Array with Queries

Assignment 5
Data Structures and Algorithms

Problem Statement: You are given an array of N integers and Q queries. Each query would be of 2 types:
type 1 query: You would be given an integer x. Perform bitwise xor of each element of array with x.
type 2 query: You would be given 2 integers i and y. Replace ith array element with y.
After each query, output F(array) where F(array) is the minimum non-negative integer which is not present in the array. For example, F([10,4,3,0,1,5])=2. You need not to output F(array) after each case. You have to output a hash value defined as $\Pi(base^{ans(i)})$ mod $1e9+7$ where $ans(i)$ is F(array) after $i-th$ query for all i's from 1 to Q. base=$10^8 always$.

Input
First line contains 2 integers: N and Q. N is the number of elements of array and Q is the number of queries.
In the following line, the array of N integers is given.
It is followed by Q lines representing each query.
format of type 1 query: 1 x , here x is an integer. You have to xor each array element with x.
format of type 2 query: 2 i y, here i and y are integers and you have to update array[i] as y.
Output
Print the hash value.
Constraints
$1 \leq N \leq 10^5$
$1 \leq Q \leq 10^5$
$0 \leq x \leq 2^{30}-1$
$1 \leq i \leq N$
$0 \leq y \leq 2^{30}-1$
for all $j \geq 1$ and j≤N,
$0 \leq array[j] \leq 2^{30}-1$

Time Limit: 3 seconds
Memory Limit: 256 MB

Sample Test Case

Input	Output
5 5 0 1 2 3 4 1 1 2 3 2 1 1 1 0 2 1 10	932824759

Explanation original array: [0,1,2,3,4]
array after each query:
1. [1,0,3,2,5] F(array)=4
2. [1,0,2,2,5] F(array)=3
3. [0,1,3,3,4] F(array)=2
4. [0,1,3,3,4] F(array)=2
5. [10,1,3,3,4] F(array)=0