Conception Avancée de Base de Données

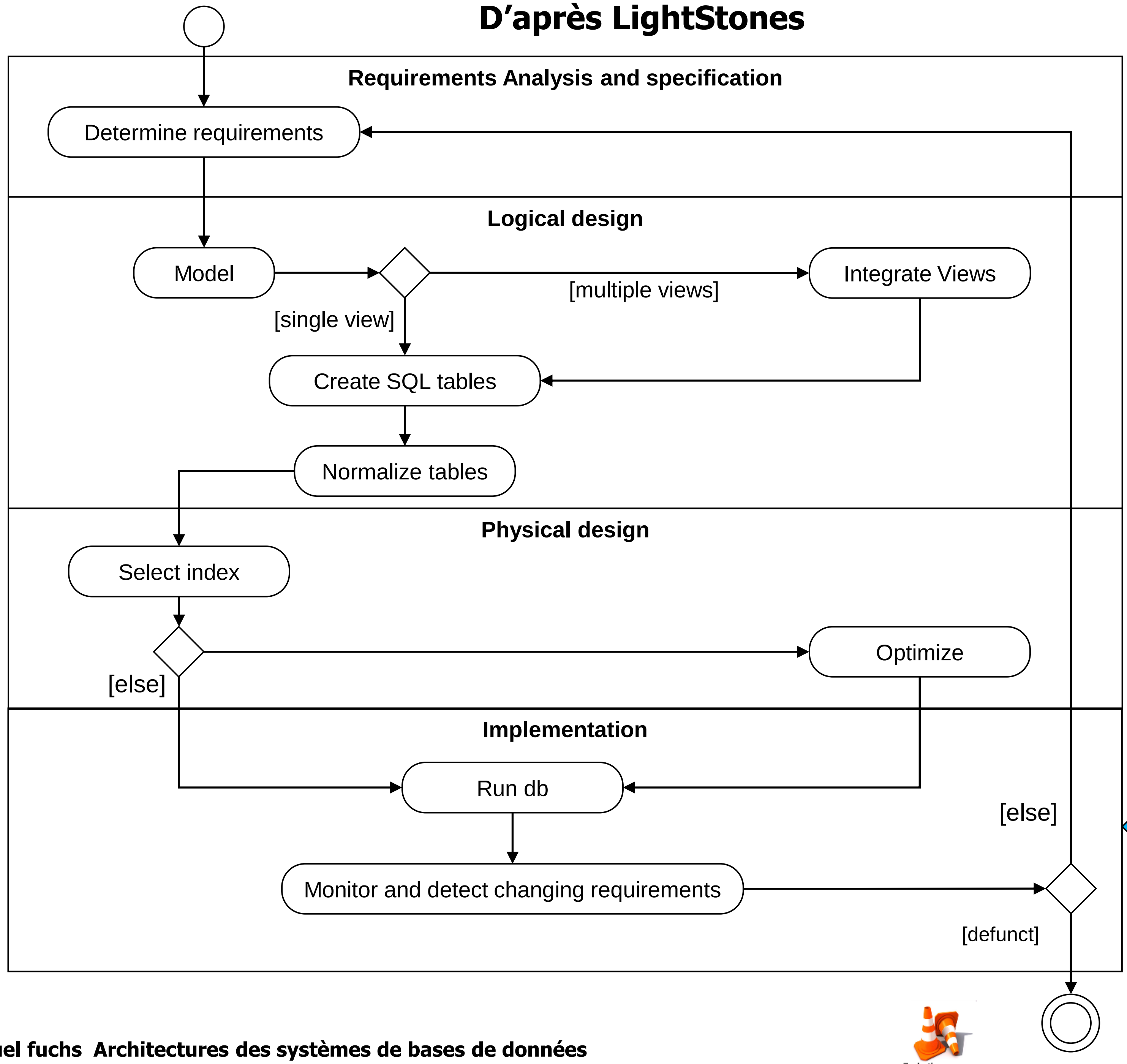
Objectifs

Traduction en cours

Traduction en cours

Objectif du cours

D'après LightStones



Traduction en cours

Objectif du cours : Data Base Optimisation

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

=> Master 1

- Database Management System 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

