

Objectifs Hadoop:

↳ Calcul, analyse,
Stockage de données
Distribué

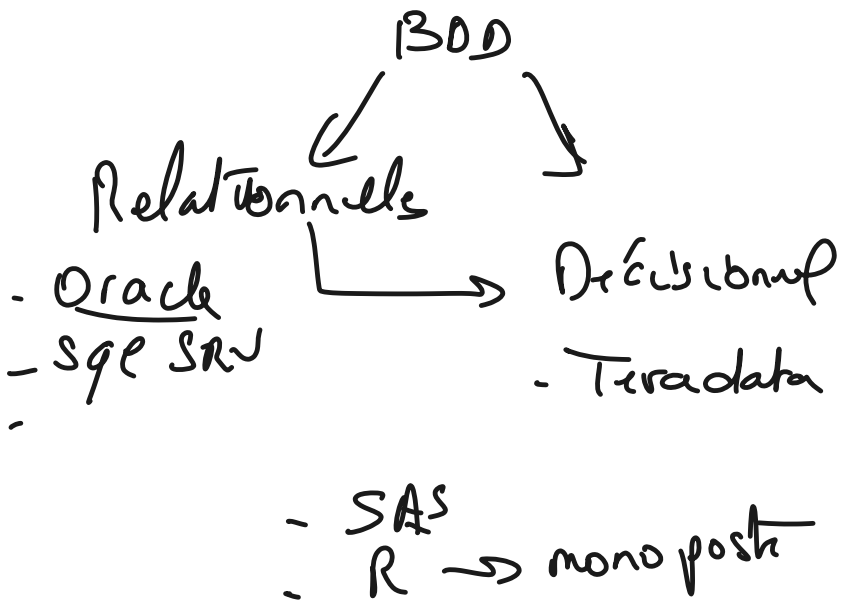
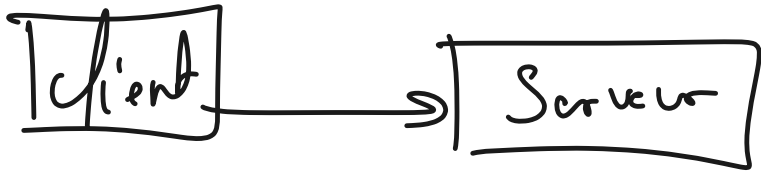
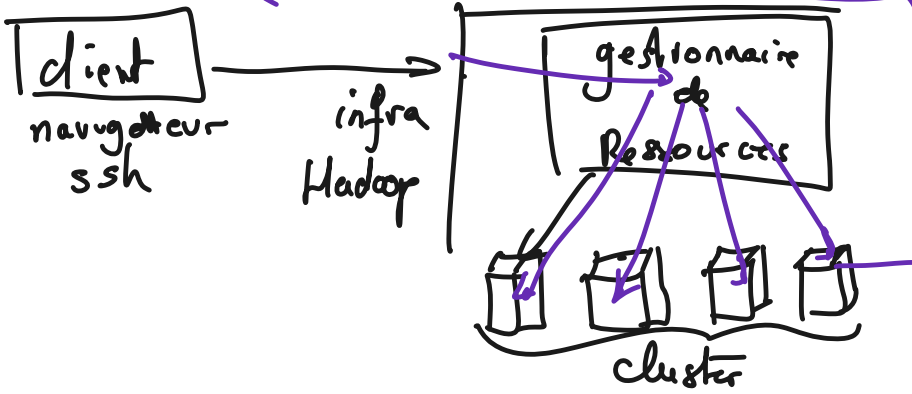
→ Combien → no limit

Stockage → orienté fichier
→ BDD Relationnelle
entre autres

Calcul → fonctions, Aggregation,
analytique, Temps réel
(Log)

"Cluster" → environnement de
machines liés ensemble
pour fournir 1 Service,
avec Haute disponibilité.

Haute Dispo = - Temps de réponse
- Tolérance de panne



Hadoop = "Framework" open
Source géré par Apache

objectif → calcul massivement
// sur du matériel
conventionnel

Équivalent Commercial =
Appliance HPC

Historique: Tous les ans
un concours "Terasort"

Début 2000 google a publié
des documents conceptuels
d'analyse distribuée, le
concept "Map Reduce"

→ Doug Cutting → implémenter une
solution inspirée
de ces docs pour
gagner le Terasort

Big Data

3V

Volume

Velocity

Variabilité

BDD Sql → Cohérent

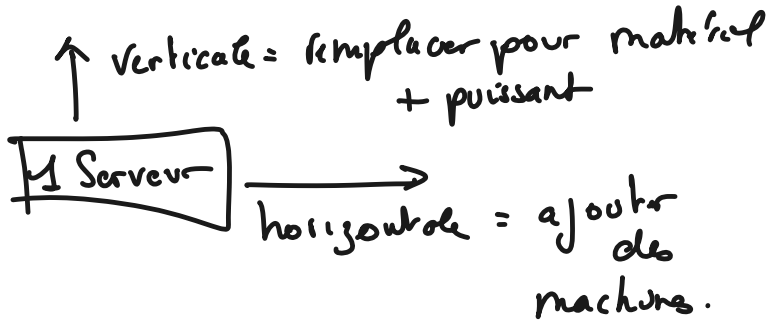
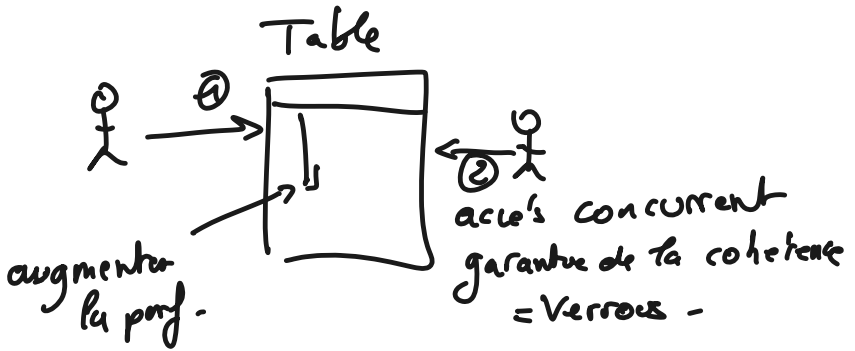
BDD NoSql → performance, HA
↳ pas forcément cohérent

NewSql → Sql + stockage
haute performance

Teradata = stockage column store
haute performance en lecture

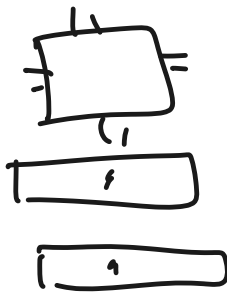
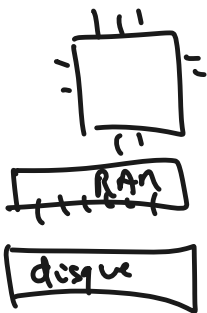
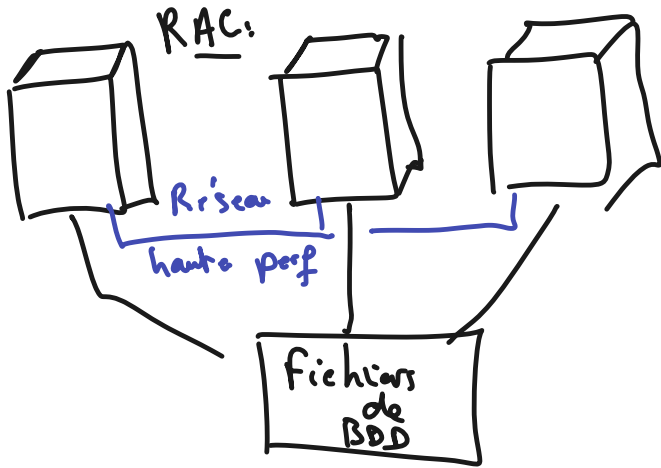
NewSql: ex Oracle, Sql Server, etc...
qui ajoutent du Column Store.

Clusters Relationnels



MS SQL = cluster Sql Serveur
Actif / Passif
⇒ 1 seul actif possible

Oracle Real Application Cluster
⇒ cluster Actif / Actif
→ plusieurs nœuds
actifs en même temps.



Verrous, ligne, 1 ligne exécutable en même temps ?

"Solution" = base NoSql

Mais !!

