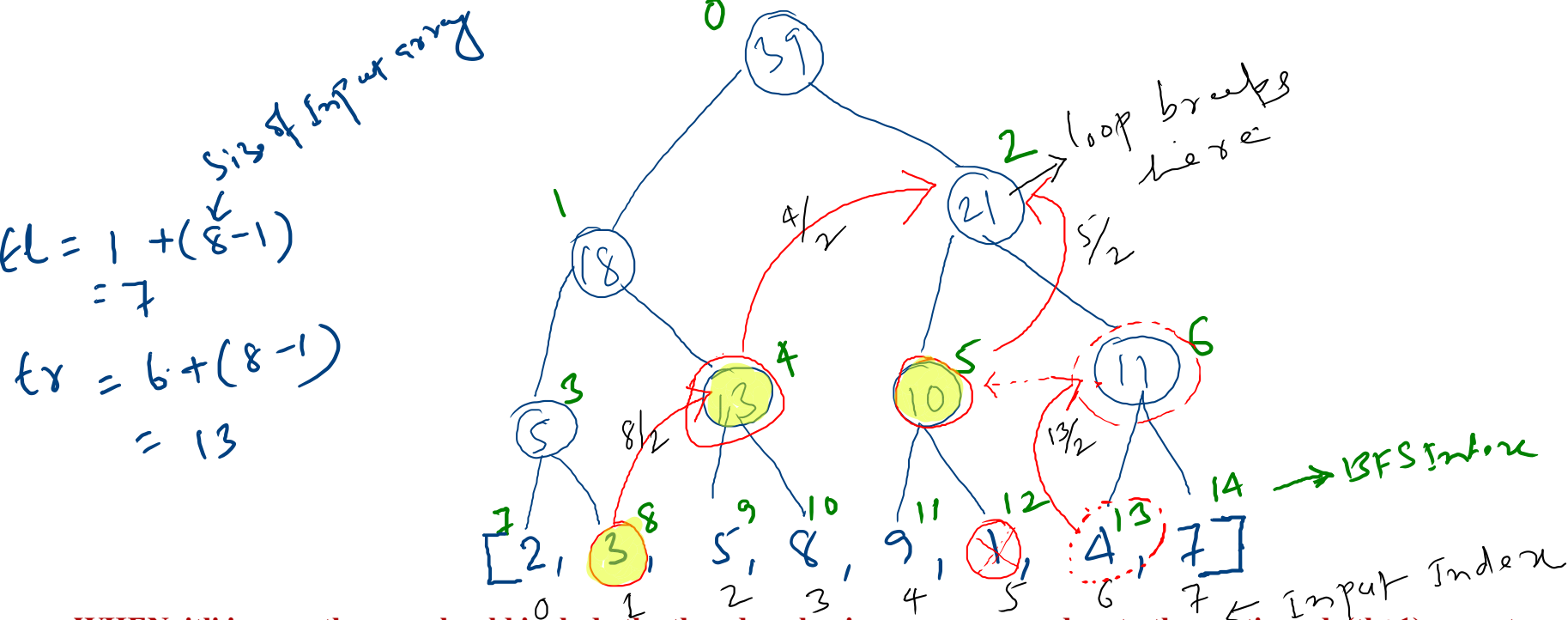


## Query explanation for optimized sum segment tree

Query =  $[1, 6)$  exclusive  
↑  
Index



**WHEN 'tl' is even then we should include the tl-node value in query-sum and go to the next's node(tl+1) parent i.e right sibling of tl-node's parent.**

Since tl is even so next node is odd, so parent of tl+1 node :  $\text{parent} = (tl+1 - 1)/2 = tl/2$

For odd child formula  $\Rightarrow 2 * \text{parent} + 1 = \text{child}$  i.e;  $\text{parent} = (\text{child} - 1)/2$ ; substitute child with tl+1.

**WHEN 'tl' is odd then no need to include the value of tl-node in query-sum, and go to the parent of 'tl' node.**

**WHEN 'tr' is even:**

Since tr is exclusive in query range, so if tr is even then we should include the (tr-1)th node value in query-sum and go to the parent node of (tr-1).

**WHEN 'tr' is odd :** then no need to include the value of (tr-1)th node in query-sum, and go to the parent of 'tr' node.