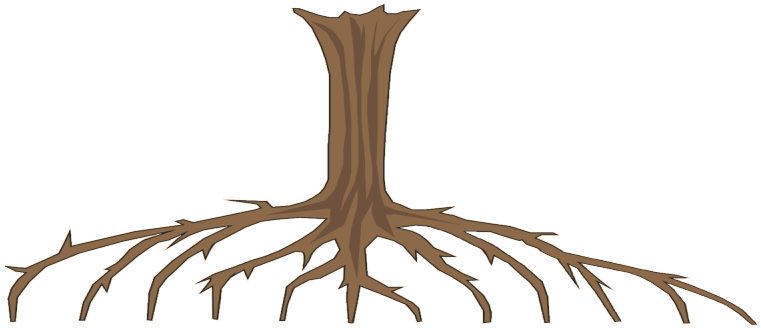
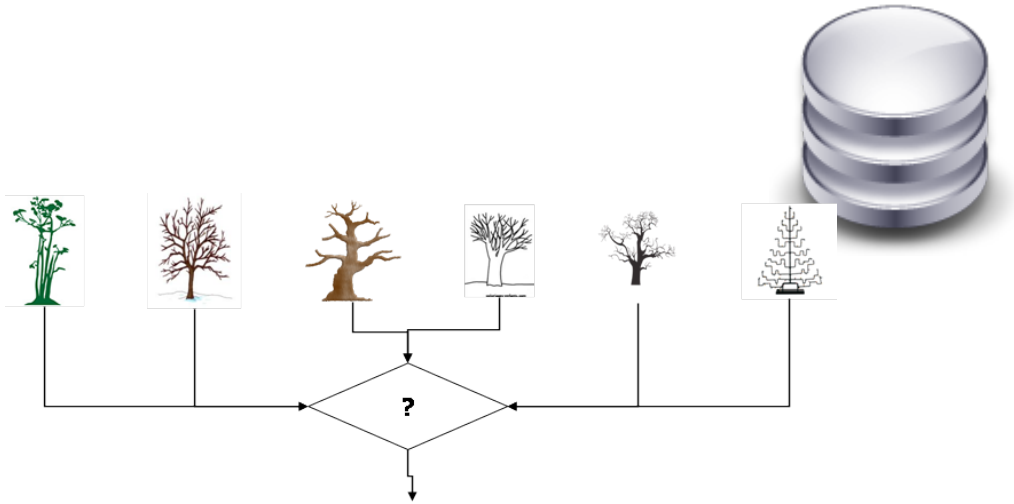