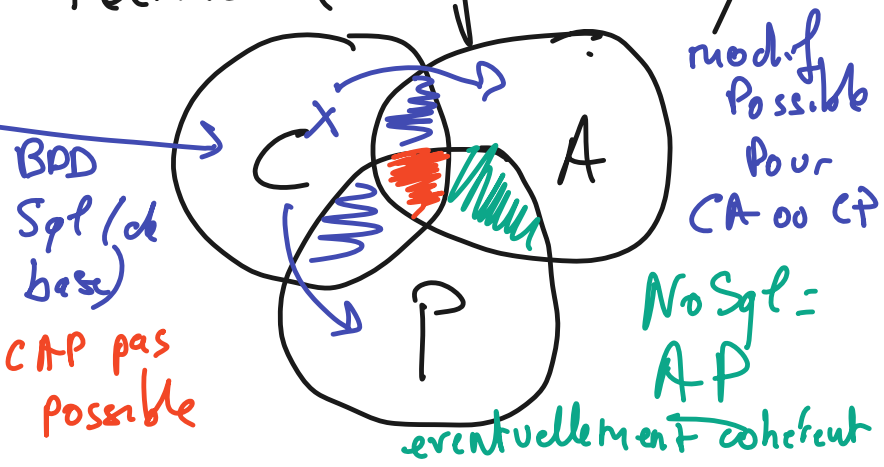
Cohérence! 

Théorème de CAP:

Cohérence

Availability (disponibilité)

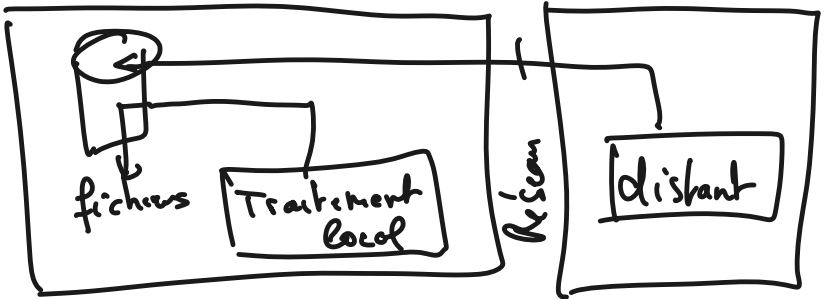
Partition (Performance)



