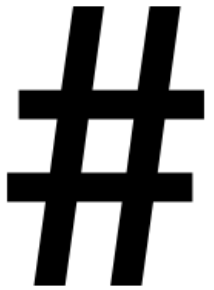
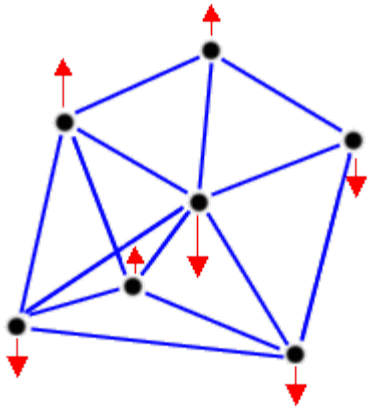
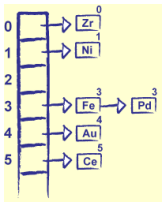


Conception Avancée de Bases de Données



Hash Selection



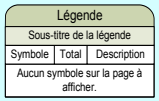
Traduction en cours

Layered Architecture

Presentation Layer

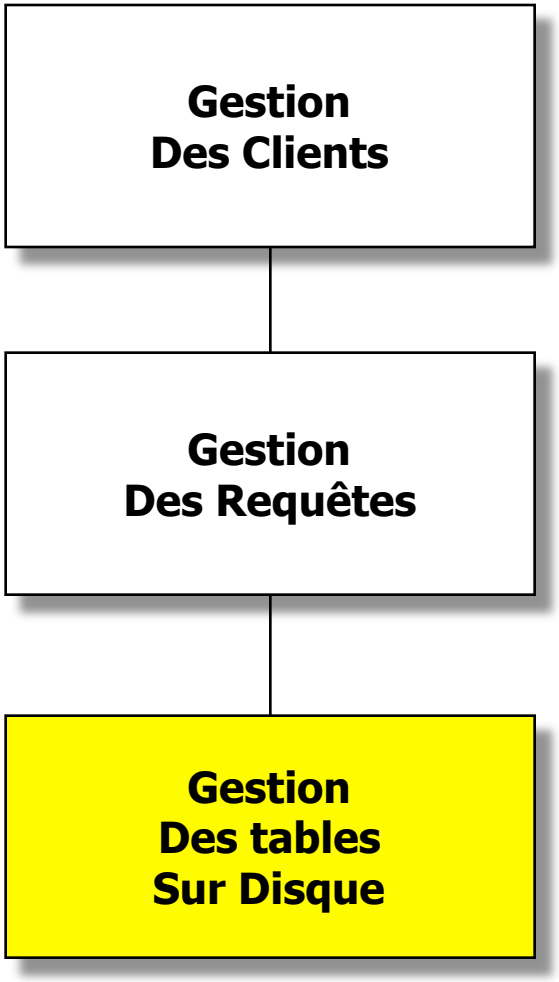
Business Layer

