

Principes du big data en 10'

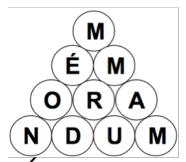
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Principes du big data

- 1 Volume
- 2 Variété
- 3 Vitesse
- 4 Eco-System Hadoop



Cette année nous fêtons les 80 ans de l'informatique

1936 : Alan Turing

1968 : Intel

1972 : Internet

1977 : Oracle

1992 : Internet = 1 million de PCs

1995 : MySQL / PostGreSQL

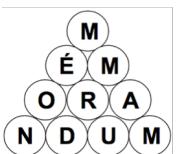
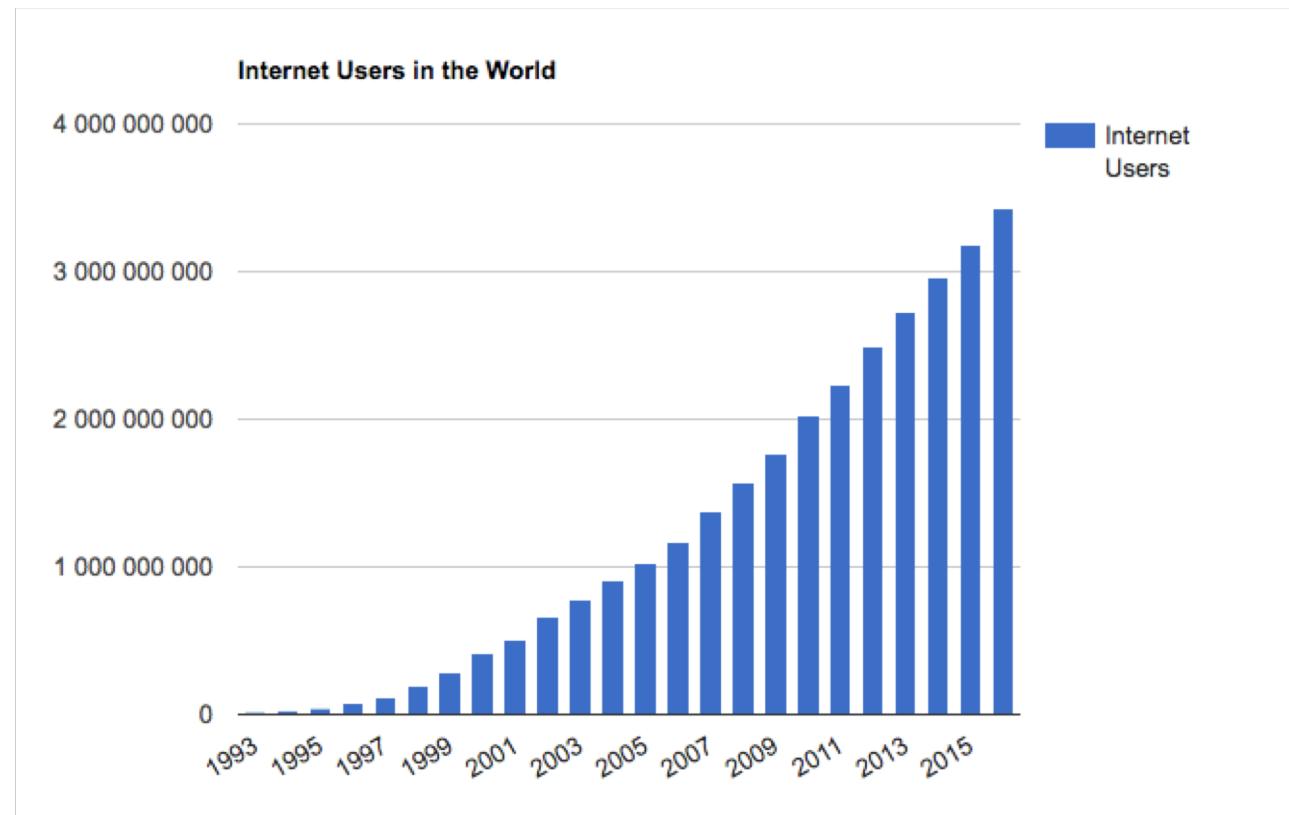
1996 : Internet = 36 millions de PCs

2000 : Internet = 360 millions de Pcs

2007 : Iphone

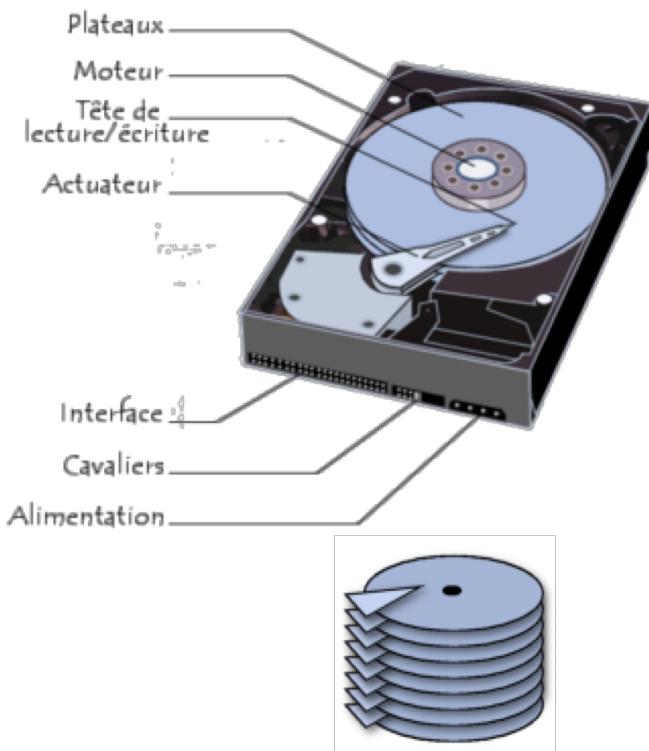
2015 : 2 milliards de smartphones

2020 : 50 milliards d'objets connectés ?



