Spark Ecosystem

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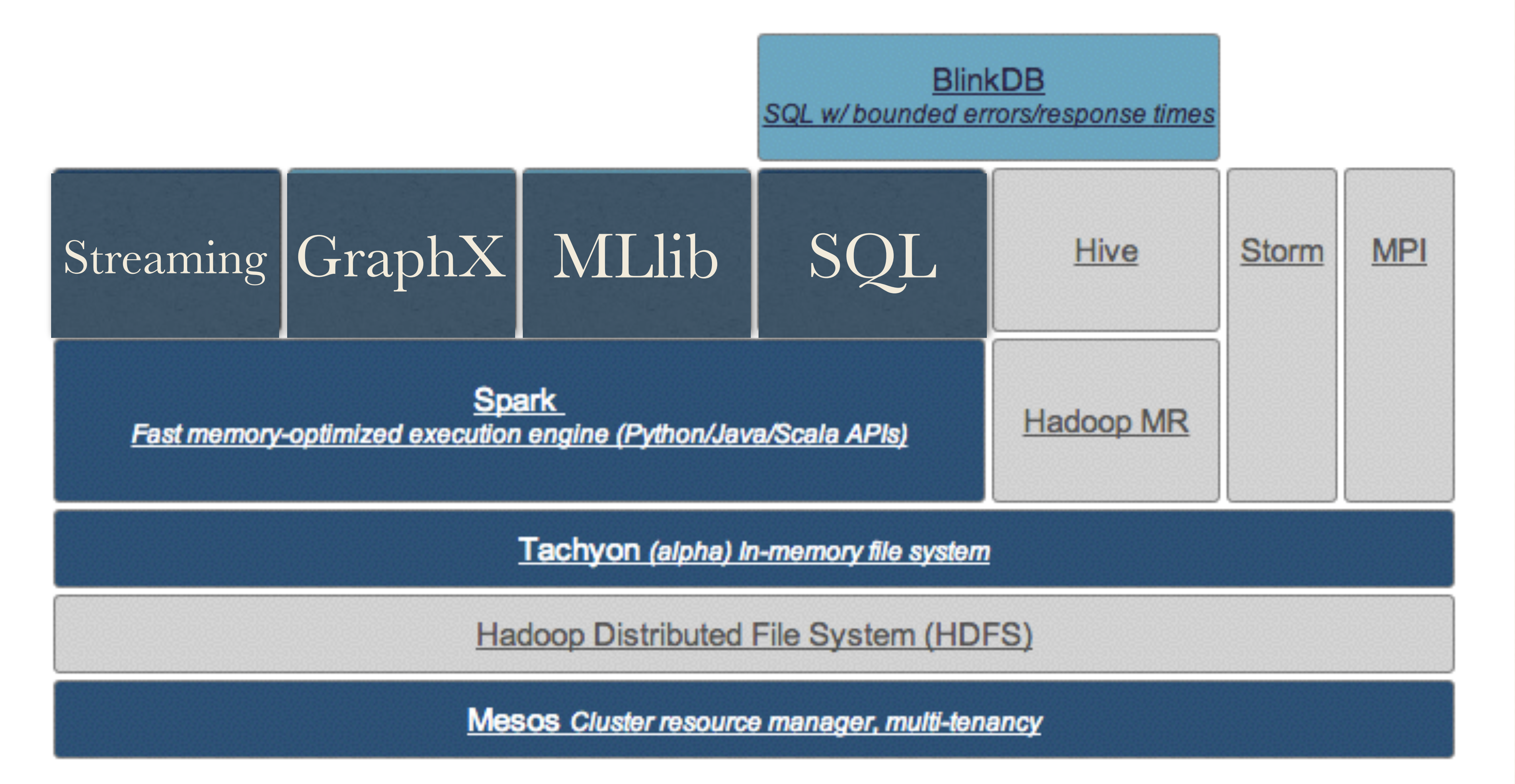
Spark Meetup @Hangzhou

2014.08.31

What is Spark

- Apache Spark is a fast and general engine for large-scale data processing.
- Speed
- Ease of Use
- Generality
- Integrated with Hadoop

BDAS



BlinkDB
SQL w/ bounded errors/response times

Streaming

GraphX

MLlib

SQL

Hive

Storm

MPI

Spark
Fast memory-optimized execution engine (Python/Java/Scala APIs)

