HDFS

What is Hadoop?

An open-source framework

Created to make it easier to work with big data.

It provides a method to

- Access data
- Process data
- manage resources across the computing and network resources

Hadoop Core Modules

Hadoop Distributed File System (HDFS)

- Provides access to application data.
- Can work with other file systems - FTP, Amazon S3 etc

Hadoop YARN

- Provides the framework to schedule jobs and manage resources

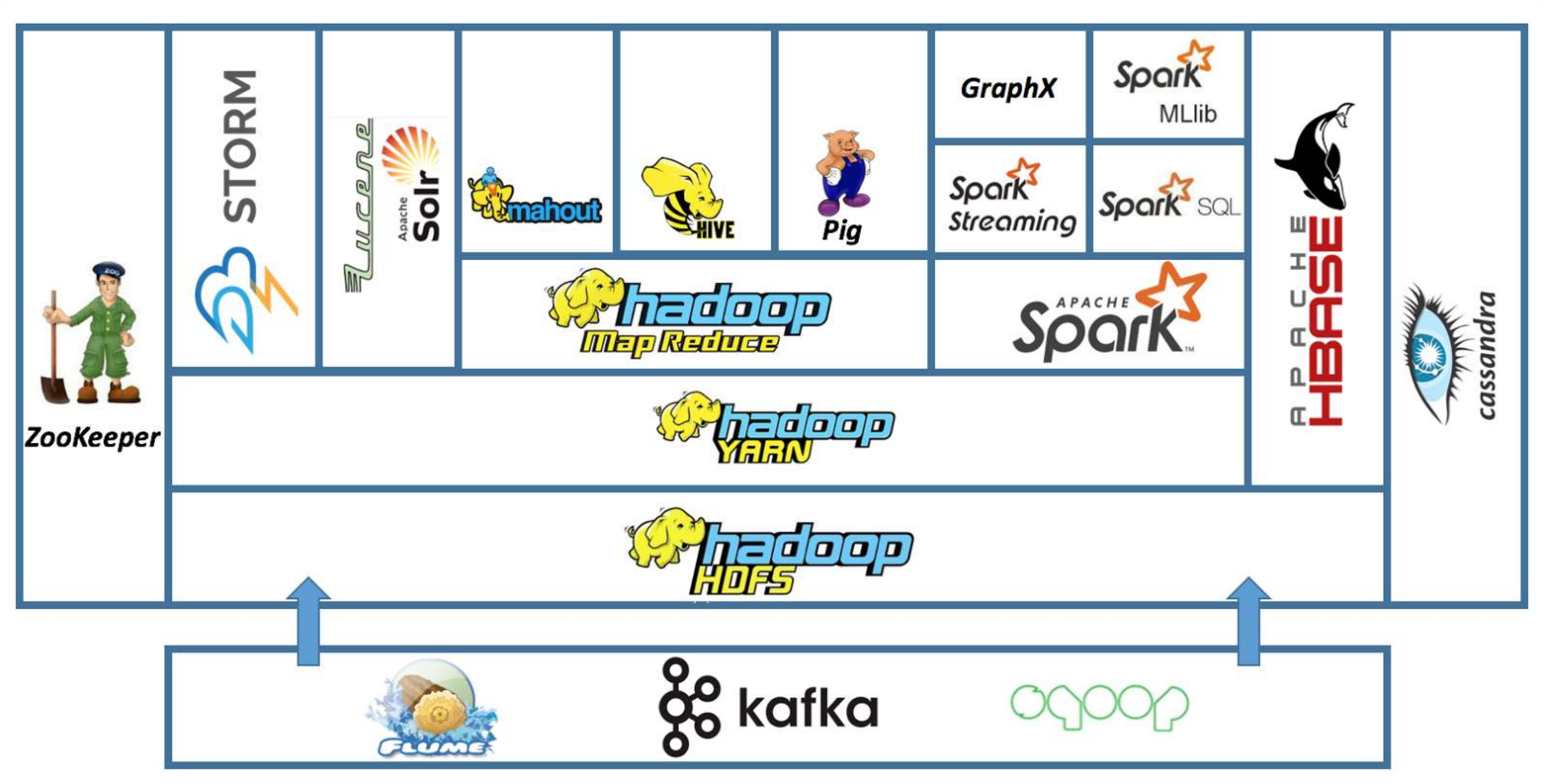
Hadoop MapReduce

- Parallel processing system for large data sets.

Hadoop Common

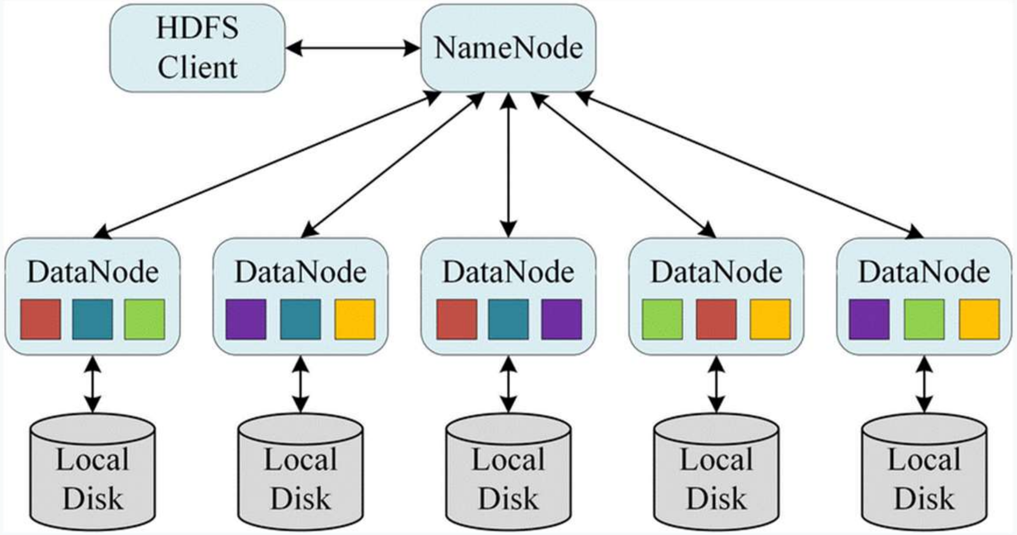
- A set of utilities that supports the three other core modules.