Où vont les données ? Sur des disques !

4



➤ Les interfaces de connexion au disque dur:

- IDE-ATA : 133 Mo/s (obsolète)
- SCSI : de 5 à 600 Mo/s (standardisé)
- S-ATA : de 150 à 600 Mo/s (standard actuel)

➤ Carte mères : 500 euro

- 2 x SATA3 6.0 Gb / s
- 8 x SAS2/SATA3 6.0 Gb / s

➤ Taille des disques : 6 To – 300 euros

➤ Configuration : 60 To max / 3500 euros

=> Combien de temps pour tout lire ?



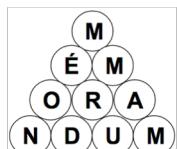
IDE-ATA



SCSI



S-ATA



IBM Benchmark (2011) : 480 disques !

Priced Storage Configuration:
24 – 8 Gbps dual port FC HBAs
IBM System Storage DS8870
2 –SMP processing clusters
Each cluster contains:
8 – processor cores
128 GB – processor memory (<i>256 GB total</i>)
16 – 8 Gb, 4 port SW FCP/FICON adapter pairs <i>(128 host port front-end connections, 32 used)</i>
8 – 4 port, 8 Gb FC-AL device adapter pairs (<i>4 adapter pair/cluster</i>) <i>(64 backend connections, 64 used)</i>
1 – Management Console (<i>internal laptop</i>)
1 – DS8870 Expansion Unit
10 – Disk Enclosure pairs (<i>48 disk drives per enclosure pair</i>)
480 – 146 GB, 15K RPM, 2.5" disk drives

480 disques de 146 Gb : 71 Tb

15 K RPM

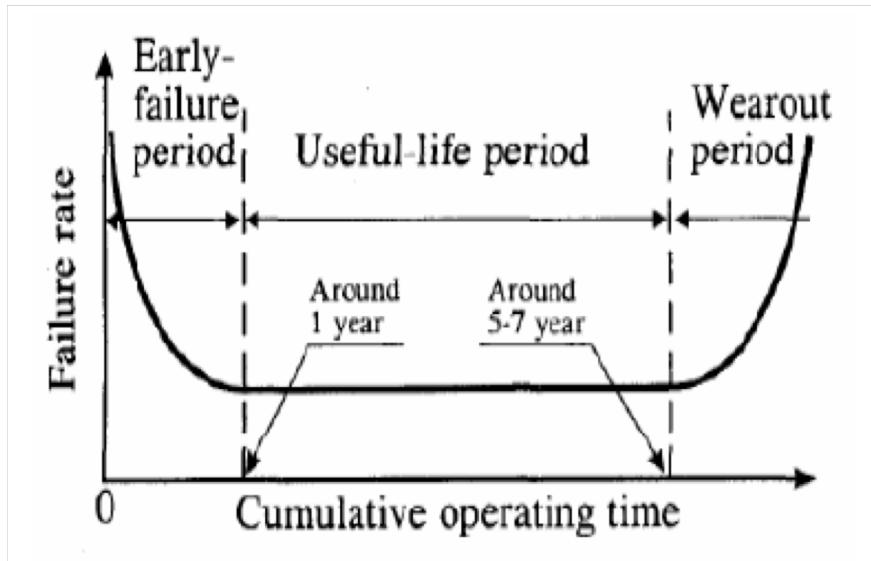
14 Gb / s

=> Combien de temps pour tout lire ?

=> A quel prix ?



MTBF : Mean Time Before Failure

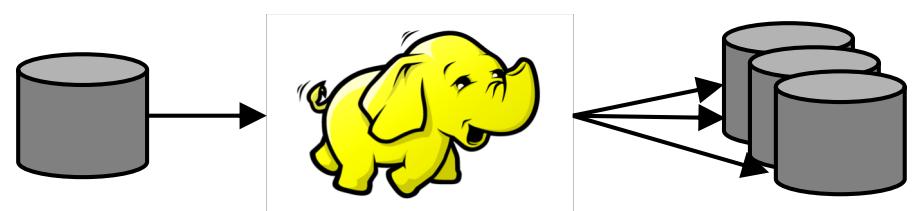


100 disques | MTBF 5 ans = 20 pannes / an
Soit un disque à changer toutes les 2 semaines.

