Hadoop Ecosystem

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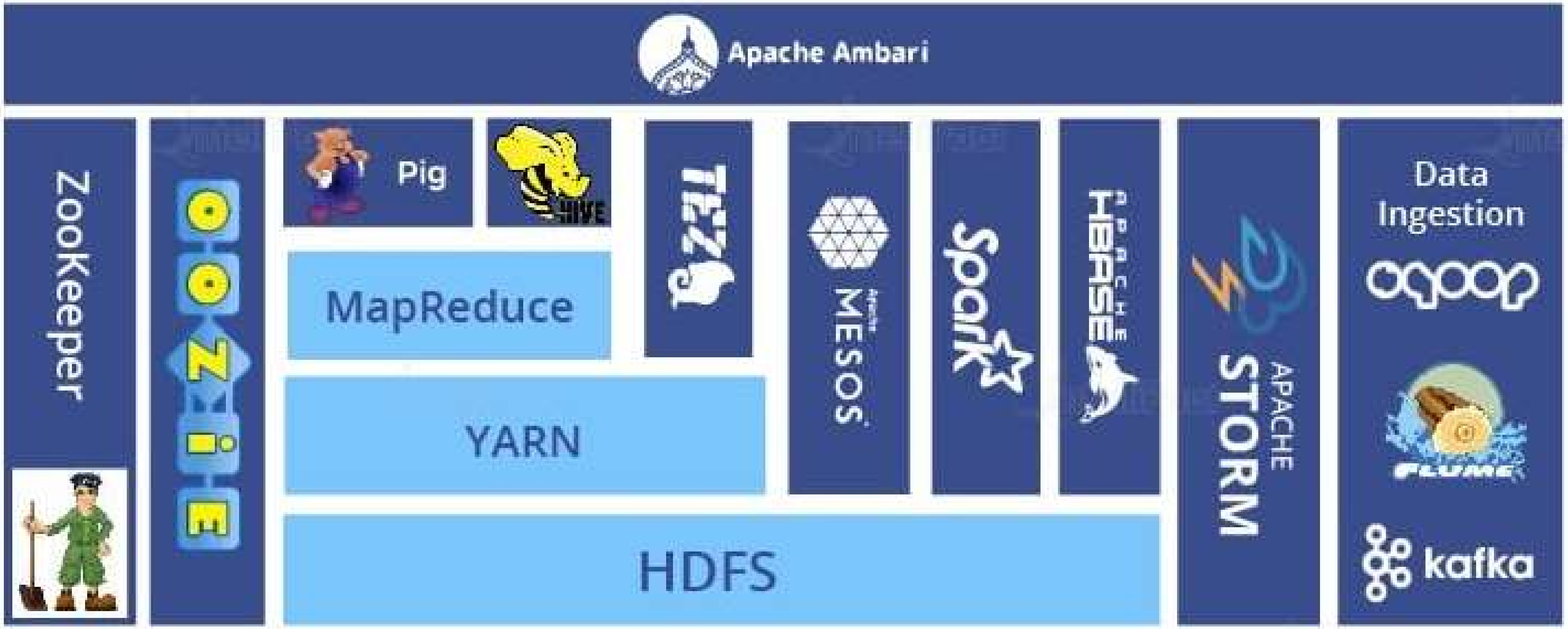
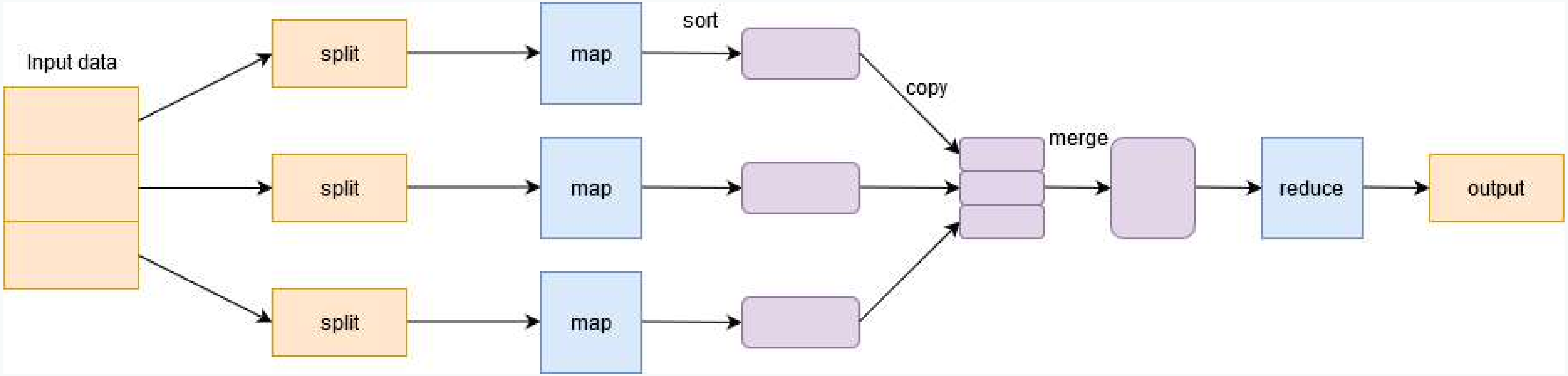