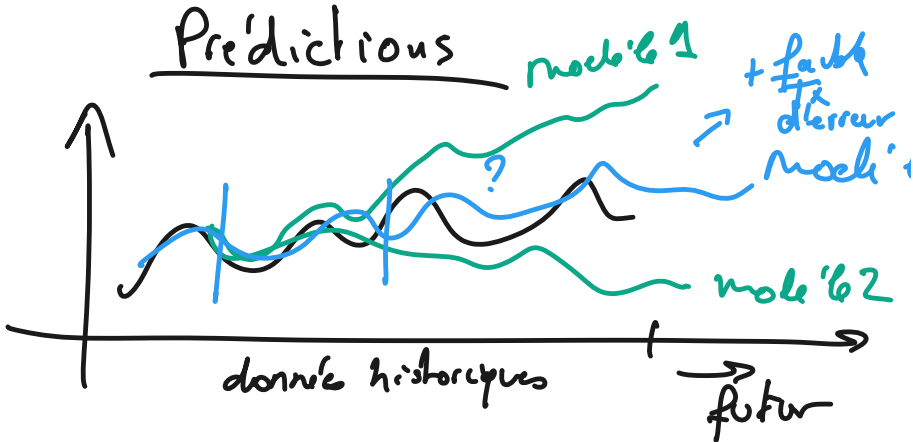
Calculs relationnels

Sql → Execution locale à la donnée

SAS → Autre serveur que la BDD

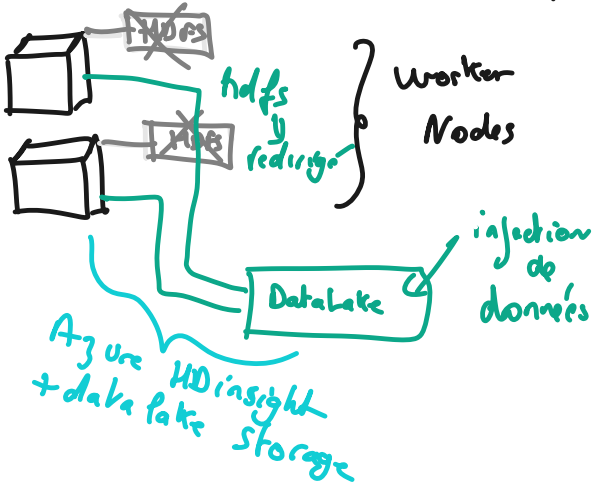


Prédictions

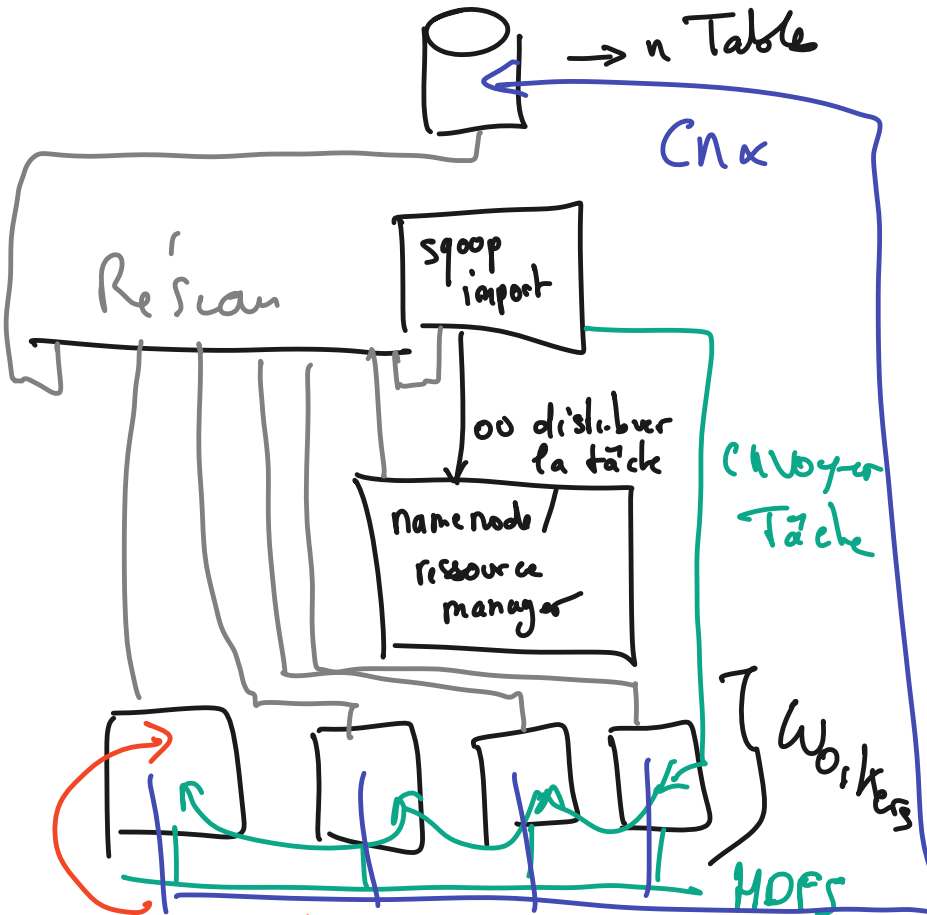


Prescriptif → la machine décide à partir des prédictions

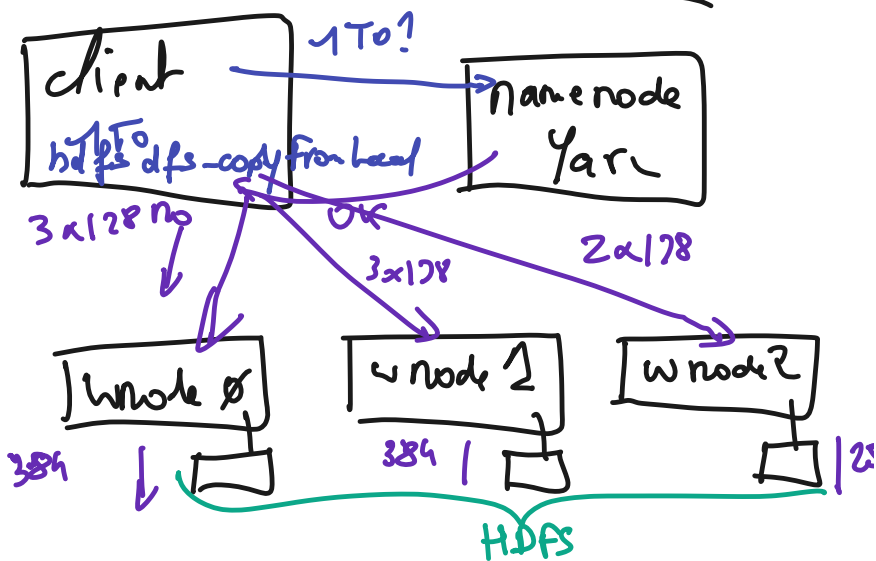
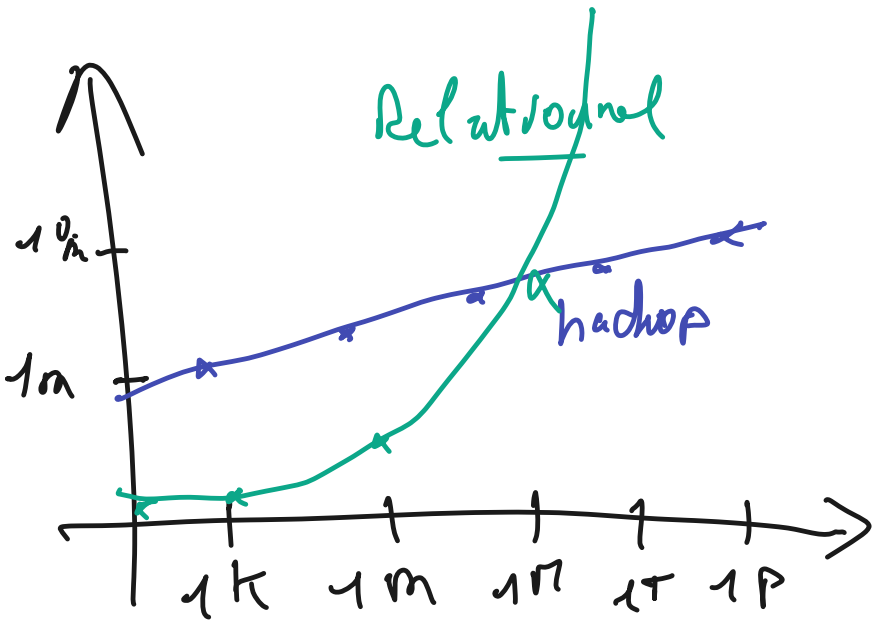
Data Lake :



Cas d'usage : Sqoop / import



Stockage des
Tables en fichiers
sur HDFS



Type de données:

Structurées: champs, Type de données

non structurées: flux Audio, Vidéo

Semi-Structurées: LOGs,
Documents
hétérogènes

Structurée Complexe:

client:

nomme :

Prenom:

age :

adresse :

rue1 :

rue2 :

CP :

ville :

Commandes:

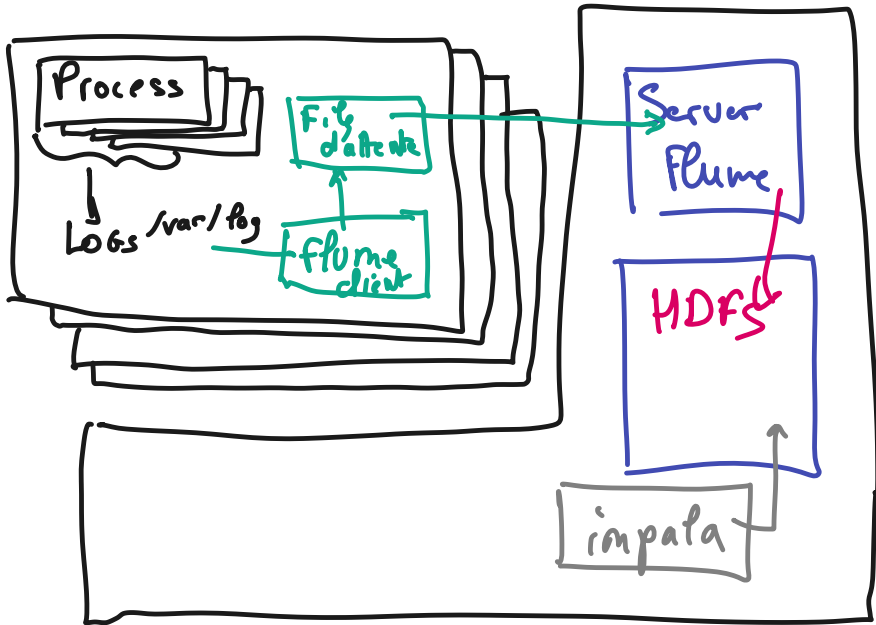
[1, 1/9/2018,

Produits: [

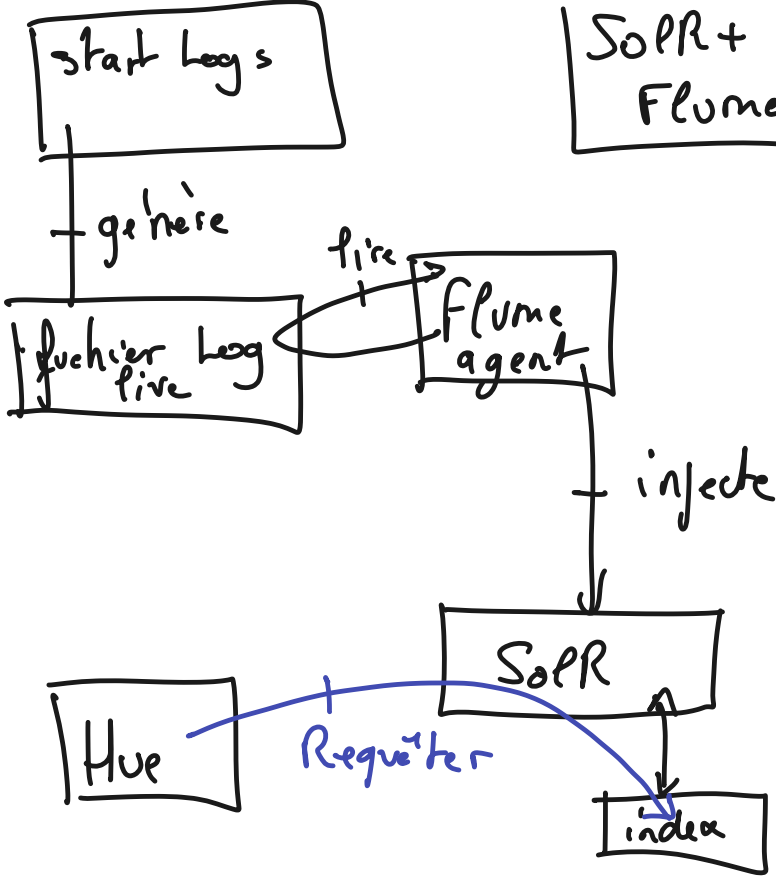
1, chair, 12, 5,

-

diagram (Box internet)



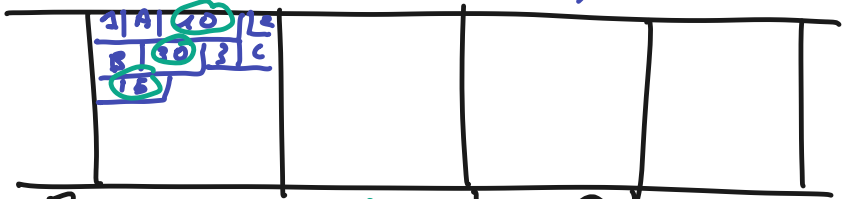
Solr +
Flume:



Format de Stockage

Traditionnel (Oracle, Sqe SRU, ...)

