

15.082J & 6.855J & ESD.78J

Visualizations

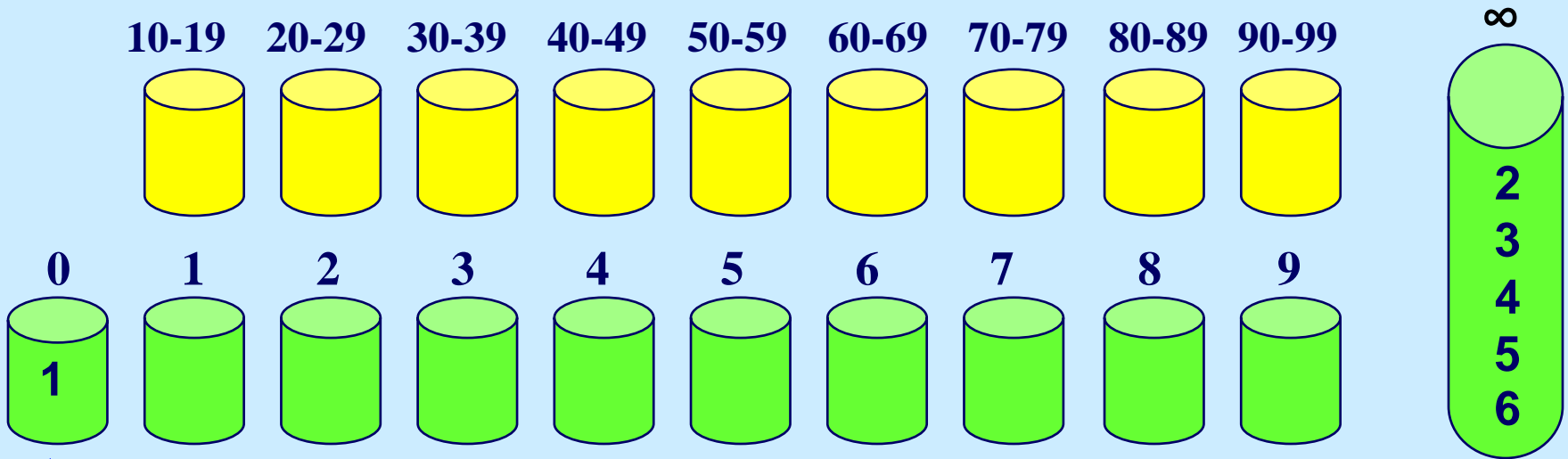
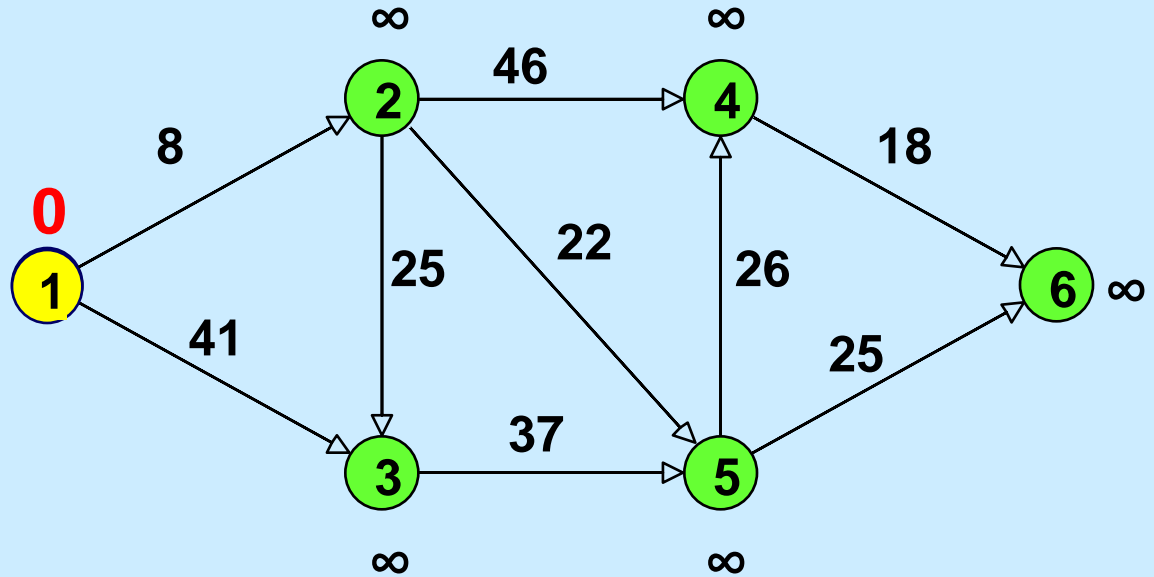
**Dijkstra's Algorithm with
two levels of buckets**

Initialize

Initialize distance labels

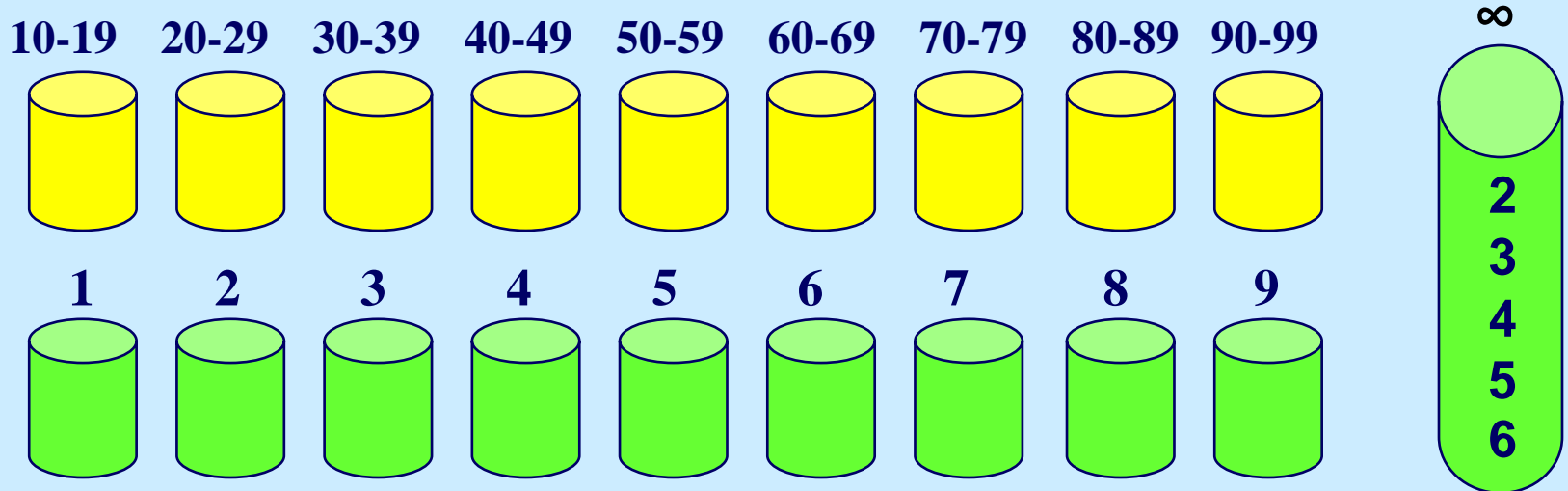
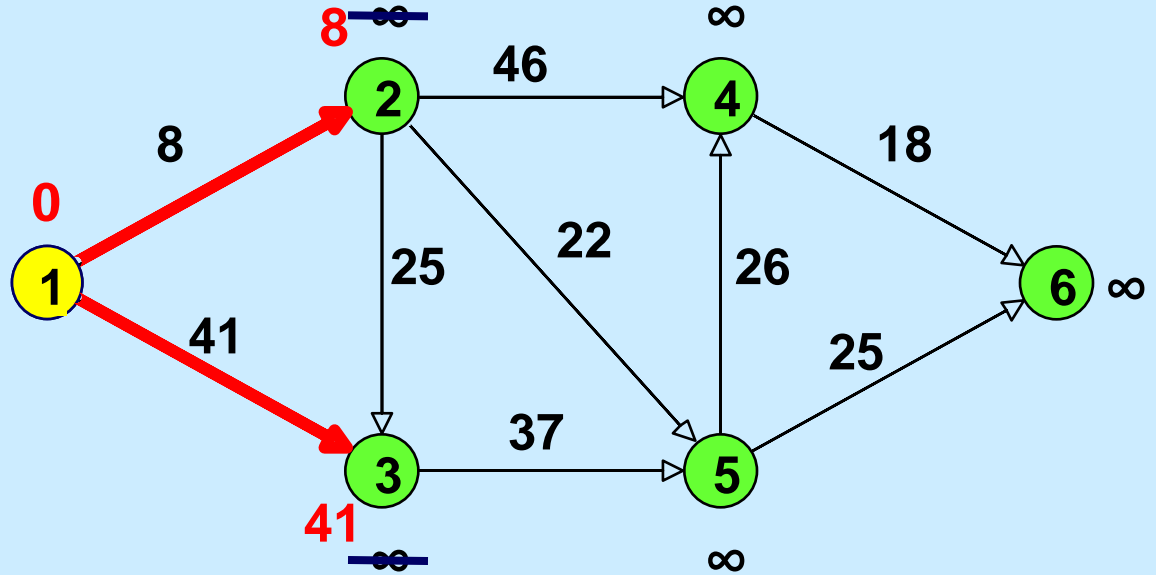
Initialize buckets.

Select the first nonempty lower bucket. Then select an element of the bucket.



