

$-\infty$
 ∞

$-\infty$
 ∞

48
 a_1

$-\infty$
 ∞

48

48
 ∞

48

cut

$-\infty$
 ∞

48

b_1

$-\infty$
 ∞

48

48
 ∞

48

b_2 //

cut

$-\infty$
 ∞

11

c_1
 $-\infty$
 ∞

48

$-\infty$
 ∞

48

c_2 //

48
 ∞

48

c_3
 $-\infty$
 ∞

48

c_4

d_1

d_2

d_3

d_4

d_5 //

d_6 //

d_7

d_8

β β

α

α

α

α

α

α

best strategy

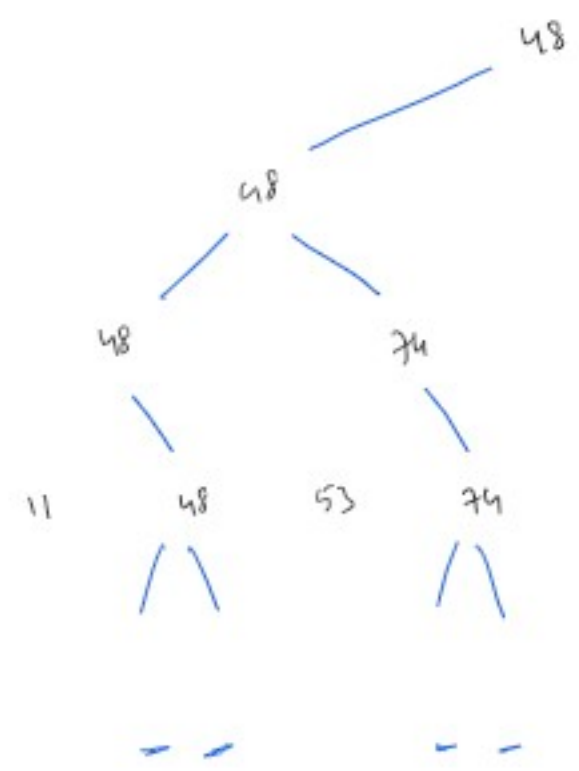
max best 1

min All

Strategy

max 1 (leftmost)

min All



30

30

50

23

30

50

45

~~cut~~
cut

~~cut~~
cut

$\frac{10}{8}$

10

$\frac{10}{10}$

10

$\frac{10}{10}$

10

//

$\frac{10}{8}$

10

$\frac{10}{10}$

10

$\frac{10}{8}$

10

//

$\frac{10}{10}$

10

$\frac{10}{9}$

10

$\frac{10}{10}$

10

//

$\frac{10}{5}$

10

$\frac{10}{4}$

10

//

//

$$\begin{array}{ccc} -\infty & 12 & 35 \\ \infty & \infty & \infty \end{array} \quad 35$$

$$\begin{array}{cc} -\infty & -\infty \\ 5 & 12 \end{array} \quad 12$$

$$\begin{array}{cc} 12 & 12 \\ \infty & 35 \end{array} \quad 35$$

$$\begin{array}{ccc} -\infty & 5 & 12 \\ \infty & \infty & \infty \end{array} \quad 12$$

$$\begin{array}{cc} -\infty & 12 \\ 12 & 12 \end{array} \quad 12$$

$$\begin{array}{ccc} 12 & 34 & 35 \\ \infty & \infty & \infty \end{array} \quad 35$$

$$\begin{array}{cc} 12 & 35 \\ 35 & 35 \end{array} \quad 35$$

//

$$\begin{array}{ccc} -\infty & -\infty & -\infty \\ \infty & \infty & 5 \end{array} \quad 5$$

