

22.4-2

nombre-chemins(s, t):
chemins = Tableau Hachage()
DFS-chemins(s, t , chemins)

DFS-chemins(u, t , chemins):

if $u == t$:

| return 1

if chemins.search(u):

| return chemins.get(u)

somme = 0

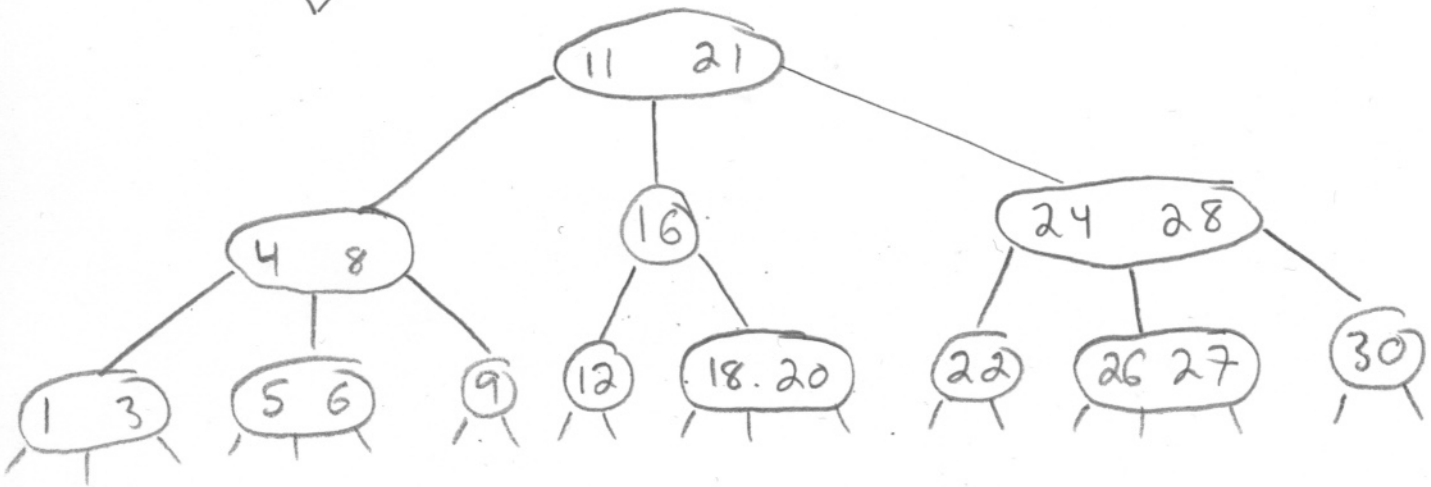
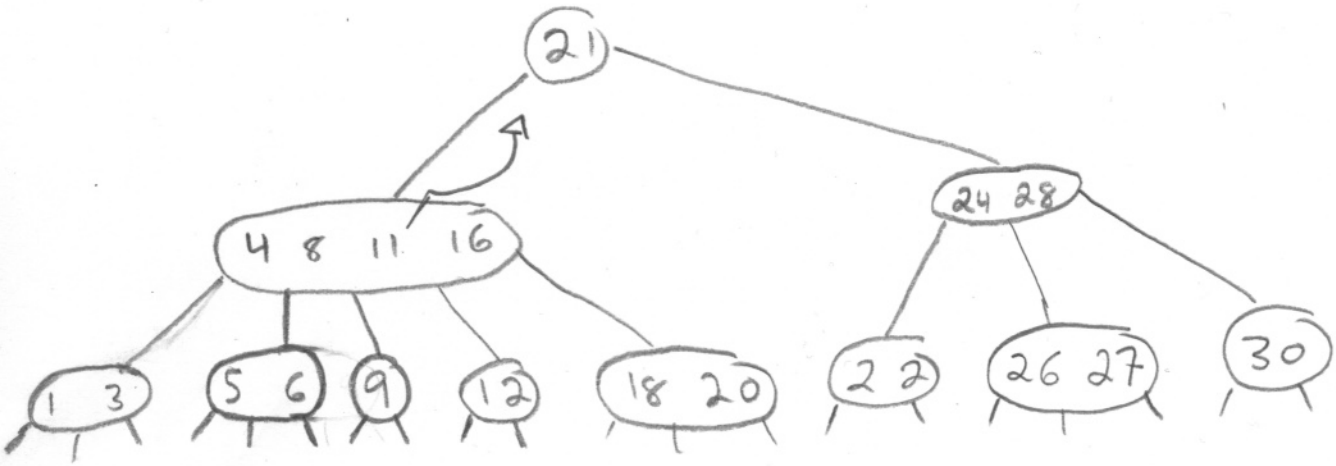
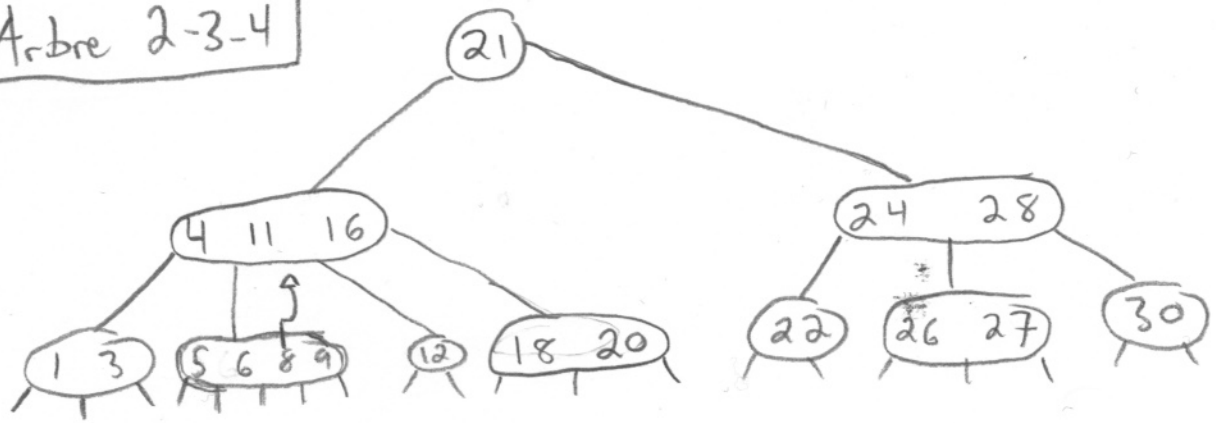
for $x \in$ sommets-adjacents(u):