Conception Avancée de Bases de Données

Sélection d'Arbre de requêtes Logique

Logical Query Plan Selection

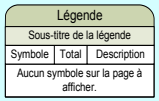
Traduction en cours

Layered Architecture

Presentation Layer

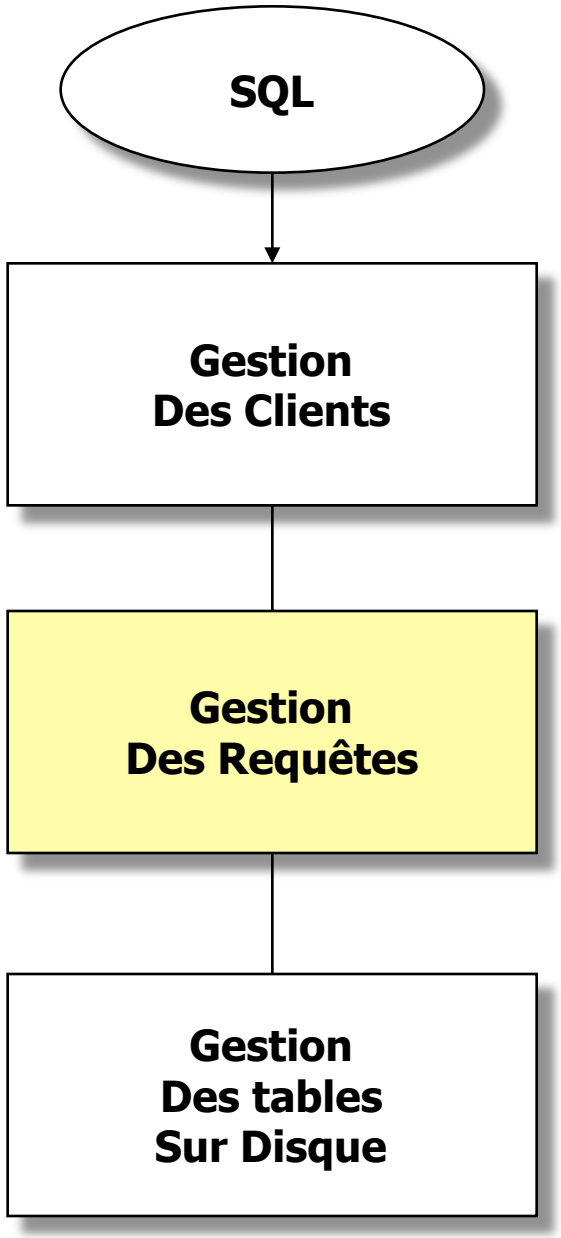
Business Layer

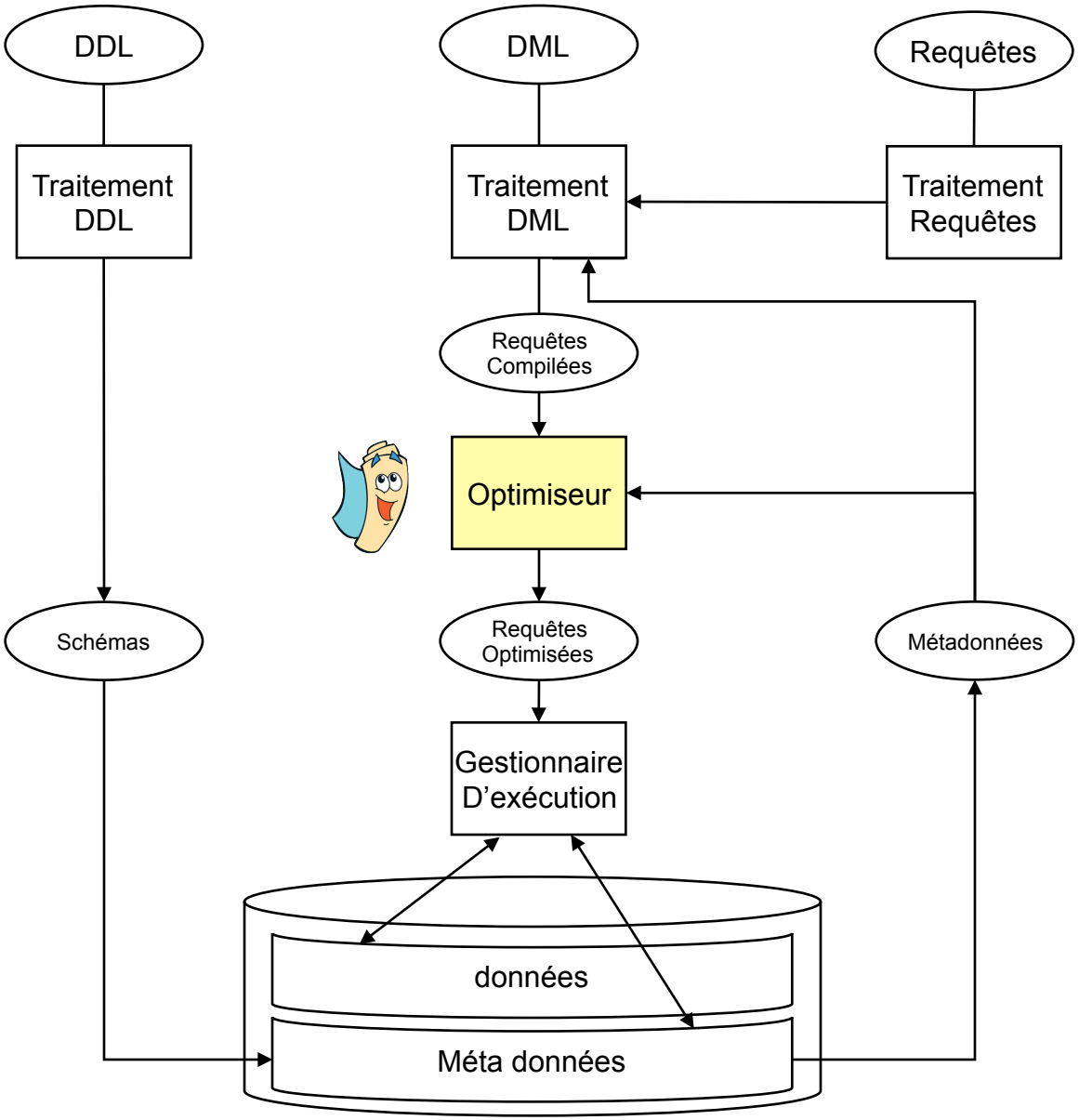
Data Layer



Data Base

Big Picture


SQL
Gestion
Des Clients
Gestion
Des Requêtes
Gestion
Des tables
Sur Disque



D'après C.J DATE

DDL : langage de définition des données; DML : langage de manipulation des données

From Ullman

Parse Query

Query expression tree

Query Optimization

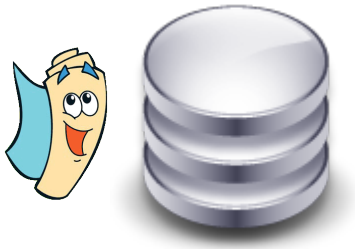
