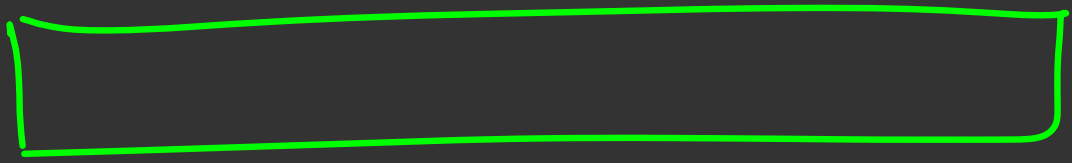
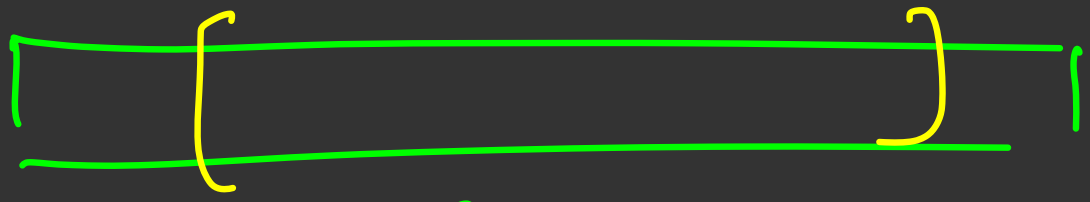


a[pos] = value

sum(l, r)

O(log n)

O(log n)



a[pos] = value

U a[l] = a[l+1] = a[l+2]

--- = a[r] = value

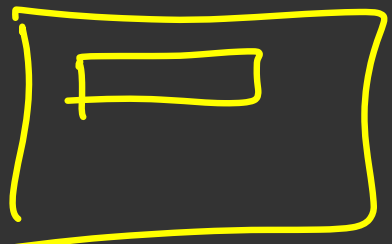
K Sum [l — r]

U R U U R

U U U U R R R R

R U U U R R U U

ST



U → point

R → [l, r]

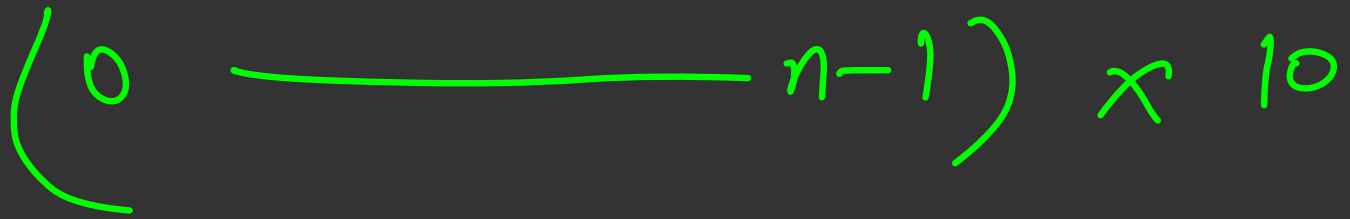
Update range [l —— r] → x

Sum of range [l —— r] → y

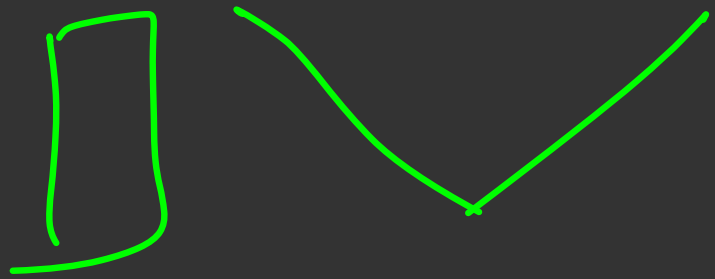
→ { st.update(l, x) ... st.update(l+1, x) st.update(r, x)

$O((r - l + 1) \cdot \log n)$ $O(\log n)$

→ lo such updates occur


0
n-1
x 10

Update



Range

10

O(1)

O(n)

O(10 · n)