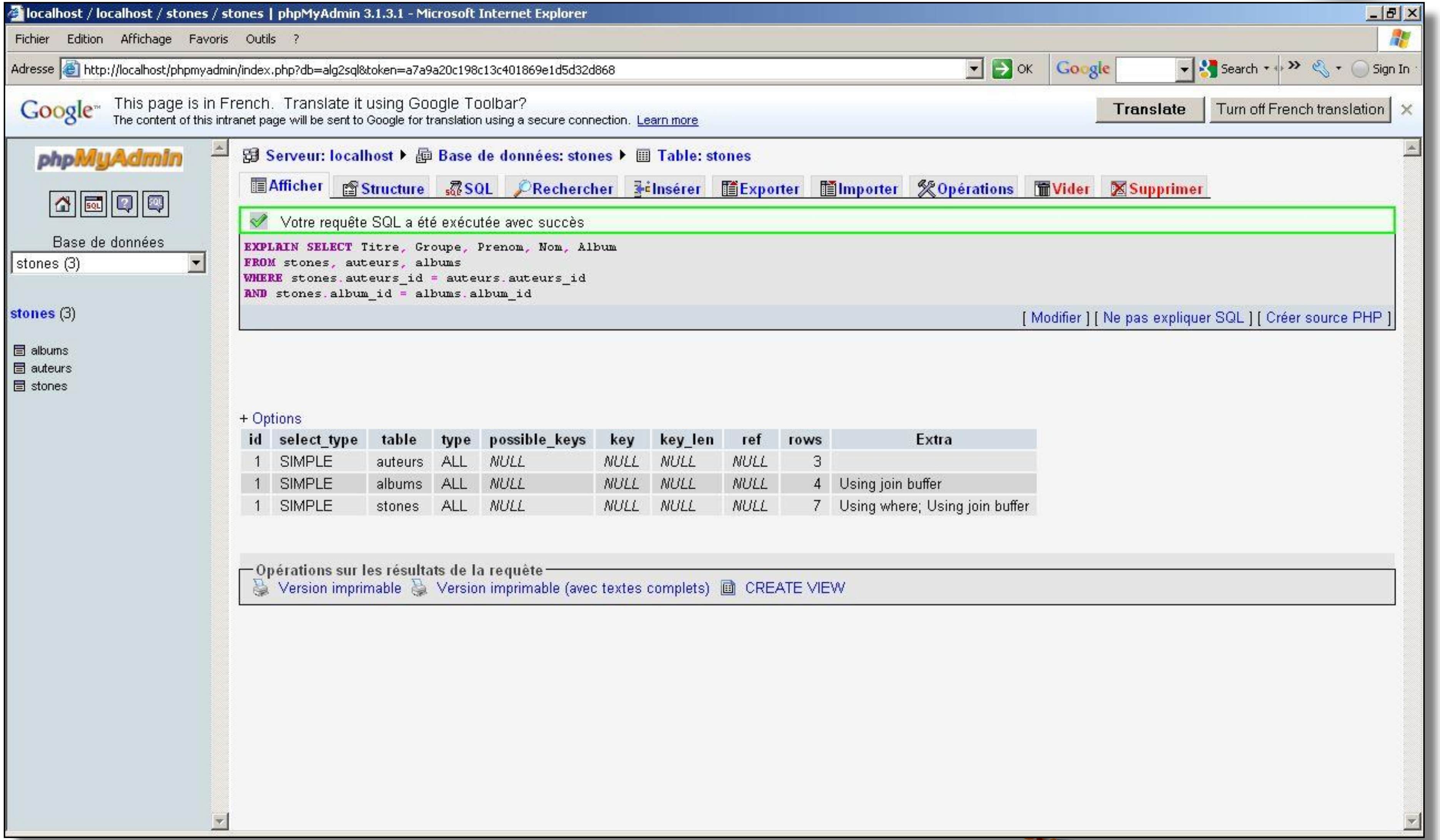
Traduction en cours

Explain Plan

- Mysql
- Postgres
- Oracle

Traduction en cours

MySQL



localhost / localhost / stones / stones | phpMyAdmin 3.1.3.1 - Microsoft Internet Explorer

http://localhost/phpmyadmin/index.php?db=alg2sql&token=a7a9a20c198c13c401869e1d5d32d868

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

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]