Select Logical Query plan

Logical Query Plan tree

Select physical Query plan

Physical Query Plan tree

From Ullman



Parse Query

Query expression tree

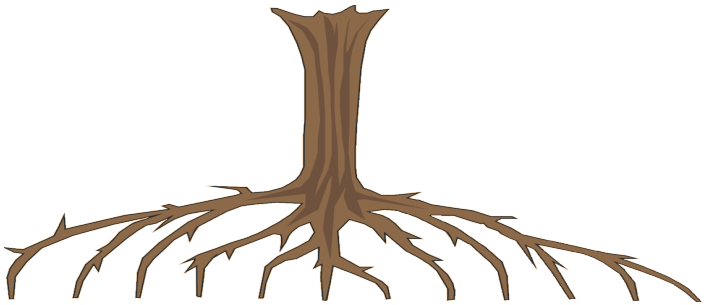
Select Logical Query plan

Logical Query Plan tree

Select physical Query plan

Physical Query Plan tree

Arbre Logique



Arbre Physique

Niveaux d'abstraction

Modèle

Algèbre

σ **owner1=owner2 (Cats** $\otimes$ **Dogs) = Cat** $\bowtie$ **Dogs**

Logiciel

Java, C++,..

Opérateurs

① SELECT -> σ (sigma)
② PROJECT -> Π(pi)
③ PRODUCT -> ×(times)
④ JOIN -> (|×|) ⋈ (bow-tie)
⑤ UNION -> ∪ (cup)
⑥ INTERSECTION -> ∩(cap)
⑦ DIFFERENCE -> - (minus)
⑧ RENAME -> ρ (rho)

