



Apache Ignite™

Real-Time Processing of IoT-Generated Data

Denis Magda

GridGain Product Manager
Apache Ignite PMC

<http://ignite.apache.org>



#apacheignite



#denismagda

Agenda

- IoT Demands to Software
- IoT Software Stack
 - Device OS/RTOS
 - Data Collection and Enrichment
 - HTAP Platform
 - Application APIs
- Demo

IoT Demands to Software

IoT Demands to Software

- Real-time ingestion
- Real-time processing
- Time-series support
- Flexible Querying APIs
 - SQL
 - Full-text search
 - Geo-spatial
- Analytics
 - BI
 - Machine Learning
- High-availability
- Simple scalability



IoT Software Stack

IoT Software Stack

Application APIs

HTAP Platform

Data Collection and Enrichment

Device OS / Real-Time OS

Apache IoT Software Stack

Application APIs



HTAP Platform



Data Collection and Enrichment



Device OS / Real-Time OS



Device OS/RTOS

Apache MyNewt

- Open Source RTOS
 - Cortex M0-M4
 - MIPS & RISC-V
- Networking
 - Bluetooth Low Energy
 - Wi-Fi
 - TCP/IP & UDP
- Build & Package Management
- Secure bootloader and signed images
- Remote Firmware Upgrade



Data Collection and Enrichment

Data Collection and Enrichment

- Spark Streaming
 - Fault-Tolerant Streams Processing
- Data Collection
 - Sockets
 - Kafka
 - Flume
- Data Enrichment
 - Spark API
- Data Storage
 - Apache Ignite



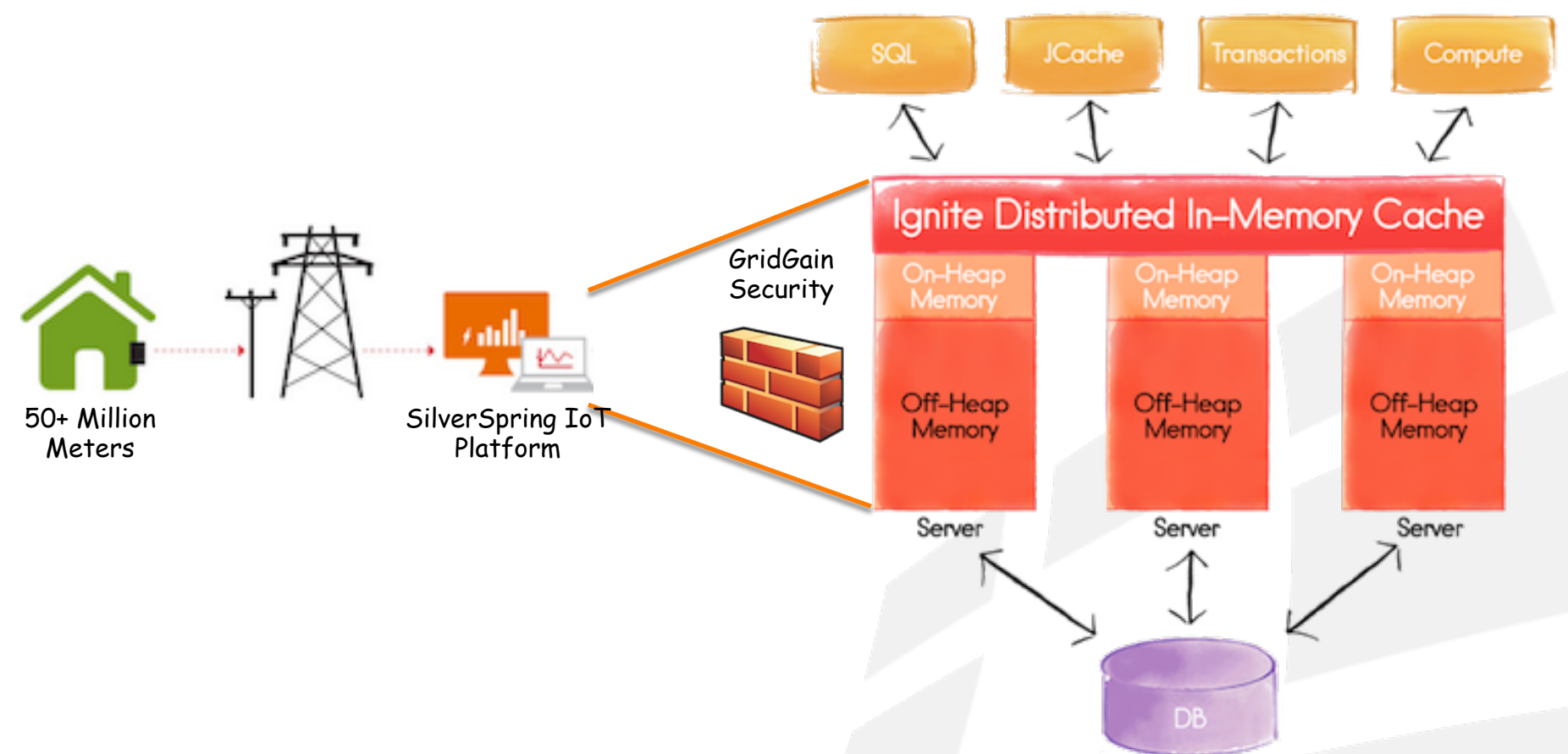
HTAP Platform

Use Case:

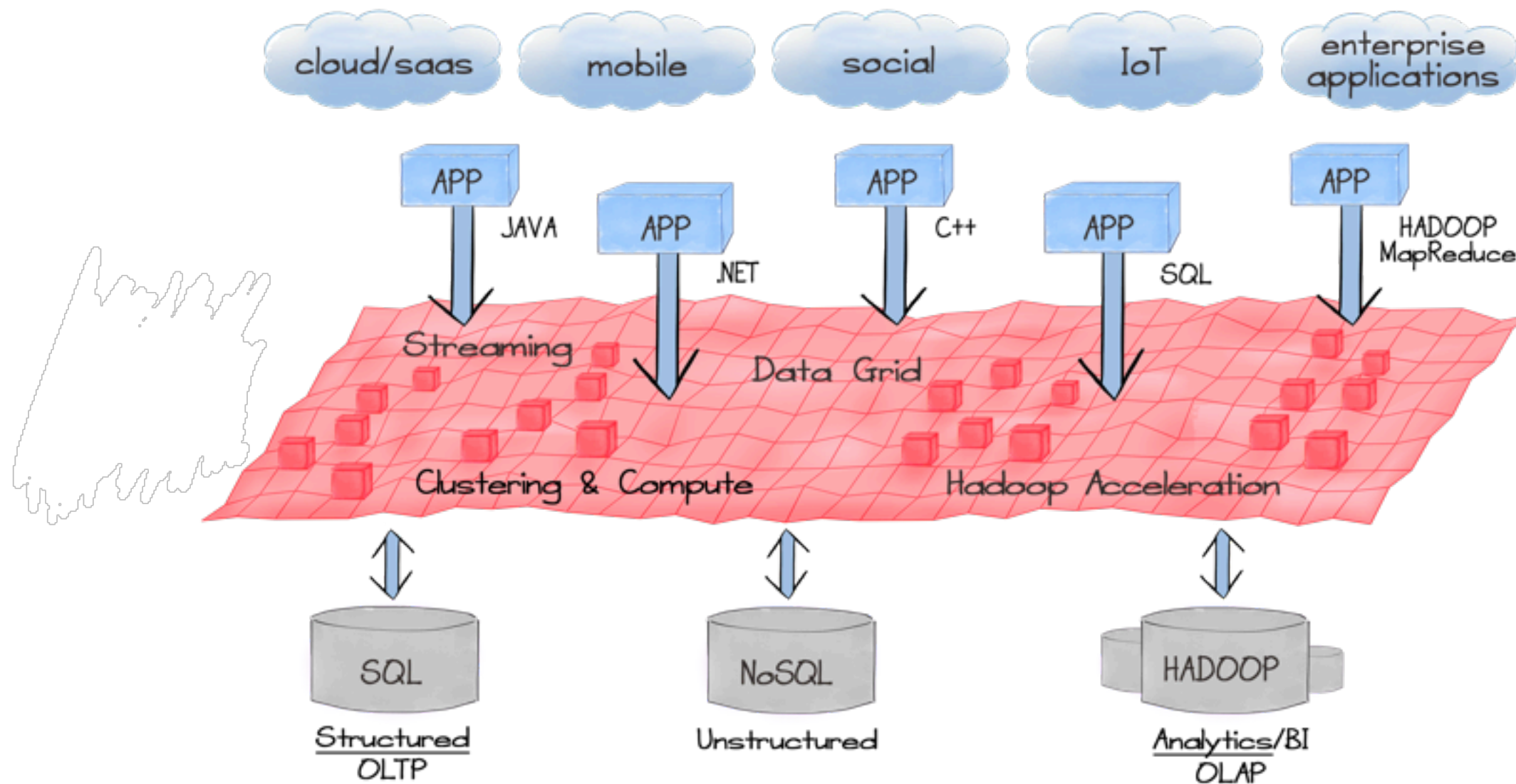
Smart Metering and Utilities – delivers a comprehensive IOT platform

- SilverSpring Requirements
 - Migrate to in-memory processing
 - Add scalability & elasticity
 - Use open source technologies

- SilverSpring Solution
 - SaaS Architecture
 - Multi-Tenancy
 - Advanced Security
 - Strong compute capabilities
 - Co-located in-memory processing
 - Demonstrated best
 - On-demand elasticity & scalability
 - ANSI-99 SQL Support
 - Transactional consistency