$$\begin{array}{cc} 5 & 5 \\ \infty & 12 \end{array} \quad 12$$

$$\begin{array}{cc} -\infty & \\ 12 & \end{array} \quad 12$$

$$\begin{array}{cc} 12 & 12 \\ \infty & 34 \end{array} \quad 34$$

$$\begin{array}{ccc} 34 & 34 & 34 \\ \infty & 35 & 35 \end{array} \quad 35$$

$$\begin{array}{cc} 12 & \\ 35 & \end{array} \quad 35$$

//

$$\begin{array}{ccc} -12 & 9 & 12 \\ 20 & 20 & 9 \end{array}$$

$$12$$

$$\begin{array}{ccc} -12 & -12 & -12 \\ 20 & 11 & 9 \end{array}$$

$$9$$

$$\begin{array}{cc} 9 & 9 \\ 20 & 12 \end{array}$$

$$12$$

$$\begin{array}{ccc} -12 & 5 & 11 \\ 20 & 9 & 8 \end{array}$$

$$11$$

$$\begin{array}{ccc} 8 & 8 & 9 \\ 11 & 11 & 11 \end{array}$$

$$9$$

$$\begin{array}{cc} 9 & 12 \\ 20 & 20 \end{array}$$

$$12$$

$$\begin{array}{cc} 9 & 12 \\ 12 & 12 \end{array}$$

$$12$$

$$\begin{array}{ccc} -12 & -12 & -12 \\ 20 & 21 & 5 \end{array}$$

$$5$$

$$\begin{array}{ccc} 5 & 5 & 5 \\ 20 & 15 & 11 \end{array}$$

$$11$$

$$\begin{array}{cc} -12 & -12 \\ 11 & 8 \end{array}$$

$$8$$

$$\begin{array}{cc} 8 & 8 \\ 11 & 9 \end{array}$$

$$9$$

$$\begin{array}{cc} 9 & 9 \\ 20 & 5 \end{array}$$

$$9$$

$$\begin{array}{ccc} 9 & 9 & 12 \\ 20 & 13 & 12 \end{array}$$

$$12$$

$$9$$

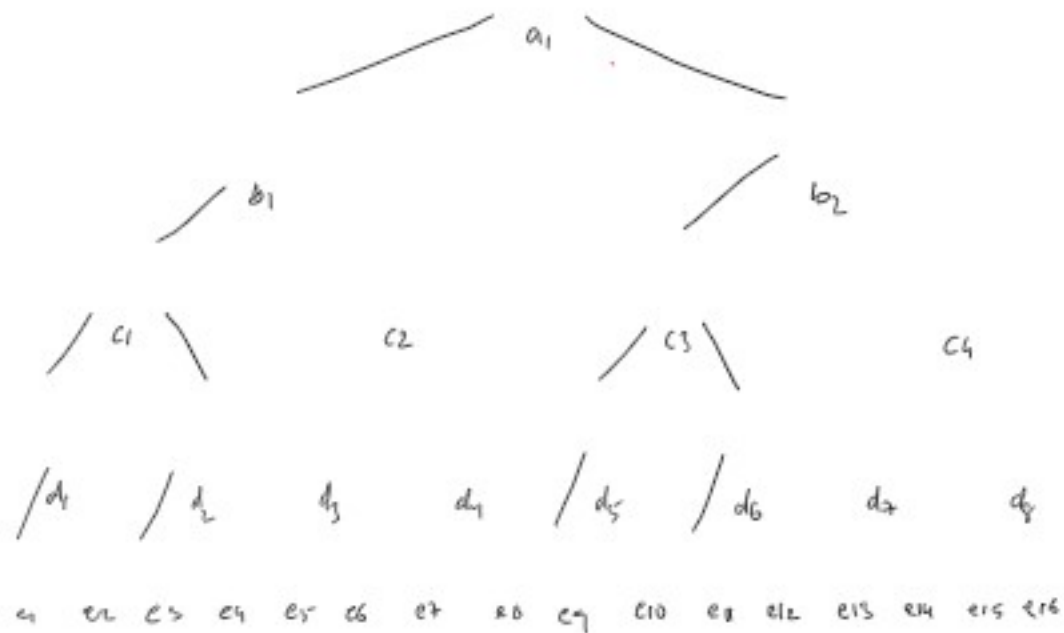
$$12$$

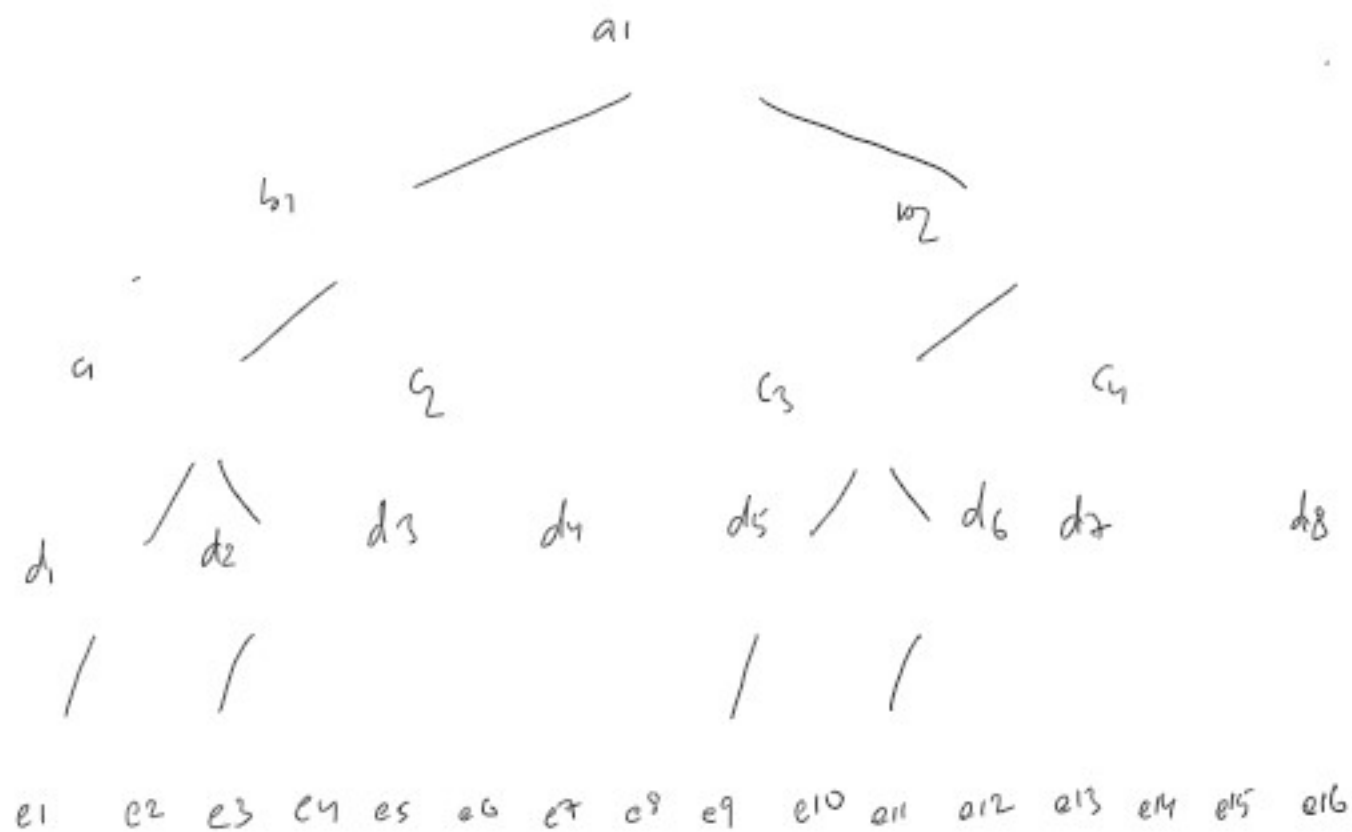
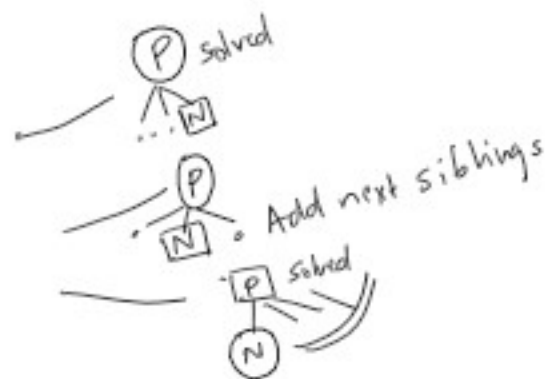
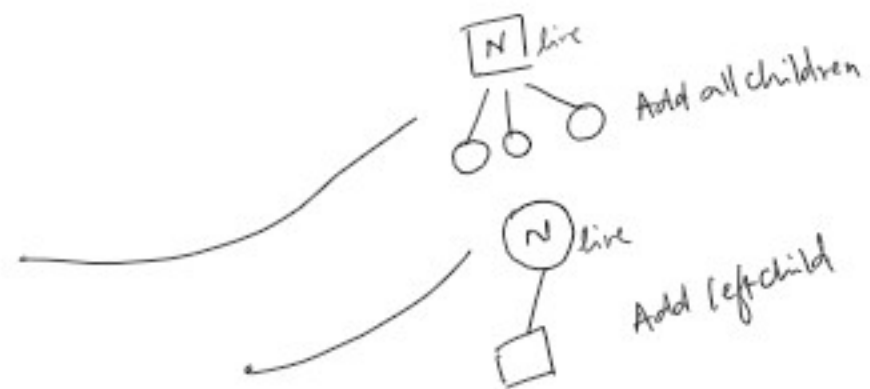
$$12$$

