Name Node failure

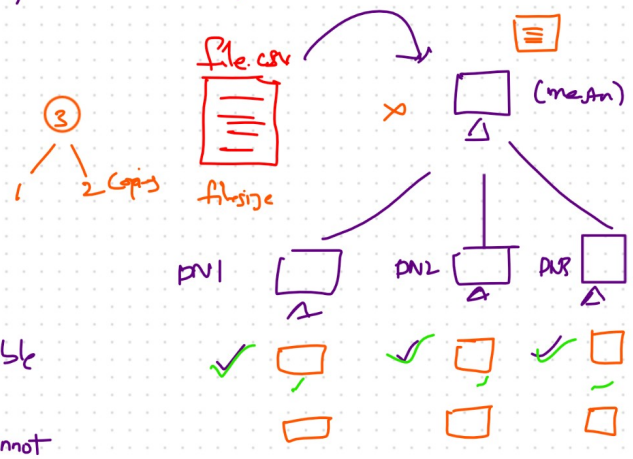
Overview :

→ NoA critical component in HDFS

→ manages metadata & namespace of the file system

→ Tracks data node locations, file structure, directory hierarchy & block information

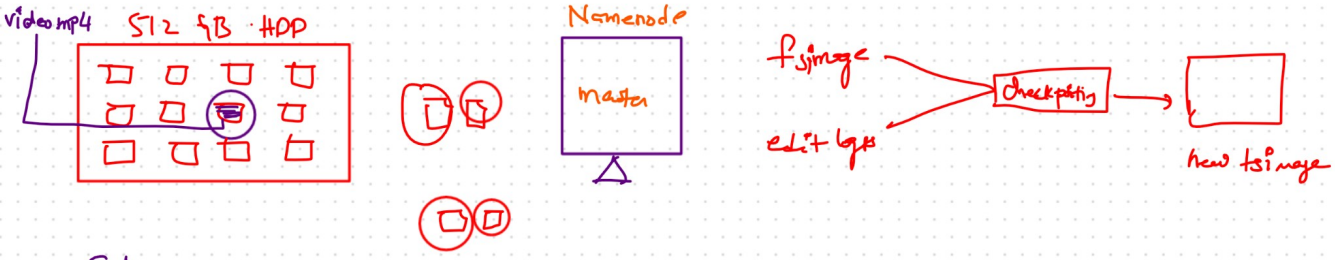
→ Single point of failure (SPOF) in Hadoop architecture



If Name node fails

* metadata becomes inaccessible
* all read/write operations halt
* entire Hadoop system becomes unusable
* The actual data is not lost, but cannot be accessed without metadata

How Namenode Works



1) FsImage:
   * Contains the entire file system namespace & block map
   * Stores metadata about files (size, path, owner, permissions, block size)

2) Edit logs:
   * Transaction logs recording changes to HDFS
   * eg: new block additions, replication, deletion
   * applied to FsImage

(3) Recovery Process:

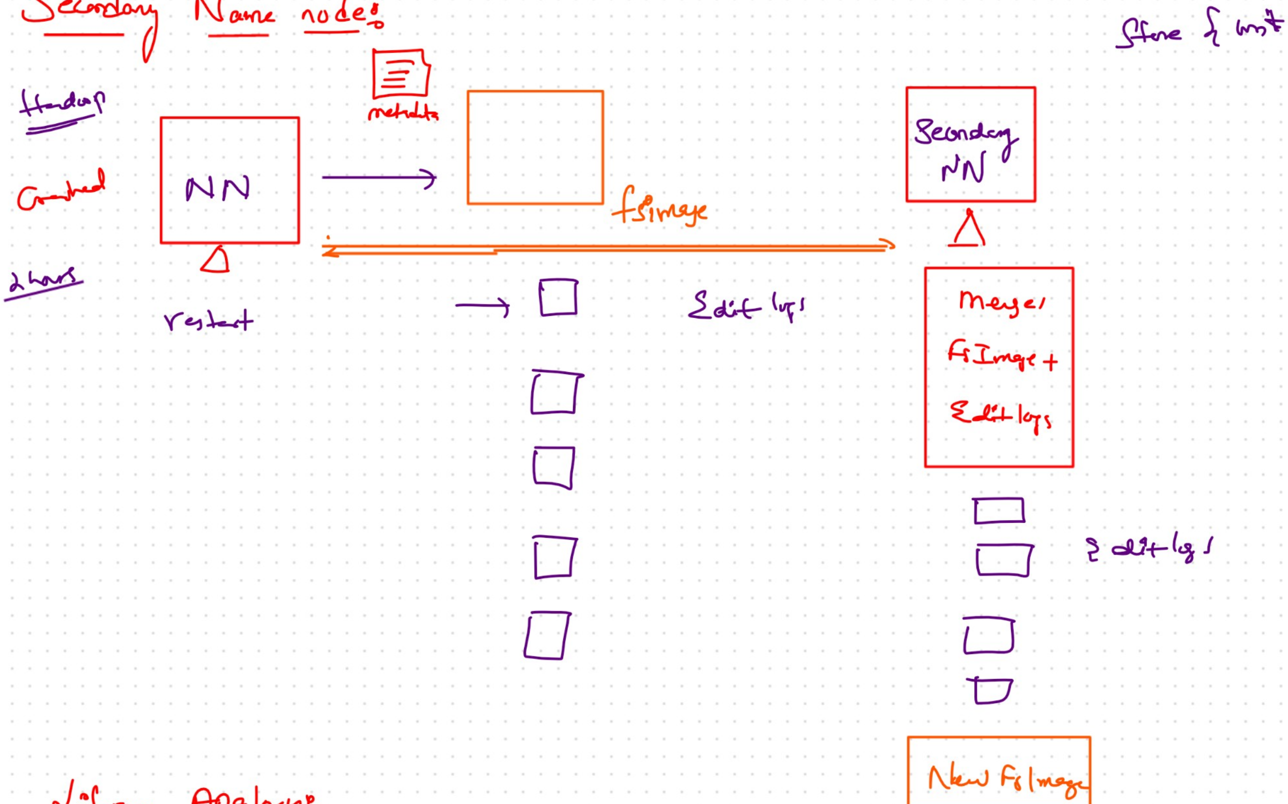
* when Name node restarts, edit logs are applied to FS Image
* reconstructs the current state of file system

Fail over Mechanism ← agenda — High Availability (Interview Question)

→ Hadoop v1.0 = Secondary Namenode

→ Hadoop v2.0 = Standy Namenode ← Zero down (if downtimes are acceptable)

Secondary Name node:



Library Analogy:

- fsImage : Registery —info→ books & sections
- Edit logs : Records → New books, returns, & borrowings
- ✓ NameNode : Head Librarian
- Secondary NameNode : Helper → Consolidates records

Important Notes

1) Secondary NameNode is not a High Availability (HA) Solution
2) When NN fails, the cluster is still down until recovers
3) Secondary Namenode just helps make the recovery fast by maintaining check points

Solution

Standby Namenode : No downtime

Read / write (parallel)