Arbre de requêtes

Cats

name	owner
Fluffy	Harold
Claws	Gwen

Dogs

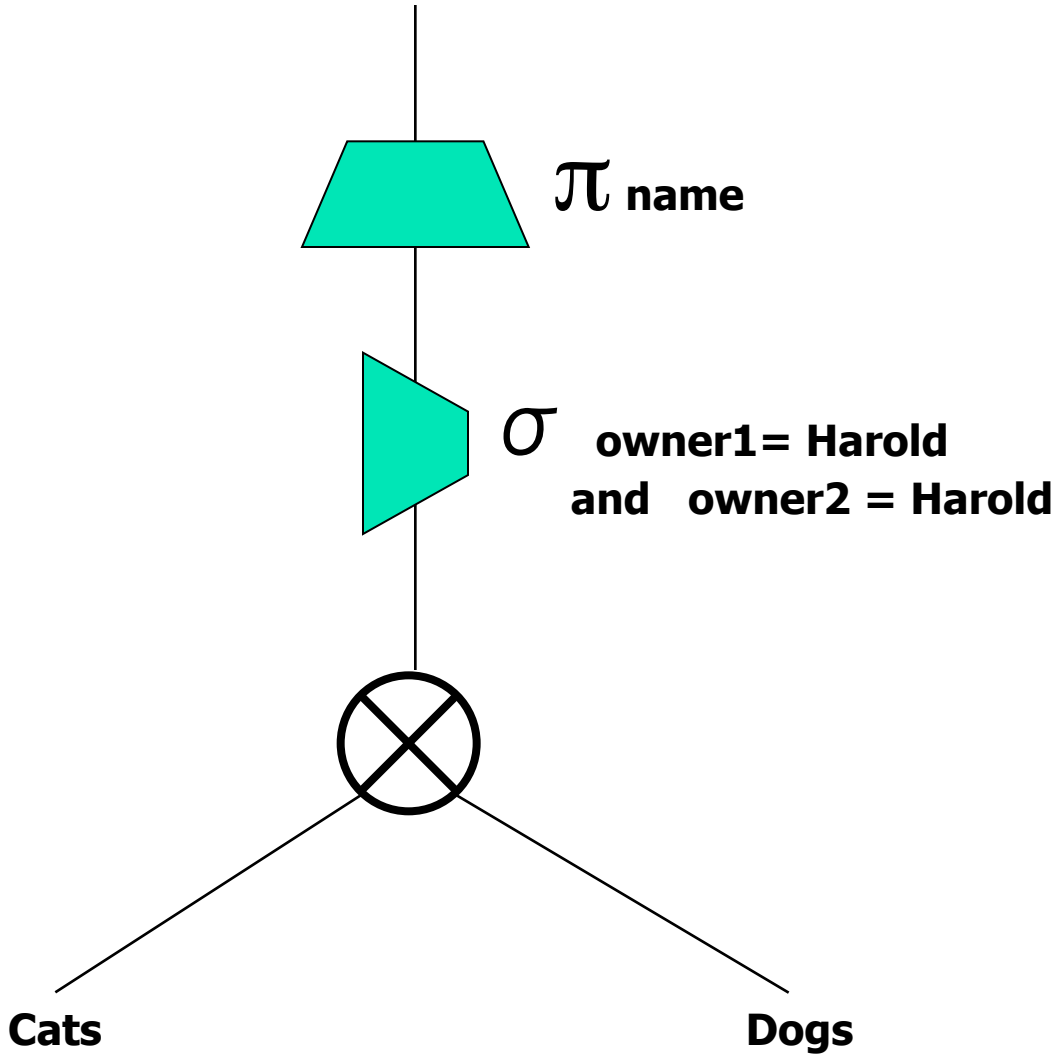
name	owner
Buffy	Harold
Fang	Benny
Bowser	Diane

Quels sont les chats et les chiens qui appartiennent à Harold ?

SQL

```
SELCT cats.name
FROM cats, dogs
WHERE  cats.owner = 'Harold'  and  dogs.owner = 'Harold';
```

Arbre 1

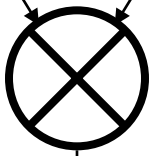


Cats

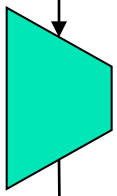
name	owner
Fluffy	Harold
Claws	Gwen

Dogs

name	owner
Buffy	Harold
Fang	Benny
Bowser	Diane



name1	owner1	name2	owner2
Fluffy	Harold	Buffy	Harold
Fluffy	Harold	Fang	Benny
Fluffy	Harold	Bowser	Diane
Claws	Gwen	Buffy	Harold
Claws	Gwen	Fang	Benny
Claws	Gwen	Bowser	Diane