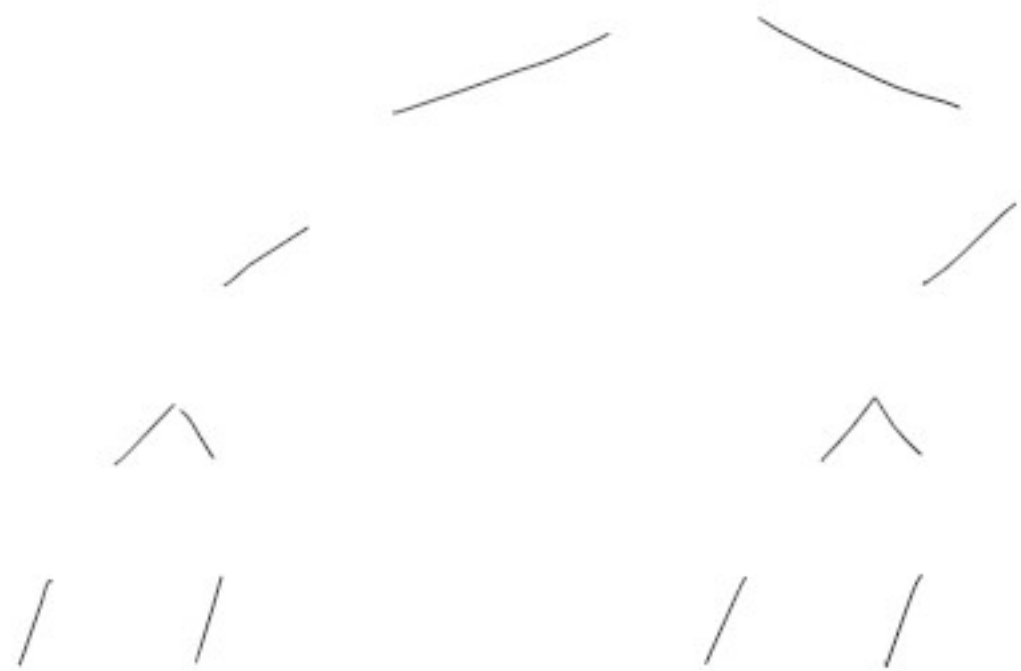
$$=$$

$$=$$

{ initial clusters
 max all
 min 1 left

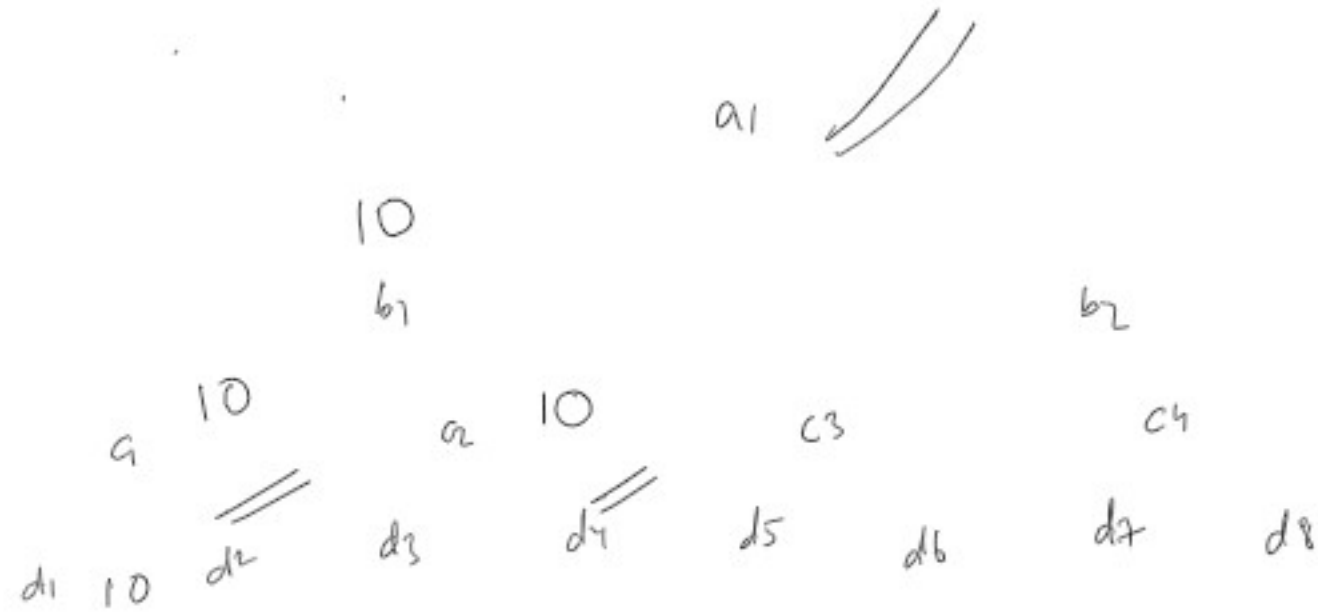




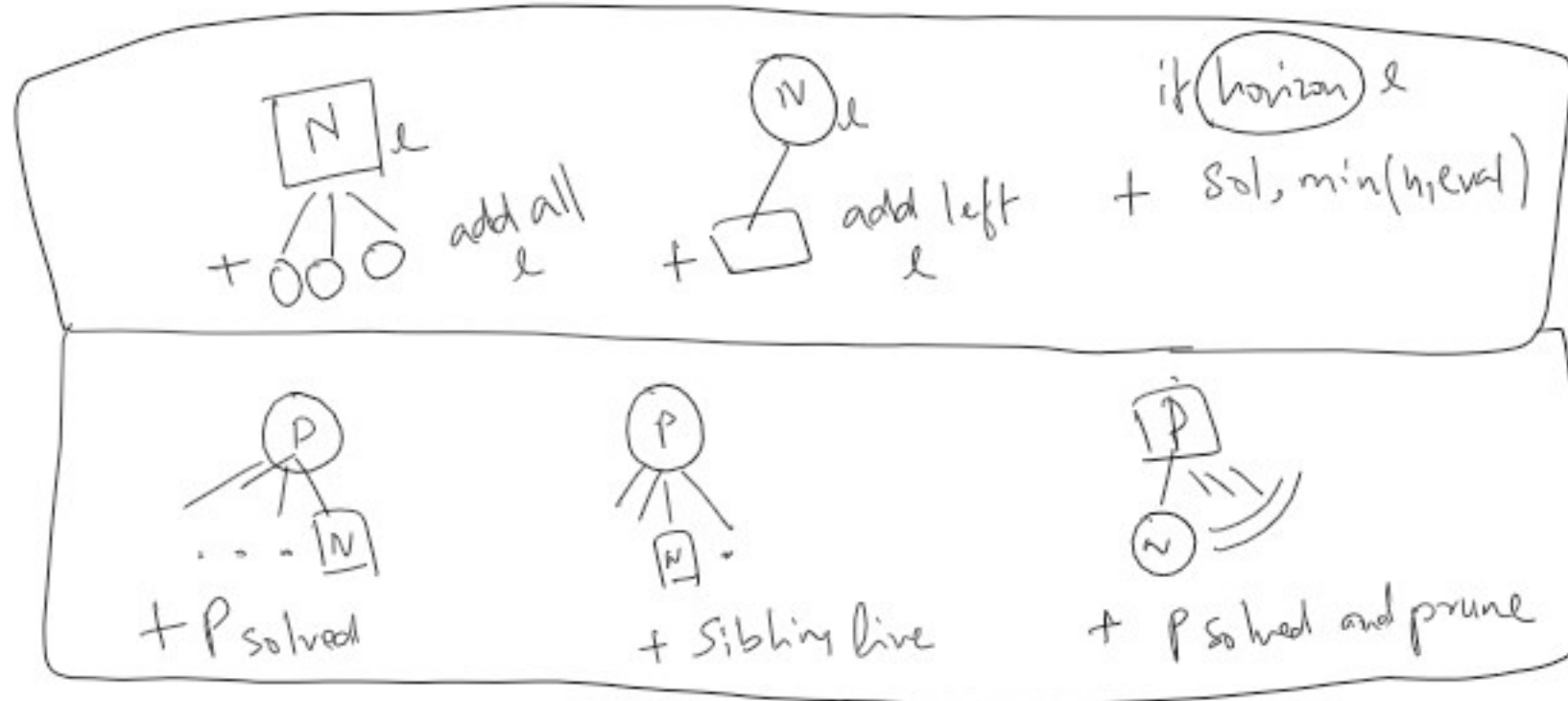


~~$e_{1s,10}$~~ e_{3s9} e_{9s5} e_{11s4}
 ~~e_{2s10}~~
 e_{2s10}

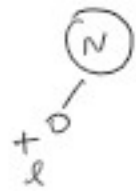
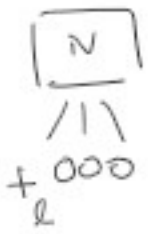
$h=10$



$e_1 s_{10} \quad e_3 s_9 \quad e_9 s_5 \quad e_{11} s_4$
 $e_2 s_{11} \quad e_3 s_9 \quad e_9 s_5 \quad e_{11} s_4$
 $e_2 s_{10} \quad e_3 s_9 \quad e_9 s_5 \quad e_{11} s_4$
 $d_1 s_{10} \quad e_3 s_9 \quad e_9 s_5 \quad e_{11} s_4$
 $c_1 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $c_2 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $d_3 s_{10} \quad d_4 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $e_5 s_{10} \quad d_4 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $e_5 s_{10} \quad d_4 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $e_6 s_{10} \quad d_4 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $e_6 s_{10} \quad d_4 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $d_3 s_{10} \quad d_4 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $c_2 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $b_1 s_{10} \quad e_9 s_5 \quad e_{11} s_4$
 $a_1 s_{10}$
 (10)



live



if horizon
+_s min(h, eval)

