

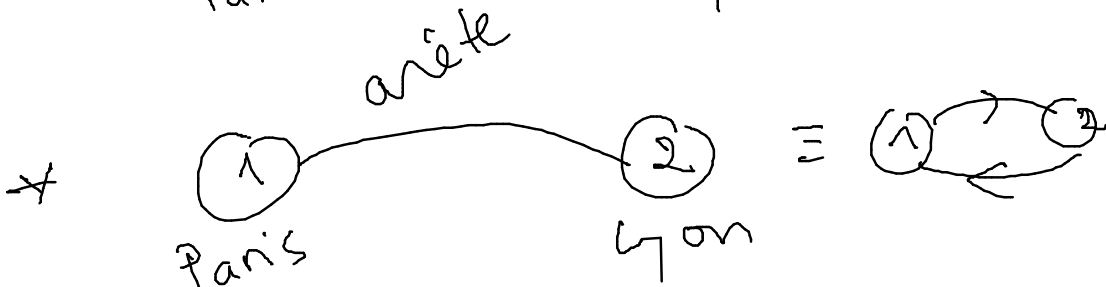
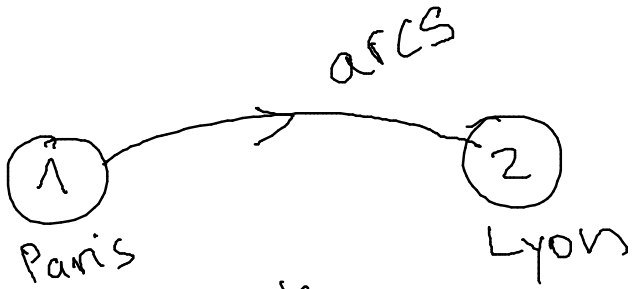
Noeud

Modification 1 Auteur: cunl  
personnes

Relation d'amitié.

Orienté  $\equiv$  Digraphe

Non-orienté



$G = (X, A)$       X: l'ensemble de noeuds  
A: arêtes/arcs

# Examples:

\* Reseau d'or directeur

X : noend : Postes

A : cracs/arctes:

\* Pages webs

TLA

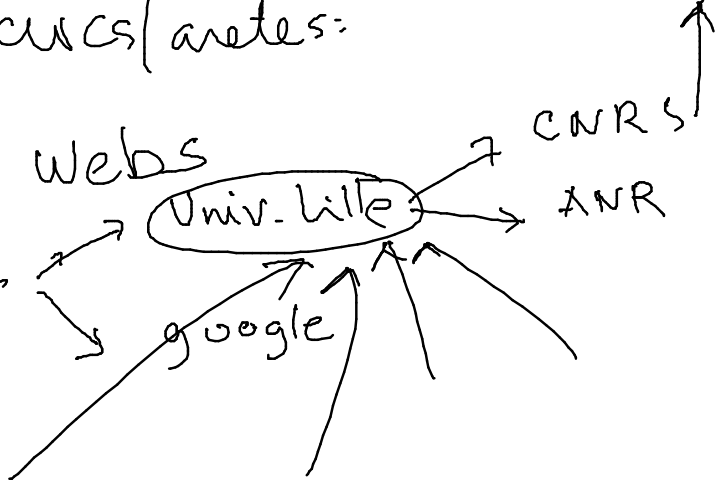
Univ. Lille

google

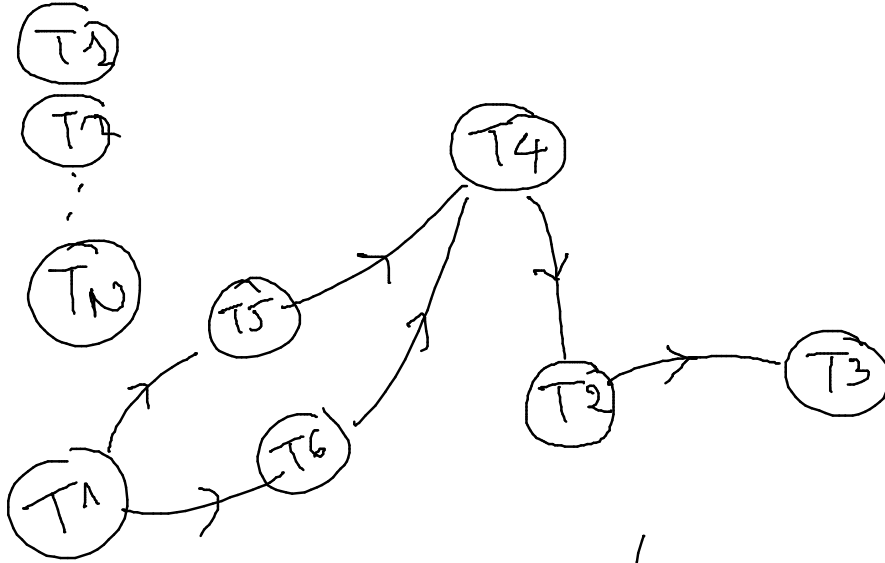
CNRS

ANR

MESR



# Planification des tâches:



Attributs aux noeuds / arcs.