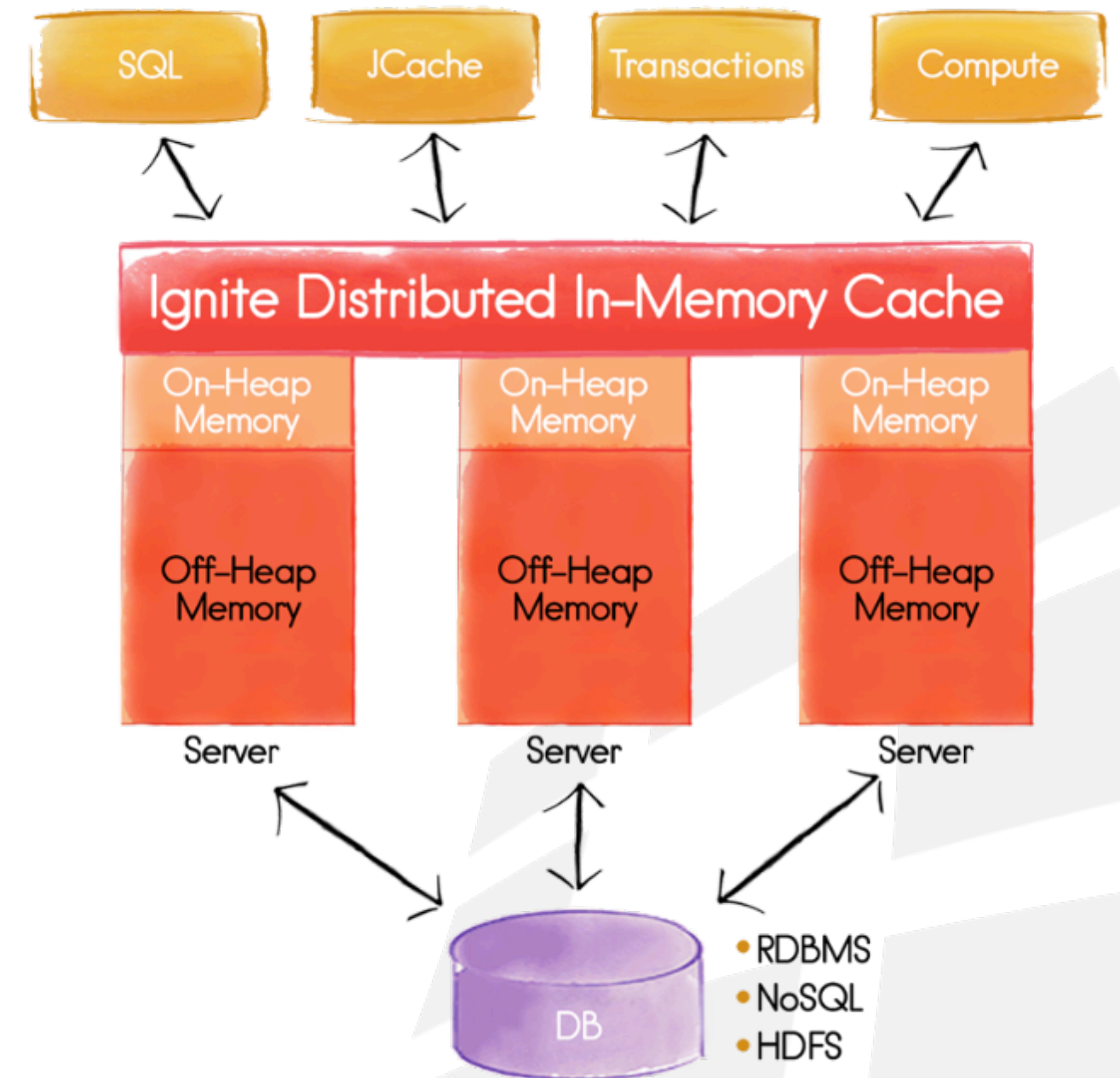
Apache Ignite In-Memory Data Fabric



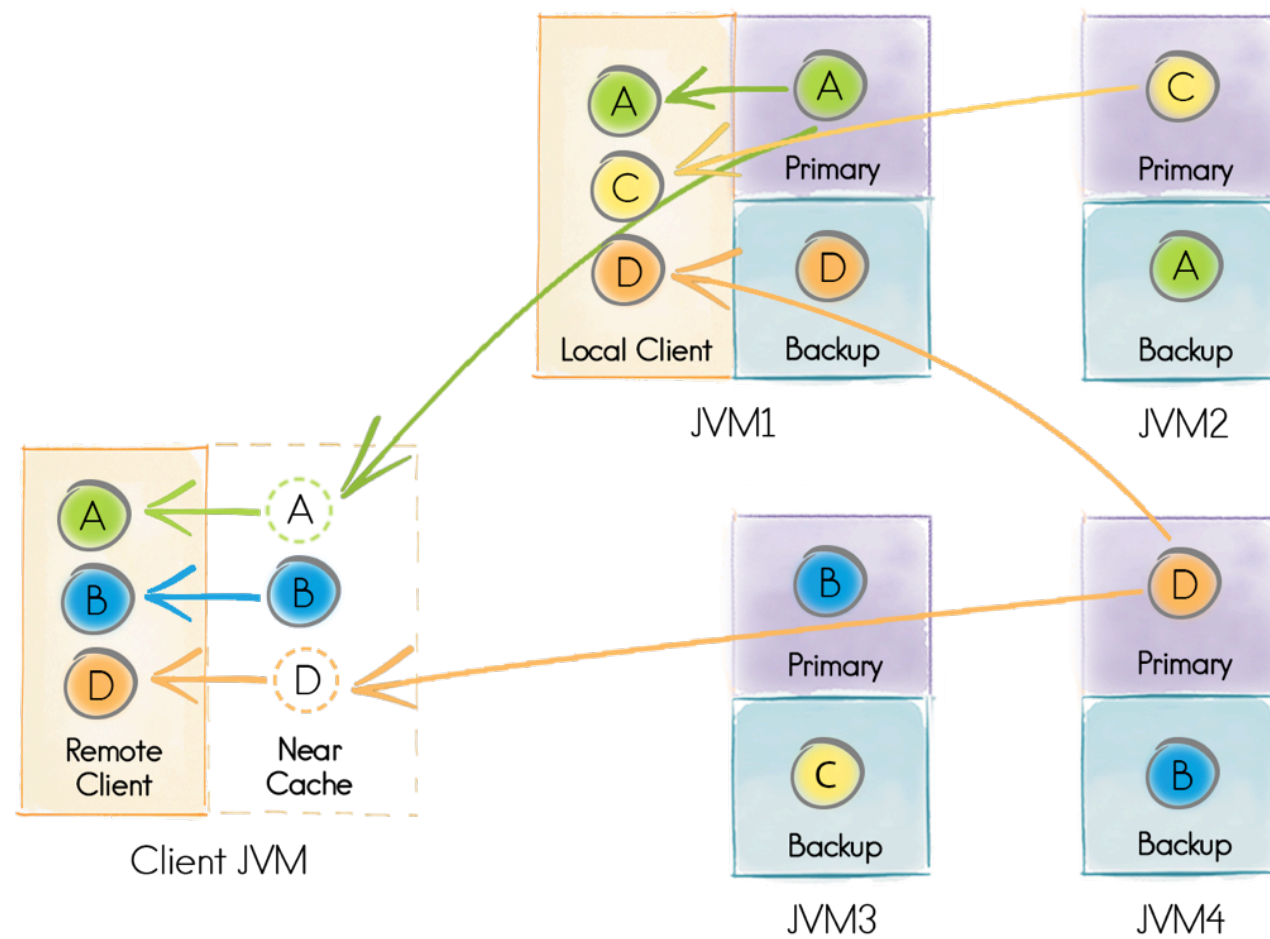
- Supports Applications of various types and languages
- Open Source – Apache 2.0
- Simple Java APIs
- 1 JAR Dependency
- High Performance & Scale
- Automatic Fault Tolerance
- Management/Monitoring
- Runs on Commodity Hardware
- Supports existing & new data sources
- No need to rip & replace

