Class 17

Wednesday, September 7, 2022 9:56 PM

Segment Tree → Data Structure

Use cases

↳ Range Queries
- Range min/max
- Range sum
- Range GCD/LCM
- Range mod
- ...
- ...

$O(N\log_2 N)$ 17 20

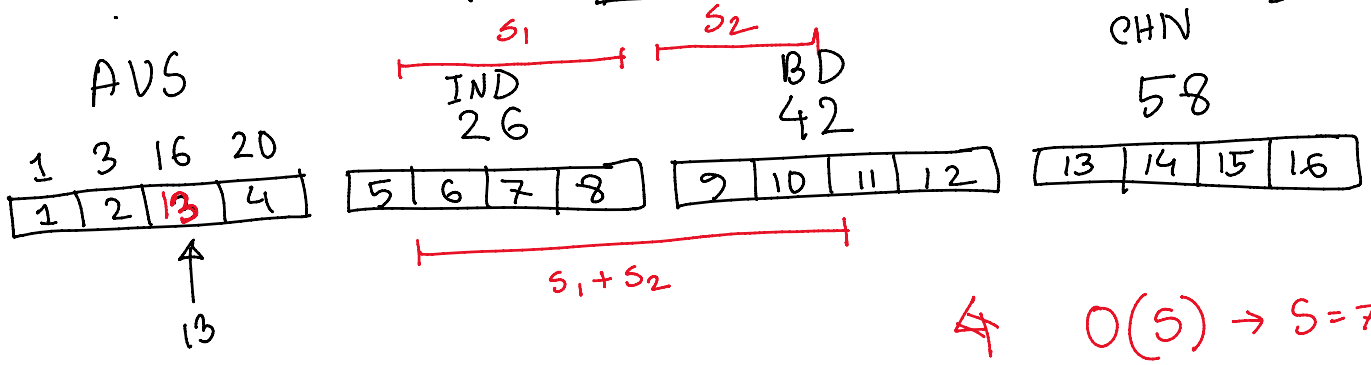
$O(N\sqrt{N})$ 317 1000

* Range Sum ↔ Point update $(1 \le N \le 10^5,\ 1 \le Q \le 10^5)$
  - N sized array
  - SUM [L,R] → $S=\sum_{i=L}^{R} arr[i]$ $O(1)$ $O(\sqrt{N})$ $O(4\log_2 N)$
  - UPDATE L X → $arr[L]=X$ $O(N)$ $O(\sqrt{N})$ $O(\log_2 N)$

