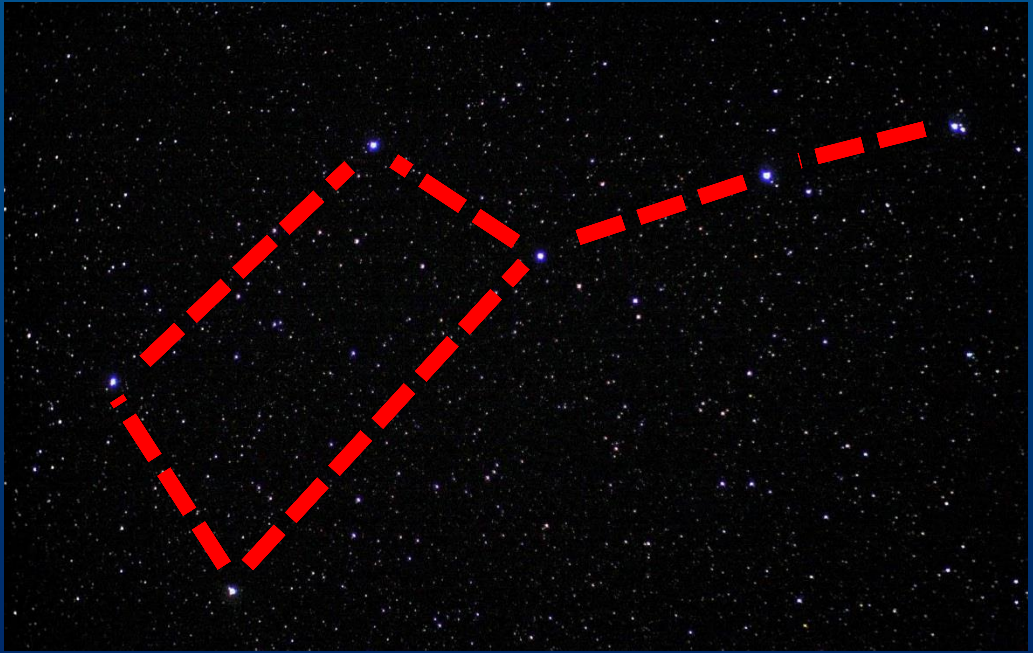
Big Data Analytics

Welcome and Introduction

The big picture: you have lots of data …

… and you want to see meaningful things.



Meaningful things give insight!