↳ Type Row Store
id, nom, prix (ex.)



select AVG(prix) from

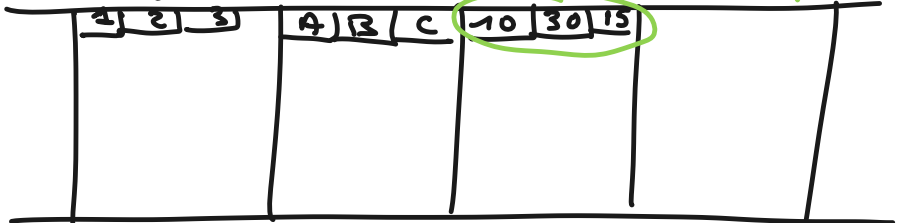
Vue du fichier de données

"Page"
env. 8 Ko

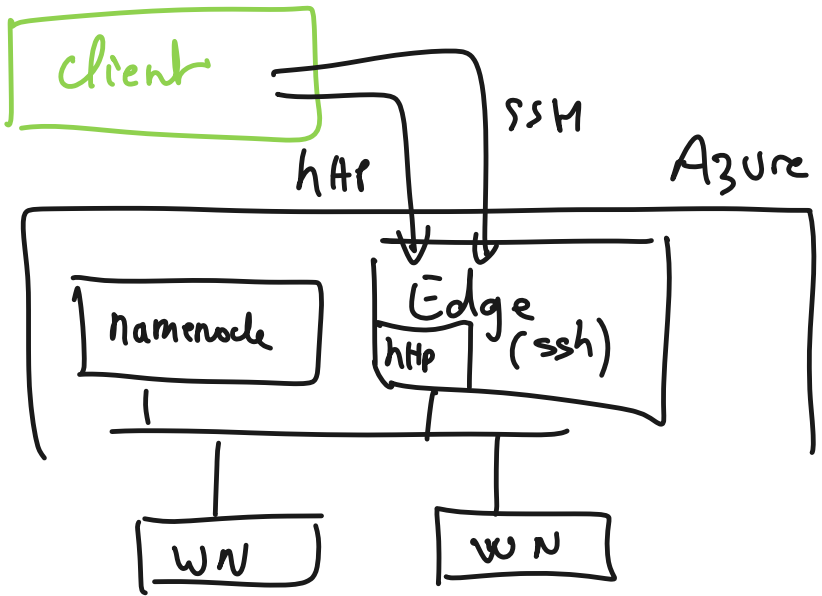
Unité de I/O entre le disque et la RAM

Stockage Column Store

→ Ajout de la Compression RLE

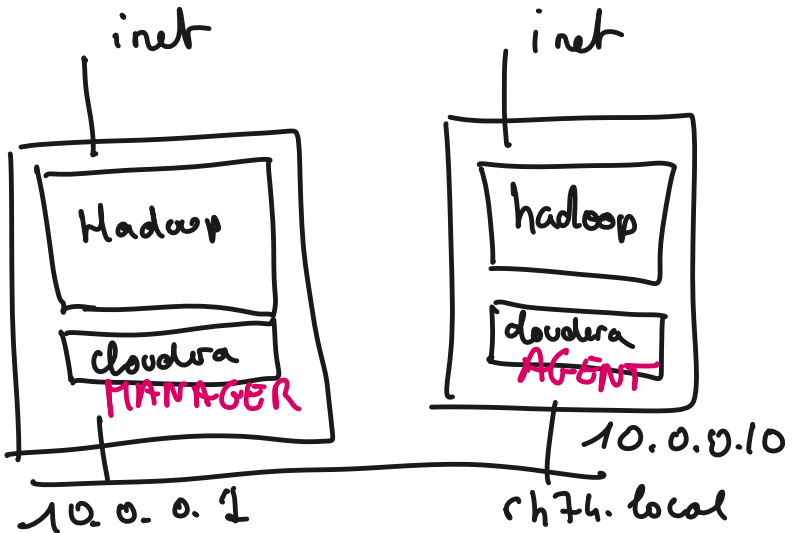


Page



cloudera

Multihost :

