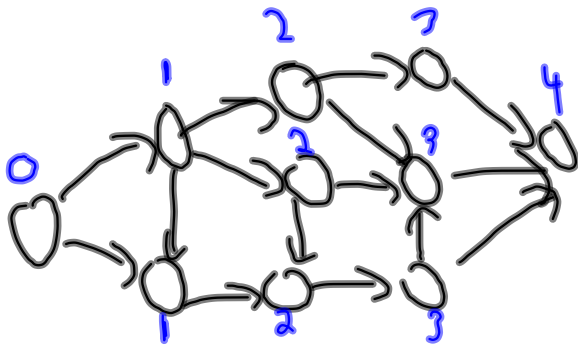


Dijkstra performs a discrete-event simulation
of breadth-first search



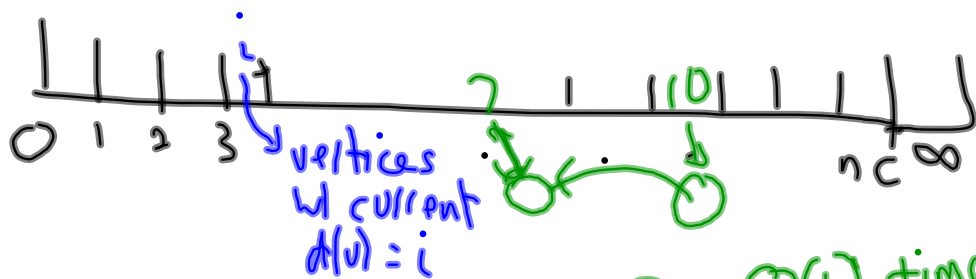
Different Data Structure
Relaxed Heap

Dijkstra

1. If the vertices are permanently labelled
in order $v_1, v_2, \dots, v_n$
then $d(v_1) \leq d(v_2) \leq \dots \leq d(v_n)$

Dial's alg.

Data struct for vertex labels



Decrease-Key

from 10 to 7

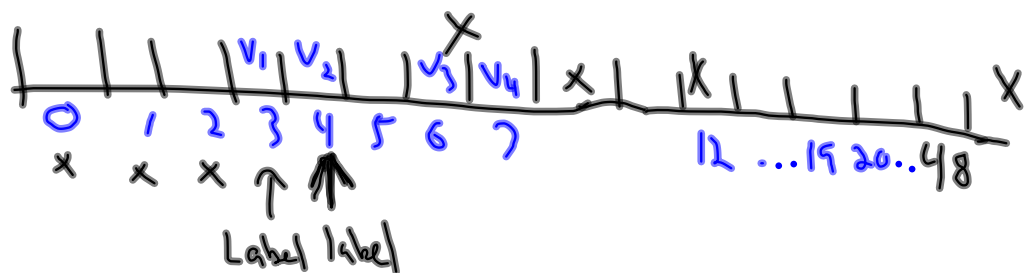
$O(1)$ time

Find Min

$O(nc)$

$O(\frac{n^2}{nc} + m)$

$$C = 8 \quad n = 6$$

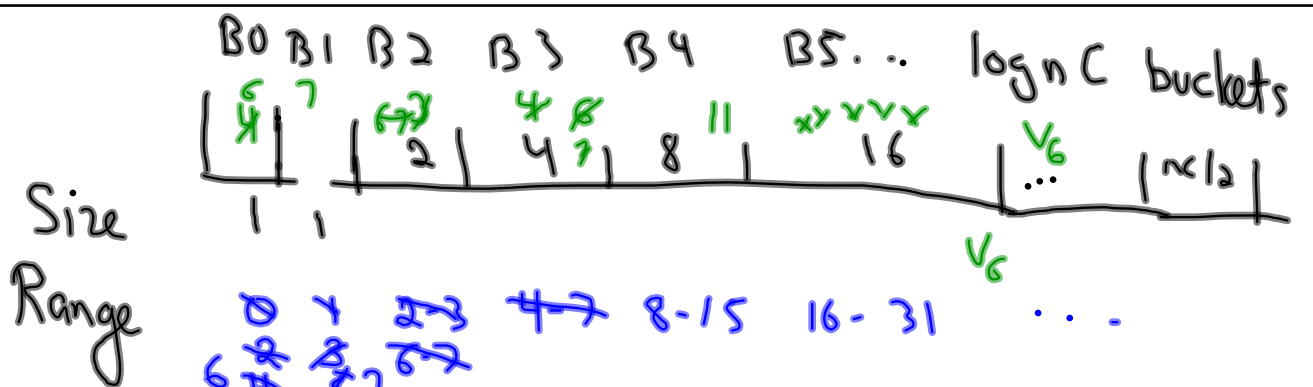


Don't back up

Time for find mins is $O(nc)$

Observations

1. Buckets to my left are never used again
2. Buckets far to the right are not going to be used soon



- Insert into correct bucket (scan from left to right for correct bucket)
- Delete Min
 - Scan Buckets for first item if it's in B_0 or B_1 remove it else in B_i .
 - Redistribute elements of B_i into buckets $B_0 \dots B_{i-1}$
- DecreaseKey
 - Remove item, change key, reinsert

- n Insert $O(\lg n C)$ time
- m DecreaseKey $O(\lg n C)$ time
- n DeleteMin $O(\lg n C)$ time + redistribution time

Nodes only move left
 1 node only moves left $\leq \lg n C$ times
 total time for all leftward moves is $O(n \lg n C)$
 $O(m \lg n C)$ time $O(m + n \lg n C)$ time.