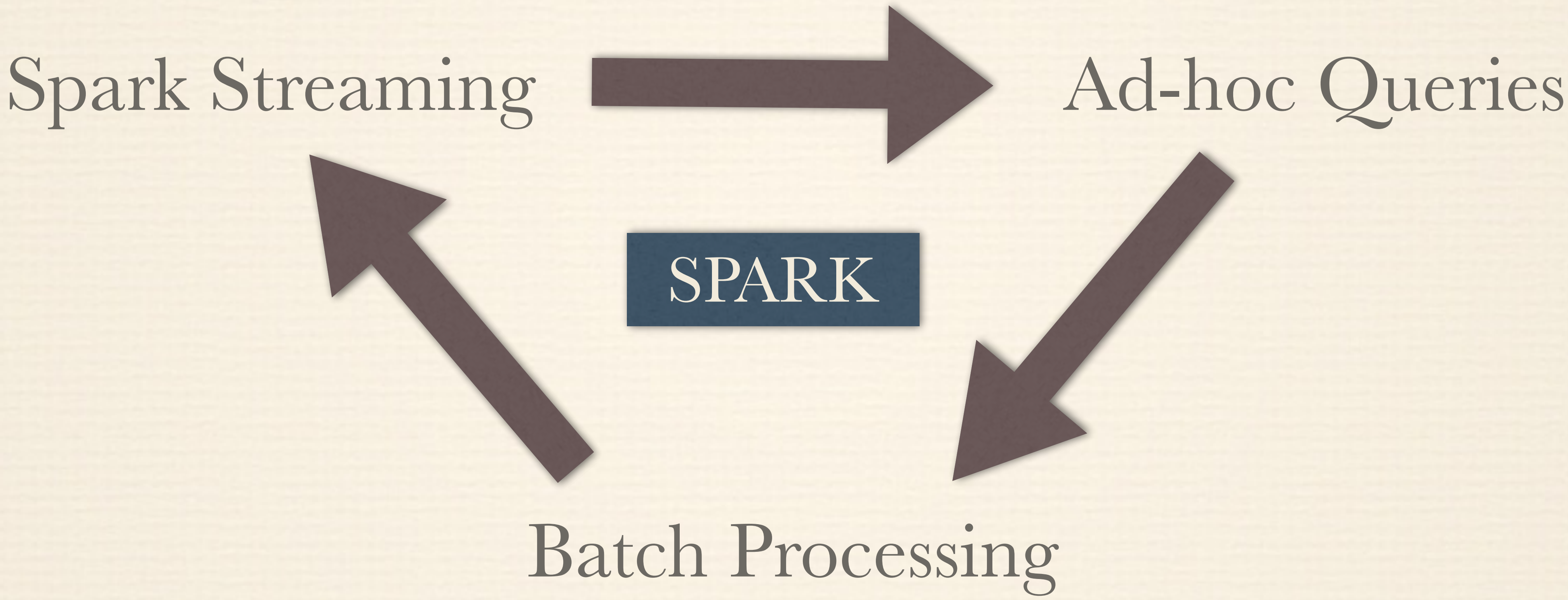
Hadoop MR

Tachyon *(alpha) In-memory file system*

Hadoop Distributed File System (HDFS)

Mesos *Cluster resource manager, multi-tenancy*

one stack to rule them all



Spark Streaming

Ad-hoc Queries

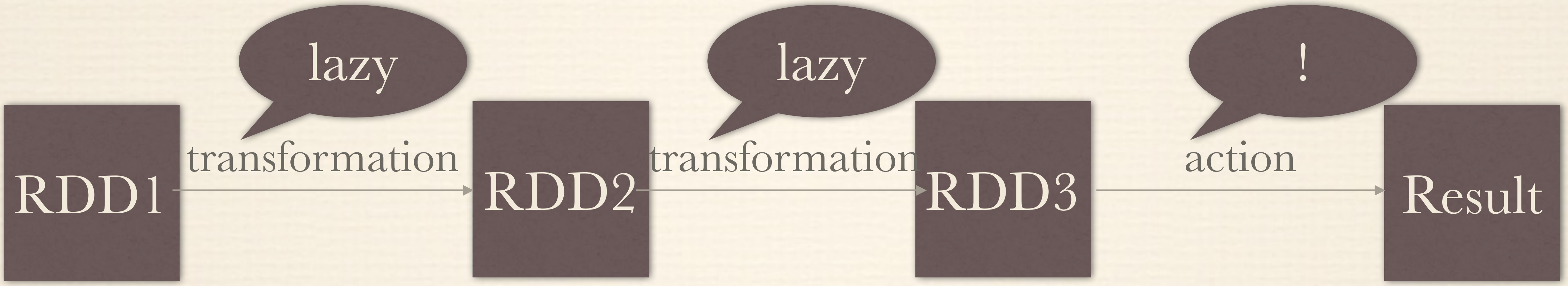
SPARK

Batch Processing

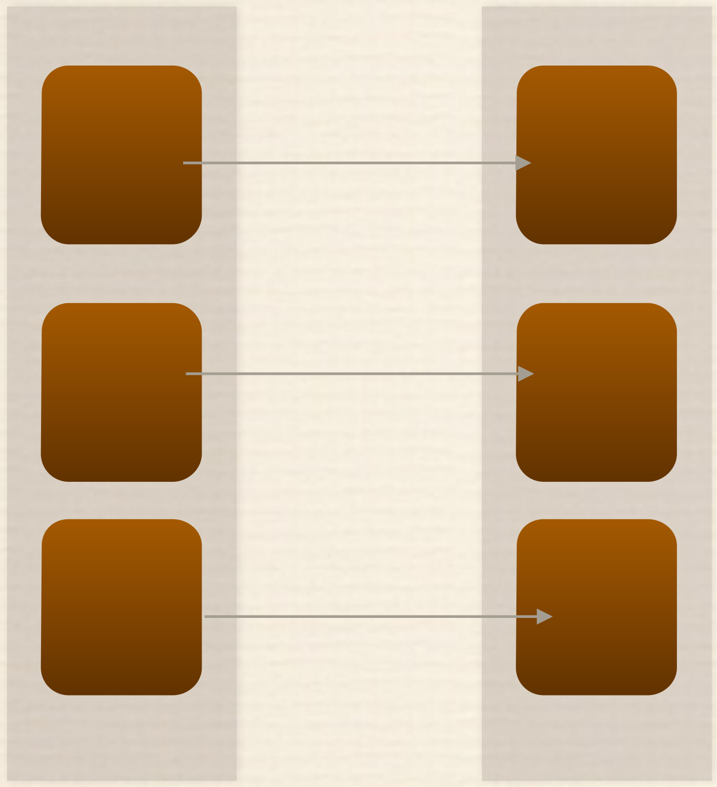
Key Concept-RDD

- A list of partitions
- A function for computing each split
- A list of dependencies on other RDDs
- Optionally, a Partitioner for key-value RDDs
- Optionally, a list of preferred locations to compute each split on

