Conception Avancée de Base de Données

Objectifs

Traduction en cours

Objectif du cours

Objectif du cours : Data Base Optimisation

- Data Base Model Optimisation
  - Functional Dependencies
  - Normalization
  - Physical Design
  - Indexing

=> Master 1

- Data Base Management Sytem Performances
  - Request Execution Plan
  - Explain Plan
  - Relationnal Operators implementation
  - Index Implementation
  - Buffer Management

Performances des bases de données

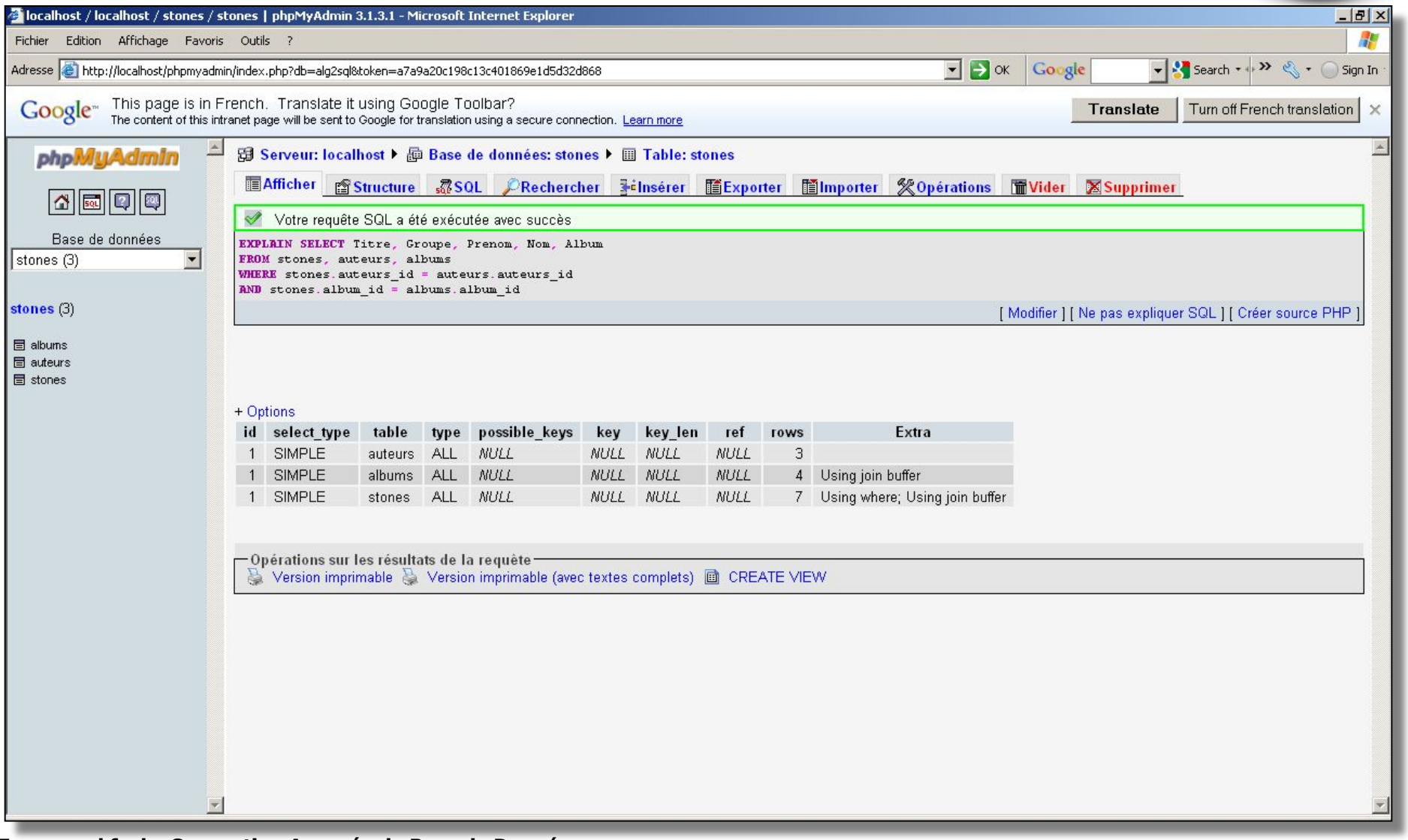
- Explan Plan
  - Cost
  - Seq Scan
  - Row ID
  - Nested Loop
  - Hash Join
- Analyse

