The State of Spark

And Where We're Going Next

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Community Growth

Project History

Spark started as research project in 2009

Open sourced in 2010

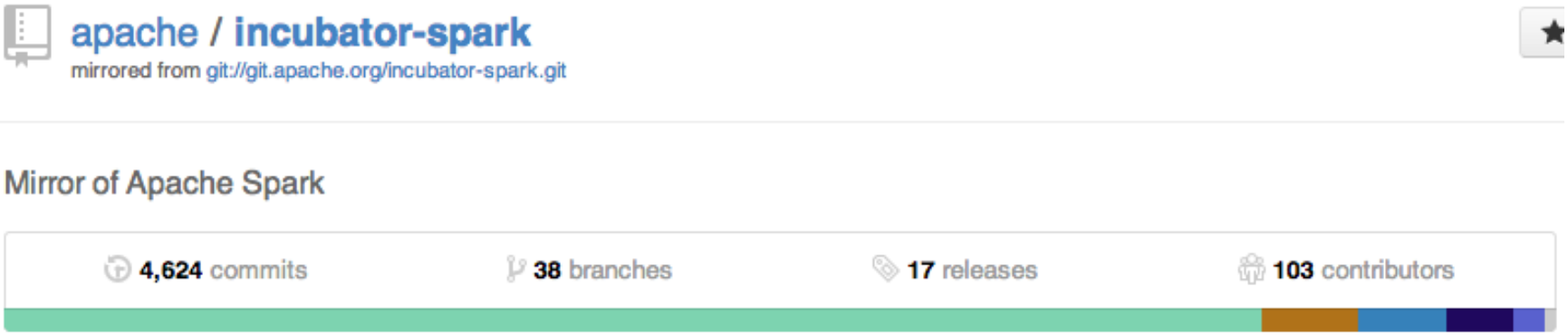
» 1st version was 1600 LOC, could run Wikipedia demo

Growing community since

Entered Apache Incubator in June 2013

Development Community

With over 100 developers and 25 companies, one of the most active communities in big data

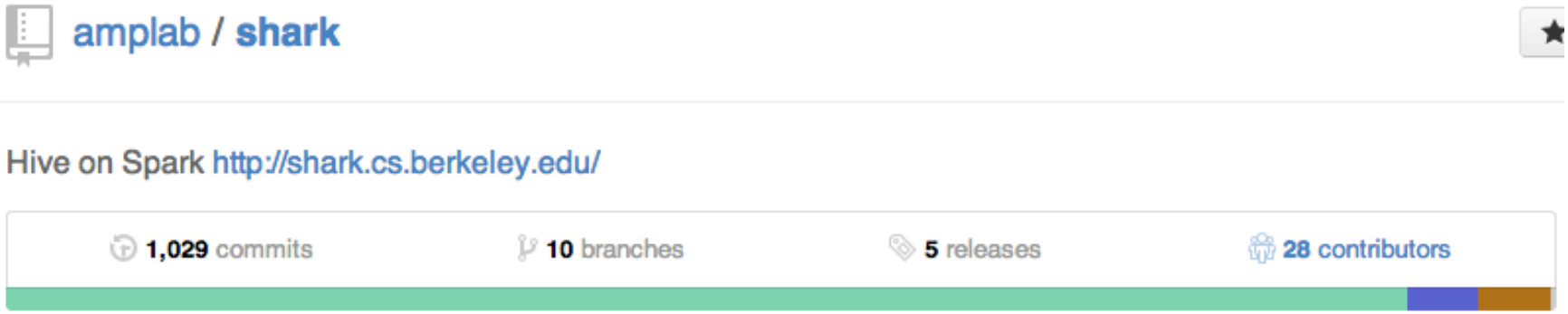


Comparison: Storm (48), Giraph (52), Drill (18), Tez (12)

