12-XA

优先级队列

优先级搜索树

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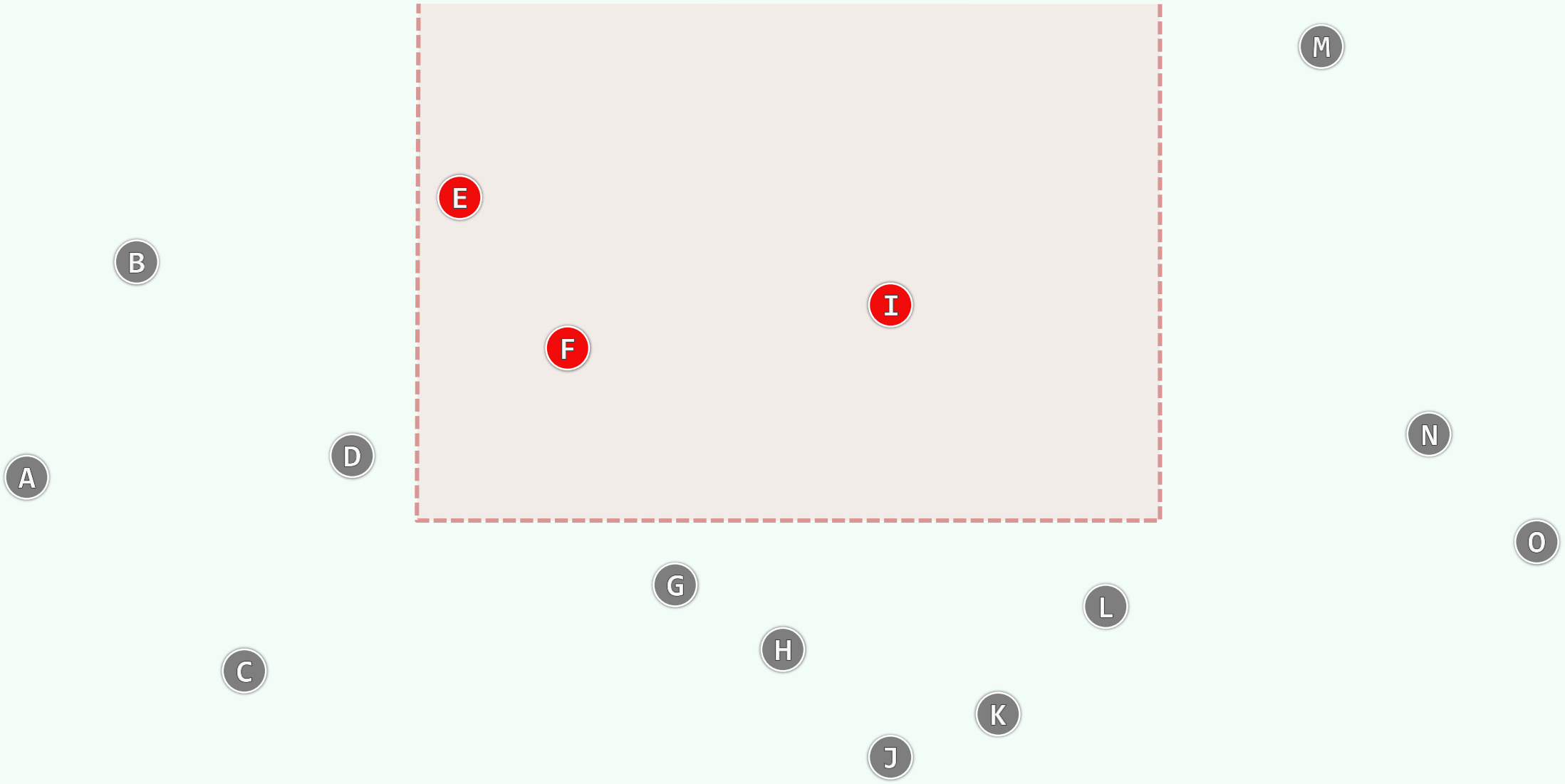
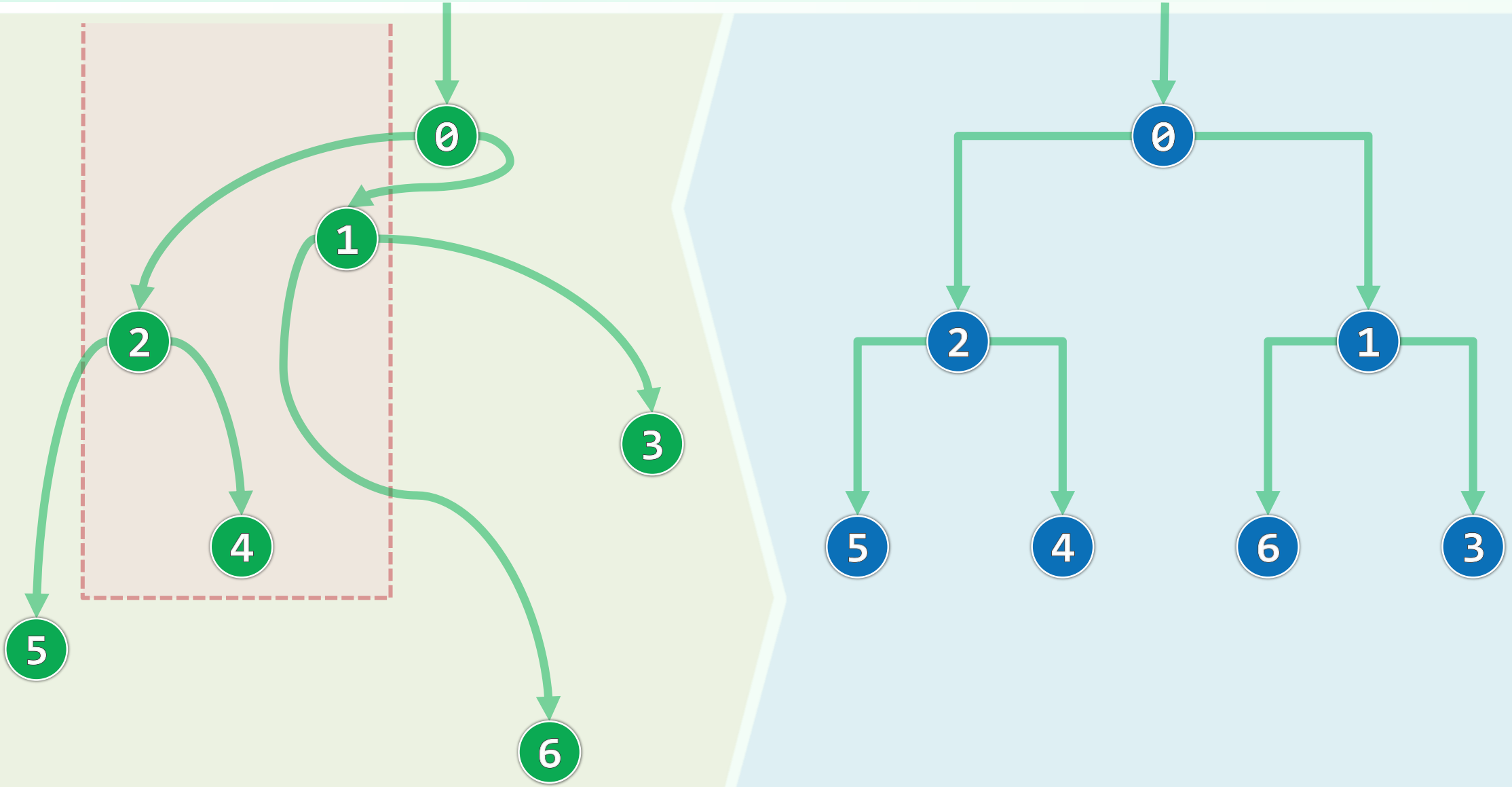
Grounded Range Query