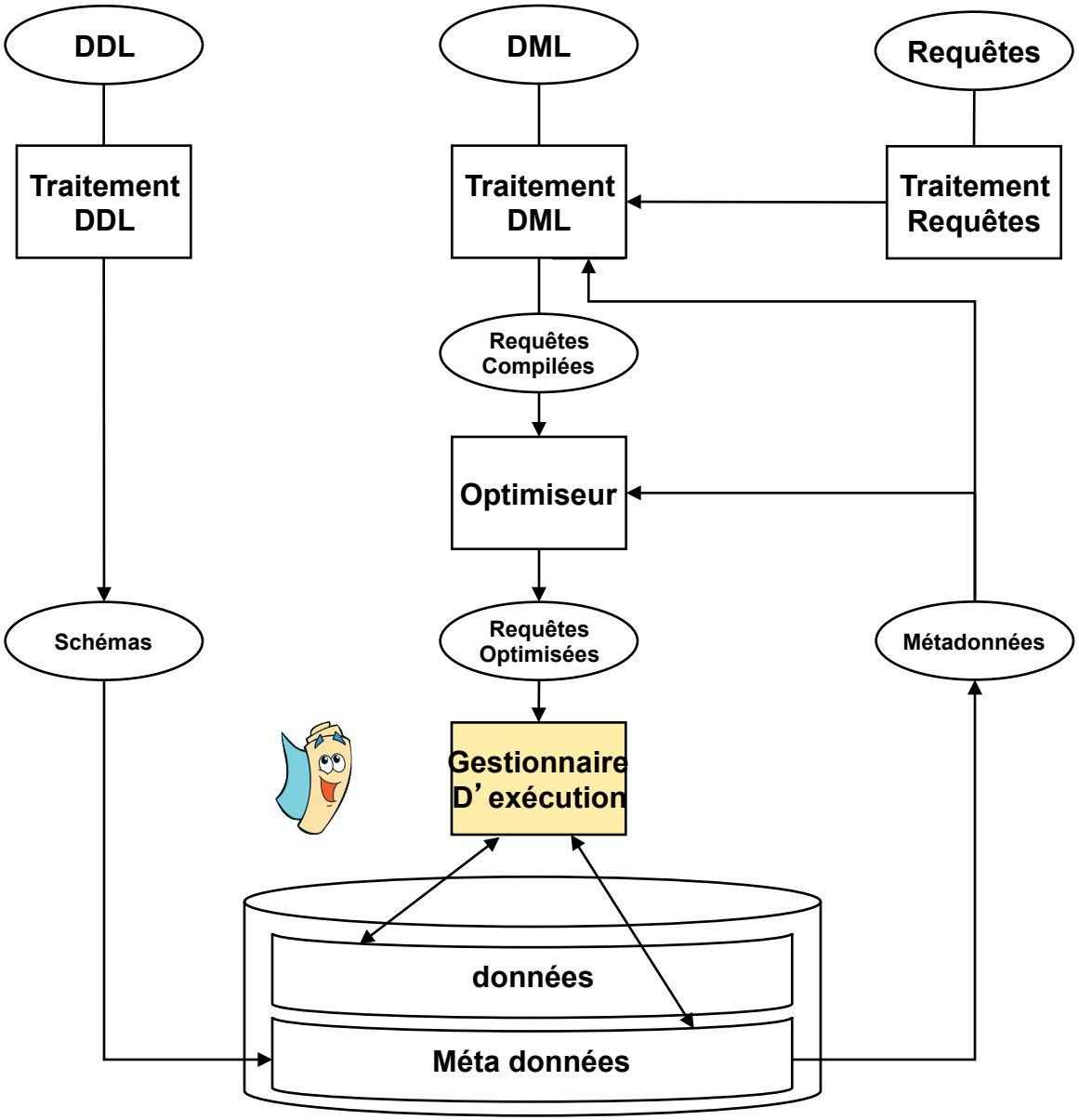
Data Layer



Data Base

Big Picture

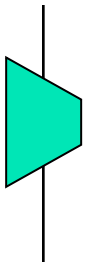

Gestion
Des Clients
Gestion
Des Requêtes
Gestion
Des tables
Sur Disque

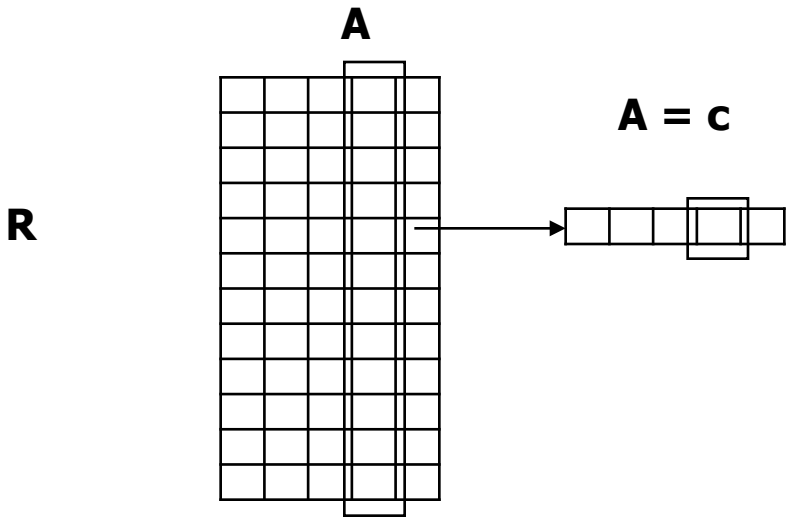


D'après C.J DATE

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

Sélection d'un Tuples : Attribut A = 'c'

