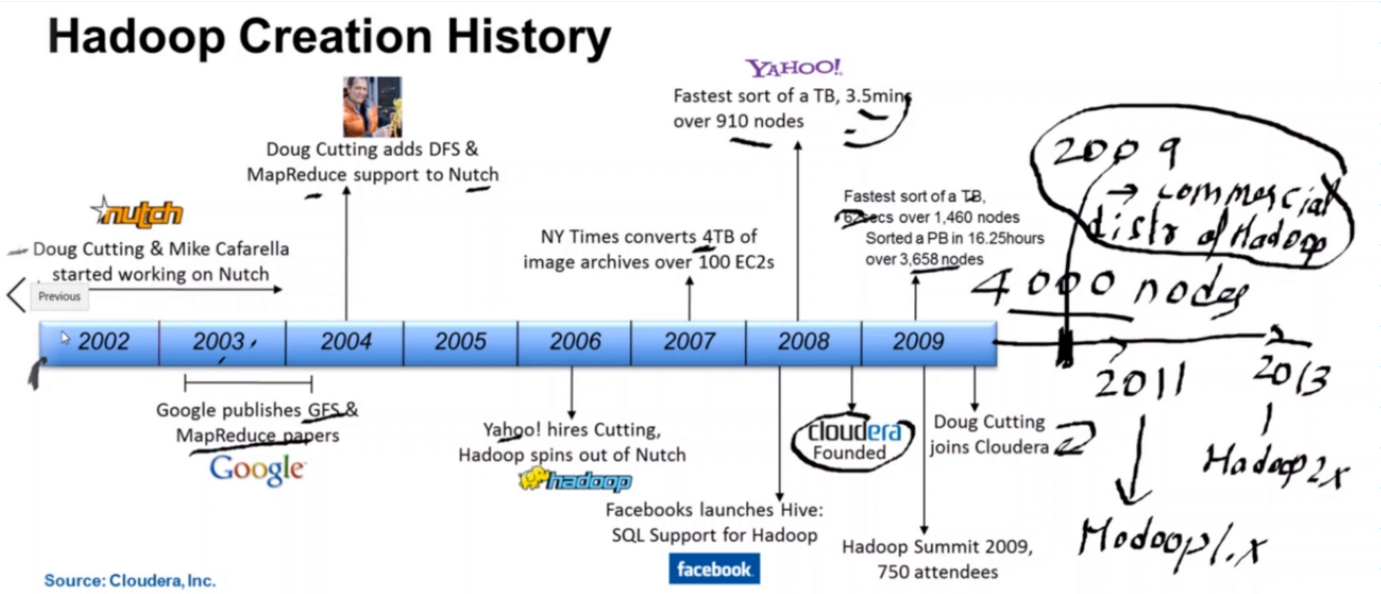
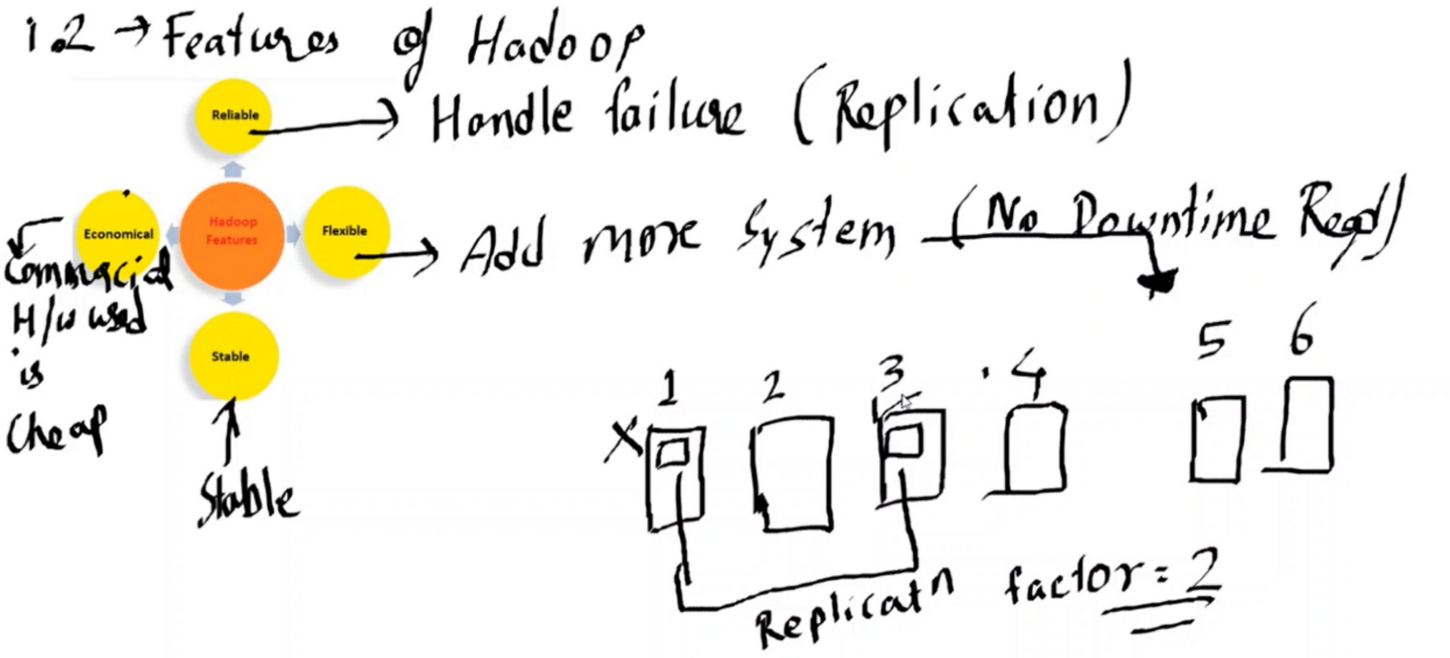
Hadoop