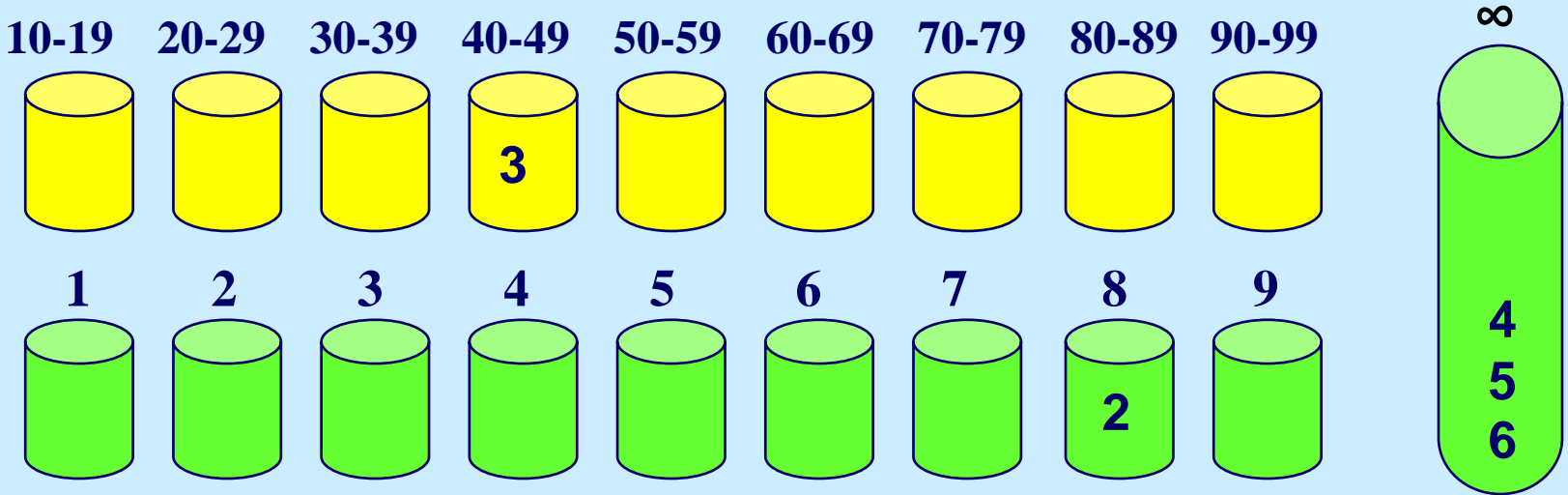
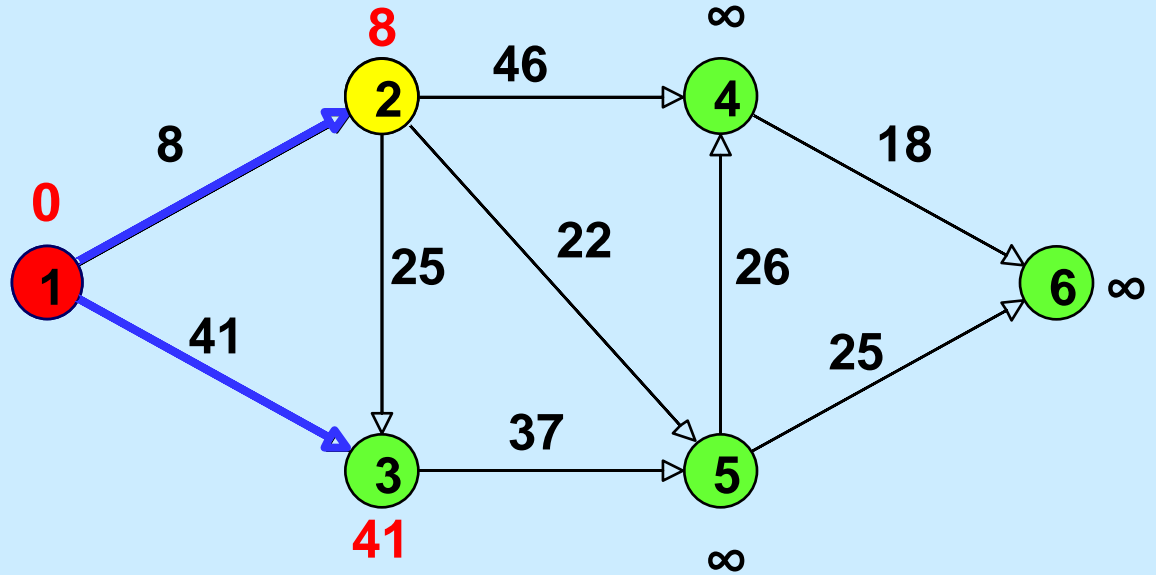
Update

Scan arcs out of node 1 and update data structures



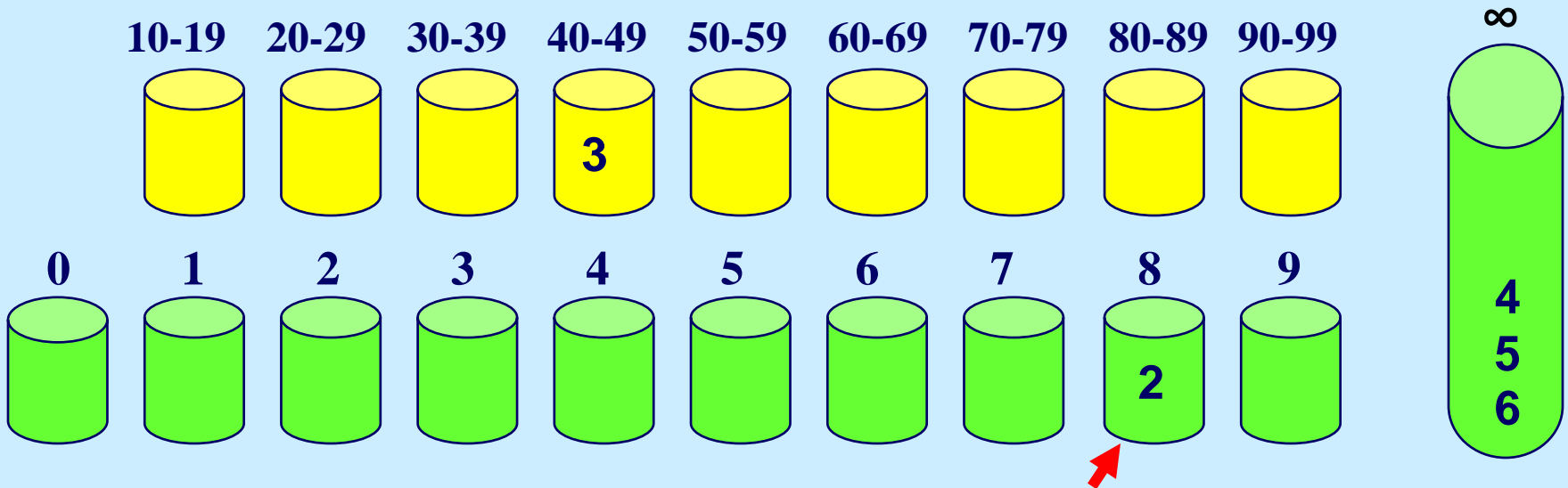
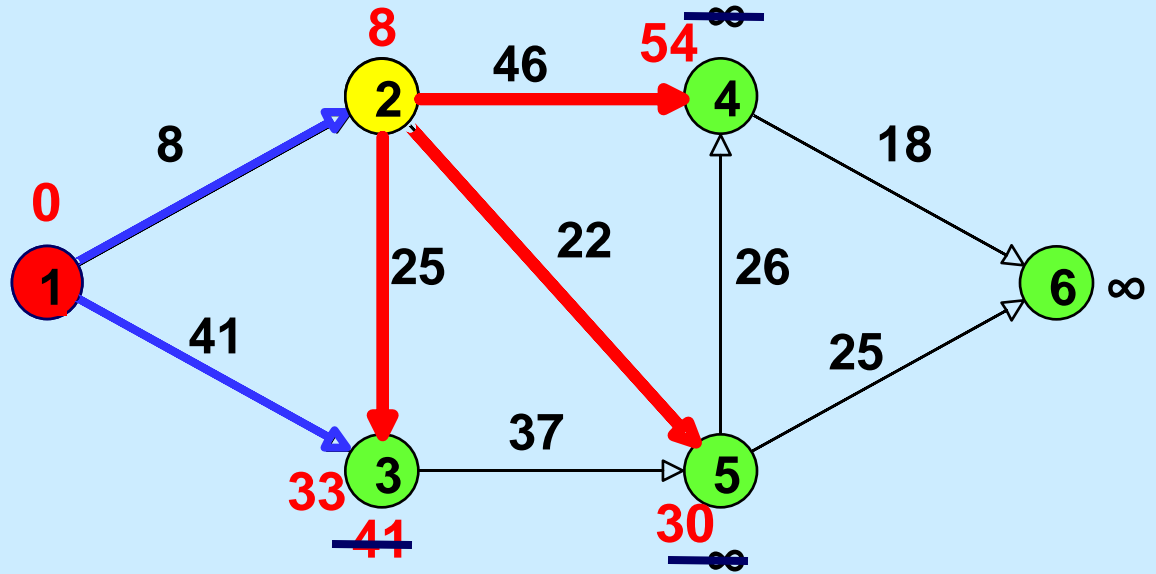
Find Min Lower Bucket

Find min non-empty lower bucket.
Select a node in the bucket.



