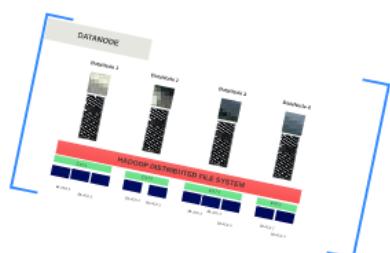


## HDFS ARCHITECTURE



# HDFS ARCHITECTURE

## DATANODE

DataNode 1



DataNode 2



DataNode 3



DataNode 4



## HADOOP DISTRIBUTED FILE SYSTEM

EXT4



BLOCK 1

BLOCK 3

EXT4



BLOCK 2

BLOCK 3

EXT4



BLOCK 3

BLOCK 2

EXT4



BLOCK 1

BLOCK 2

## NAMENODE



aka Master

**File Name** - MyDatasetInHDFS

**File Size** - 350 MB

**Replication Factor** - 3

**Blocks** - BLK\_0045732, BLK\_9610590, BLK\_8851209

**Block Locations**

**Permissions**

**Created By, Created On**

**Lasted Modified By, Last Modified On**

## MyDatasetInHDFS

BLK_0045732	DN20	DN2	DN10
BLK_9610590	DN20	DN4	DN13
BLK_8851209	DN7	DN2	DN10

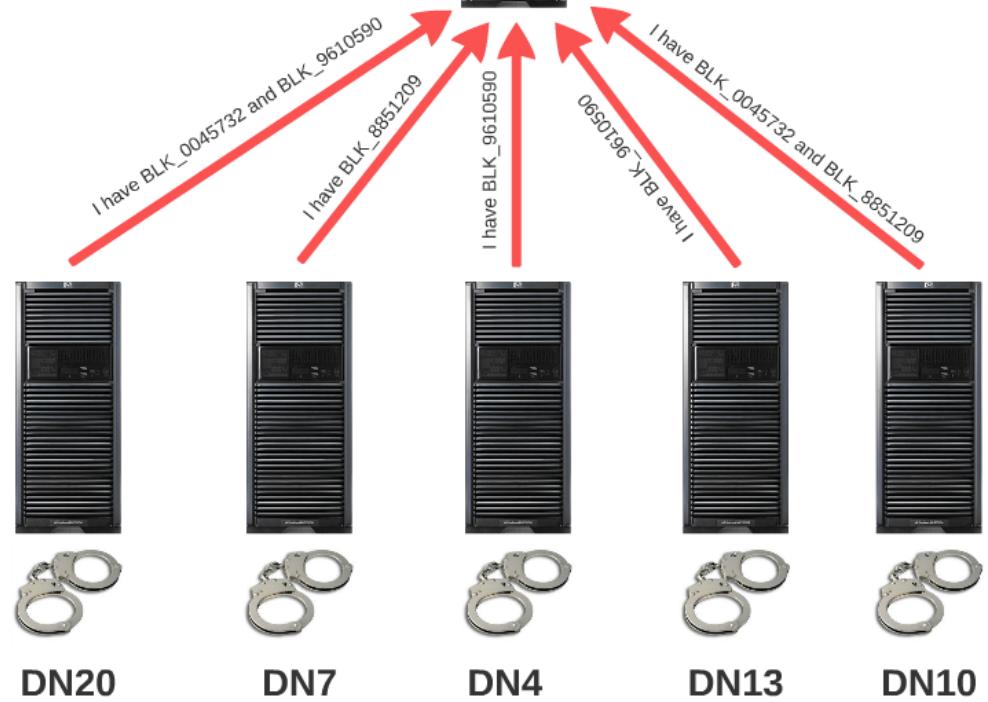
### Name Node

In Disk - Metadata of Files & Folders

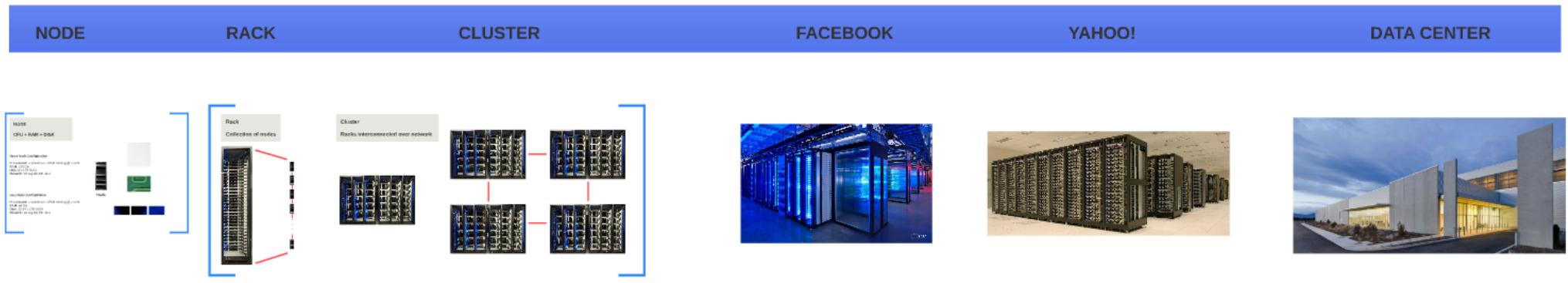
In Memory - Block locations



To All Data Nodes:  
Send me block locations



# HADOOP CLUSTER



## NODE

### CPU + RAM + DISK

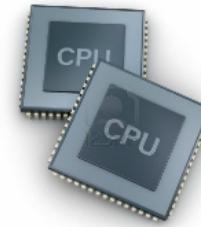
#### Name Node Configuration

**Processors:** 2 Quad Core CPUs running @ 2 GHz

**RAM:** 128 GB

**Disk:** 6 x 1TB SATA

**Network:** 10 Gigabit Ethernet



Node