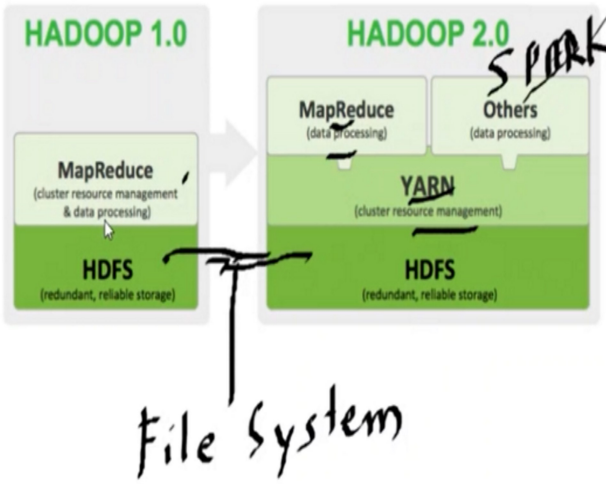
Sunday, October 17, 2021 3:56 PM





1.3 Major Components of Hadoop

Map Reduce



SPARK

① Map → Distributes the Queries
Reduce → Gathers the Result

② Resource Management.

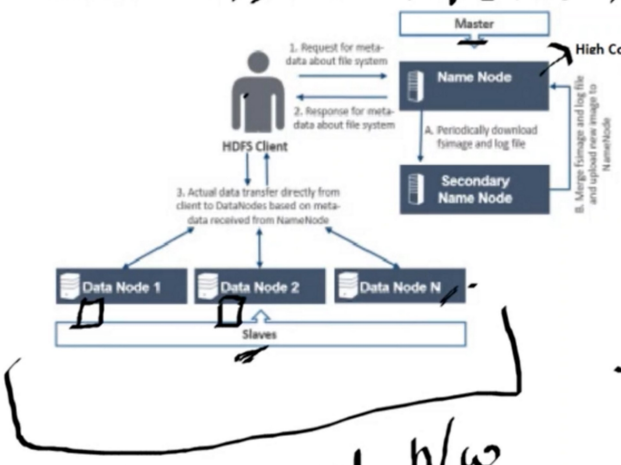
File System

2. HDFS

2.1 → What is HDFS?

→ Hadoop Distributed File System
→ Core Component
→ like Regular file system (Txt, ex4l, Image, etc)
→ TB & PB