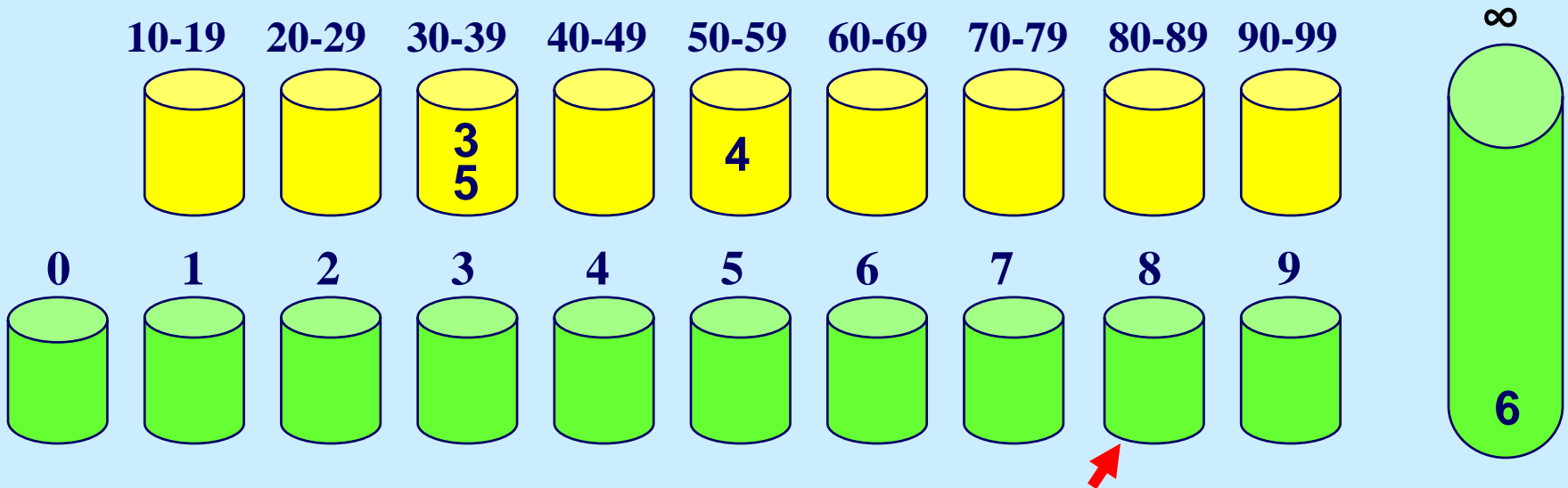
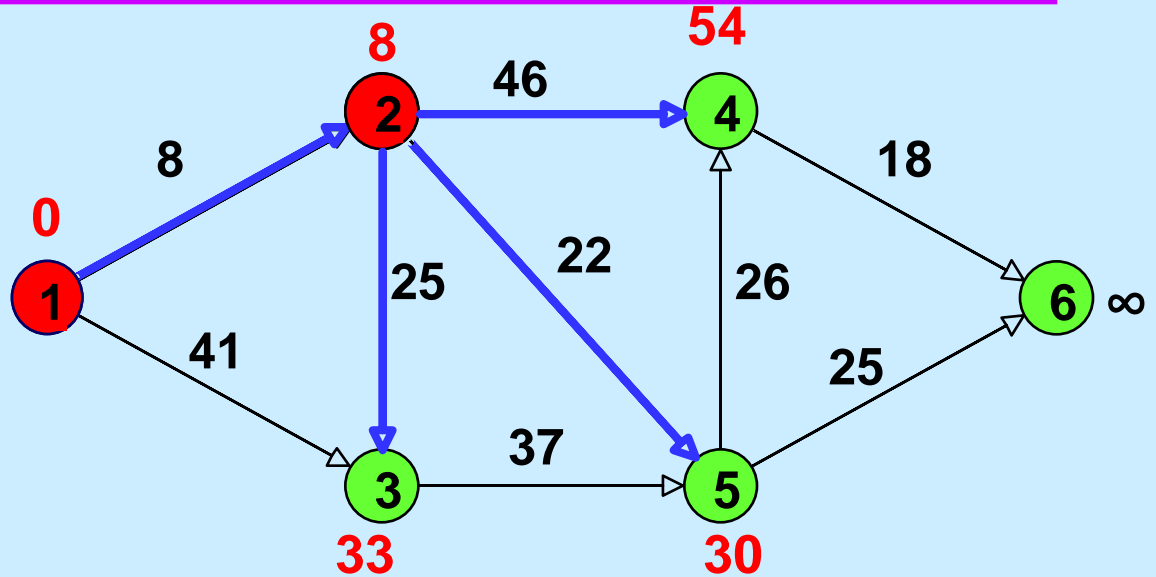
Update

Scan arcs out of node 2 and update distance labels and buckets.



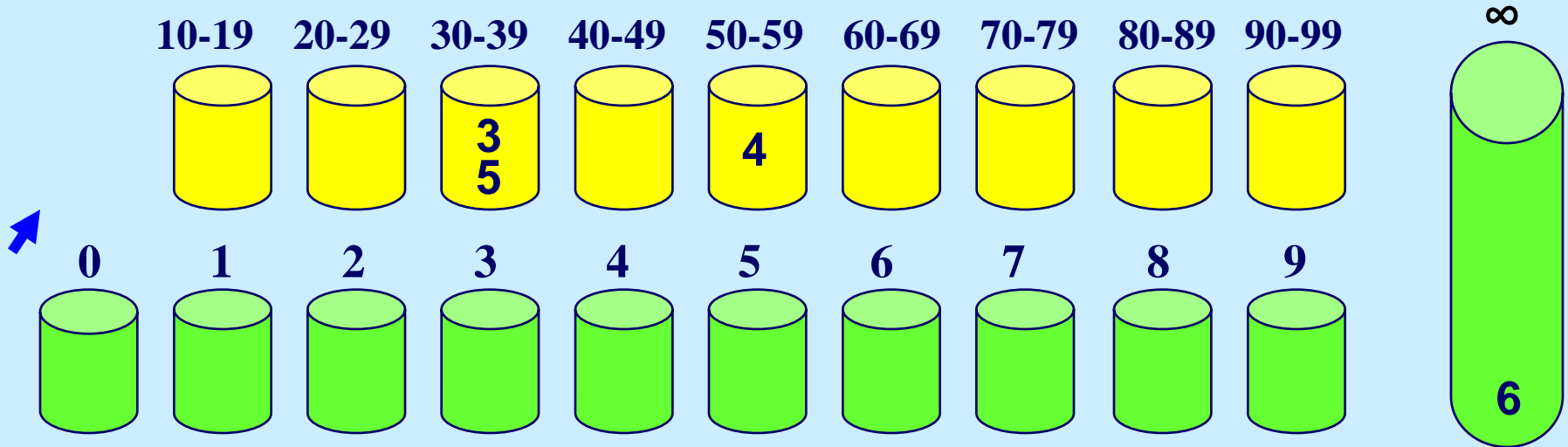
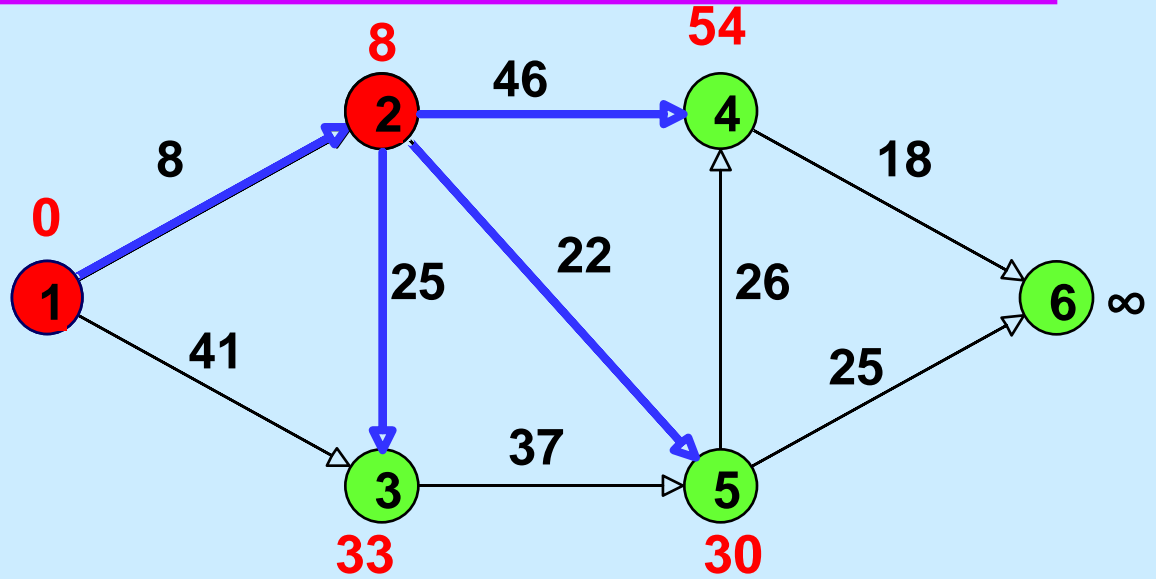
Find Min Lower Bucket

Scan lower bucket for first non-empty bucket. If none exist, then go to scanning upper buckets.



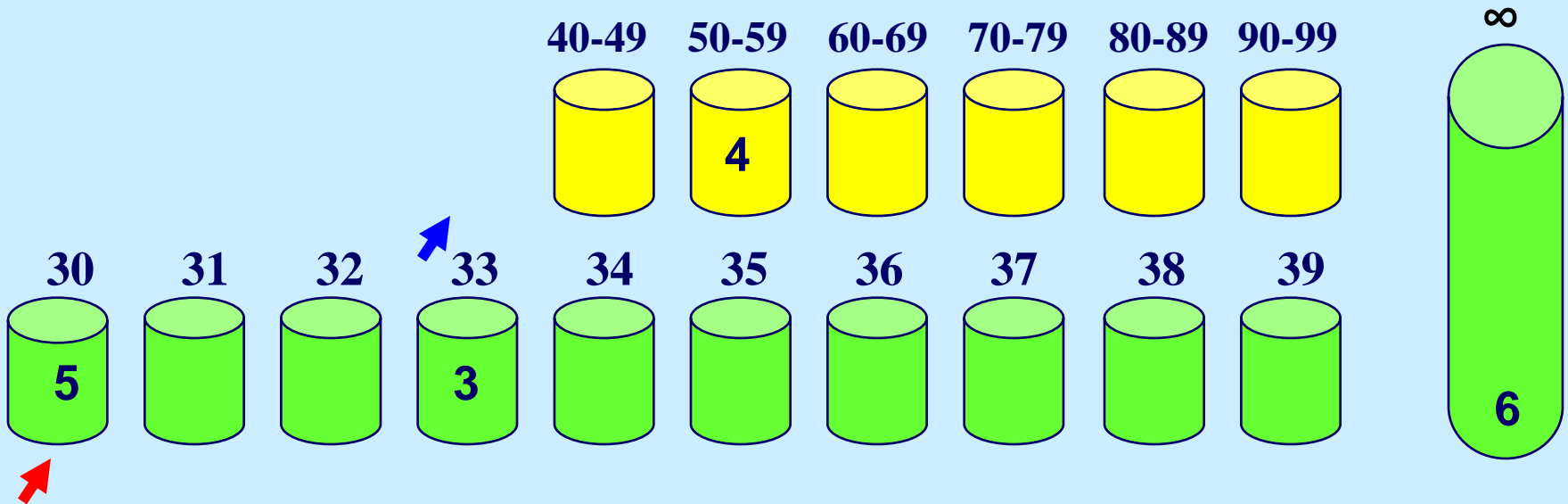
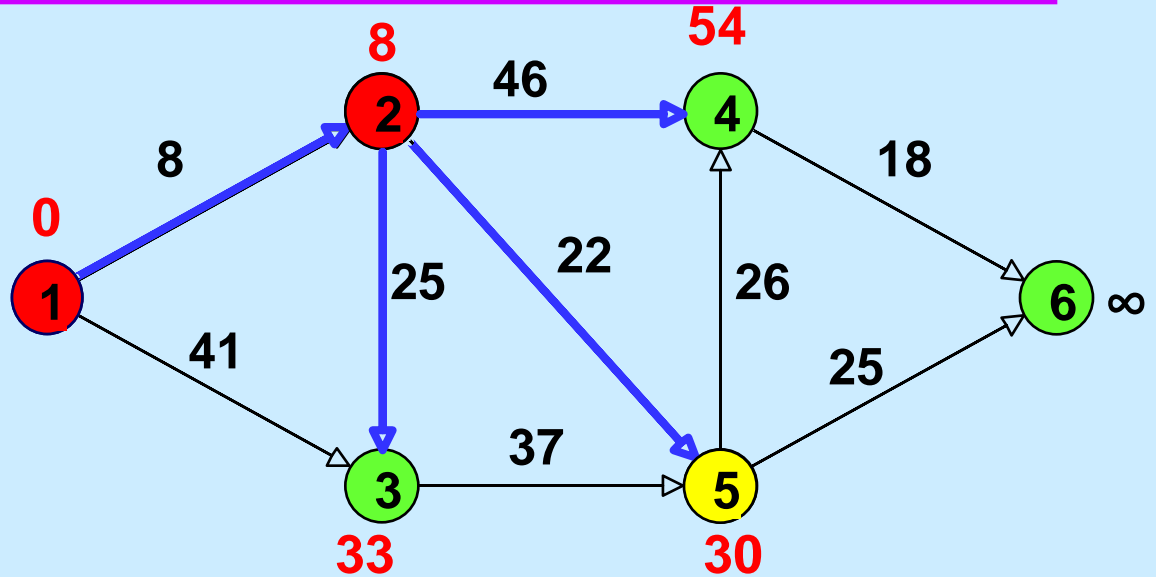
Find Min Upper Bucket

Scan upper buckets to find the first non-empty bucket.