Analysis

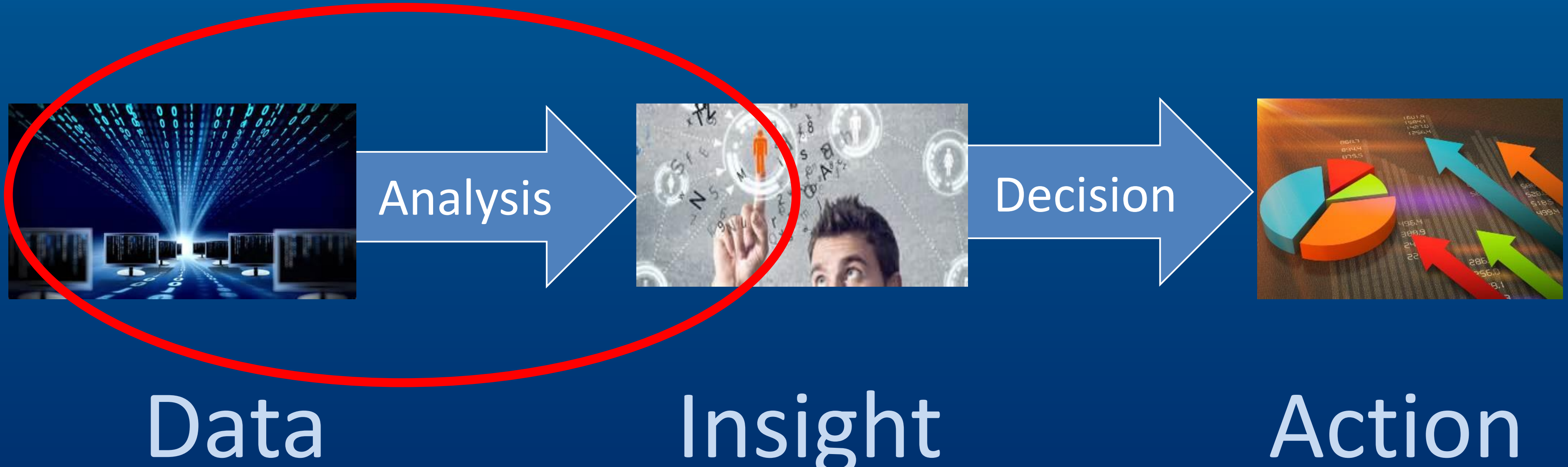
Decision

Data

Insight

Action

This course and next course



Analysis

Decision

Data

Insight

Action

Analysis (in a nutshell)

- Search for:

  Interesting observations

  Summaries

  etc …

The Analyst Needs:

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- Easy access to data

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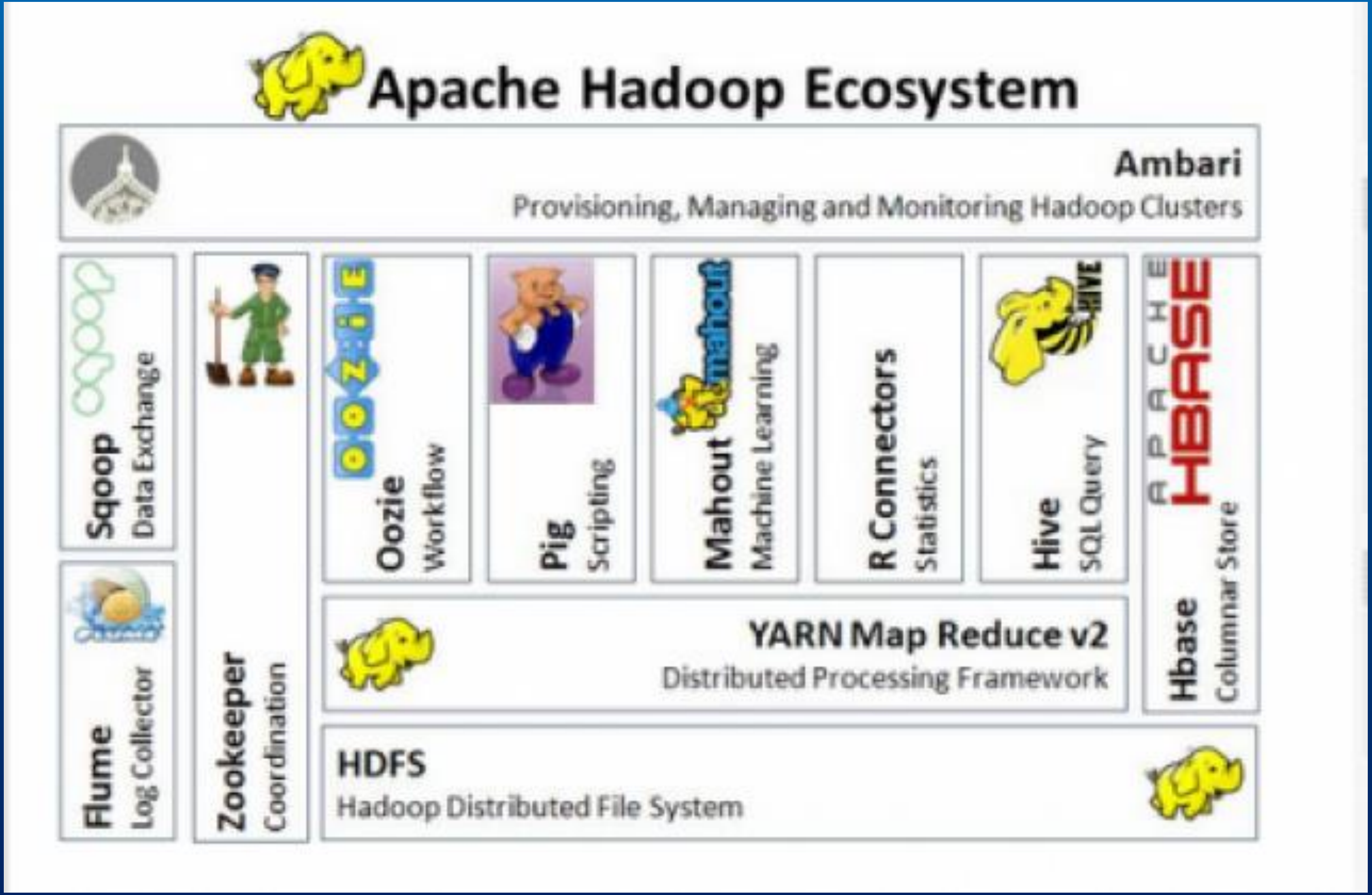
We Need Hadoop Tools!