Risques :

1. Coût
2. Instabilité du système
3. Perte d'information !

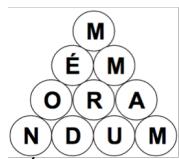
Hadoop résout le MTBF en déuplicant la donnée :
replication factor = 3



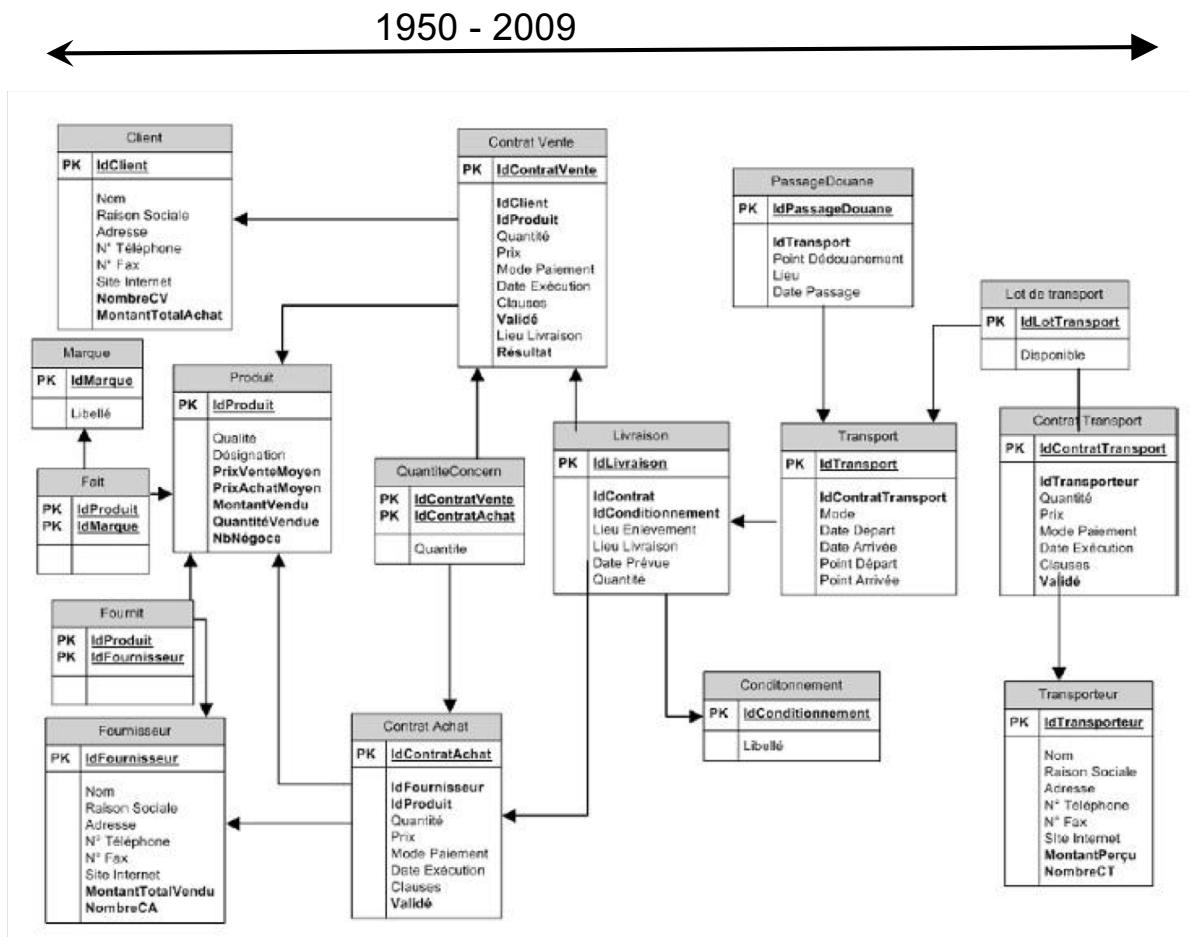
Si un disque tombe en panne, on retrouve l'information sur un des deux autres disques.

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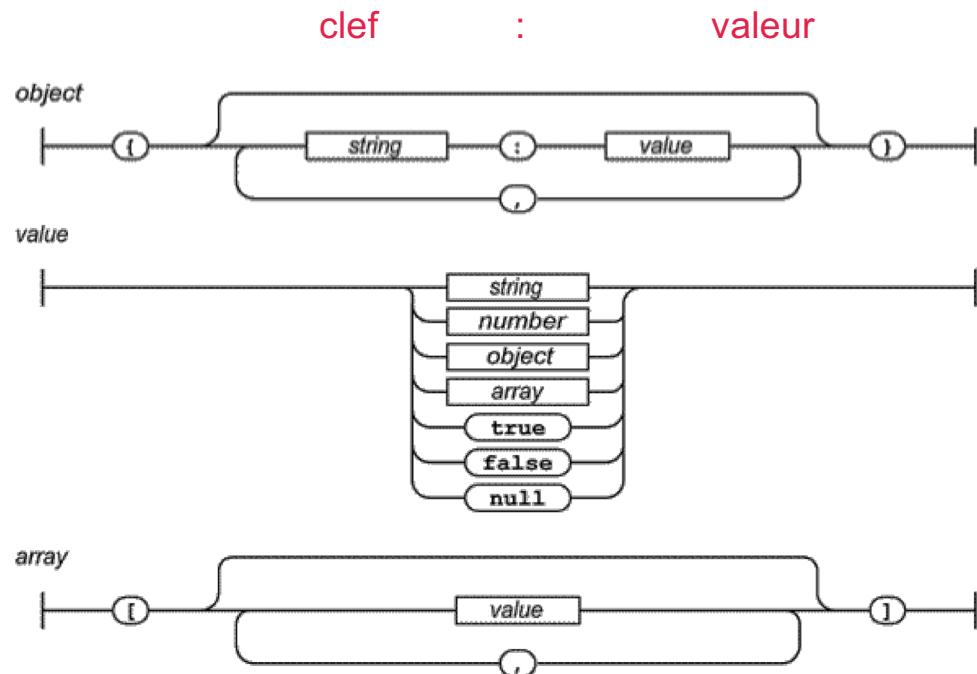
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La fin d'un monde