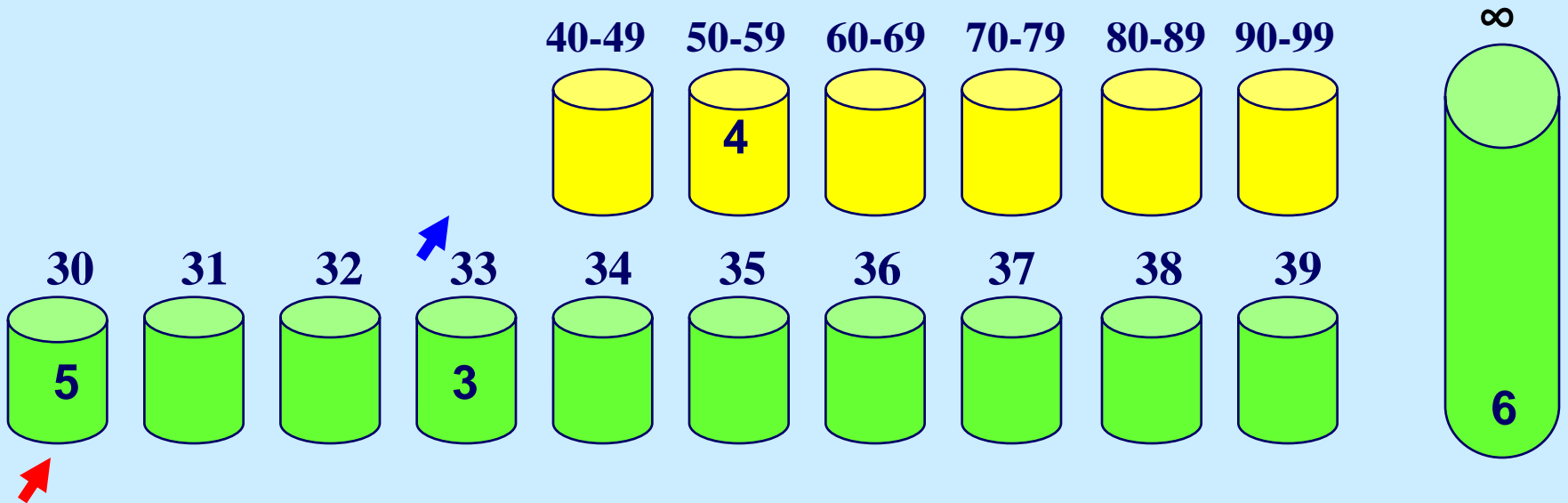
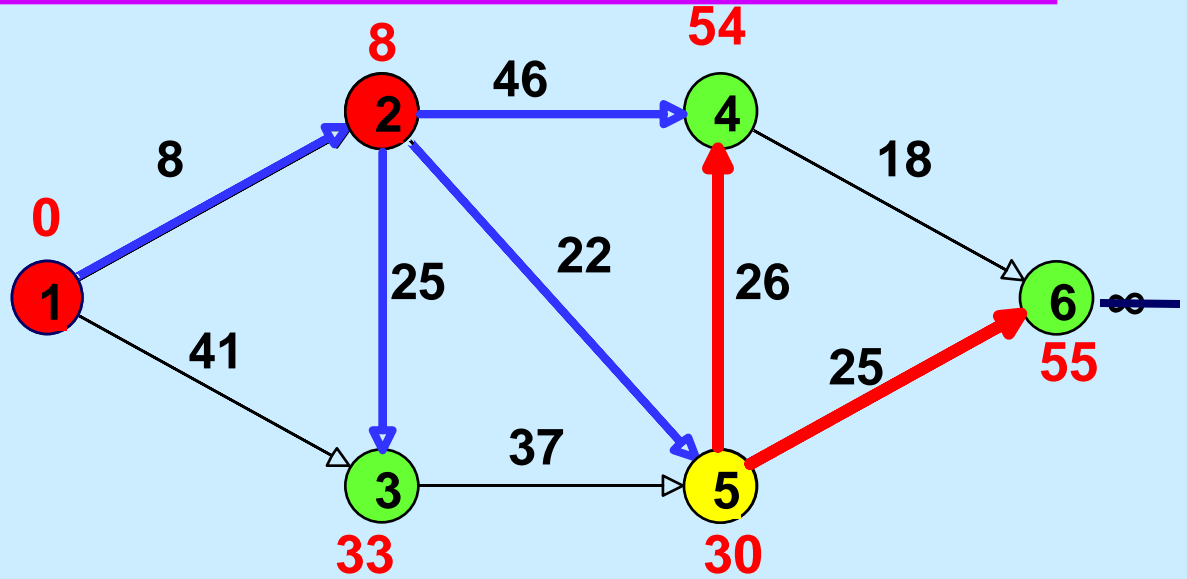
Find Min Lower Bucket

Find the first nonempty lower bucket and select a node in the bucket



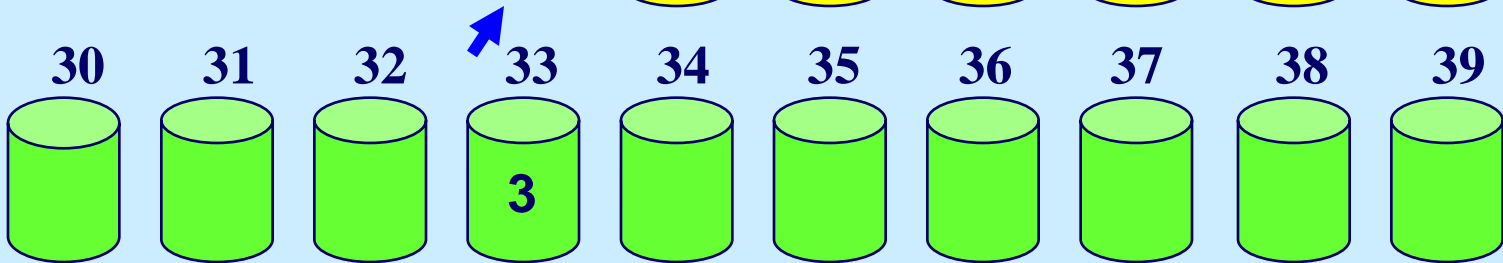
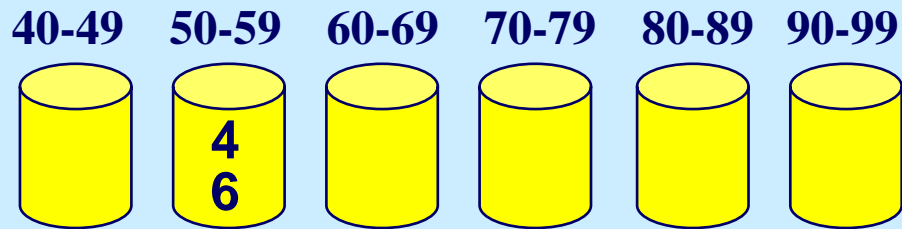
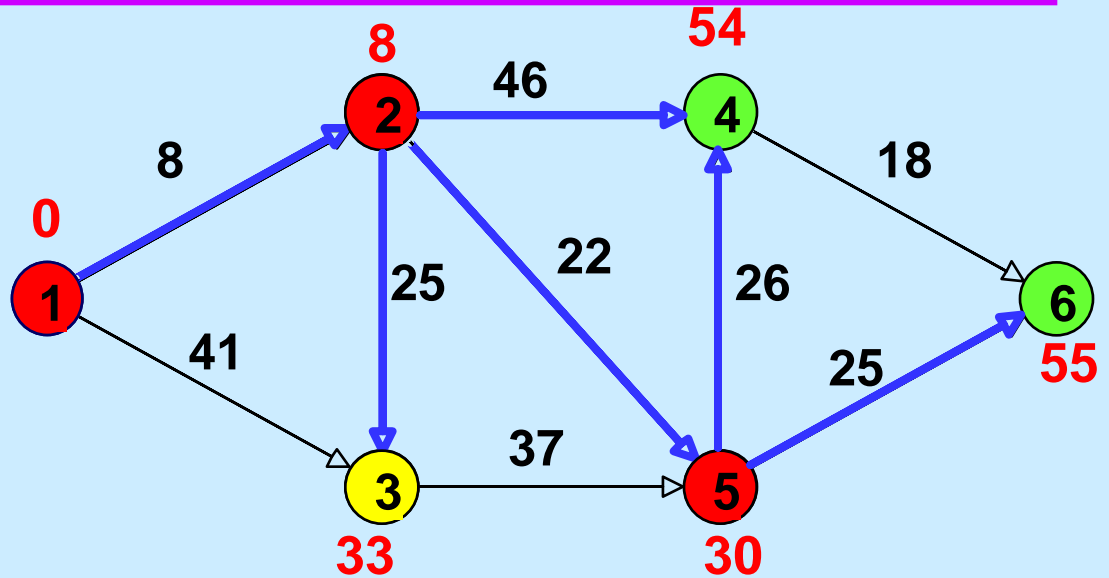
Update

Scan arcs out of node 5 and update distance labels and buckets.