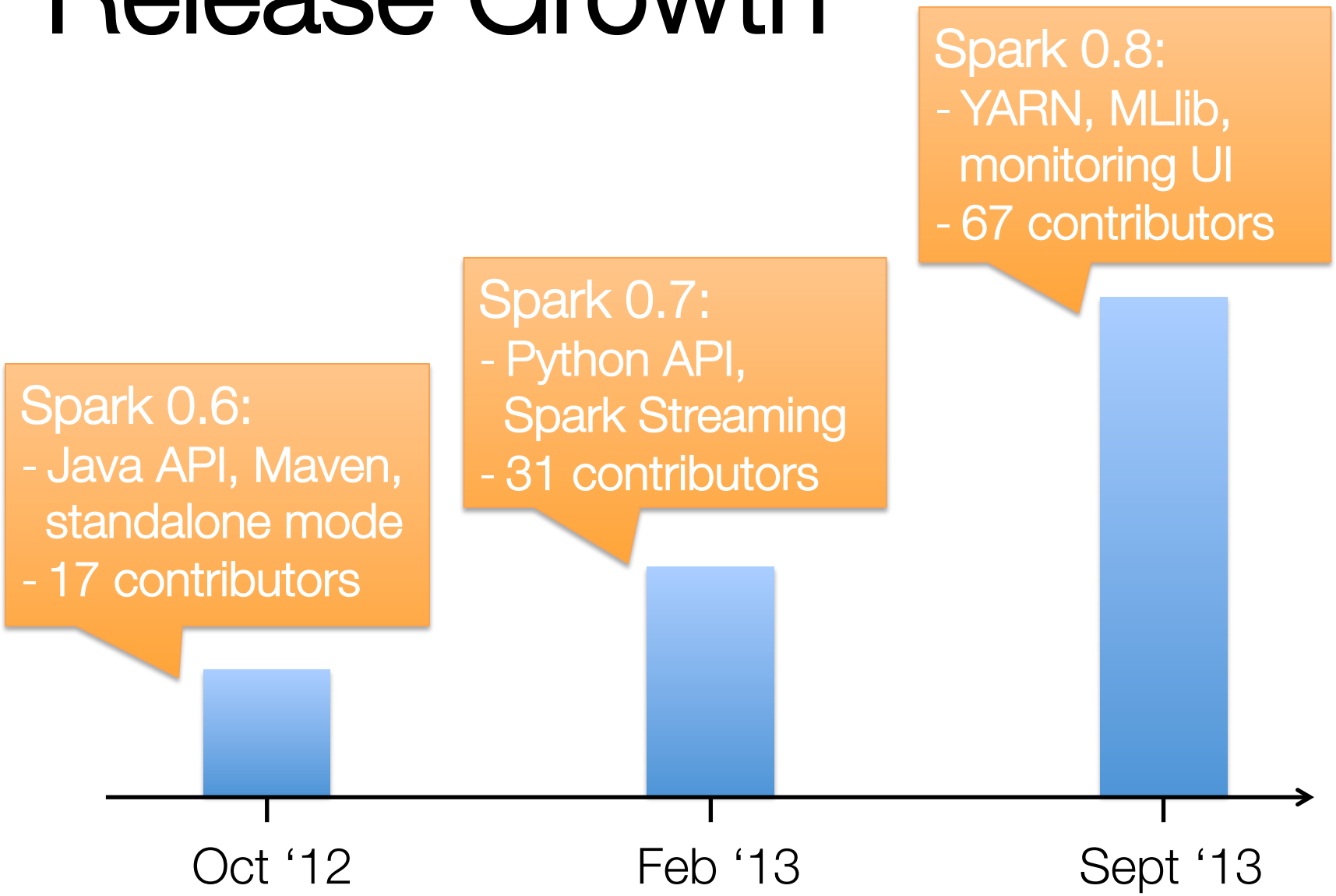
Past 6 months: more active devs than Hadoop MapReduce!

Development Community

Healthy across the whole ecosystem



Release Growth



Some Community Contributions

YARN support (Yahoo!)

Columnar compression in Shark (Yahoo!)

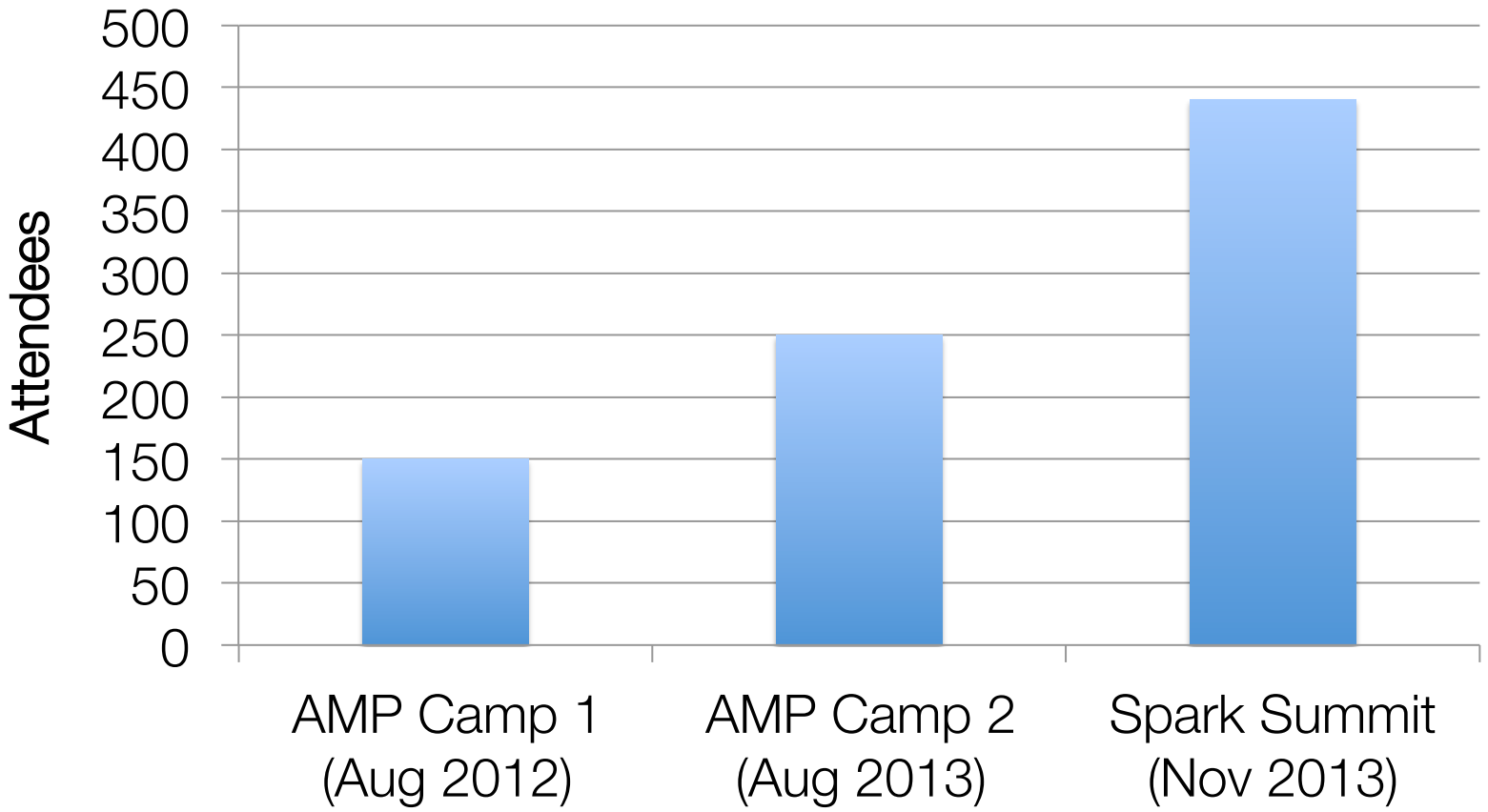
Fair scheduling (Intel)