2.2 – HDFS Architecture



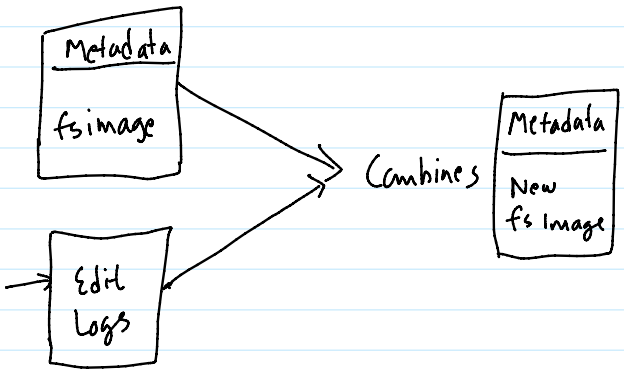
Commercial h/w

1. Master – Slave arch
2. Name Node
   → Manage file system
   → 300MB

Blocks: 128MB + 128MB + 44MB

→ Daemon Runs on Name Node & Data Node Machine

* Secondary NameNode



Hadoop 1.X

→ No standby NameNode

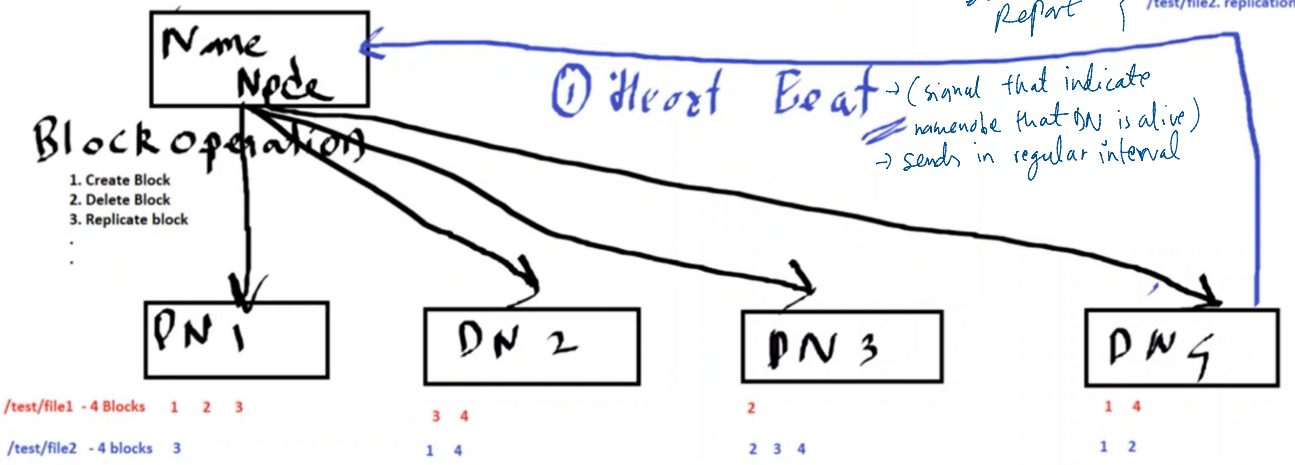
→ Can be called single point of failure (if namenode fails)

Hadoop 2.X

→ There is secondary namenode

→ Not single point of failure. (recover by standby namenode)

2.2 – HDFS Architecture.. ② Block Report

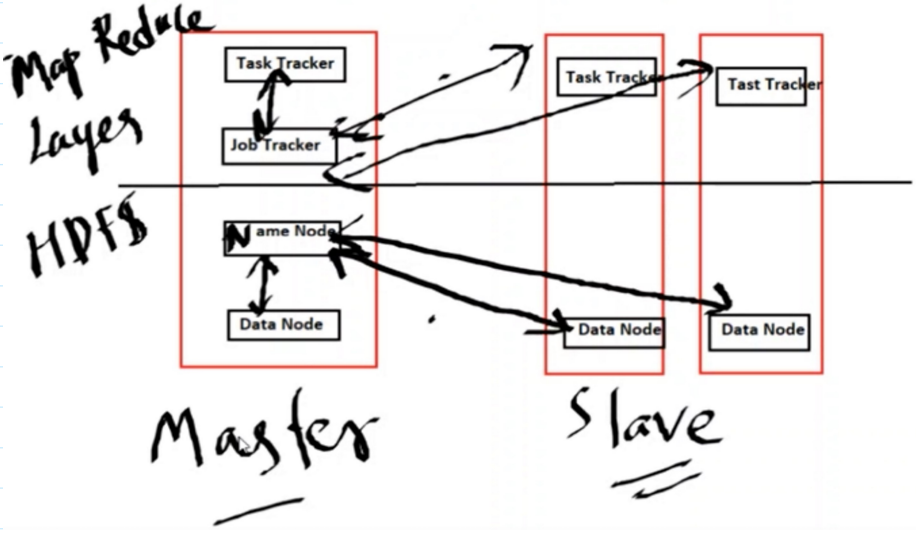


metadata for DN3 – /test/file1, replication2, {2}
/test/file2, replication3, {2,3,4}

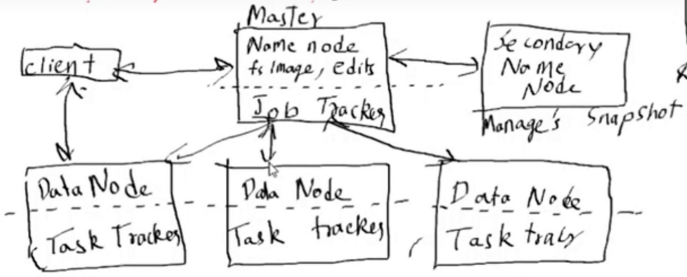
① Create Block → eg. if file cross 128MB

2.2 – HDFS Architecture..