h=41

Solved



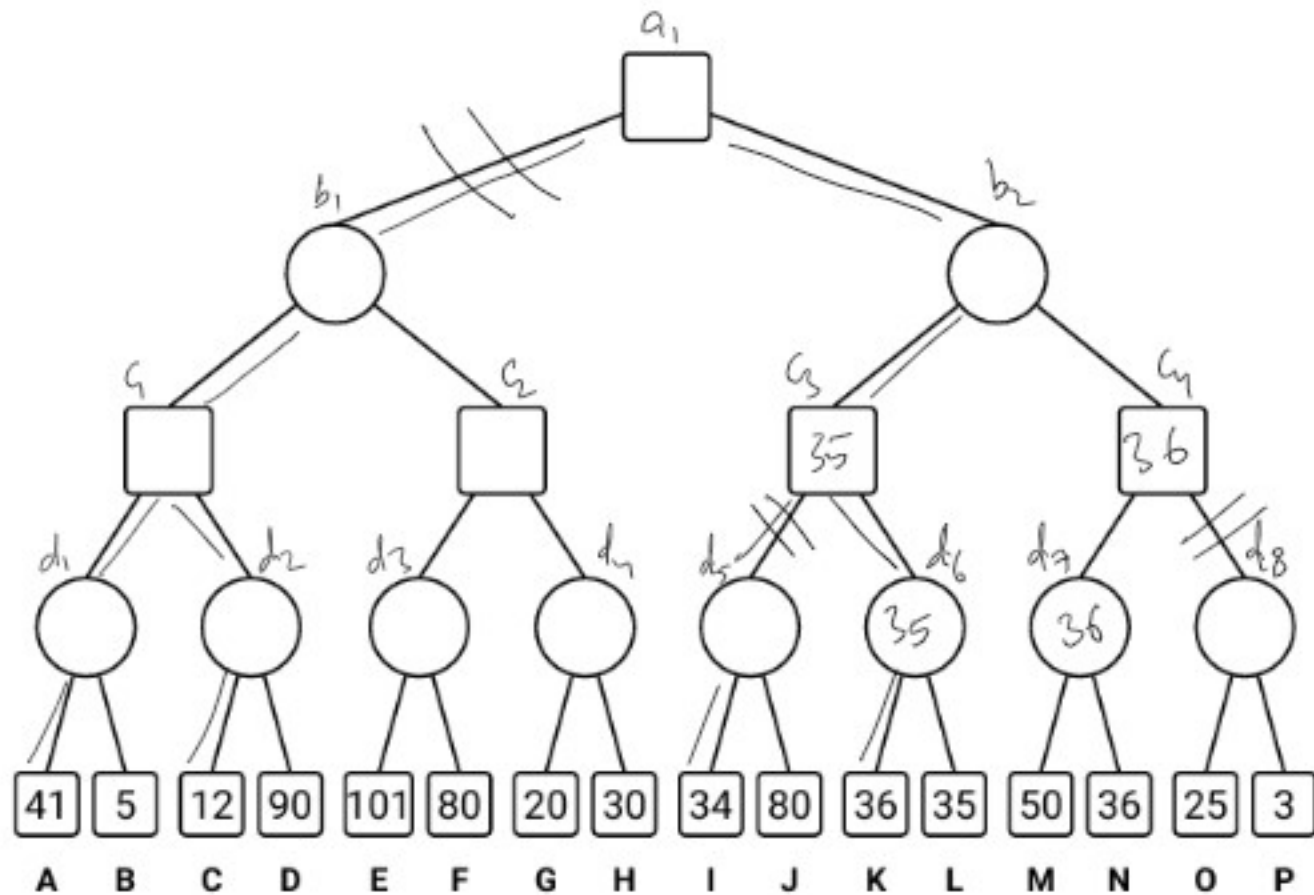
+_s P



+_l siblings



+_s P



0

$e_1 s 41$ $e_{11} s 36$ $e_9 s 34$ $e_3 s 12$

1

$e_2 l 41$ $e_{11} s 36$ $e_9 s 34$ $e_3 s 12$

2

$e_{11} s 36$ $e_9 s 34$ $e_3 s 12$ $e_2 s 5$

3

$e_{12} l 36$ $e_9 s 34$ $e_3 s 12$ $e_2 s 5$

4

$e_{12} s 35$ $e_9 s 34$ $e_3 s 12$ $e_2 s 5$

5

$d_6 s 35$ $e_9 s 34$ $e_3 s 12$ $e_2 s 5$

6

$c_3 s 35$ $e_3 s 12$ $e_2 s 5$

7

$c_4 l 35$ $e_3 s 12$ $e_2 s 5$

8

$d_7 l 35$ $d_8 l 35$ $e_3 s 12$ $e_2 s 5$

9

$e_{13} l 35$ $d_8 l 35$ $e_3 s 12$ $e_2 s 5$

10

$e_{13} s 35$ $d_8 l 35$ $e_3 s 12$ $e_2 s 5$

11

$e_{14} l 36$ $d_8 l 35$ $e_3 s 12$ $e_2 s 5$

12

$e_{14} s 35$ $d_8 l 35$ $e_3 s 12$ $e_2 s 5$

13

$d_7 s 35$ $d_8 l 35$ $e_3 s 12$ $e_2 s 5$

14

$c_4 s 35$ $e_3 s 12$ $e_2 s 5$

15

$b_2 s 35$ $e_3 s 12$ $e_2 s 5$

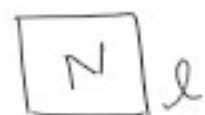
16

$a_1 s 35$

17

[]