Metrics reporting (Intel, Quantifind)

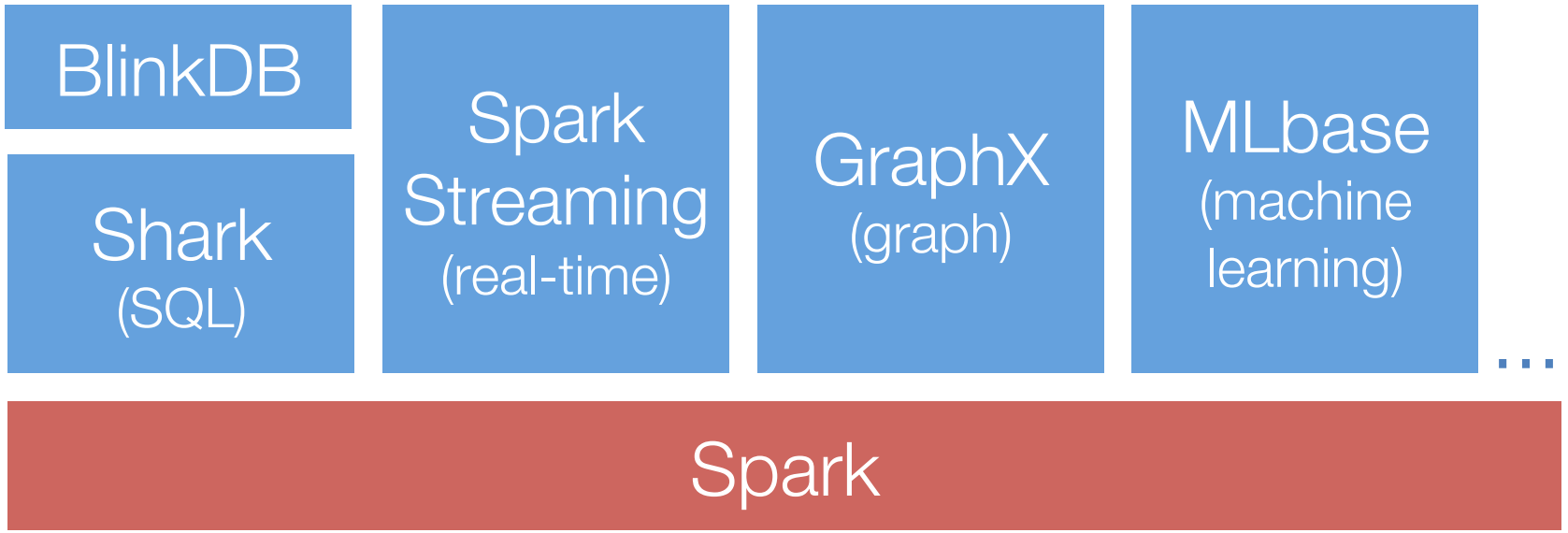
New RDD operators (Bizo, ClearStory)

Scala 2.10 support (Imaginea)

Conferences



Projects Built on Spark



What’s Next?

Our View

While big data tools have advanced a lot, they are still far too difficult to tune and use

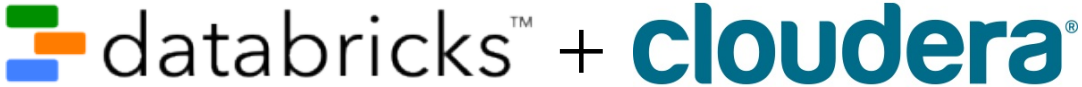
Goal: design big data systems that are as powerful & seamless as those for small data

Current Priorities

Standard libraries

Deployment

Out-of-the-box usability

Enterprise use 

Standard Libraries

While writing K-means in 30 lines is great, it's even better to call it from a library!