Hadoop Ecosystem

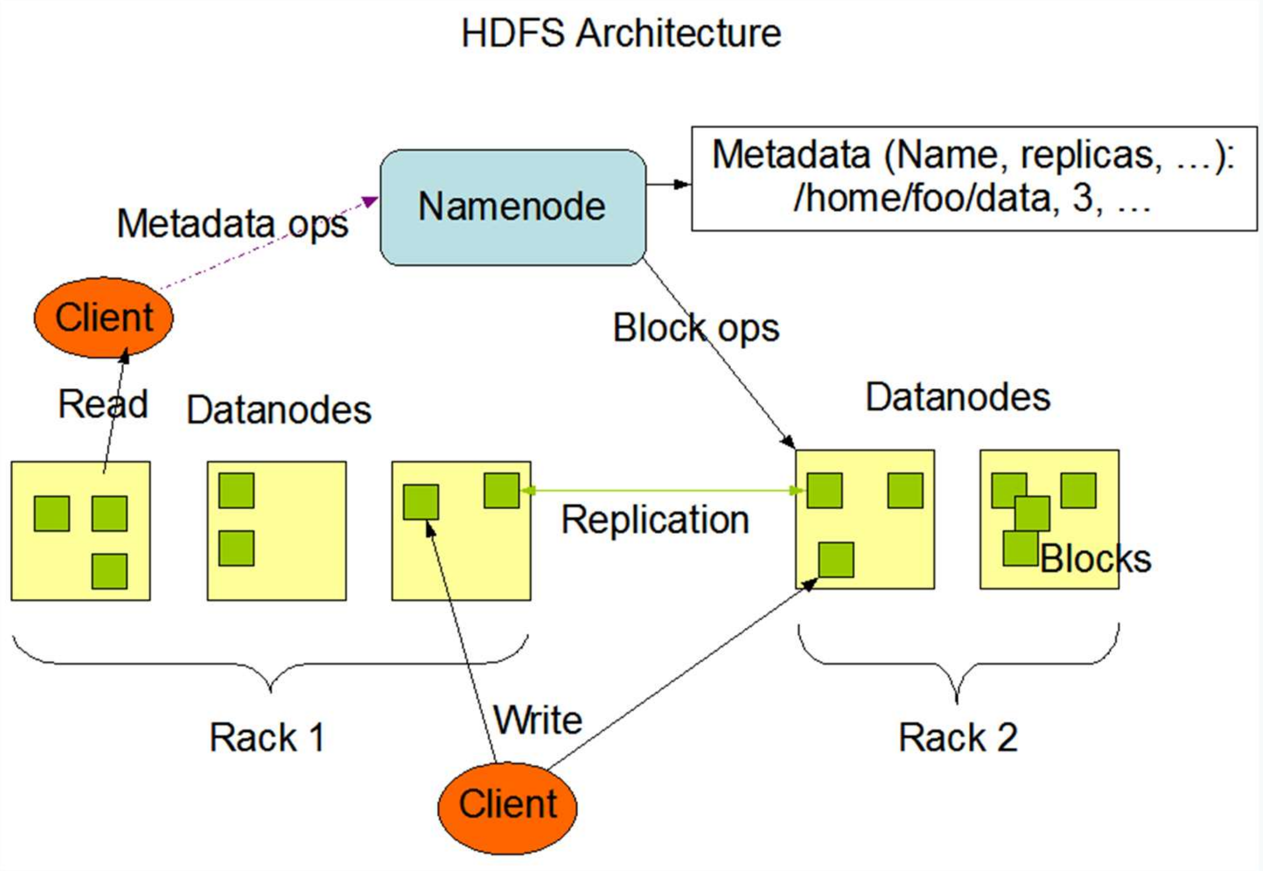


HDFS

- Manages how data files are divided and stored across the cluster.
- Data is divided into blocks
- Each server in the cluster contains data from different blocks
- There is also some built-in redundancy.