#### Data Node Configuration

**Processors:** 2 Quad Core CPUs running @ 2 GHz

**RAM:** 64 GB

**Disk:** 12-24 x 1TB SATA

**Network:** 10 Gigabit Ethernet



# RACK

# CLUSTER

Rack

Collection of nodes



Cluster

Racks interconnected over network

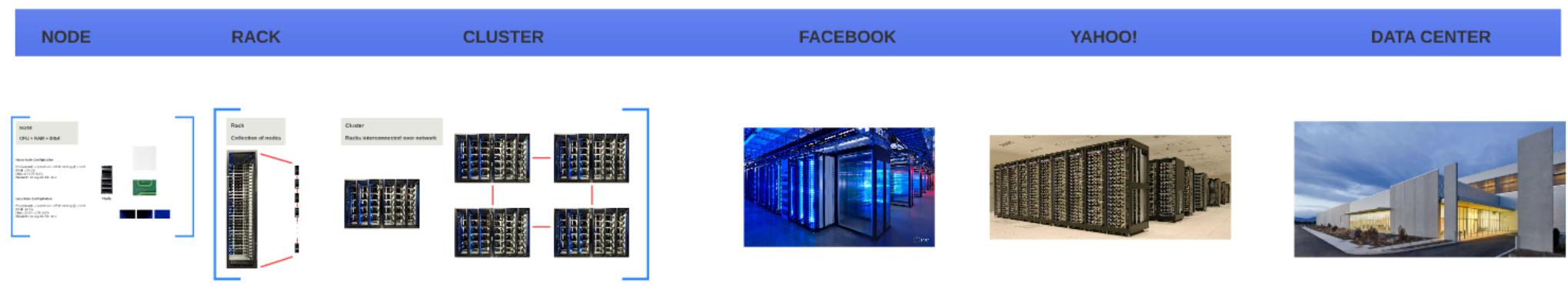








# HADOOP CLUSTER

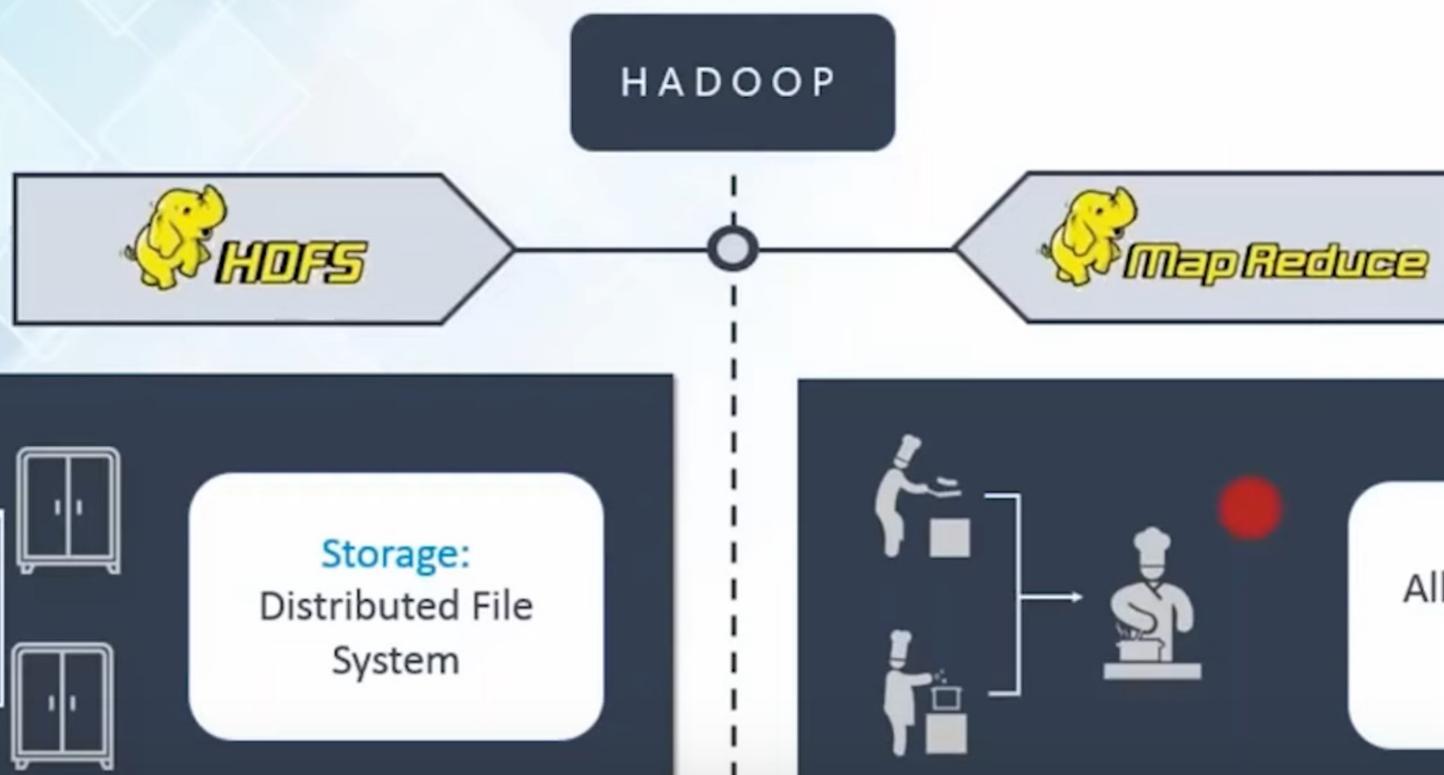


# Hadoop | HDFS

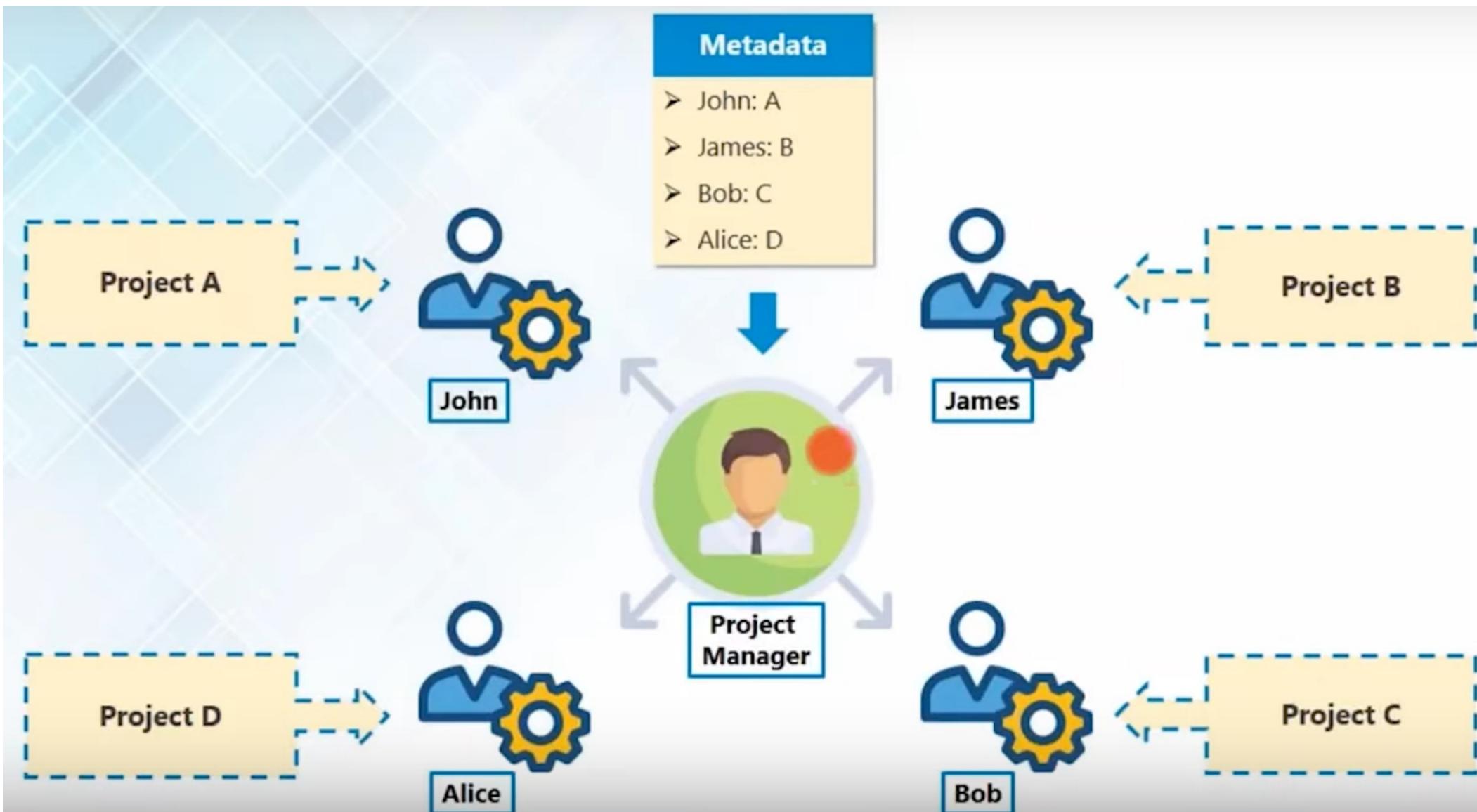


# Apache Hadoop Framework

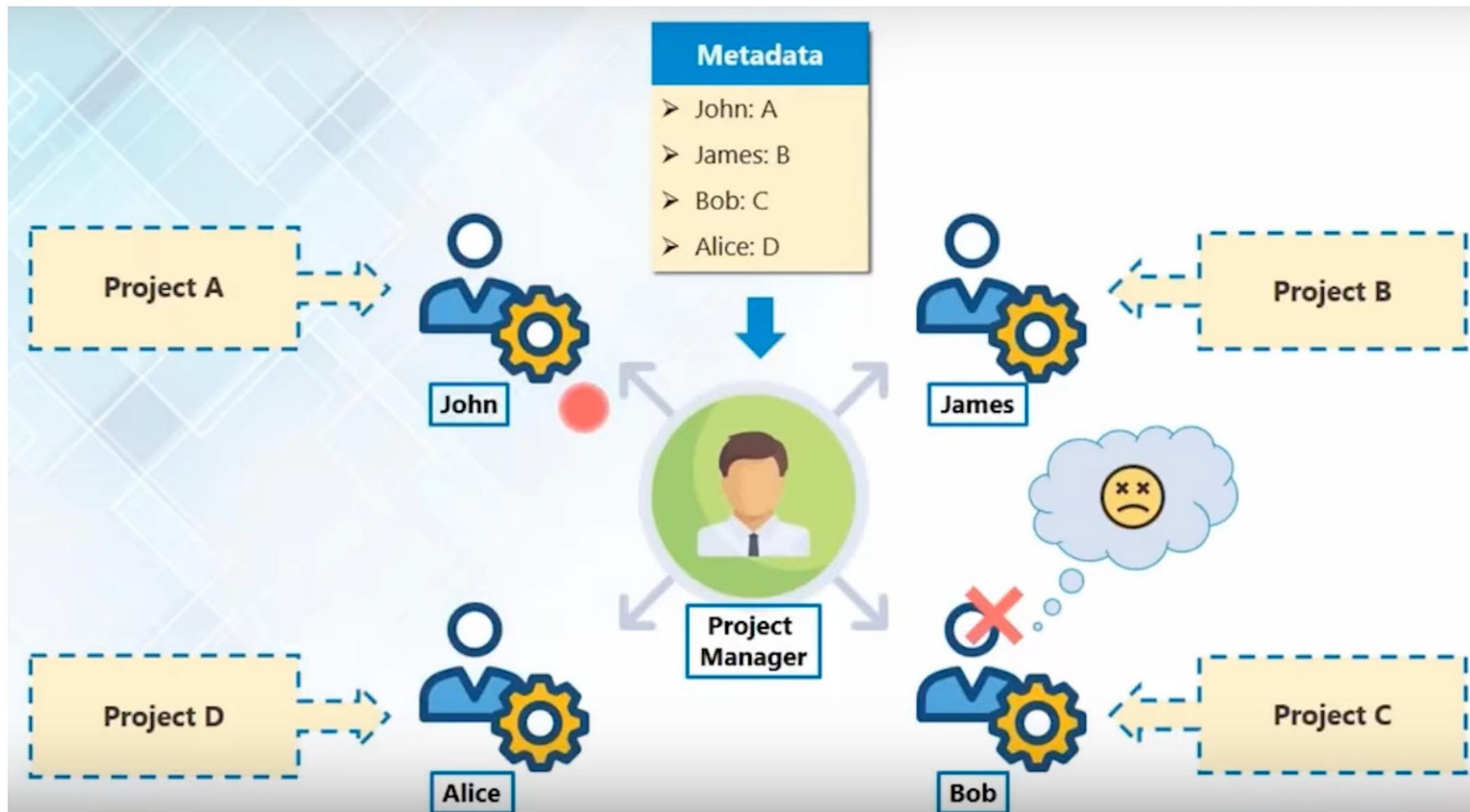
Hadoop is a framework that allows us to **store** and **process** large data sets in **parallel** and **distributed** fashion



