CS 201 Homework 2

Tables

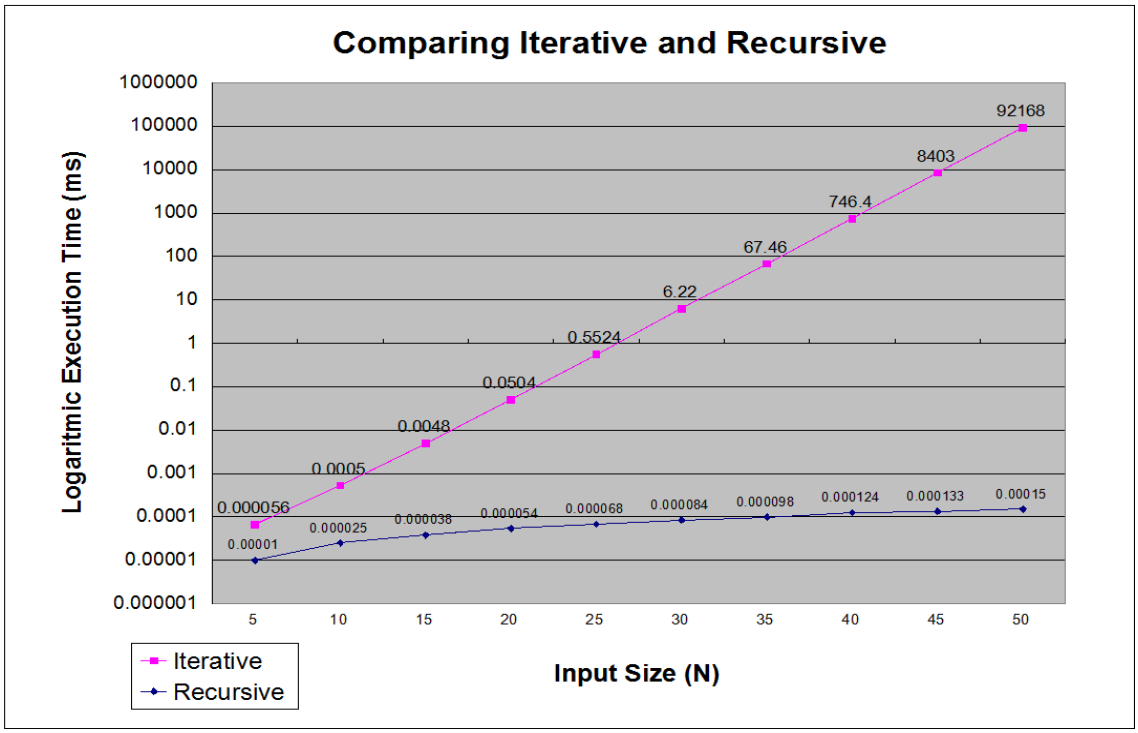
Size/Type	Recursive	Iterative
5	0.000056	0.00001
10	0.0005	0.000025
15	0.0048	0.000038
20	0.0504	0.000054
25	0.5524	0.000068
30	6.22	0.000084
35	67.46	0.000098
40	746.4	0.000124
45	8403	0.000133
50	92168	0.00015

Table 1: Running times (milliseconds) of recursive and iterative Fibonacci series

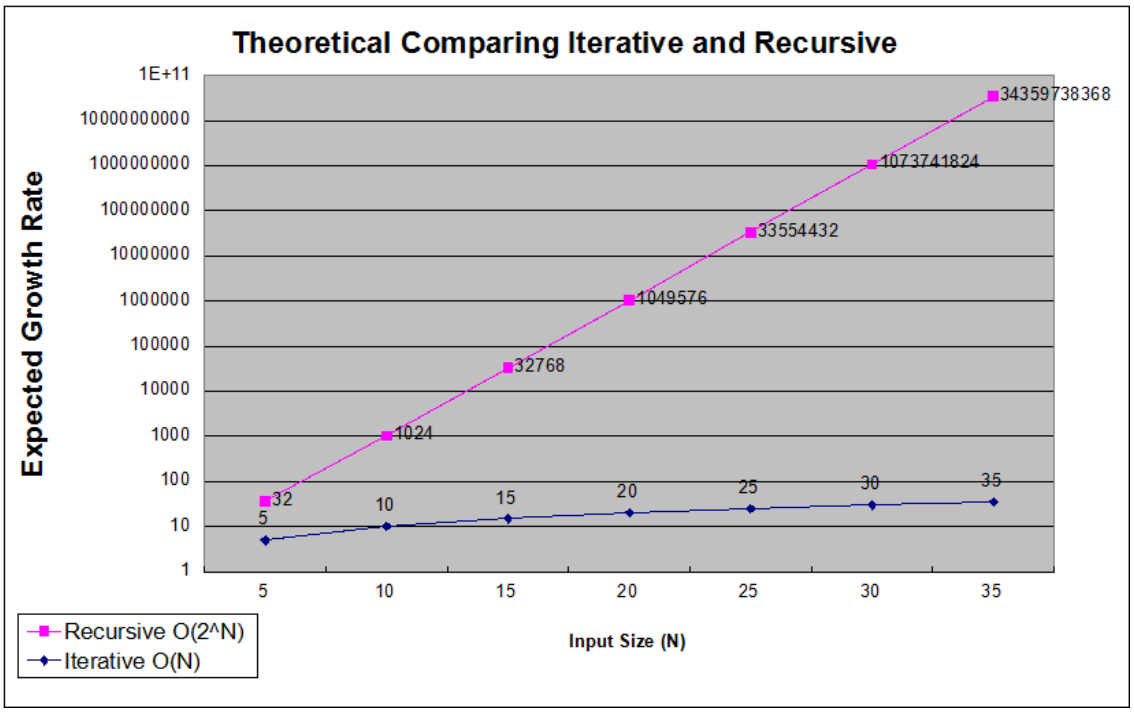
Size/Type	Iterative
1	0.000003
10	0.000027
100	0.00029
1000	0.0033
10000	0.0342
100000	0.334
1000000	3.267
10000000	32.66
100000000	326.81
1000000000	3255