U R

$\underline{\underline{Q}}$ $Q/2$ $Q/2$

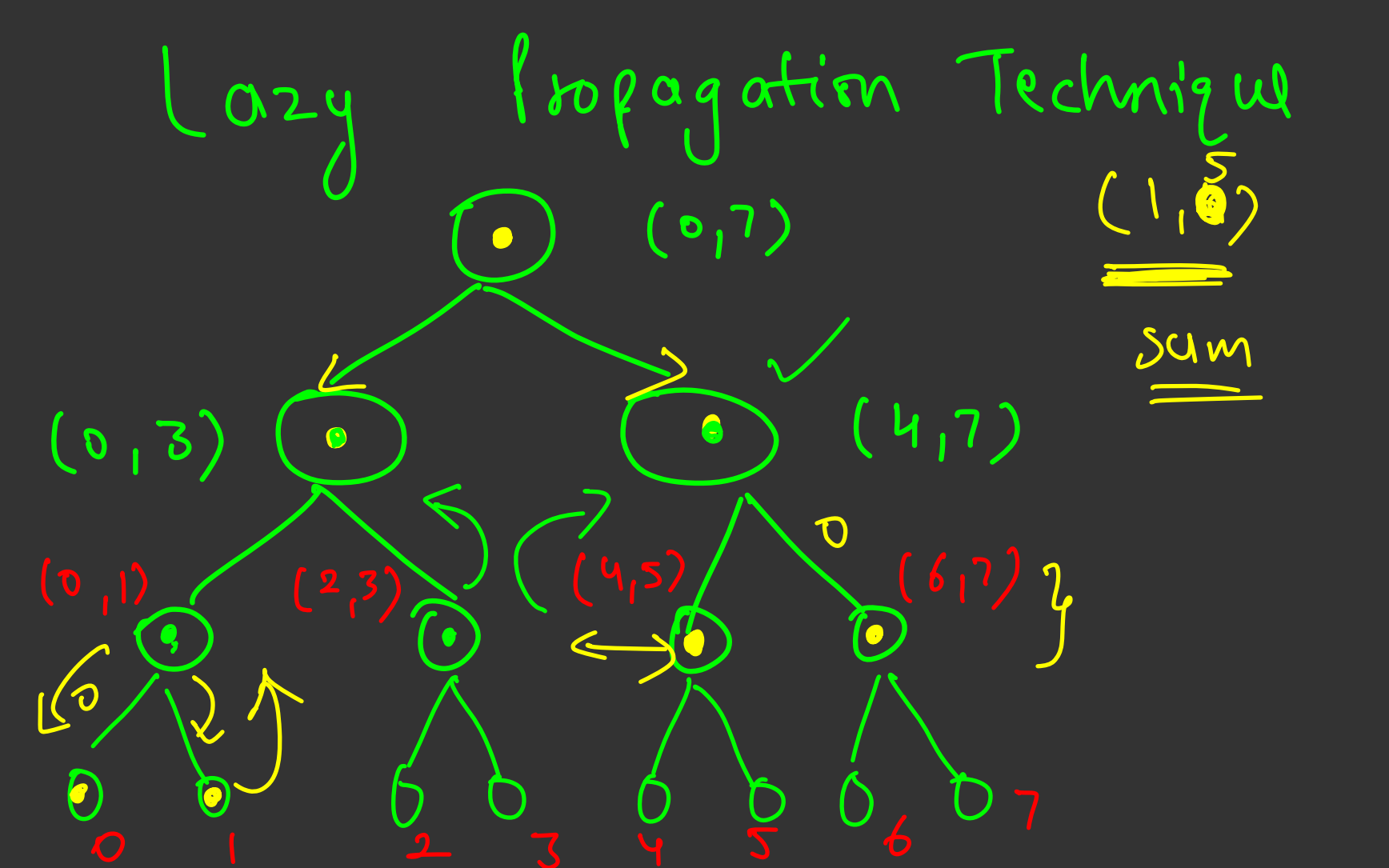
$\hookrightarrow$ $\underline{\underline{10^5}}$ $\longrightarrow$ Normal segment