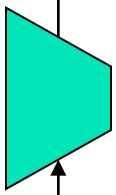
σ **owner1= Harold and owner2 = Harold**

name1	owner1	name2	owner2
Fluffy	Harold	Buffy	Harold

Arbre 1

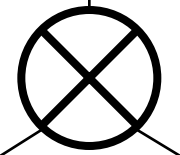
π name

4 col, 1 lignes



σ owner1= Harold
and owner2 = Harold

4 col, 6 lignes



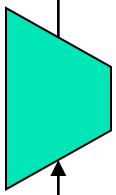
2 col, 2 lignes

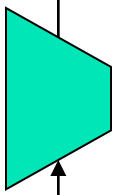
2 col, 3 lignes

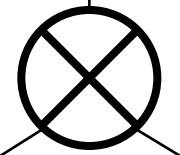
Cats

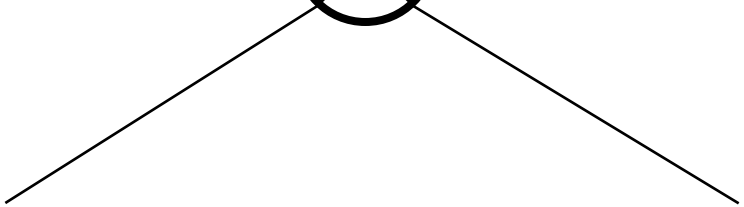
Dogs

Arbre 1









π name

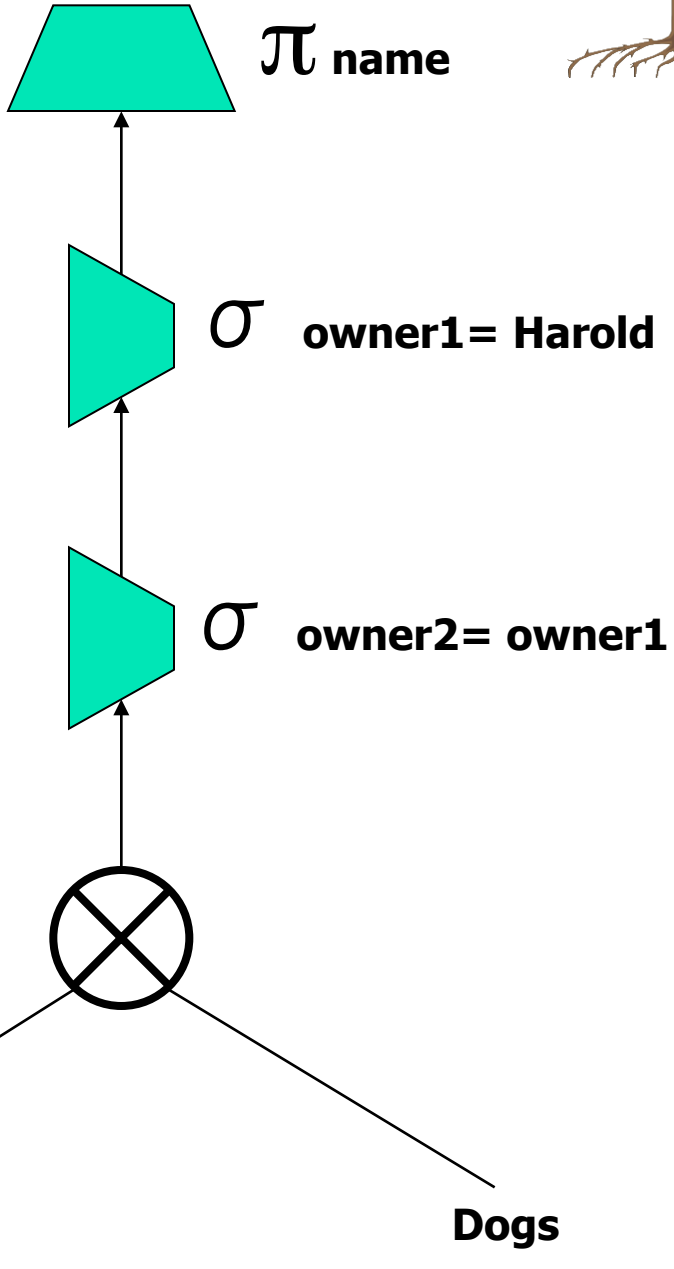
σ owner1= Harold

σ owner2= Harold

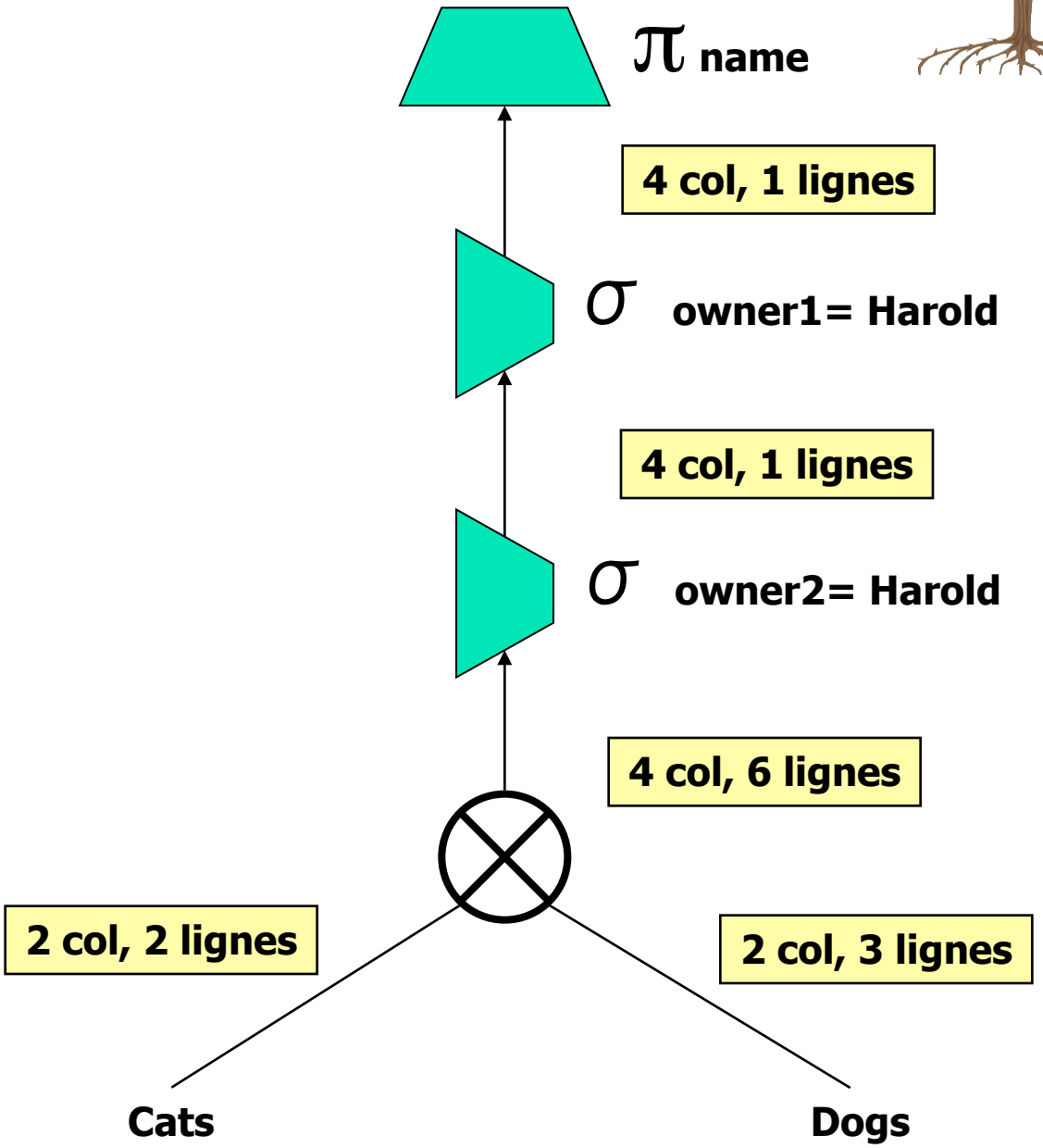
Cats

Dogs

Arbre 1



Arbre 1


π name
4 col, 1 lignes
σ owner1= Harold
4 col, 1 lignes
σ owner2= Harold
4 col, 6 lignes
2 col, 2 lignes
2 col, 3 lignes
Cats
Dogs