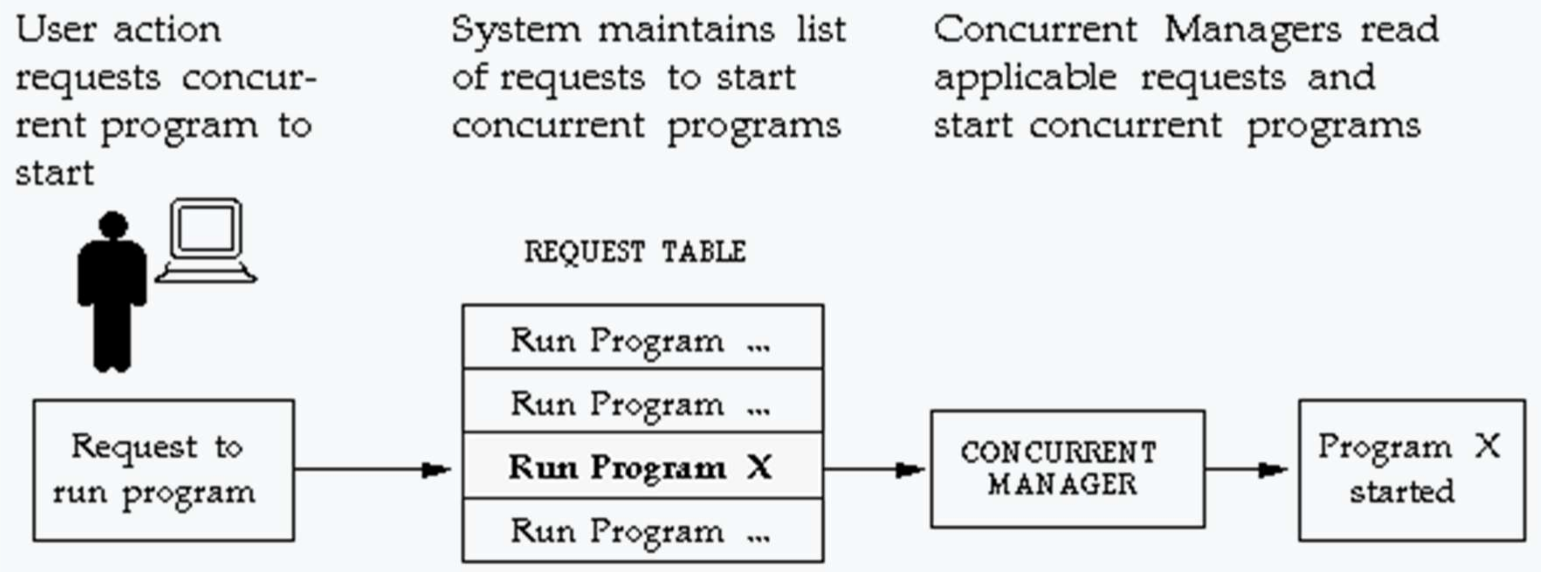


HDFS Architecture



Concurrent Processing

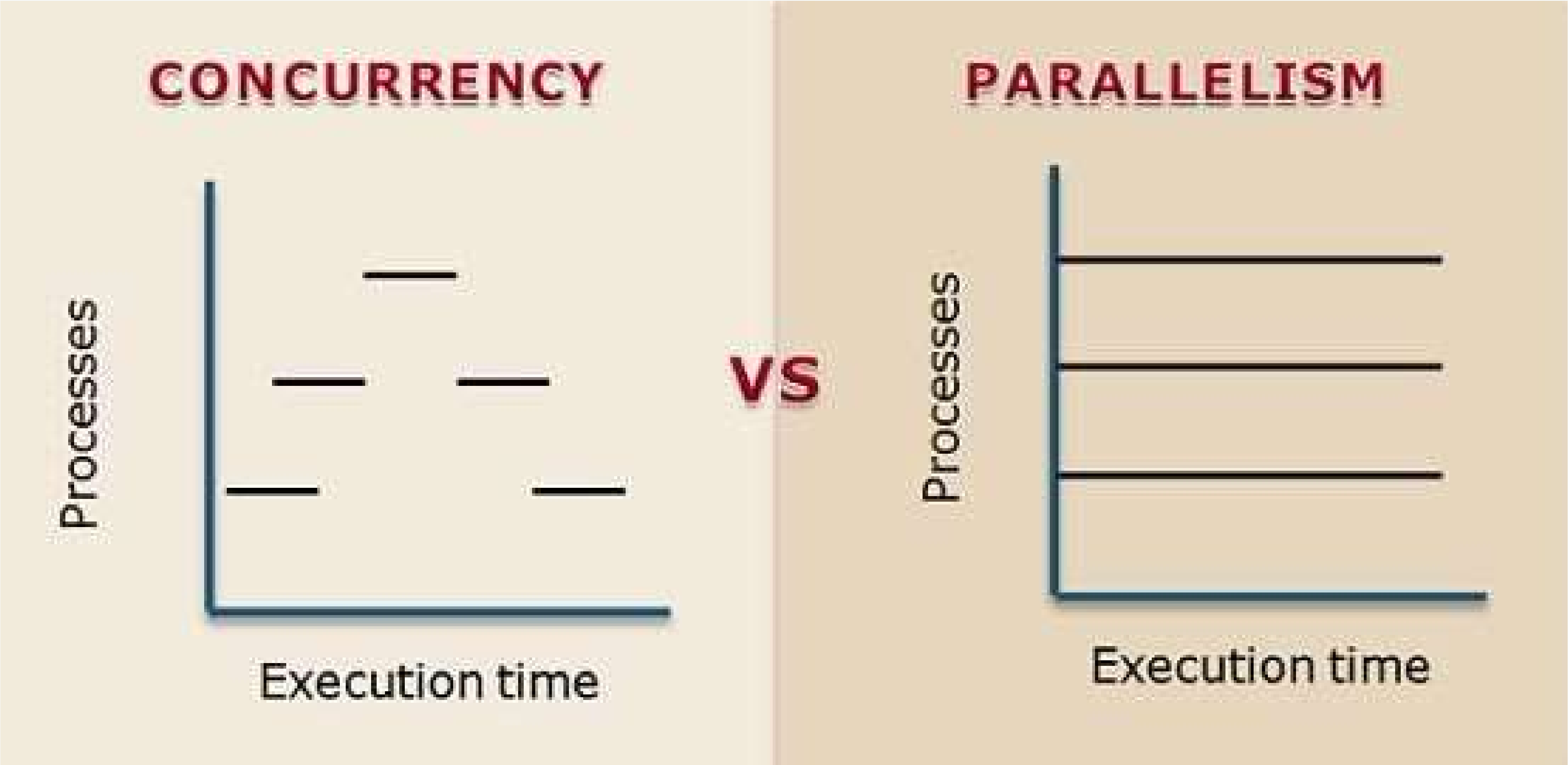
- The simultaneous execution of several interrelated computer programs
- A sequential computer program consists of a series of instructions to be executed one after another
- A concurrent program consists of several sequential programs to be executed in parallel
- Each of the concurrently executing sequential programs is called a process



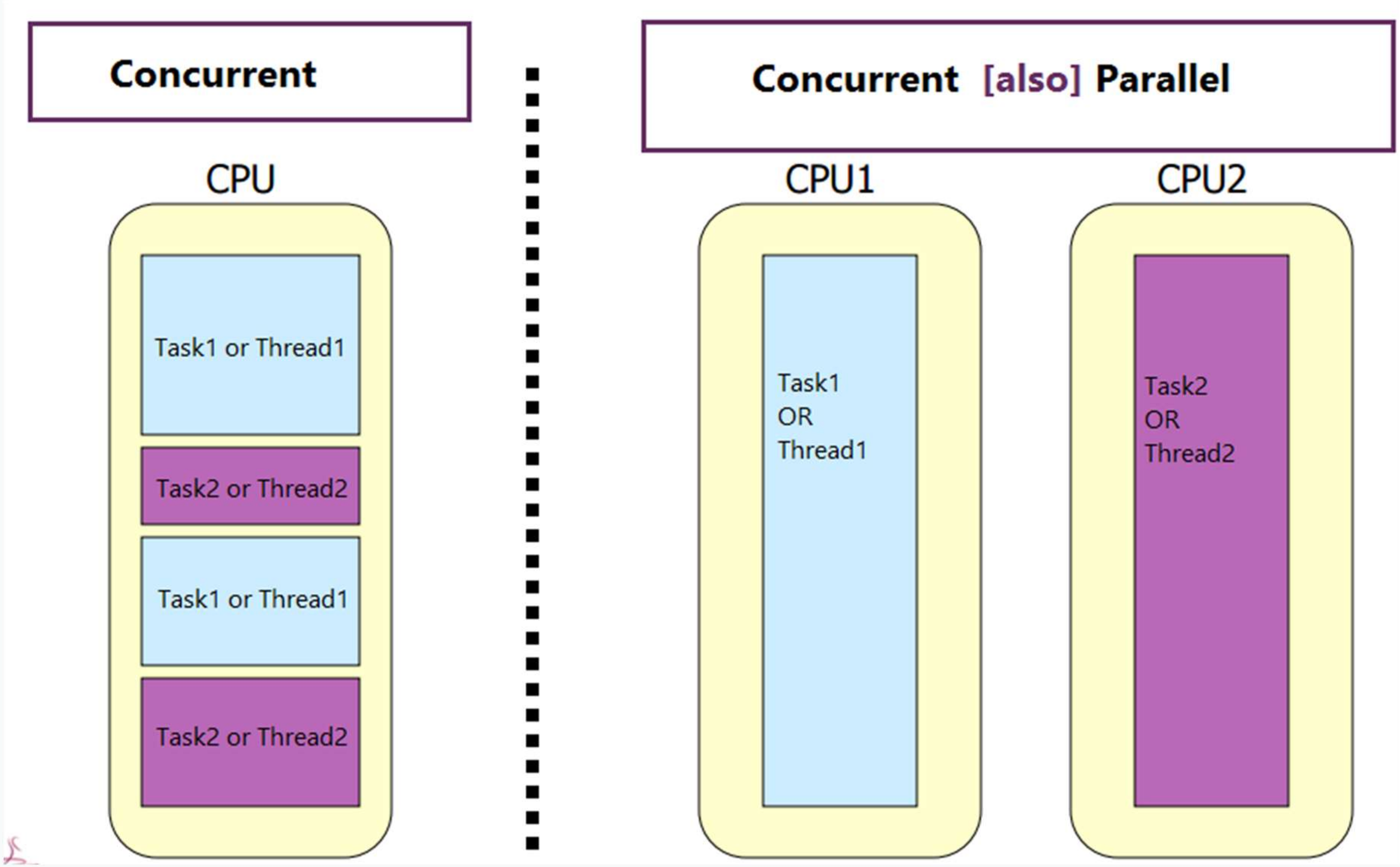
User action requests concurrent program to start