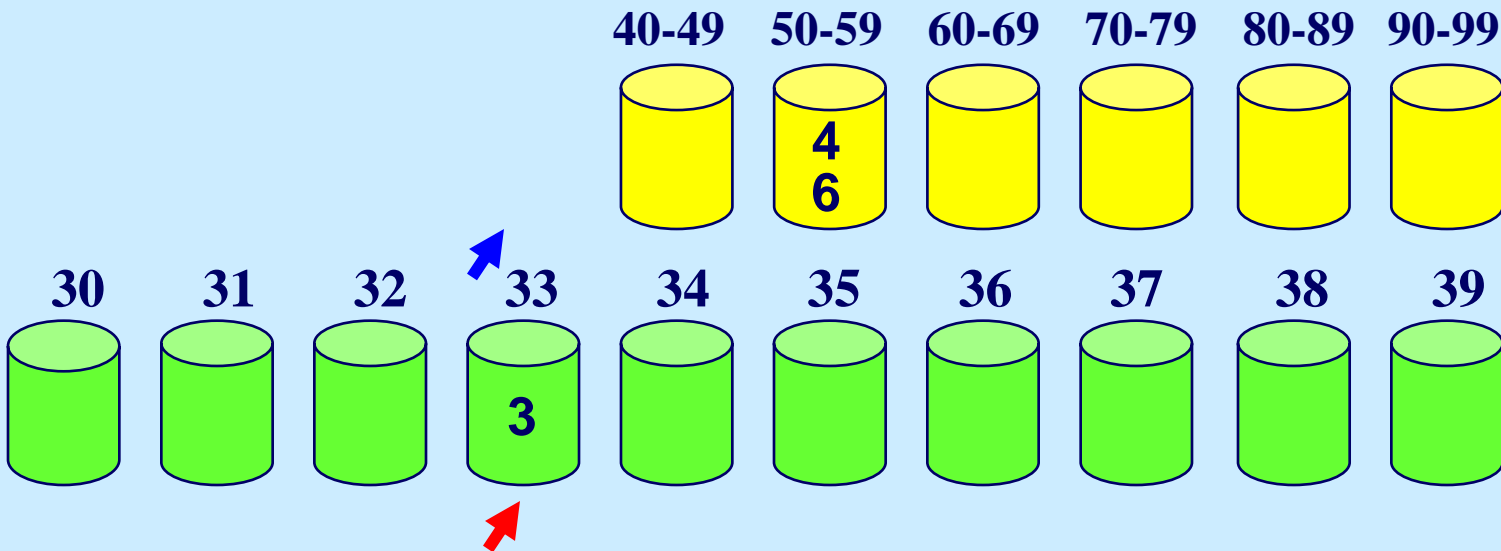
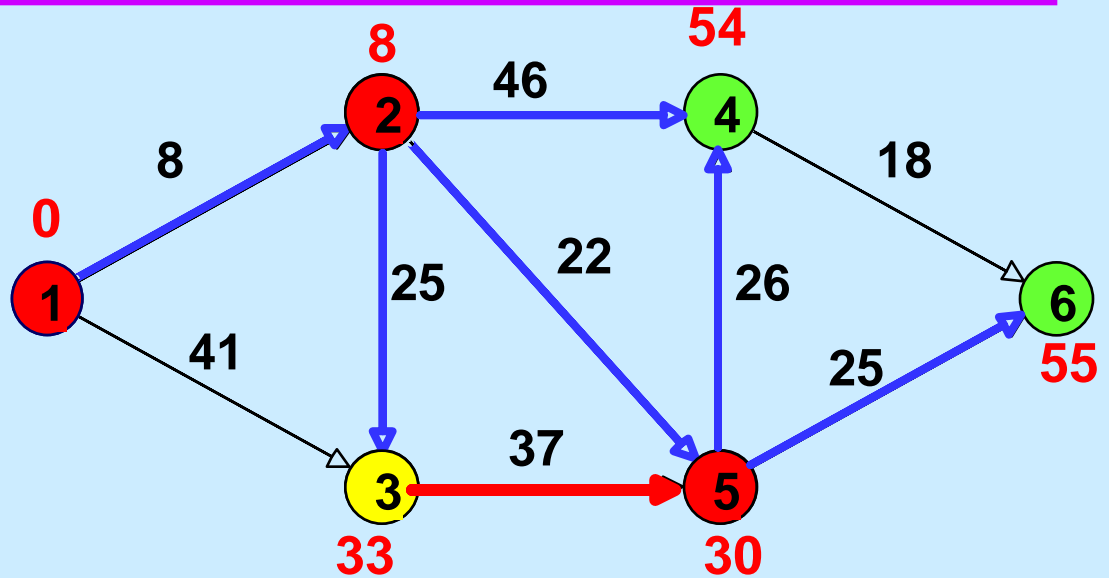
Find Min Lower Bucket

Find the first nonempty lower bucket and select a node in the bucket



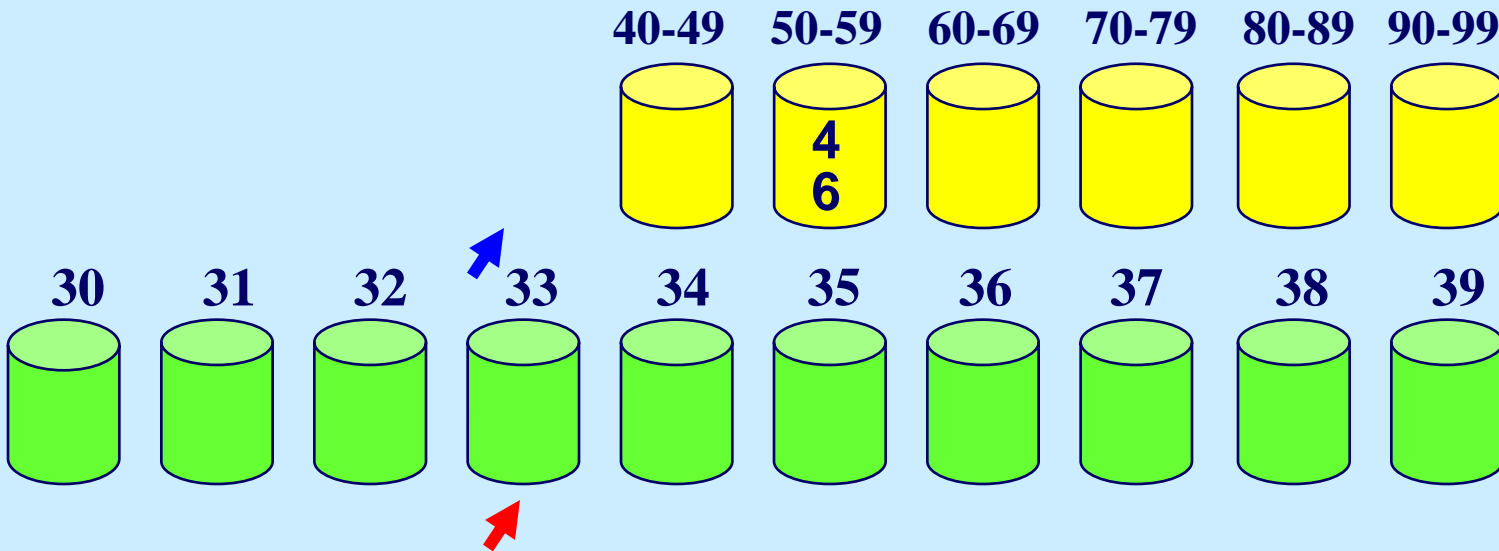
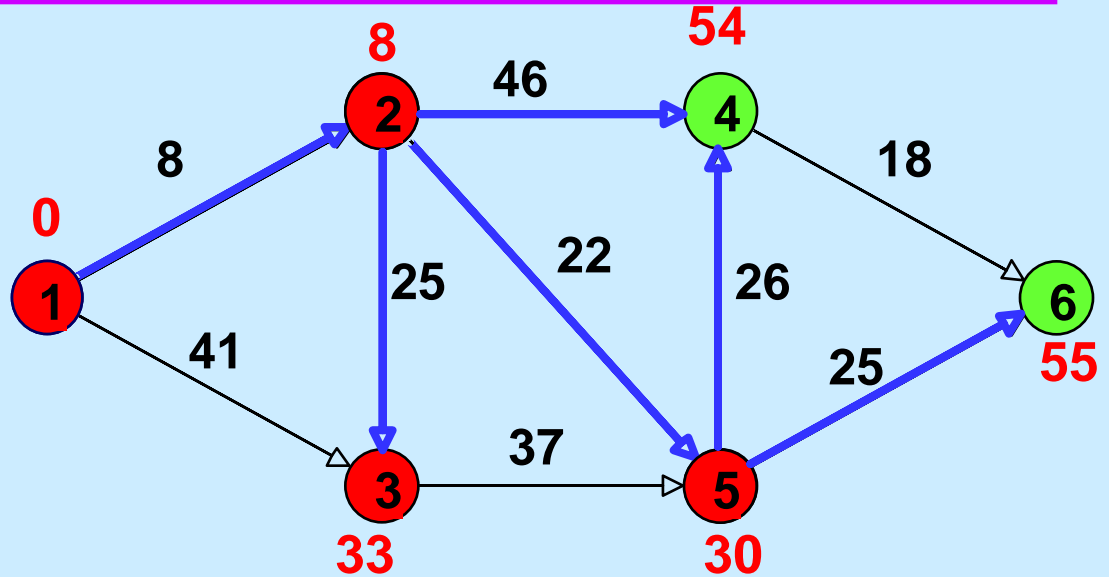
Update

Scan arcs out of node 3 and perform updates.