Spark's MLlib and GraphX will be standard libraries supported by core developers

- » MLlib in Spark 0.8 with 7 algorithms
- » GraphX coming soon
- » Both operate directly on RDDs

Standard Libraries

```
val rdd: RDD[Array[Double]] = ...
val model = KMeans.train(rdd, k = 10)
```

```
val graph = Graph(vertexRDD, edgeRDD)
val ranks = PageRank.run(graph, iters = 10)
```

Standard Libraries

Beyond these libraries, Databricks is investing heavily in higher-level projects

Spark Streaming:
easier 24/7 operation and optimizations coming in 0.9

Shark:
calling Spark libs (e.g. MLlib), optimizer, Hive 0.11 & 0.12

Goal: a complete and interoperable stack

Deployment

Want Spark to easily run anywhere

Spark 0.8: much improved YARN, EC2 support

Spark 0.8.1: support for YARN 2.2

SIMR: launch Spark *in* MapReduce clusters as a Hadoop job (no installation needed!)

- For experimenting; see talk by Ahir

Ease of Use

Monitoring and metrics (0.8)

Better support for large # of tasks (0.8.1)

High availability for standalone mode (0.8.1)

External hashing & sorting (0.9)

Long-term: remove need to tune beyond defaults

Next Releases

Spark 0.8.1 (this month)

- YARN 2.2, standalone mode HA, optimized shuffle, broadcast & result fetching

Spark 0.9 (Jan 2014)

- Scala 2.10 support, configuration system, Spark Streaming improvements

What Makes Spark Unique?

Big Data Systems Today

MapReduce

Pregel

Giraph

Dremel

Drill

Tez

Impala

GraphLab

Storm

S4

…

General batch processing

Specialized systems (iterative, interactive and streaming apps)

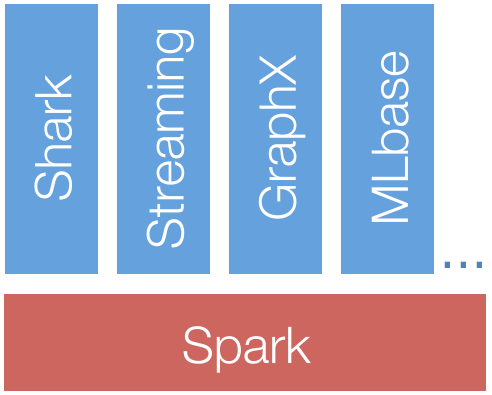
Spark's Approach

Instead of specializing, *generalize* MapReduce to support new apps in same engine

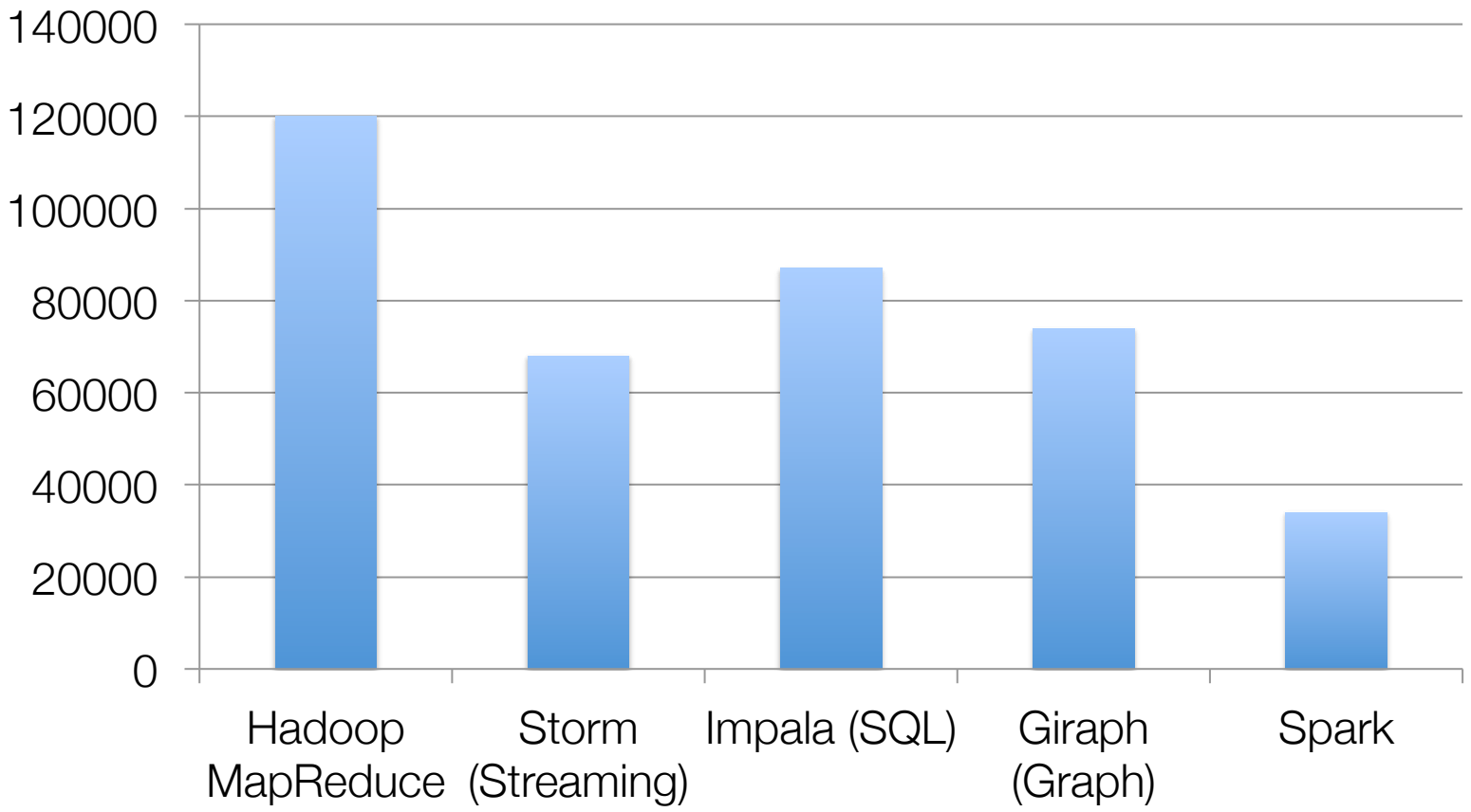
Two changes (general task DAG & data sharing) are enough to express previous models!