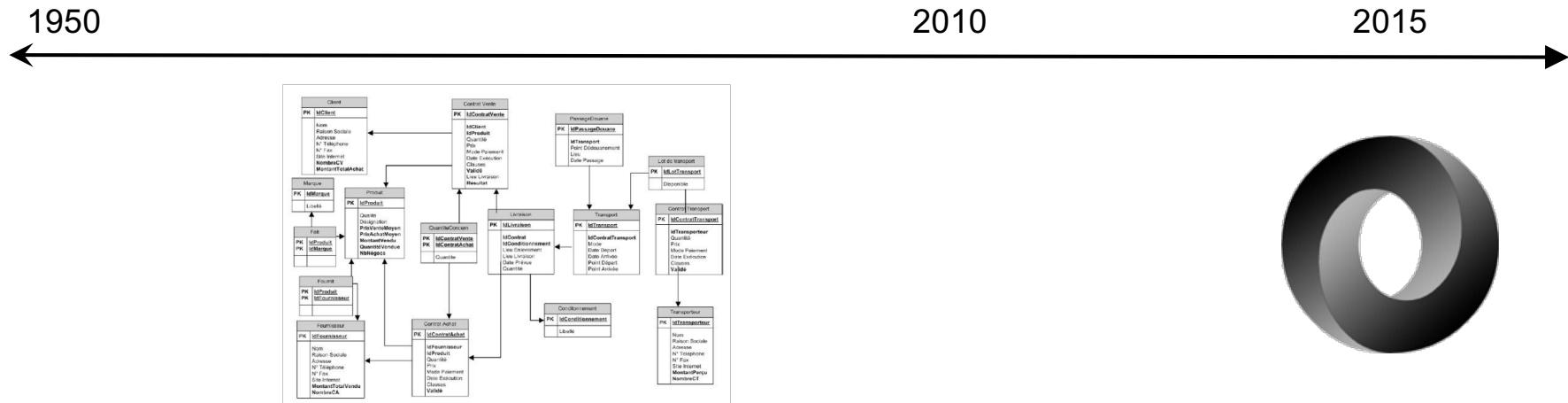


Formalisme JSON :



```
{  
  « nom » : « jouin »,  
  « prénom » : « romain »,  
  « adulte » : true,  
  « adresse » : {  
    « ville » : « paris »,  
    « cp » : « 75013 »  
  }  
}
```

Pour de nouveaux usages :



Online Transaction Processing

Transactions garanties
Lecture et écriture
Schéma défini

Banques / Systèmes de sécurité

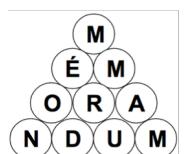
Oracle / Access
PostgreSQL / MySQL

Online Analytical Processing

Pas de transactions
Principalement en lecture
Sans schéma

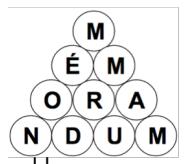
Sites Web / Applications non critiques

MongoDB / CouchDB
HBase / Cassandra

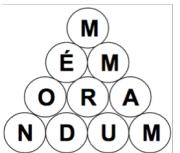
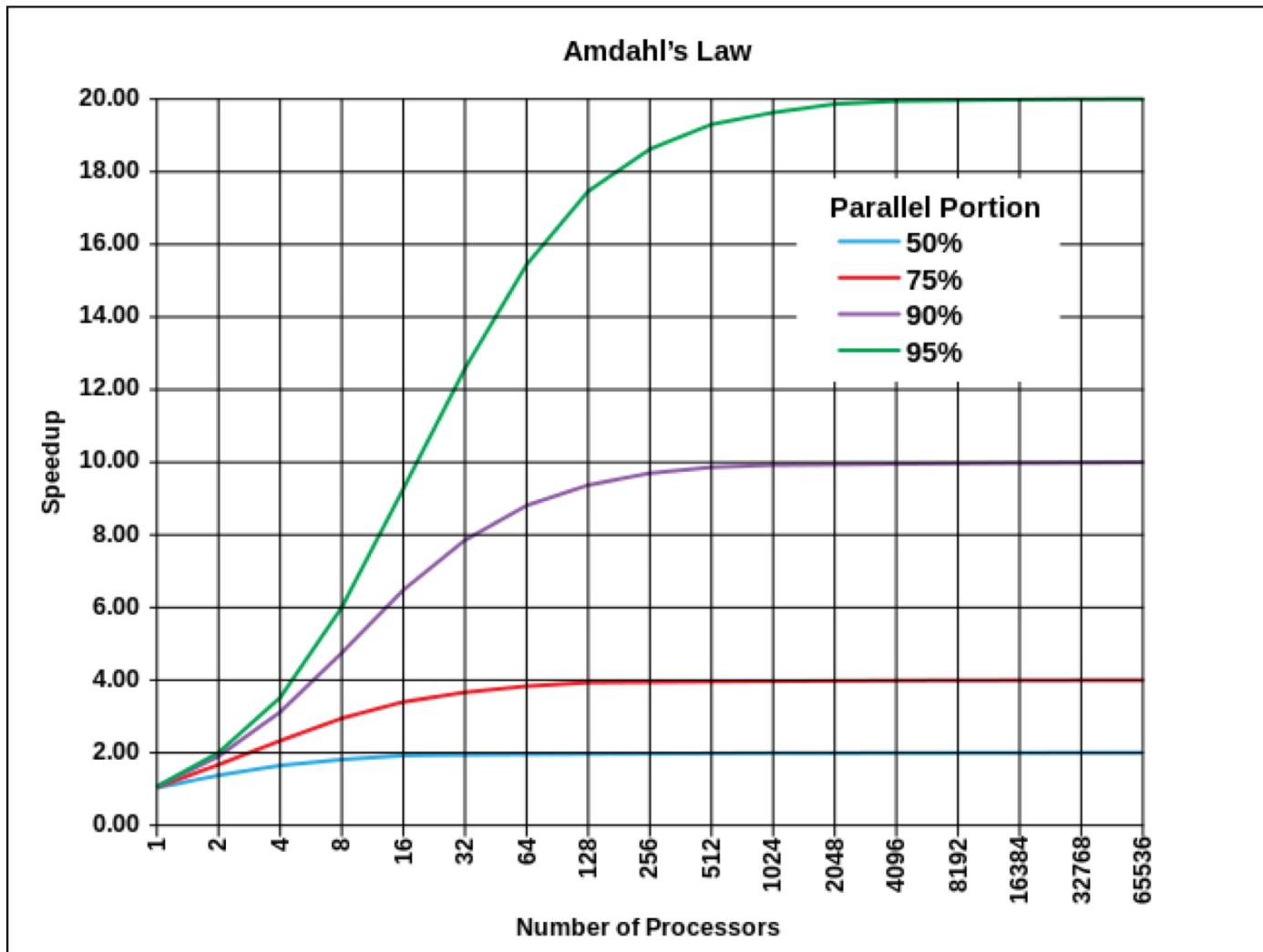