128 CPU

1.001 sec

128×

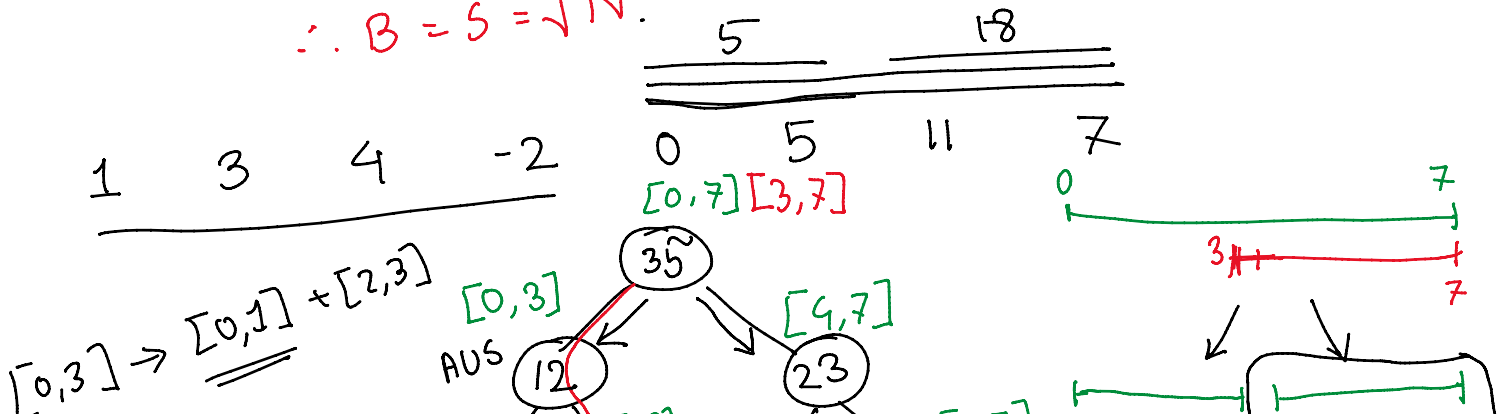


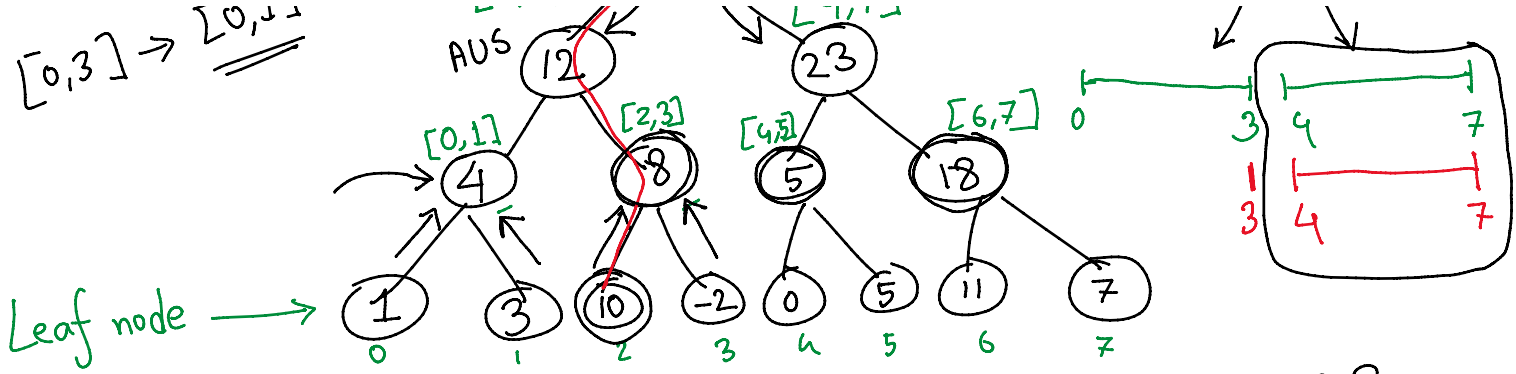
4 $O(S)$ → S = # blocks of size B

$O(B)$ → B = size of block

$BS = N$

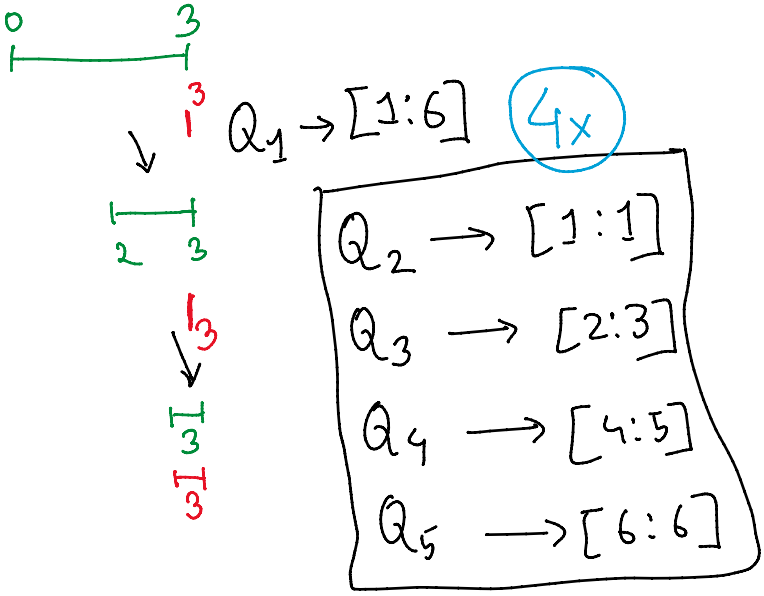
$\therefore B = S = \sqrt{N}$.





-2 + 23

$O(4 \cdot \log_2 N)$



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