System maintains list of requests to start concurrent programs

Concurrent Managers read applicable requests and start concurrent programs


CONCURRENCY
Processes
Execution time
VS
PARALLELISM
Processes
Execution time

Concurrency and Parallalism



Concurrent

CPU

Task1 or Thread1

Task2 or Thread2

Task1 or Thread1

Task2 or Thread2

Concurrent [also] Parallel

CPU1

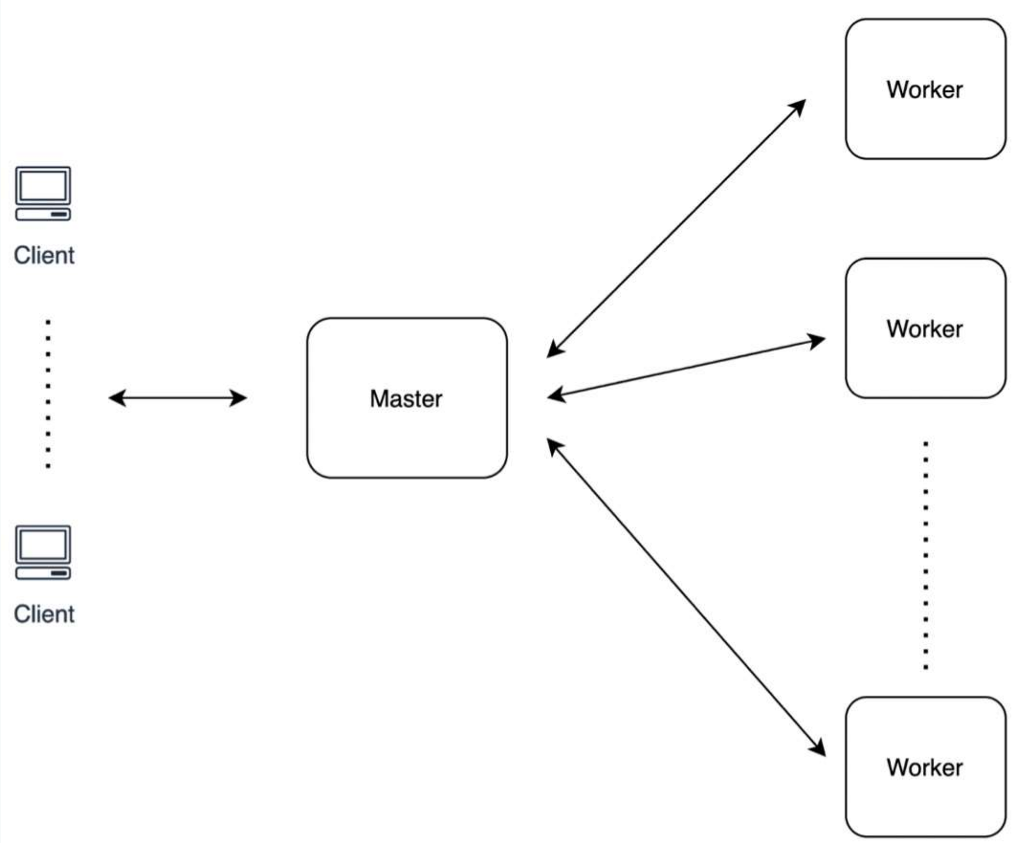
Task1
OR
Thread1

CPU2

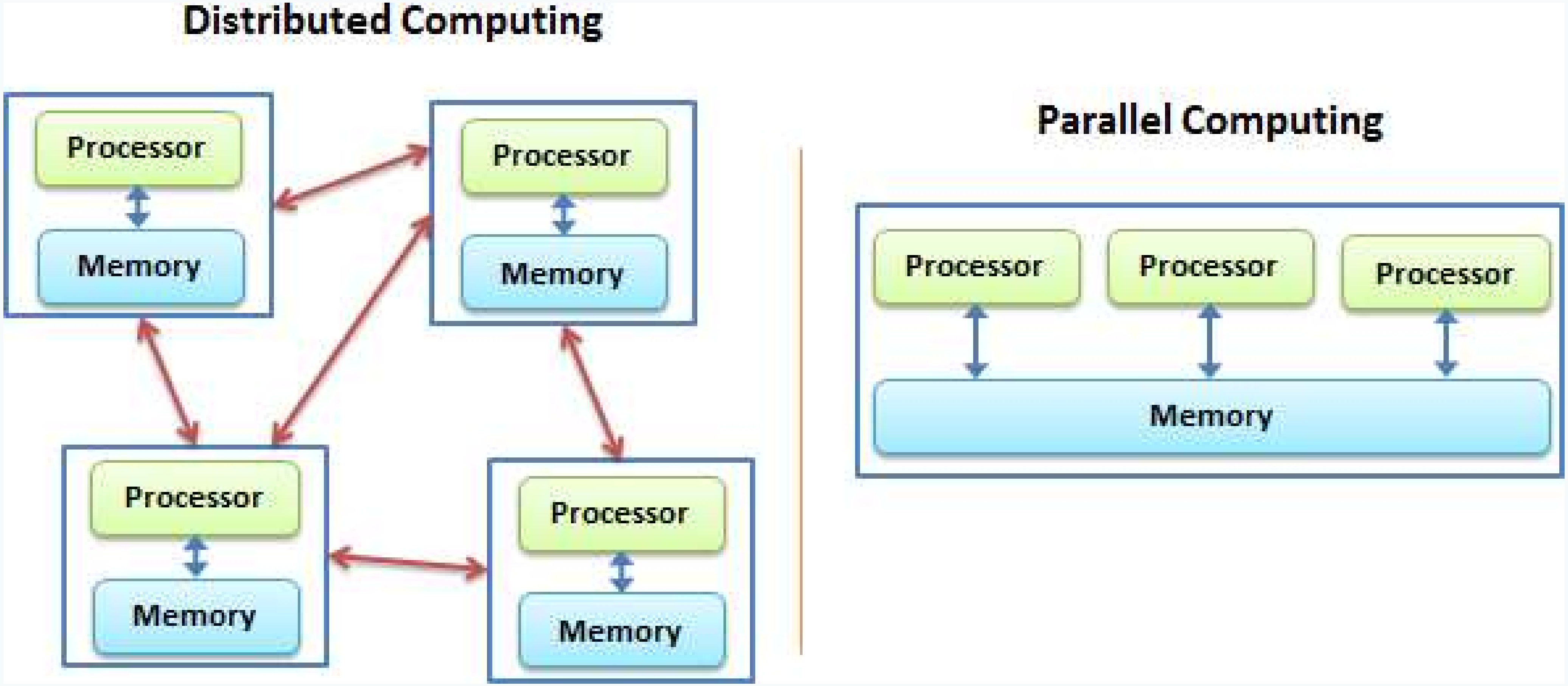
Task2
OR
Thread2

Distributed Processing

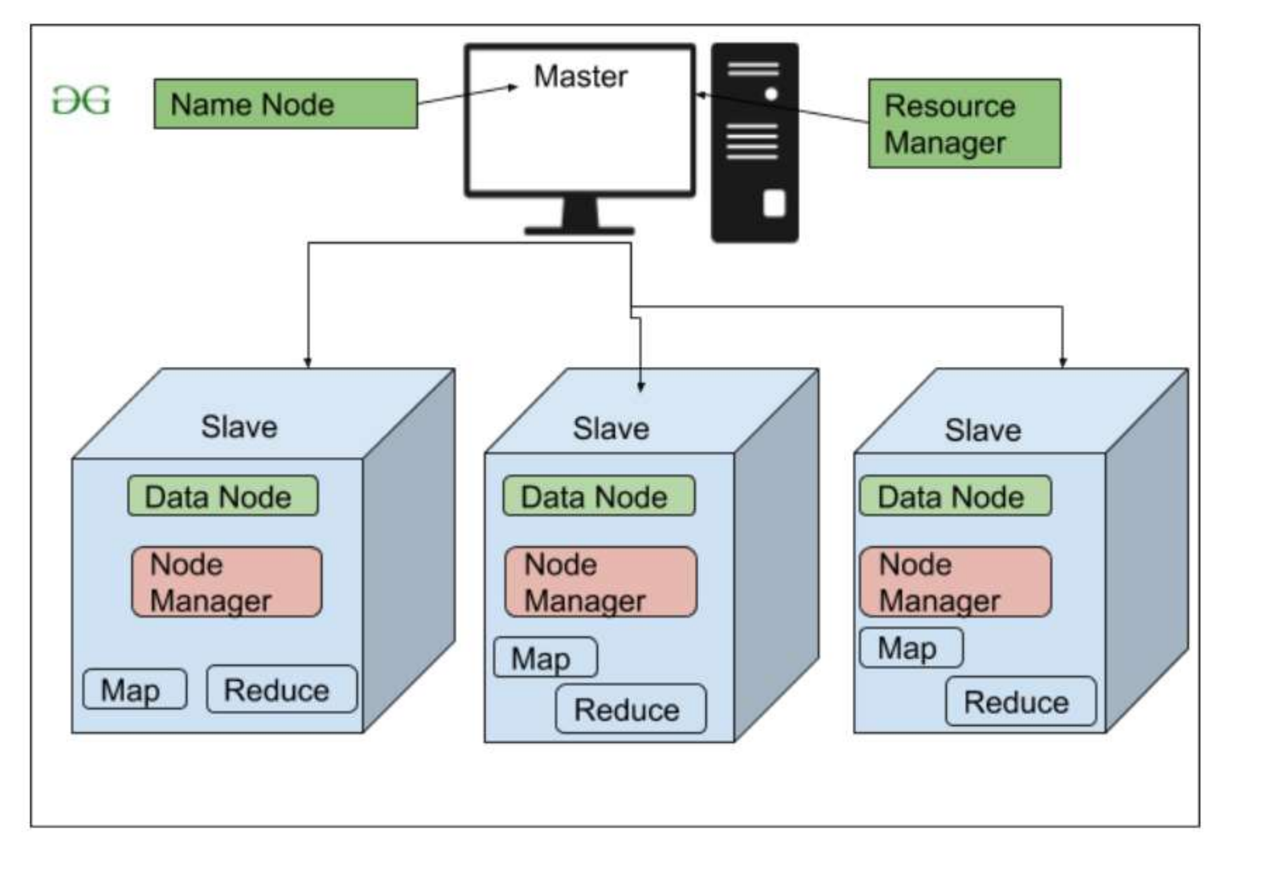
- Is the technique of linking together multiple computer servers over a network into a cluster