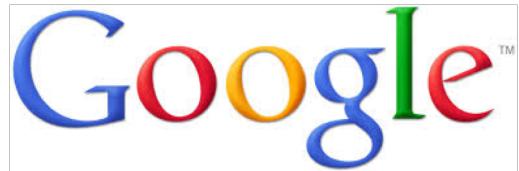
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La valeur ajoutée de chaque CPU diminue avec la taille du cluster

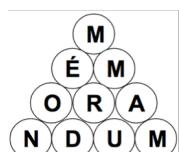
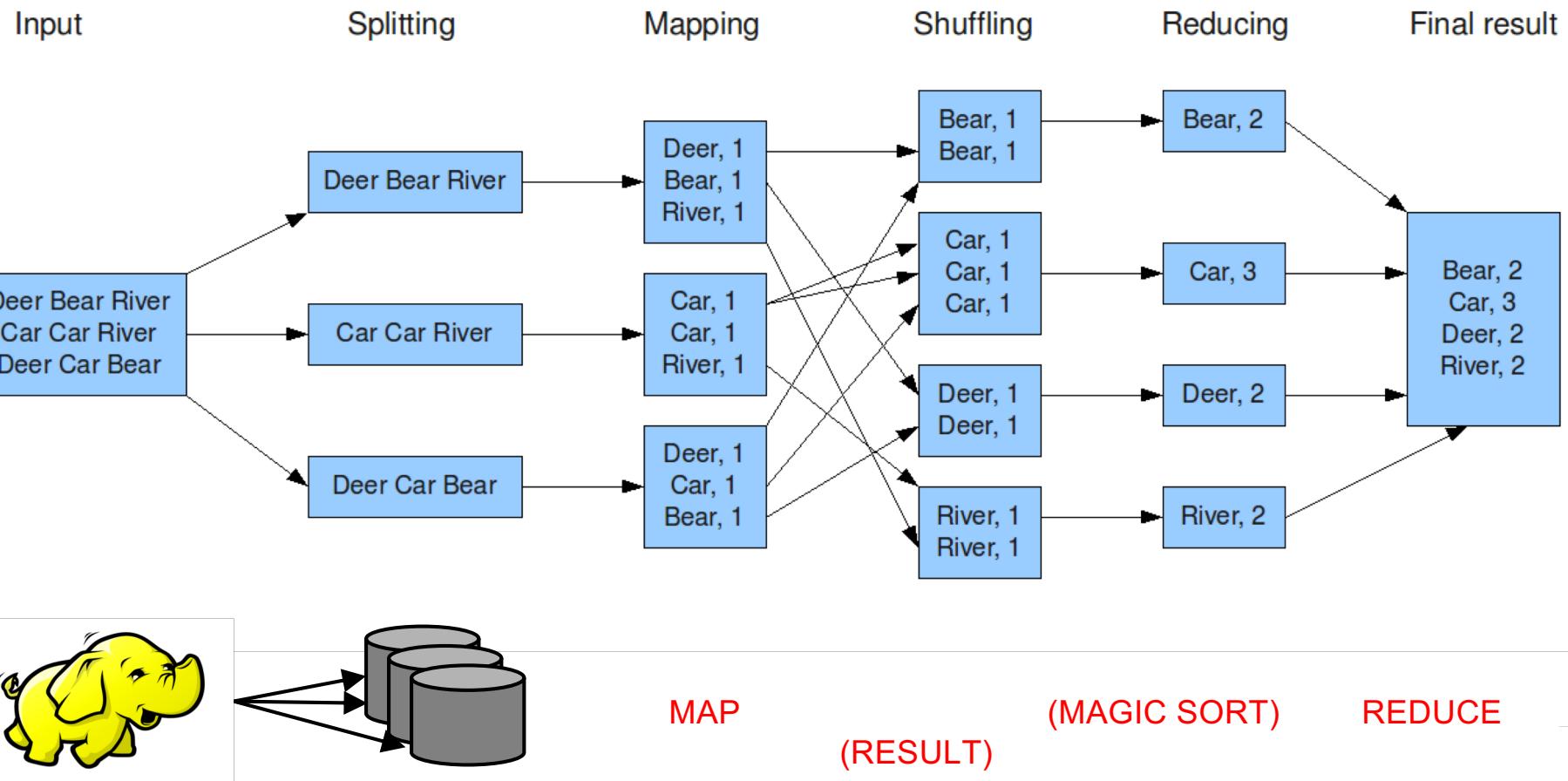




