Experiment-4

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Subject Name: Advanced Programming Lab - 2
Subject Code: 22CSP-351

1. Aim: Divide and Conquer

1. Problem: 190. Reverse Bits.
2. Problem: 191. Number of 1 Bits

2. Objective:

1. Problem 190. To reverse the bits of a given 32-bit unsigned integer. Implement an optimized bit manipulation technique to reverse bits.
2. Problem 191.Number of 1 Bits. To count the number of set bits (1s) in a given 32-bit unsigned integer.

3. Implementation/Code:

1.)

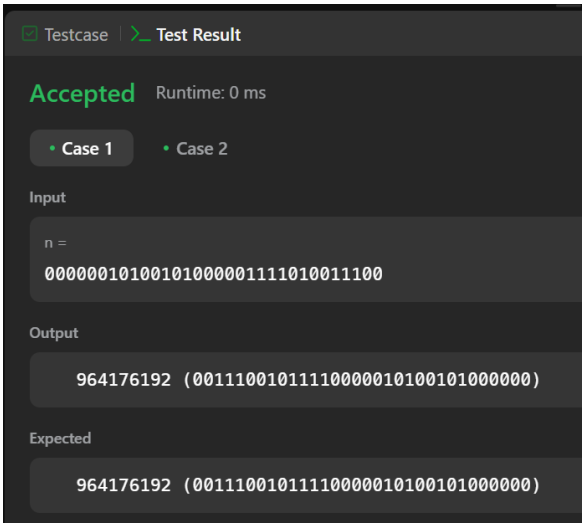
```
class Solution {
public:
    uint32_t reverseBits(uint32_t n) {
        uint32_t result = 0;
        for (int i = 0; i < 32; ++i) {
            result = (result << 1) | (n & 1);
            n >>= 1;
        }
        return result;
    }
};
```

2.)

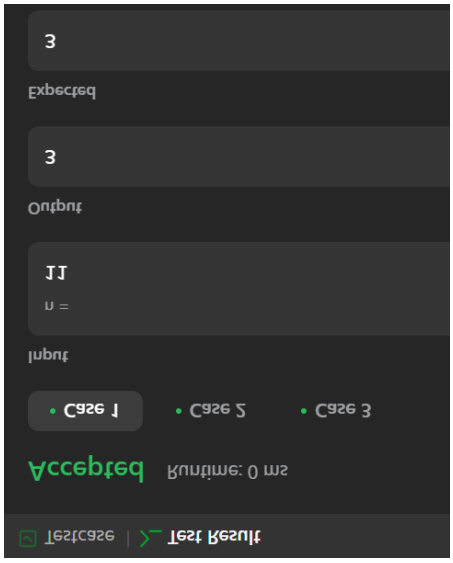
```
class Solution {
public:
    int hammingWeight(int n) {
        int count = 0;
        while (n) {
            n &= (n - 1);
            count++;
        }
        return count;
    }
};
```

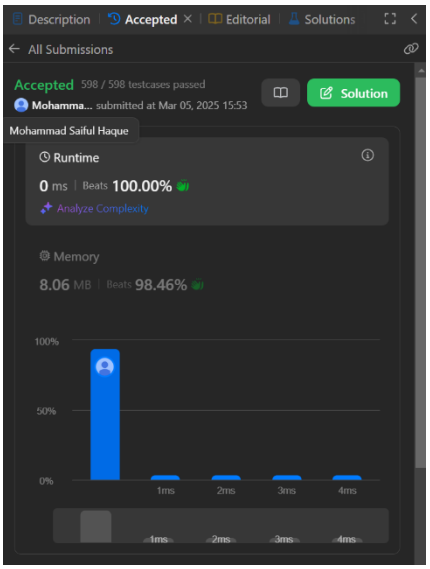
4. Output:

1.



2.





5. Time Complexity:

1. O(1)
2. O(k)

6. Space Complexity:

1. O(1)
2. O(1)

7. Learning Outcome:

1. Understanding bitwise operations for reversing bits.
2. Implementing lookup tables for faster computation.
3. Utilizing intrinsic functions for hardware-level optimization.
4. Mastering bitwise AND & shifting for counting bits.
5. Exploring hardware-accelerated functions.
6. Optimizing solutions using precomputed tables for fast lookups.