MPP vs Hadoop

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HUG Meetup
28.11.2015

Pivotal.

Agenda

- Distributed Systems

- MPP

- Hadoop

- MPP vs Hadoop

- Summary

Agenda

- **Distributed Systems**

- MPP

- Hadoop

- MPP vs Hadoop

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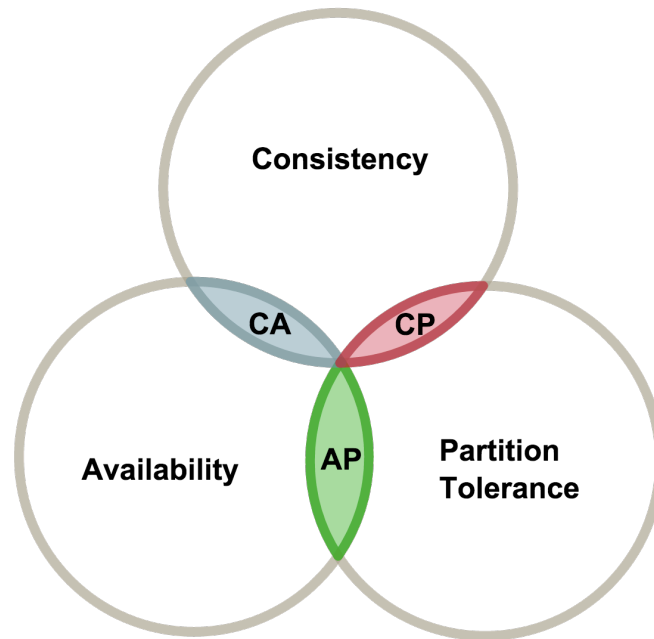**Pivotal**

Distributed Systems

Avoid distributed systems in all the problems that potentially could be solved using non-distributed systems

Distributed Systems

- Consensus problem
  - Paxos
  - RAFT
  - ZAB
  - etc.

- Transaction consistency
  - 2PC
  - 3PC

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Distributed Systems

- CAP Theorem

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Distributed Systems

```
L1 cache reference                              0.5 ns
Branch mispredict                                 5 ns
L2 cache reference                                7 ns
Mutex lock/unlock                                25 ns
Main memory reference                           100 ns
Compress 1K bytes with Zippy                  3,000 ns
Send 2K bytes over 1 Gbps network            20,000 ns
Read 1 MB sequentially from memory          250,000 ns
Round trip within same datacenter           500,000 ns
Disk seek                                10,000,000 ns
Read 1 MB sequentially from disk         20,000,000 ns
Send packet CA->Netherlands->CA         150,000,000 ns
```

http://www.cs.cornell.edu/projects/ladis2009/talks/dean-keynote-ladis2009.pdf

Distributed Systems

Reasons to use

- Performance issues
  - More than 100'000 TPS
  - More than 4 GB/sec scan rate
  - More than 100'000 IOPS