In-Memory Data Grid

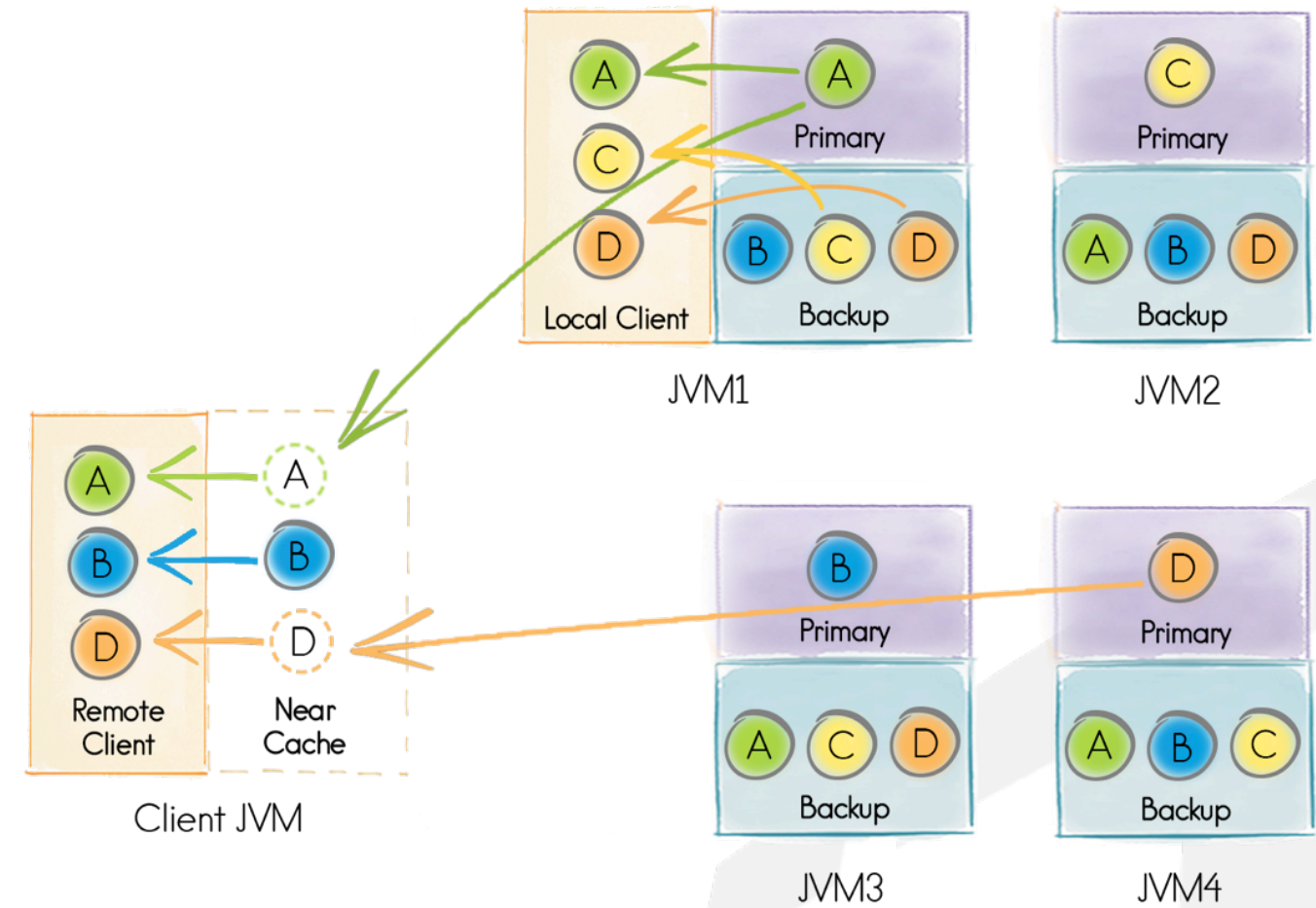
- Distributed Key-Value Data Store
- Data Reliability
- High-Availability
 - Active replicas, automatic failover
- Data Consistency
 - ACID distributed transactions