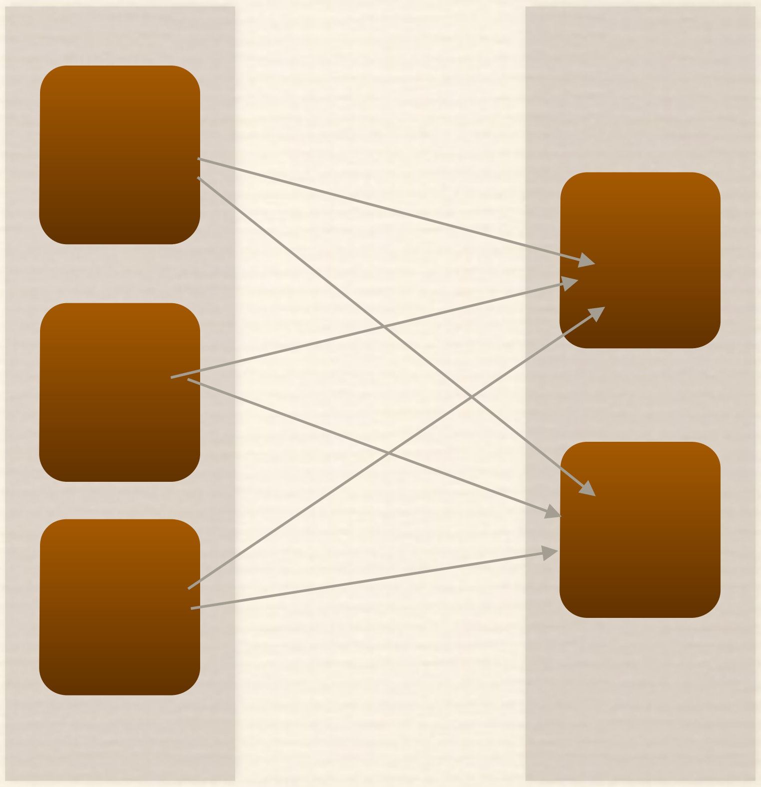
Key Concept-Lineage



Key Concept-Dependency



Narrow Dependency

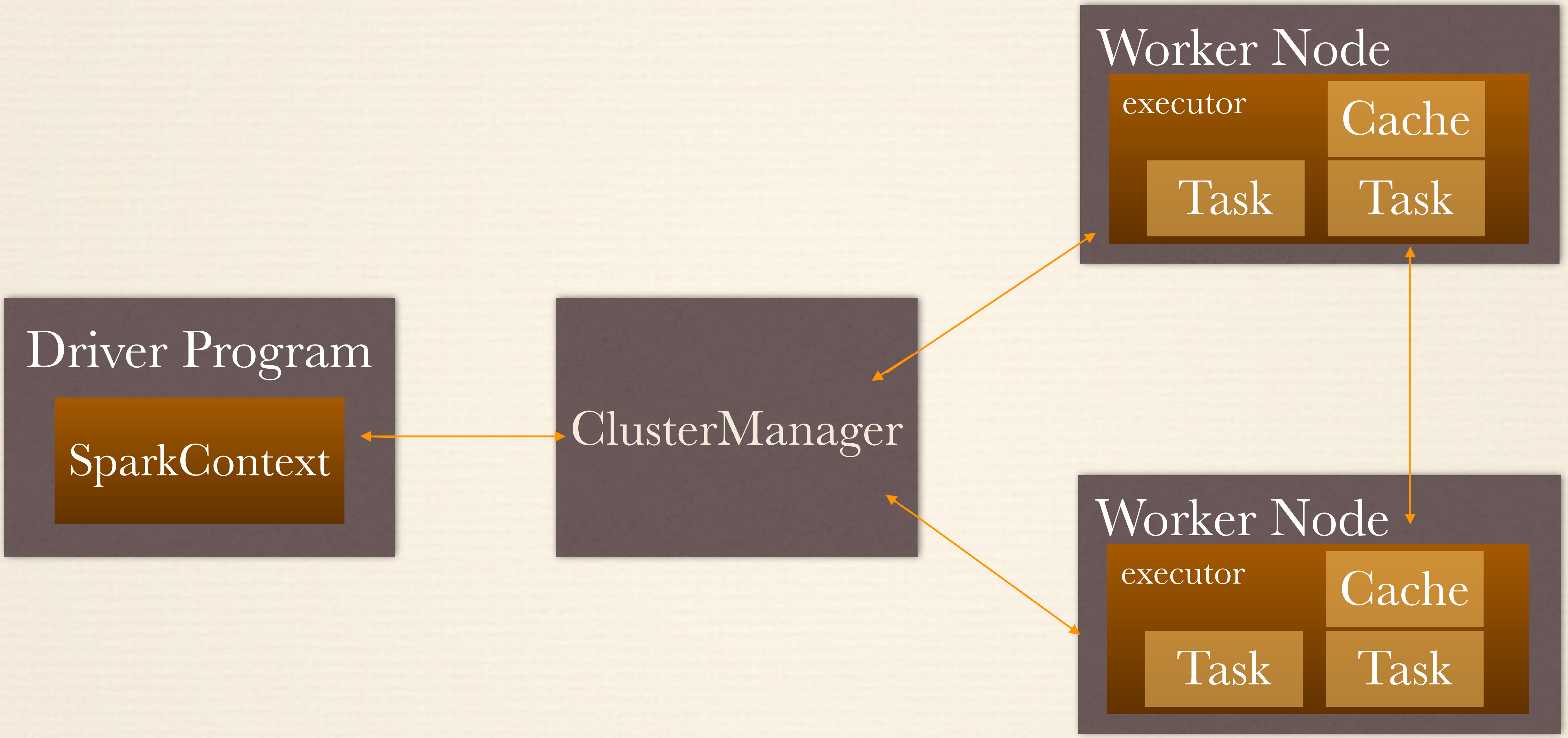


Wide Dependency

Key Concept-ClusterManager

- Local
- Standalone
- Yarn
- Mesos