- Capacity issues
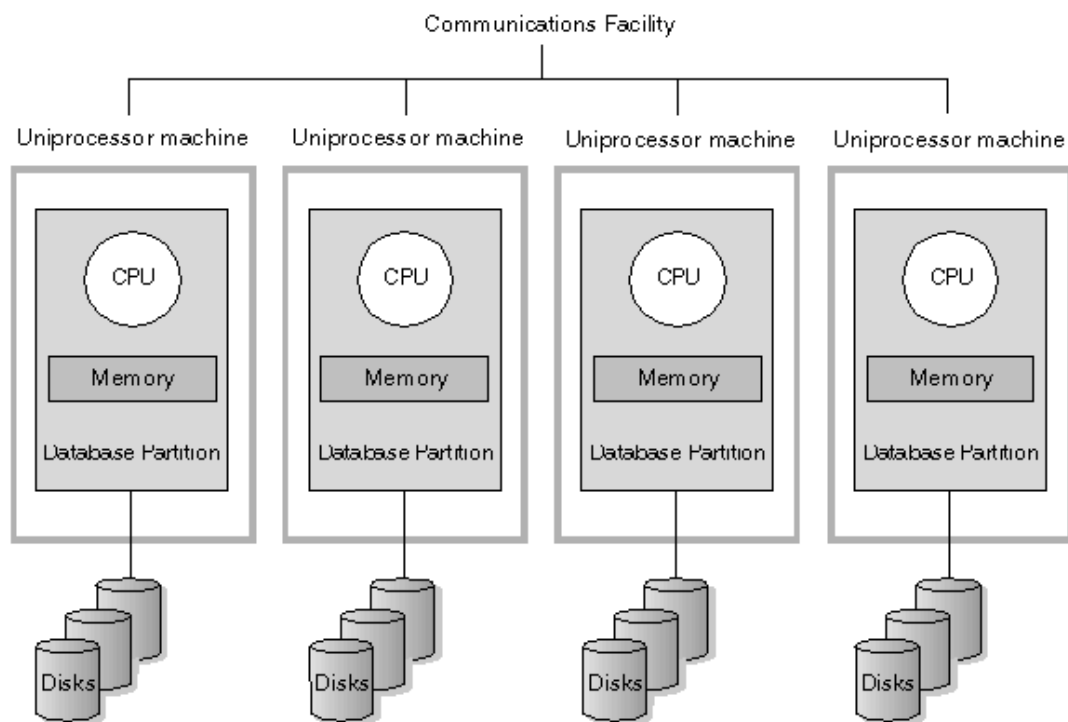 - More than 50TB of data