In-Memory Data Grid: Partitioning



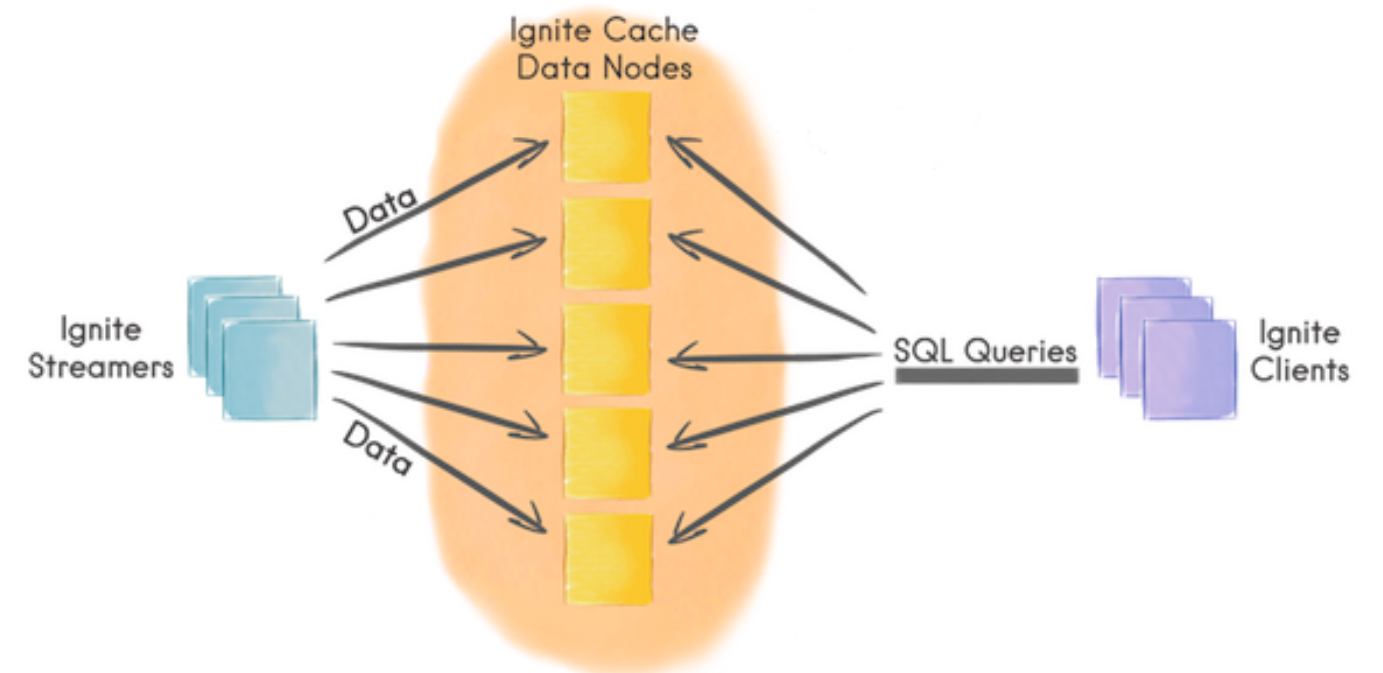
Partitioned Cache



Replicated Cache

Streaming to Ignite

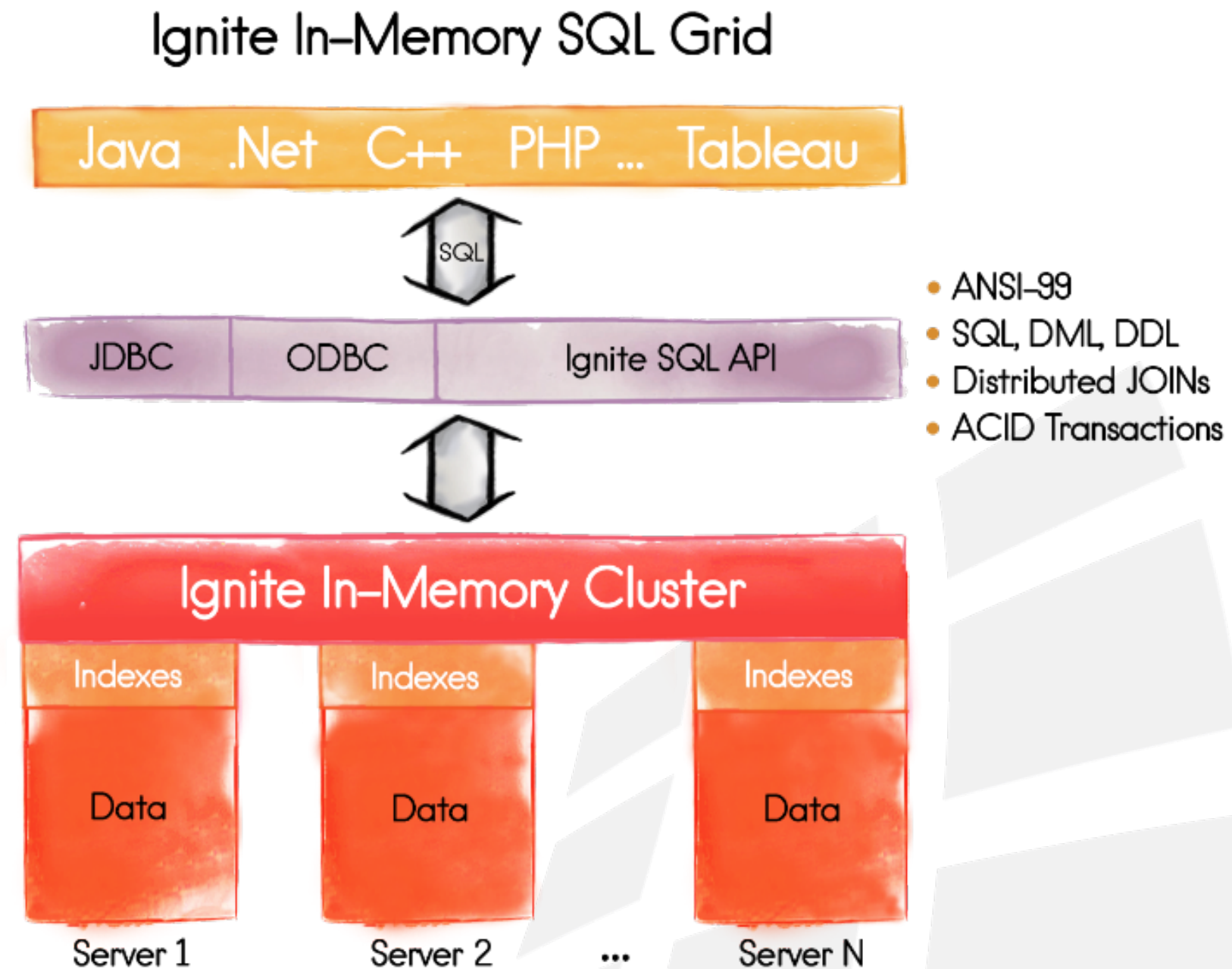
- Ignite Data Streamer
 - Fastest Data Injection
 - Automatic data partitioning
- Stream Receivers
 - Custom logic execution
 - Additional data transformation
- Stream Adapter
 - Socket
 - Kafka
 - Flink
 - RocketMQ
 - etc.