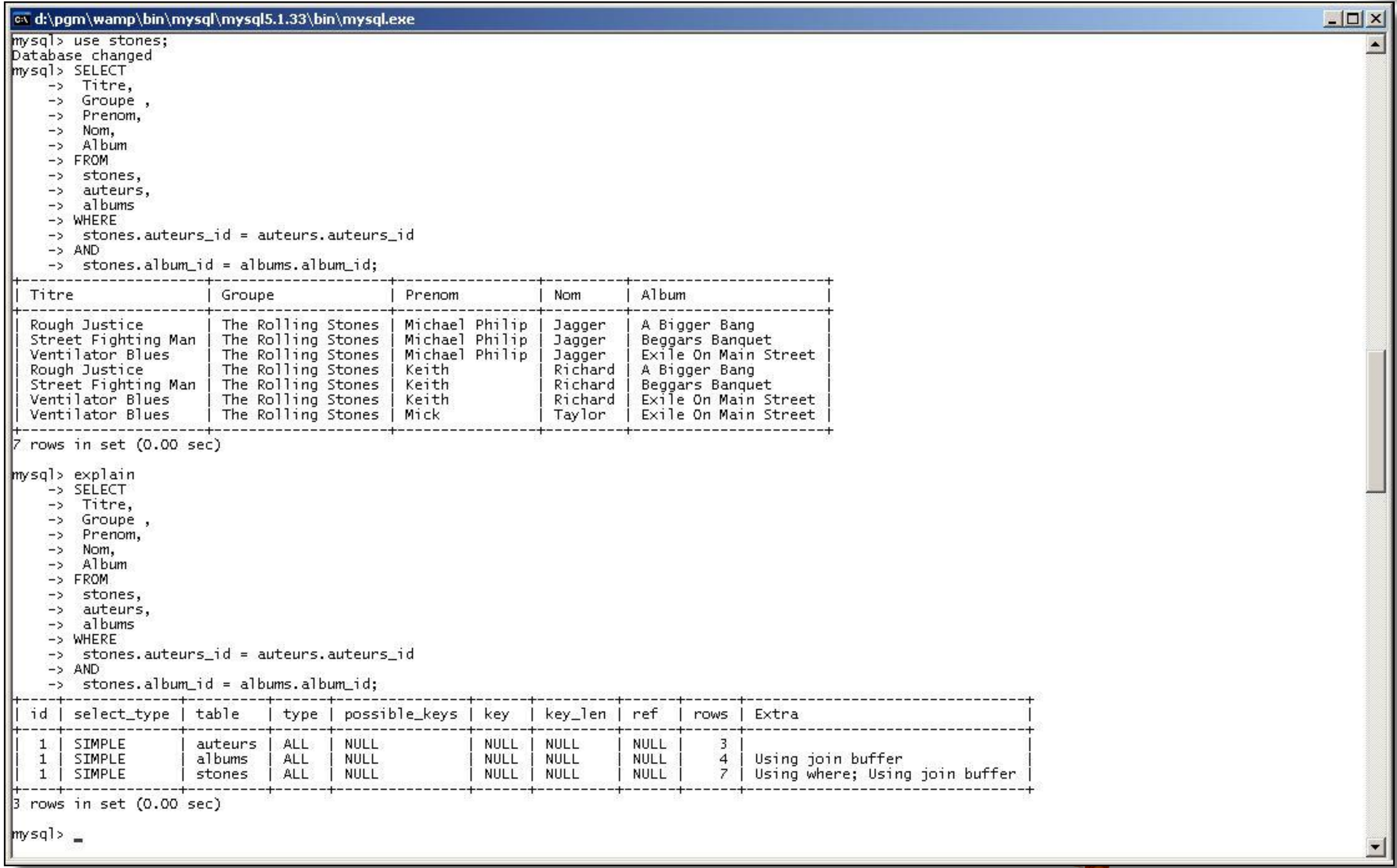
+ Options

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

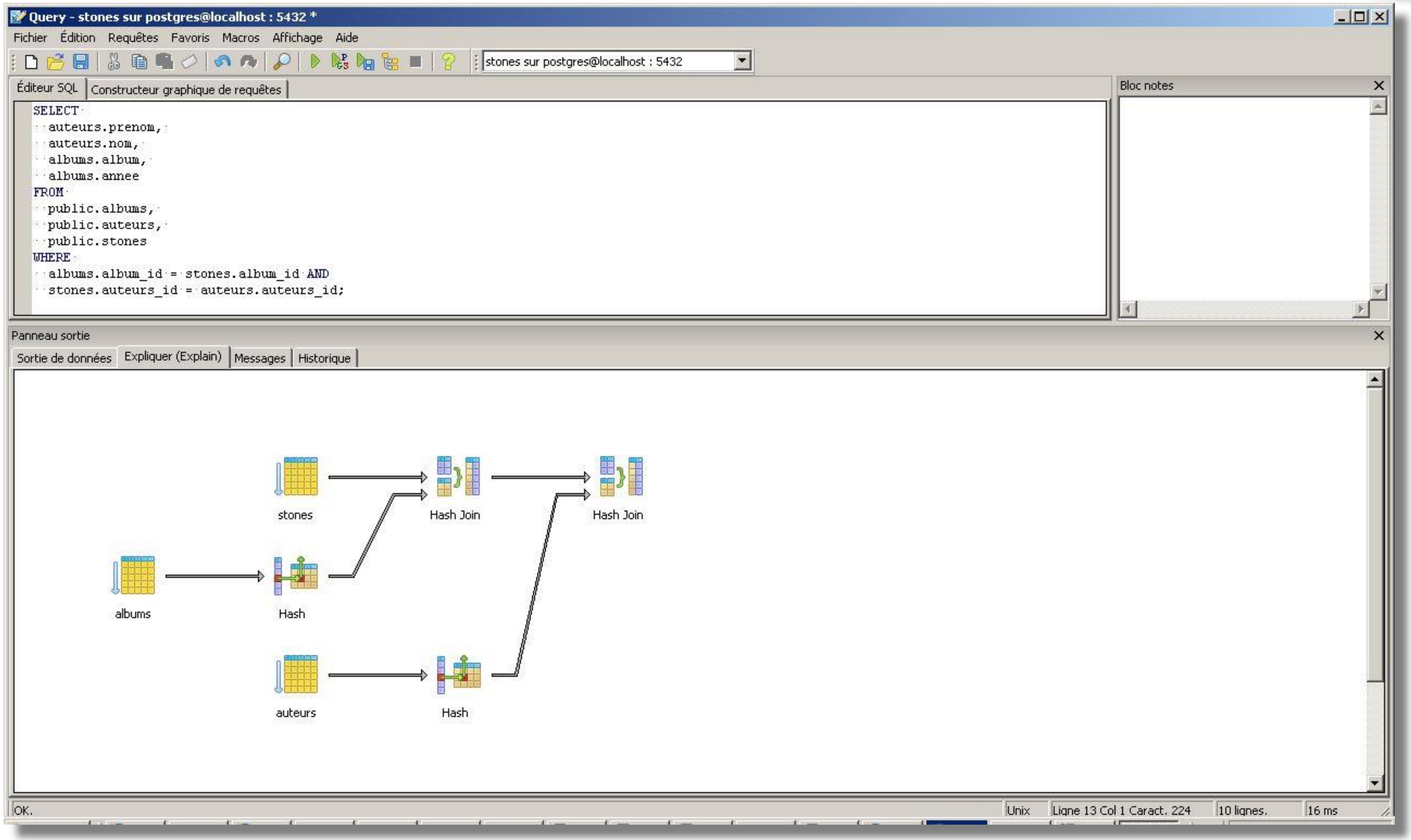
MySQL



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> _
```

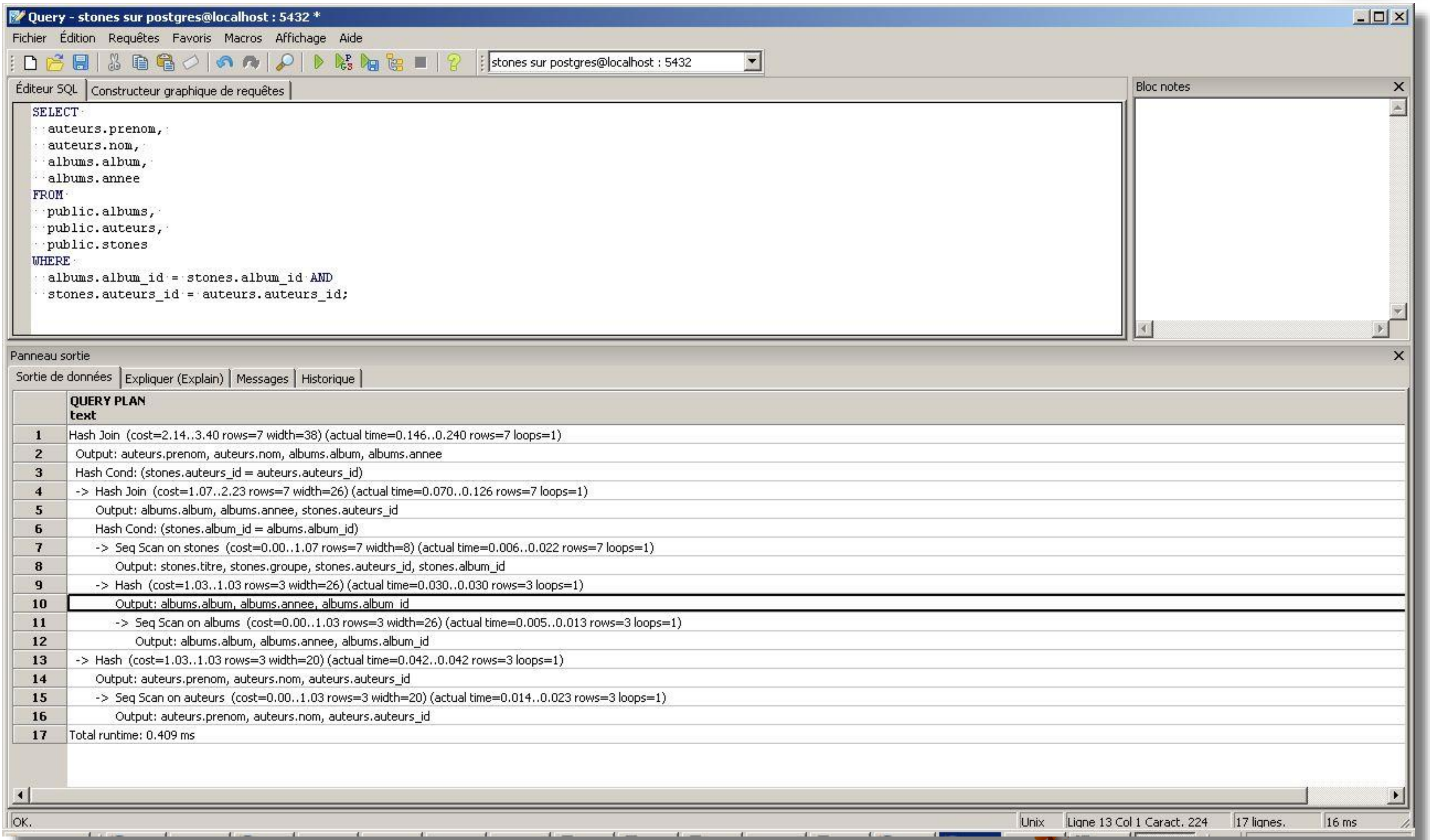
