Single Number in C++

```
#include <iostream>
#include <vector>
using namespace std;

int singleNumber(vector<int>& nums) {
   int result = 0;
   for (int num : nums) {
      result ^= num;
   }
   return result;
}

int main() {
   vector<int> arr = {2, 2, 3, 3, 4, 6, 6};
   cout << singleNumber(arr) << endl; // Output: 4

   return 0;
}
```

Input:

vector<int> arr = {2, 2, 3, 3, 4, 6, 6};

All numbers repeat twice **except 4**, which should be our result.

💡 Logic Behind XOR:

- a ^ a = 0
- a ^ 0 = a
- XOR is **commutative** and **associative**, so order doesn't matter.

🧮 Dry Run Table:

Step	num	result (before)	result ^ num	result (after)
1	2	0	0 ^ 2 = 2	2
2	2	2	2 ^ 2 = 0	0
3	3	0	0 ^ 3 = 3	3
4	3	3	3 ^ 3 = 0	0
5	4	0	0 ^ 4 = 4	4
6	6	4	4 ^ 6 = 2	2
7	6	2	2 ^ 6 = 4	4

✅ Final Output:

4

4