CS 201

Homework 2

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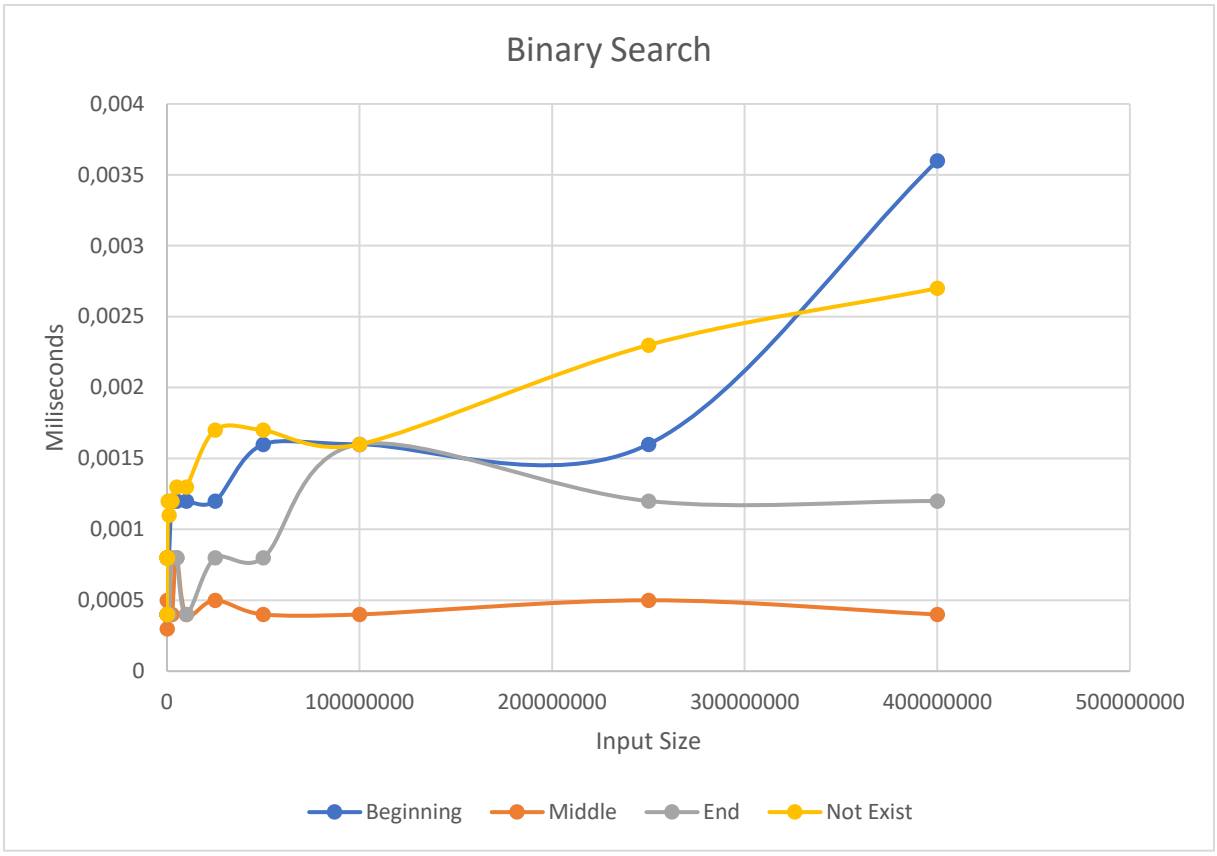
Section: 2

