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## Lab Report on Design and Analysis of Algorithms

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# Experiment 1

WAP to perform empirical analysis of Iterative algorithm to find nth Fibonacci number**.**

/\* Program to find the nth Fibonacci number \*/ #include<stdio.h>

#include<time.h> int main()

{

int n,i;

double first=0,second=1,temp, time; clock\_t start, end;

printf("Enter the position of fibonacci number:"); scanf("%d",&n);

start=clock(); printf("%f,%f",first,second); i=3;

while(i<=n)

{

temp=first+second; first=second; second=temp; printf("%f \n", temp); i++;

}

printf("\n\n\n"); end=clock();

printf("The nth fibonacci number is: %lf \n",temp); time=((double)(end-start)\*1000)/ CLOCKS\_PER\_SEC; printf("Time=%lf mili seconds",time);

}

## Result Analysis and Discussion:

This experiment has been conducted in a 64-bit system with 4 GB RAM and Intel® Core™ i5- 4300U CPU. The algorithm is implemented in C programming language in DEV C++ 5.11. IDE. In this experiment the algorithm to find the nth Fibonacci number has been implemented and executed for different value of n. During this experiment for different value of n the time taken by the algorithm has been measured and tabulated as shown in table below.

|  |  |
| --- | --- |
| **Input size (n)** | **Time(milliseconds)** |
| 100 | 76 |
| 300 | 266 |
| 500 | 422 |
| 700 | 671 |
| 900 | 911 |
| 1100 | 1086 |
| 1300 | 1321 |

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he graph shown below is the plot of input n and the time in milliseconds taken by the algorithm while running on a system recorded in table above.

1500

1400

1300

1200

1100

1000

900

800

700

600

500

400

300

200

100

Input size (n)

Time(milliseconds)

1 2 3 4 5 6 7

Based on the above table and graph it is clearly seen that the input number n has linear relationship with the time taken by the system to find the nth Fibonacci number of input number n.

## Conclusion:

In this experiment it has been found that the size of input (n) has linear relationship with the time taken by the system to find the nth Fibonacci number. This is equivalent with the asymptotic time complexity of the algorithm. Hence, this experiment proves complexity of the algorithm to find nth Fibonacci number is O (n).