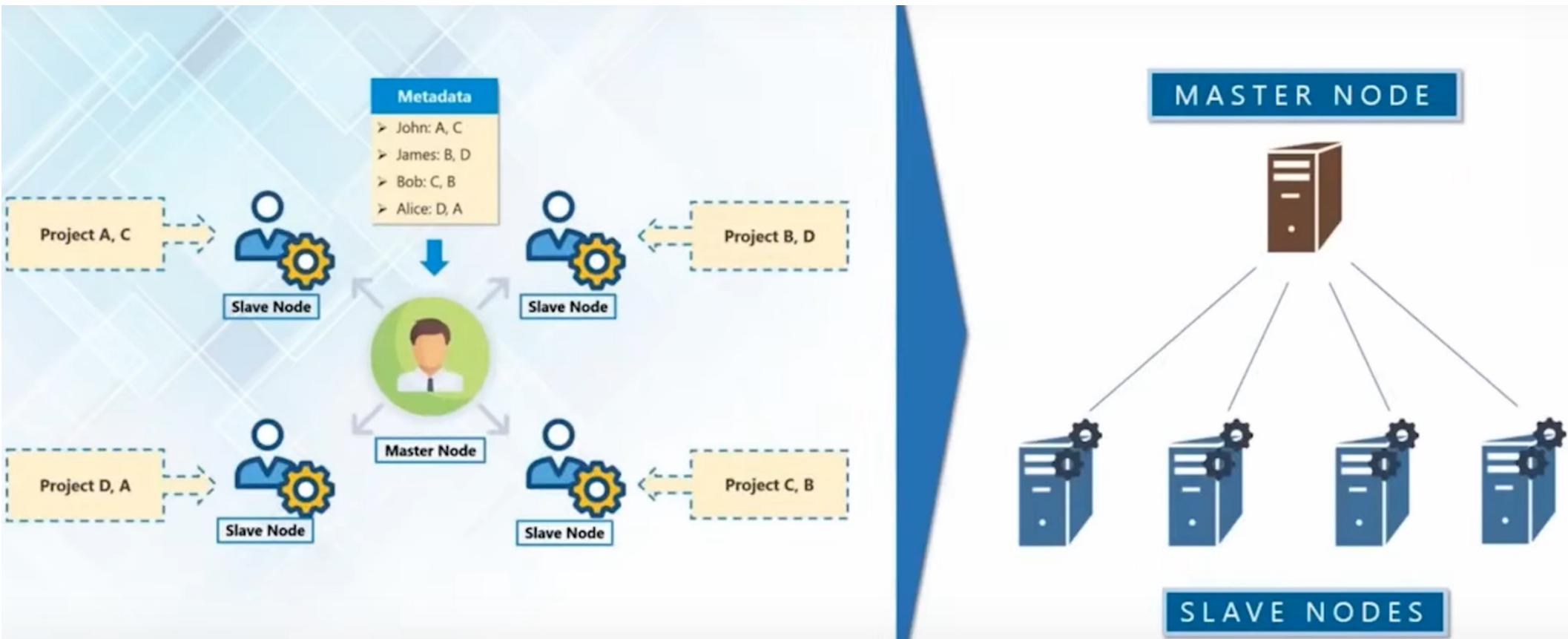
# Hadoop Master/Slave Architecture



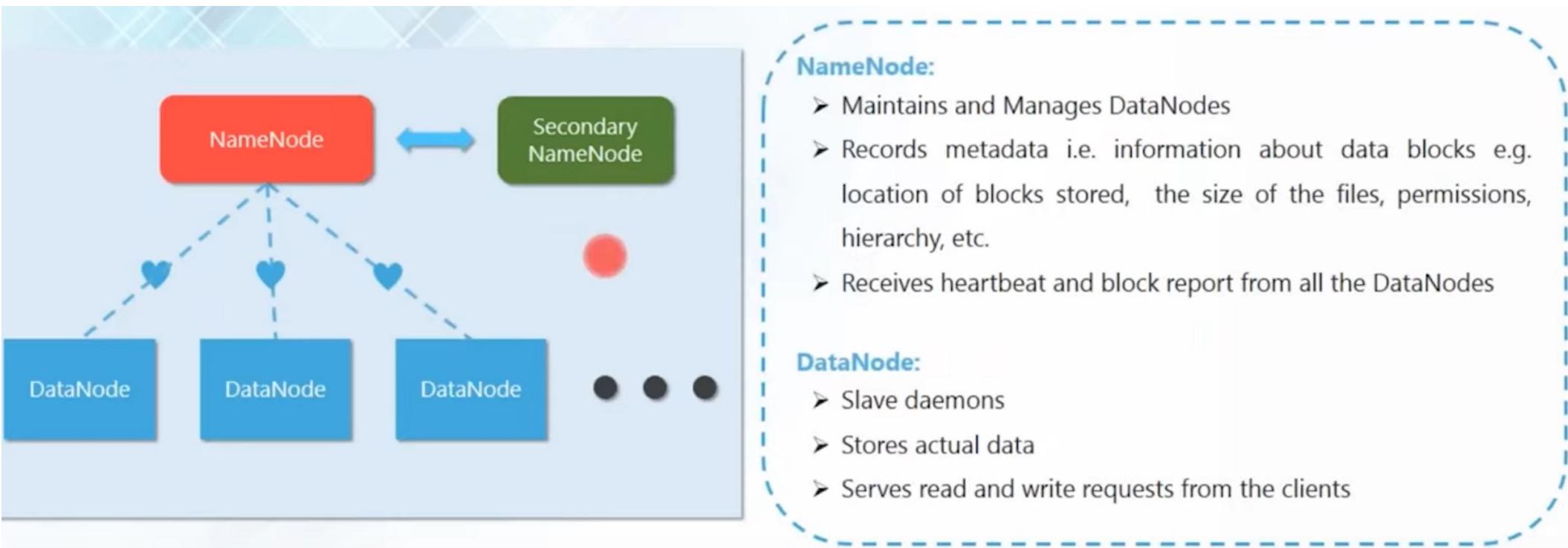
# Hadoop Master/Slave Architecture



# Hadoop Master/Slave Architecture

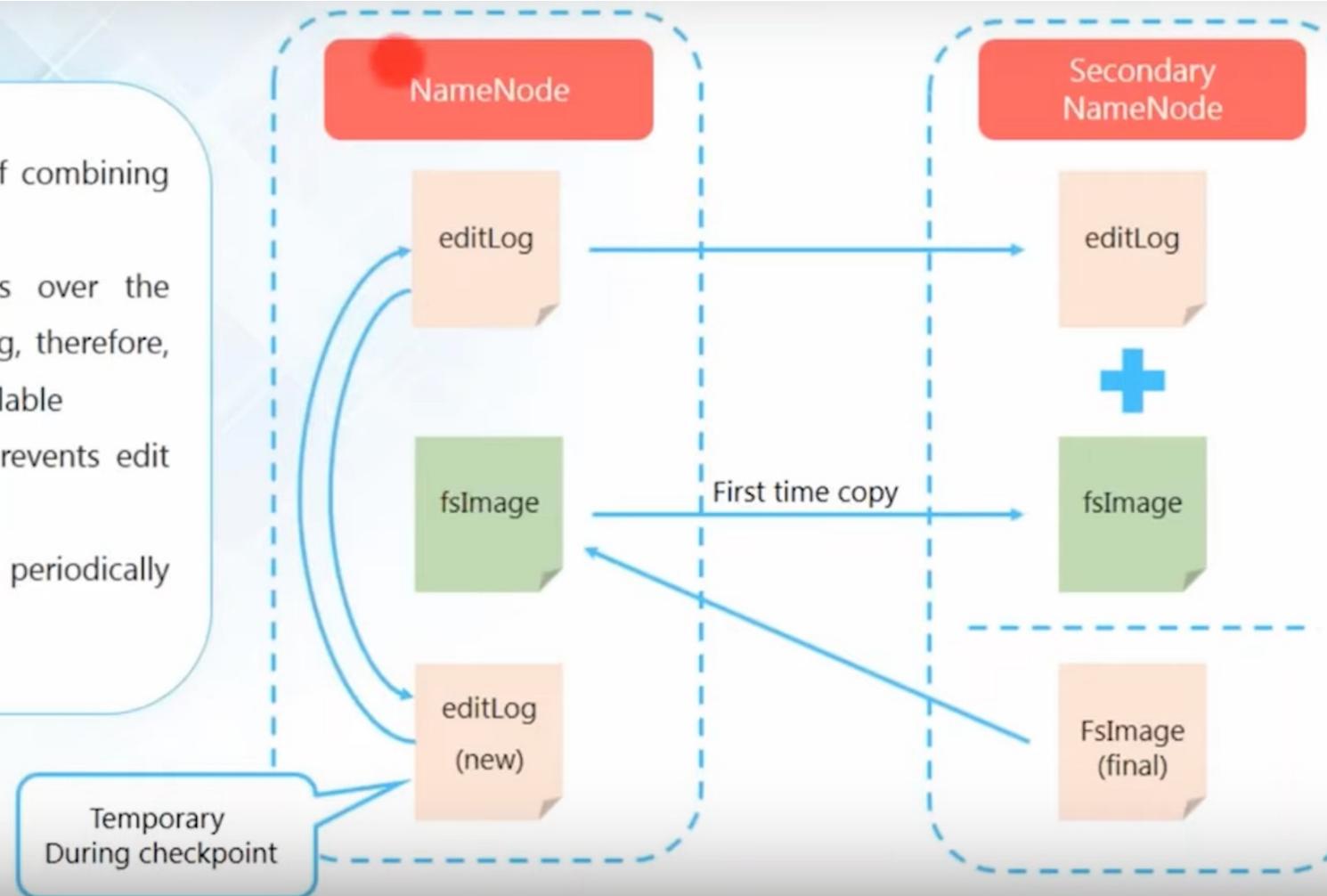


# HDFS | NameNode & DataNode



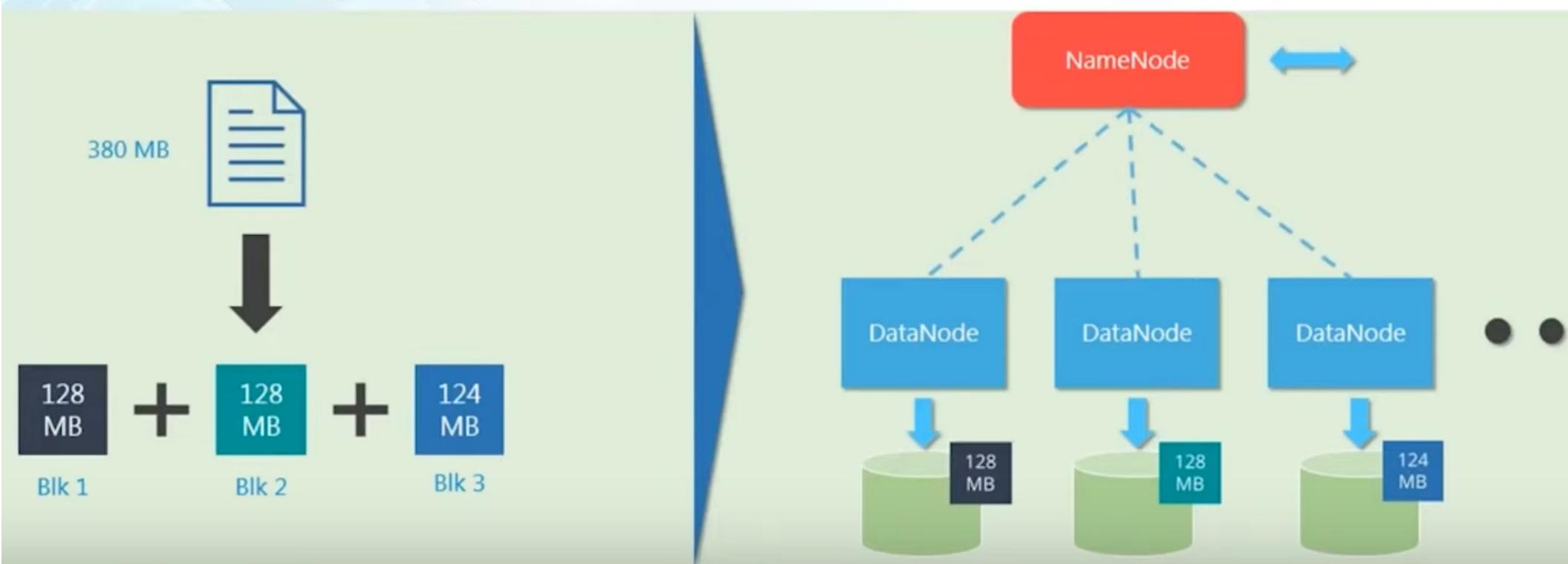
# HDFS | S.NameNode & Checkpointing

- Checkpointing is a process of combining edit logs with FsImage
- Secondary NameNode takes over the responsibility of checkpointing, therefore, making NameNode more available
- Allows faster Failover as it prevents edit logs from getting too huge
- Checkpointing happens periodically (default: 1 hour)



