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1  #include <bits/stdc++.h>
2  #define ll long long
3  #define inf (int)1e9
4  using namespace std;
5
6  Sparse table for (min / max / gcd) query in 1D-Array:
7  #define log2(x) (31^__builtin_clz(x))
8
9  vector<vector<int>> st(20, vector<int>(100100)); //change the log when change the
size
10 vector<int> a(100100);
11 int n;
12
13 //to build and answer the query:
14 void build()
15 {
16     for (int i = 0; i < n; i++)
17         st[0][i] = a[i]; // to change
18     for (int j = 1; 1 << j ≤ n; j++)
19         for (int i = 0; i + (1 << j) ≤ n; i++)
20             st[j][i] = temp(st[j - 1][i], st[j - 1][i + (1 << j - 1)]); // to change
21 }
22
23 //get query in O(1)
24 int inline get(int l, int r)
25 {
26     int k = log2(r - l + 1);
27     return temp(st[k][l], st[k][r - (1 << k) + 1]); // to change
28 }
29
30
31 Sparse table for sum query in 1D-Array:
32 vector<vector<int>> st(20, vector<int>(100100)); //change the log when change the
size
33 vector<int> a(100100);
34 int n;
35
36 void build()
37 {
38     for (int i = 0; i < n; i++)
39         st[0][i] = a[i];
40     for (int j = 1; 1 << j ≤ n; j++)
41         for (int i = 0; i + (1 << j) ≤ n; i++)
42             st[j][i] = st[j - 1][i] + st[j - 1][i + (1 << j - 1)];
43 }
44
45 //get query in O(log(n))
46 ll inline get(int l, int r)
47 {
48     ll sum = 0;
49     for (int j = 20; j ≥ 0; j--)
50     {
51         if ((1 << j) ≤ r - l + 1)
52         {
53             sum += st[j][l];
54             l += 1 << j;
55         }
56     }
57     return sum;
58 }

```