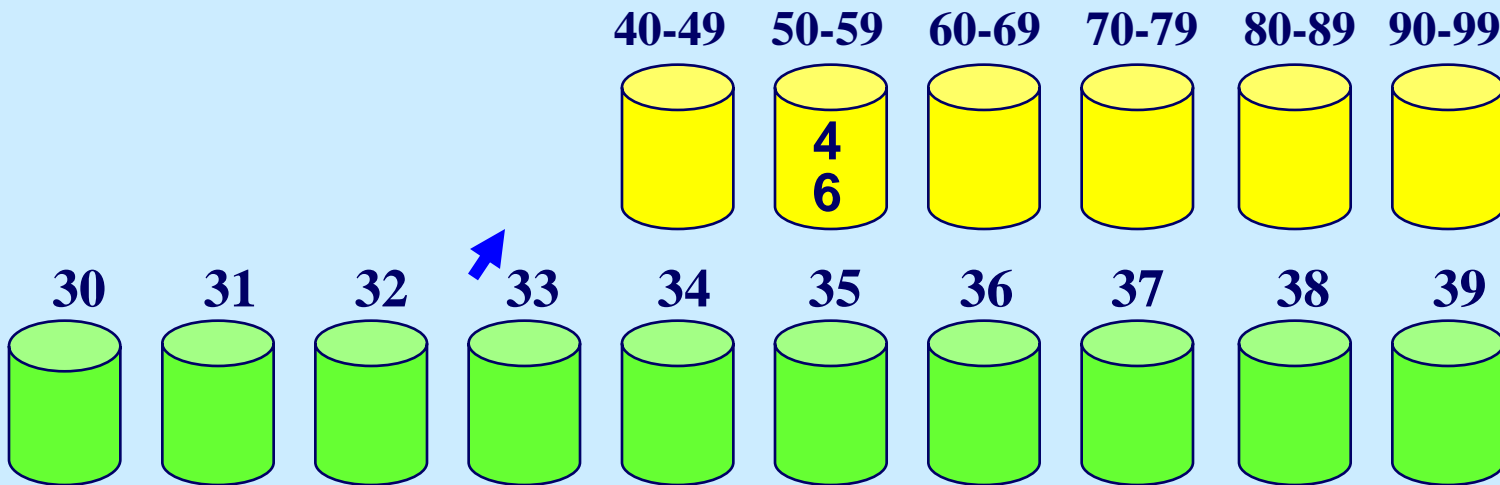
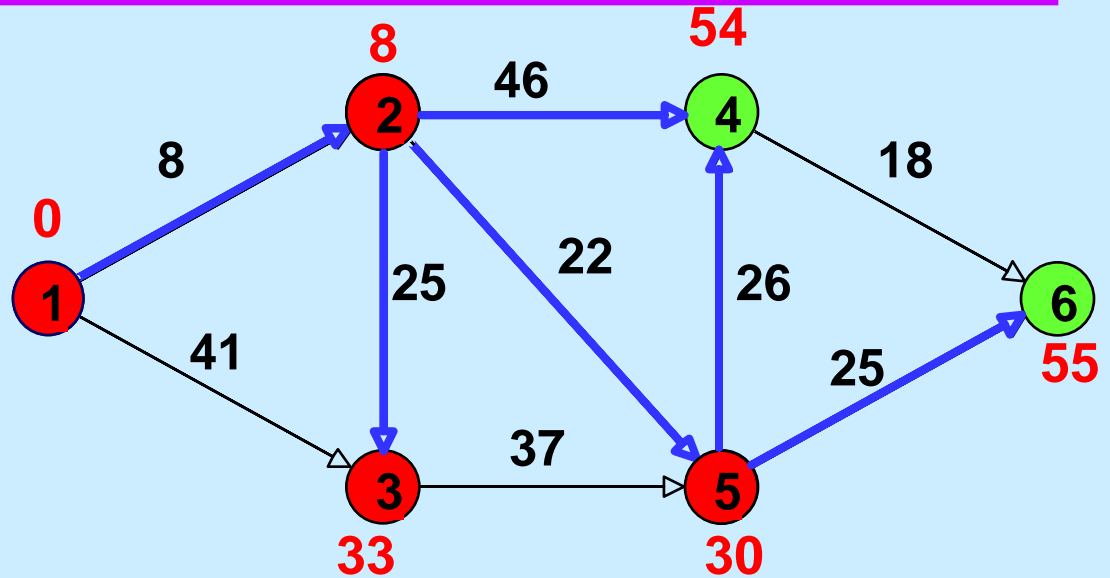
Find Min Lower Bucket

Scan lower buckets looking for a non-empty bucket.



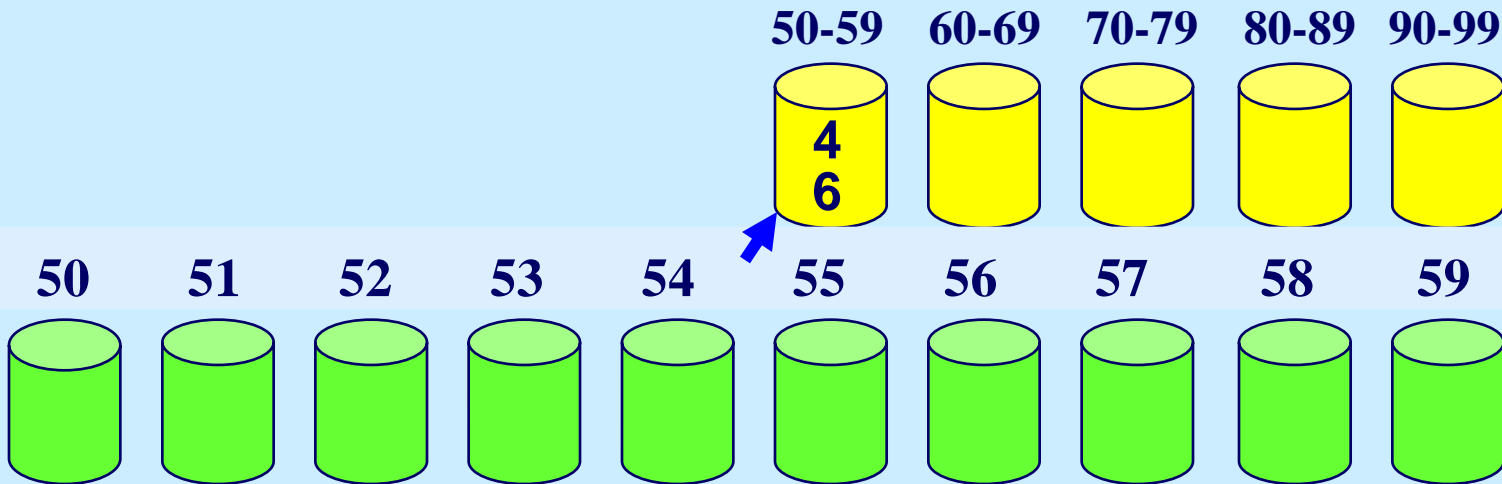
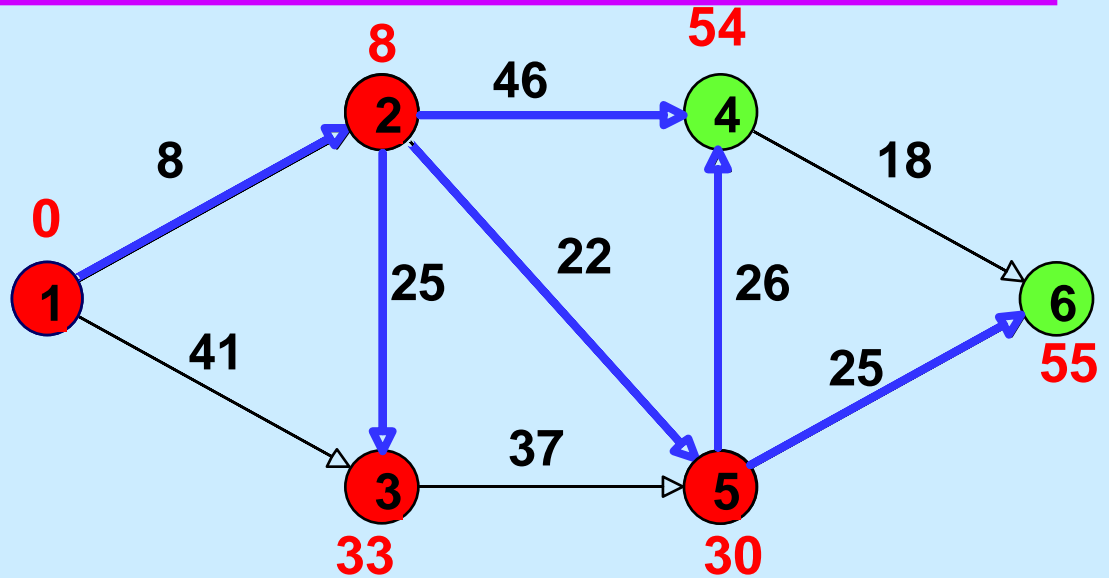
Find Min Upper Bucket

Scan upper buckets looking for a non-empty bucket.



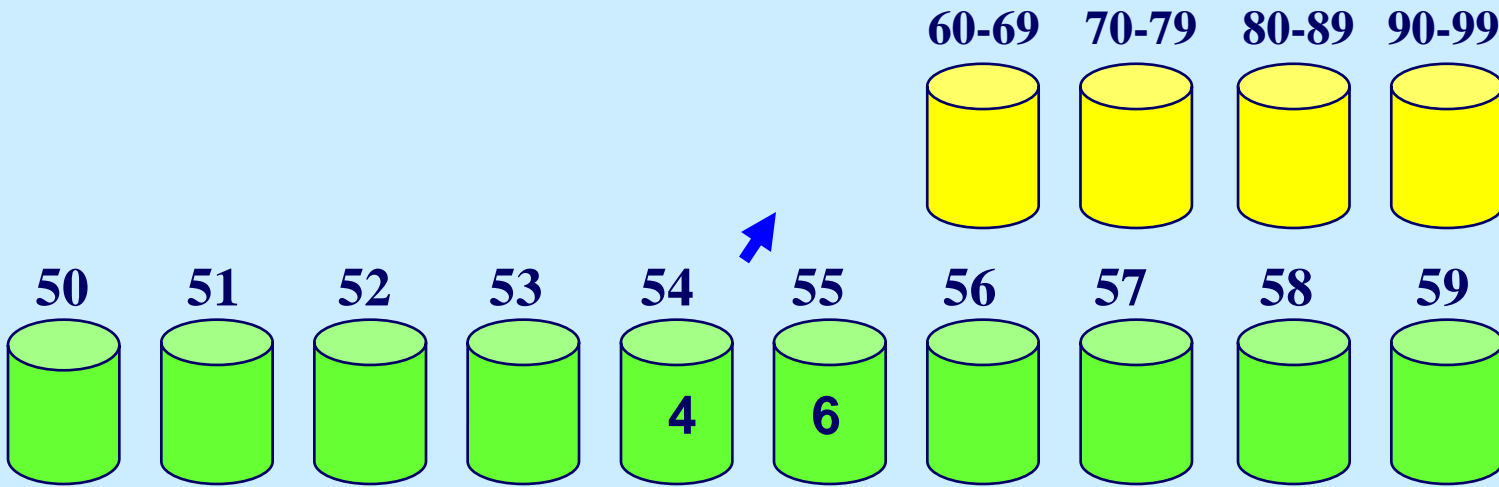
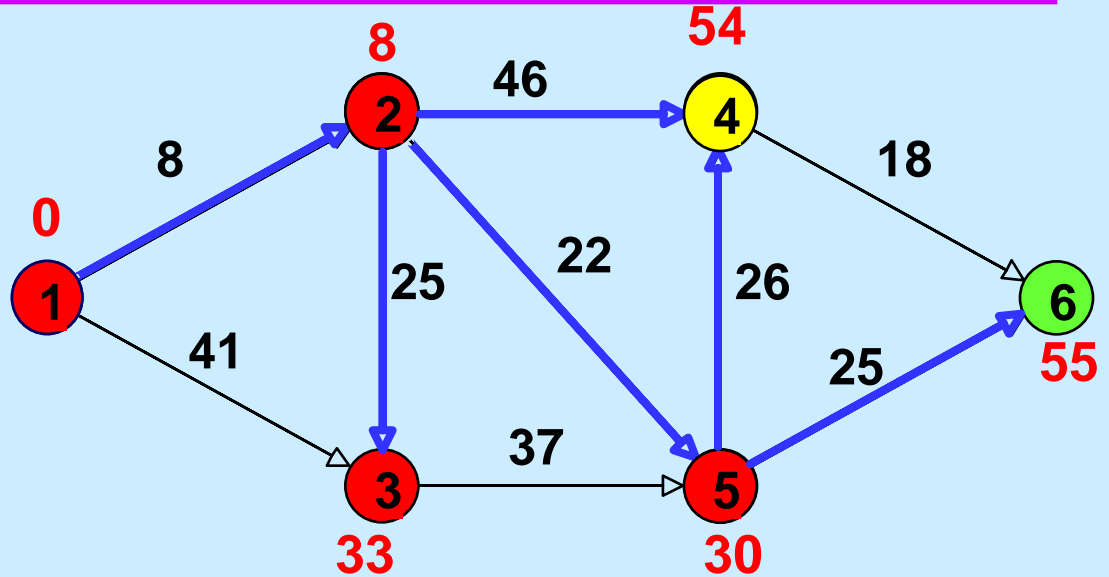
Move contents down