Cluster Overview



Worker Node

executor

Cache

Task

Task

Driver Program

SparkContext

ClusterManager

Worker Node

executor

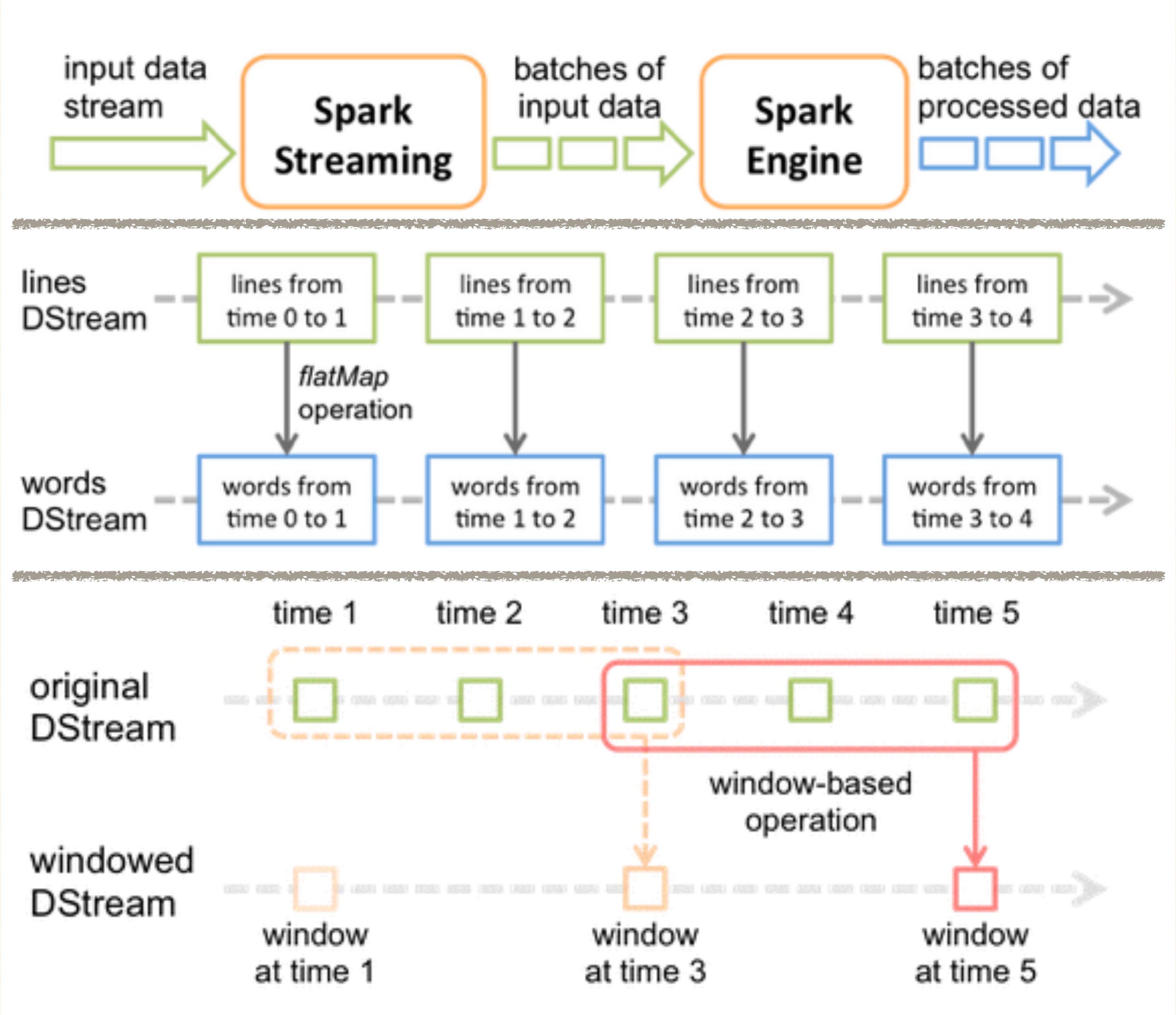
Cache

Task

Task

Spark Streaming

- mini-batch



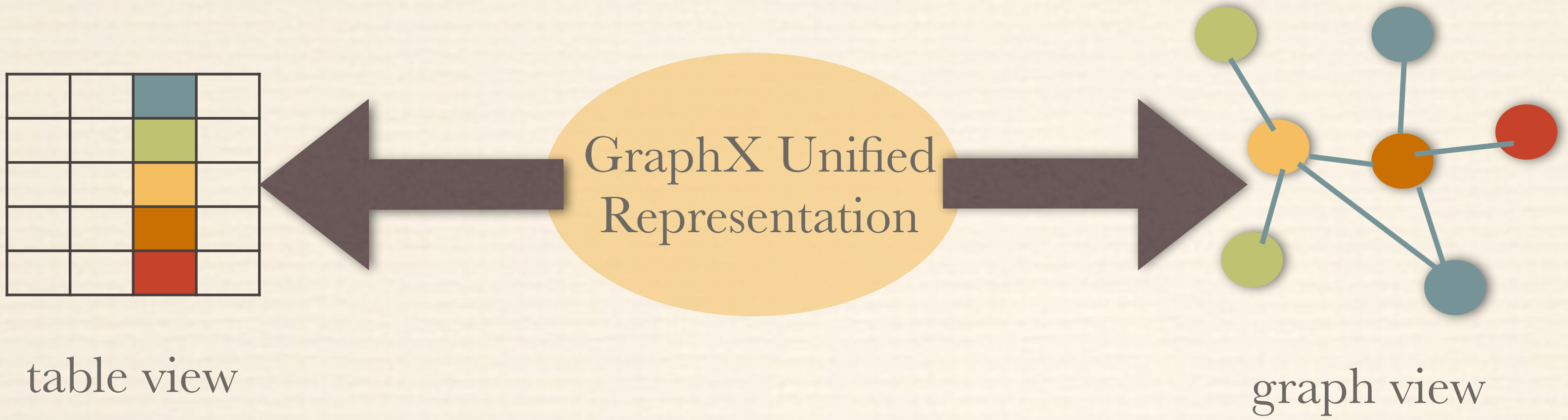
