Homework 2

Introduction to CAD

107021129 黃明瀧

1. Calculate slack for each block

The tables below tabluates the process of finding slack for each of block. Slack is given in the rows marked as $S(X)$.

	A	B	C	D	F	G	H	I
$D(X)$	0	0	0	0	1	4	2	1
$A(Y)$ of predecessors	0	0	0	0	0	0;0	1	4
$R(X) - D(X)$ of successors	1;9	-1;12	-1;11	1;12	2;5	3;7	4;7	4;5
$A(X)$	0	0	0	0	1	4	3	5
$R(X)$	1	-1	-1	1	2	3	4	4
$R(X) - D(X)$	1	-1	-1	1	1	-1	2	3
$S(X)$	1	-1	-1	1	1	-1	1	-1

	J	K	L	M	N	O	P
$D(X)$	5	2	3	2	3	5	4
$A(Y)$ of predecessors	3;5	1;5	4;3	0;10	0;0	7;7	0;12
$R(X) - D(X)$ of successors	9	10	10	11	15	15	15
$A(X)$	10	7	7	12	3	12	16
$R(X)$	9	10	10	11	15	15	15
$R(X) - D(X)$	4	5	7	9	12	10	11
$S(X)$	-1	3	3	-1	12	3	-1

2. Find longest and shortest delay paths and their delays

First, perform a topological sort on the graph in increasing order.

$$(S), A, F, B, G, K, C, H, L, D, I, N, J, M, E$$

We find the longest and shortest path delays ($A(X)$'s and $a(X)$'s) in the sorted order. The node names after the path delays inside parentheses are the chosen predecessor.

	$A(X)$	$a(X)$
A	$\max(0) = 0$ (S)	$\min(0) = 0$ (S)
F	$\max(0) = 0$ (S)	$\min(0) = 0$ (S)
B	$\max(2, 3) = 3$ (F)	$\min(2, 3) = 2$ (A)
G	$\max(3) = 3$ (F)	$\min(3) = 3$ (F)
K	$\max(2, 0) = 2$ (A)	$\min(2, 0) = 0$ (S)
C	$\max(4) = 4$ (B)	$\min(3) = 3$ (B)
H	$\max(4, 4) = 4$ (B)	$\min(3, 4) = 3$ (B)
L	$\max(4, 3) = 4$ (G)	$\min(4, 1) = 1$ (K)
D	$\max(8) = 8$ (C)	$\min(7) = 7$ (C)
I	$\max(8, 3) = 8$ (H)	$\min(7, 1) = 1$ (K)
N	$\max(10) = 10$ (D)	$\min(9) = 9$ (D)
J	$\max(8, 11) = 11$ (I)	$\min(7, 4) = 4$ (I)
M	$\max(10, 6) = 10$ (D)	$\min(9, 3) = 3$ (L)
E	$\max(13, 14, 15) = 15$ (M)	$\min(12, 7, 8) = 7$ (J)

Finally we identify the longest and shortest paths.

- Longest path: $S \to F \to B \to C \to D \to M \to E$, path delay 15.
- Shortest path: $S \to K \to I \to J \to E$, path delay 7.

3. Normalized Polish expression for the floorplan

Construct the normalized slicing tree. Here the tree is presented in an S-expression-like format. Left children nodes come before right children nodes.

```
(V (1)
```

```
    (H (H (V (5)
             (H (H
                (8)
                (7))
             (6)))
          (4))
       (V (2)
          (3))))
```

Convert the slicing tree to Polish expression.

```
1587H6HV4H23VHV
```