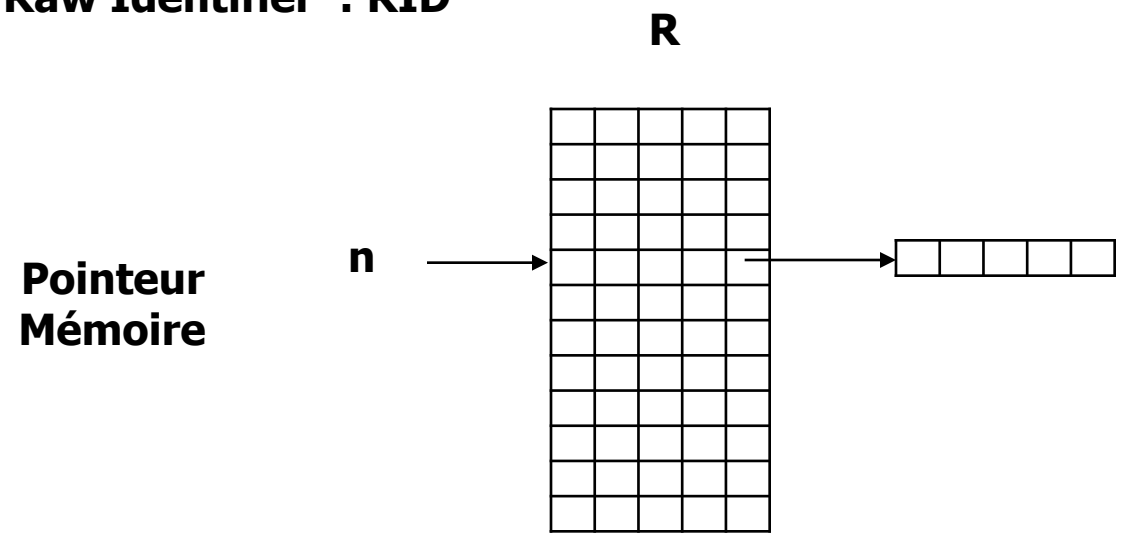


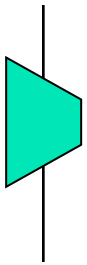


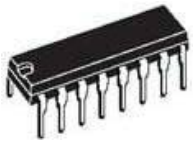
Accès par adresse : RID

Hypothèse : On connaît l'adresse physique de la ligne

Raw Identifier : RID







Recherche dans un tableau

- Intuitivement, la recherche d'une chaîne de caractère dans un tableau nécessite la lecture de chacune des cases du tableau et la comparaison avec la chaîne de référence.

Position du problème

- Pour rechercher dans une table un Tuples ayant un attribut A tel que A = c
  - Solution 1 : Seq Scan 
  - Solution 2 : Hash 

Tuple physical access : RID

Raw Identifier (RID)

R

	X	Y
0	5	A
1	8	B
2	3	B
3	9	E
4	1	G
5	10	J
6	7	K
7	2	U
8	4	V
9	6	Z

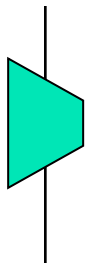
RID →

Y = 'E'