MLlib

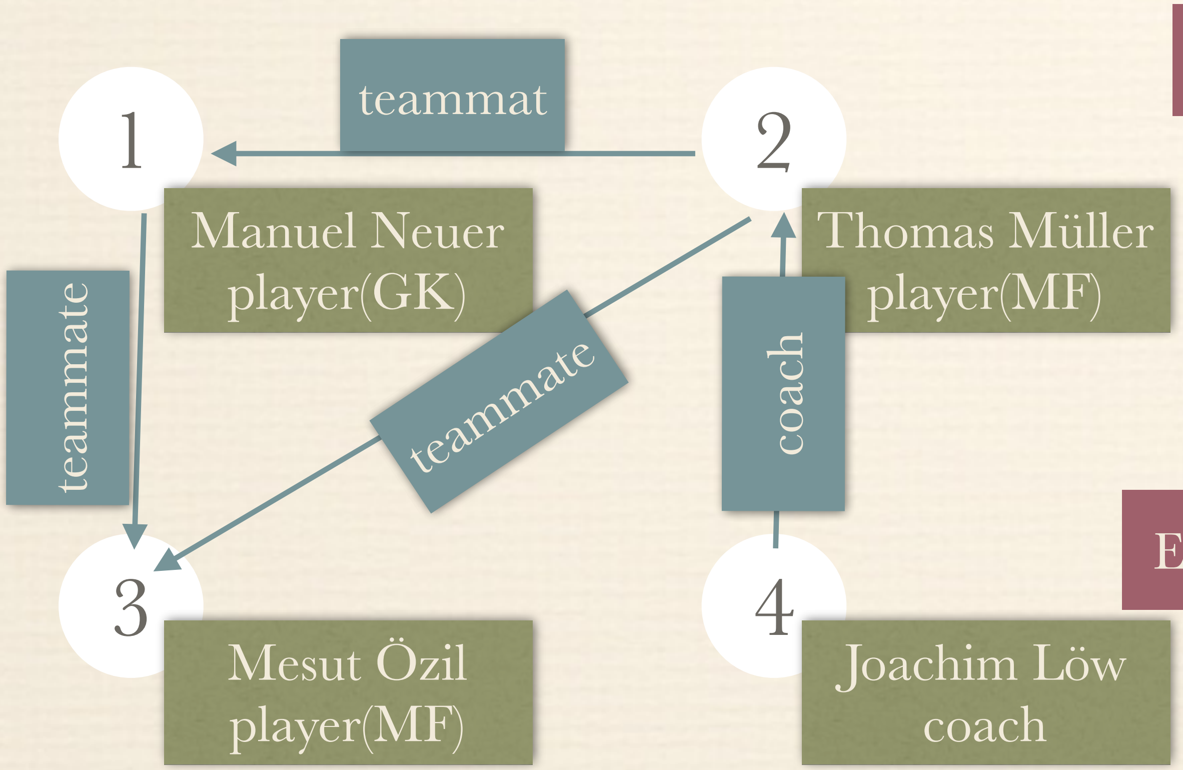
- Spark implementation of some common machine learning algorithms and utilities
- classification
- regression
- clustering
- collaborative filtering
- dimensionality reduction