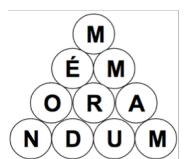
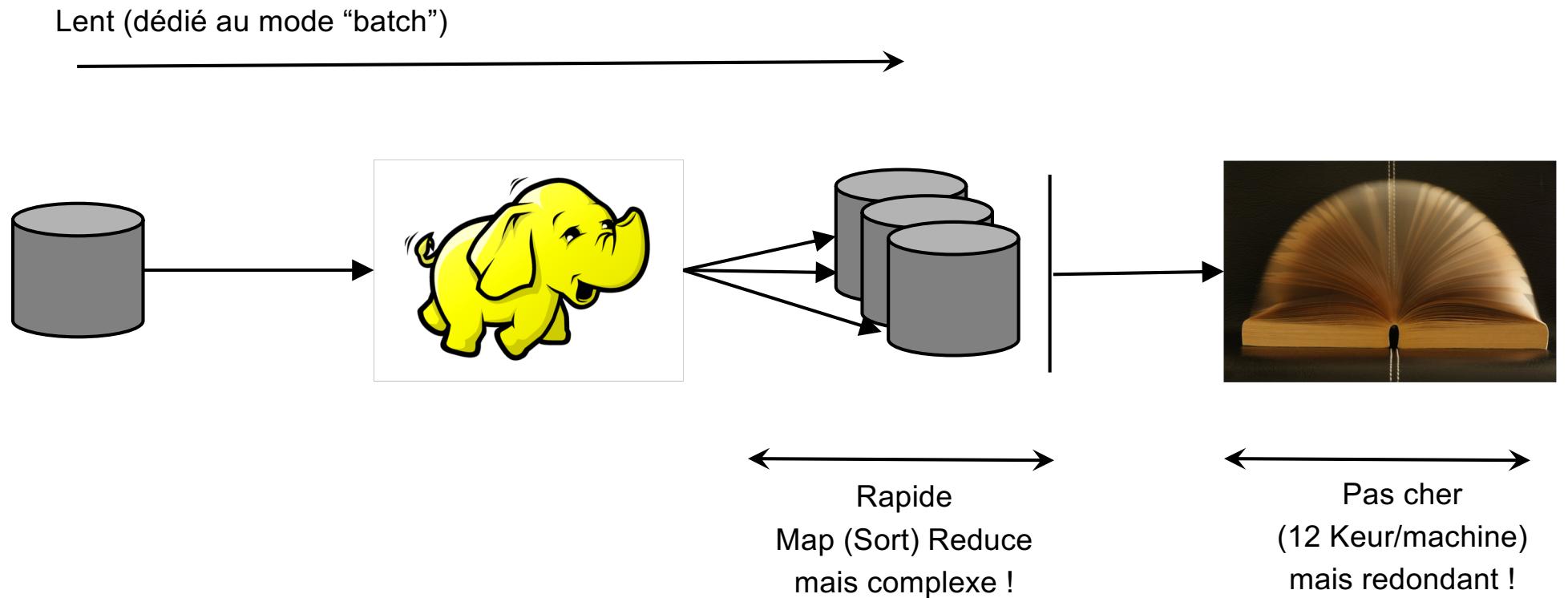
Map reduce