Traduction en cours

Explain Plan

- Mysql
- Postgres
- Oracle

MySQL

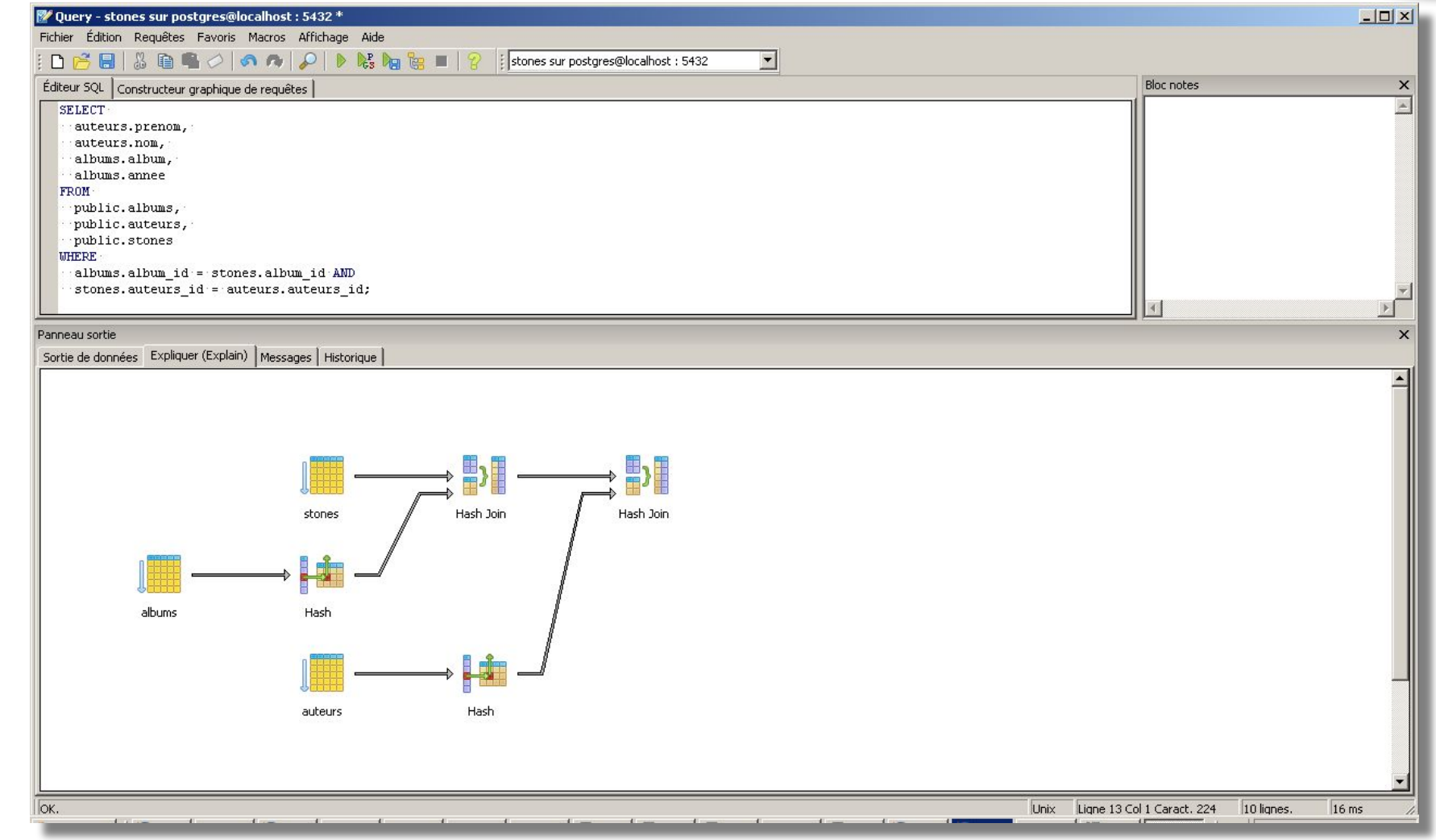

localhost / localhost / stones / stones | phpMyAdmin 3.1.3.1 - Microsoft Internet Explorer
Fichier Edition Affichage Favoris Outils ?
Adresse http://localhost/phpmyadmin/index.php?db=alg2sql&token=a7a9a20c198c13c401869e1d5d32d868
OK
Google
Search
Sign In
Google This page is in French. Translate it using Google Toolbar?
The content of this intranet page will be sent to Google for translation using a secure connection. Learn more
Translate
Turn off French translation
phpMyAdmin
Base de données
stones (3)
stones (3)
albums
auteurs
stones
Serveur: localhost ▸ Base de données: stones ▸ Table: stones
Afficher
Structure
SQL
Rechercher
Insérer
Exporter
Importer
Opérations
Vider
Supprimer
Votre requête SQL a été exécutée avec succès
EXPLAIN SELECT Titre, Groupe, Prenom, Nom, Album
FROM stones, auteurs, albums
WHERE stones.auteurs_id = auteurs.auteurs_id
AND stones.album_id = albums.album_id
[Modifier] [Ne pas expliquer SQL] [Créer source PHP]
+ Options
id select_type table type possible_keys key key_len ref rows Extra
1 SIMPLE auteurs ALL NULL NULL NULL NULL 3
1 SIMPLE albums ALL NULL NULL NULL NULL 4 Using join buffer
1 SIMPLE stones ALL NULL NULL NULL NULL 7 Using where; Using join buffer
Opérations sur les résultats de la requête
Version imprimable
Version imprimable (avec textes complets)
CREATE VIEW

MySQL

d:\pgm\wamp\bin\mysql\mysql5.1.33\bin\mysql.exe

```
mysql> use stones;
Database changed
mysql> SELECT
    ->  Titre,
    ->  Groupe ,
    ->  Prenom,
    ->  Nom,
    ->  Album
    -> FROM
    ->  stones,
    ->  auteurs,
    ->  albums
    -> WHERE
    ->  stones.auteurs_id = auteurs.auteurs_id
    -> AND
    ->  stones.album_id = albums.album_id;
+--------------------+--------------------+----------------+---------+----------------------+
| Titre              | Groupe             | Prenom         | Nom     | Album                |