Adjust bucket numbers of lower buckets and move contents of upper bucket to lower buckets.



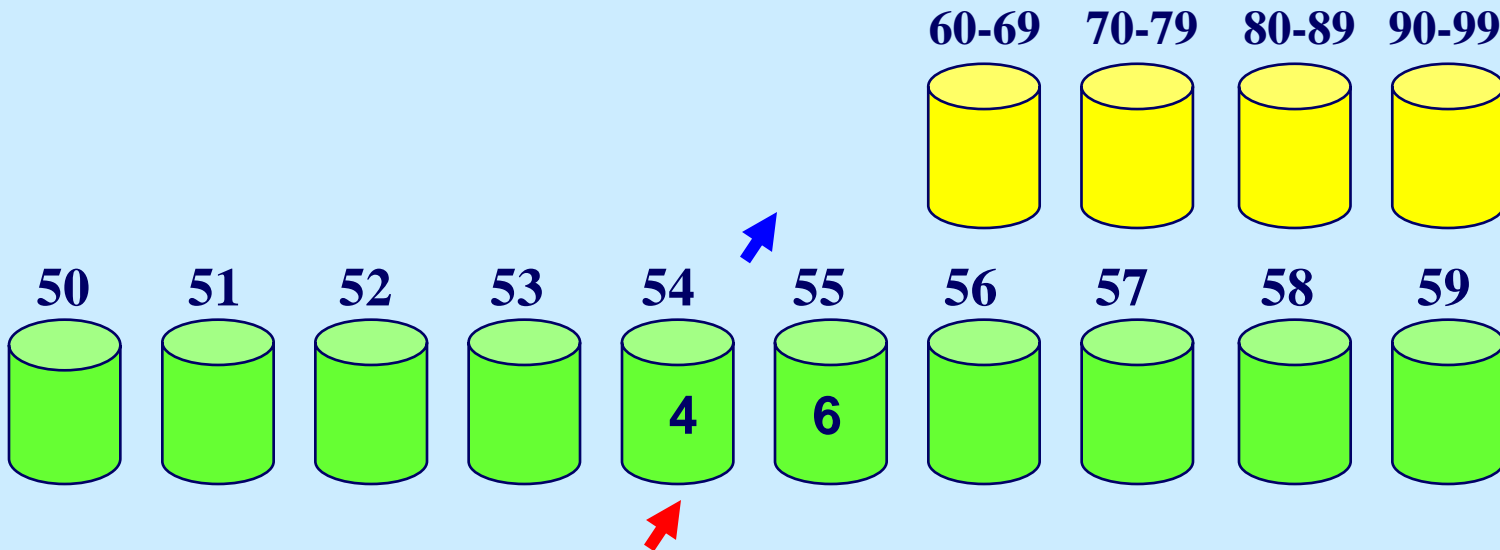
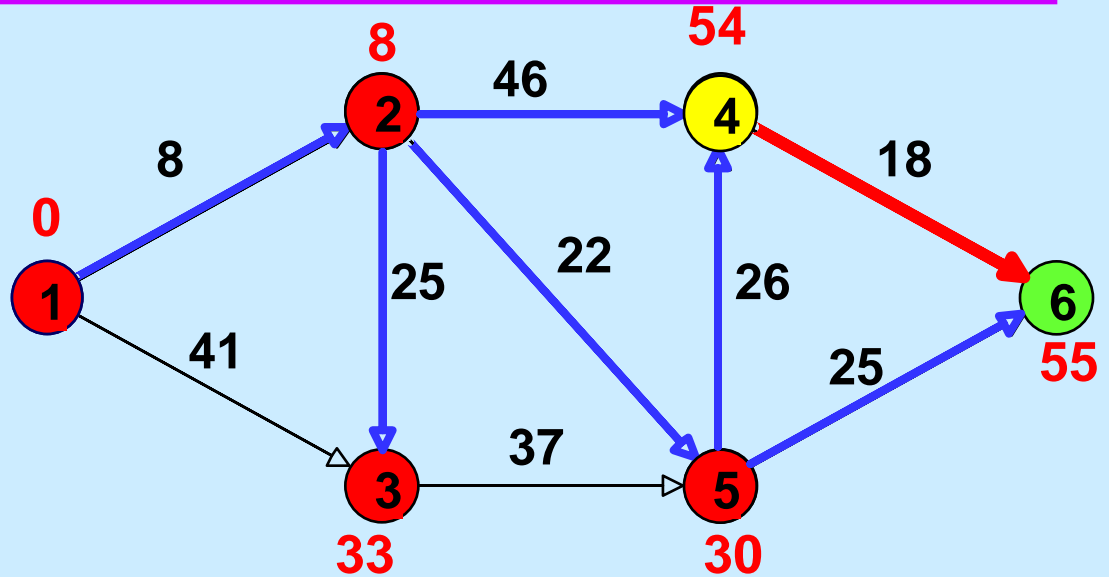
Find Min Lower Bucket

Select the min non-empty lower bucket.
Select an element from the bucket.



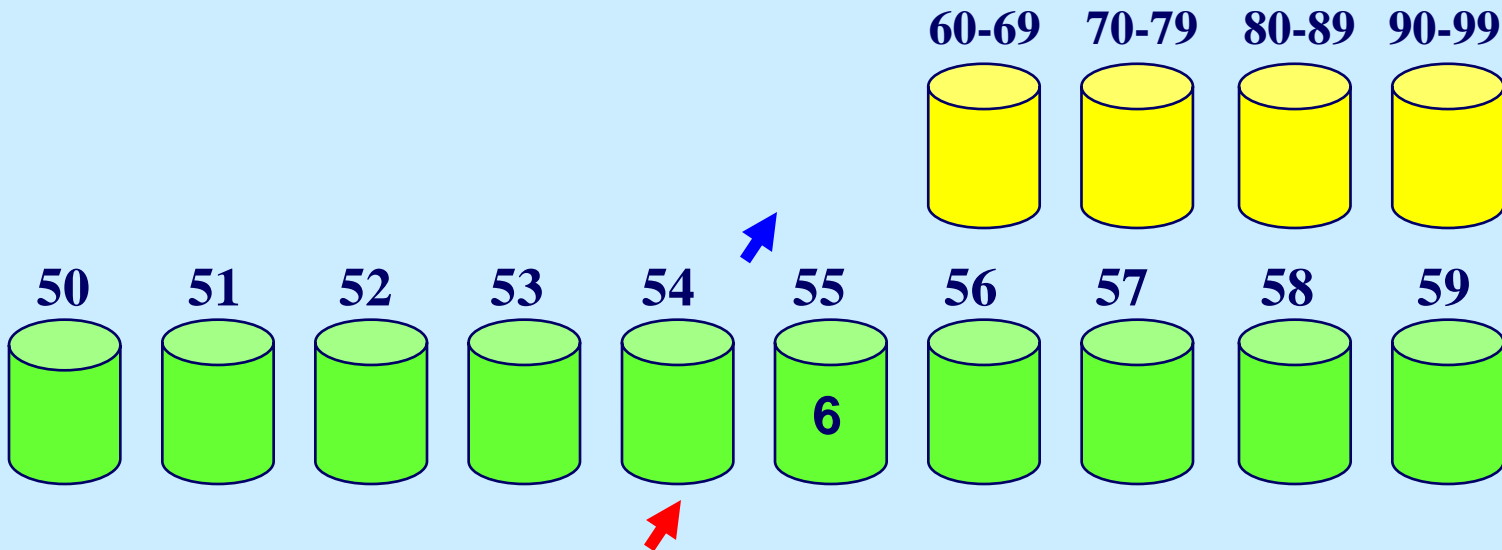
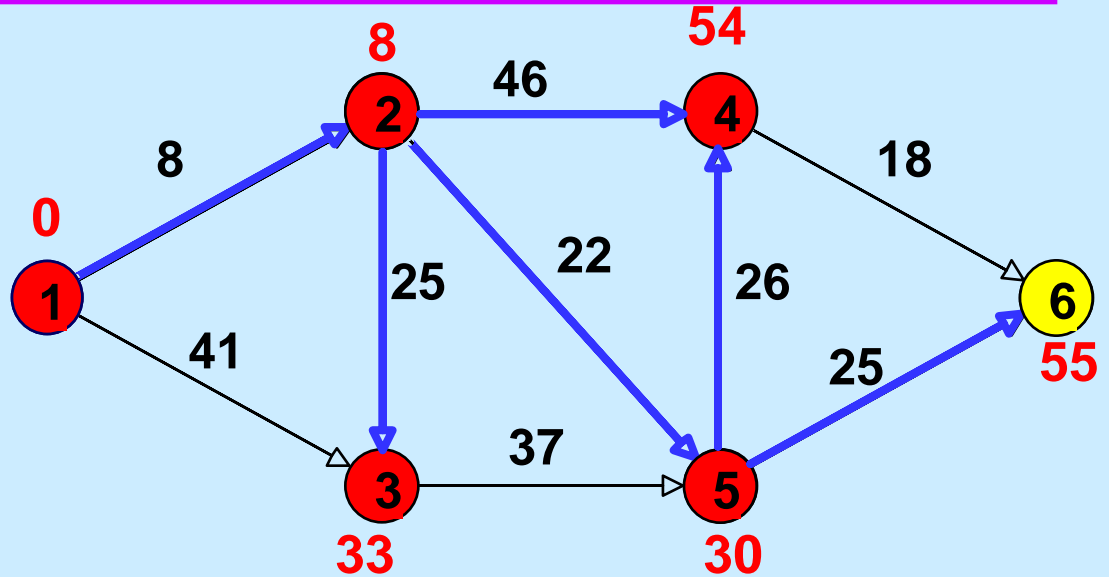
Update

Scan arcs out of node 4 and perform all updates.