Application APIs

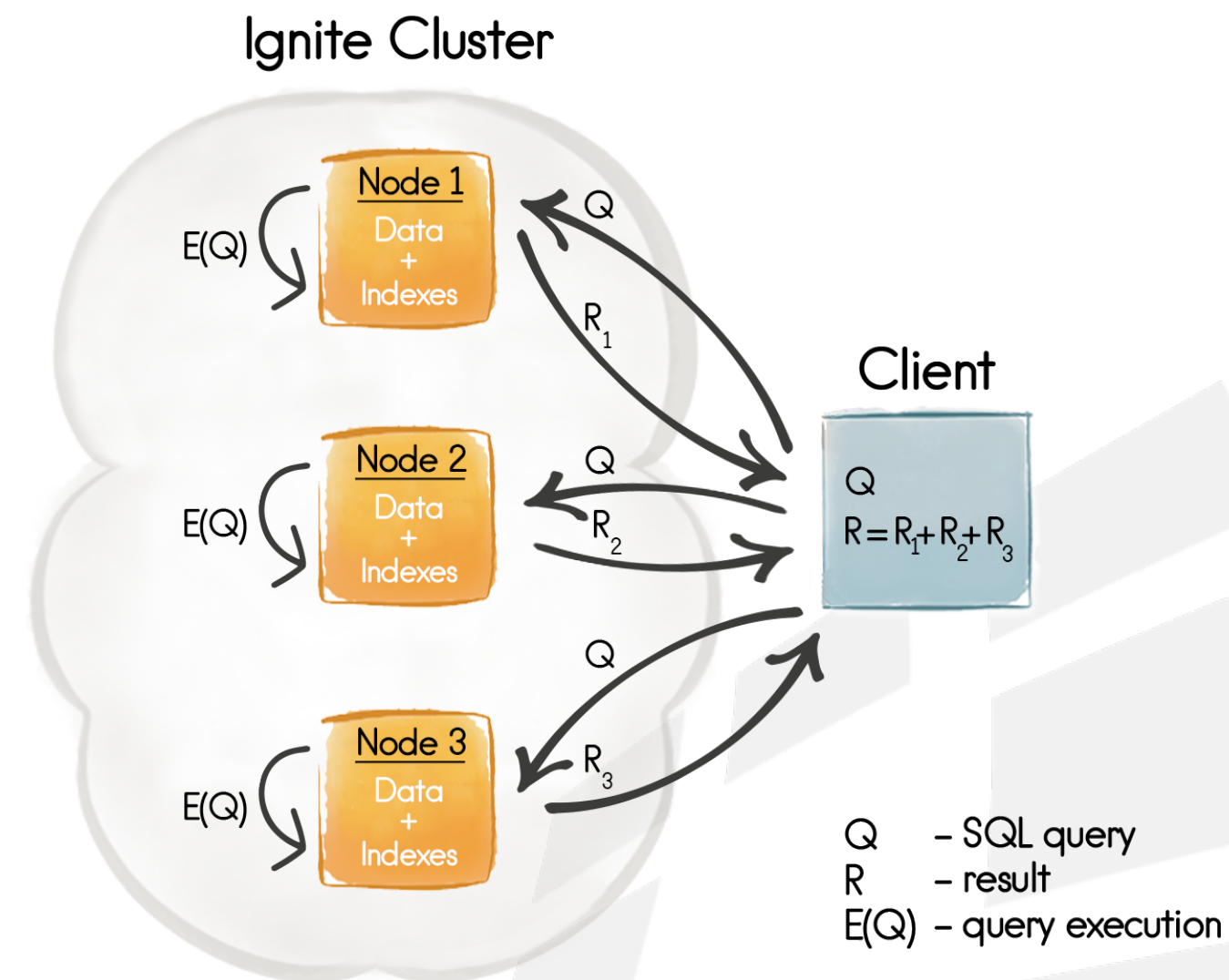
Apache Ignite SQL Grid

- ANSI-99 SQL
- Geo-spatial Queries
- Full-text Search
- Always Consistent
- Fault Tolerant
- Cross-Platform
 - JDBC and ODBC drivers
 - DML (INSERT, UPDATE, etc.)
 - DDL (CREATE, DROP, etc.)