# HDFS | Data Blocks

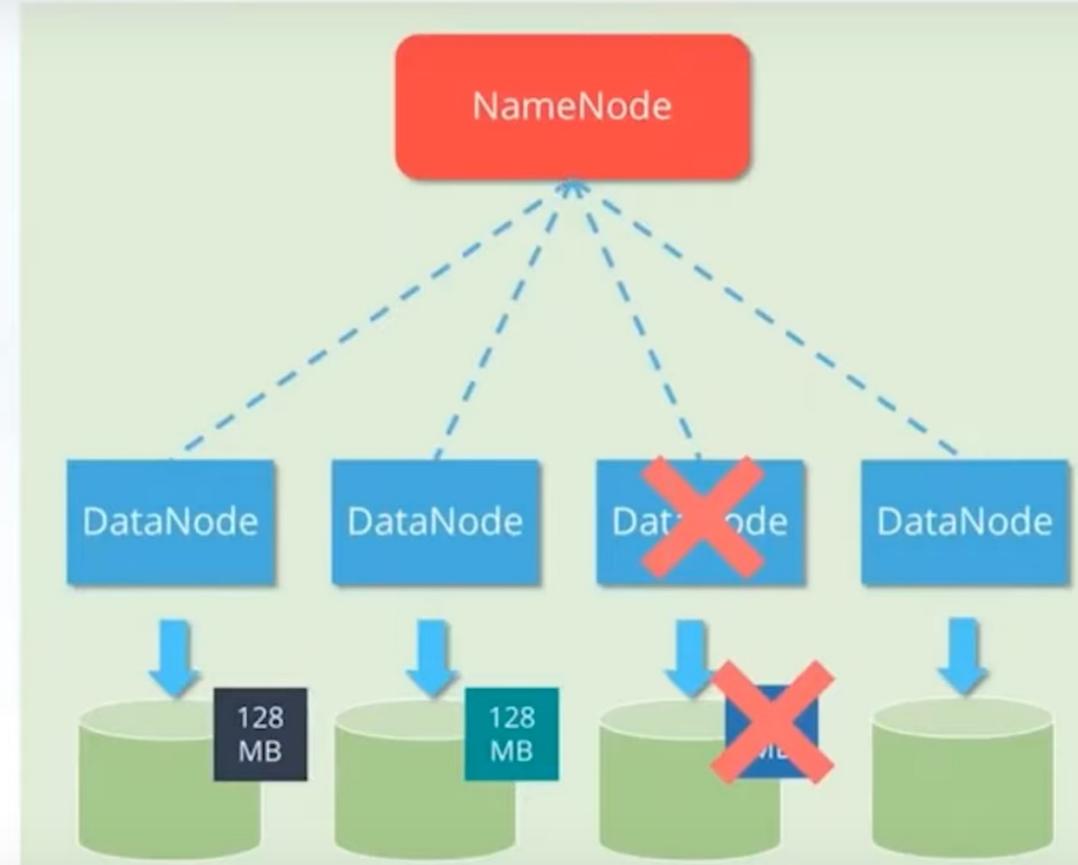
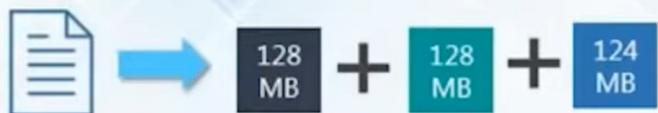
- Each file is stored on HDFS as blocks
- The default size of each block is 128 MB in Apache Hadoop 2.x (64 MB in Apache Hadoop 1.x)



