Problem Description

Given an array of integers nums, where all elements appear exactly three times except for one unique element that appears only once, the challenge is to identify the unique element.\

Intuition

The key understanding in solving this problem is recognizing that if we add up the same bits of all numbers in nums, since all but one number appears three times, the sum of bits in any position must be a multiple of three if the unique number does not contribute a bit in that position.

* We will use two bitwise markers, a and b, to keep track of the counts of bits.
* We'll iterate through every bit of each number and update a and b to keep track of the counts modulo 3.
* The rules for updating a and b are determined by the current value of a, b, and the bit value in our current number, c.
* We use a series of bitwise AND, OR, and XOR operations to maintain the invariant that after processing each bit of each number, b will have a bit set if and only if the corresponding bit in the unique number is set.
* The final answer is the value of b, as it represents the bits that are unique to the number appearing only once

We'll be using this logical circuit to simulate the updates:

* The new value of a (a\_i) is determined by the logical expression a\_i = (~a & b & c) | (a & ~b & ~c) which corresponds to the truth table conditions for the case when the modulo 3 result is 2.
* The new value of b (b\_i) is determined by b\_i = ~a & (b ^ c), which simplifies the updating process.