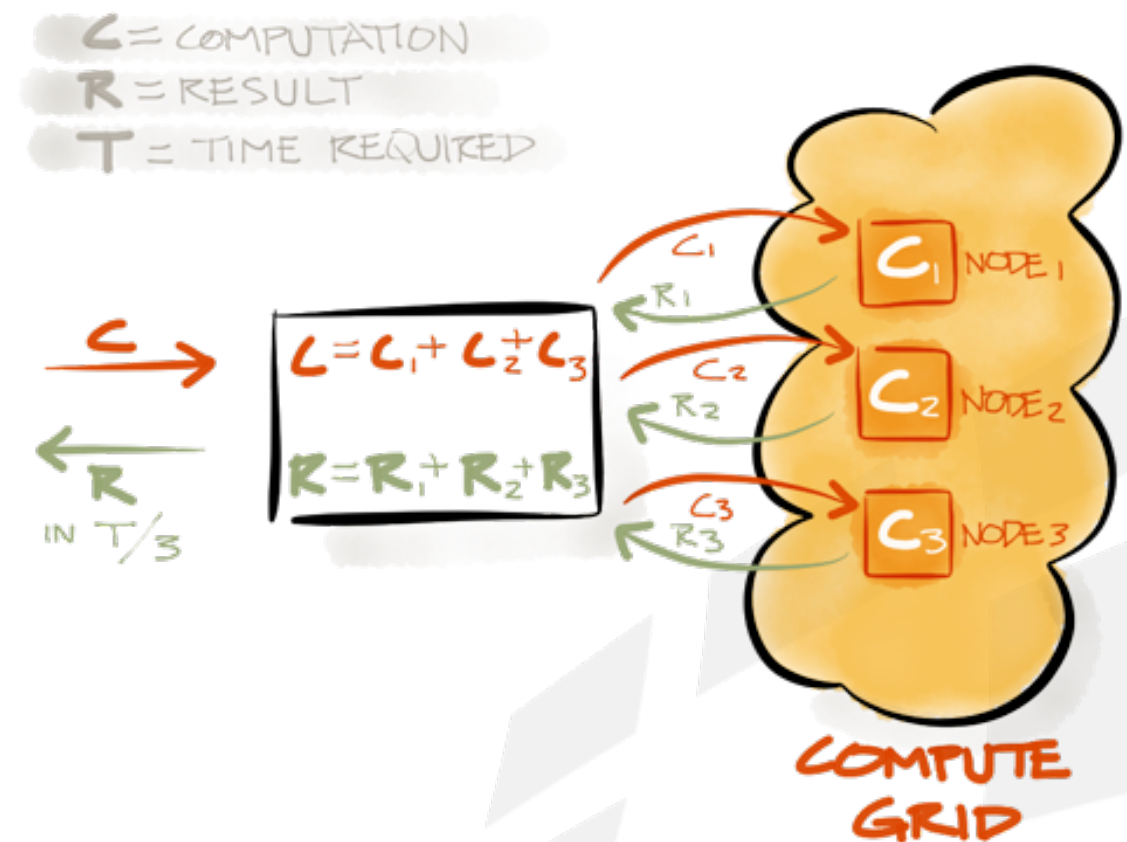
Apache Ignite SQL Grid: Queries

- Distributed Joins
- Automatic Group By, Aggregations, Sorting
- Cross-Cache Joins, Unions, etc.
- Ad-Hoc SQL Support