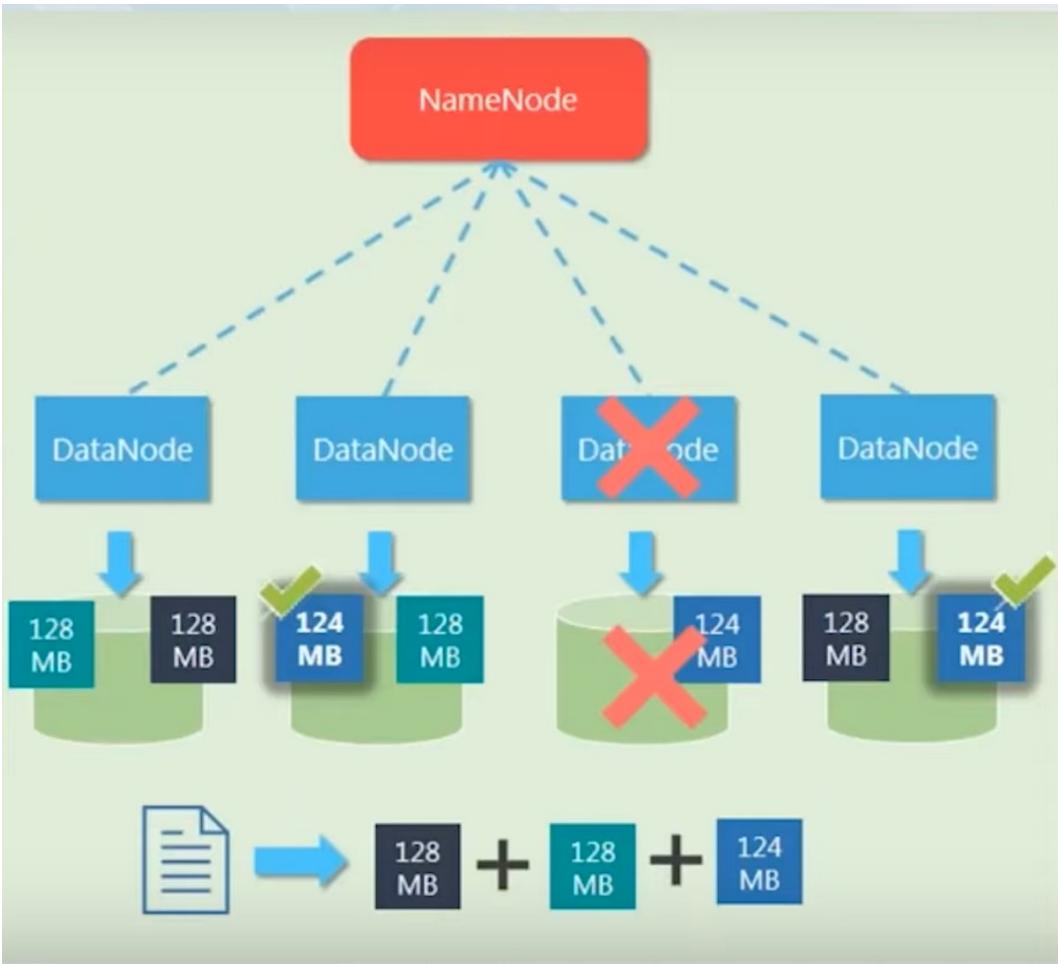
# HDFS | Fault Tolerance

**Scenario:**

One of the DataNodes crashed containing the data blocks



# HDFS | Fault Tolerance | Replication



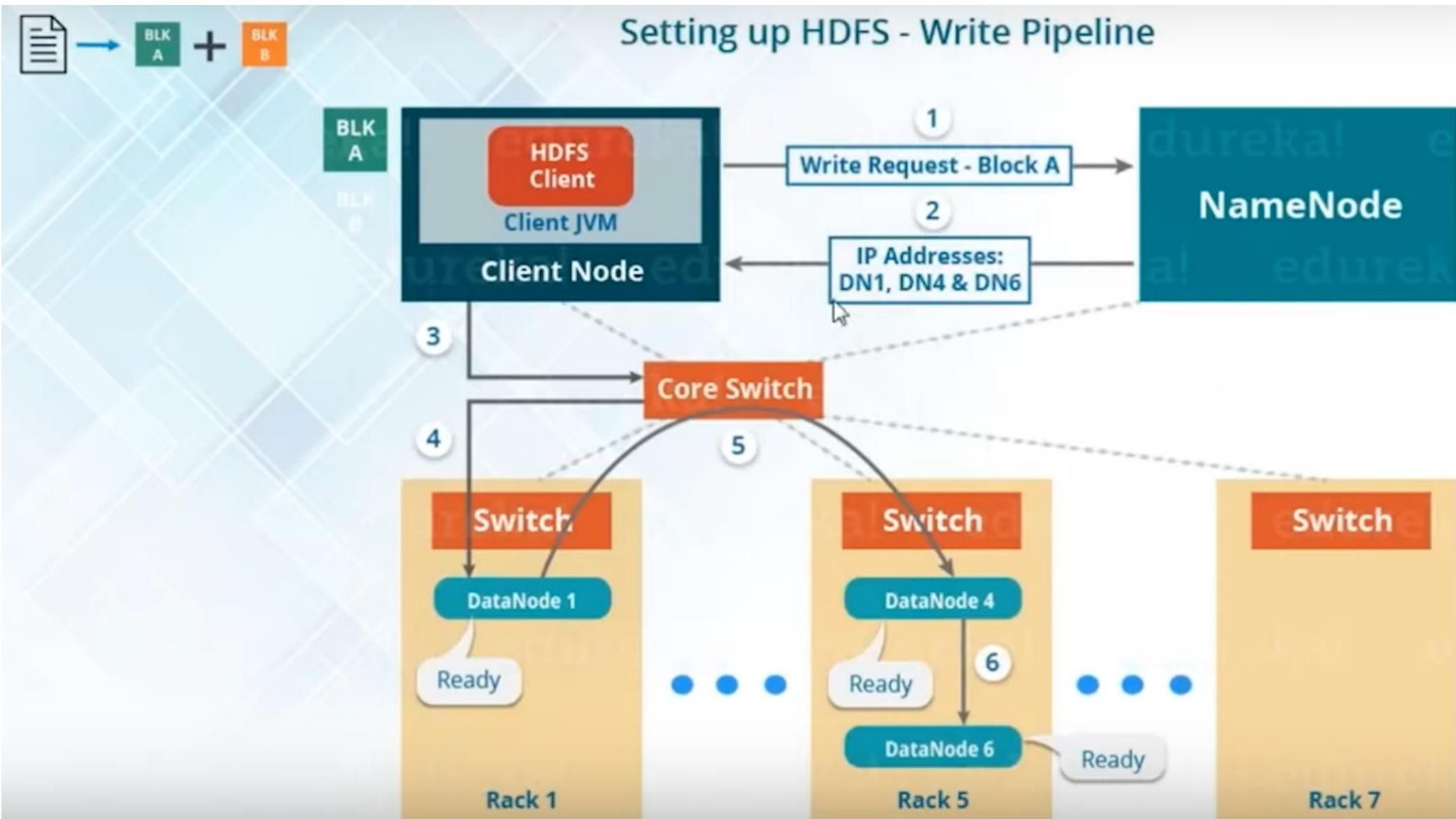
## Solution:

Each data blocks are replicated (thrice by default) and are distributed across different DataNodes