3

9	E

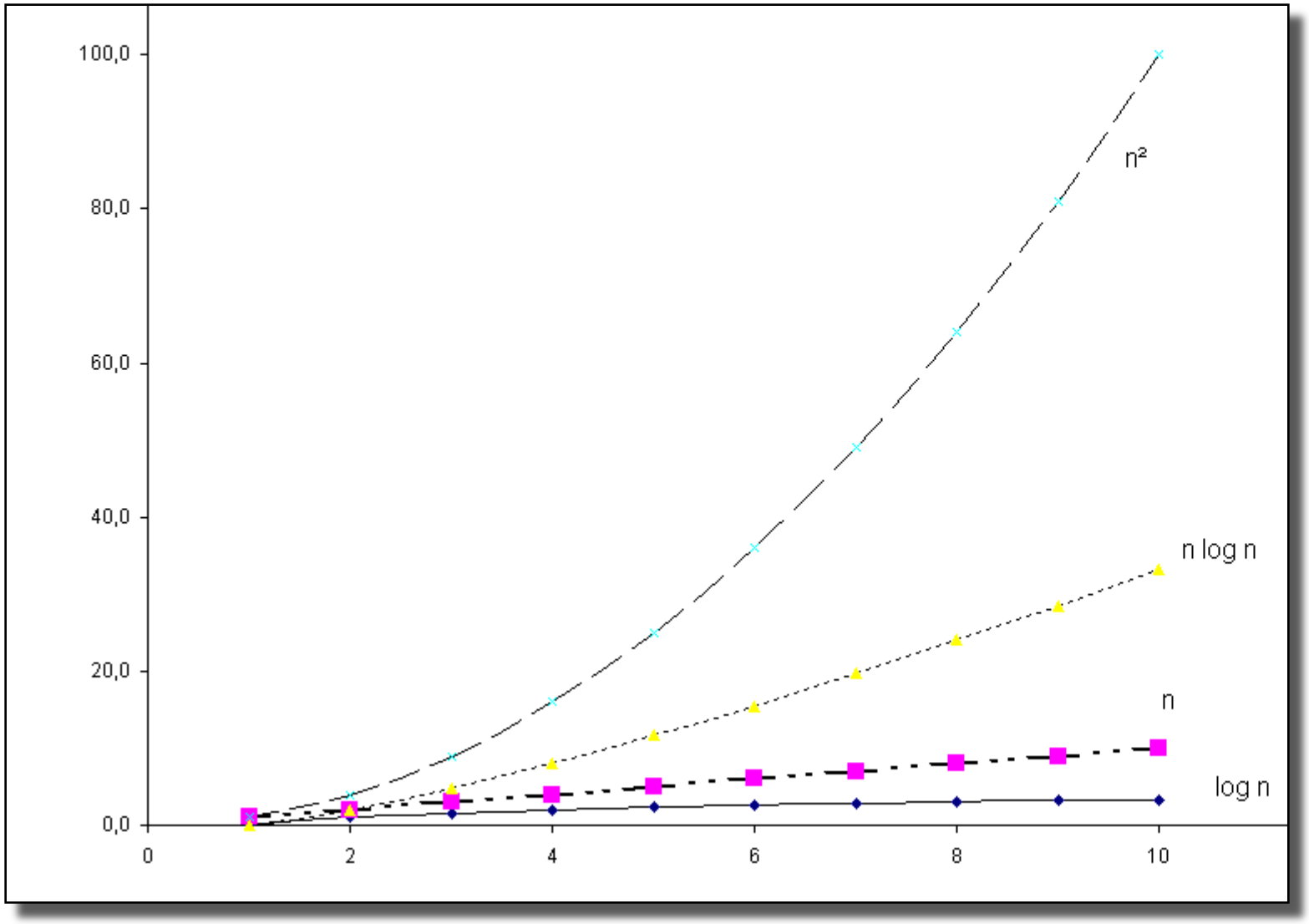
R (3)



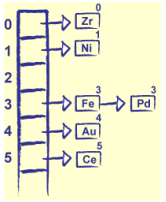
Solution 2

- Pour rechercher dans une table un Tuples ayant un attribut A tel que A = c
  - La fonction de hachage renvoie par calcul le RID du Tuples.
- Le hachage permet d'éviter les comparaisons.

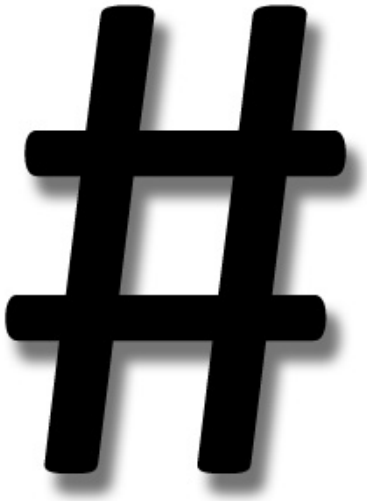
Complexity



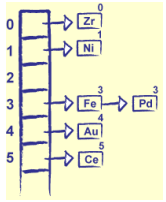
Principe du hachage (associatif)