Sparse vector support

Evaluation support

GraphX





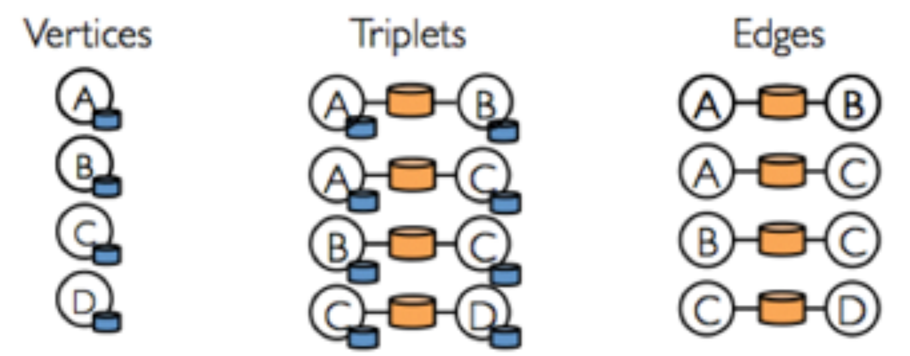
Vertex Table

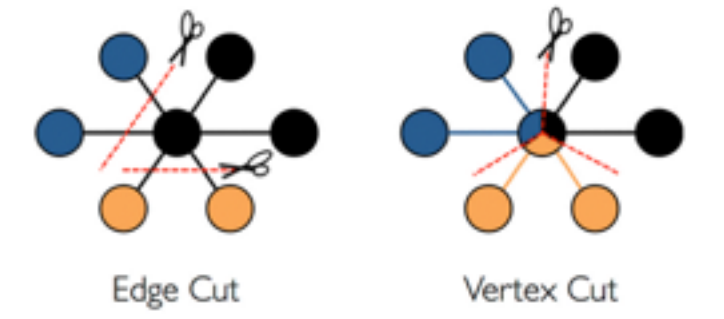
id	
1	(Manuel Neuer,player)
2	(Thomas Müller,player)
3	(Mesut Özil,player)
4	(Joachim Löw,coach)