Unification has big benefits

- » For the engine
- » For users



Code Size



non-test, non-example source lines

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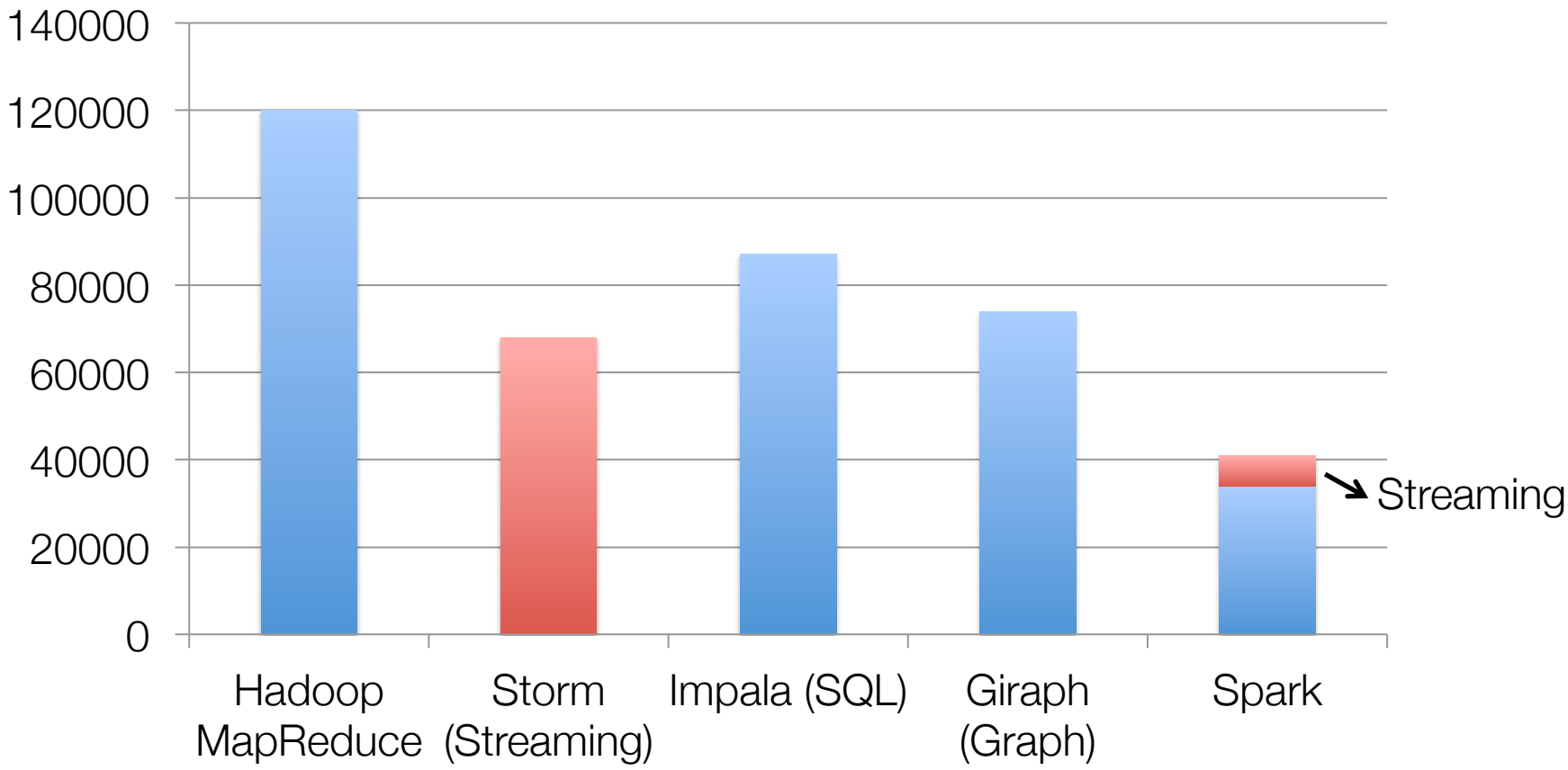