+--------------------+--------------------+----------------+---------+----------------------+
| Rough Justice      | The Rolling Stones | Michael Philip | Jagger  | A Bigger Bang        |
| Street Fighting Man | The Rolling Stones | Michael Philip | Jagger  | Beggars Banquet      |
| Ventilator Blues   | The Rolling Stones | Michael Philip | Jagger  | Exile On Main Street |
| Rough Justice      | The Rolling Stones | Keith          | Richard | A Bigger Bang        |
| Street Fighting Man | The Rolling Stones | Keith          | Richard | Beggars Banquet      |
| Ventilator Blues   | The Rolling Stones | Keith          | Richard | Exile On Main Street |
| Ventilator Blues   | The Rolling Stones | Mick           | Taylor  | Exile On Main Street |
+--------------------+--------------------+----------------+---------+----------------------+
7 rows in set (0.00 sec)

mysql> explain
    -> SELECT
    ->  Titre,
    ->  Groupe ,
    ->  Prenom,
    ->  Nom,
    ->  Album
    -> FROM
    ->  stones,
    ->  auteurs,
    ->  albums
    -> WHERE
    ->  stones.auteurs_id = auteurs.auteurs_id
    -> AND
    ->  stones.album_id = albums.album_id;
+----+-------------+---------+------+---------------+------+---------+------+------+-----------------------------+
| id | select_type | table   | type | possible_keys | key  | key_len | ref  | rows | Extra                       |
+----+-------------+---------+------+---------------+------+---------+------+------+-----------------------------+
|  1 | SIMPLE      | auteurs | ALL  | NULL          | NULL | NULL    | NULL |    3 |                             |
|  1 | SIMPLE      | albums  | ALL  | NULL          | NULL | NULL    | NULL |    4 | Using join buffer           |
|  1 | SIMPLE      | stones  | ALL  | NULL          | NULL | NULL    | NULL |    7 | Using where; Using join buffer |
+----+-------------+---------+------+---------------+------+---------+------+------+-----------------------------+
3 rows in set (0.00 sec)

mysql> _
```