- DR and Geo-Distribution

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Agenda

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MPP

Main principles

- Shared Nothing

- Data Sharding

- Data Replication

- Distributed Transactions

- Parallel Processing

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MPP

MPP

Works well for

- Relational data

- Batch processing

- Ad hoc analytical SQL

- Low concurrency

- Applications requiring ANSI SQL

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MPP

Not the best choice for

- Non-relational data

- OLTP and event stream processing

- High concurrency

- 100+ server clusters

- Non-analytical use cases

- Geo-Distributed use cases

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Agenda

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Hadoop

Main Components

- HDFS

- YARN

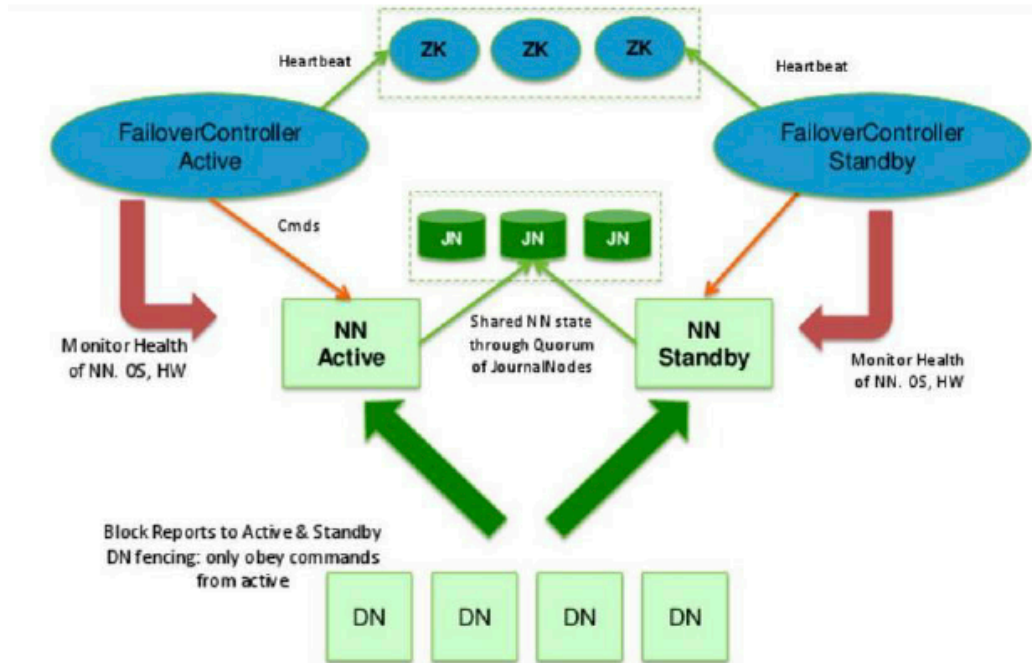- MapReduce

- HBase

- Hive / Hive+Tez

Hadoop

HDFS

- Distributed filesystem

- Block-level storage with big blocks

- Non-updatable

- Synchronous block replication

- No built-in Geo-Distribution support

- No built-in DR solution

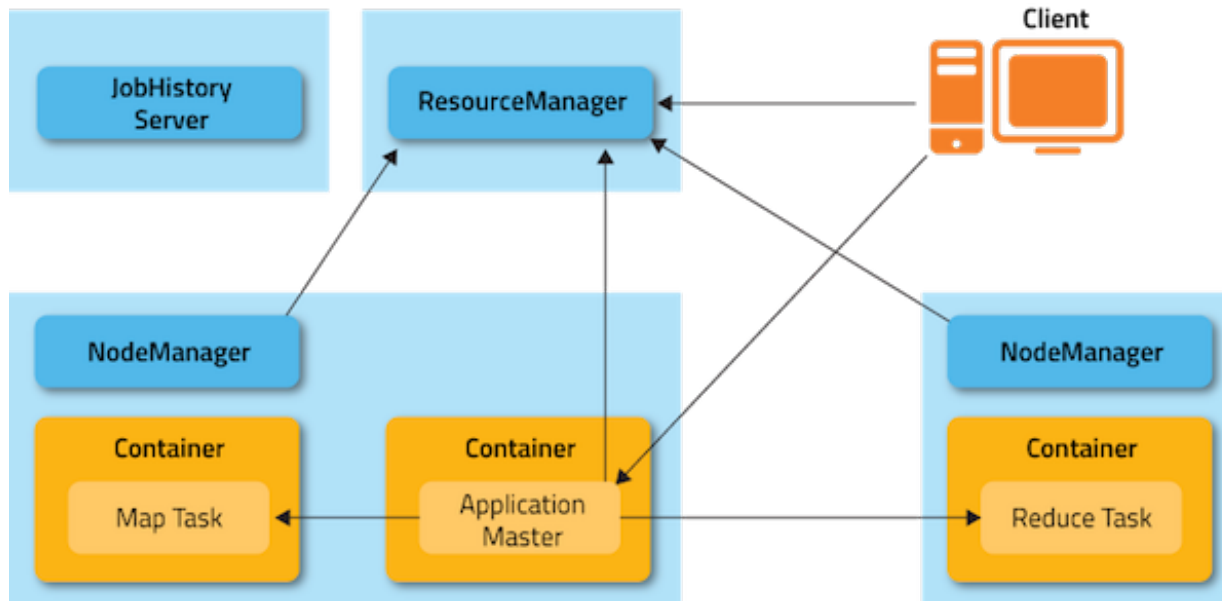Pivotal™

Hadoop

HDFS

Hadoop

YARN

- Cluster resource manager

- Manages CPU and RAM allocation

- Schedulers are pluggable

- Can handle different resource pools

- Supports both MR and non-MR workload

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Hadoop

YARN

Hadoop

MapReduce

- Framework for distributed data processing

- Two main operations: map and reduce

- Data hits disk after "map" and before "reduce"