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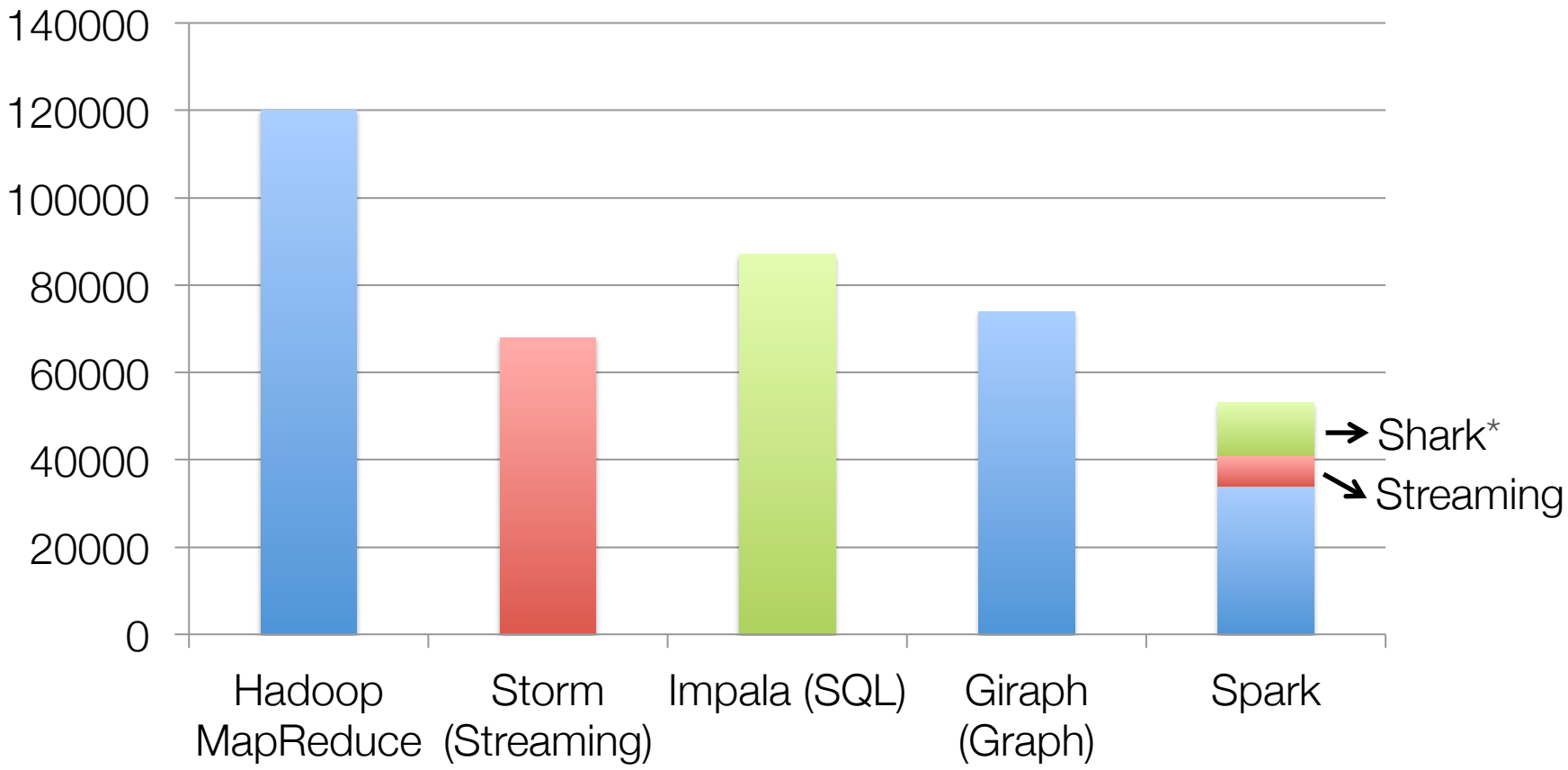