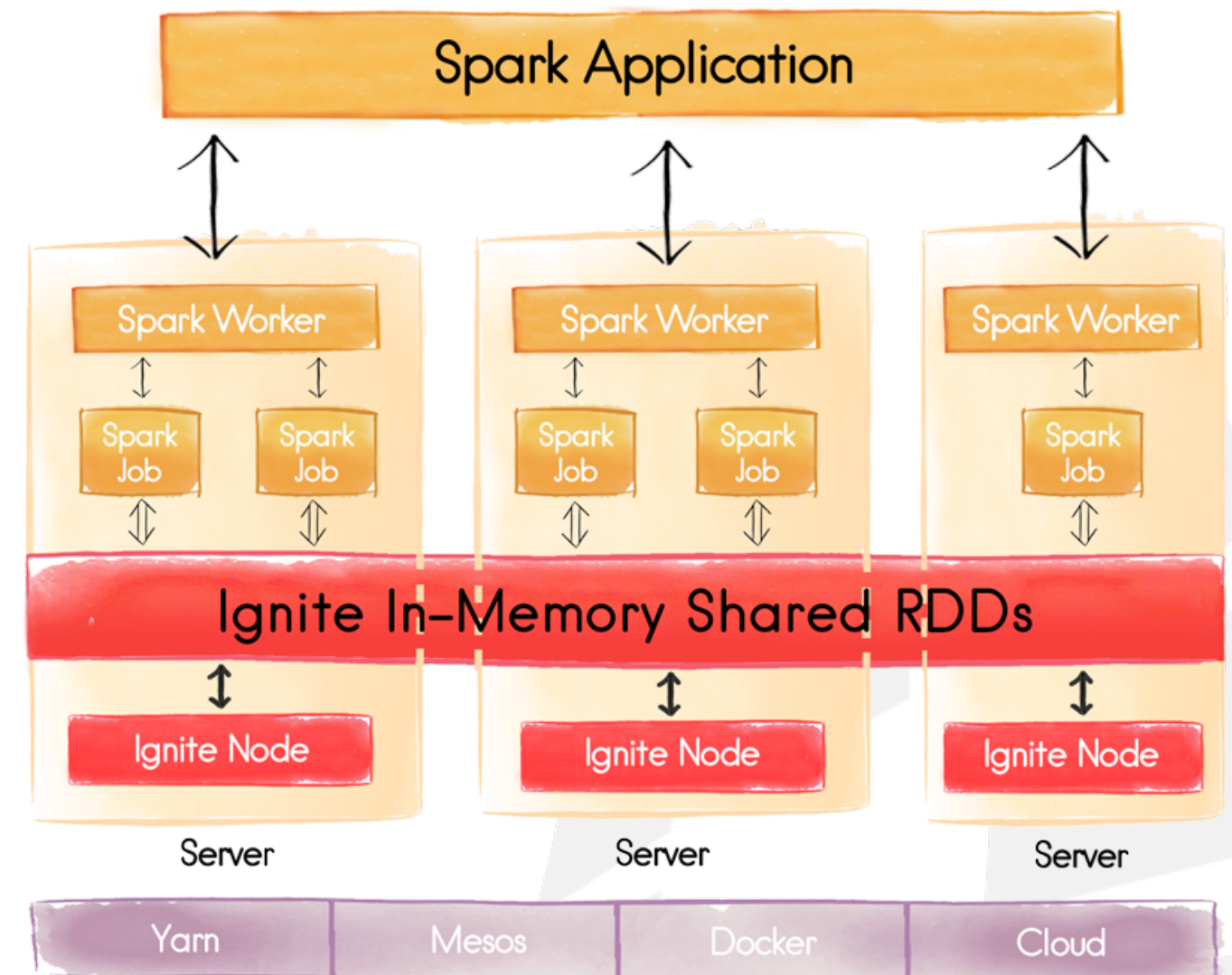
Apache Ignite Compute Grid

- Direct API for MapReduce
- Direct API for ForkJoin
- Zero Deployment
- State Checkpoints
- Load Balancing
- Automatic Failover

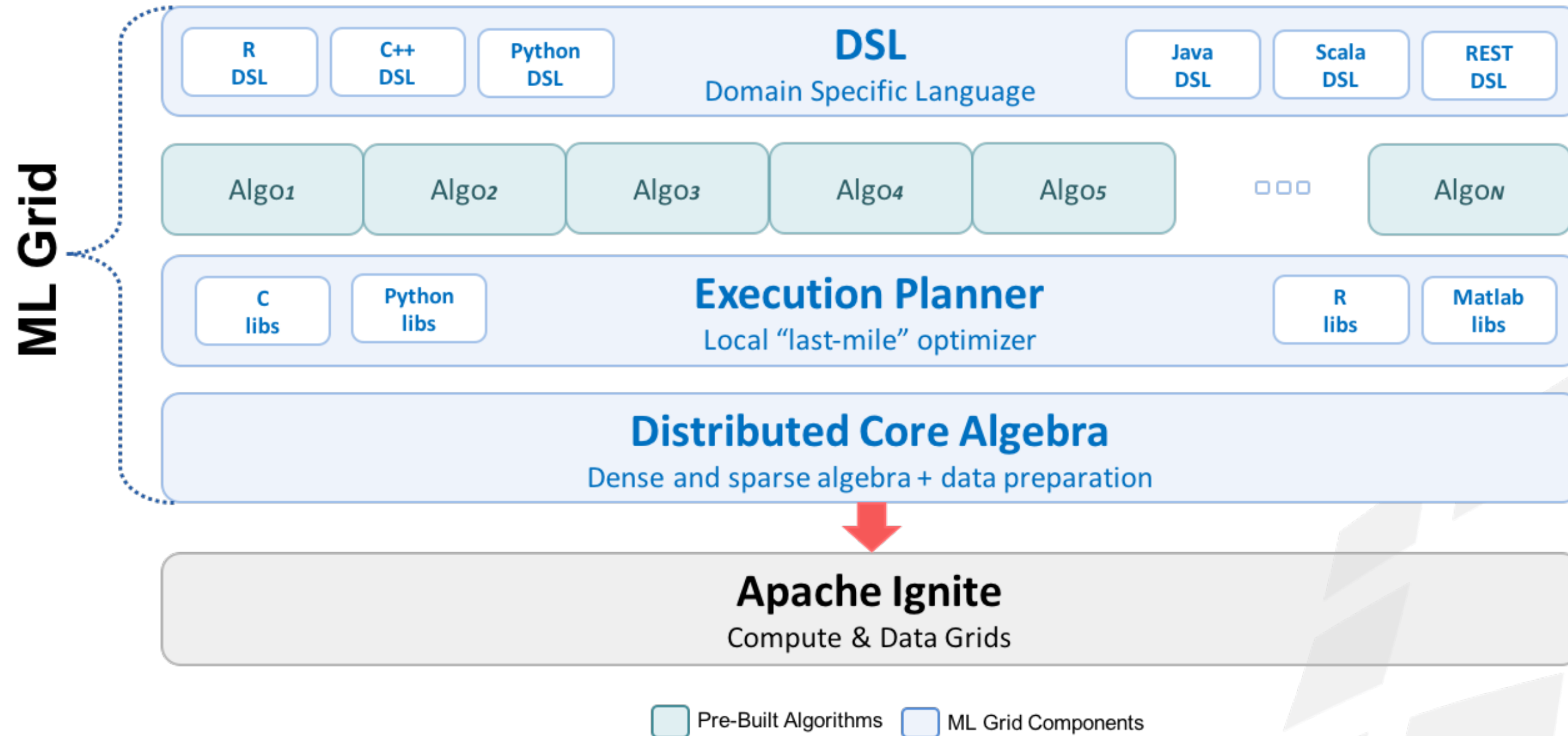


Spark Shared RDDs

- IgniteRDD
 - Share RDD across jobs on the host
 - Share RDD across jobs in the application
 - Share RDD globally
- Faster SQL
 - In-Memory Indexes
 - SQL on top of Shared RDD



Machine Learning Grid



Demo

Resources

- Documentation:
 - Apache Ignite: <https://apacheignite.readme.io/docs>
 - Apache Spark Streaming: <http://spark.apache.org/streaming/>
 - Ignite and Spark Integration: <https://apacheignite-fs.readme.io/docs/ignite-for-spark>
 - Apache MyNewt: <http://mynewt.apache.org>
- Demo Source Code:
 - <https://github.com/dmagda/igniteSparkIoT>



ANY QUESTIONS?

Thank you for joining us. Follow the conversation.

<http://ignite.apache.org>



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