3 Reservoirs d'eau 150  
2000 50

1000/m

5 maisons M1 M2 M3

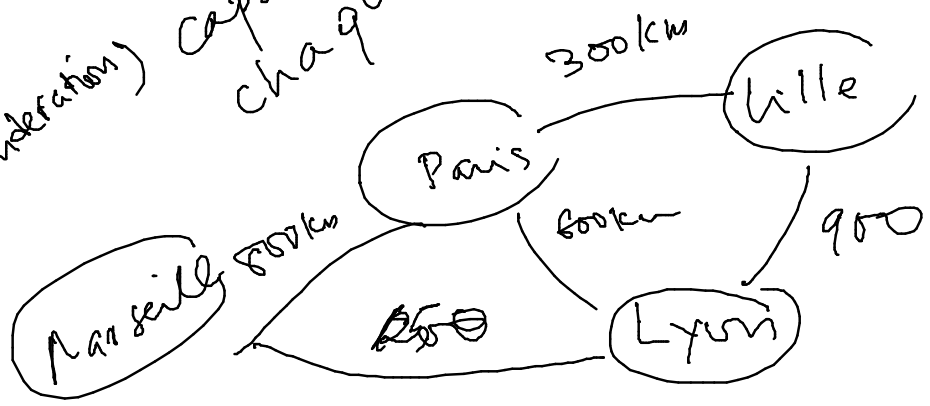
$$G = (X, A, W_x, W_A)$$

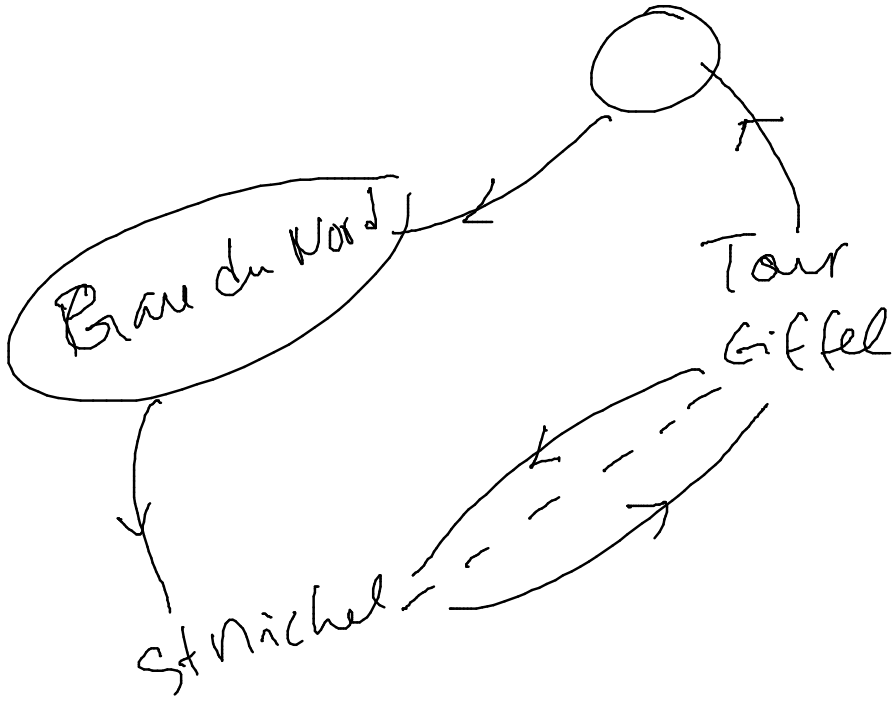
noeuds

arcs /  
arêtes

(pondération) capacité de  
chaque noeud

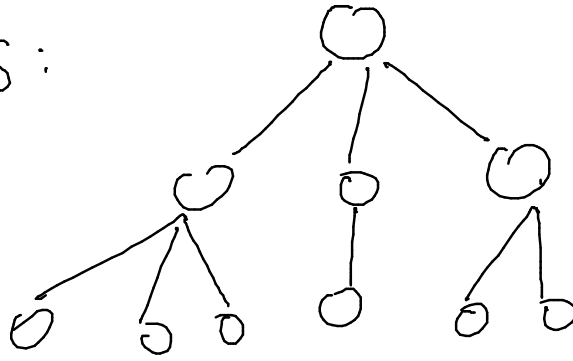
capacités /  
pondération /  
connectivité



