
Problem A. Median on Binary Tree

Input file: *standard input*
Output file: *standard output*
Time limit: 2 seconds
Memory limit: 512 mebibytes

Yuuka has a binary tree with vertices which are conveniently labeled with $1, 2, \dots, n$. For each $i \geq 2$, there is an edge between vertices i and $\lfloor i/2 \rfloor$. The i -th vertex has weight w_i associated with it, and all weights are distinct.

Consider a subtree of the given tree (a subgraph which is itself a tree) which consists of vertices $v_1, v_2, \dots, v_k$ such that $w_{v_1} < w_{v_2} < \dots < w_{v_k}$. The a -median of this subtree is then $w_{v_{\lfloor (k-a+1)/2 \rfloor}}$ for $0 \leq a < k$.

For each $a \in \{0, 1, 2, \dots, n-1\}$, find the largest a -median among all subtrees of the given tree.

Input

The input contains zero or more test cases, and is terminated by end-of-file. For each test case:

The first line contains an integer n ($1 \leq n \leq 2 \cdot 10^5$).

The second line contains n integers $w_1, w_2, \dots, w_n$ ($1 \leq w_i \leq n$, and the numbers $w_1, w_2, \dots, w_n$ are all distinct).

It is guaranteed that the sum of all n does not exceed $2 \cdot 10^5$.

Output

For each test case, output n integers $M_0, M_1, \dots, M_{n-1}$ where M_a denotes the largest a -median.

Example

standard input	standard output
5	5 2 2 1 1
1 2 3 4 5	10 9 5 4 4 3 3 2 2 1
10	
9 10 4 2 3 5 7 1 8 6	