HDFS (Hadoop Distributed File System)

- Storage component of Hadoop
- Stores data in the form of files
- Each file is divided into blocks of 128MB (configurable)
- Stores them on different machines in the cluster.
- Has a master-slave architecture with two main components
    - Name Node and Data Node

MapReduce

- Divides a single task into multiple tasks and processes them on different machines.



- Map phase filters, groups, and sorts the data
- Reduce phase aggregates the data, summarises the result, and stores it on HDFS.

YARN

- Manages resources in the cluster
- Allows data stored in HDFS to be processed and run by various data processing

HBase

- Column-based NoSQL database
- Runs on top of HDFS
- Can handle any type of data

Pig

- Analyses large datasets
- Overcomes difficulty to write map and reduce functions
- Consists of two components:
  - Pig Latin
  - Pig Engine
- Pig Latin
  - Scripting Language that is similar to SQL
- Pig Engine
  - Execution engine on which Pig Latin runs
- Internally, the code written in Pig is converted to MapReduce functions

Hive

- Distributed data warehouse system
- Allows for easy reading, writing, and managing files on HDFS
- Has its own querying language
- Makes it easy for programmers to write MapReduce functions using simple HQL queries.

Sqoop

- Bring data from Relational Databases into HDFS.
- The commands written in Sqoop internally converts into MapReduce tasks
- Can also be used to export data from HDFS to RDBMS

Oozie

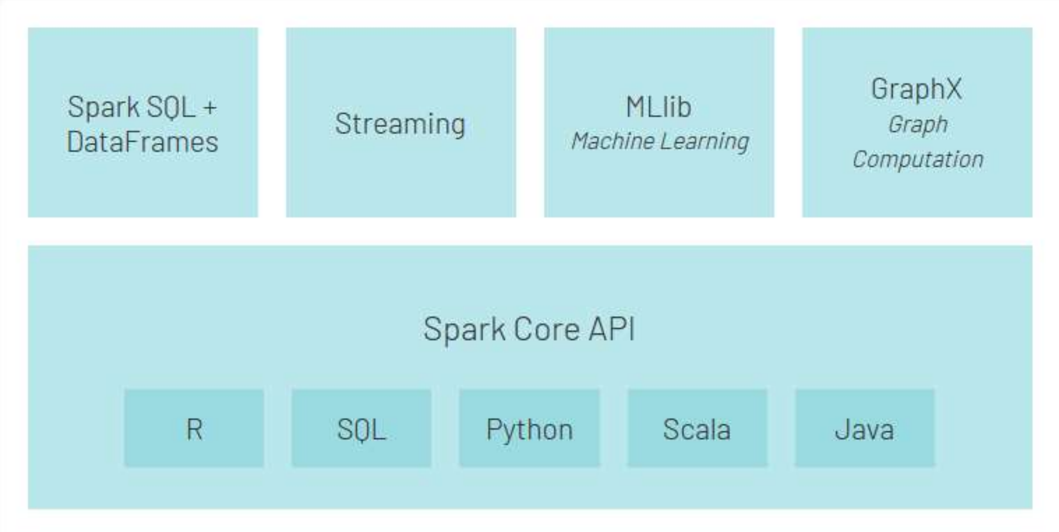
- A workflow scheduler system
- Allows to link jobs written on various platforms like MapReduce, Hive, Pig, etc
- Can create a pipeline of individual jobs to be executed to achieve a bigger task
- Can use Oozie to perform ETL operations

Zookeeper

- Centralized service for
  - Maintaining configuration information
  - Naming
  - Providing distributed synchronization
  - Providing group services across the cluster.