Update Range

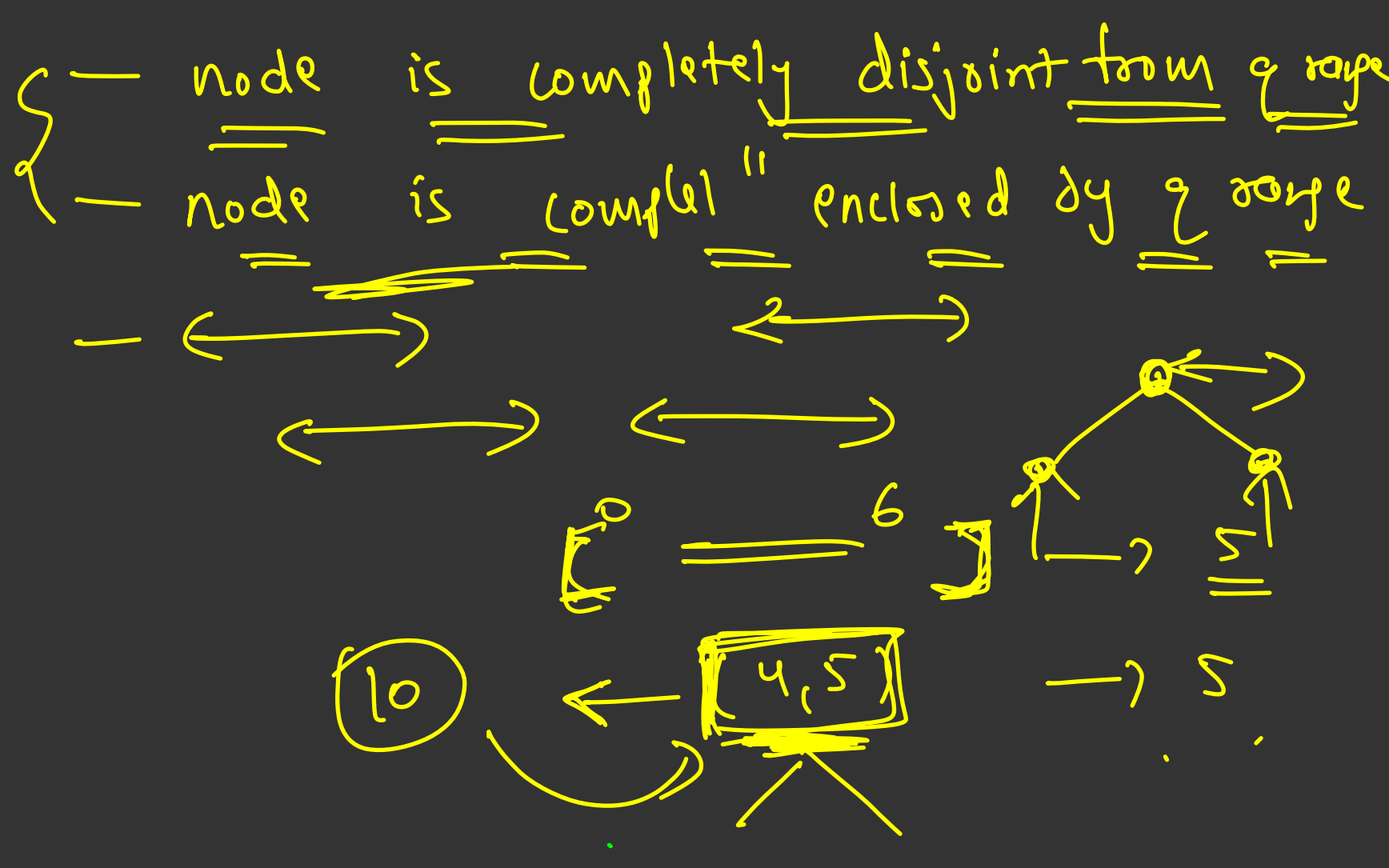
Range Property

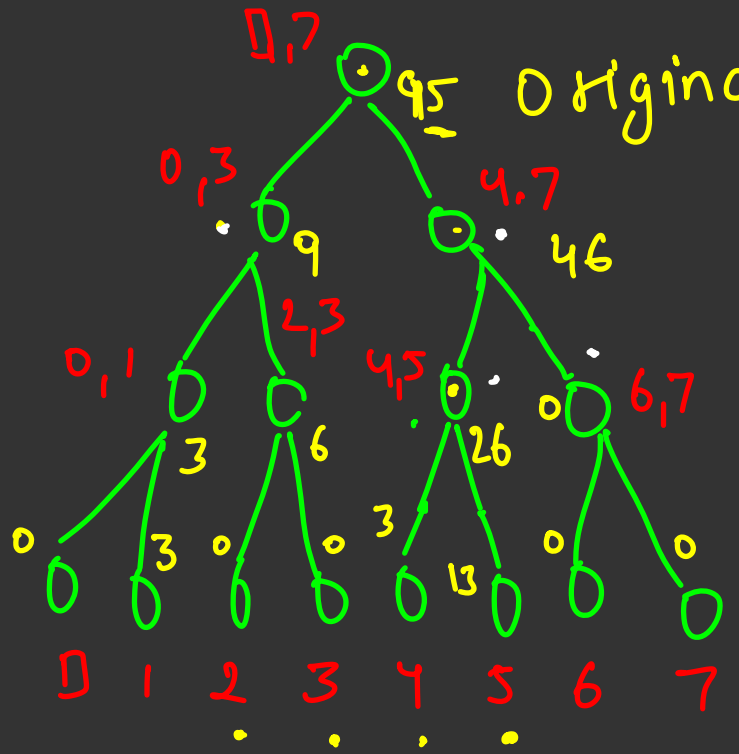
$\Big\} \longrightarrow O(\log n)$

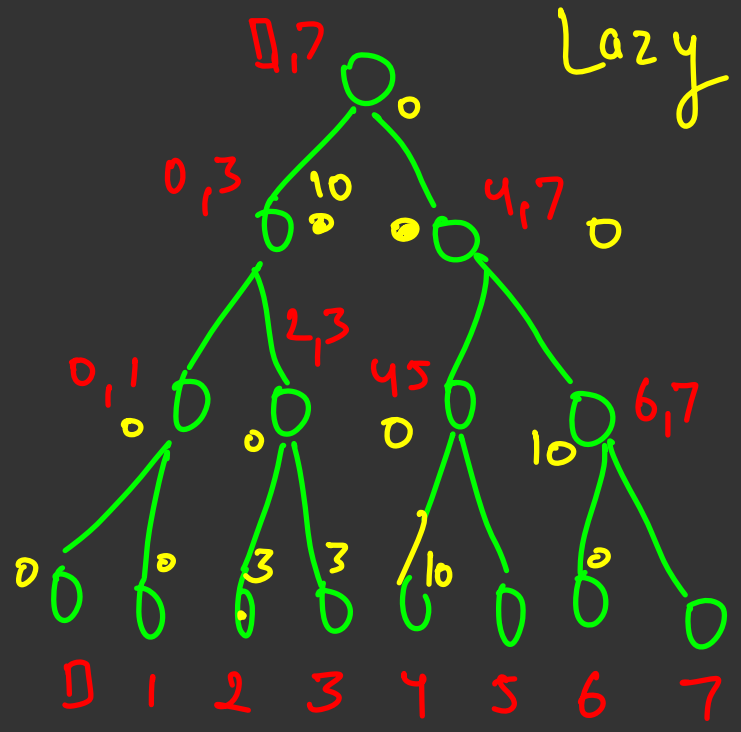
Lazy Propagation Technique



- node is completely disjoint from range
- node is completely enclosed by range







(5,5)

- add X to (L, R) → R.time
- sum(L, R) → O(log n)

val += (end - start + 1) * X

(1,5) → 3

O (log n)

o (log n)