Arbre 2

Cats

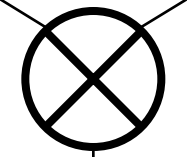
name	owner
Fluffy	Harold
Claws	Gwen

Dogs

name	owner
Buffy	Harold
Fang	Benny
Bowser	Diane

name	owner
Buffy	Harold

name	owner
Fluffy	Harold



name1	owner1	name2	owner2
Fluffy	Harold	Buffy	Harold

Gokul
Busta
Phyllida
Chumney
Sprinkle
Almendarez
Ruderman
Stash
Teagle
Mulnix
Slezak
Lepore
Czaplicki
Curti
Tibelda
Seymore
Hoe
Spickler
Mattingly
Regner
Hirschberg
Cyndy
Rowlett
Werling

Stash

Gokul	F
Busta	M
Phyllida	M
Chumney	F
Sprinkle	M
Almendarez	F
Ruderman	F
Stash	M
Teagle	F
Mulnix	M
Slezak	F
Lepore	F
Czaplicki	M
Curti	M
Tibelda	F
Seymore	F
Hoe	M
Spickler	F
Mattingly	F
Regner	M
Hirschberg	F
Cyndy	M
Rowlett	M
Werling	F

F

Gokul	F
Chumney	F
Almendarez	F
Ruderman	F
Teagle	F
Slezak	F
Lepore	F
Tibelda	F
Seymore	F
Spickler	F
Mattingly	F
Hirschberg	F
Werling	F

SELECTIVITY

Arbre 2

π name
4 col, 1 ligne
2 col, 1 ligne
2 col, 1 ligne
σ owner= Harold
σ owner = Harold
2 col, 2 lignes
2 col, 3 lignes
Cats
Dogs

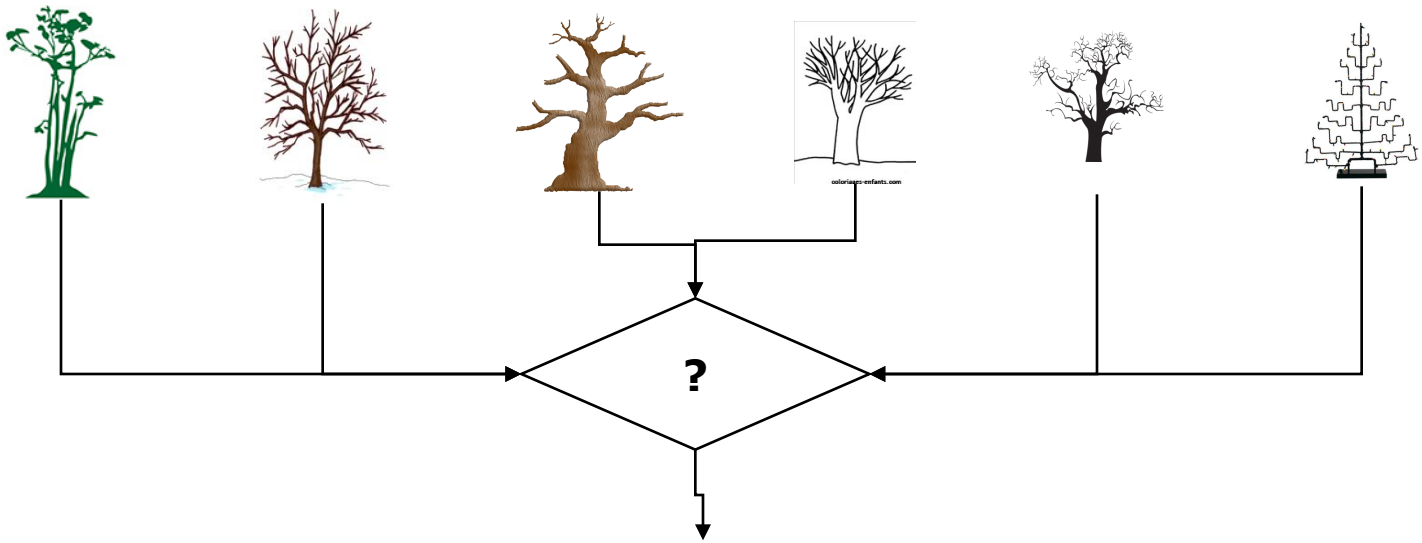
Modèle de coût simplifié



- On considère le nombre de cellules manipulées
- Arbre 1:
  - 2*2 + 2*3 + 4*6 + 4*1 = 38 cellules manipulées.
- Arbre 2:
  - 2*2 + 2*3 + 2*1 + 2*1 = 10 cellules manipulées.