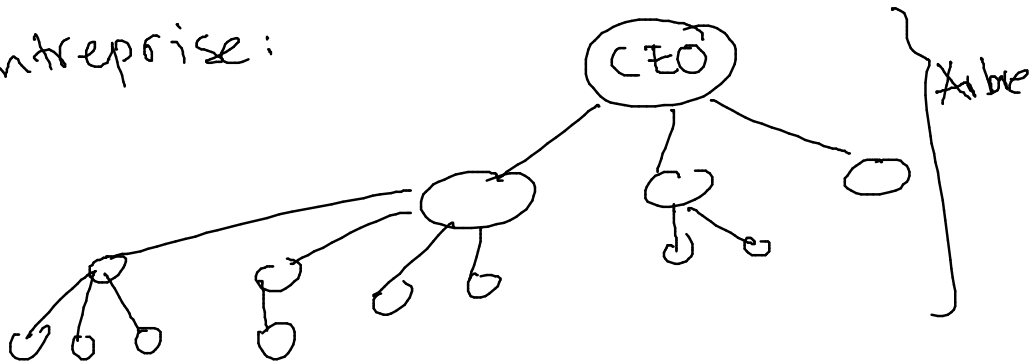


# Graphes particuliers

Arbres:

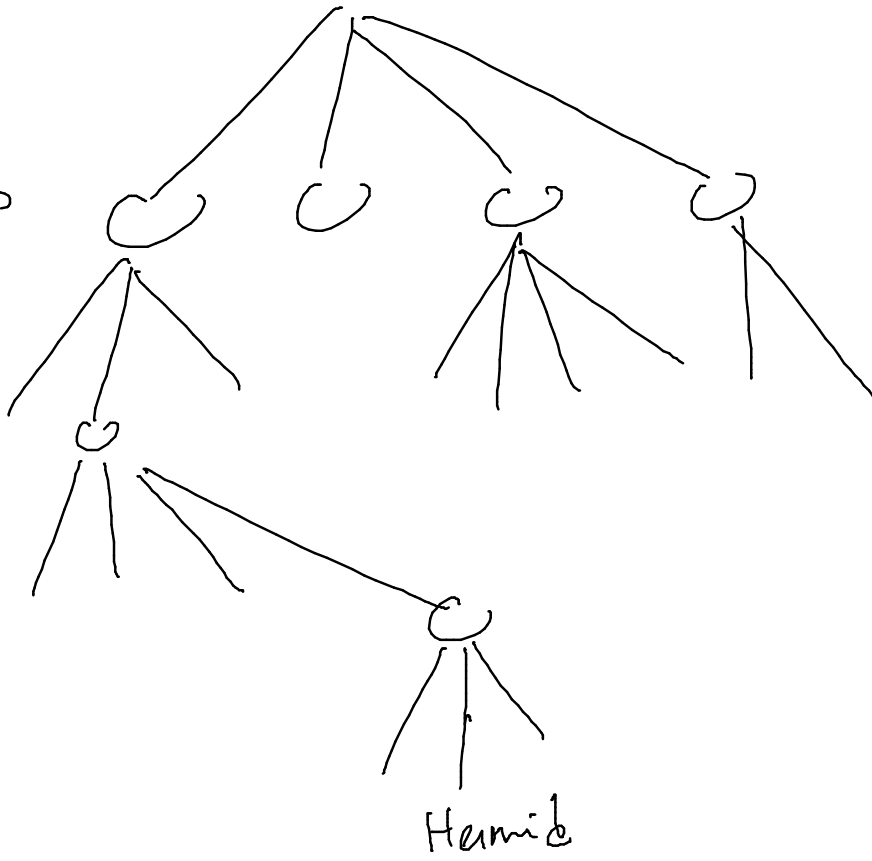


Entreprise:



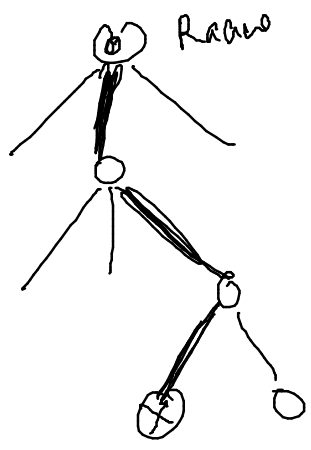
AK Grampere

5 enfants





# Chains



# Représentation $G = (X, A, W_X, W_A)$

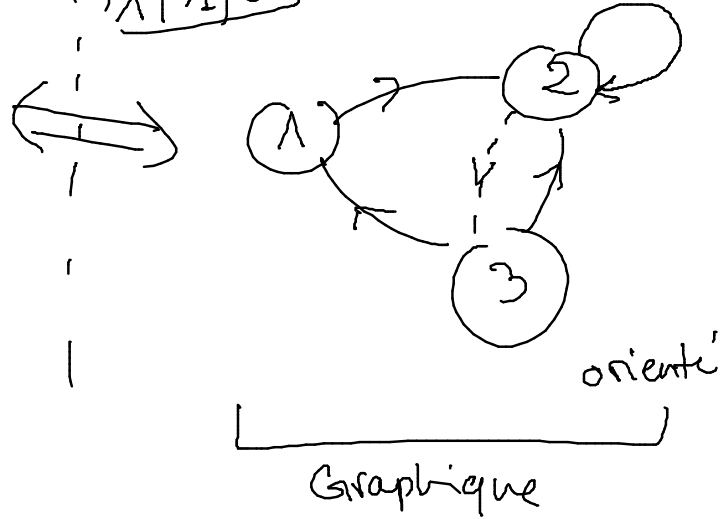
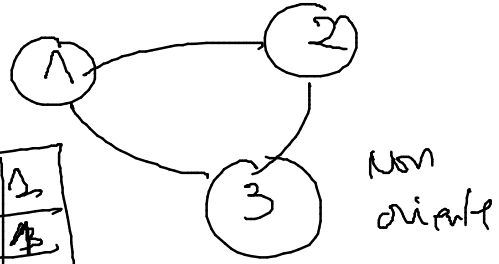
Matricielle ;  
Matrice d'adjacence

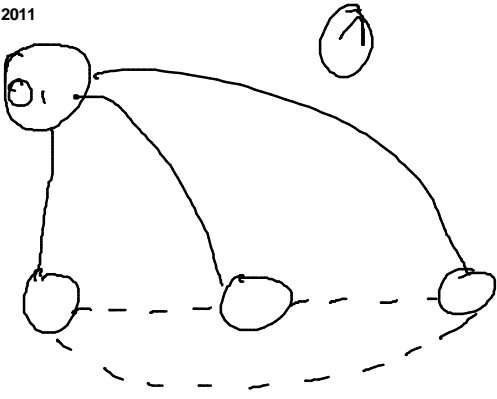
	1	2	3
1	0	1	0
2	0	<del>1</del>	<del>1</del>
3	1	1	0

orienté

~~1~~ Boucle

0	1	1
1	0	1
1	1	0



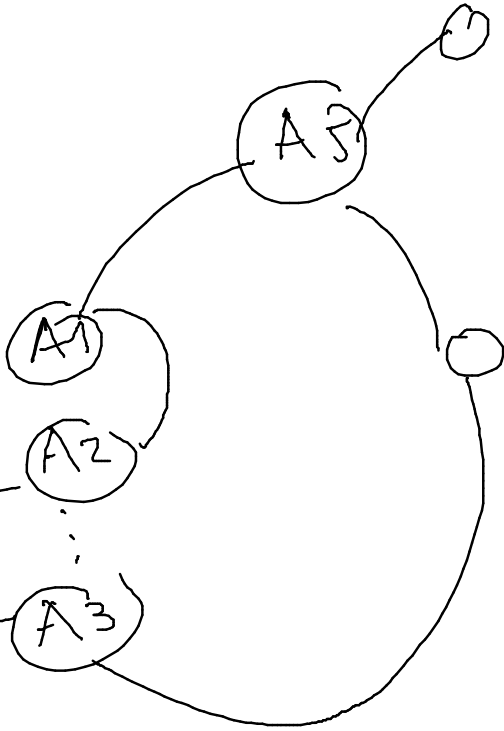


Hamid

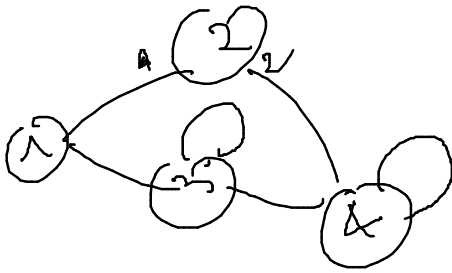
Noeud

personnes

Relation d'amitié



## Non-orienté

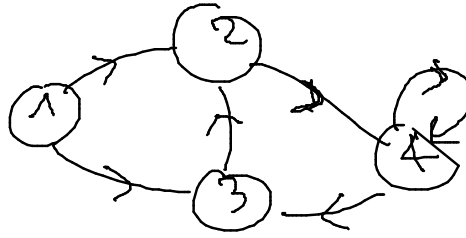


### Degré d'un nœud

nombre d'arêtes  
incidentes au  
nœud +  
nombre de boucles  
sur ce nœud

$$\begin{aligned} d(i) \\ \text{deg}(i) \end{aligned}$$

## Orienté



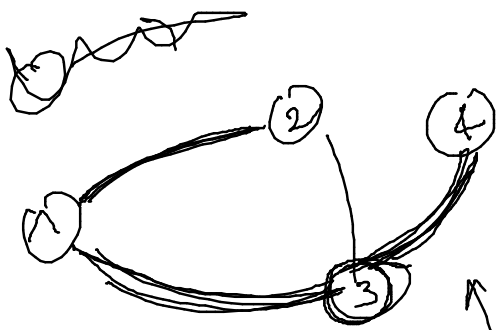
### Degré d'un nœud:

$$d(i) = \begin{cases} d^+(i) & \text{sortant} \\ d^-(i) & \text{entrant} \end{cases}$$

$$d(2) = 3 \quad \begin{cases} d^+(2) = 1 \\ d^-(2) = 2 \end{cases}$$

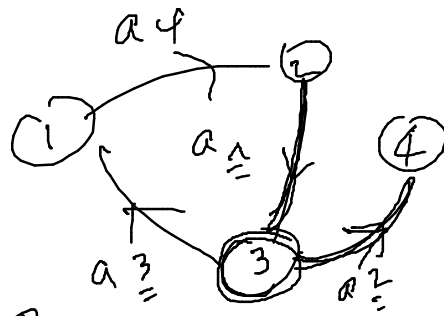
$$d(4) = 4 \quad \begin{cases} d^+(4) = 2 \\ d^-(4) = 2 \end{cases}$$

# Adjacence



noeuds adjacents  
(voisins)

arêtes adjacentes.

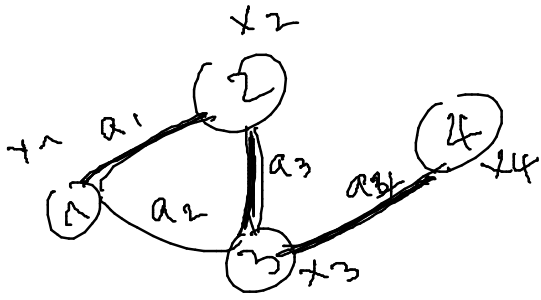


$a_1$  est adjacent avec  $a_2$

$a_3$  n'est pas adj.  
à  $a_2$

$a_1$  est adjacent à  $a_3$

# chaines (non-orienté)



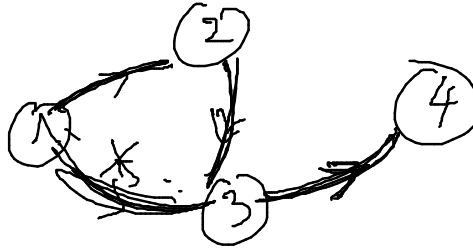
$$G = (X, A)$$

chaîne  $(x_0, a_1, x_1, a_2, \dots)$

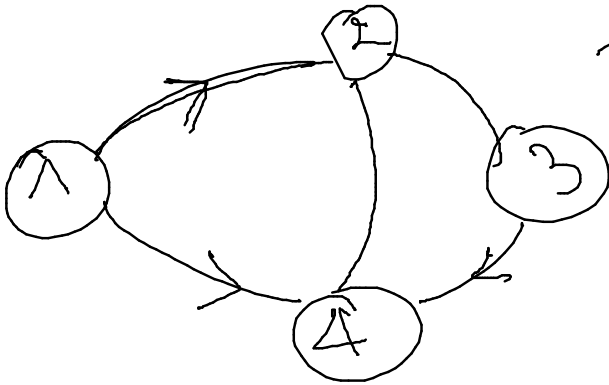
$$(x_1, a_1, x_2, a_2, x_3, a_3, x_4)$$

$$(x_1, a_1, x_2, a_2, x_3, a_3, x_4, a_4, x_5)$$

# chemin (orienté)

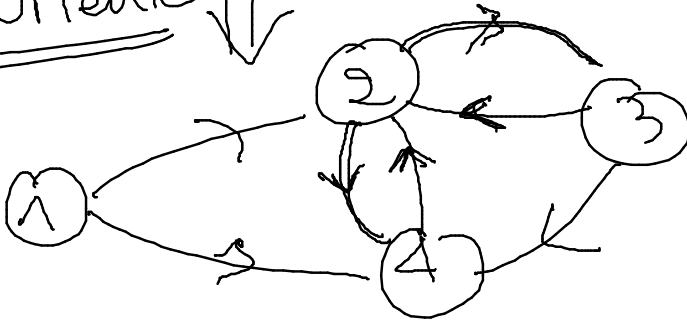


# Mixture (Graphes hybrid).



→ ~~ORiente~~

Graph ORiente ↓



# chaîne

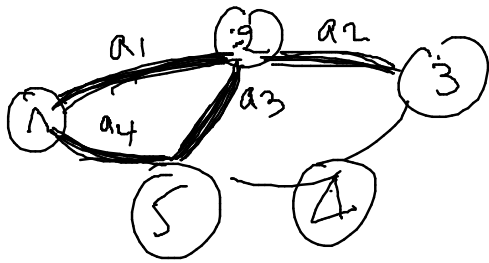
$(x_0, a_1, x_1, a_2, \dots, x_n)$

↑  
source  
(depart)

↑  
but  
(arrivée)