Typical Hadoop Cluster



2.2- HDFS Architecture

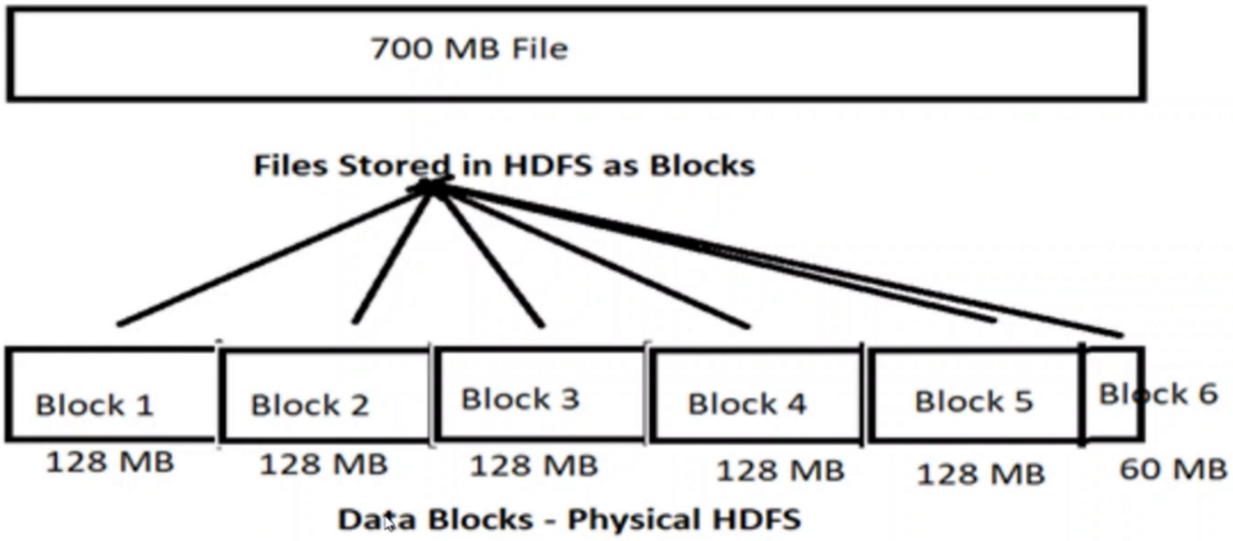


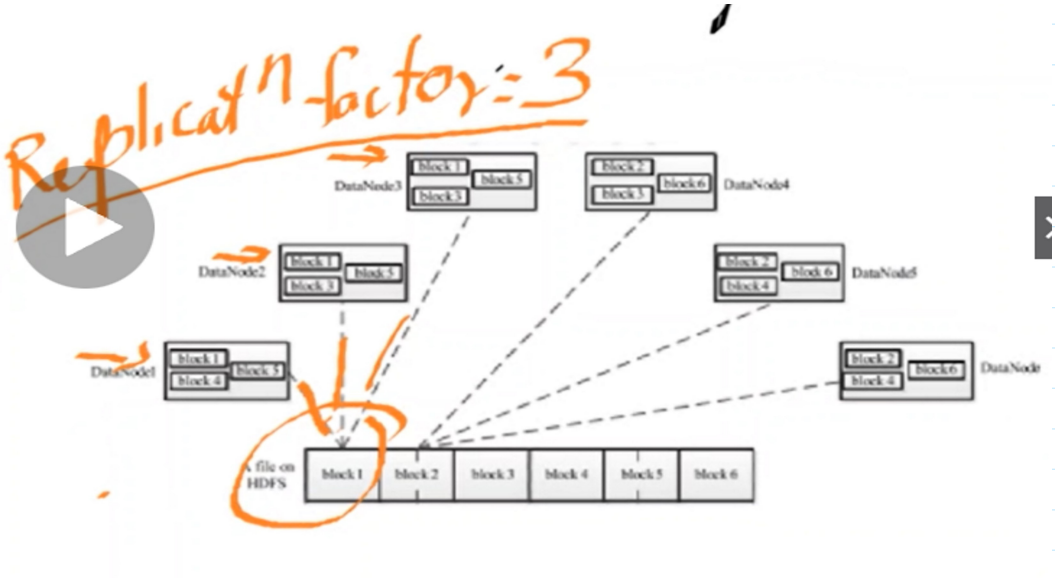
Jobtracker ← 1 instance of JT in Master

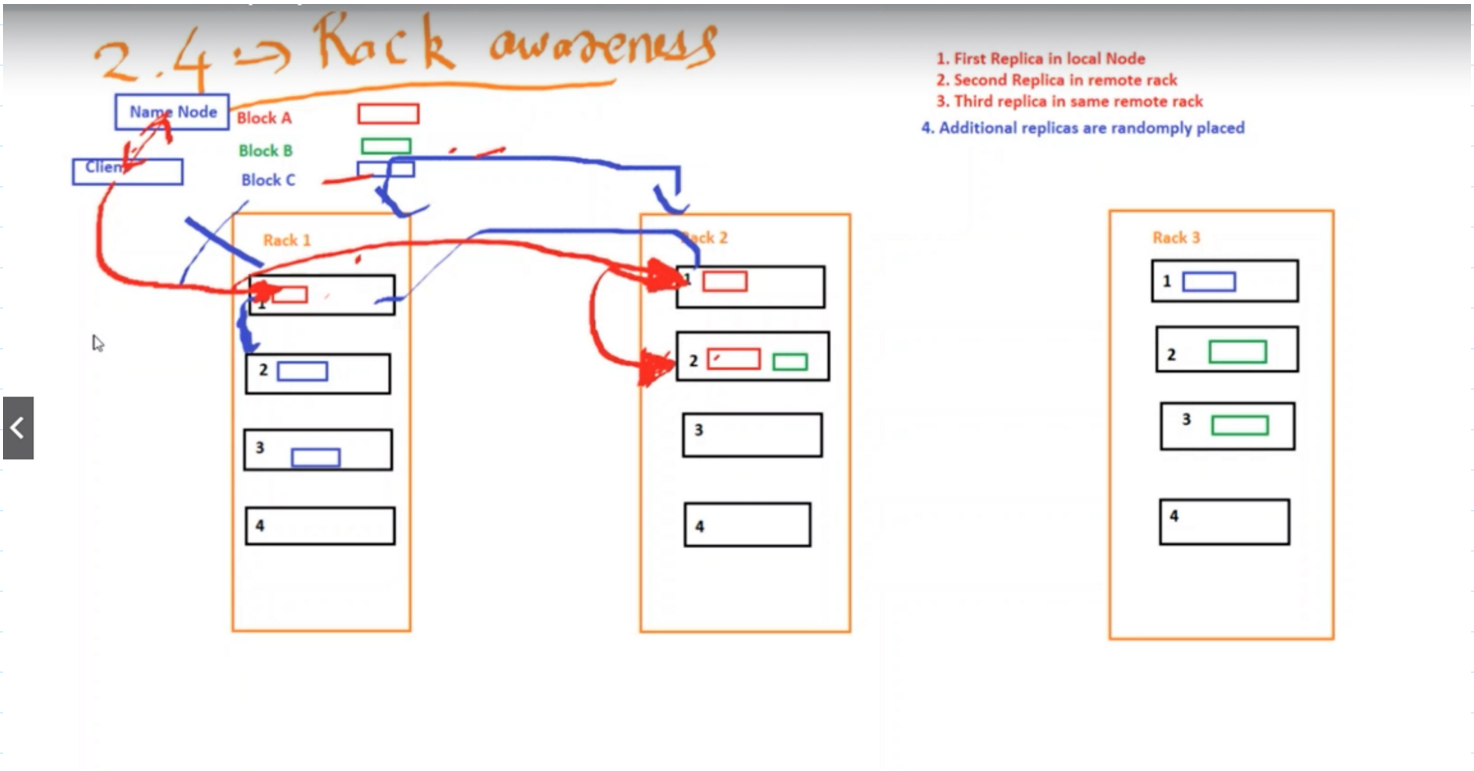
* MR job is submitted to JT
* Initiate task in nodes where file is located