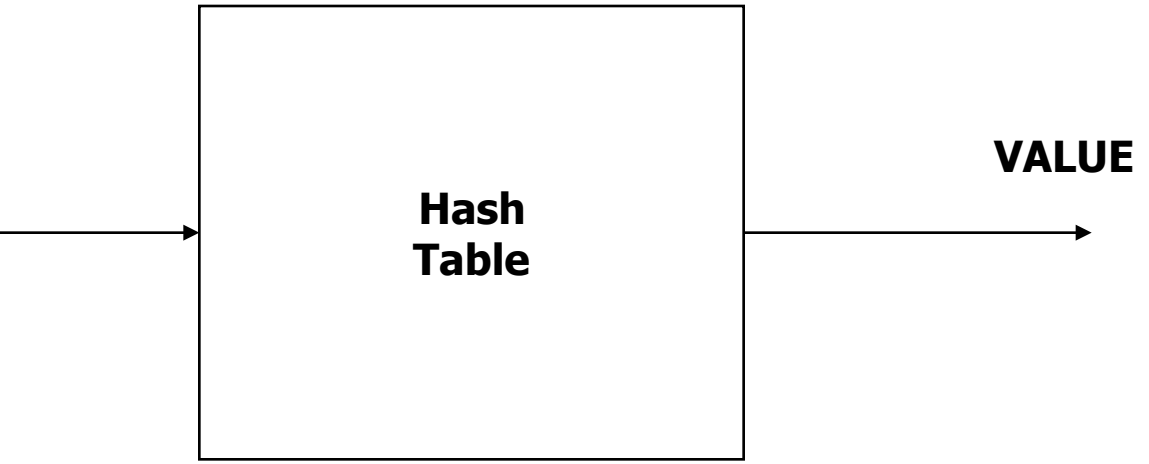


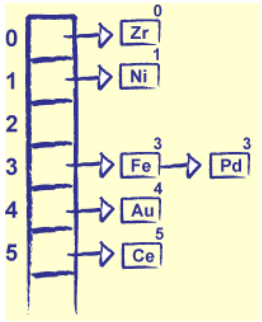
- Une table de hachage est une structure de données qui permet une association clé éléments.
- Le temps moyen pour chercher un élément est en O(1).
- Le temps pour le cas le pire est en O(n).



Key Value Pair

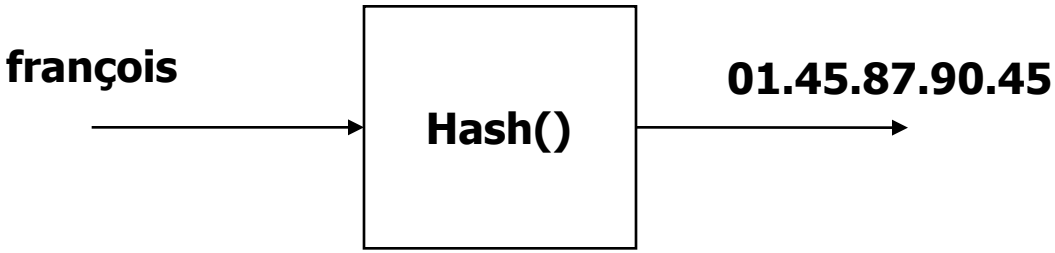


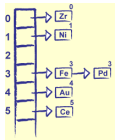




Exemple : Liste de numéros de téléphone

Key	VALUE
pierre	01.42.78.96.12
paul	03.67.90.67.00
françois	01.45.87.90.45
mohamed	04.88.8945.29
khaled	06.98.56.22.48
laila	01.23.45.67.89
alex	34.56.15.27.78.
claire	34.56.73.45.67
philippe	02.34.26.48.26.

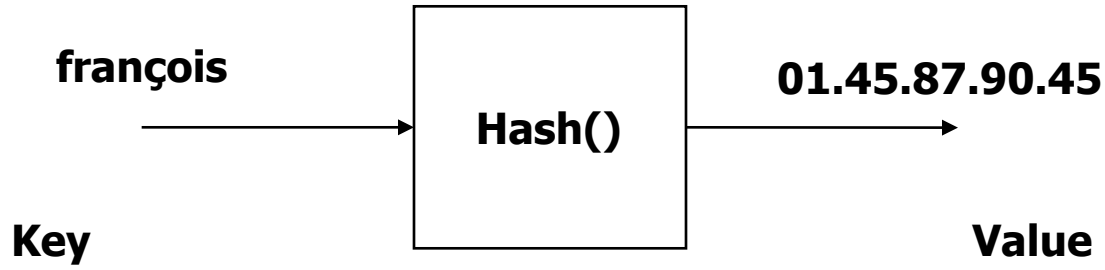


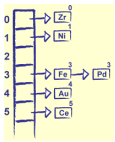


Exemple : Liste de numéros de téléphone

	Key	VALUE
0	pierre	01.42.78.96.12
1	paul	03.67.90.67.00
2	françois	01.45.87.90.45
3	mohamed	04.88.8945.29
4	khaled	06.98.56.22.48
5	laila	01.23.45.67.89
6	alex	34.56.15.27.78.
7	claire	34.56.73.45.67
8	philippe	02.34.26.48.26.

