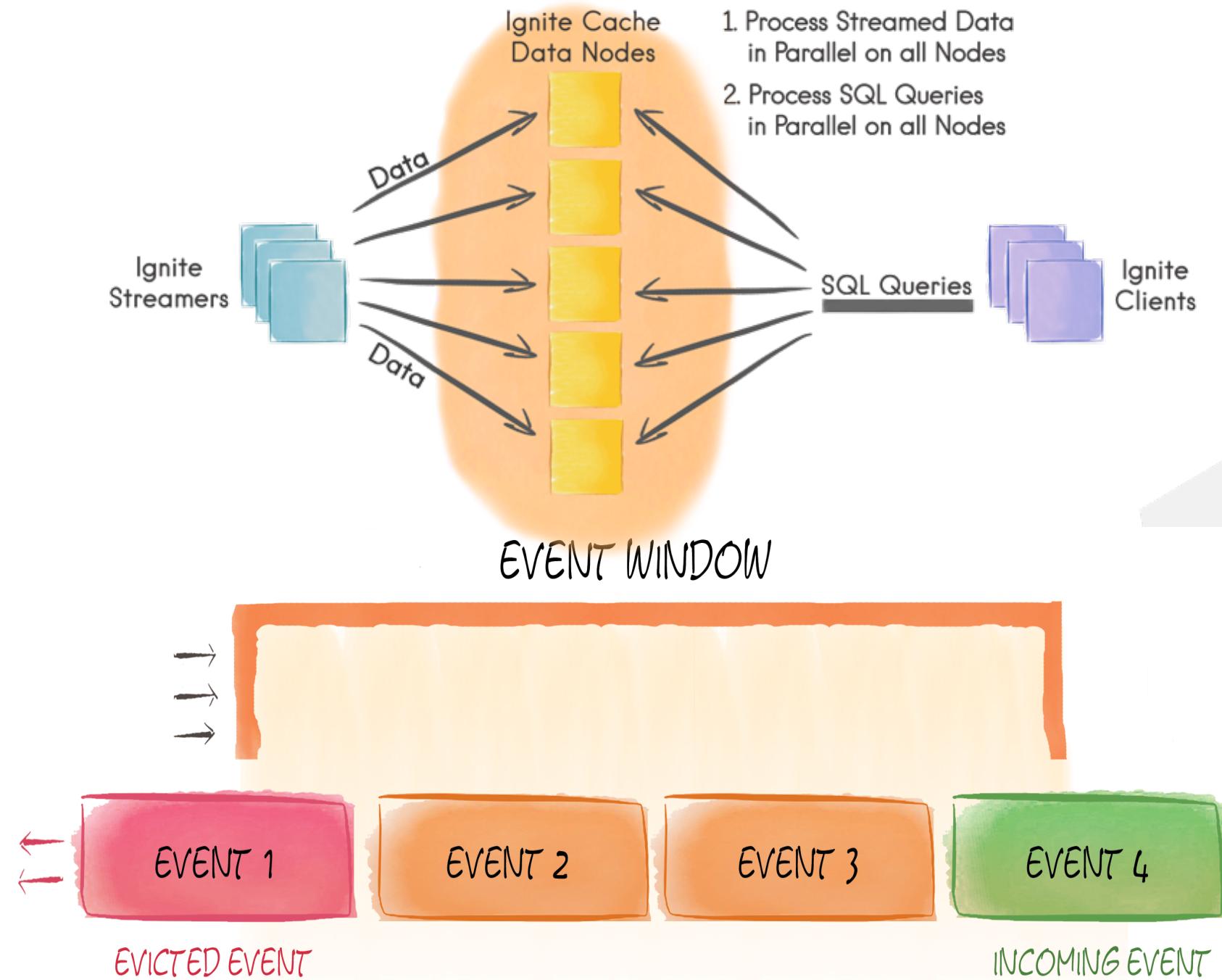
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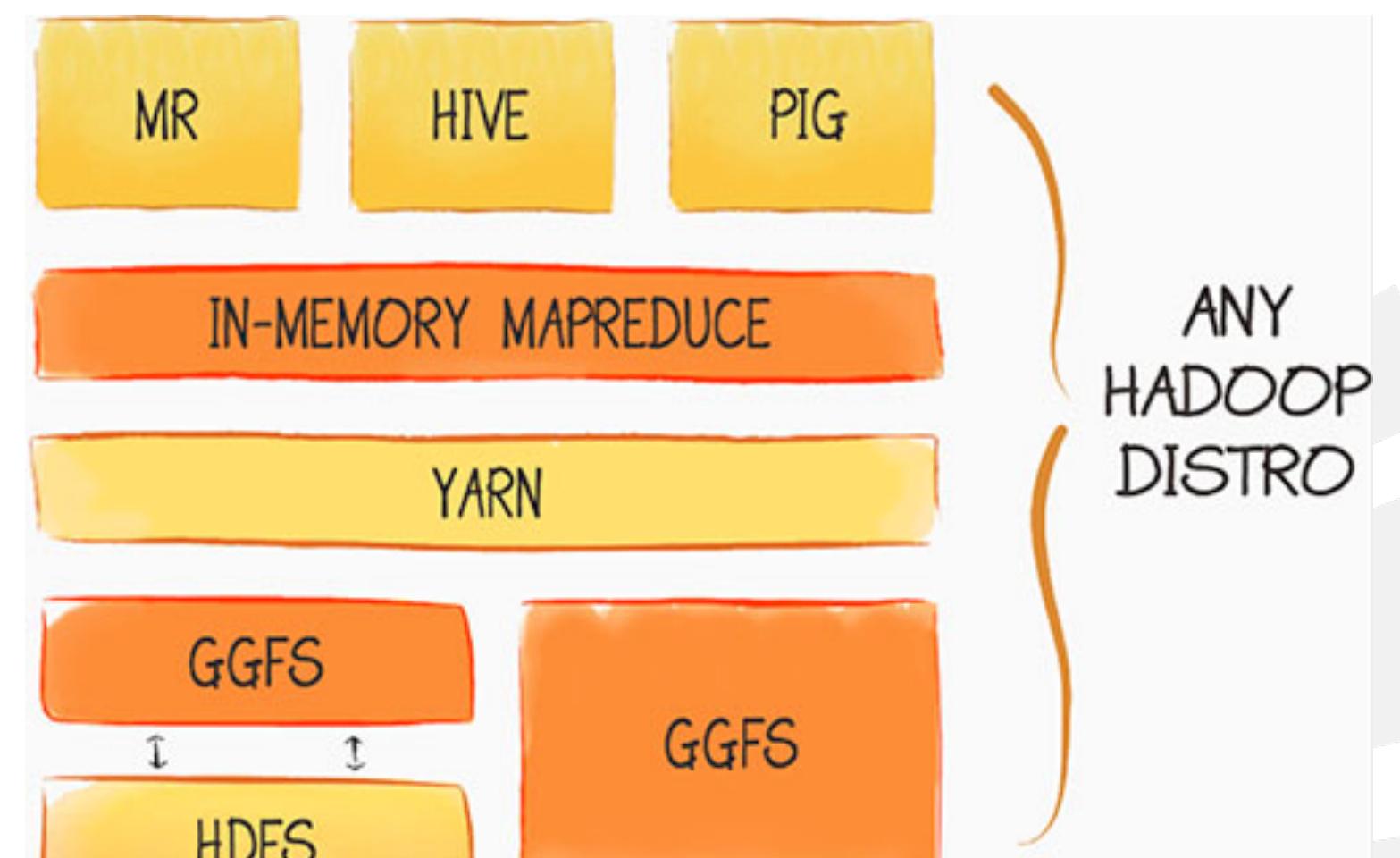
# In-Memory Streaming and CEP