Task tracker ← multiple instance of TT in Slave

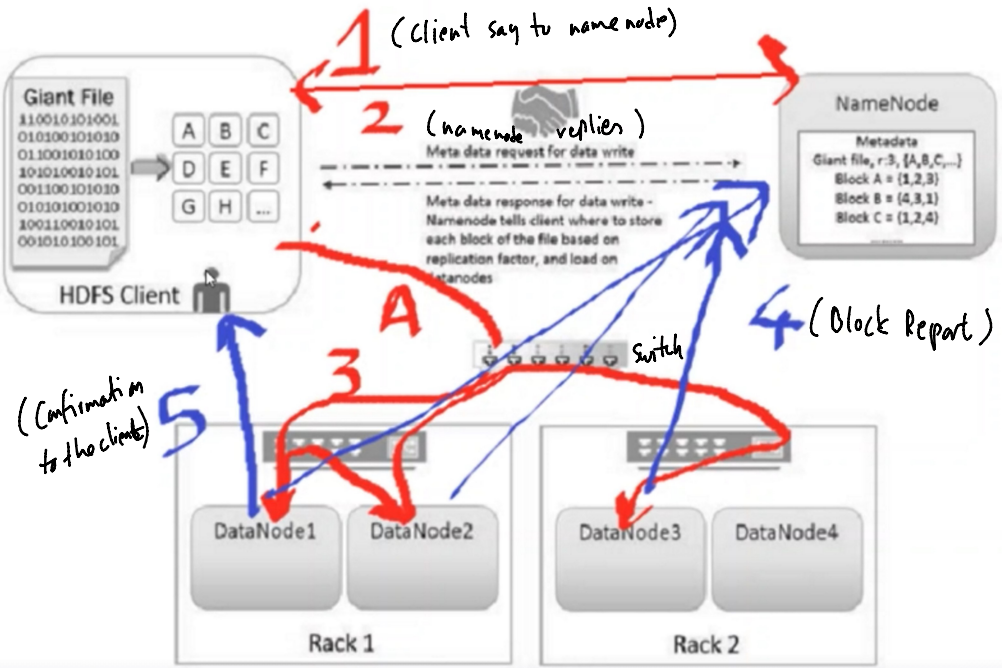
* Recieves information from job tracker.
* Heart beats to job tracker



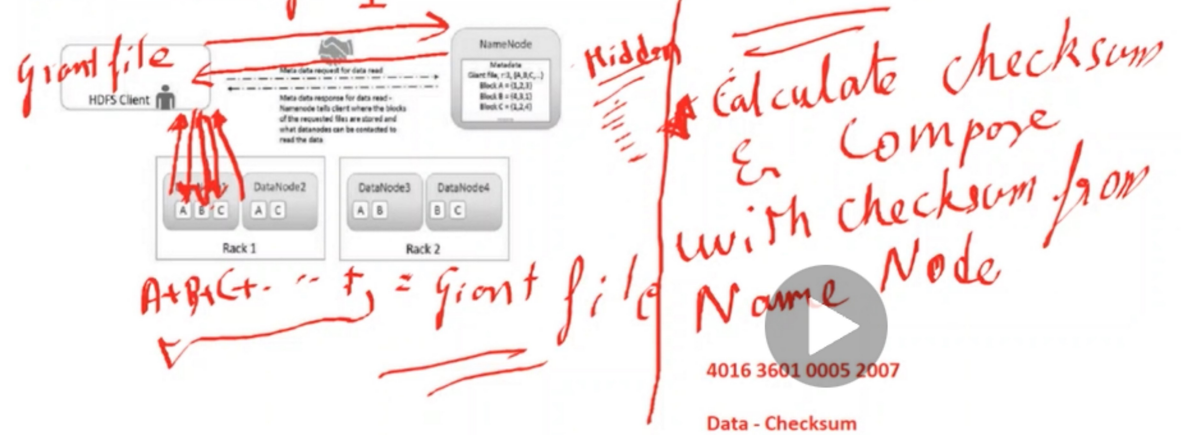

Replicatn factor:=3
DataNode3
DataNode4
DataNode2
DataNode5
DataNode1
DataNode
block 1
block 2
block 3
block 4
block 5
block 6
file on HDFS


