DAA LAB - 5

Fibonacci number: The Fibonacci numbers, commonly denoted F_n, form a sequence, called the Fibonacci sequence, such that each number is the sum of the two preceding ones, starting from 0 and 1.

Dynamic programming: Dynamic programming approach is similar to divide and conquer in breaking down the problem into smaller and yet smaller possible sub-problems. But unlike, divide and conquer, these sub-problems are not solved independently. Rather, results of these smaller sub-problems are remembered and used for similar or overlapping sub-problems.

1. **The user is prompted to enter n.**
2. **Fibonacci is called to compute the nth Fibonacci number.**
3. **The result is then displayed.**

Brute force approach: The brute force method is by solving a particular problem by checking all the possible cases which is slow. The brute force method is to make a for loop and iterate through the elements of the array.

Time Complexity: T(n) = T(n-1) + T(n-2) which is exponential.
We can observe that this implementation does a lot of repeated work (see the following recursion tree). So this is a bad implementation for nth Fibonacci number.

Bottom - up approach: A bottom-up approach is the piecing together of systems to give rise to more complex systems, thus making the original systems sub-systems of the emergent system. Bottom-up processing is a type of information processing based on incoming data from the environment to form a perception.

We can directly calculate the value of F(n) if we already know the value of F(n-1) and F(n-2). So if we calculate the smaller values of Fibonacci first, then we can easily build larger values from them. This approach is known as bottom-up approach.

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