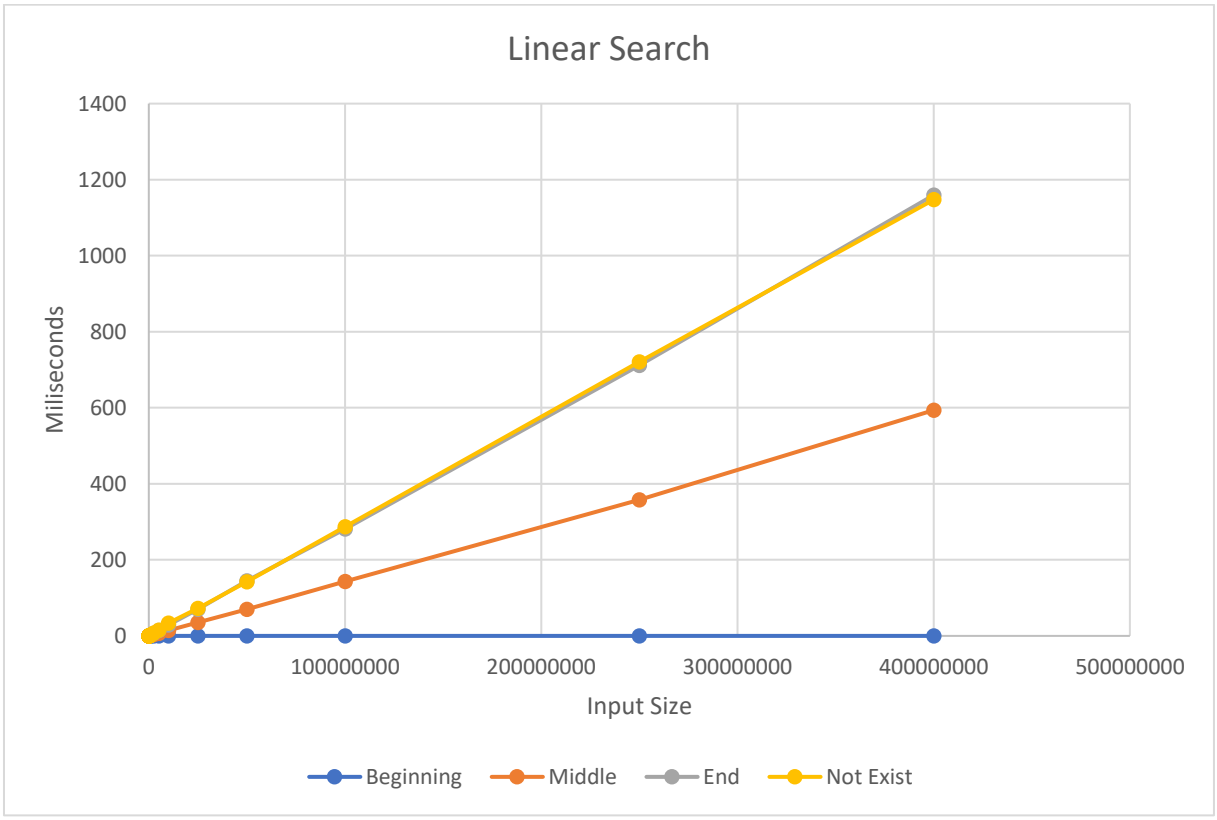
Date: 16.04.2018

Binary Search				
Input Size (N)	**Beginning**	**Middle**	**End**	**Not Exist**
100	0,0004	0,0004	0,0004	0,0004
250	0,0004	0,0003	0,0004	0,0004
500	0,0008	0,0004	0,0004	0,0004
1000	0,0008	0,0008	0,0004	0,0008
2500	0,0004	0,0004	0,0008	0,0008
5000	0,0004	0,0004	0,0004	0,0008
10000	0,0004	0,0005	0,0004	0,0008
25000	0,0004	0,0008	0,0004	0,0008
50000	0,0004	0,0008	0,0004	0,0008
100000	0,0008	0,0008	0,0008	0,0008
250000	0,0008	0,0008	0,0008	0,0008
500000	0,0008	0,0004	0,0008	0,0012
1000000	0,0008	0,0008	0,0004	0,0011
2500000	0,0012	0,0004	0,0008	0,0012
5000000	0,0012	0,0008	0,0008	0,0013
10000000	0,0012	0,0004	0,0004	0,0013
25000000	0,0012	0,0005	0,0008	0,0017
50000000	0,0016	0,0004	0,0008	0,0017
100000000	0,0016	0,0004	0,0016	0,0016
250000000	0,0016	0,0005	0,0012	0,0023
400000000	0,0036	0,0004	0,0012	0,0027

Linear Search				
Input Size (N)	**Beginning**	**Middle**	**End**	**Not Exist**
100	0,0004	0,0004	0,0004	0,0004
250	0,0009	0,0007	0,0012	0,0012
500	0,0004	0,0008	0,0012	0,0174
1000	0,0004	0,0016	0,0028	0,0028
2500	0,0008	0,0036	0,0071	0,0071
5000	0,0004	0,0067	0,0138	0,0135
10000	0,0004	0,0122	0,0273	0,274
25000	0,0004	0,0344	0,0672	0,0833
50000	0,0004	0,0699	0,1367	0,1355
100000	0,0004	0,1691	0,3049	0,311
250000	0,0004	0,3386	0,7565	0,7941
500000	0,0004	0,7305	1,4072	1,4491
1000000	0,0004	1,4937	2,8373	2,8883
2500000	0,0004	3,5521	7,0594	7,3467
5000000	0,0004	6,7588	14,1068	14,7274
10000000	0,0004	14,0421	28,5467	33,7703
25000000	0,0004	34,9688	69,7454	72,3296
50000000	0,0004	69,6376	144,888	142,609
100000000	0,0008	143,02	281,535	286,767
250000000	0,0004	357,469	711,42	720,546
400000000	0,0004	593,611	1159,18	1147,27



Best case is having the value at the middle , average case is at the beginning and end, worst case is not existance of the value.