Spark

- Alternative framework to Hadoop
- Built on Scala
- Supports varied applications written in Java, Python, etc.
- It provides in-memory processing which accounts for faster processing



Spark SQL + DataFrames

Streaming

MLlib
Machine Learning

GraphX
Graph Computation

Spark Core API

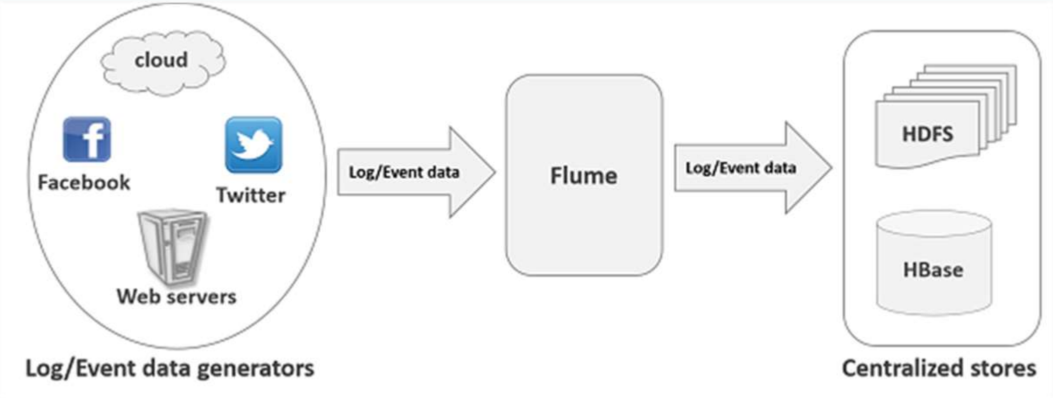
R | SQL | Python | Scala | Java

Apache Ambari

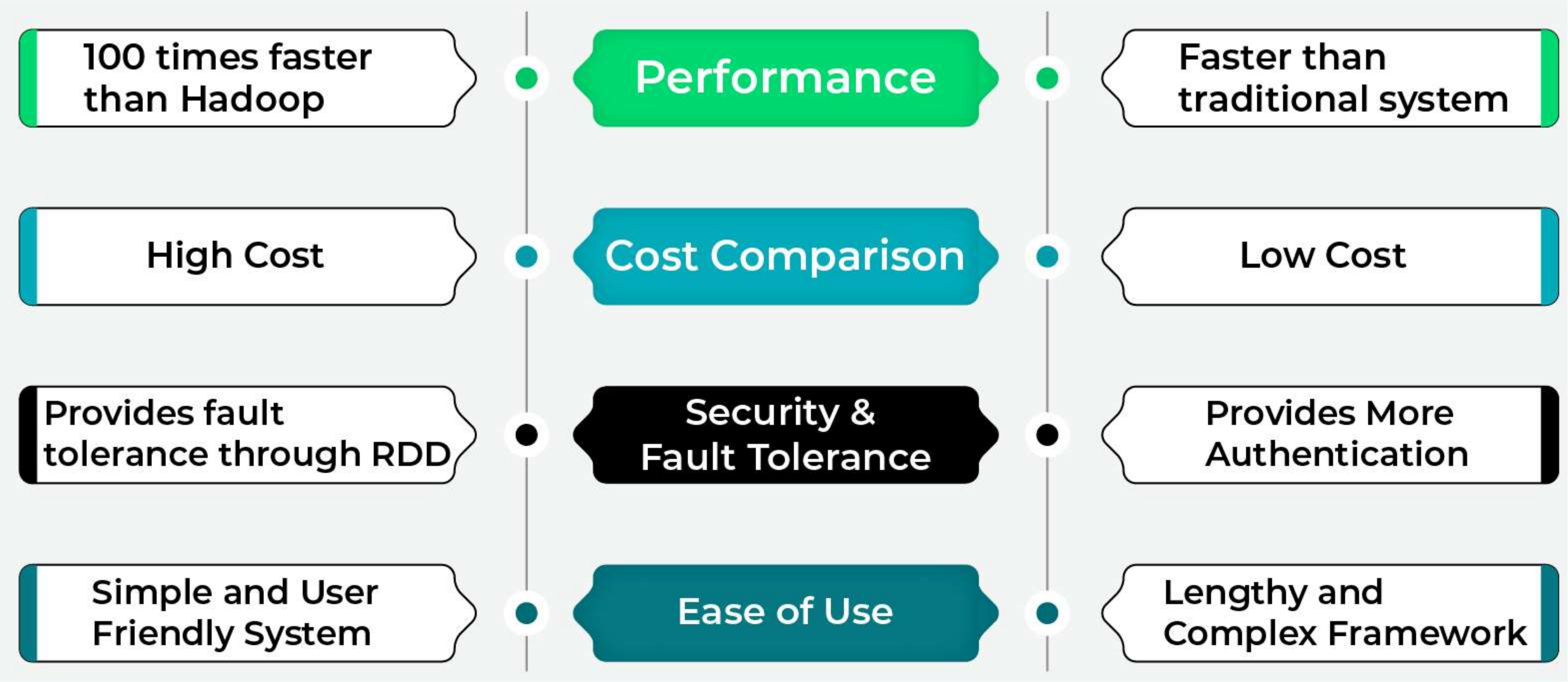
- Includes software for provisioning, managing and monitoring Apache Hadoop clusters.
- Provides:
- Hadoop cluster provisioning:
  - Gives us step by step process for installing Hadoop services across a number of hosts.
  - Also handles configuration of Hadoop services over a cluster.
- Hadoop cluster management:
  - Provides a central management service for starting, stopping and re-configuring Hadoop services across the cluster
- Hadoop cluster monitoring:
  - For monitoring health and status, Ambari provides us a dashboard