Apache Hadoop Ecosystem

Ambari
Provisioning, Managing and Monitoring Hadoop Clusters

Sqoop
Data Exchange

Flume
Log Collector

Zookeeper
Coordination

Oozie
Workflow

Pig
Scripting

Mahout
Machine Learning

R Connectors
Statistics

Hive
SQL Query

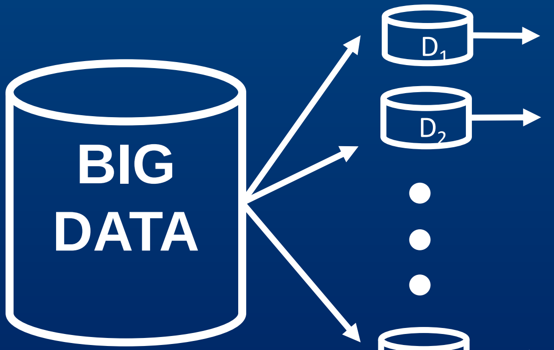
Hbase
Columnar Store

YARN Map Reduce v2
Distributed Processing Framework

HDFS
Hadoop Distributed File System

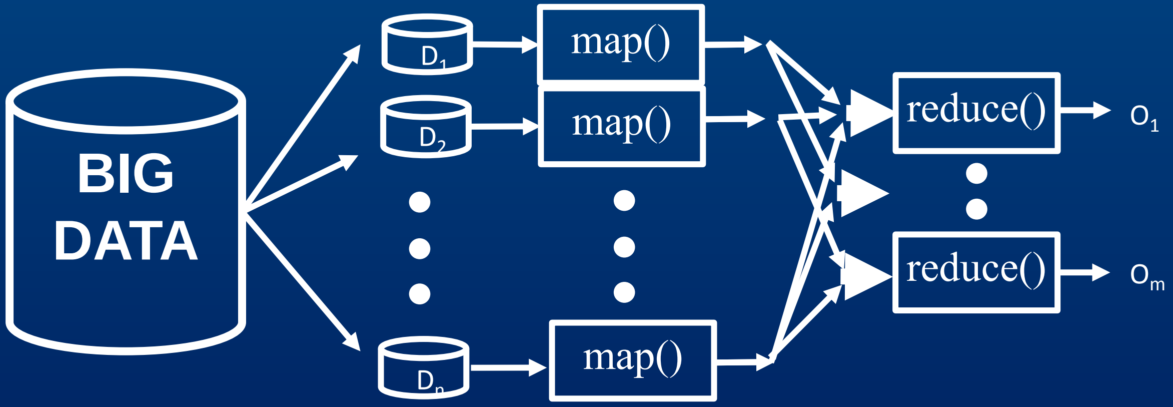
Hadoop Distributed File System (HDFS):

- partition data across cluster
- no schema so easy to add data



Map/Reduce Framework:

- Distribute computation to data
- Map – Hadoop Shuffle – Reduce



Map Shuffle Reduce

Hadoop (By Design):