| somme += DFS-chemins(x, t , chemins)

chemins.set(u , somme)

return somme

Arbre 2-3-4



22.1-5 - Square

square-adj-list(A):

$A' = \text{copy}(A)$

for $v = 0..n-1$: # $n = \text{length}(A)$

| for u in $A[v]$:

| | $A'[v].\text{append}(A[u])$

return A'

$O(|V| \times |E|)$

square-adj-matrix(M):

$M' = \text{copy}(M)$

for $i = 0..n-1$: # $n = \text{length}(M)$

| for $j = 0..n-1$:

| | for $k = 0..n-1$:

| | | if ($M'[i,j] == 0$ && $M'[i,k] == 1$

| | | && $M'[k,j] == 1$):

| | | $M'[i,j] = 1$

$O(|V|^3)$

22.4 Reachability

$\text{transpose}(\text{Adj}) :$

$\text{Adj}' = [0..n-1] \# n = \text{length}(\text{Adj})$

for $i = 0..n-1$:

| for j in $\text{Adj}[i]$:

| | $\text{Adj}'[j].\text{append}(i)$

Return Adj'

$O(V+E)$, each vertex is visited once and each edge is visited once

$\text{reachability}(\text{Adj}, L) \# L$ is the label function

$\text{Adj}' = \text{transpose}(\text{Adj})$

$\text{levels} = [1..n] \# n = \text{length}(\text{Adj})$

$\text{mins} = [0..n-1]$

for v in Adj :

| $\text{levels}[L(v)] = v$

for v in levels :

| $S = \text{Stack}()$

| $S.\text{push}(v)$

| while $! S.\text{is_empty}()$:

| | $u = S.\text{pop}()$

| | if $\text{mins}[u] == \text{null}$:

| | | $\text{mins}[u] = v$

| | | for e in $\text{Adj}'[u]$:

| | | | $S.\text{push}(e)$

return mins

modified DFS,
 $O(V+E)$