2.4 ⇒ Rack awareness
1. First Replica in local Node
2. Second Replica in remote rack
3. Third replica in same remote rack
4. Additional replicas are randomply placed
Name Node
Client
Block A
Block B
Block C
Rack 1
Rack 2
Rack 3
1
2
3
4

2.5 Write file



2.6 → Read file



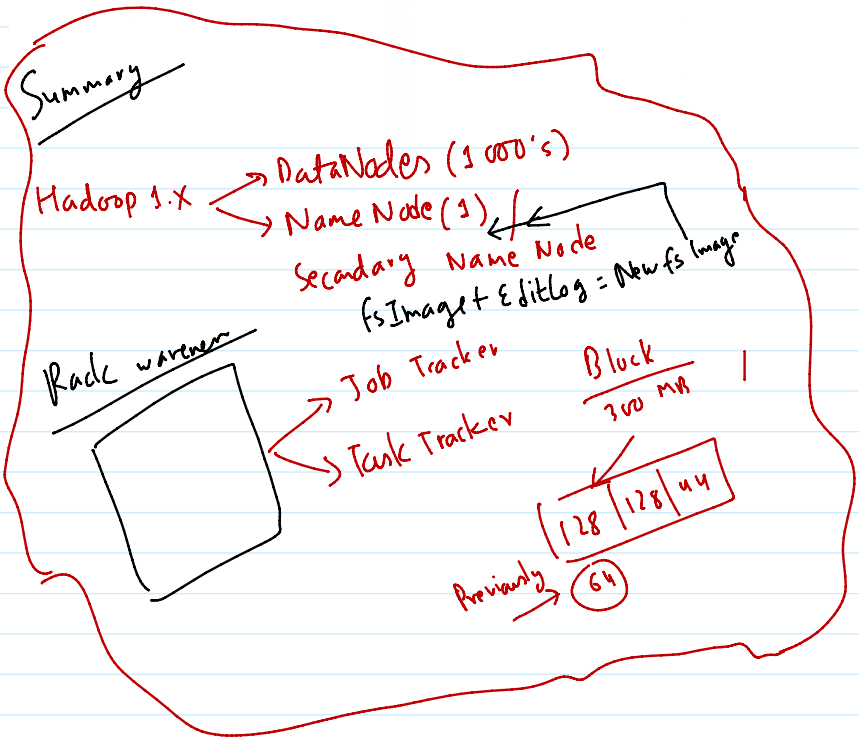
3 - Limitation of Hadoop 1.x

→ SPOF → Name Node ——→ Stand By

→ 1 Job tracker ⇒ Bottle Neck → X Node Mang
1000's Task trackers App Manager

→ ~4000 Nodes (upto) ——→ 10,000's

Hadoop 2.x



YARN

Yet Another Resource Negotiater

→ Managing Resource Cluster

→ Introduced from Hadoop 2.0

→ Previously done by MapReduce ytb.

Why YARN?

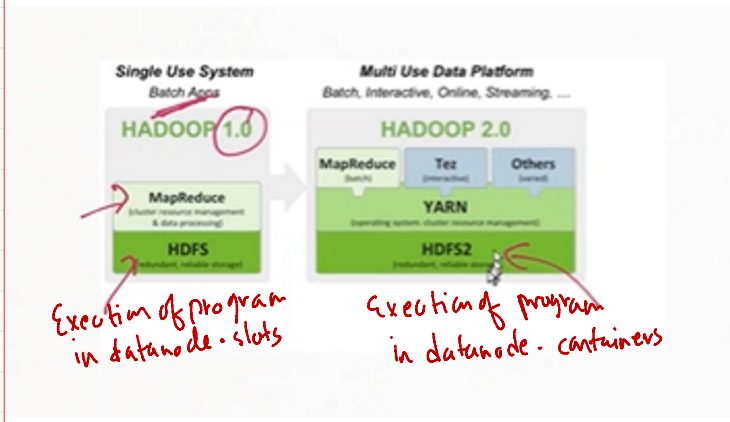
Hadoop 1.x → Resource Management by MR

Hadoop 1.X → Resource Management by MR
→ Processing by MR
Pig, Hive
→ only supports MR