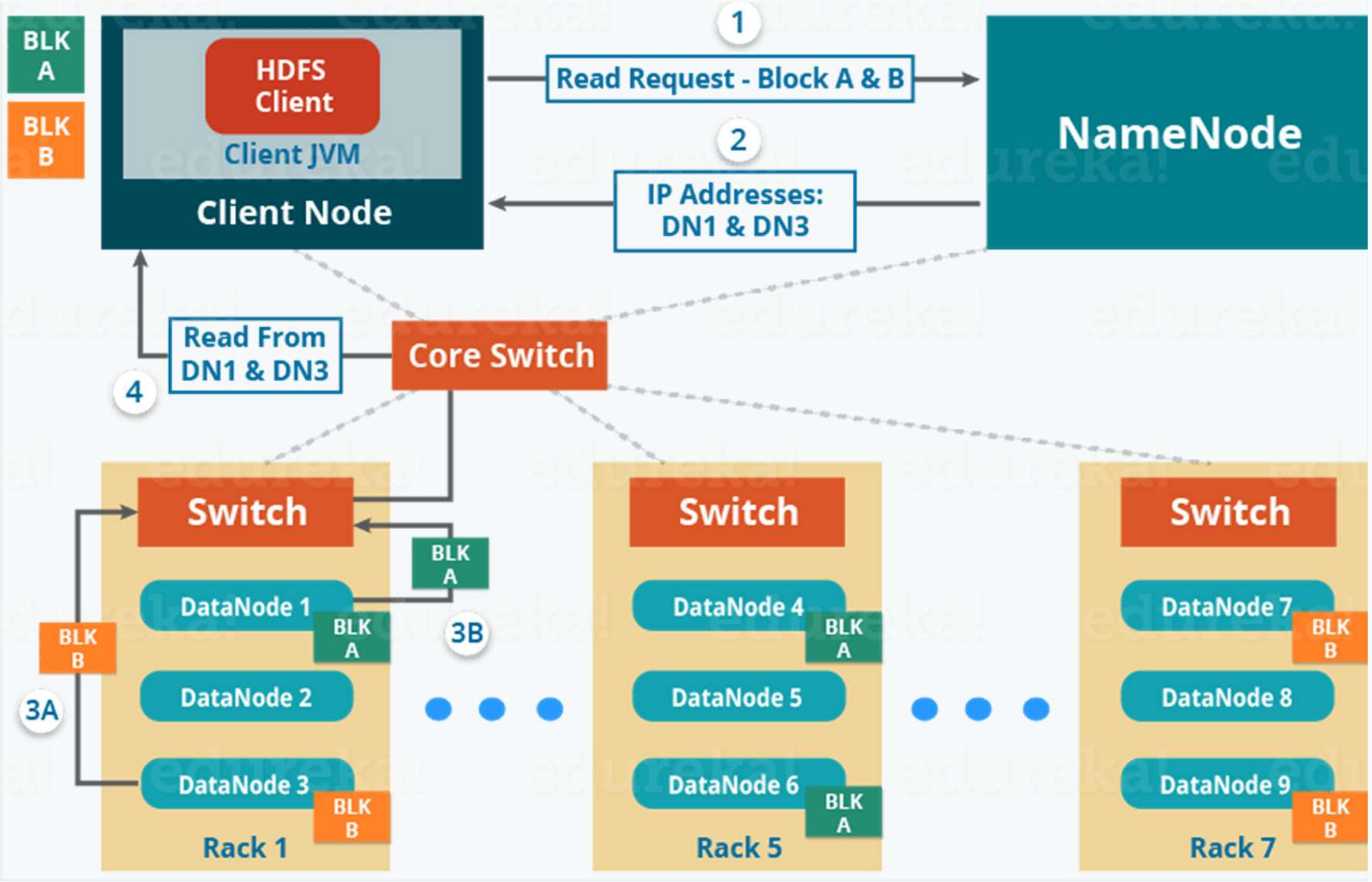
Distributed Computing vs Parallel Computing