Flume

- Assume an e-commerce web application wants to analyse the customer behaviour from a particular region
- To do so, they would need to move the available log data in to Hadoop for analysis
- Here, Apache Flume comes to our rescue.
- Flume is a system for collecting, aggregating and moving massive quantities of log data.

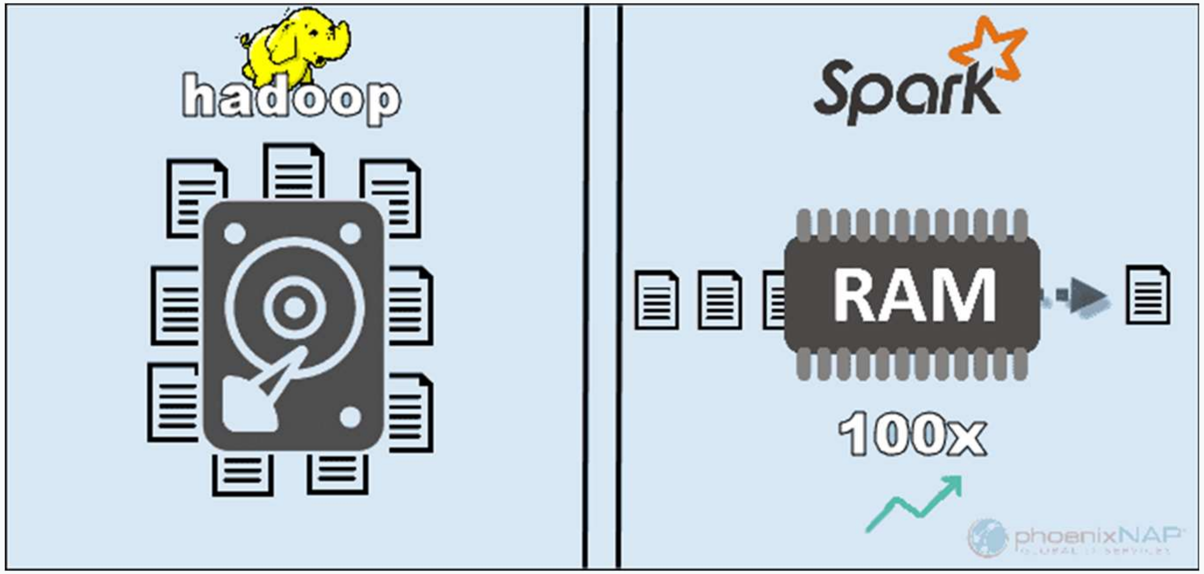


Hadoop vs Spark