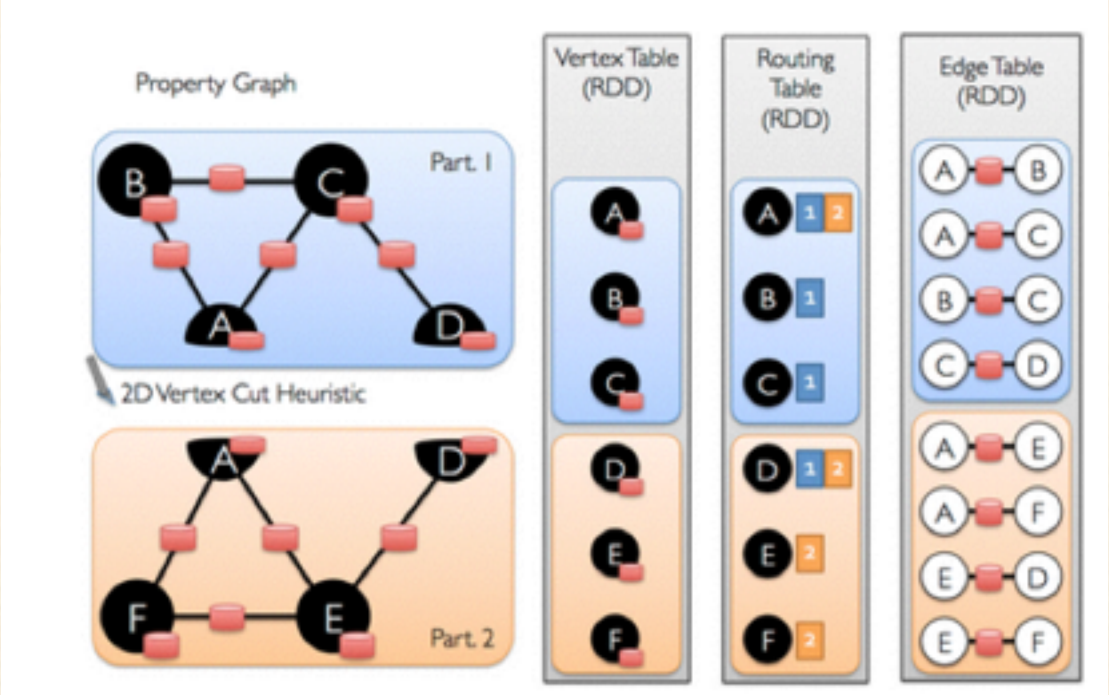
Edge Table

SrcId	DstId	Property(E)
2	1	teammate
2	3	teammate
1	3	teammate
4	2	coach

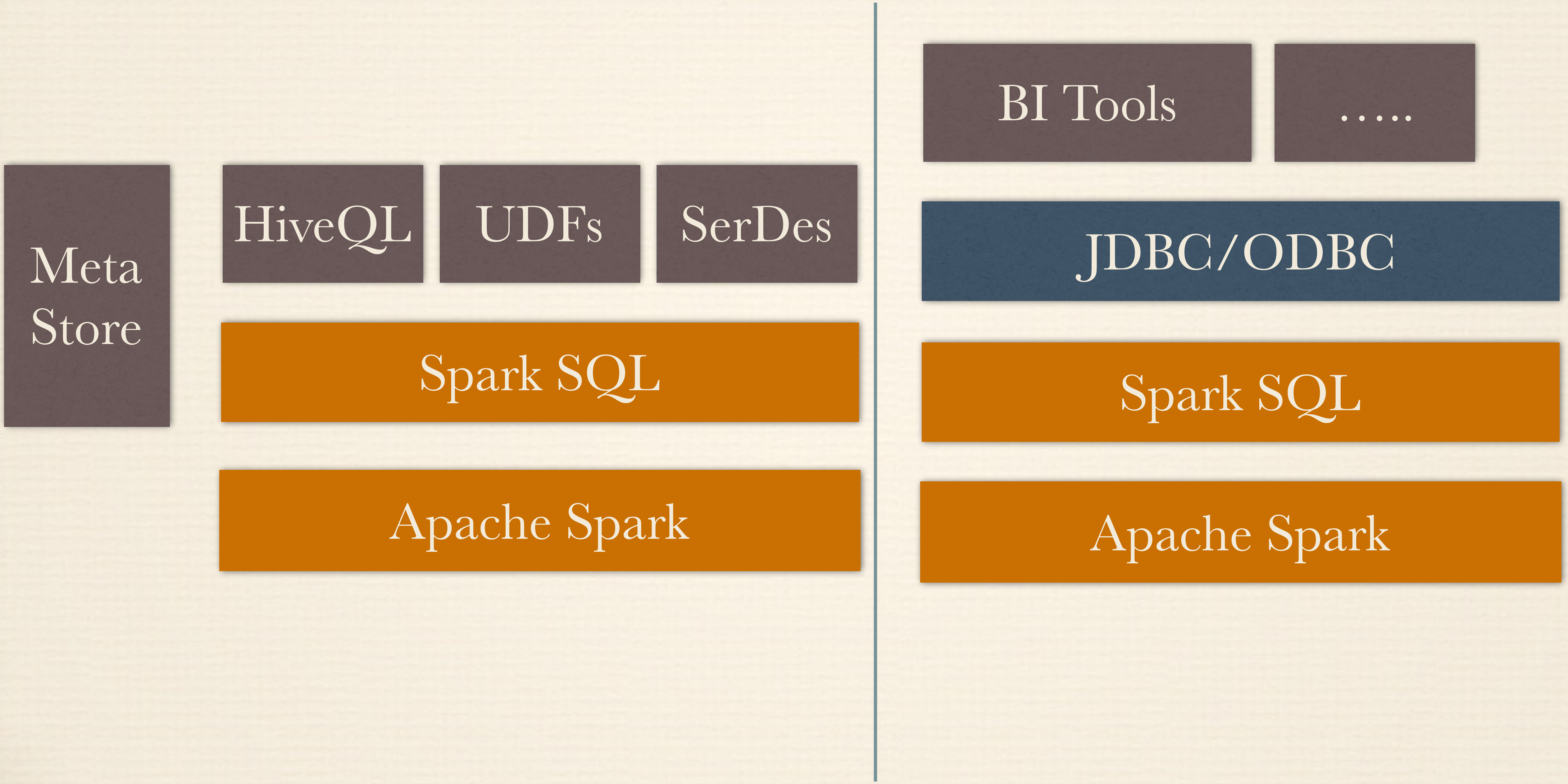
GraphX


Vertices
Triplets
Edges
A
B
C
D
A B
A C
B C
C D


Edge Cut
Vertex Cut


Property Graph
Part. 1
2D Vertex Cut Heuristic
Part. 2
Vertex Table (RDD)
Routing Table (RDD)
Edge Table (RDD)
A 1 2
B 1
C 1
D 1 2
E 2
F 2
A B
A C
B C
C D
A E
A F
E D
E F