Table2: Running times (milliseconds) of iterative Fibonacci Series with given sizes

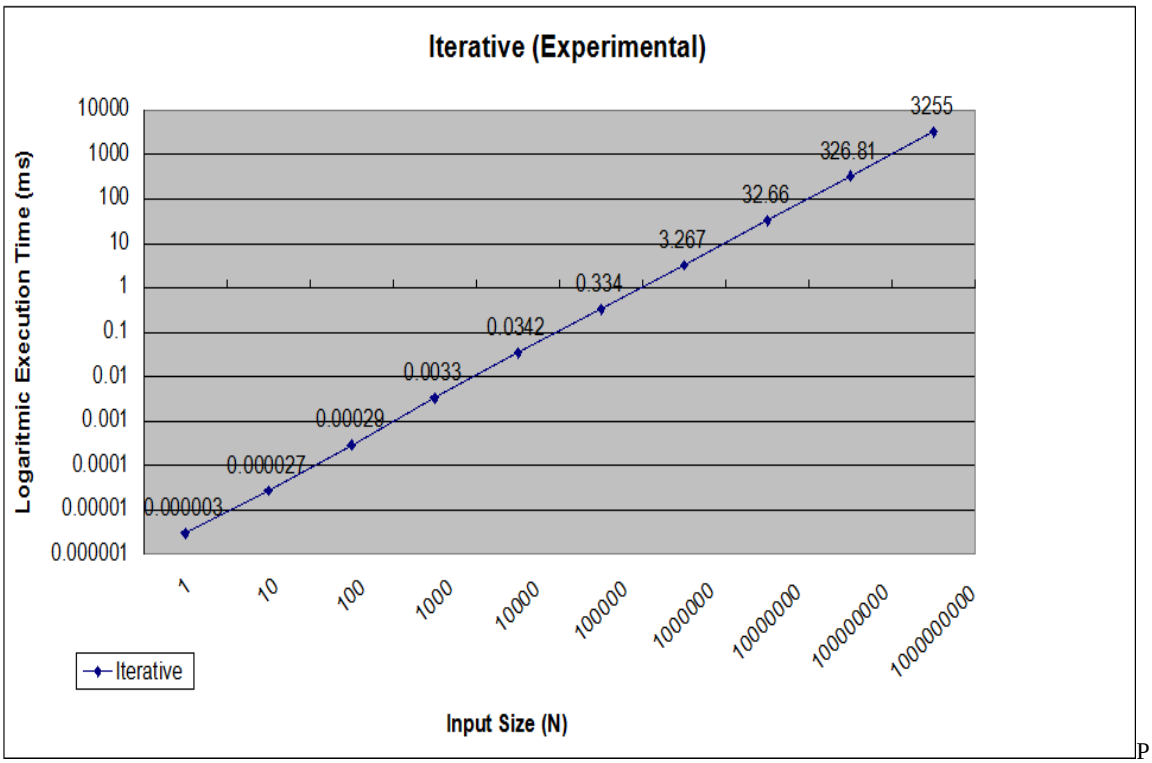
Plots



Plot 1: Comparing iterative and recursive Fibonacci series, input size from 5 to 50, y axis is logarithmic scale.



Plot 2: Theoretical comparing iterative (O(N)) and recursive(O(2^N)) Fibonacci series, y axis is logarithmic scale.



Plot3: Iterative Fibonacci series, x and y axis are logarithmic scale.

Computer Specifications

Aspire V5-591G

Computer Name	LAPTOP-5388K5PJ
Processor	Intel(R) Core(TM) i7-6700HQ CPU @ 2.60GHz 2.60 GHz
Memory (RAM)	16,0 GB (kullanılabilir: 15,9 GB)
Device ID	5ADFD03A-DD9E-4766-B8CA-034DDC608D71

Discussion

When Plot 1 and Plot 2 are compared, it is seen that they are really similar although there are some differences. To observe these differences, by looking table 1, iterative and recursive functions do not increase exactly as O(N) and O(2^N) as expected. Results are slightly different from expected growth rate so it can be ignored. These differences are occurred from measurement errors because these data are just approach. While simulation repeats increase and average result is examined, it is seen that experimental results approaches to expected theoretical results. After compared recursive and iterative functions, it is noticed that recursive function is worse that iterative in terms of running times. For all input sizes, iterative is faster than recursive. When input size of recursive function is little increased, running times increases exponentially (2^N). Comparing functions, input size is 1.000.000.000 for iterative and input size is 45 for recursive, iterative is faster than recursive even its input is extremely larger than input of recursive. Consequently, iterative Fibonacci series is more efficient than recursive Fibonacci series.