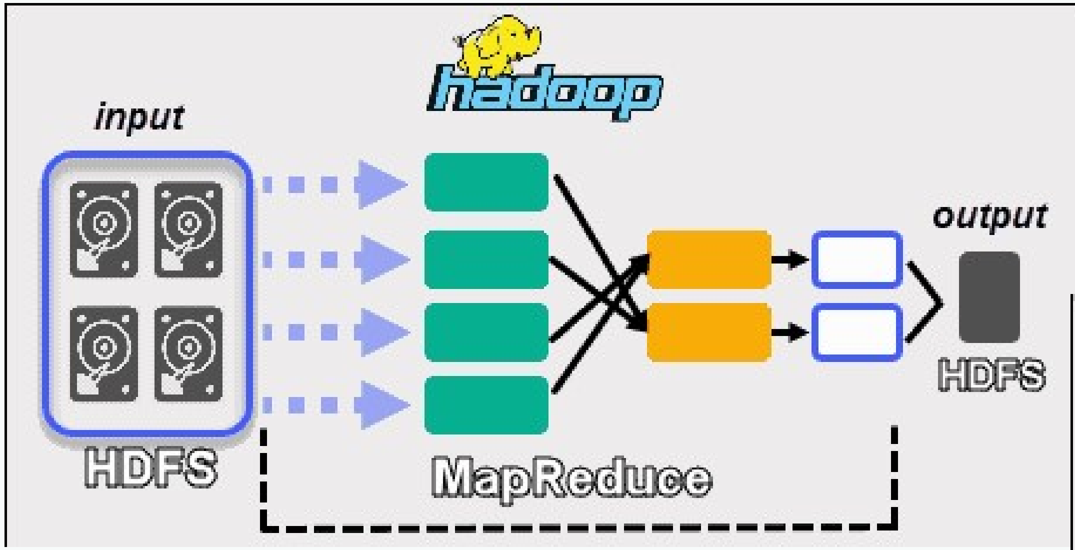


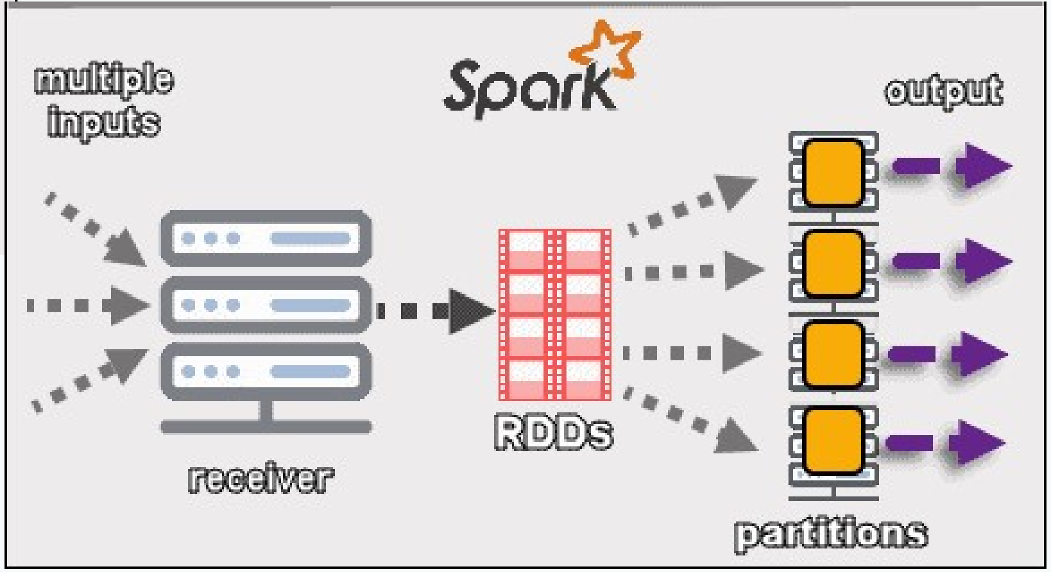
100 times faster than Hadoop	Performance	Faster than traditional system
High Cost	Cost Comparison	Low Cost
Provides fault tolerance through RDD	Security & Fault Tolerance	Provides More Authentication
Simple and User Friendly System	Ease of Use	Lengthy and Complex Framework

Hadoop vs Spark



Hadoop vs Spark





Thank You