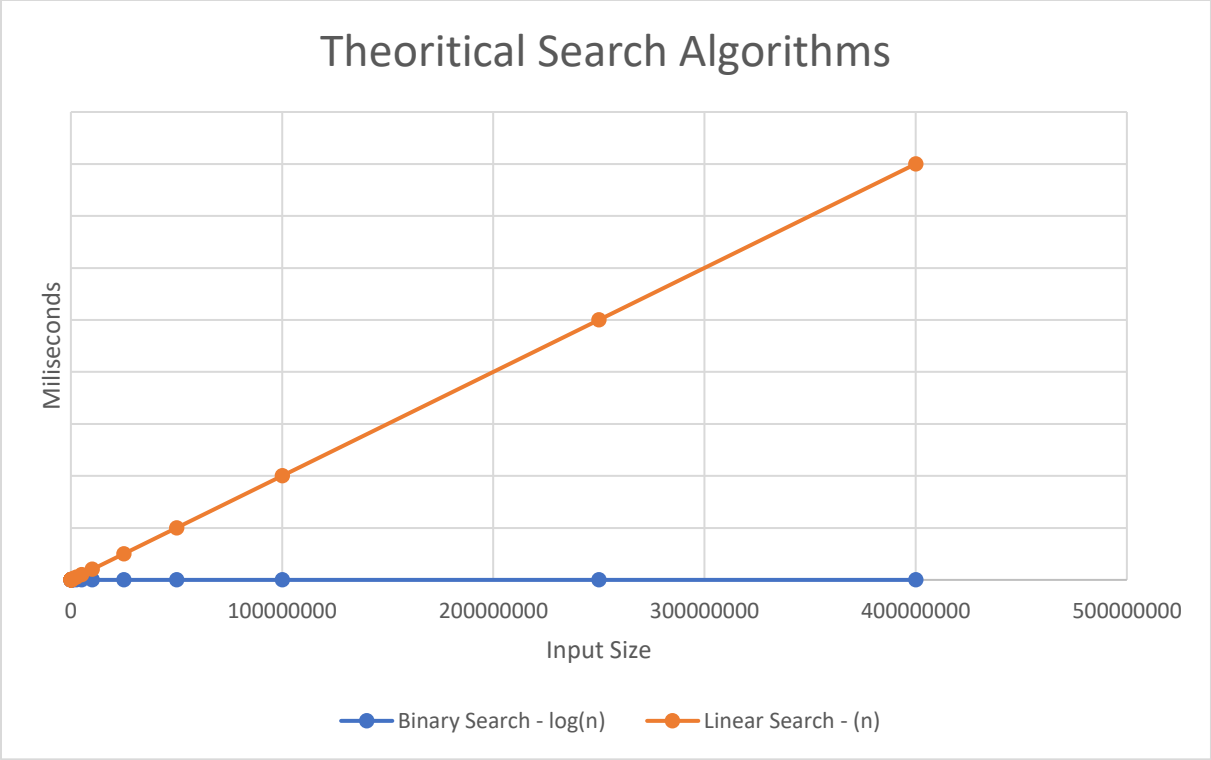
Best case is having the value at the beginning , average case is at the middle, worst case is non existance of the value.

Computer Specification

Processor – Intel (R) Core(TM) i7 – 6700 HQ CPU @ 2.60 Ghz

Ram – 16 Gb

Operating System – 64 bit Window 10



When we analyze these plots, it can be seen that for binary search, there are some deviations. It's because we are dealing with so small numbers. But in general for binary search, not having the value in the array is the longest one. So the worst case is not having the value. Thus, computer checks mid values ,as we have in the code block, until there will not be any value in the array. However, it only takes ,even for the worst case, logN times. And for the linear search, the worst case is relatively same as having the value at the end or not having the value in the array. Because both times computer checks the all memory locations to find the value until the end of the array. Therefore, it takes N times which means growth rate of linear search is N. Lastly, when we compare the results and theoritical graphs, it can be observed that binary search is more efficient than linear search. Because as the input size grows, the execution time grows with it for linear search. However, for the binary search execution time grows very very slowly compared to linear search.