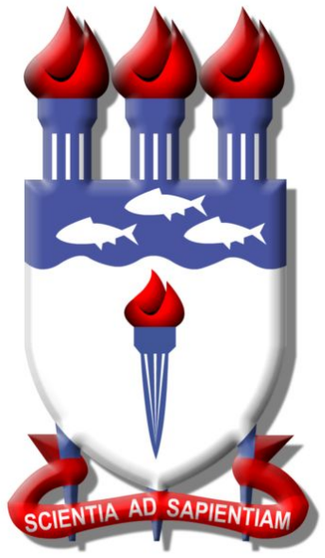

Segment Tree

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https://github.com/AnaFerreira015/little-huff

Problem

- Imagine that you have ***N*** integer values and, from time to time, are interested in finding the sum or looking in a range of these values

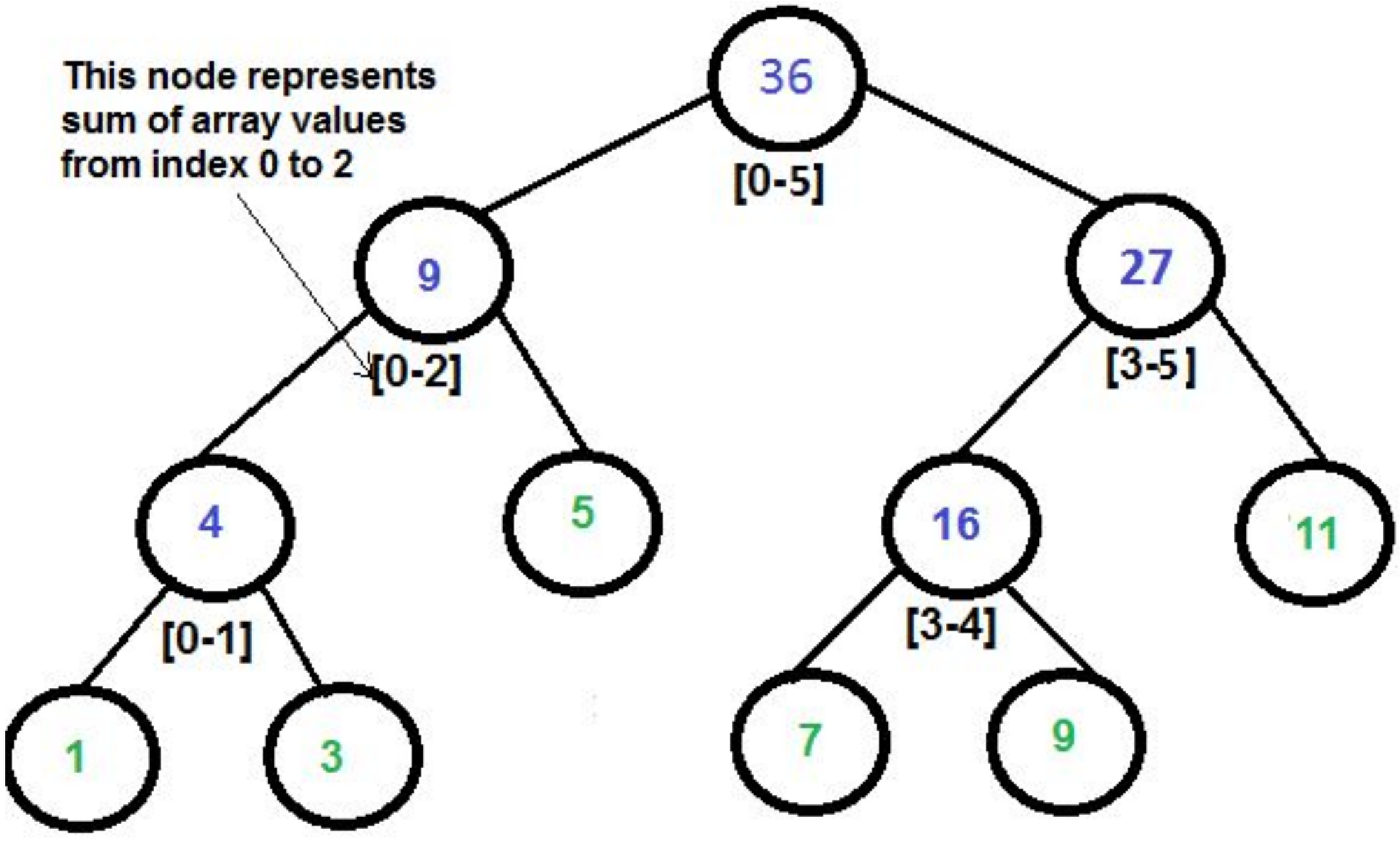
Segment Tree

- Segment tree is a basically a binary tree used for storing the intervals or segments
- Each node in the segment tree represents an interval. Considering an array ***A*** of size ***N*** and a corresponding segment tree ***T***:
  i. The root of ***T*** will represent the whole array ***A***[0 : N - 1]
  ii. Each leaf in the segment tree ***T*** will represent a single element ***A***[i]
  iii. The internal nodes in the segment tree T represents the union of elementary intervals ***A***[i : j]

Segment Tree

- Segment Tree can be used to solve range min/max and sum queries and range update queries in O(log n) time.

- is one of the most widely used data structures in competitive programming because of its efficiency and versatility.



Segment Tree for input array {1, 3, 5, 7, 9, 11}

Código

```
#include <stdio.h>
#include <stdlib.h>
typedef long long int lli;
int A[256];

void build(int node, int left, int end)
{
    if(start == end)
    {
        tree[node] = A[left];
    }
    else
    {
        int mid = (left + end) / 2;
        build(2*node, left, mid);
        build(2*node+1, mid+1, end);
        tree[node] = tree[2*node] + tree[2*node+1];
    }
}
```

Código

```
int query(int node, int tl, int tr, int l, int r)
{

    if(r<tl or l>tr) return 0;

    if(l<=tl and r>=tr) return tree[node];

    int mid = (tl+tr)/2;

    return query(2*node+1, tl, mid, l, r)+query(2*node+2, mid+1, tr, l, r);
}
```