Postgres


Query - stones sur postgres@localhost : 5432 *
Fichier Édition Requêtes Favoris Macros Affichage Aide
stones sur postgres@localhost : 5432
Éditeur SQL
Constructeur graphique de requêtes
SELECT
auteurs.prenom,
auteurs.nom,
albums.album,
albums.annee
FROM
public.albums,
public.auteurs,
public.stones
WHERE
albums.album_id = stones.album_id AND
stones.auteurs_id = auteurs.auteurs_id;
Bloc notes
Panneau sortie
Sortie de données
Expliquer (Explain)
Messages
Historique
stones
Hash Join
Hash Join
albums
Hash
auteurs
Hash
OK.
Unix
Ligne 13 Col 1 Caract. 224
10 lignes.
16 ms

Postgres

Query - stones sur postgres@localhost : 5432 *

Fichier Édition Requêtes Favoris Macros Affichage Aide

stones sur postgres@localhost : 5432

Éditeur SQL | Constructeur graphique de requêtes

```
SELECT
  auteurs.prenom,
  auteurs.nom,
  albums.album,
  albums.annee
FROM
  public.albums,
  public.auteurs,
  public.stones
WHERE
  albums.album_id = stones.album_id AND
  stones.auteurs_id = auteurs.auteurs_id;
```

Bloc notes

Panneau sortie

Sortie de données | Expliquer (Explain) | Messages | Historique

	QUERY PLAN text
1	Hash Join (cost=2.14..3.40 rows=7 width=38) (actual time=0.146..0.240 rows=7 loops=1)
2	Output: auteurs.prenom, auteurs.nom, albums.album, albums.annee
3	Hash Cond: (stones.auteurs_id = auteurs.auteurs_id)
4	-> Hash Join (cost=1.07..2.23 rows=7 width=26) (actual time=0.070..0.126 rows=7 loops=1)
5	Output: albums.album, albums.annee, stones.auteurs_id
6	Hash Cond: (stones.album_id = albums.album_id)
7	-> Seq Scan on stones (cost=0.00..1.07 rows=7 width=8) (actual time=0.006..0.022 rows=7 loops=1)
8	Output: stones.titre, stones.groupe, stones.auteurs_id, stones.album_id
9	-> Hash (cost=1.03..1.03 rows=3 width=26) (actual time=0.030..0.030 rows=3 loops=1)
10	Output: albums.album, albums.annee, albums.album_id
11	-> Seq Scan on albums (cost=0.00..1.03 rows=3 width=26) (actual time=0.005..0.013 rows=3 loops=1)
12	Output: albums.album, albums.annee, albums.album_id
13	-> Hash (cost=1.03..1.03 rows=3 width=20) (actual time=0.042..0.042 rows=3 loops=1)
14	Output: auteurs.prenom, auteurs.nom, auteurs.auteurs_id
15	-> Seq Scan on auteurs (cost=0.00..1.03 rows=3 width=20) (actual time=0.014..0.023 rows=3 loops=1)
16	Output: auteurs.prenom, auteurs.nom, auteurs.auteurs_id
17	Total runtime: 0.409 ms