- No schema, no index Pros :

  scalable, fault tolerant, fast loading,

- Cons:

  requires programming

  no help with hierarchical relations

  no transaction reliability

DBMS:	Hadoop:
Structured data	Unstructured & growing
Transactional	Pass through data
SQL	Flexible mapping

The original functional view:

DBMS:	**Hadoop:**
Structured data	Unstructured & growing
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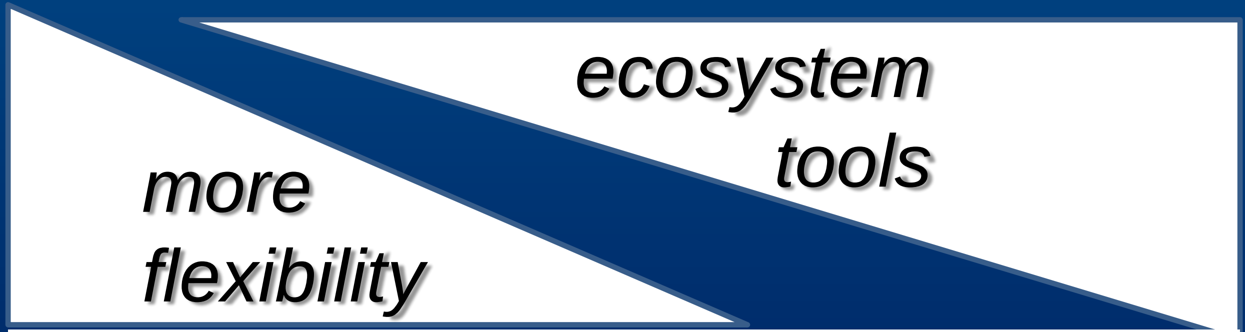