- Streaming Data Never Ends
- Sliding Windows for CEP/Continuous Query
- Customizable Event Workflow
- Branching Pipelines
- Pluggable Routing
- Real Time Analysis
- Data Indexing
- Distributed Streamer Queries



# In-Memory Hadoop Acceleration

- Provides easy to use extensions to disk-based HDFS and traditional MapReduce, delivering up to 10x faster performance
- **Features:**
  - Use existing MapReduce / Pig / Hive
  - 10x Faster Performance
  - In-Memory MapReduce
  - Highly Optimized In-Memory Processing
  - Standalone File System
  - Optional Caching Layer for HDFS
  - Read-Through and Write-Through with HDFS



# Comparison of the GridGain Professional and Enterprise Editions to Apache Ignite

Features	Apache Ignite	Professional Edition	Enterprise Edition
In-Memory Data Grid	○	○	○
In-Memory Compute Grid	○	○	○
In-Memory SQL Grid	○	○	○
In-Memory Streaming	○	○	○
In-Memory Hadoop Acceleration	○	○	○
In-Memory Service Grid	○	○	○
Distributed In-Memory File System	○	○	○
Advanced Clustering	○	○	○
Distributed Messaging	○	○	○
Distributed Events	○	○	○
Distributed Data Structures	○	○	○
Portable Objects	○	○	○
Security Updates		○	○
Maintenance Releases & Patches		○	○
Management & Monitoring GUI			○
Enterprise-Grade Security			○
Network Segmentation Protection			○
Recoverable Local Store			○
Rolling Production Updates			○
Data Center Replication			○



# THANK YOU