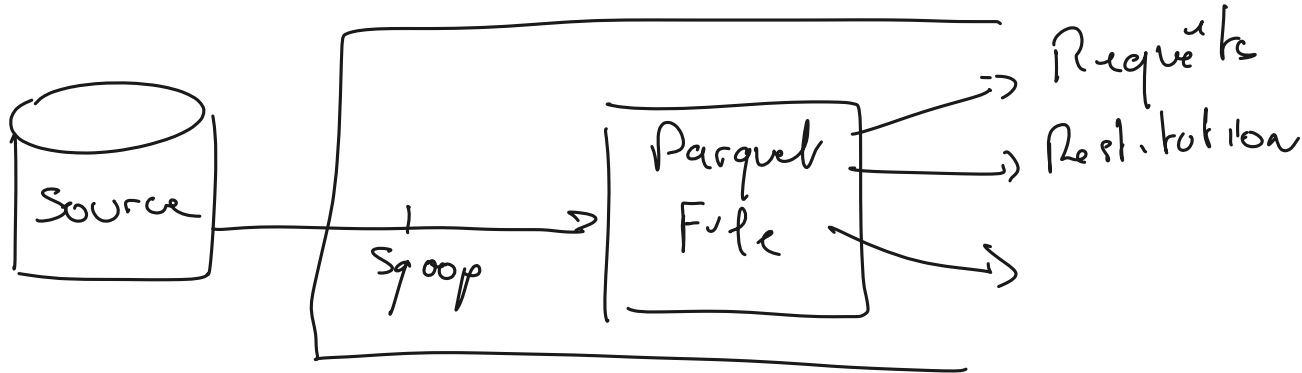


ETL/ELT | Cycle de vie de flux de données -

Extract → Transform → Load

Objectif: générer en batch un transfert /
Transform. de données -

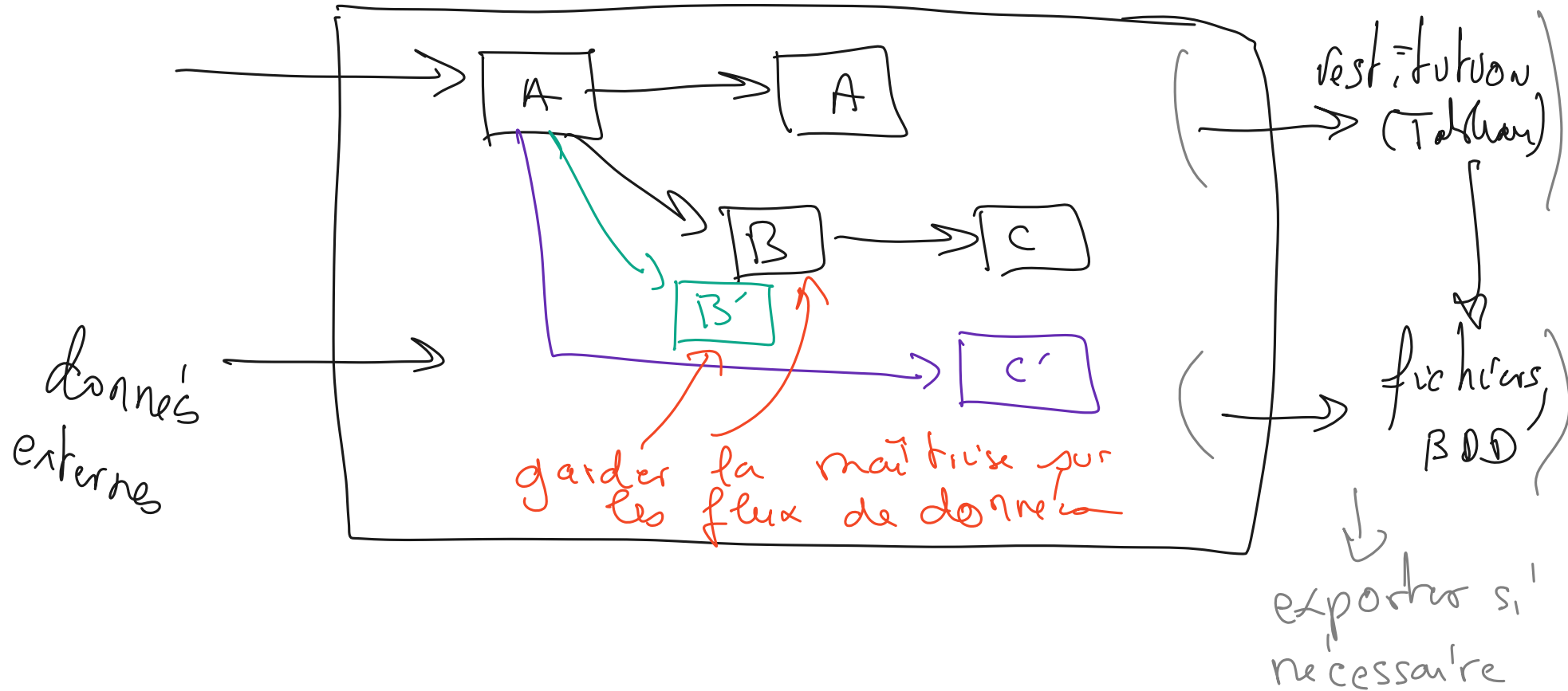
Extract Load Transform HDFS



Scénarios hybrides avec sources hétérogènes

Teradata / hadoop

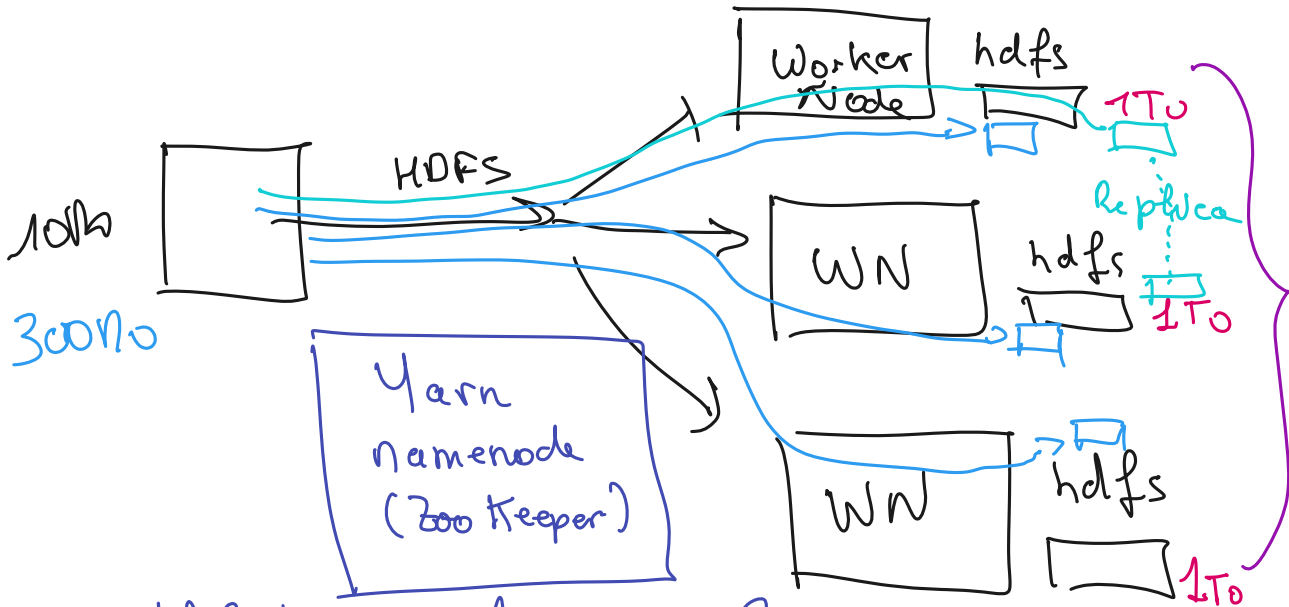
Hadoop / HDFS



Notion de Split

bloc disque = 4ko en général

HDFS → blocs HDFS → 128 Mo



Σ de la taille des HDFS divisé par le facteur de réplication

Rep = 2 :

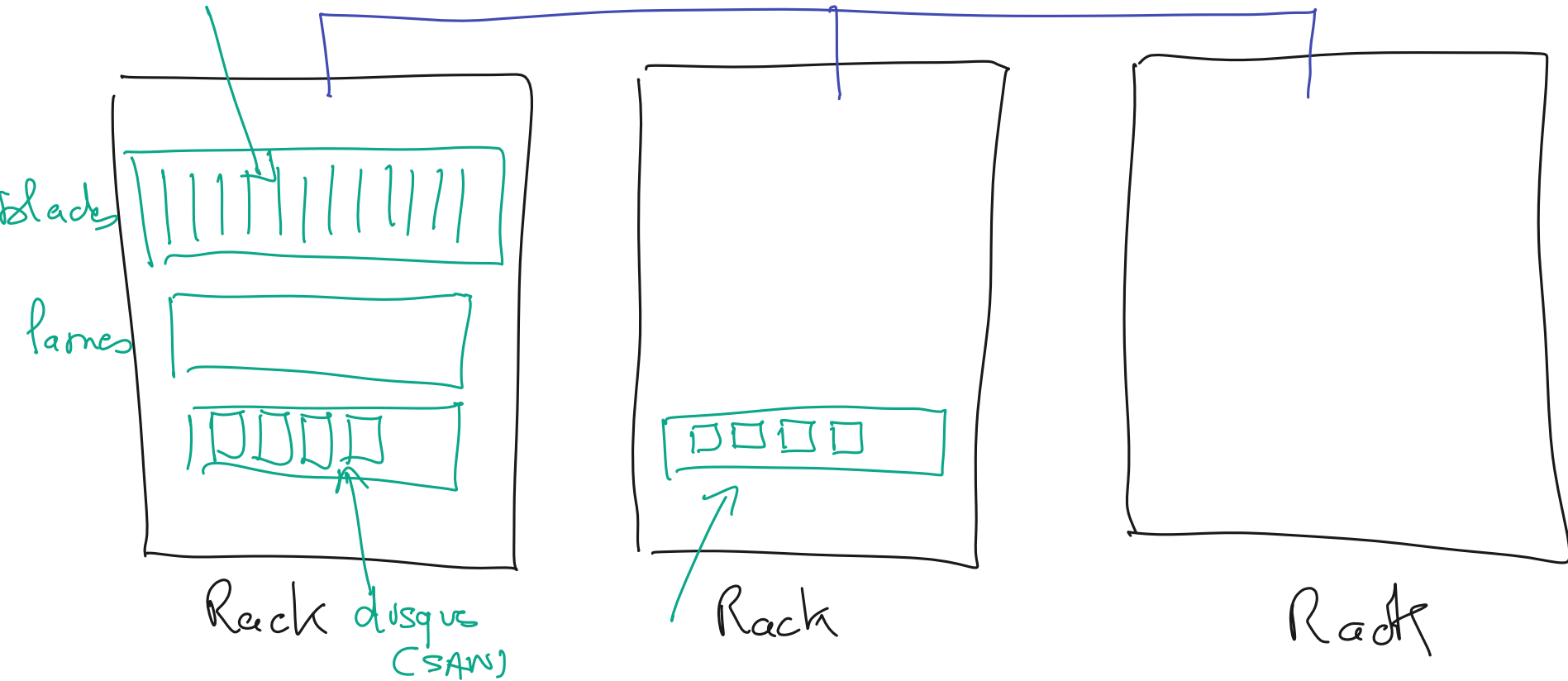
$$\frac{3 \times 1 \text{ To}}{2} = 1,5 \text{ To}$$

YARN → gestion des Ressources

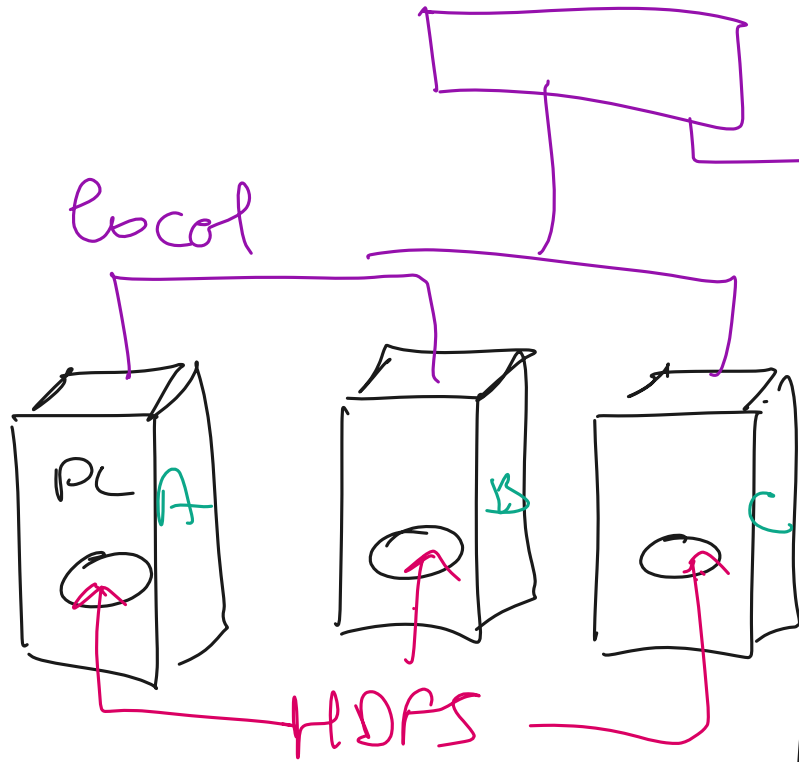
NameNode → détient le dictionnaire de ou se trouvent les données HDFS.

