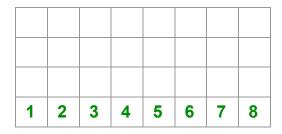
Permissions

Values

- Change permissions, write top value (left child + right child)
- 1|2 means $\frac{1}{2}$ permission for both

Upsweep - Initial

1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4



Upsweep - First row

1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4
1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4

3	7	11	15				
1	2	3	4	5	6	7	8

Upsweep - Second row

1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4

10	26	~	~				
3	7	11	15				
1	2	3	4	5	6	7	8

Upsweep - Third row

1	2	3	4	1	2	3	4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4

36	~	~	~				
10	26	~	~				
3	7	11	15				
1	2	3	4	5	6	7	8

Permissions

Values

- Write right child (top+left), write left child (top), change permissions
- \old value of left child is required for the loop invariant (it is overwritten).

Downsweep - Preparation

1	2	3	4	1	2	3	4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4

0	0	0	0				
10	26	~	~				
3	7	11	15				
1	2	3	4	5	6	7	8

Downsweep - First row

1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4

0	0	0	0				
0	10	~	~	~	~	~	~
3	7	11	15				
1	2	3	4	5	6	7	8

Downsweep - Second row

1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4
1 1	1 1	1 2	1 2	2 3	2 3	2 4	2 4

0	0	0	0				
0	10	~	~	~	~	~	~
0	3	10	21	~	~	~	~
			4		6		8

Downsweep - Third row

	2						
1	2	3	4	1	2	3	4
1	2	3	4	1	2	3	4

0	1	3	6	10	15	21	28
0	3	10	21	~	~	~	~
0	10	~	~	~	~	~	~
0	0	0	0				