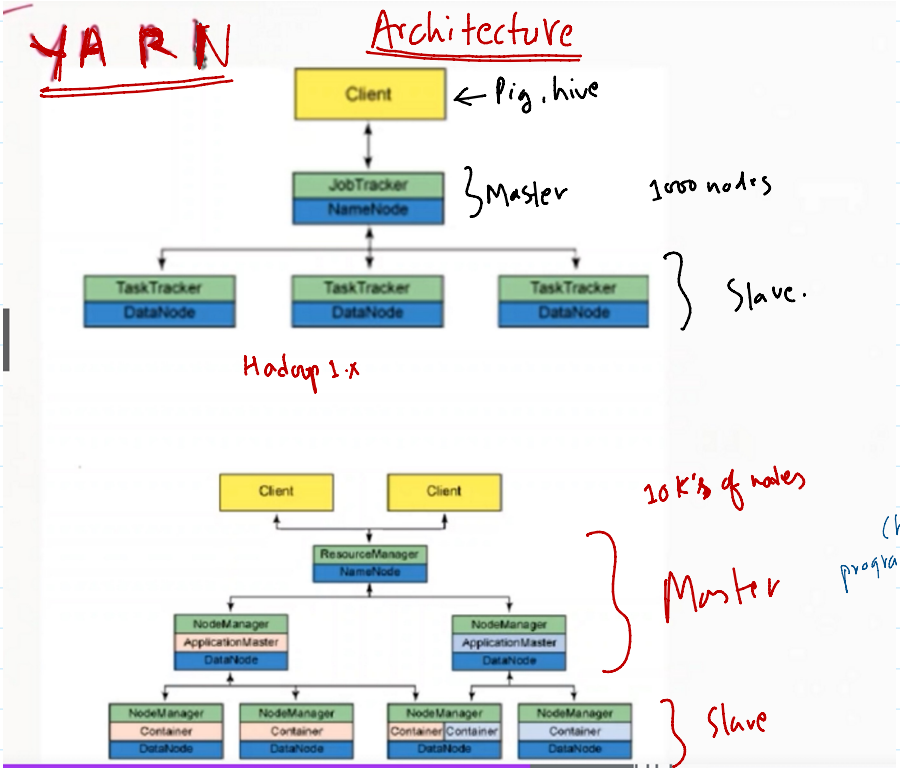
MR
HDFS

Hadoop 2.X → Resource Management → YARN
→ Processing → MR, SPARK, TEZ

MR, SPARK, TEZ
YARN
HDFS



YARN Architecture



← Pig, hive

} Master — 1000 nodes

} Slave.

Hadoop 1.x

10 K's of nodes

} Master

} Slave

Hadoop 2.x

Job Tracker → Resource Manager, Application Master

TaskTracker → Node Manager

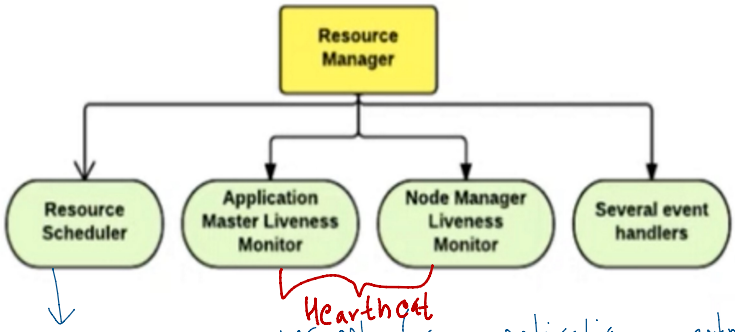
Slots (basic unit where program is executed) → Container

1.X

2.X

* There can be multiple slots/ Containers inside a single node.

Resource Manager



→ To do things like data replication

Heartbeat

Scheduling as per request from application master.

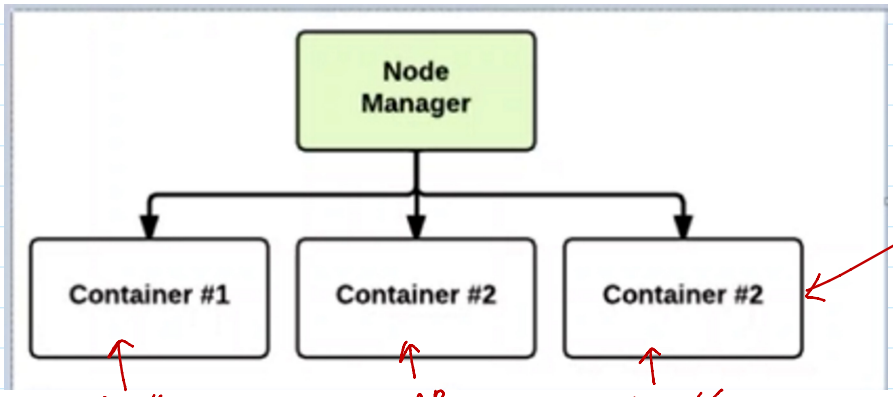
Application Master

→ Works @ application level

→ Manages lifecycle of Application & Manages Resources from RM

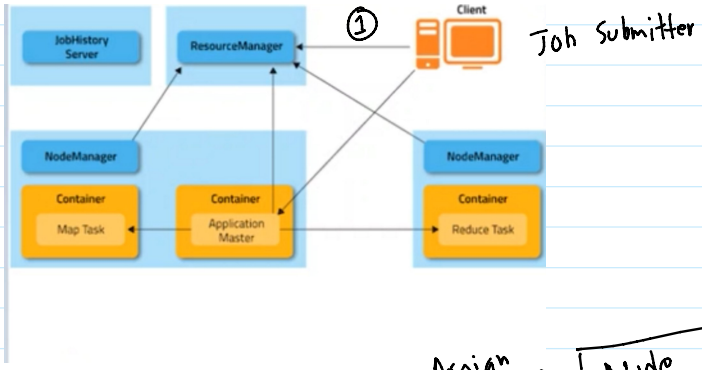
→ Load on RM is reduced.