Texte transformé en indice de tableau



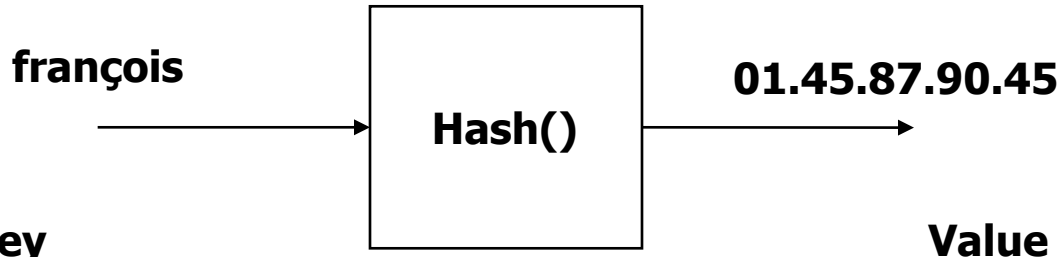


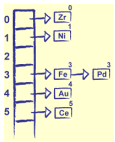
Exemple : Liste de numéros de téléphone

#

	Key	Key RID	VALUE
0	pierre	0	01.42.78.96.12
1	paul	1	03.67.90.67.00
2	françois	2	01.45.87.90.45
3	mohamed	3	04.88.8945.29
4	khaled	4	06.98.56.22.48
5	laila	5	01.23.45.67.89
6	alex	6	34.56.15.27.78.
7	claire	7	34.56.73.45.67
8	philippe	8	02.34.26.48.26.

Texte transformé en indice de tableau





Exemple : Liste de numéros de téléphone

#

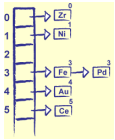
paul

	Key	Key RID	VALUE
0	pierre	0	01.42.78.96.12
1	paul	1	03.67.90.67.00
2	françois	2	01.45.87.90.45
3	mohamed	3	04.88.8945.29
4	khaled	4	06.98.56.22.48
5	laila	5	01.23.45.67.89
6	alex	6	34.56.15.27.78.
7	claire	7	34.56.73.45.67
8	philippe	8	02.34.26.48.26.

Texte transformé en indice de tableau

françois → **Hash()** → **01.45.87.90.45**

Key **Value**



Octothorpe

- The symbol # is most commonly known as a number sign, hash, or pound sign. Other names include octothorpe and hashtag.
- Not to be confused with the Chinese character ⌗, the sharp sign (♯),

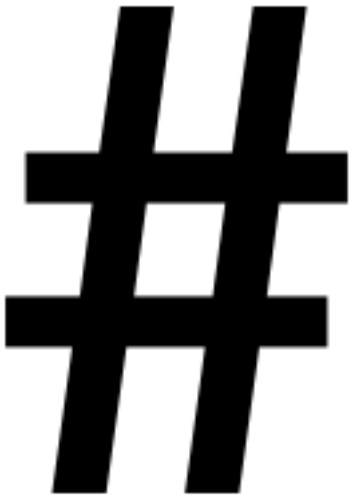
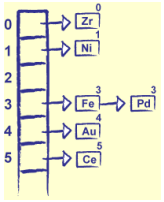
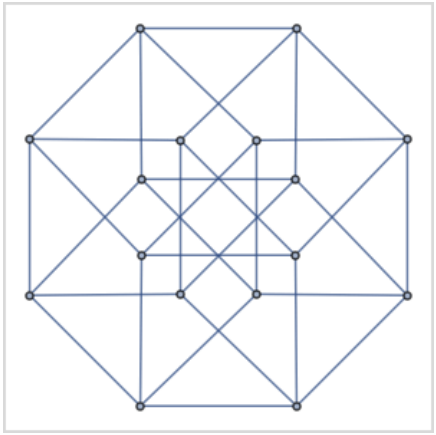
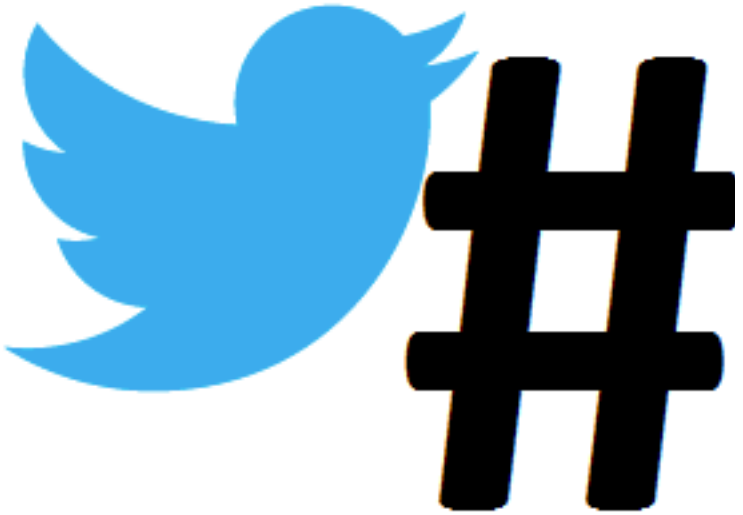