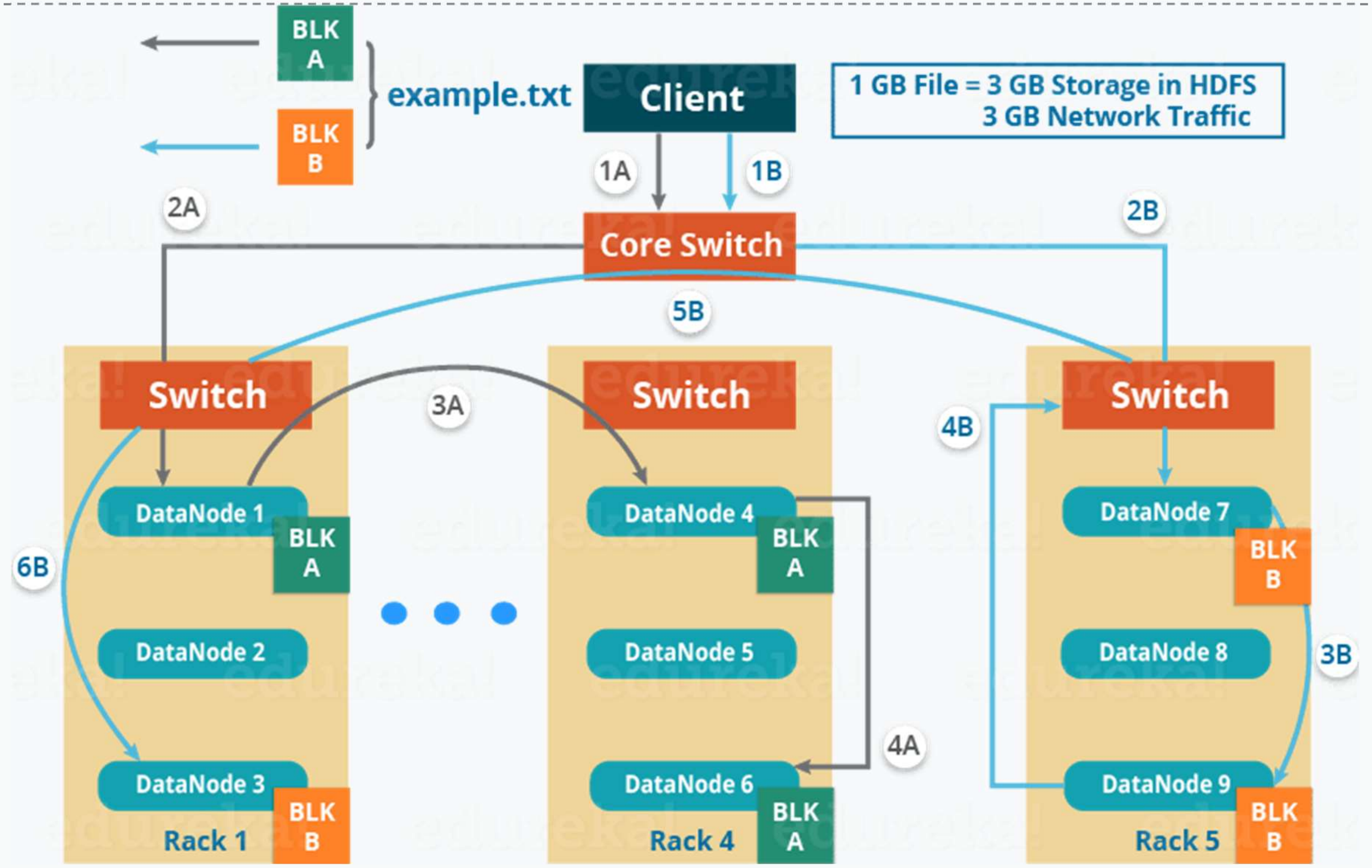
HDFS Architecture

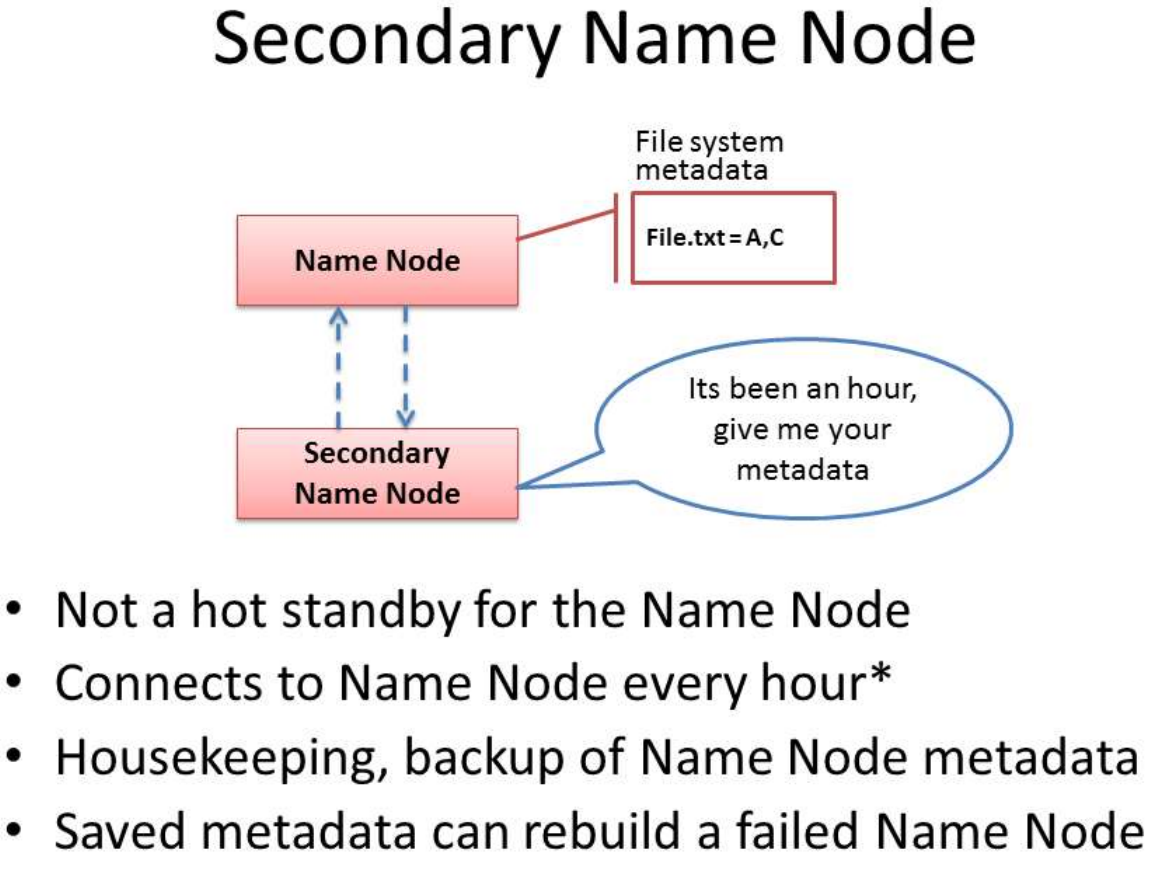


HDFS Read Flow



HDFS Write Flow





Secondary Name Node

File system metadata

File.txt = A,C

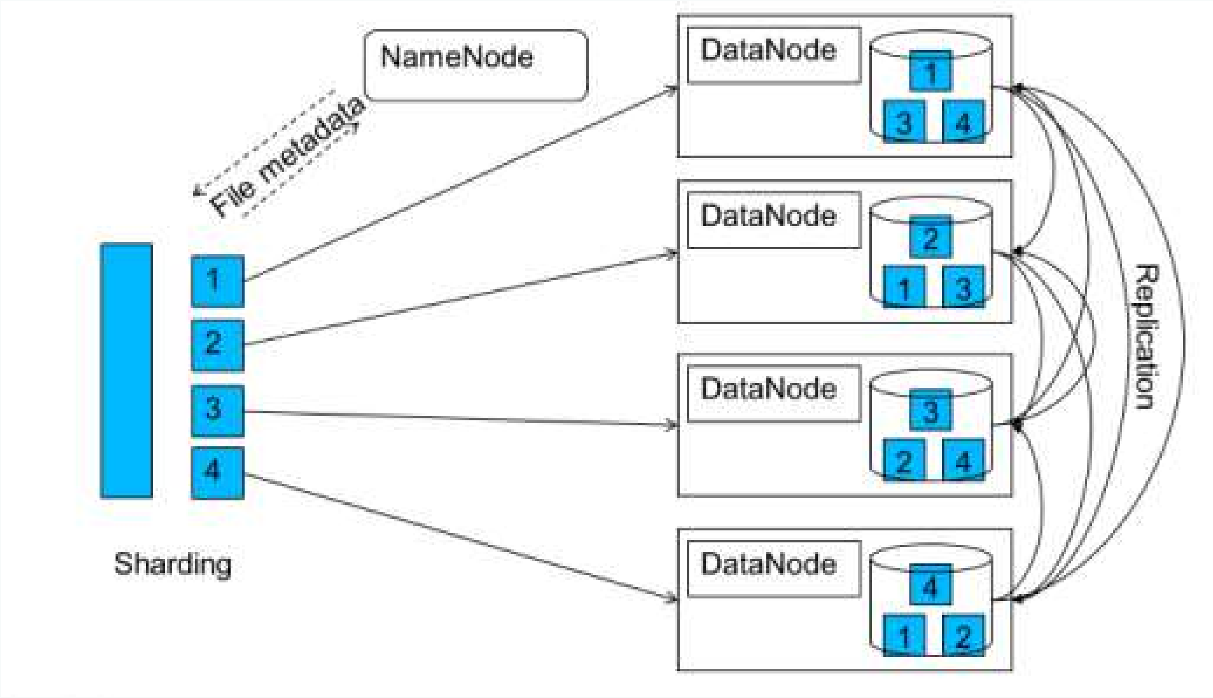
Name Node

Secondary Name Node