noeuds/nœuds

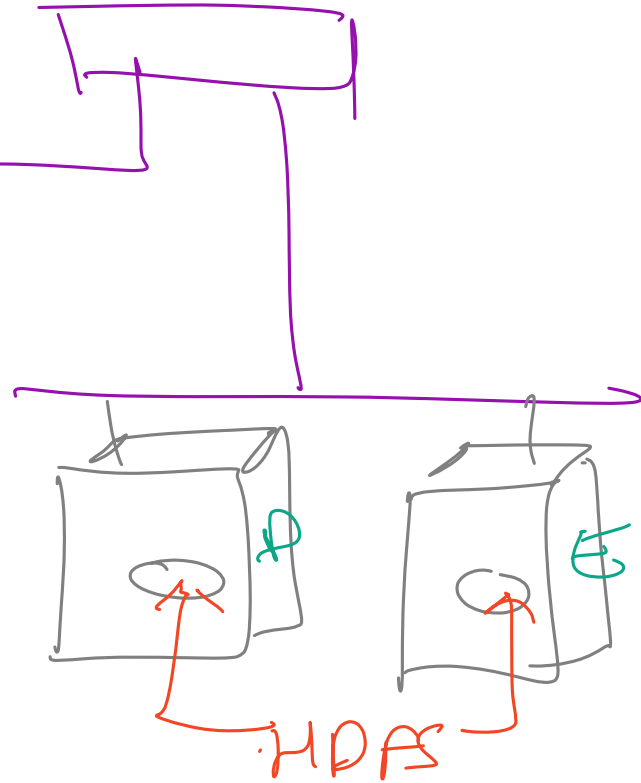
Reseau Très haute perf (10Gb/s)

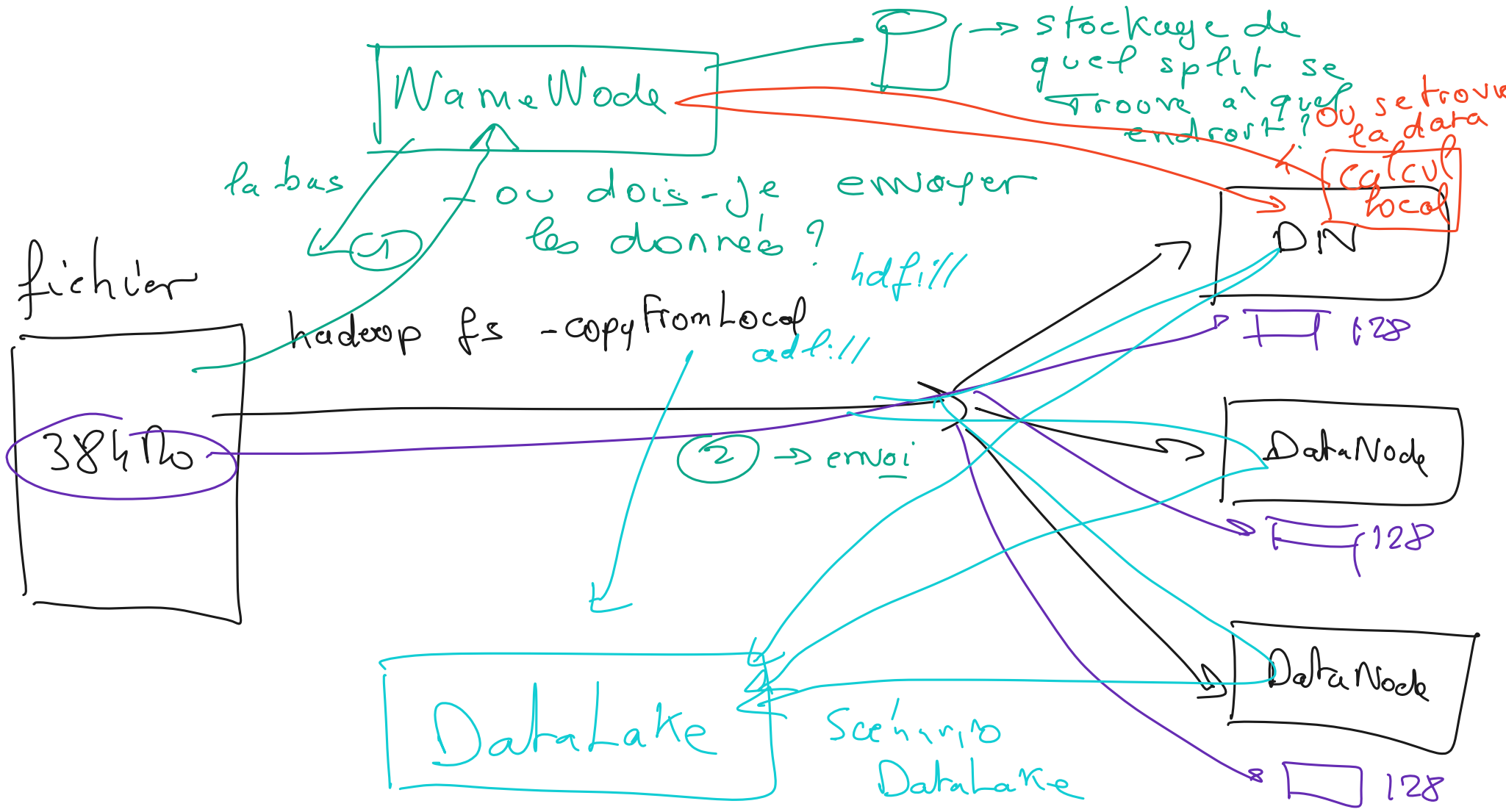


Salle machine 1



Salle 2





Tableau

Clubs
Connecteurs sont
disponibles ?

Tout le fichier

accès héfés?

