

Explain Hadoop architecture and its components with proper diagram

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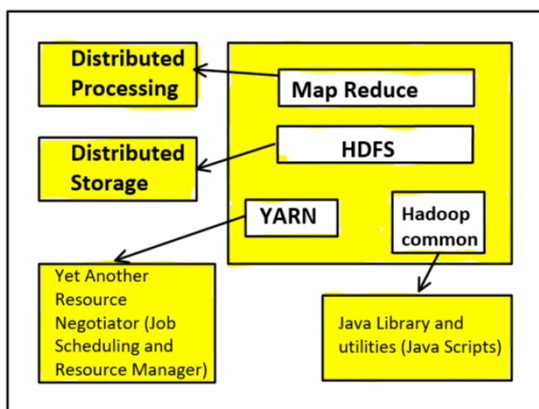


1. Hadoop Distributed File System (HDFS)
2. Yet Another Resource Negotiator (YARN)
3. MapReduce
4. Hadoop Common

In Previous Years Questions

Hadoop is a distributed processing framework designed to efficiently process large datasets across clusters of computers.

It consists of four core components, each playing a crucial role in data management and processing:



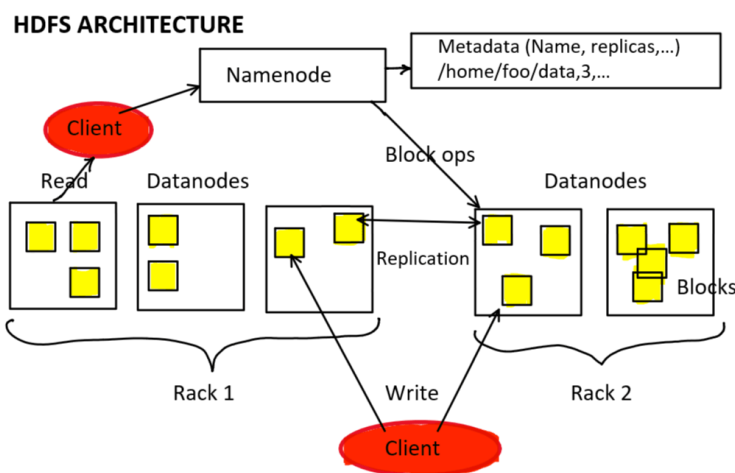
1. Hadoop Distributed File System (HDFS)

- Function: Stores and manages large datasets across multiple nodes in a cluster.
- Components:
 - NameNode: Central server managing file system metadata (data block locations, replication factors).

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- DataNode: Storage nodes where actual data blocks reside.
- Benefits:
 - High availability: Data replicated across nodes ensures access even if some fail.
 - Scalability: Easily expands to accommodate larger datasets by adding nodes.
- Diagram:



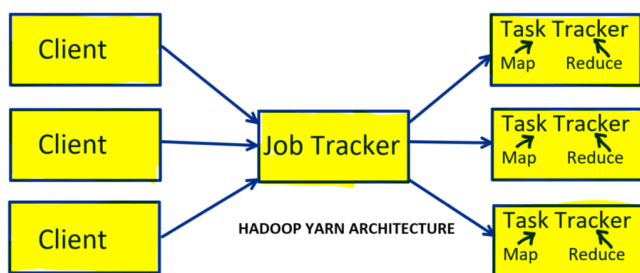
2. Yet Another Resource Negotiator (YARN)

- Function: Allocates and manages resources (CPU, memory) for applications running on the cluster.
- Components:
 - ResourceManager: Oversees all resource management within the cluster.
 - NodeManager: Manages resources on individual nodes.
 - ApplicationMaster: Negotiates resources for specific applications and coordinates their execution.

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- Benefits:
 - Efficient resource utilization: Ensures applications receive necessary resources while maximizing overall cluster performance.
 - Multi-application support: Allows multiple applications to run concurrently on the cluster.
- Diagram:



3. MapReduce

- Function: Programming model for parallel processing of large datasets.
- Process:
 - Map phase: Processes data in parallel on individual nodes.
 - Reduce phase: Combines and aggregates results from the map phase to produce final output.
- Benefits:
 - Simplified implementation for large-scale data processing tasks.
 - Efficient parallelization for faster execution.

4. Hadoop Common

- Function: Provides utilities and libraries supporting other Hadoop components.
- Includes:

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- File system operations
- Networking functionalities
- Security mechanisms
- Benefits:
 - Facilitates development and interoperability among different Hadoop components.