Tableau associatif



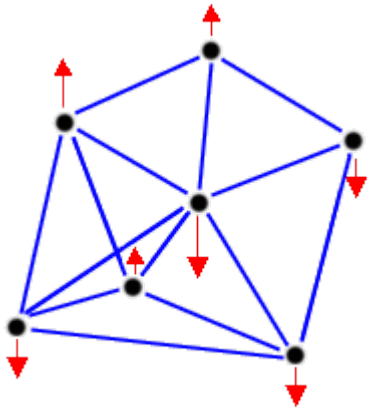
- Les Tuples sont retrouvés dans une table par une approche associative.
- Ce qui est le principe du modèle relationnel





Principe de la mémoire associative

- Gestion de la mémoire virtuelle
- Mémoire cache
- Anté Mémoire



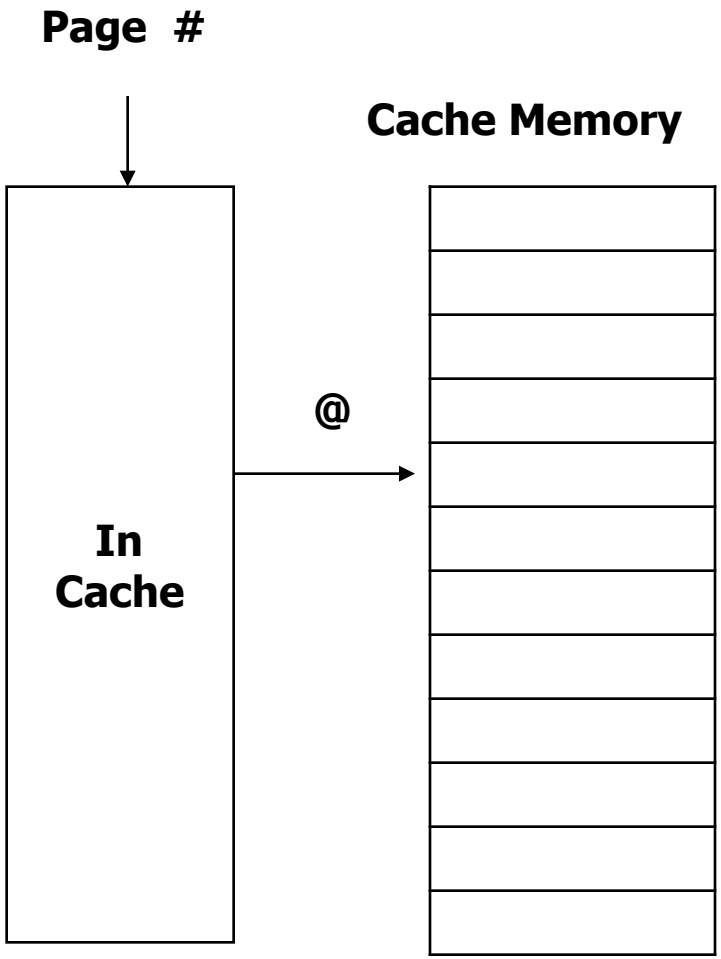


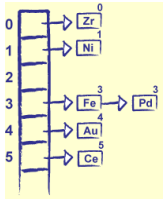
Table de hachage

- Une table de hachage est une structure de données qui permet une association « clef » « éléments ».

Valeur de l'attribut ⟶ **RID**

=

Key ⟶ **Value**



Class HashMap JSE 1.4

- Object **get**(Object key)
  - Returns the value to which the specified key is mapped in this identity hash map, or null if the map contains no mapping for this key.
- Object **put**(Object key, Object value)
  - Associates the specified value with the specified key in this map.
- Object **remove**(Object key)
  - Removes the mapping for this key from this map if present

Java Class Object

- Class Object is the root of the class hierarchy. Every class has Object as a superclass.
- All objects, including arrays, implement the methods of this class.
- Every class you write inherits the instance methods of Object.
- You may need to override them with code that is specific to your class.

- The java.lang.Object.hashCode() method returns a hash code value for the object.