Select simple
where

Tout le fichier

Direct table
active

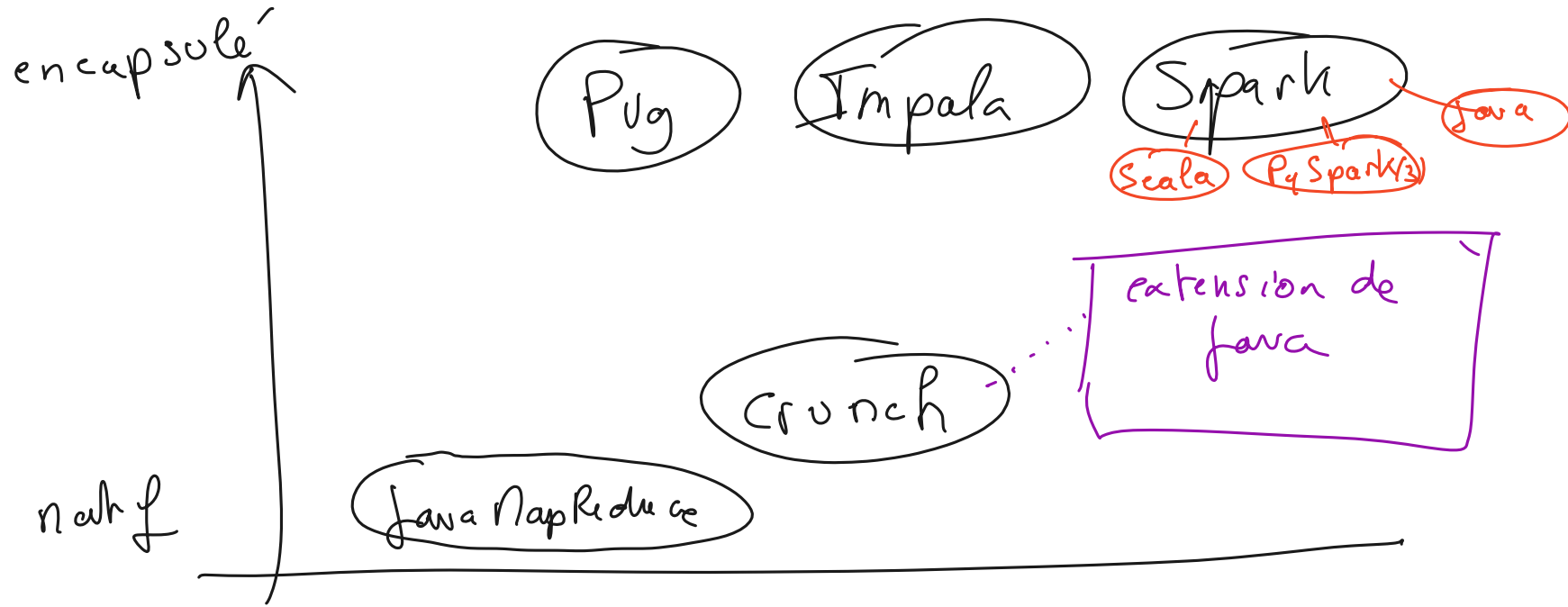
Impala

fichier
HDFS

M/R
Select + pushdown

juste le
nécessaire

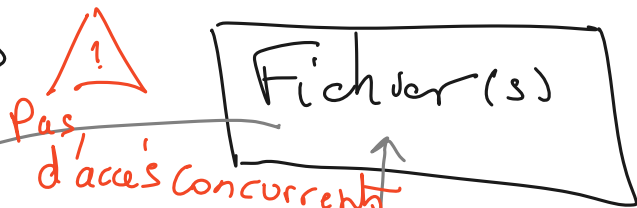
Niveaux d'abstraction des langages



HADOOP

HDFS → Seule solution de stockage

Fichier



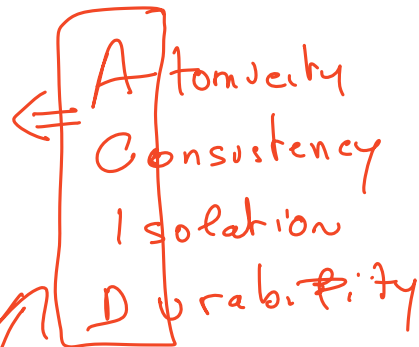
BDP

lire

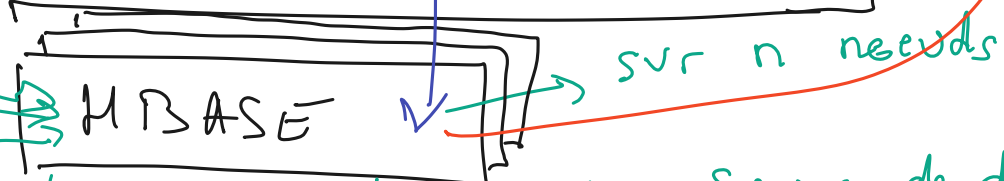
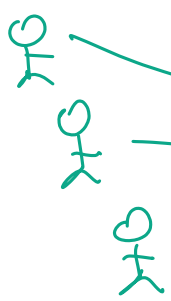
via Hive



SGBD



Persistance de HBase

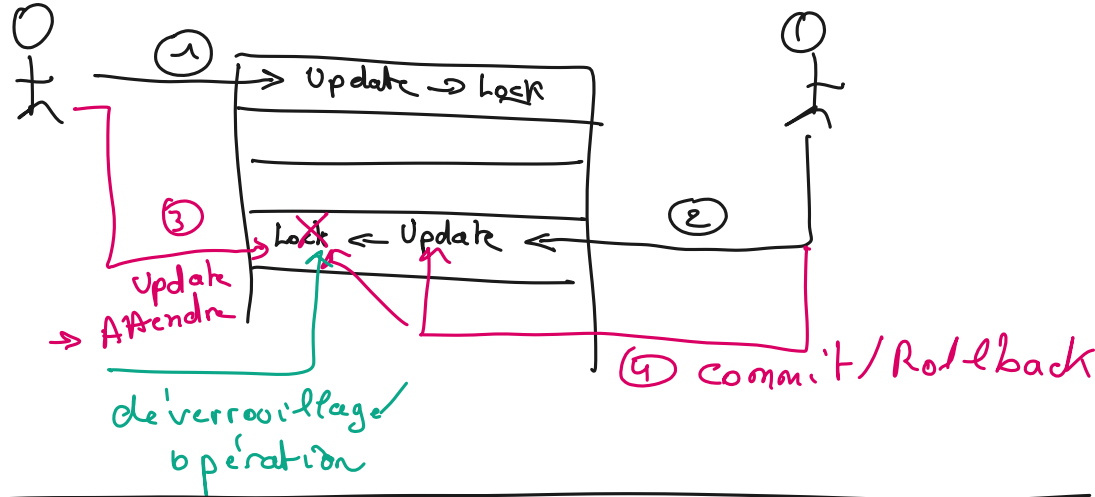
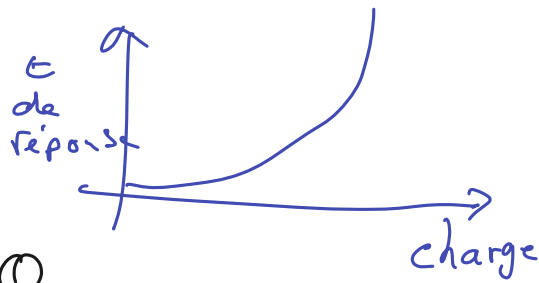


Accès Concurrents sur une source de data

Via MVCC
Multiple Version
Concurrency
Check

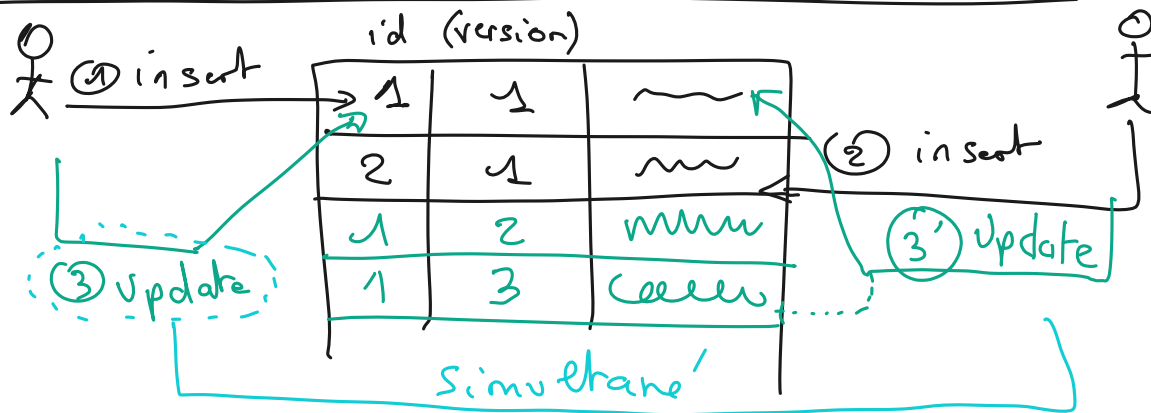
SGBAR non MVCC

→ Oracle
 → NS SQLSRV (mvcc est une option)