OK. Unix Ligne 13 Col 1 Caract. 224 17 lignes. 16 ms

Oracle

Oracle SQL*Plus

File Edit Search Options Help

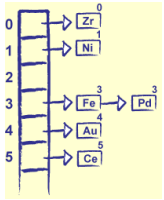
```
SQL>
SQL> 1
  1  EXPLAIN PLAN SET STATEMENT_ID = 'HOTKA' for SELECT count(*)
  2  from B, C, A
  3  WHERE A.STATUS = B.STATUS
  4  AND   A.B_ID = B.ID
  5  AND   B.STATUS = 'OPEN'
  6  AND   B.ID = C.B_ID
  7* AND   C.STATUS = 'OPEN'
SQL> /

Explained.

SQL> start c:\temp\SHOW_PLAN.sql HOTKA
old   4: where statement_id = '&1'
new   4: where statement_id = 'HOTKA'

                Access                          Access          Object
Cost    ID P_ID Plan                            Path            Name
---- ---- ---- ------------------------------ --------------- ---------------
        0        SELECT STATEMENT
        1    0     SORT                        AGGREGATE
        2    1       TABLE ACCESS              BY INDEX ROWID  C
        3    2         NESTED LOOPS
        4    3           NESTED LOOPS
        5    4             TABLE ACCESS        BY INDEX ROWID  B
        6    5               INDEX             RANGE SCAN      B_STATUS_IDX
        7    4             TABLE ACCESS        BY INDEX ROWID  A
        8    7               INDEX             RANGE SCAN      A_STATUS_IDX
        9    3           INDEX                 RANGE SCAN      C_B_ID_IDX

10 rows selected.
```