Postgres



Query - stones sur postgres@localhost : 5432 *

```
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;
```

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
Bloc notes
Panneau sortie
Sortie de données
Expliquer (Explain)
Messages
Historique

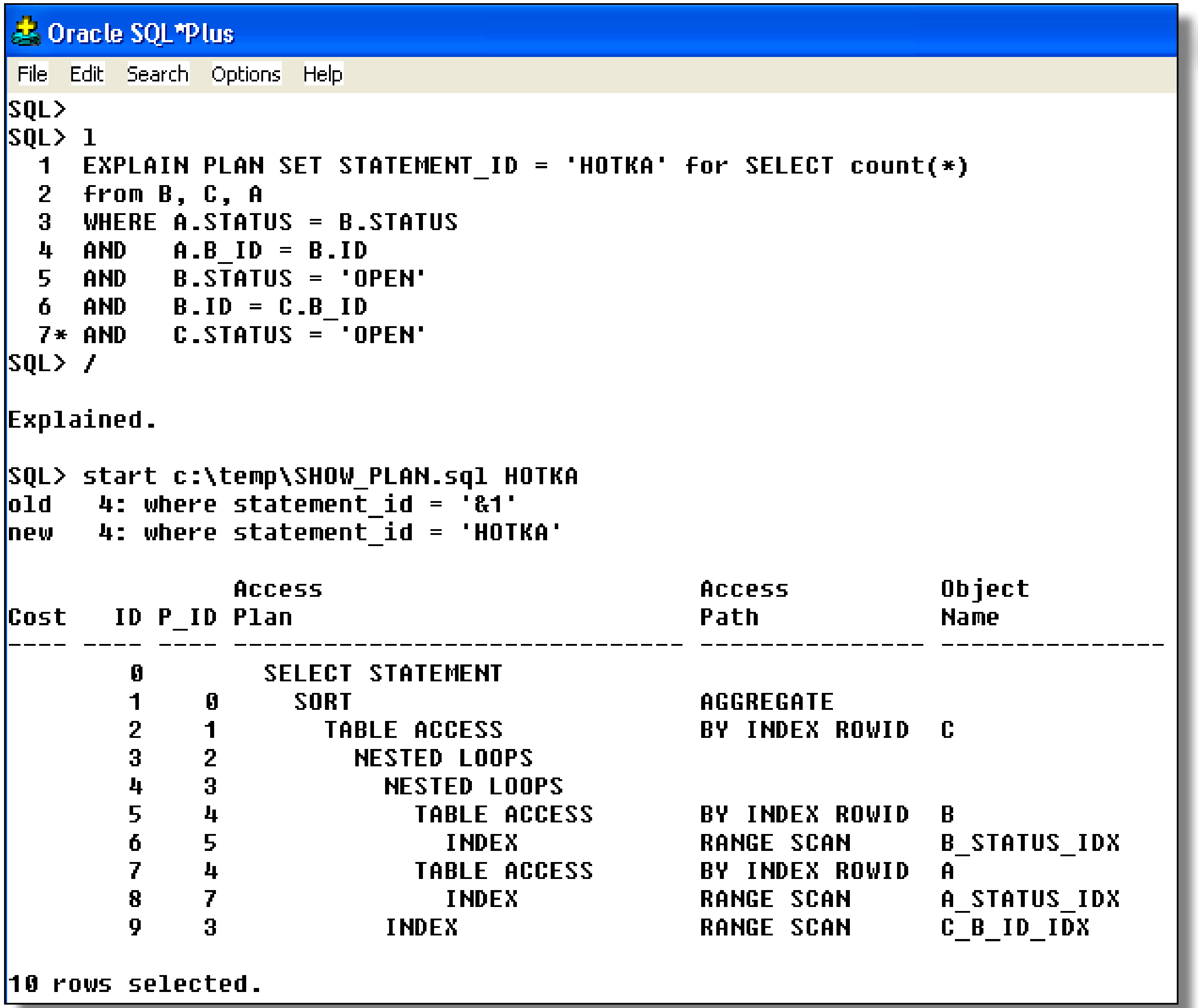
```sql
SELECT
  auteurs.prenom,
  auteurs.nom,
  albums.album,
  albums.annee
FROM
  public.albums,
  public.auteurs,
  public.stones
WHERE
  albums.album_id = stones.album_id AND
  stones.auteurs_id = auteurs.auteurs_id;
```