The overall MapReduce word count process

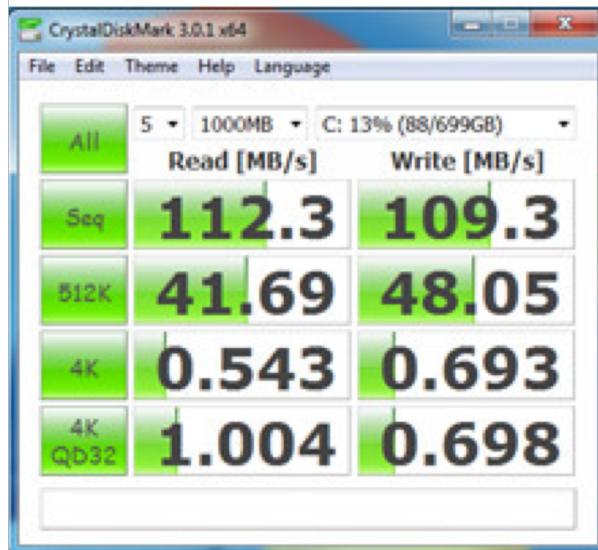


MTBF : Transformer un problème en atout

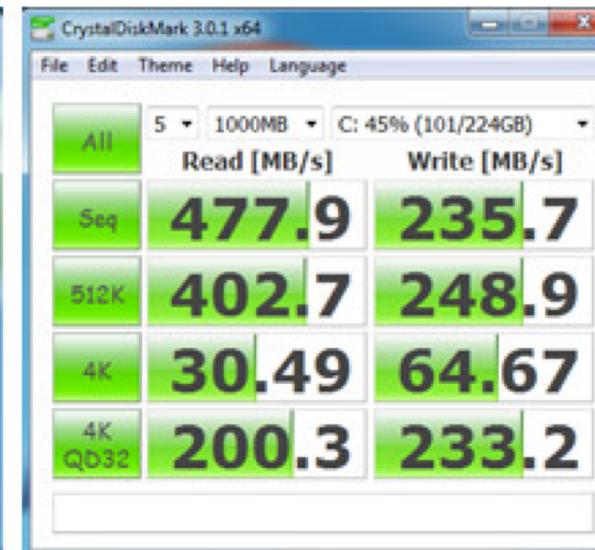


Support matters

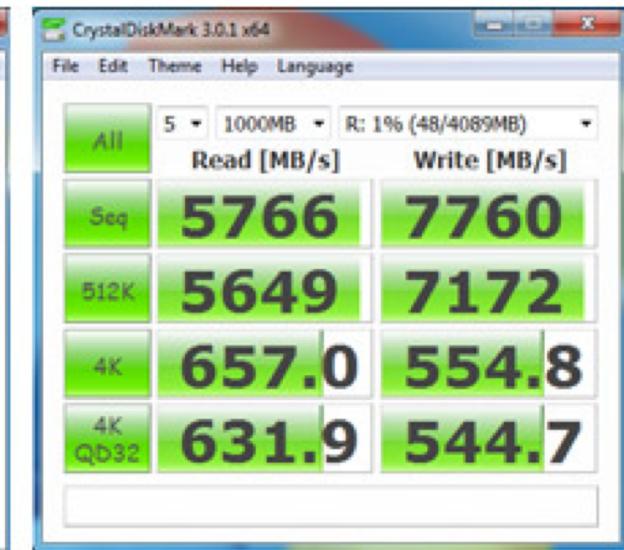
Hard Drive



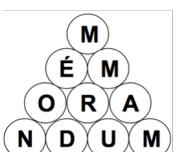
SSD



RAM Disk

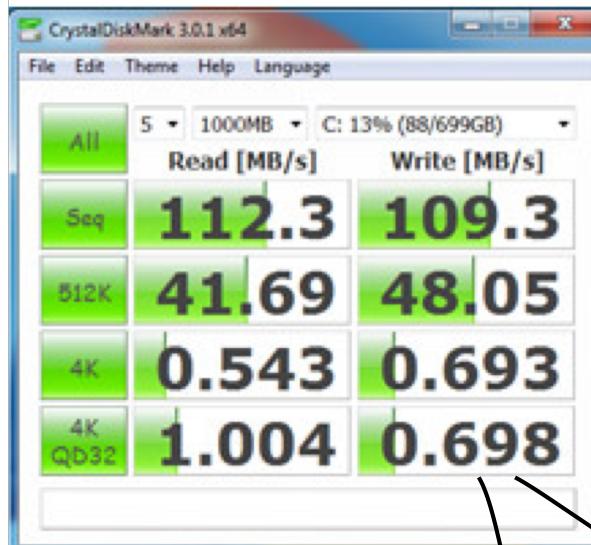


La RAM est jusqu'à 70 fois plus rapide que le disque en écriture et 50 fois en lecture