Join Algorithmn Implemenation

- Nested loop

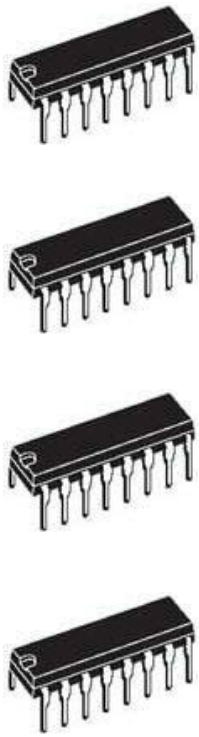
- Merge join

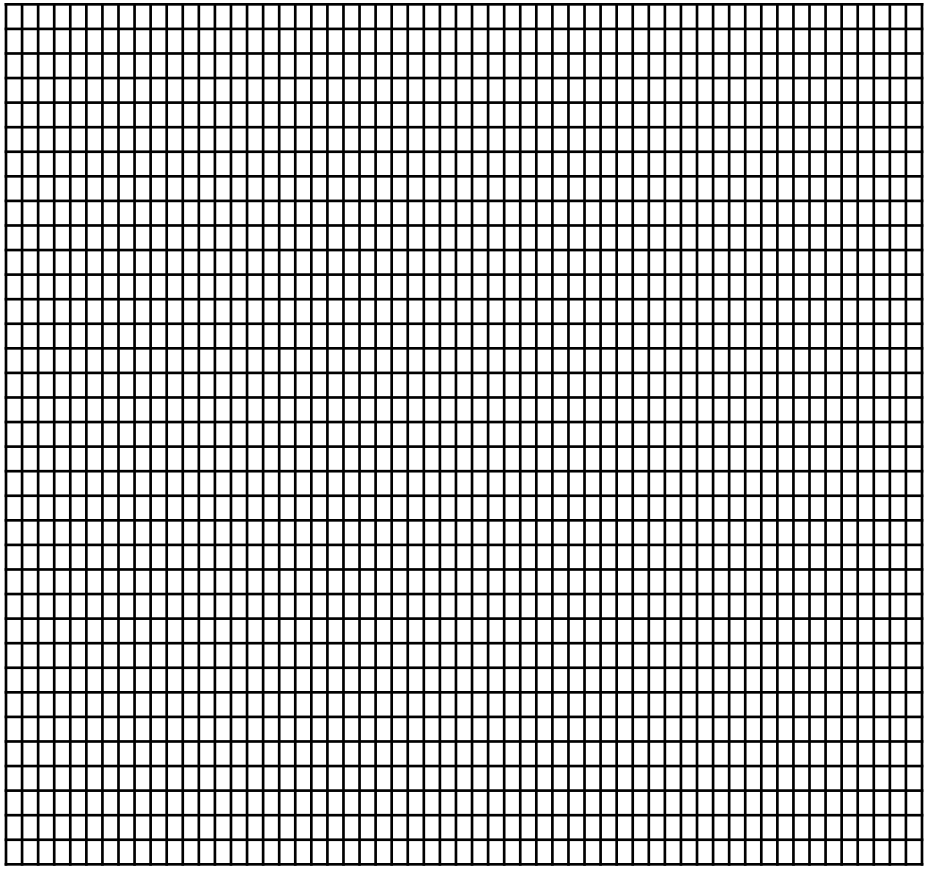
- Hash join



Big Relation => Big Data

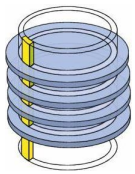
Relation





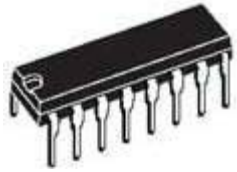
Memory

Disc

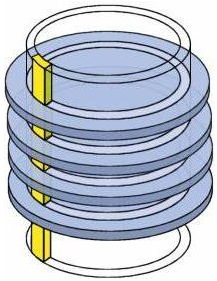


Jointures Physiques

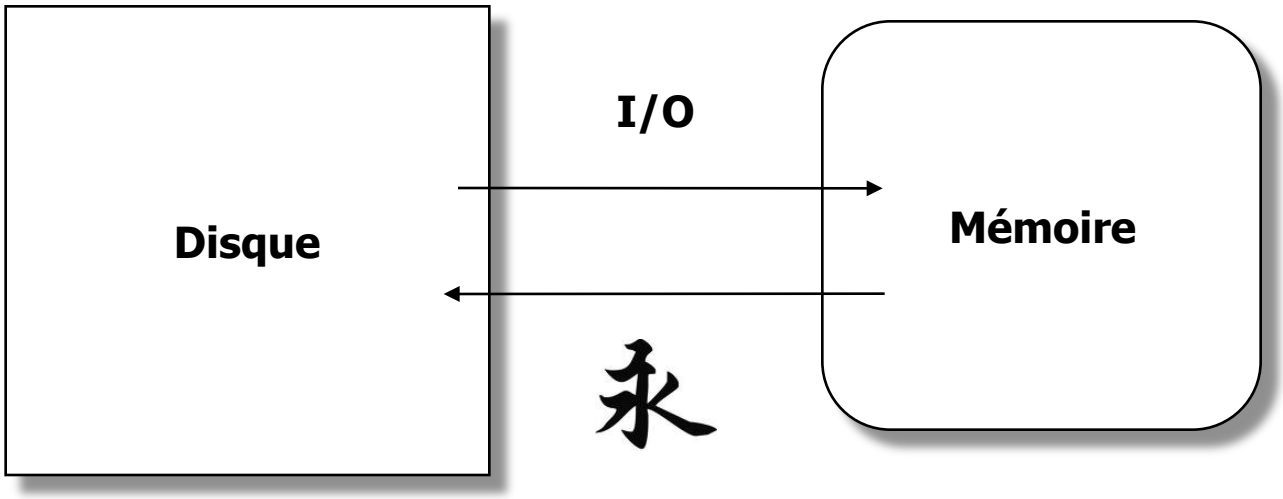
- Jointure en mémoire
  - Nested Loop
  - Merge join
  - Hash join