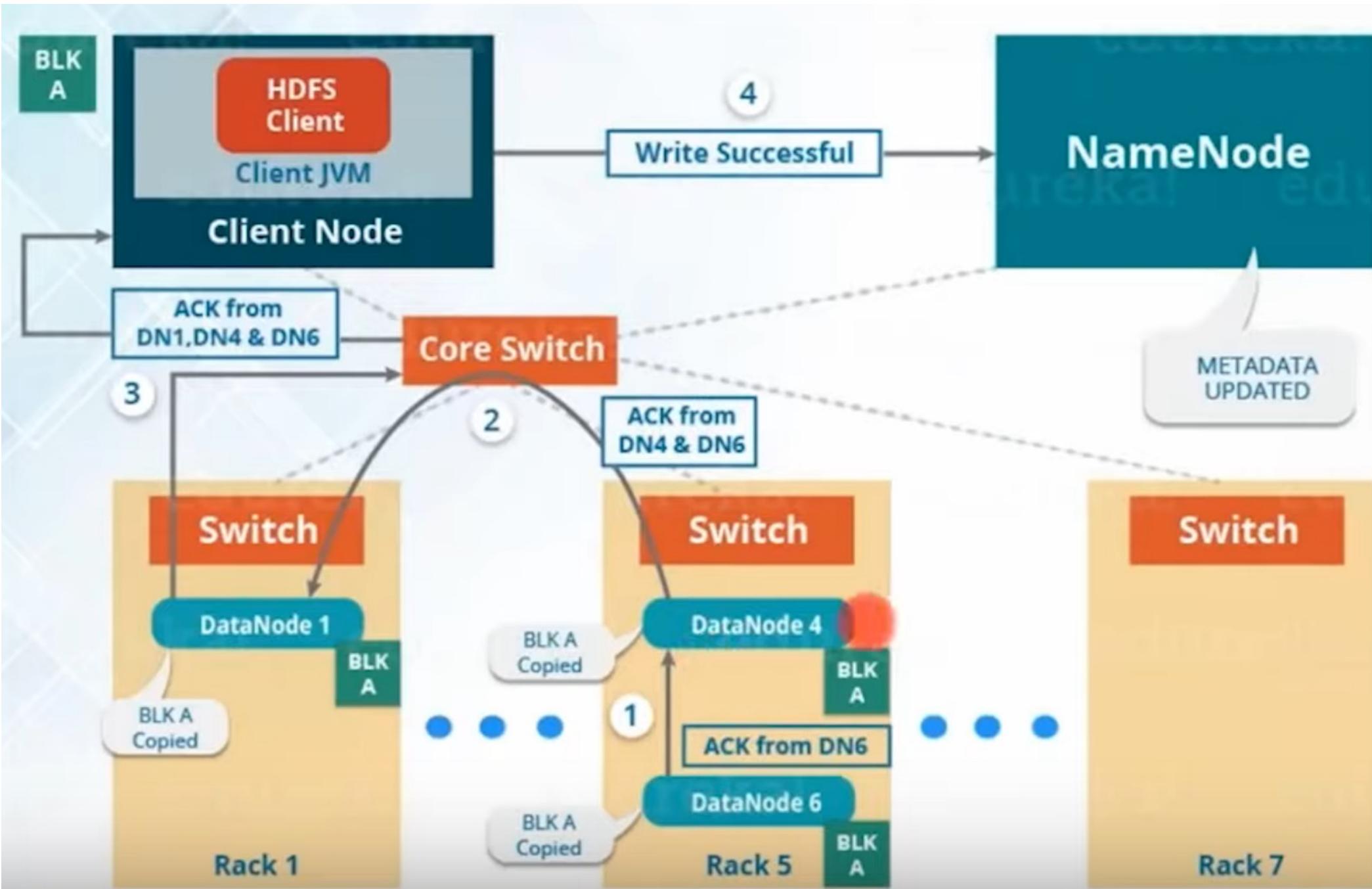


As it is said Never Put All Your Eggs in the Same Basket

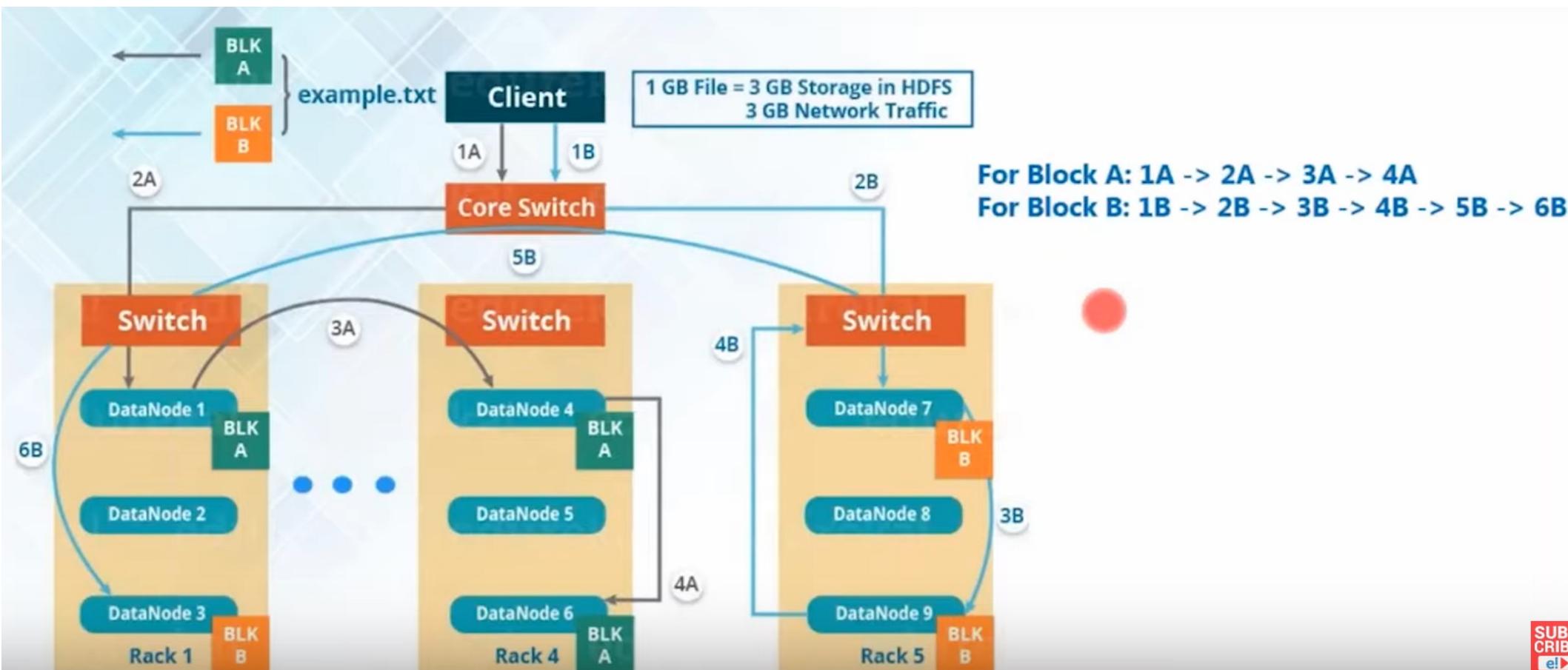
# HDFS | Write Mechanism – Pipeline Setup



# HDFS | Write Acknowledgment



# HDFS | Multi-Block Write Mechanism



# HDFS | Read Mechanism

