DAILY PROGRAMMING

CHALLENGE

WISDOM SPROUTS

IT Training Hub

Fibonacci Sequence using Dynamic Programming

You are given an integer n. Your task is to calculate the n-th Fibonacci number using Dynamic Programming.
The Fibonacci sequence is a series of numbers where:

- $F(0)=0$
- $F(1)=1$
- For $n \geq 2$, $F(n)=F(n-1)+F(n-2)$

Your task is to compute F(n) efficiently by using a bottom-up dynamic programming approach, avoiding redundant calculations.

Input:

- A single integer n ($0 \leq n \leq 1000$).

Output:

- Return the n-th Fibonacci number.

Examples:

- Example 1
  Input: 5
  Output: 5
  Explanation: The 5th Fibonacci number is 5. The sequence up to F(5) is [0, 1, 1, 2, 3, 5].

Constraints:

- $0 \leq n \leq 1000$
- Output values can be large for high values of n, so ensure to handle large integers properly.

Test Cases:

1. Input: 5
   Output: 5
2. Input: 10
   Output: 55

3. Input: 0
   Output: 0
4. Input: 1000
   Output: 4.346655768693743e+208

Edge Cases:

1. The Fibonacci number is 0.
2. The Fibonacci number is 1.
3. Ensure your algorithm can handle up to n=1000 efficiently.