Requêtes Arbres

- Une requête SQL corresponds à une multitude d'arbres.
- L'optimiseur de requêtes doit choisir parmi tous ces arbres.
- Algorithme de choix du bonne arbre.

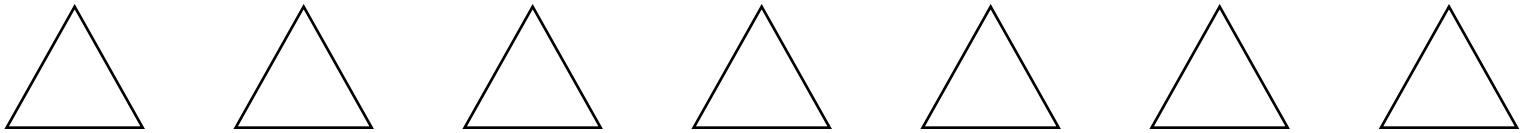


Simple Algorithm

1. Enumerate all the available plans
2. Assess the cost of each plan
3. Choose the cheapest plan

Simple Algorithm

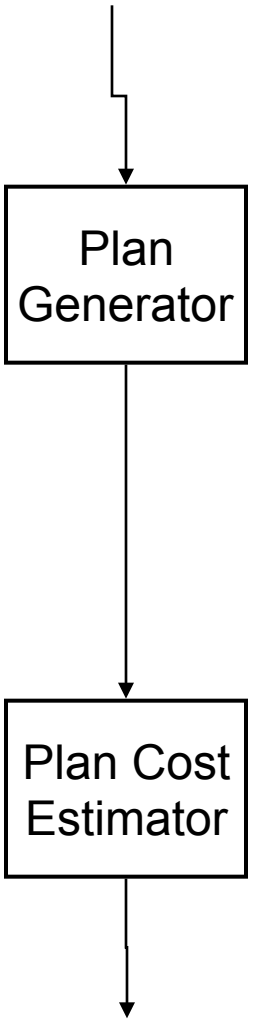
- 1. Enumerate all the available plans

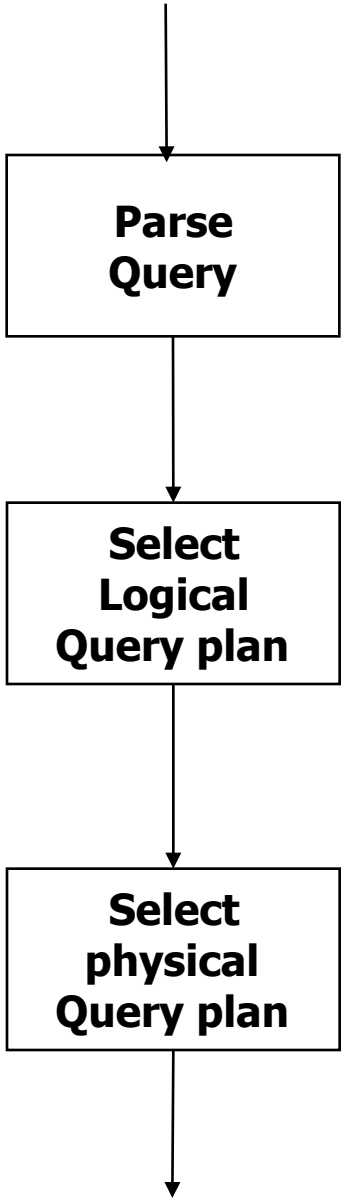


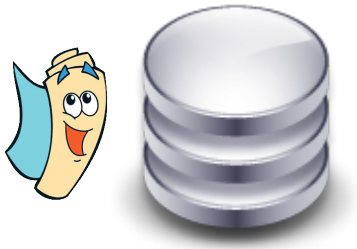
- 2. Assess the cost of each plan

- 3. Choose the cheapest plan

Algorithm Phase







- 1. Enumerate all the available plans
- 2. Assess the cost of each plan
- 3. Choose the cheapest plan