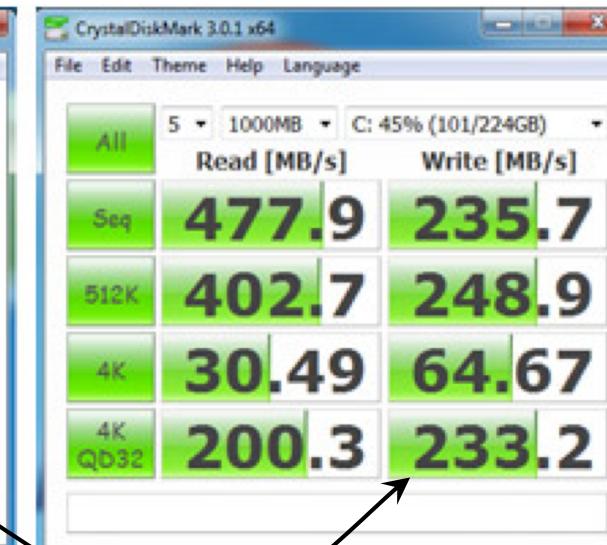


Support matters

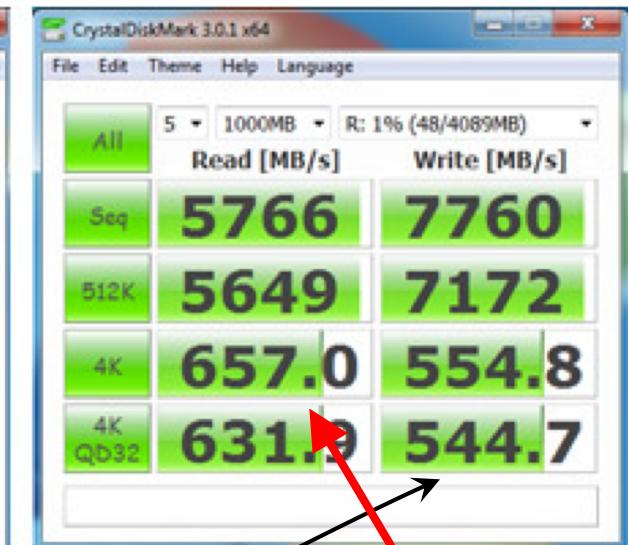
Hard Drive



SSD



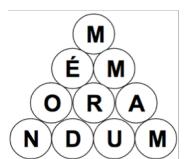
RAM Disk



x 388

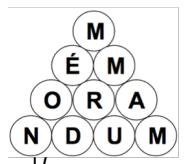
x 777

x 1314

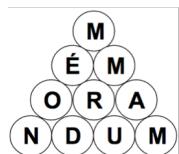
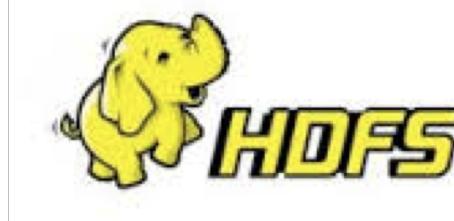
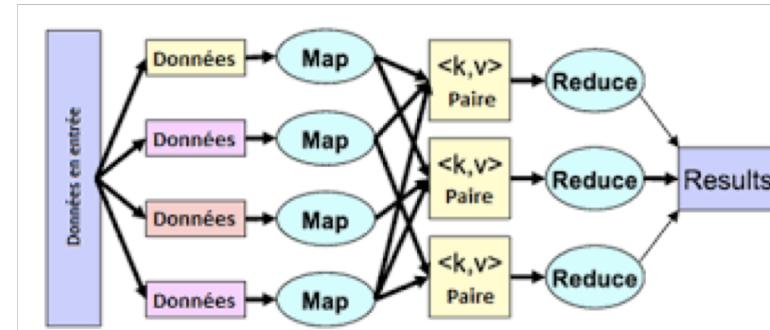


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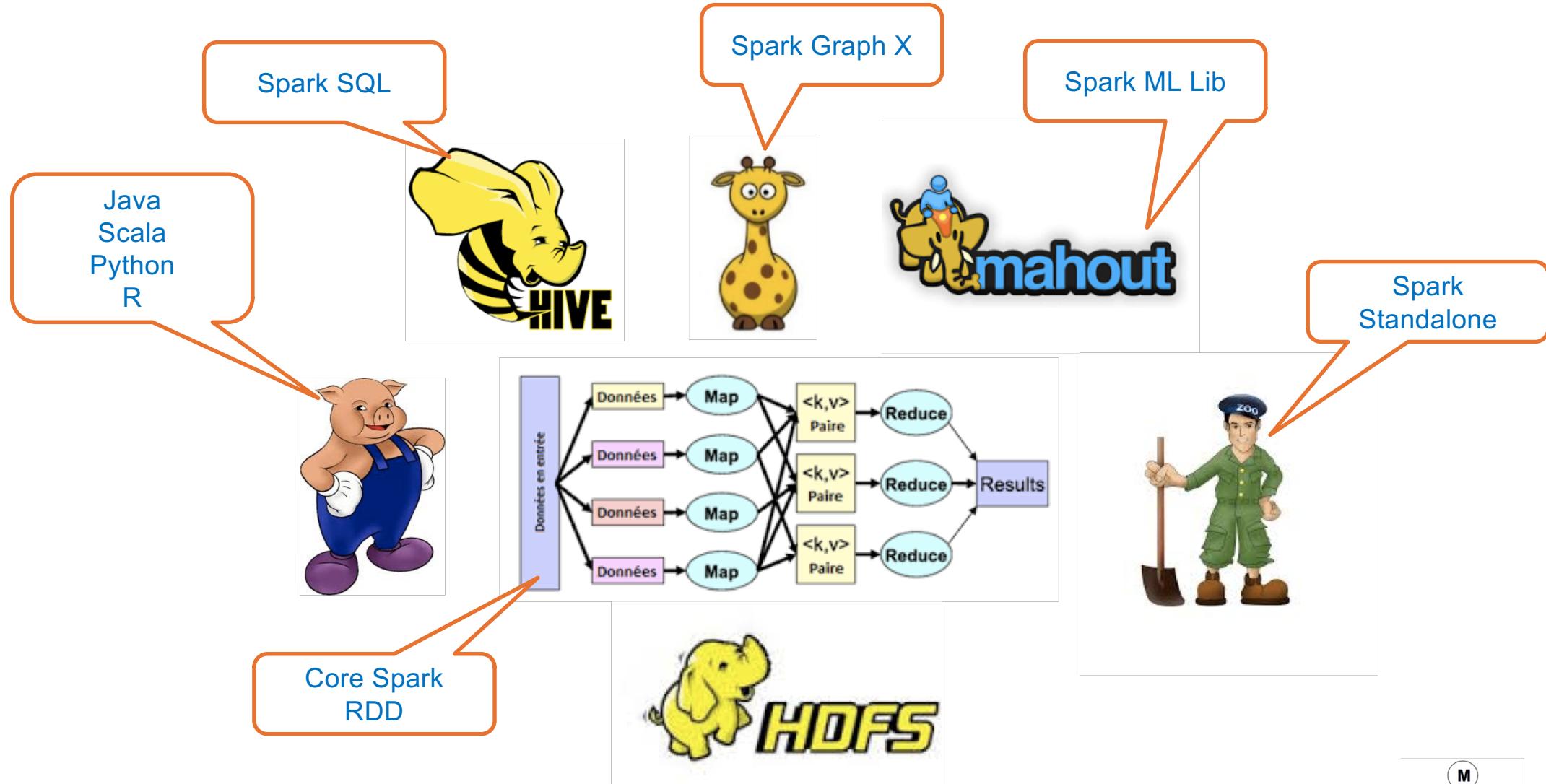
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Hadoop désigne autant un outil qu'un Eco-Système



Spark unifie les différentes briques software de l'écosystème hadoop





Hadoop est en train de disparaître, au profit de Spark