Spark SQL



Meta Store

HiveQL

UDFs

SerDes

Spark SQL

Apache Spark

BI Tools

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JDBC/ODBC

Spark SQL

Apache Spark

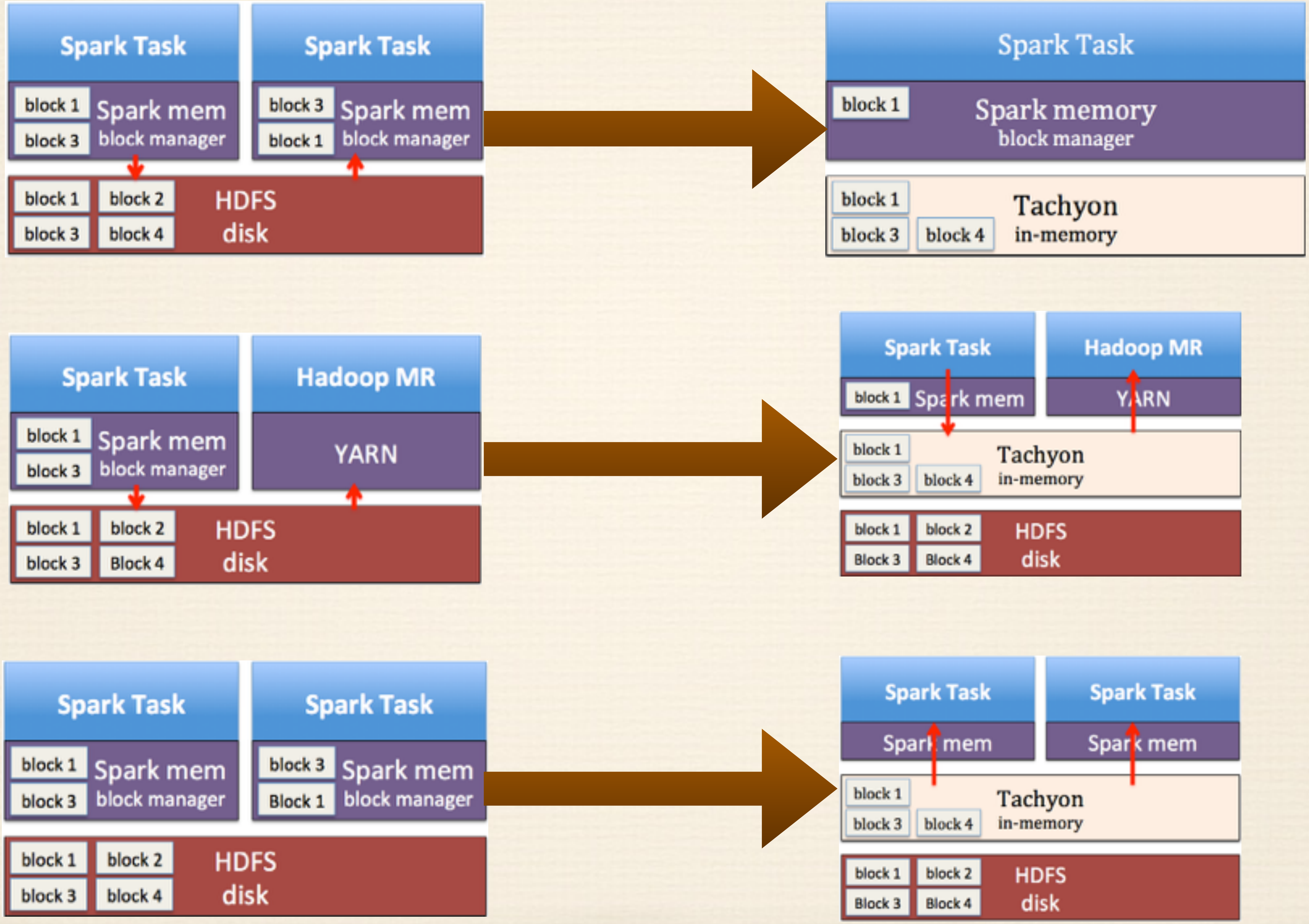
Spark SQL

- Data Sources
  - RDDs/Parquet Files/JSON Datasets/Hive Table
- DSL
- JDBC Server

Shark

- Mission Completed!!!

Tachyon



Spark Task
block 1
block 3
Spark mem
block manager
Spark Task
block 3
block 1
Spark mem
block manager
block 1
block 2
block 3
block 4
HDFS
disk

Spark Task
block 1
Spark memory
block manager
block 1
block 3
block 4
Tachyon
in-memory

Spark Task
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block 3
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block manager
Hadoop MR
YARN
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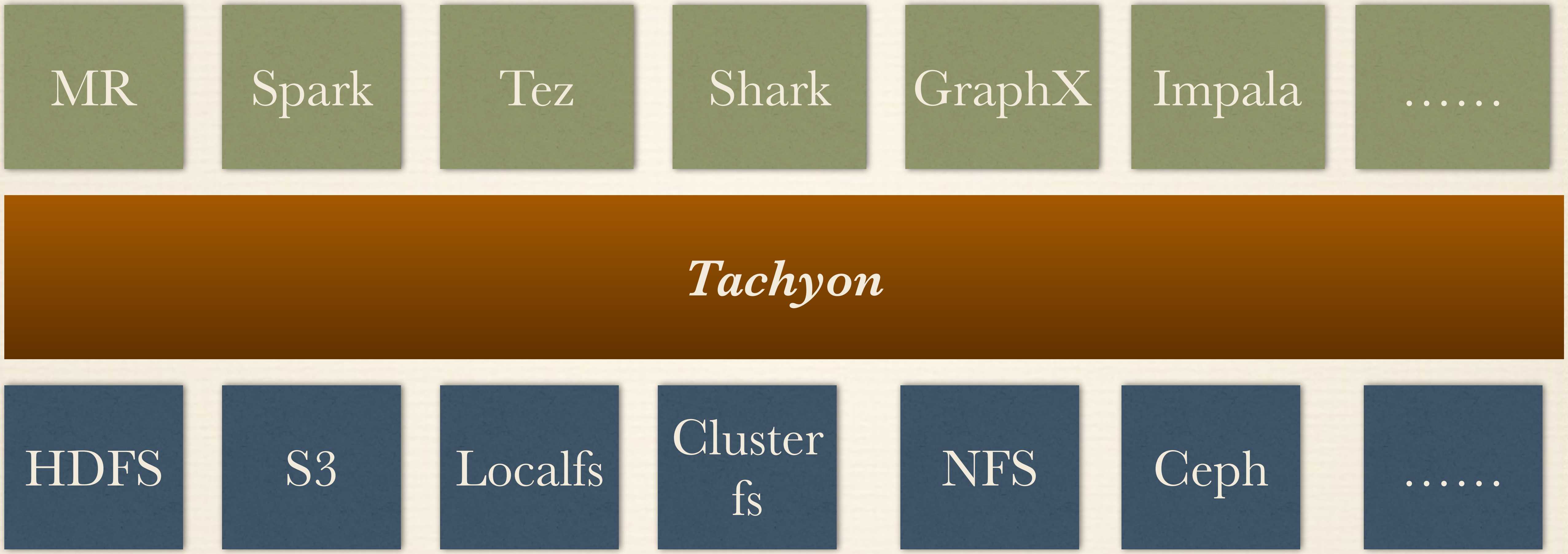
Tachyon



MR Spark Tez Shark GraphX Impala ……

Tachyon

HDFS S3 Localfs Cluster fs NFS Ceph ……

SparkR

- R + RDD = RRDD

RDDs as Distributed Lists

QA & Thanks

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