Day-1

'Advanced' Track

Topic: Fenwick Tree

It is a special data structure, usually represented using an "array". - General Complexity, for Update & Query: O(log n), where n=Number of Elements of Array

It is also called "**Binary Indexed Tree**" (BIT) (because of the logic in its implementation and how it works).

General/Basic application problems, which require Fenwick Tree and can't be solved using Brute Force Approach:

- Queries on Sum of Ranges [l,r] in an Array, with updates on ranges or elements,
- Queries on Product of Ranges [l,r] in an Array, with updates on ranges or elements, etc.

- (**Must Read**) Blog, with Explanation, Implementation and Practice Problems: https://cp algorithms.com/data_structures/fenwick.html

- (**Must Watch**) YouTube Video, for better Understanding and Visualisation: https://youtu.be/CWDQJGaN1gY

Topic: Simple Segment Tree

It is a special data structure that allows answering range queries over an array effectively, while still being flexible enough to allow modifying the array.

- General Complexity, for Update & Query: O(log n), where n=Number of Elements of Array - Many complex as well as simple problems can be solved using Segment Tree, efficiently.
- General/Basic application problems, which require Segment Tree and can't be solved using Brute Force Approach:
    - Queries on Sum of Ranges [l,r] in an Array, with updates on ranges or elements, -
    - Queries on Product of Ranges [l,r] in an Array, with updates on ranges or elements, - etc.

- (**Must Read**) Blog, with Explanation, Implementation and Practice Problems: https://cp algorithms.com/data_structures/segment_tree.html

- (**Must Watch**) YouTube Video(s), for better Understanding and Visualisation: https://youtu.be/W4KUVTjh8RQ

Fenwick Tree v/s Segment Tree

Nearly every problem that can be solved using *Fenwick Tree* can be solved using *Segment Tree*, but vice-versa isn't true.

But, since Fenwick Tree requires less memory as compared to Segment Tree, so, when the "Memory Limit" for a problem is tight, try to solve the problem using Fenwick Tree. - Also, since Fenwick Tree is easier to implement, try, and use it over Segment Tree, where it is possible to use, to solve the problem.