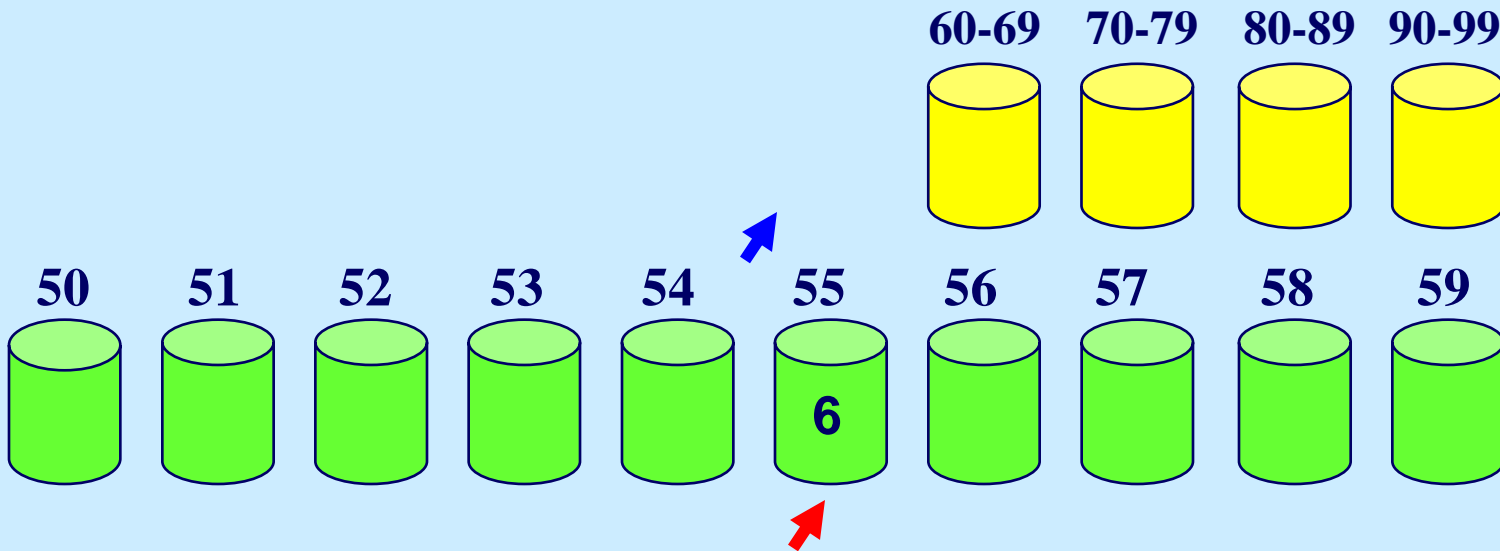
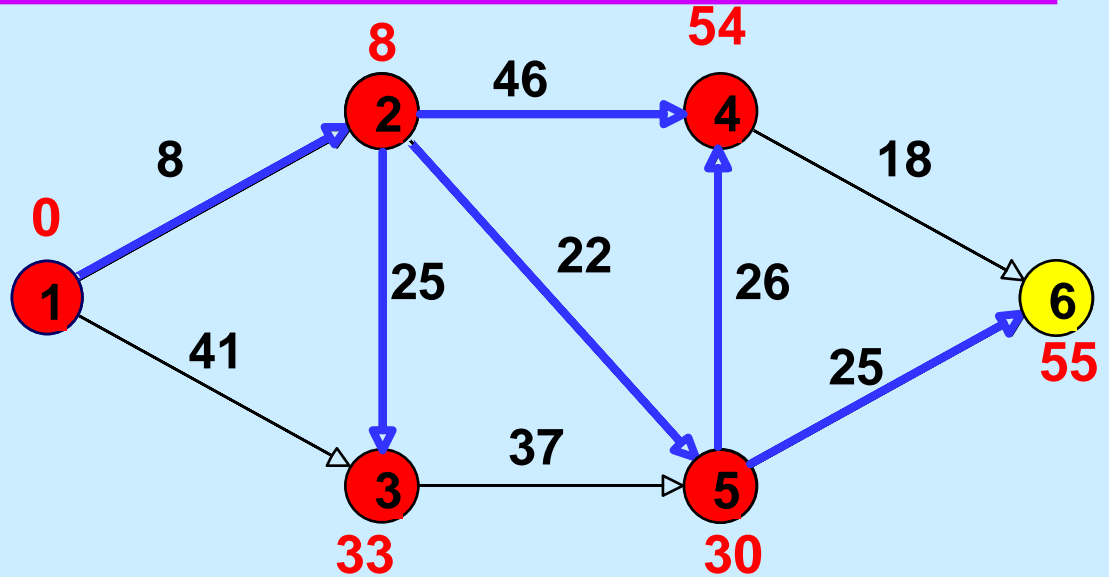
Find Min Lower Bucket

Scan lower buckets looking for a non-empty bucket.
Select a node of the bucket



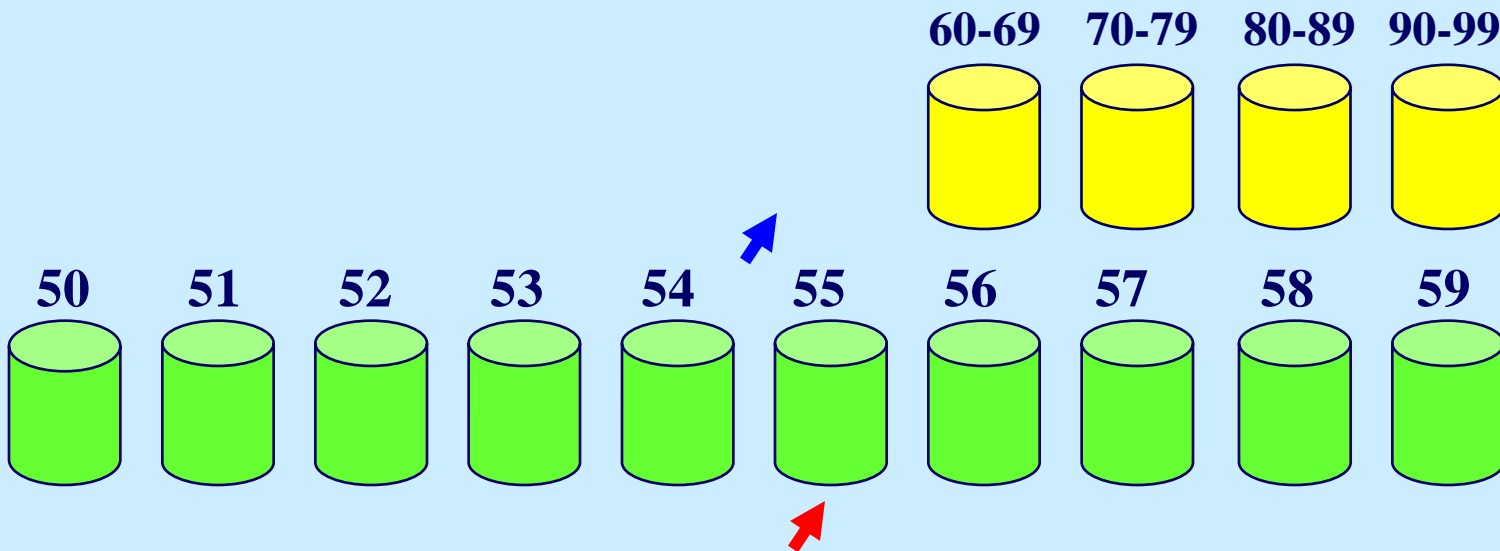
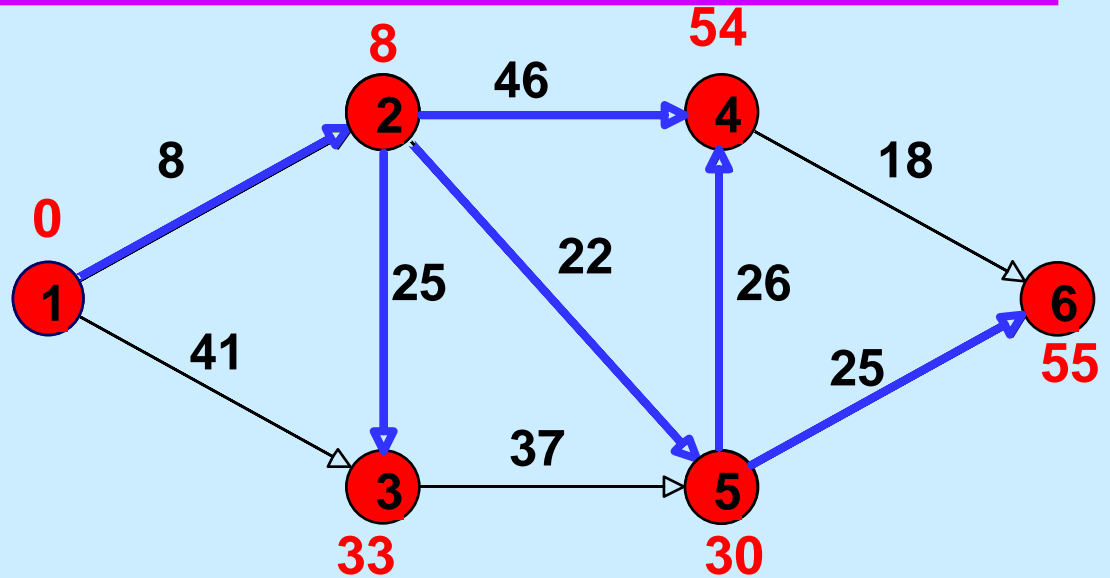
Update

Scan arcs out of node 6, and perform updates



Termination

All nodes are permanent. The algorithm terminates with the optimal shortest path tree.



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15.082J / 6.855J / ESD.78J Network Optimization

Fall 2010

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