Node Manager:

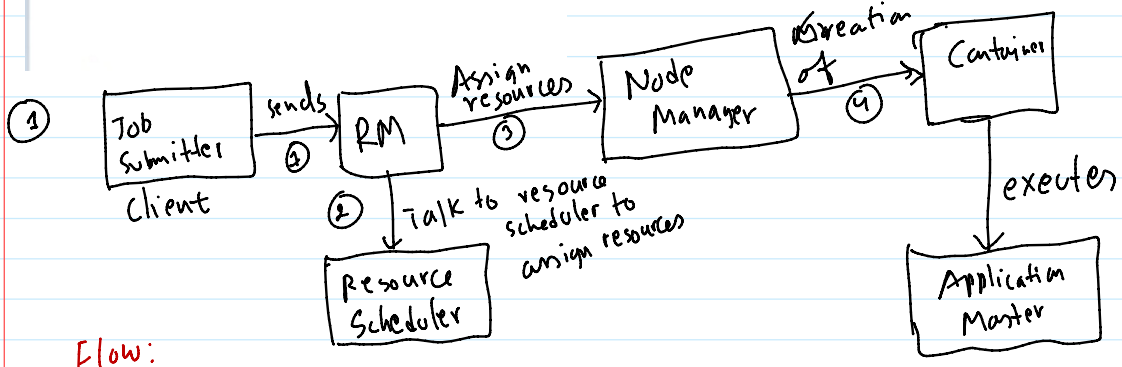


Slot (in Hadoop 1.x)

1) Present in slaves.
2) Many containers per cluster
3) Manage lifecycle of container
4) Send heart beat to Resource Manager



Job Submitter



Flow:

(1) Client submits application to Resource Manager

(2) ResourceManager (RM) allocates container.

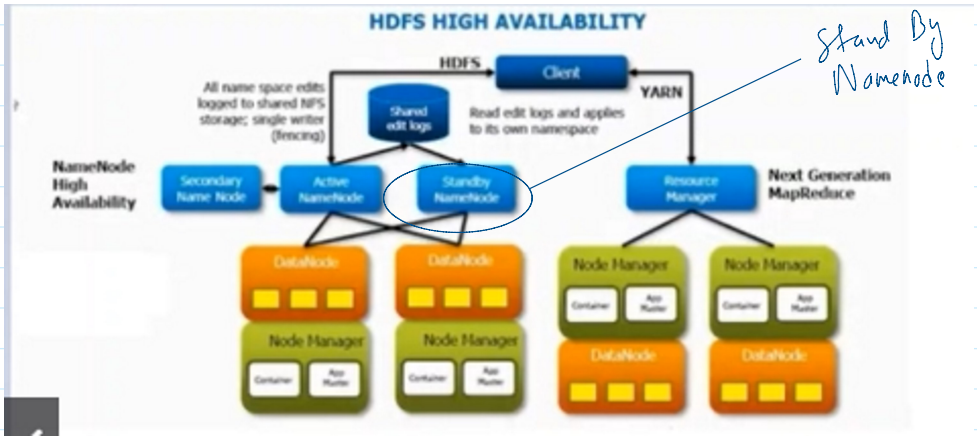
(3) ResourceManager (RM) contant NodeManager (NM)

⑤ NodeManager (NM) launches container

⑥ Container executes Application Master

HADOOP 1.X	HADOOP 2.X
1) MR does procesing and management	2) YARN → Resource Management MR, TEZ, SPARK → Procesing
2) Job tracker, Task Tracker	2) Resource Manager & Application Master, Node Manager
3) MapReduce Supported (PIG, HIVE)	3) MR, TEZ, SPARK, GIRAPH
4) 4000 (upto)	4) 10,000 (upto)
5) Namenode (Single Point of failure)	5) stand by Name Node.
6) No windows support (X)	6) windows support also present

COMPONENTS in 1.X	COMPONENTS in 2.X
Name Node	NameNode + StandbyName Node
Data Node	DataNode
Secondary Name Node	Secondary Name Node
Job Tracker	ResourceManager, Application Master
Task Tracker	NodeManager



Hadoop Commands

1. hdfs dfs -mkdir /test1019
2. hdfs dfs -ls /
3. hdfs dfs -chgrp cloudera /test1019
4. hdfs dfs -chmod 777 /test1019
5. hdfs dfs -copyFromLocal /home/cloudera/Desktop/file1 /test1019/fil1
6. hdfs dfs -copyToLocal /test1019/file1 /home/cloudera/Desktop/file2
7. ls -l /home/cloudera/Desktop
8. hdfs dfs -count /
9. hdfs dfs -cp /test1019/file1 /test1019/file2
10. hdfs dfs -ls /test1019/
11. hdfs dfs -du /
12. hdfs dfs -du -s /
13. hdfs dfs -du -h /
14. hdfs dfs -mv /test1019/file1 /file2

16. hdfs dfs -rm /file2

17. hdfs dfs -tail /test1019/file2

18. hdfs dfs

19. hdfs dfs -help

* hdfs dfs or hdfs fs