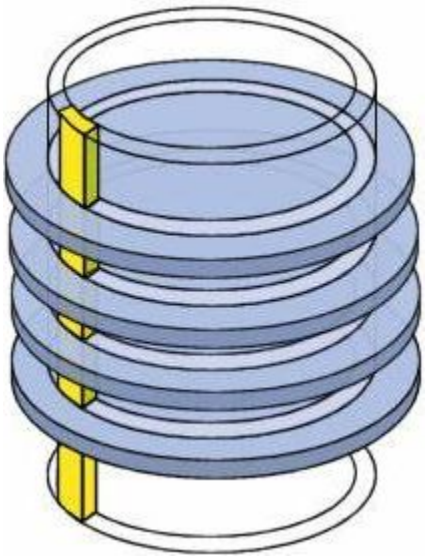


- Jointure sur disque
  - Nested Loop
  - Sort Merge Join
  - Hash join

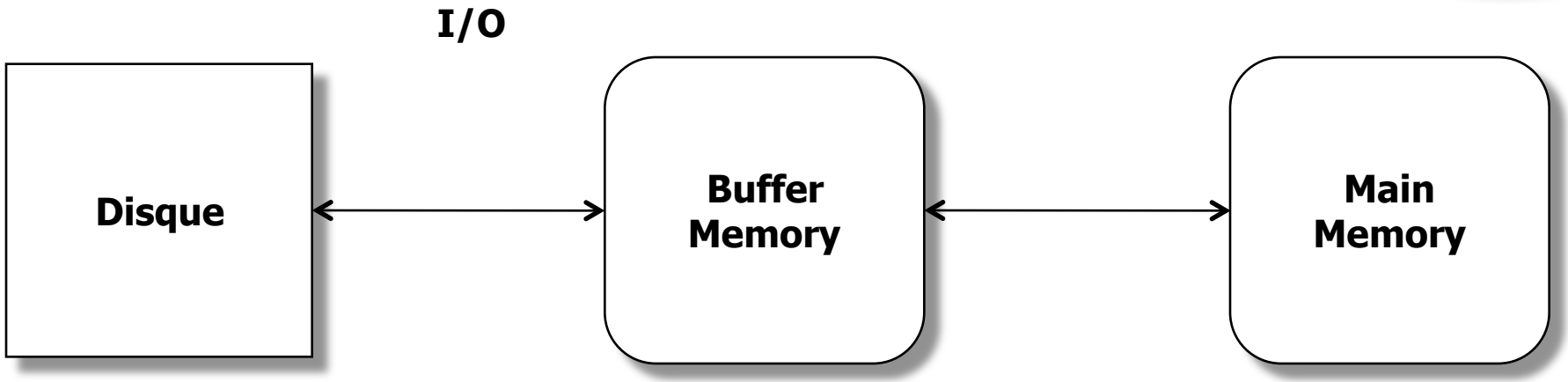


Entrées/Sorties, Lectures écritures disques, IO

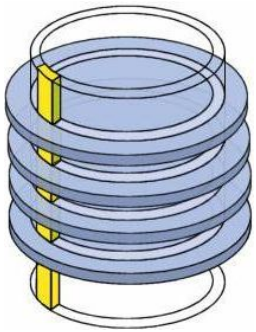


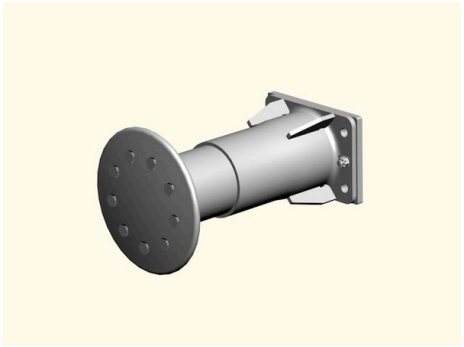


Entrées/Sorties, Lectures écritures disques, IO



永





BIG DATA

- NoSQL
- MAP REDUCE