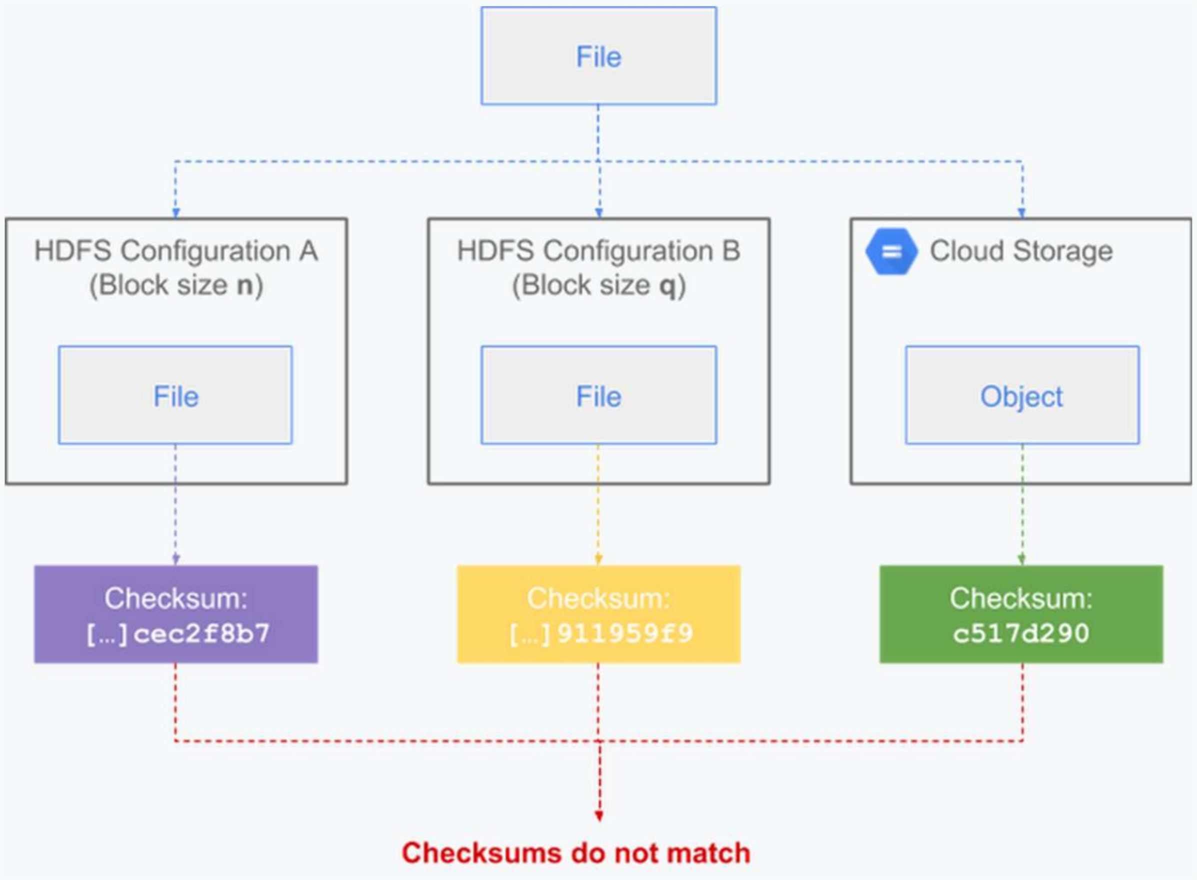
Its been an hour, give me your metadata

- Not a hot standby for the Name Node
- Connects to Name Node every hour*
- Housekeeping, backup of Name Node metadata
- Saved metadata can rebuild a failed Name Node

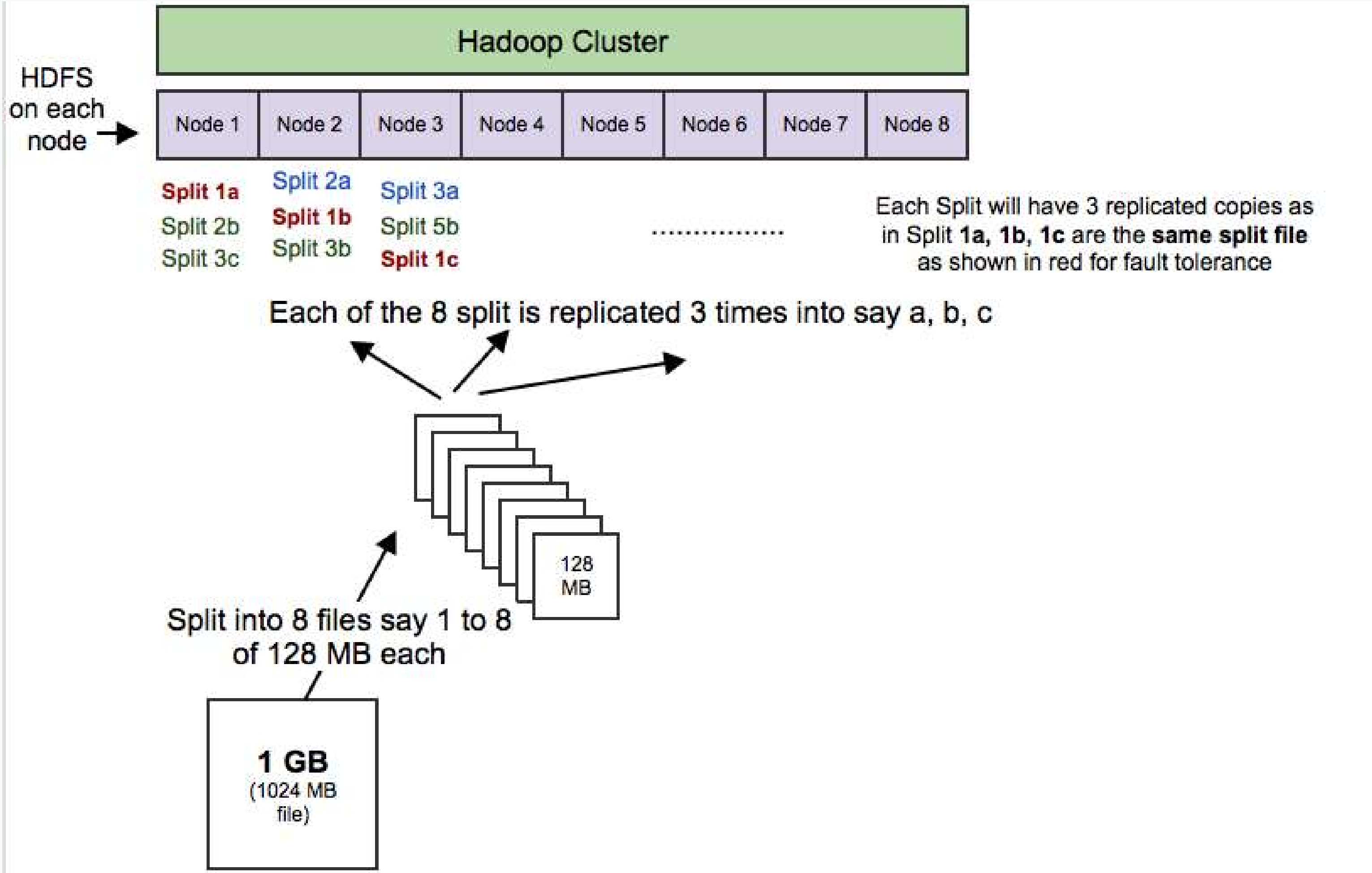
HDFS Redundancy



HDFS Integrity



Fault Tolerance



Each Split will have 3 replicated copies as in Split **1a, 1b, 1c** are the **same split file** as shown in red for fault tolerance

Each of the 8 split is replicated 3 times into say a, b, c

Split into 8 files say 1 to 8 of 128 MB each

Thank You