```
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

Traduction en cours

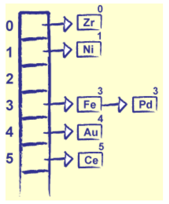
Oracle



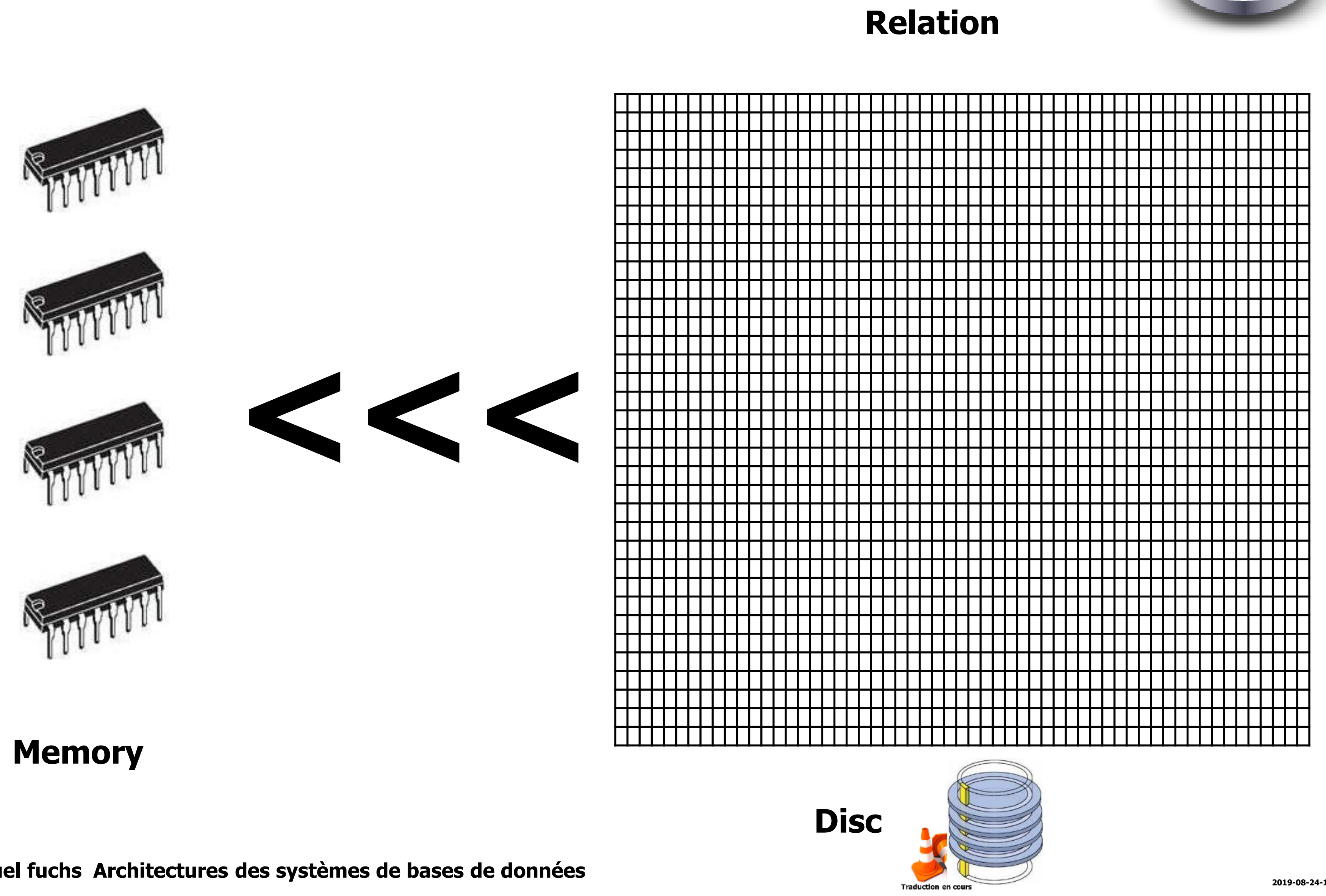
```
SQL>
SQL> l
  1  EXPLAIN PLAN SET STATEMENT_ID = 'HOTKA' for SELECT count(*)
  2  from B, C, A
  3  WHERE A.STATUS = B.STATUS
  4  AND   A.B_ID = B.ID
  5  AND   B.STATUS = 'OPEN'
  6  AND   B.ID = C.B_ID
  7* AND   C.STATUS = 'OPEN'
SQL> /

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 Implementation

- Nested loop
- Merge join
- Hash join

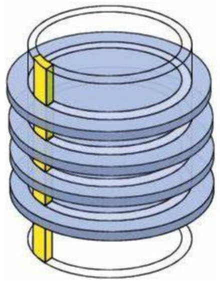


Big Relation => Big Data

