Space Optimized Method

In the previous method, we created an array to store the Fibonacci numbers but, as we need only the last two numbers to find the next one, it is **space-consuming** to store all the previously calculated numbers. Therefore we will use the space-optimized method, where just the previous two numbers are stored and using which the next number is found.

Time Complexity and Space Complexity of Space Optimized Method

- The time complexity of the Fibonacci series is **T(N) i.e., linear**. We have to find the sum of two terms, and it is repeated n times depending on the value of n.
- The space complexity of the Fibonacci series using dynamic programming is **O(1)**.

Method	Time complexity	Space complexity
Using recursion	T(n) = T(n-1) + T(n-2)	O(n)
Using DP	O(n)	O(1)
Space optimization of DP	O(n)	O(1)
Using the power of matrix method	O(n)	O(1)
Optimized matrix method	O(log n)	O(log n)
Recursive method in O(log n) time	O(log n)	O(n)
Using direct formula	O(log n)	O(1)
DP using memoization	O(n)	O(1)

Applications of Fibonacci Series

The Fibonacci series finds application in different fields in our day-to-day lives. The different patterns found in a varied number of fields from nature, to music, and to the human body follow the Fibonacci series.

Some of the applications of the series are given as,

- It is used in the grouping of numbers and used to study different other special mathematical sequences.
- It finds application in Coding (computer algorithms, distributed systems, etc). For example, Fibonacci series are important in the computational run-time analysis of Euclid's algorithm, used for determining the GCF of two integers.
- It is applied in numerous fields of science like quantum mechanics, cryptography, etc.
- In finance market trading, Fibonacci retracement levels are widely used in technical analysis.
- **Conclusion:**
  In this way Concept of Fibonacci series is explored using recursive and non recursive method and alsolearn time and space complexity.