- Scales to thousands of servers

- Can process petabytes of data

- Extremely reliable

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Hadoop

MapReduce
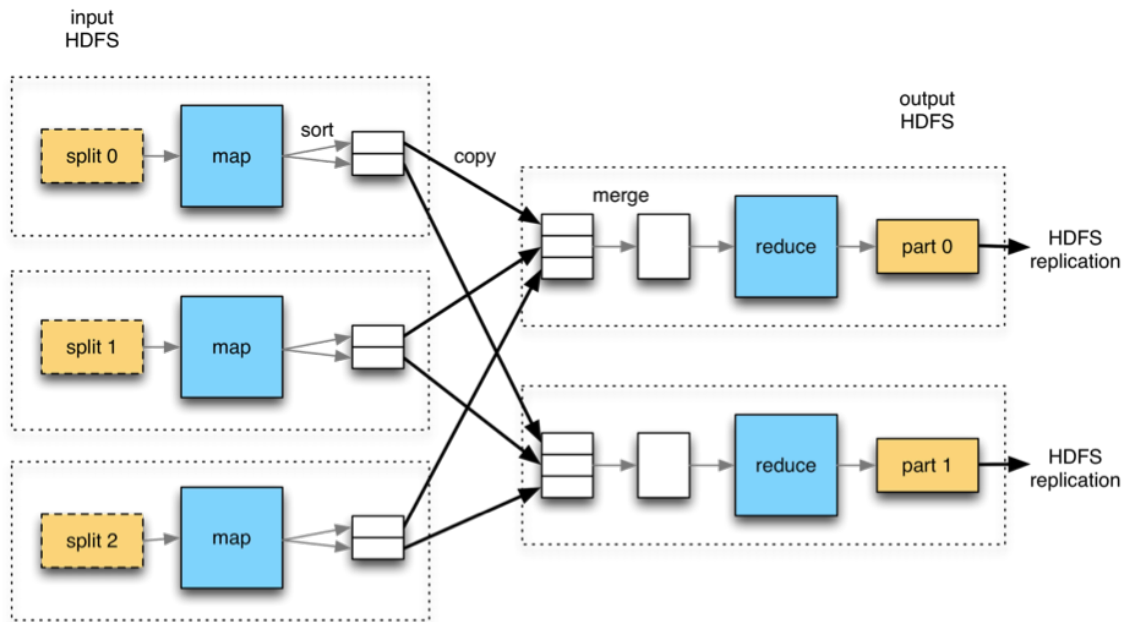
Hadoop

HBase

- Distributed key-value store

- Data is sharded by key

- Data is stored in sorted order

- Stores multiple versions of the row

- Easily scales

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Hadoop

HBase
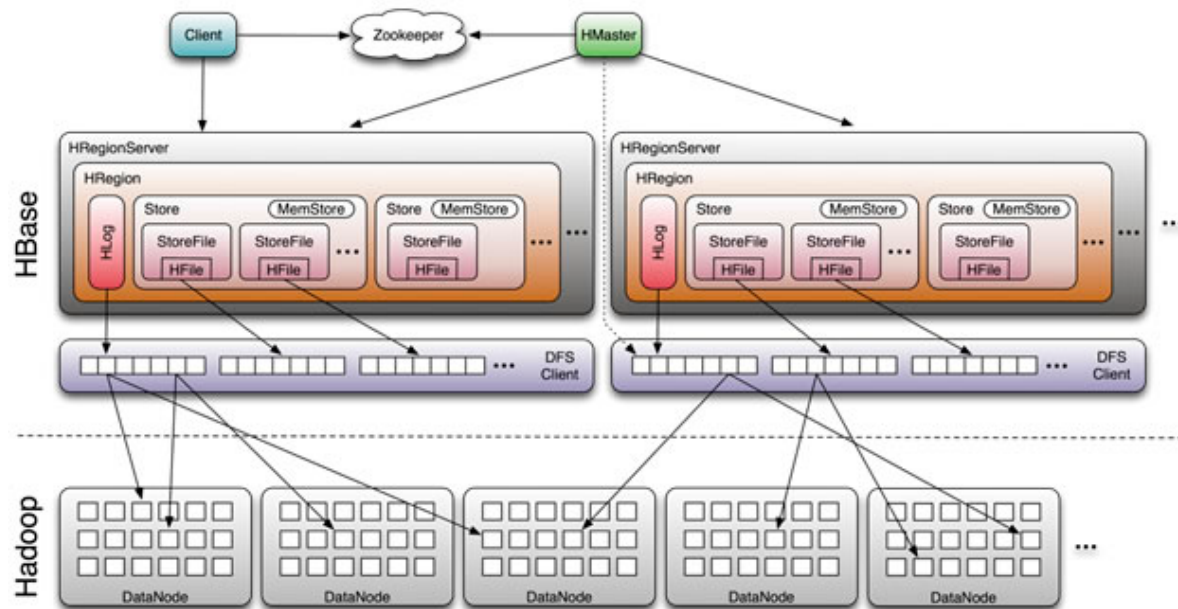
Hadoop

Hive

- Query engine with SQL-like syntax

- Translates HiveQL query to MR / Tez / Spark job

- Processes HDFS data

- Supports UDFs and UDAFs

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Hadoop

Hive
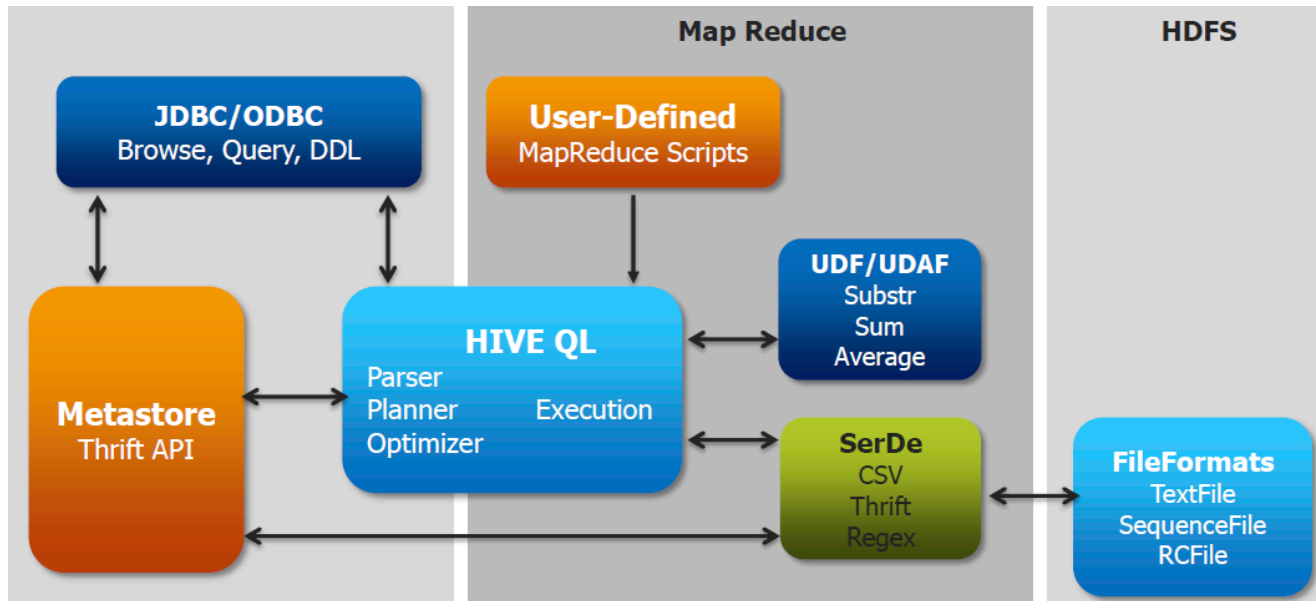
Hadoop

Works well for

- Write Once Read Many

- 100+ server clusters

- Both relational and non-relational data

- High concurrency

- Batch processing and analytical workload

- Elastic scalability

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Hadoop

Not the best choice for

- Write-heavy workloads

- Small clusters

- Analytical DWH cases

- OLTP and event stream processing

- Cost savings

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Agenda

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MPP vs Hadoop for Business

	MPP	Hadoop
Platform Openness	Mostly Closed	Open

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Target End Users	Business Analysts	Developers

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Min Collection Size	Megabytes	Gigabytes
Max Concurrency	10-15 queries	70-100 jobs

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- *Distributed Systems*

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- *Hadoop*

- *MPP vs Hadoop*

- *Examples*

- **Summary**

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Summary

Use MPP for

- Analytical DWH

- Ad hoc analyst SQL queries and BI

- Keep under 100TB of data

Use Hadoop for

- Specialized data processing systems

- Over 100TB of data

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Questions?

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BUILT FOR THE SPEED OF BUSINESS