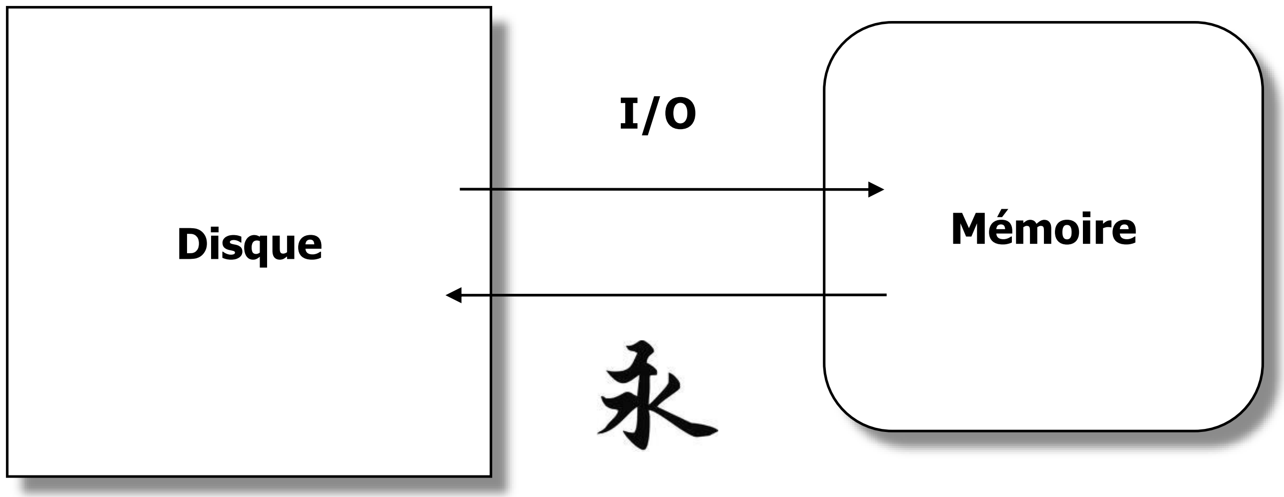


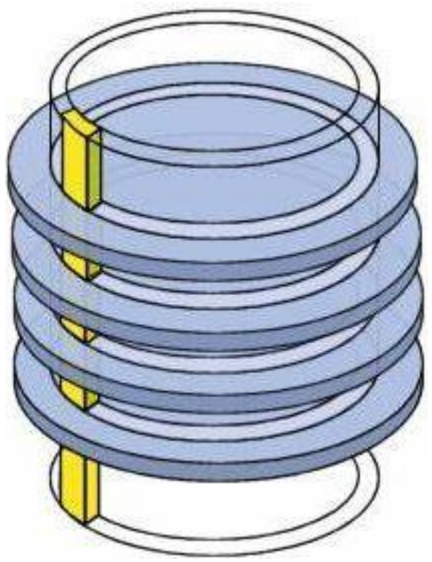
Jointures Physiques

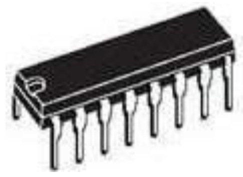
- Jointure en mémoire
  - Nested Loop
  - Merge join
  - Hash join
- Jointure sur disque
  - Nested Loop
  - Sort Merge Join
  - Hash join



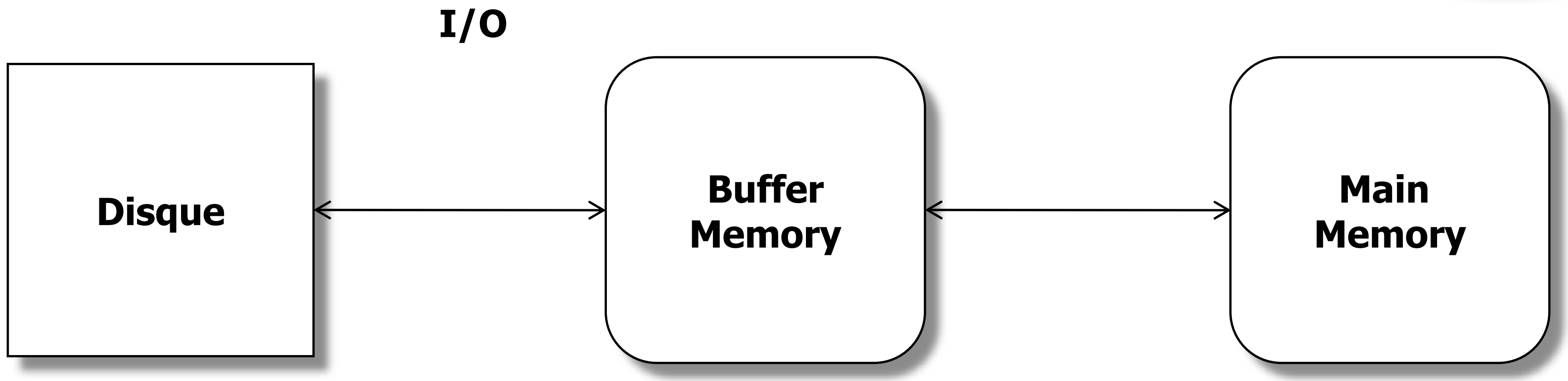
Entrées/Sorties, Lectures écritures disques, IO

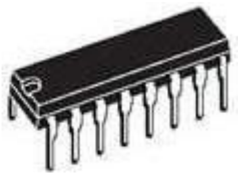


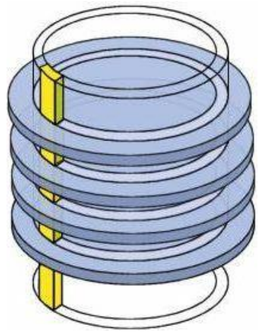


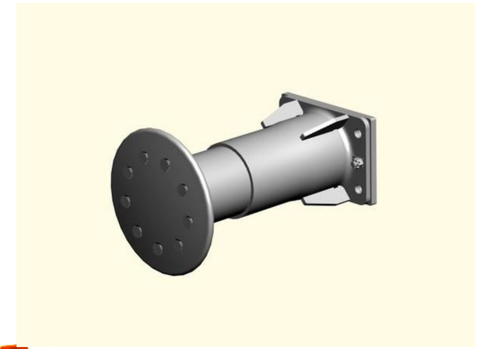


Entrées/Sorties, Lectures écritures disques, IO

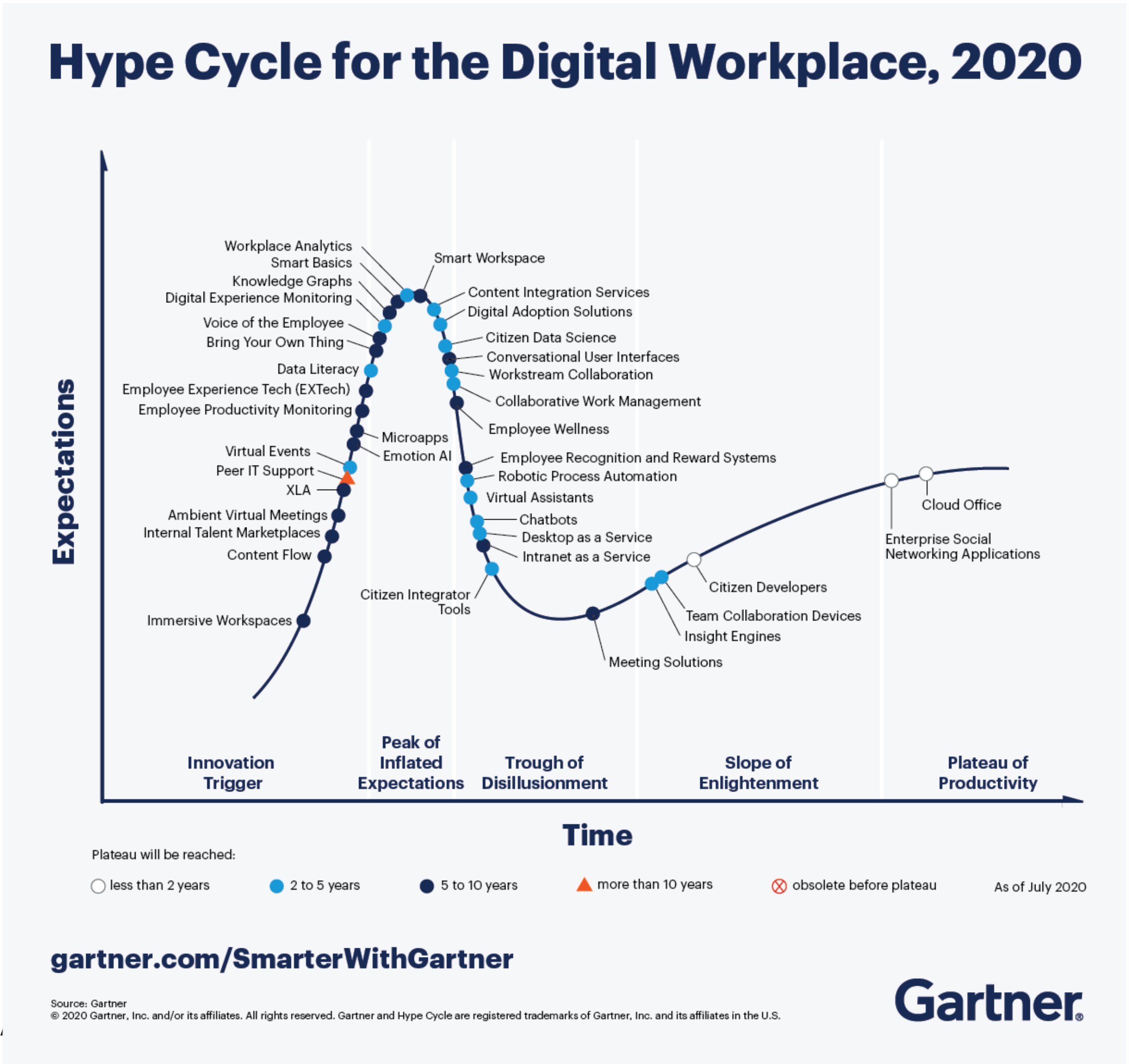