SSS *



t_l add all children



t_l left child

if horizon

$t_s \min(h, eval)$



$t_s P$

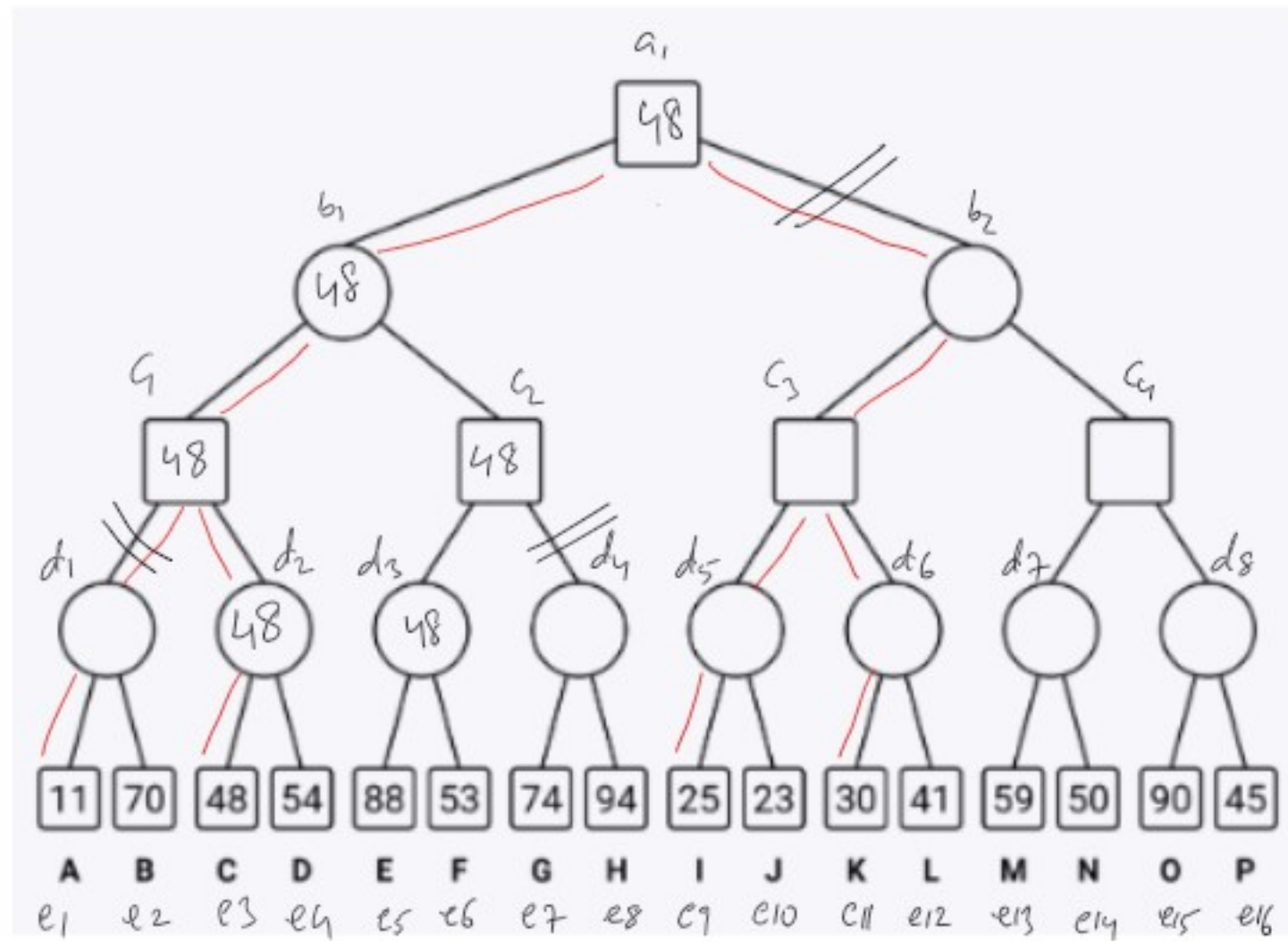


t_l next sibling



$t_s P$ & prune siblings

Initial Cluster Horizon Nodes
A, C, I, K



SSS* Solved status for Horizon nodes
A, C, I, K, D, E, F

Order: A, C, D, E, F, I, K

0	$e_3 S 48$	$e_{11} S 30$	$e_9 S 25$	$e_1 S 11$	→ Initial clusters
1	$e_4 L 48$	$e_{11} S 30$	$e_9 S 25$	$e_1 S 11$	
2	$e_4 S 48$	$e_{11} S 30$	$e_9 S 25$	$e_1 S 11$	
3	$d_2 S 48$	$e_{11} S 30$	$e_9 S 25$	$e_1 S 11$	
4	$c_1 S 48$	$e_{11} S 30$	$e_9 S 25$		
5	$c_2 L 48$	$e_{11} S 30$	$e_9 S 25$		
6	$d_3 L 48$	$d_4 L 48$	$e_{11} S 30$	$e_9 S 25$	
7	$e_5 L 48$	$d_4 L 48$	$e_{11} S 30$	$e_9 S 25$	
8	$e_5 S 48$	$d_4 L 48$	$e_{11} S 30$	$e_9 S 25$	
9	$e_6 L 48$	$d_4 L 48$	$e_{11} S 30$	$e_9 S 25$	
10	$e_6 S 48$	$d_4 L 48$	$e_{11} S 30$	$e_9 S 25$	
11	$d_3 S 48$	$d_4 L 48$	$e_{11} S 30$	$e_9 S 25$	
12	$c_2 S 48$		$e_{11} S 30$	$e_9 S 25$	
13	$b_1 S 48$	$e_{11} S 30$	$e_9 S 25$		
14	$a_1 S 48$				
15	[]				