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* also calls into Hive

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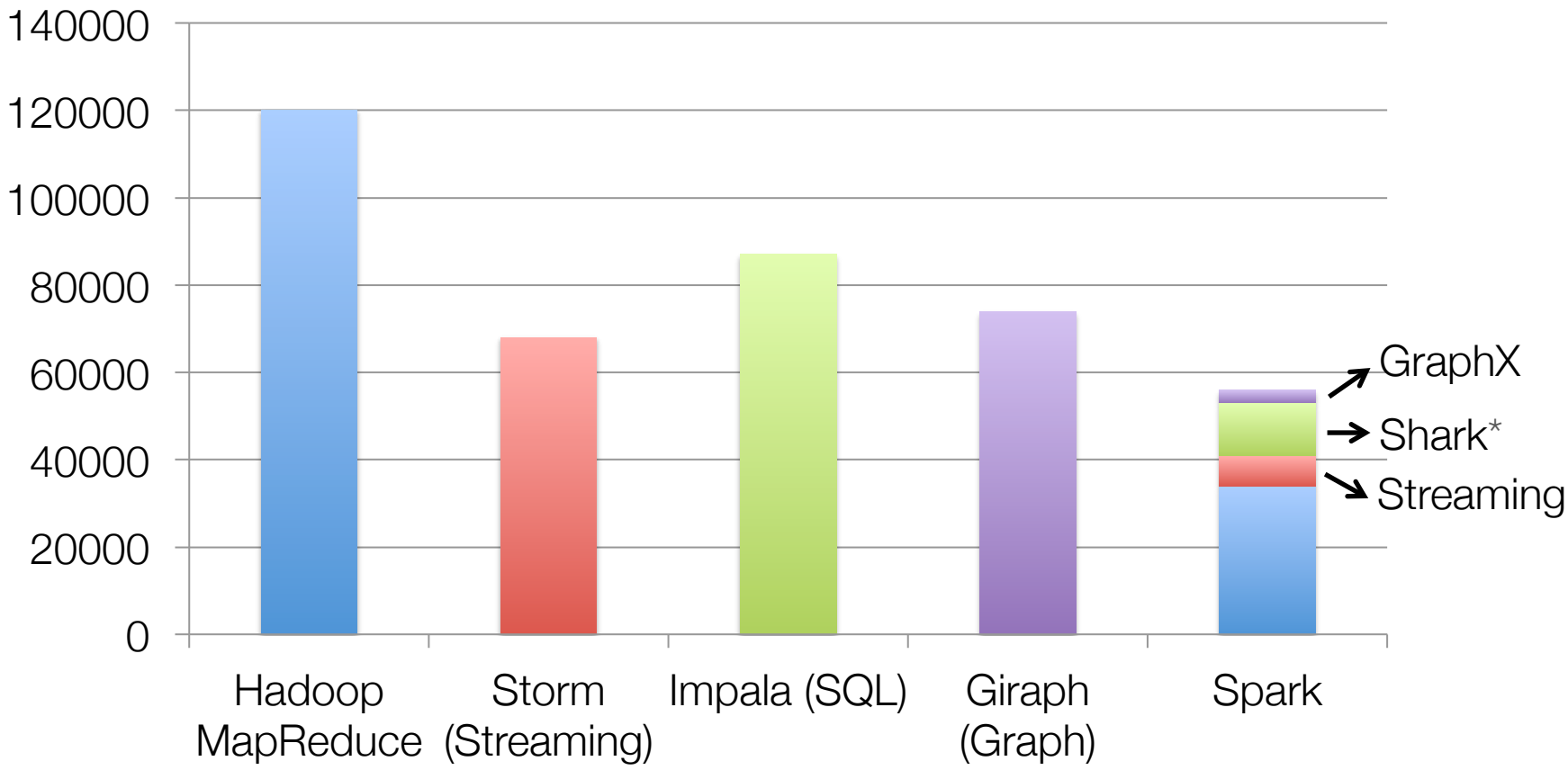

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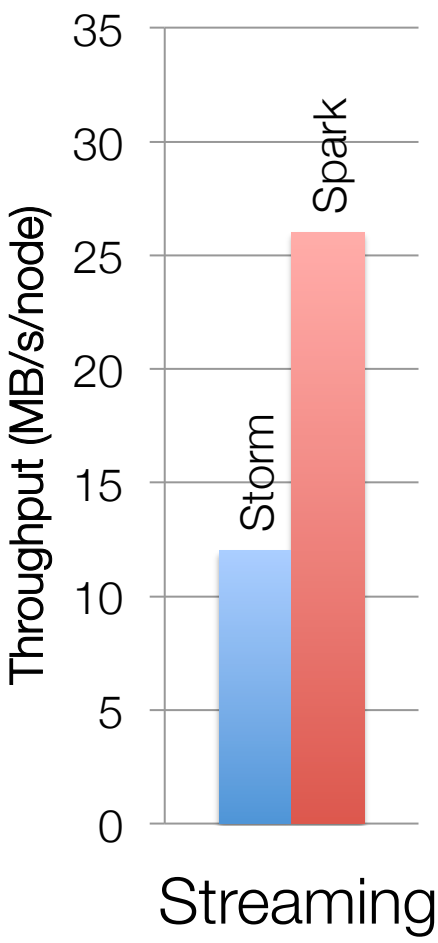
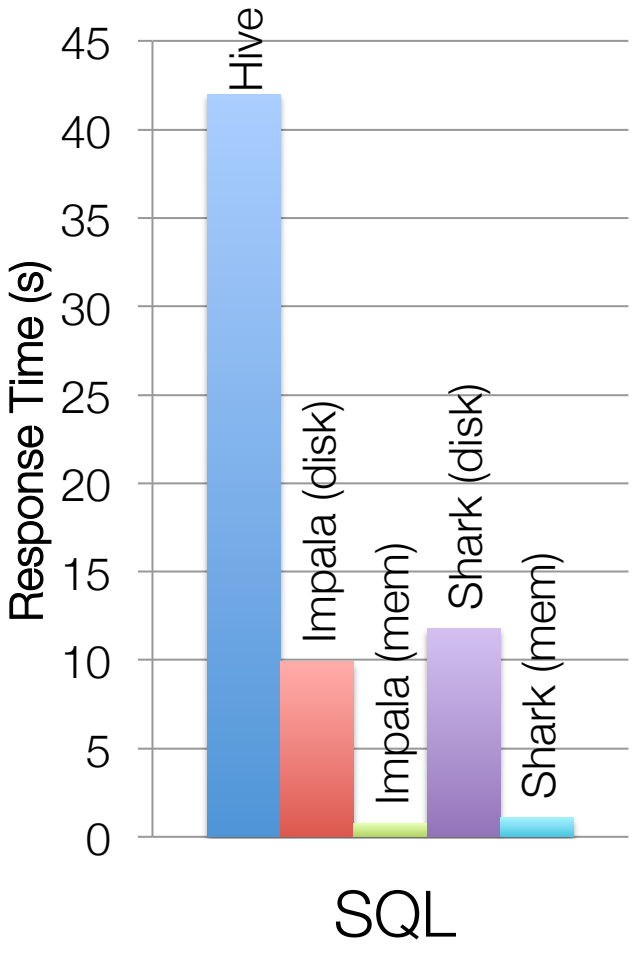
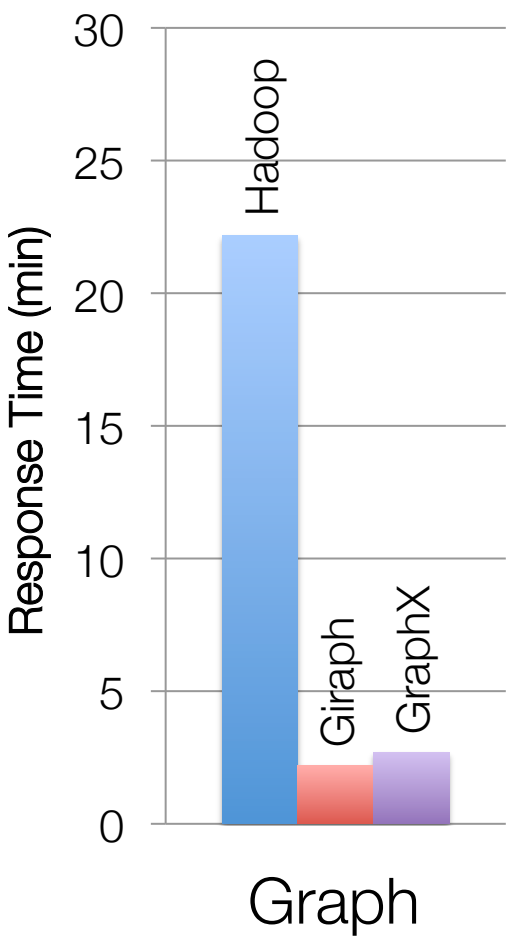
Performance