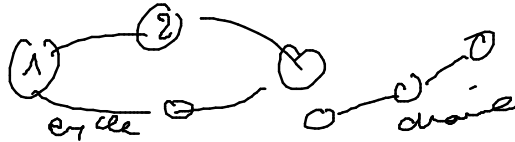
$x_0 \neq x_n$  : chaîne ouverte  
 $x_0 = x_n$  ——— fermée  
 $\Rightarrow$  cycle

# chemins



$\underline{1, a_1, 2, a_2, 3}$

$\underline{1, a_1, 2, a_3, 5, a_4, 1}$





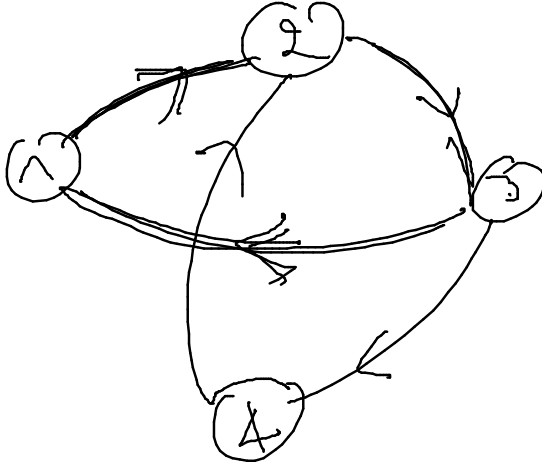
# Chemins

ouvert : source  $\neq$  destination

fermé : source = destination



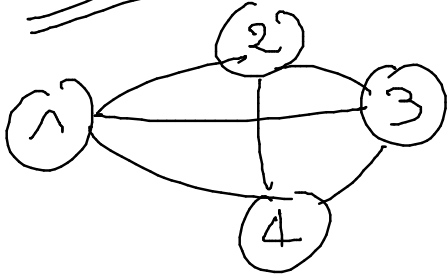
circuit



# Graphes particuliers

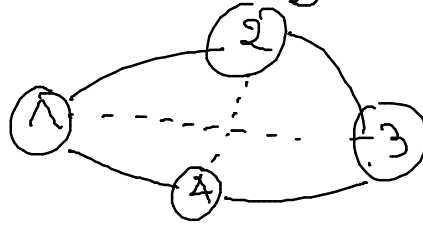
- Arbres
- chaînes

3-régulier



~~Arbre~~ complet  
graphe

2-régulier



in complet

Graphes réguliers:

tous les nœuds ont le même  $d = k$

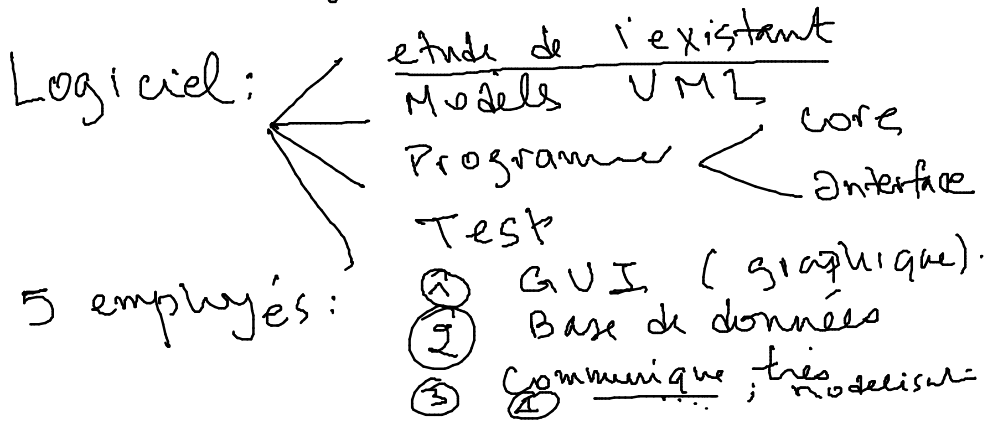
k-régulier



# Application

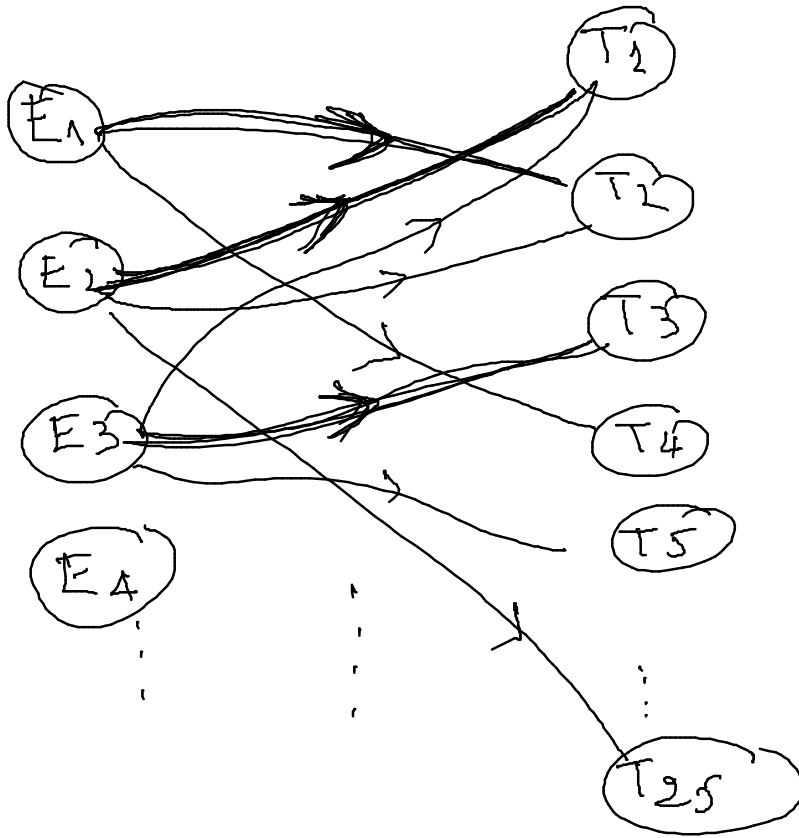
## Entreprise:

- ensemble de tâches.  
(K tâches)
- N employés
- chaque employé connaît  
à un certain nbre de tâches.

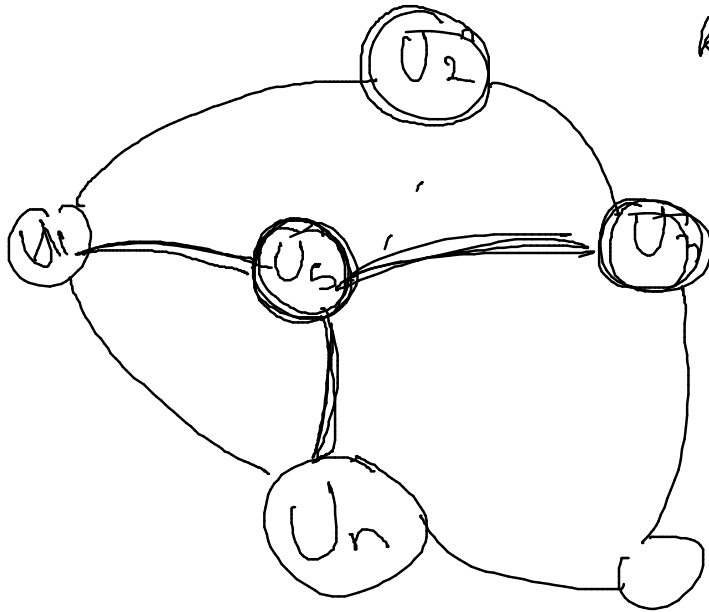


Employees

Tasks



# Application: Réseaux Sociaux:

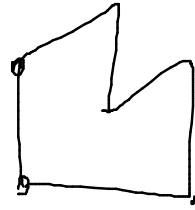
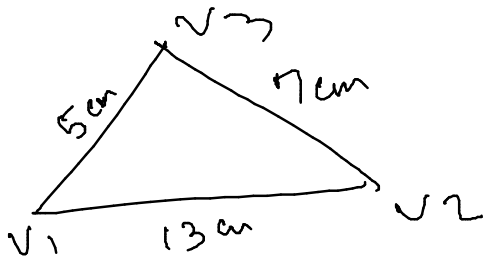


Analyser les  
réseaux  
sociaux  
=====  
→ Communautés

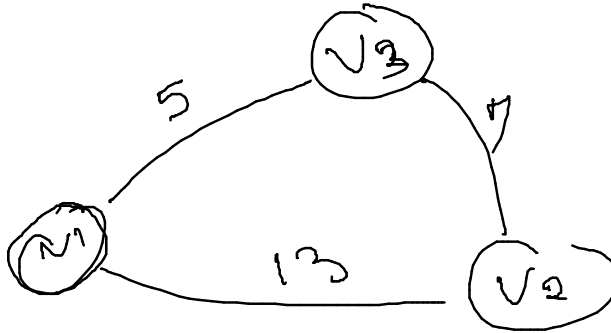
Noeud:  
arête:

Utilisateurs,  
Relation d'amitié

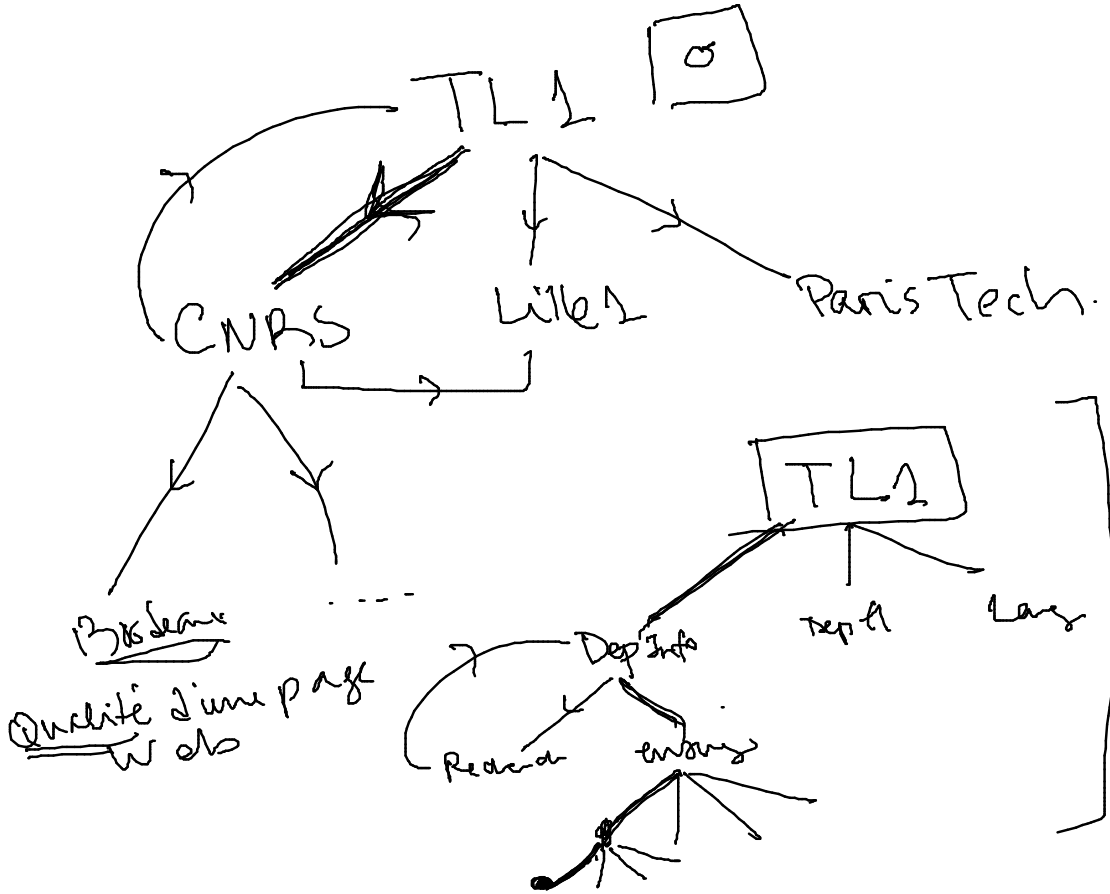
# Formes geometriques



(1)



# Hyper liens Sur les pages web



Sous graphe:

$$G = (X, A)$$

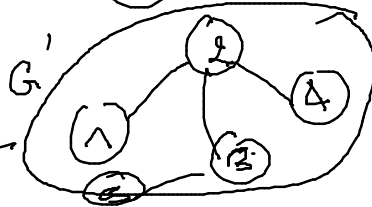
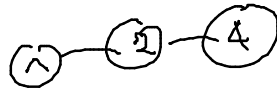
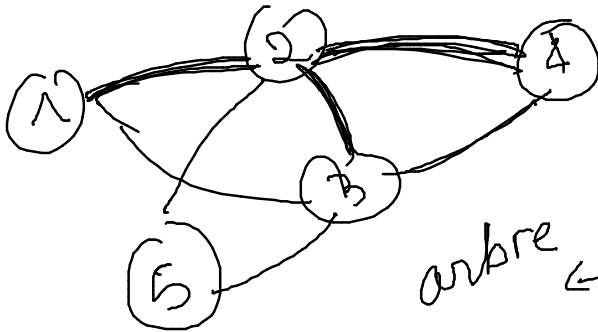
$$G' = (X', A')$$

$$X' \subset X$$

$$A' \subset A$$

chaines  
chemin  
cycles  
circuit

G



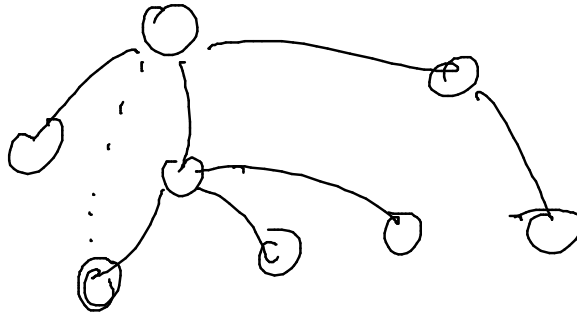
arbre





# Arbre:

~~Graph~~ est un graph  
Arbre  
sans circuit  
(cycle).



Pas chaîne fermée.