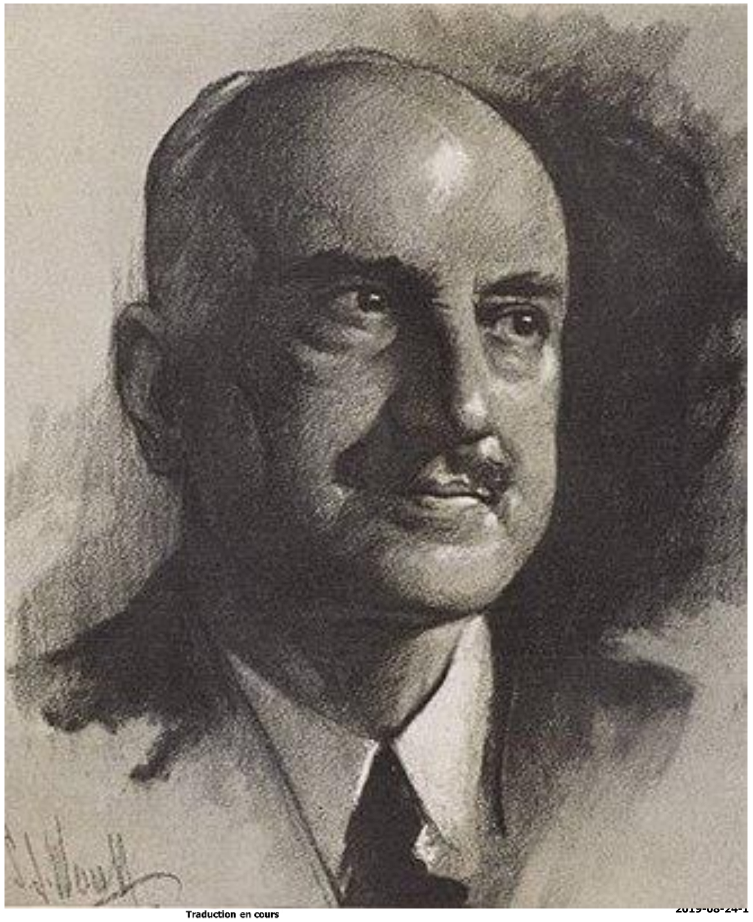
Gartner Hype Cycle



George Santayana

George Santayana (1905) Reason in Common Sense, p. 284, volume 1 of The Life of Reason

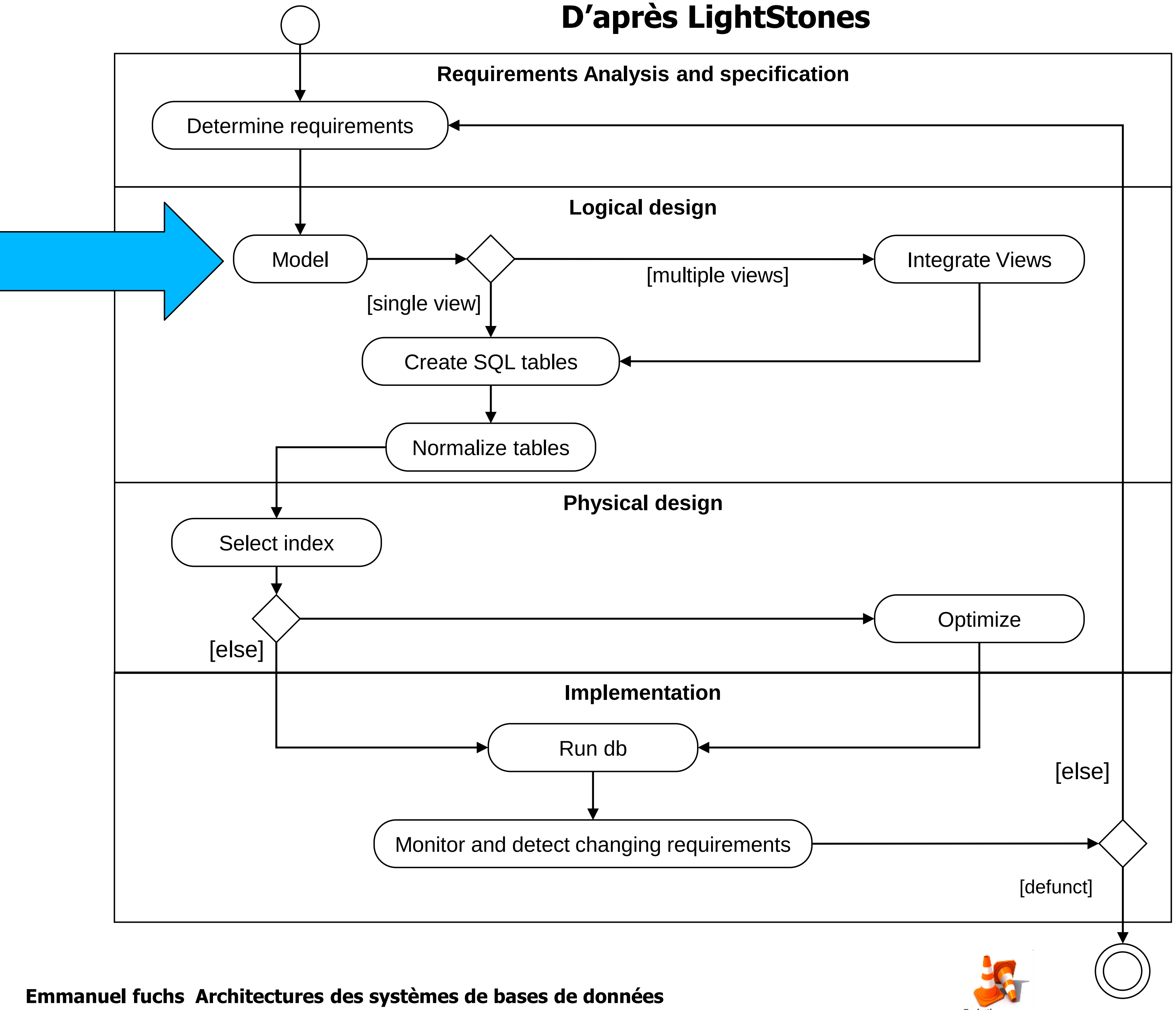
"Those who cannot remember the past are condemned to repeat it"



BIG DATA

- NoSQL
- MAP REDUCE
- ….

D’après LightStones


Requirements Analysis and specification
Determine requirements
Logical design
Model
[multiple views]
Integrate Views
[single view]
Create SQL tables
Normalize tables
Physical design
Select index
Optimize
[else]
Implementation
Run db
[else]
Monitor and detect changing requirements
[defunct]