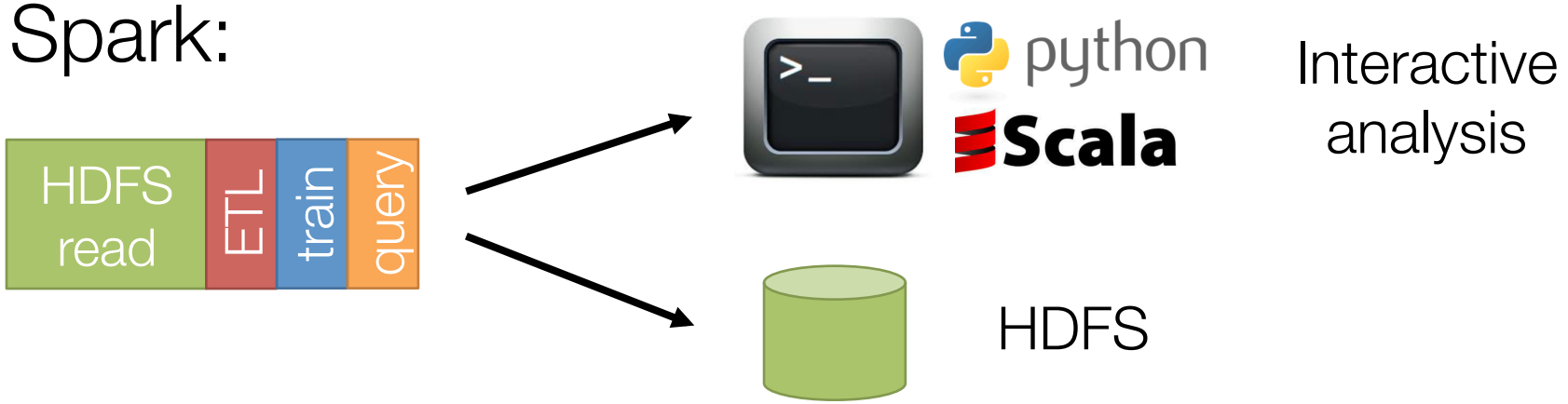




What it Means for Users

Separate frameworks:

Spark:



Combining Processing Types

From Scala:

```
val points = sc.runSql[Double, Double](
  “select latitude, longitude from historic_tweets”)

val model = KMeans.train(points, 10)

sc.twitterStream(...)
  .map(t => (model.closestCenter(t.location), 1))
  .reduceByWindow(“5s”, _ + _)
```

Combining Processing Types

From SQL (in Shark 0.8.1):

```
GENERATE KMeans(tweet_locations) AS TABLE tweet_clusters
```

```
// Scala table generating function (TGF):
object KMeans {
  @Schema(spec = “x double, y double, cluster int”)
  def apply(points: RDD[(Double, Double)]) = {
    ...
  }
}
```

Conclusion

Next challenge in big data will be complex and low-latency applications

Spark offers a *unified* engine to tackle and combine these apps

Best strength is the community: enjoy Spark Summit!

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