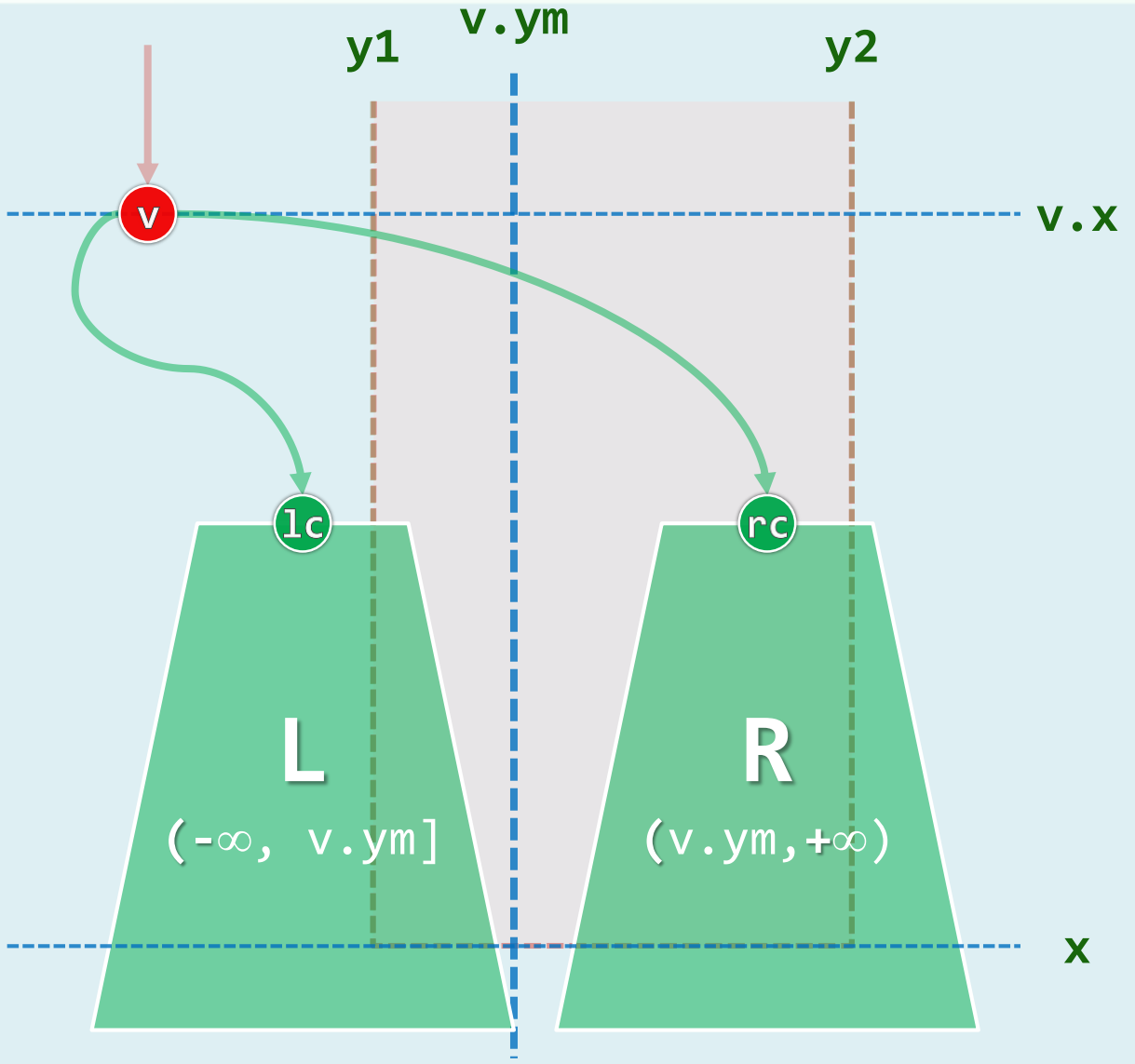


Priority Search Tree = BST + PQ

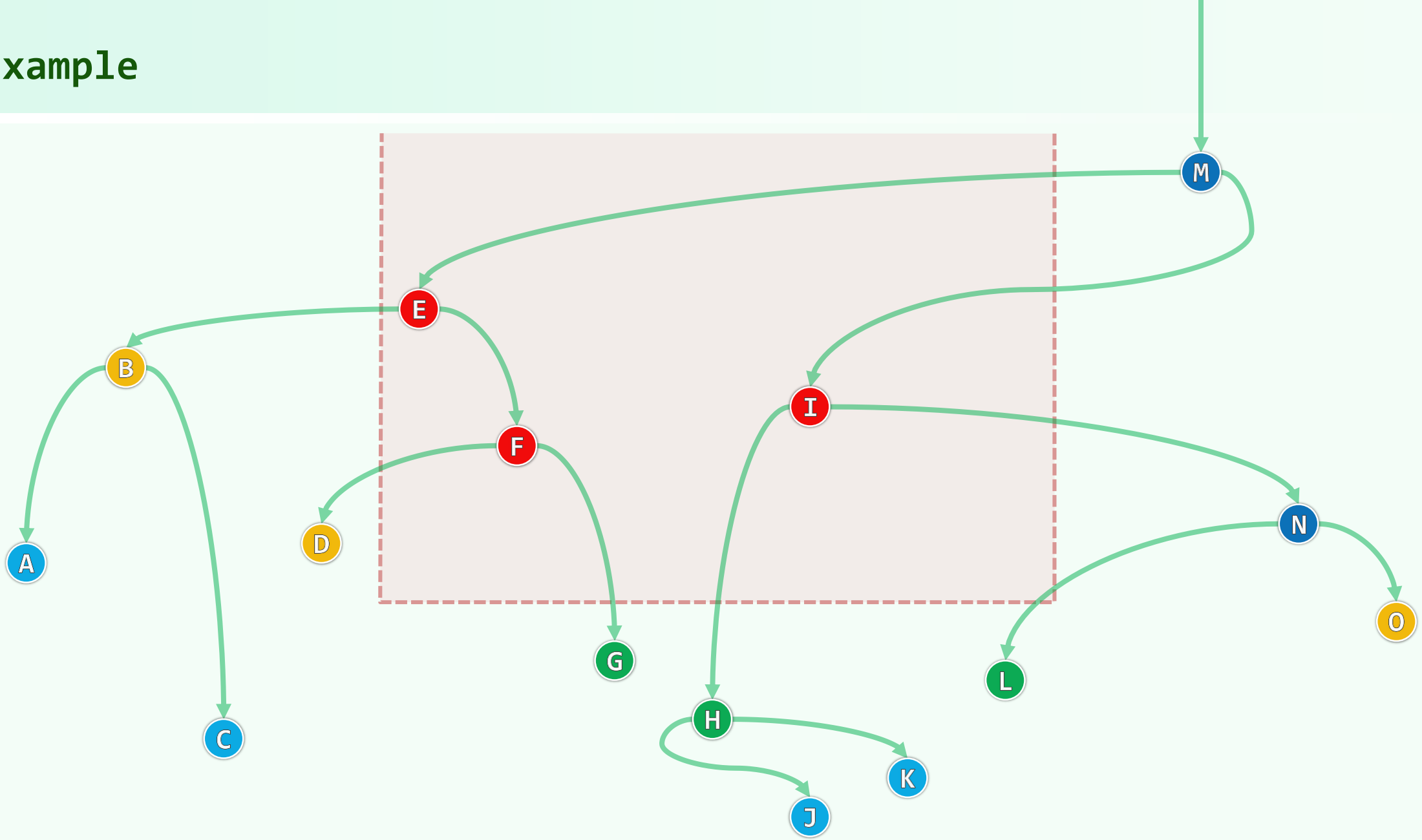


queryPST(PSTNode v, int x, int y1, int y2)

```
if ( !v || x < v.x )
    return //pruned for bad X
if ( ( y1 < v.y ) && ( v.y < y2 ) )
    output(v) //accepted
//else rejected for bad Y
if ( y1 ≤ v.ym )
    queryPST( v.lc, x, y1, y2 )
//else pruned for bad Y
if ( v.ym < y2 )
    queryPST( v.rc, x, y1, y2 )
//else pruned for bad Y
```



Example



Query Time

- P: Pruned with descendants due to bad Y
  - no more time cost
- A: Visited and accepted
  - exactly r = output size
- BY: Visited but rejected due to bad Y
  - no more than 2 for each level
  - altogether $O(\log n)$
- BX: Visited but rejected due to bad X
  - having an A or BY parent
  - no more than $O(r + \log n)$