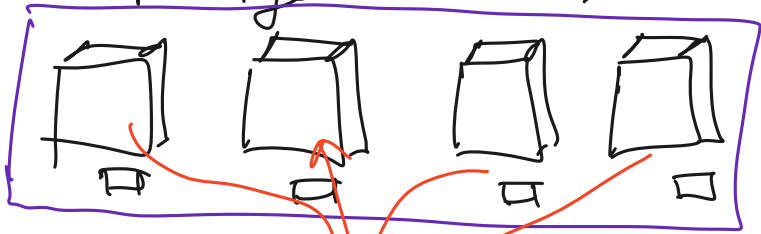


BDR
 Isolation Transaction Level

- Read Uncommitted *Wbase*
- Read Committed *SGBAR*
- Repeatable Read



Longo DB $\rightarrow K, V$



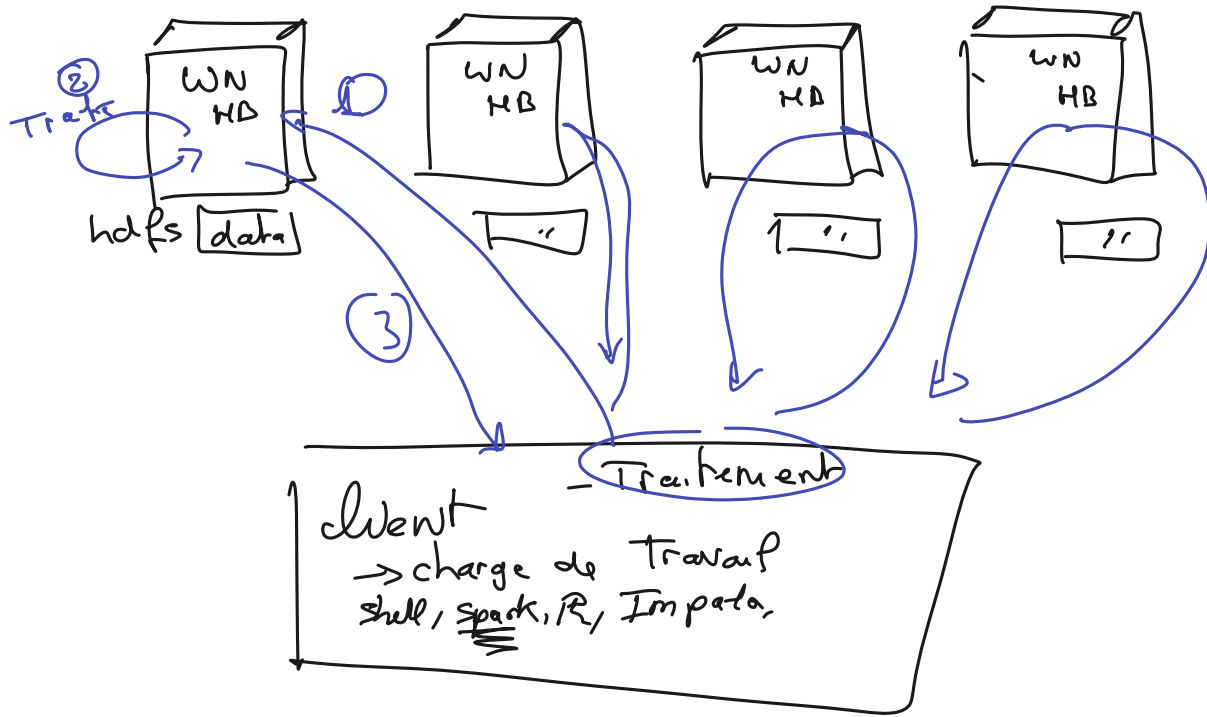
HA



\rightarrow non Part. Liomé

A \rightarrow disponible
P \rightarrow performance

HBASE



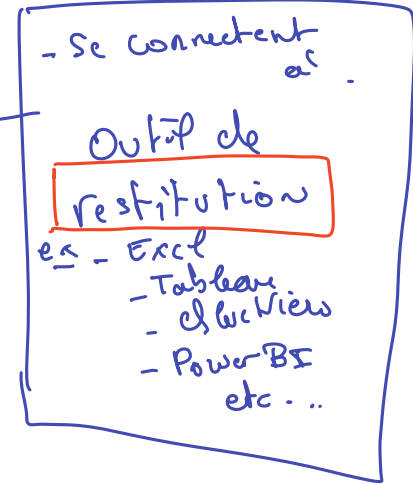
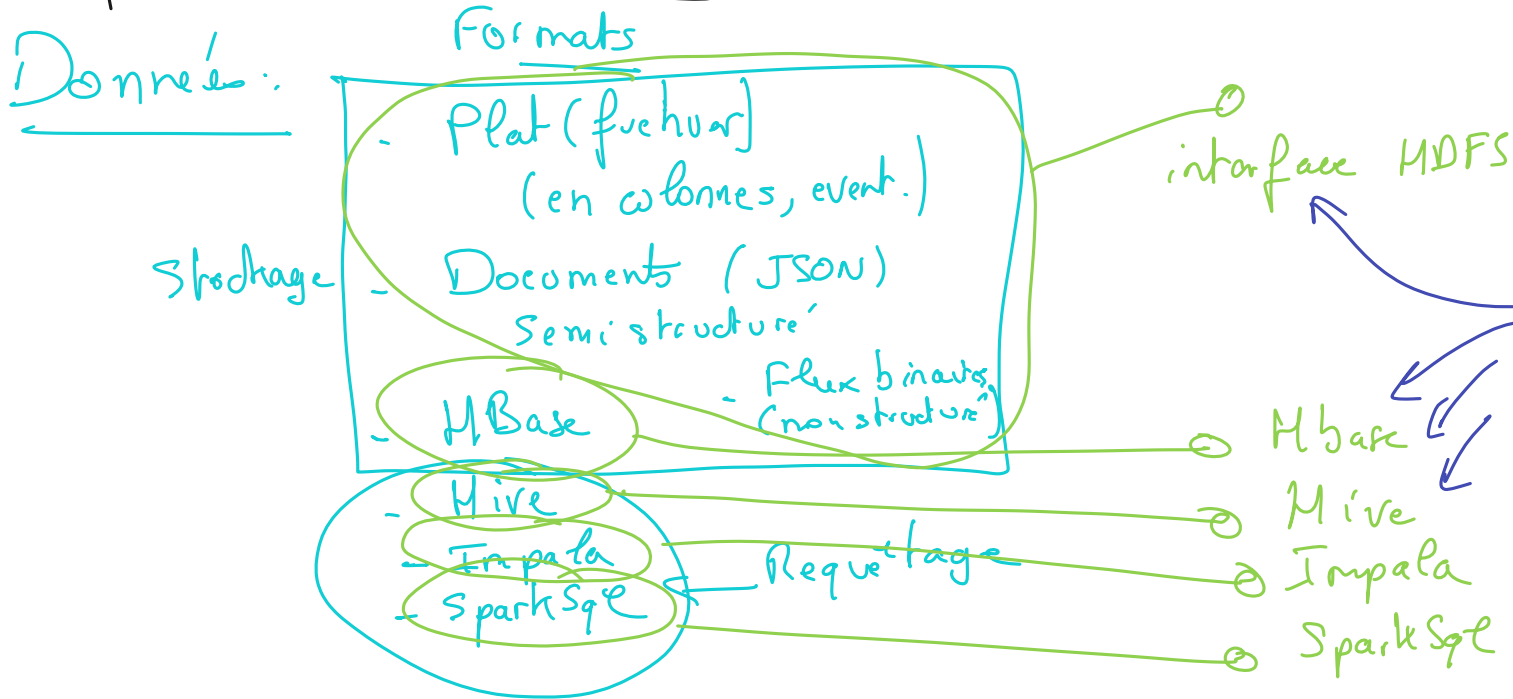
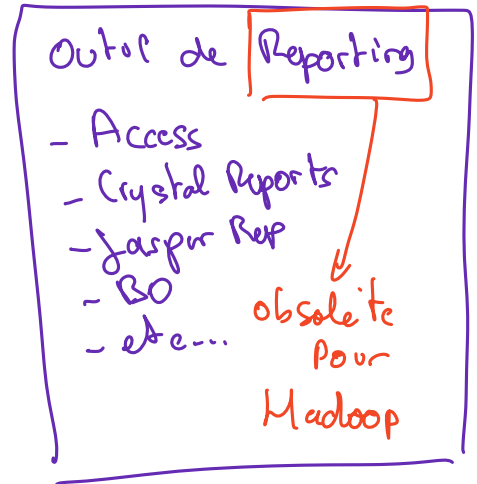
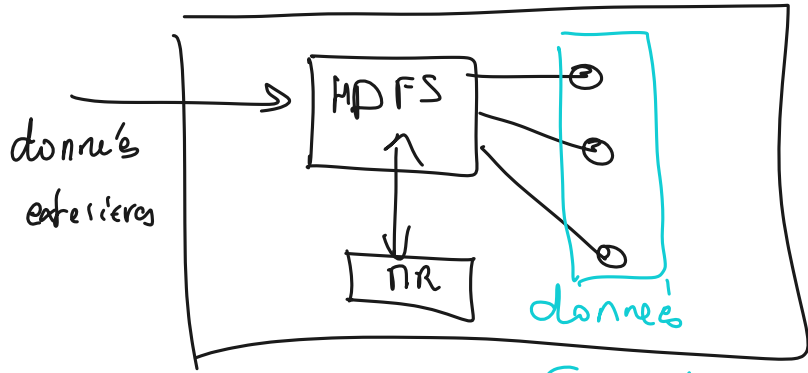
'test'

	data		
clé	1	2	3
row1	1		30
row2		2	
row3			3

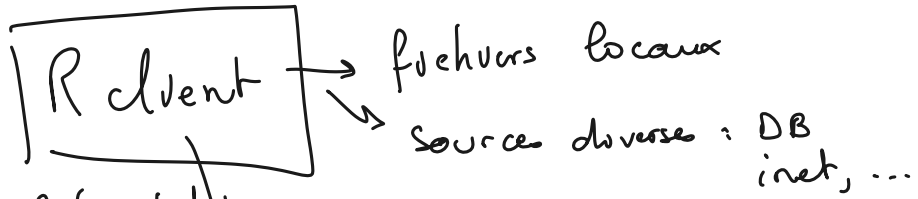
	famille	famille
Region		
Region		

famille ↖
famille ↗

MapReduce Analyse et Restitution



R



Re'écriture

MapReduce