more flexibility

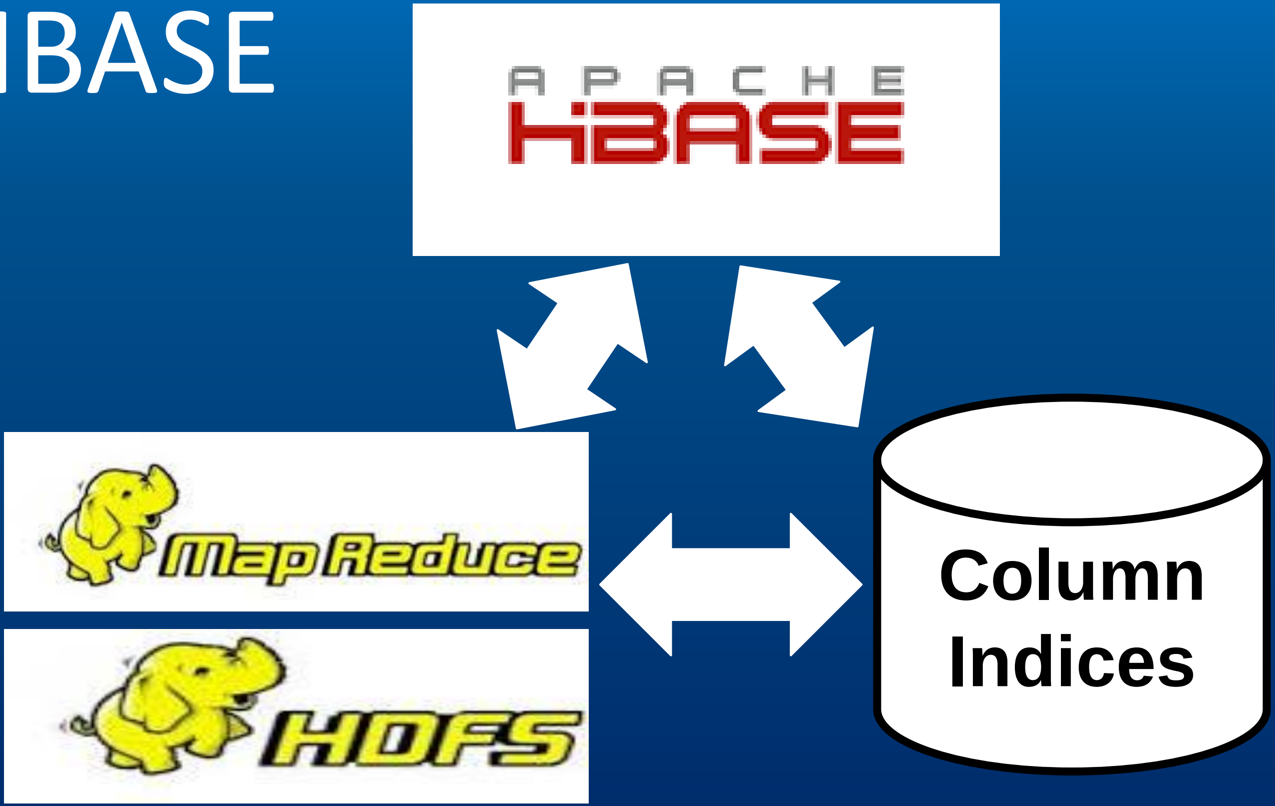
ecosystem tools

The functional trend – overlap & coexistence

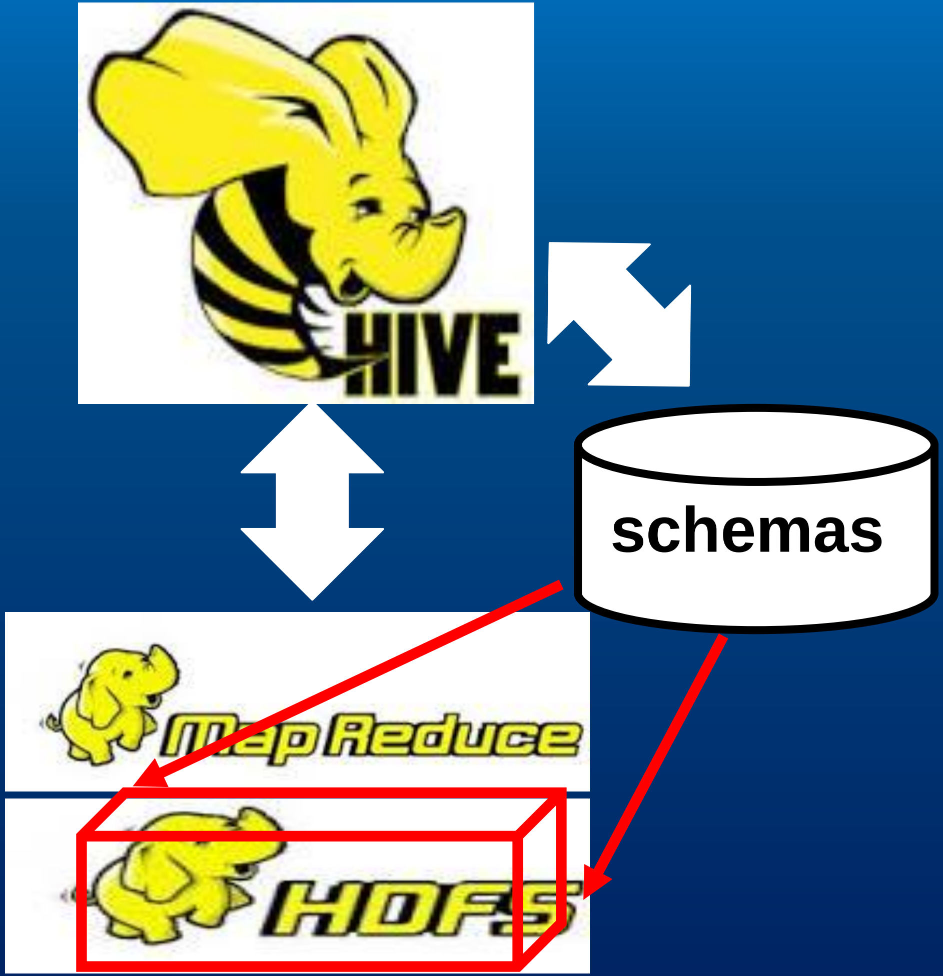
Ecosystem Tools

- query processing
- schema information
- utilities

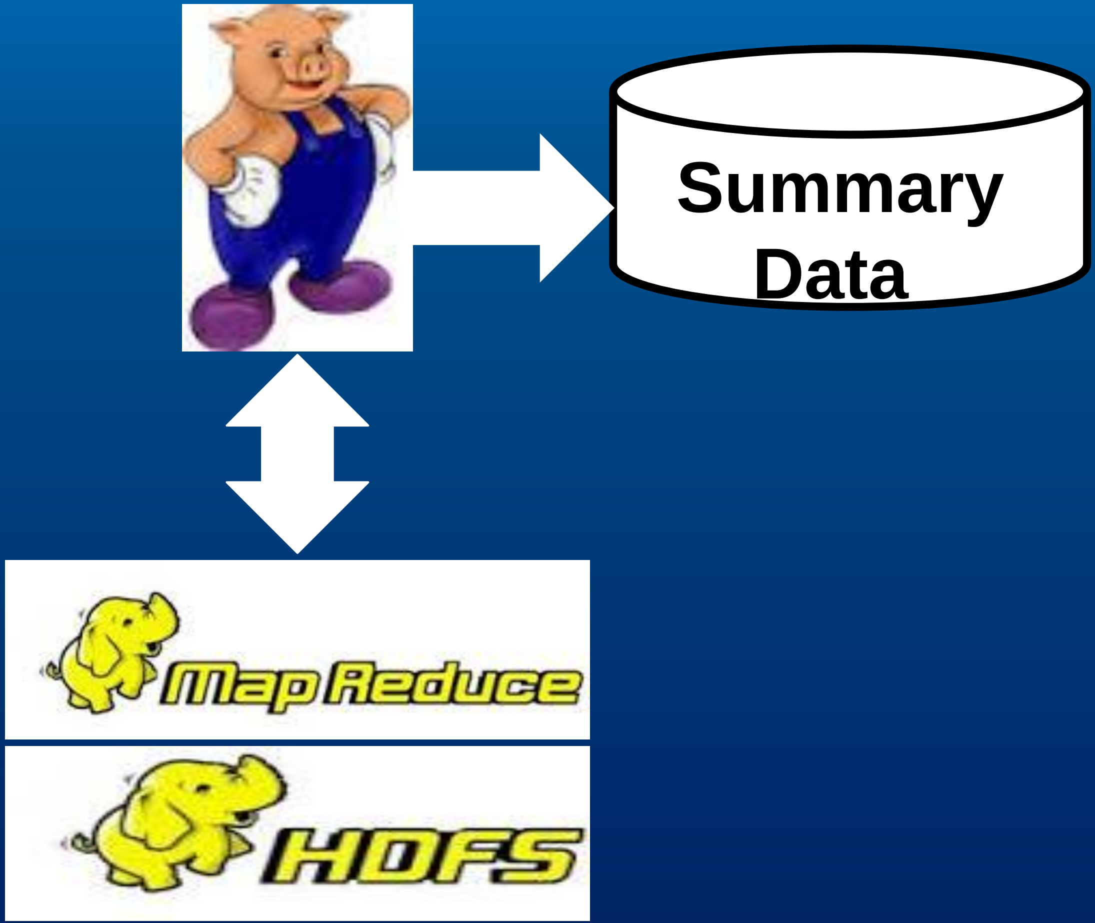
HBASE



HIVE

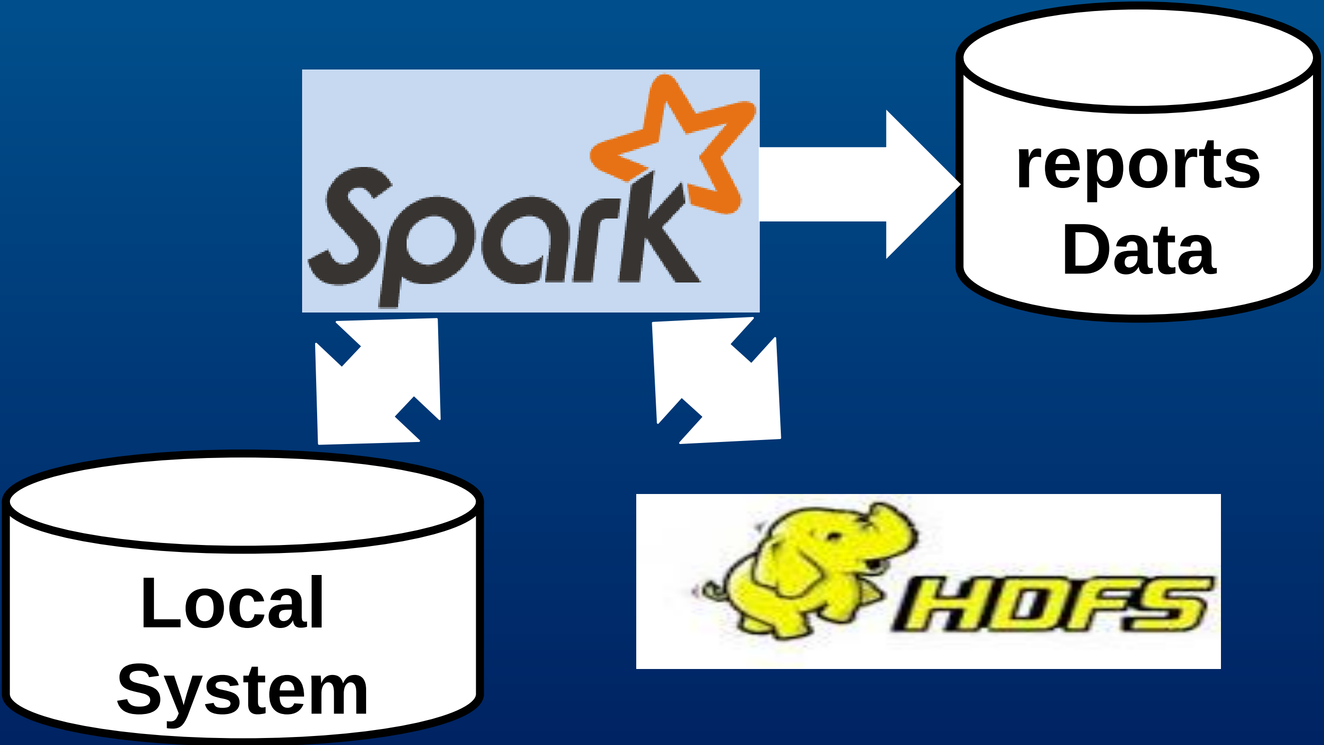


PIG



Summary Data

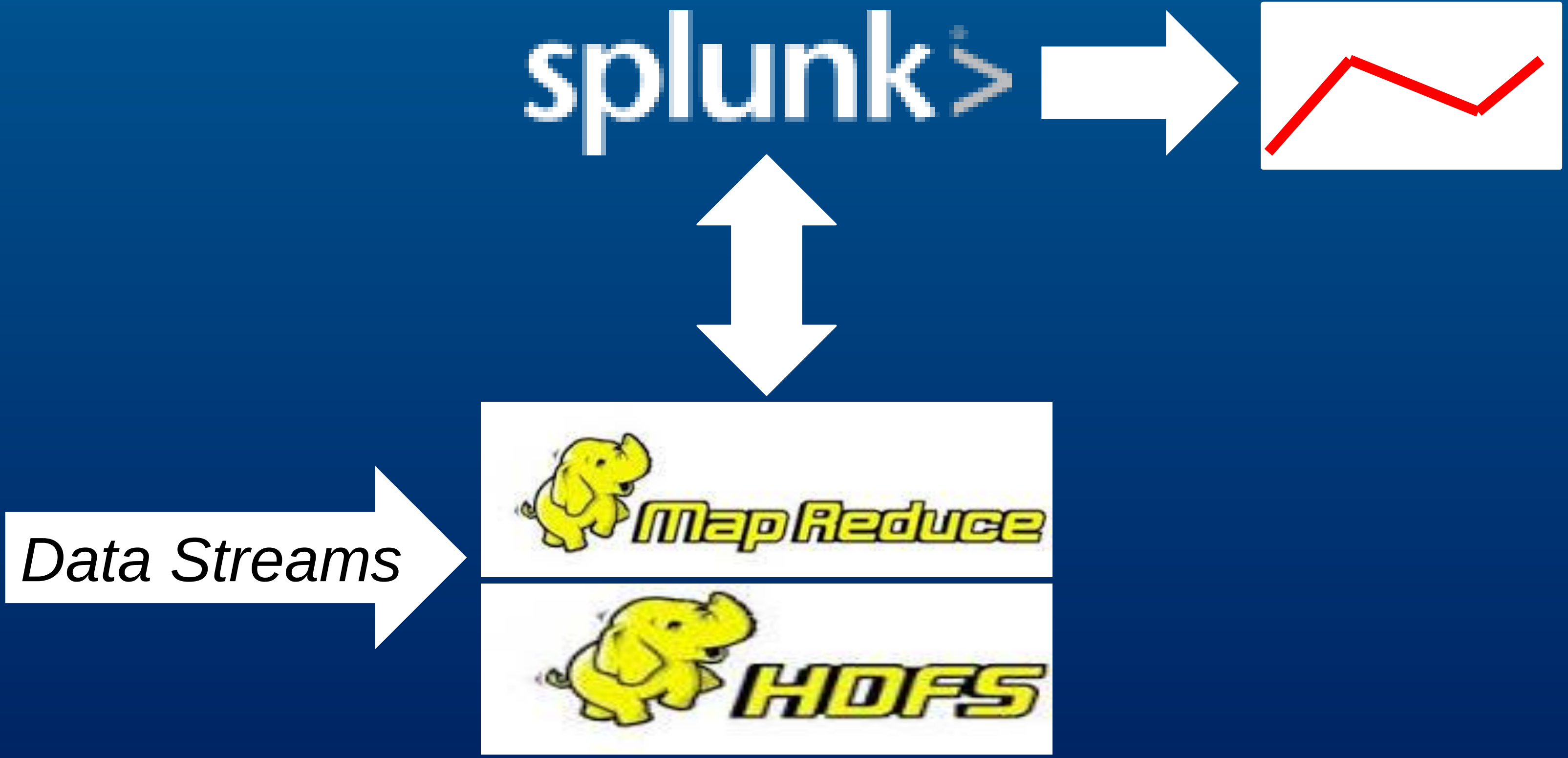
SPARK



reports Data

Local System

SPLUNK



Data Streams

- end

Big Data Analytics

What is Analysis?

Kinds of Analysis

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- Query Processing

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- Summary Statistics

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- Exploration

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- Query Processing
- Summary Statistics
- Exploration
- Modeling

Query Processing

- SQL:

  select rows,

  project columns,

  join, group, sort, etc..

- Large queries need optimization

Descriptive Statistics

- Data Characteristics:

  sum, mean, variance,

  max, min, percentiles, etc…

- Often by groups

Exploratory Analysis

- Interactive
- Iterative
- Using samples

Sampling for Analysis

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- Descriptive Statistics sample well

  sum, mean, max

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  sum, mean, max

- Some queries do not sample well:

  joins, distinct, not in

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- Descriptive Statistics sample well

  sum, mean, max, …
- Some queries do not sample well:

  joins, distinct, not in
- But some distribute well

  distinct, not in

Big vs Scaling

- Big Data Analysis is more than analysis with scaling:

  different tools,

  different questions & processing

- end