JavaDoc Snippet

hashCode

```
public int hashCode()
```

Returns a hash code for this string. The hash code for a `String` object is computed as

```
s[0]*31^(n-1) + s[1]*31^(n-2) + ... + s[n-1]
```

using `int` arithmetic, where `s[i]` is the *i*th character of the string, `n` is the length of the string, and ^ indicates exponentiation. (The hash value of the empty string is zero.)

Overrides:

`hashCode` in class `Object`

Returns:

a hash code value for this object.

Hachage d'une String

x : chaîne de caractères

$$h(x) = \sum_{i=0}^{l-1} x[i] B^{l-1-i} \bmod N$$

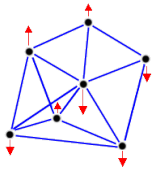
$h(x) = (x[1]x\ B^{l-1} + x[2]x\ B^{l-2} + \ldots + x[l]) \bmod N$

B puissance de 2.

B = 128, B = 256

N nombre premier

Tableau associatif



Valeur de l'Attribut = Key

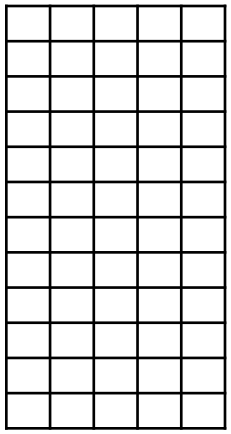
« c »

Relation

Relation R

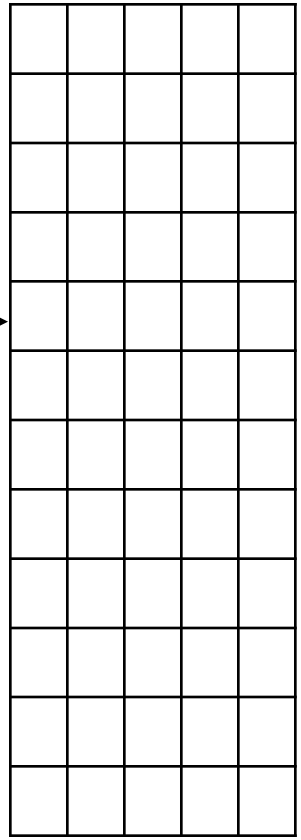
Attribut A

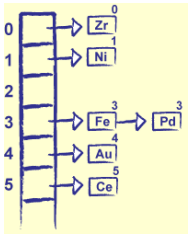
RID



Hach()

RID = Value





hashtable

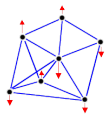
Nombre de lecture = 1

Tableau associatif

Valeur de l'Attribut = Key

« E »

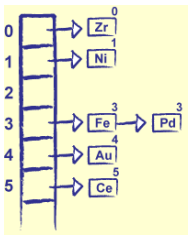
Relation R



Relation R

Attribut A

RID	
1	A
2	B
3	G
4	J
5	U
6	K
7	E
8	Z
9	V
10	B



Hach()

7

RID = Value

A
B
G
J
U
K
E
Z
V
B

hashtable

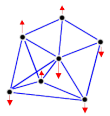
Nombre de lecture = 1

Tableau associatif

Valeur de l'Attribut = Key

« U »

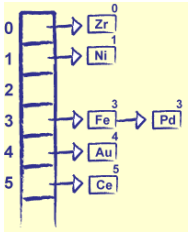
Relation R



Relation R

Attribut A

RID	
1	A
2	B
3	G
4	J
5	U
6	K
7	E
8	Z
9	V
10	B



Hach()

5

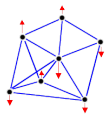
RID = Value

A
B
G
J
U
K
E
Z
V
B

hashtable

Nombre de lecture = 1

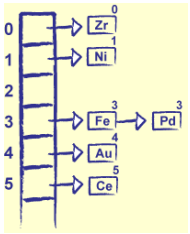
Tableau associatif



Relation R

Attribut A

RID	
1	A
2	B
3	G
4	J
5	U
6	K
7	E
8	Z
9	V
10	B



« B »

Hach()

hashtable

2

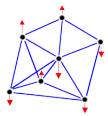
10

Relation R

A
B
G
J
U
K
E
Z
V
B

Nombre de lecture = 1

Tableau associatif



Relation R

Attribut A

RID	
1	A
2	B
3	G
4	J
5	U
6	K
7	E
8	Z
9	V
10	B

« B »

Relation R

Hach()

2

10

A
B
G
J
U
K
E
Z
V
B

hashtable

Traitement des doublons