

CS201 HOMEWORK 2 REPORT

OLCAYTU GÜRKAN 21903031

Hardware Specifications of My Computer:

CPU: Intel i5-4590 3.30GHz

RAM: 8 GB

OS: Windows 10 64 bit

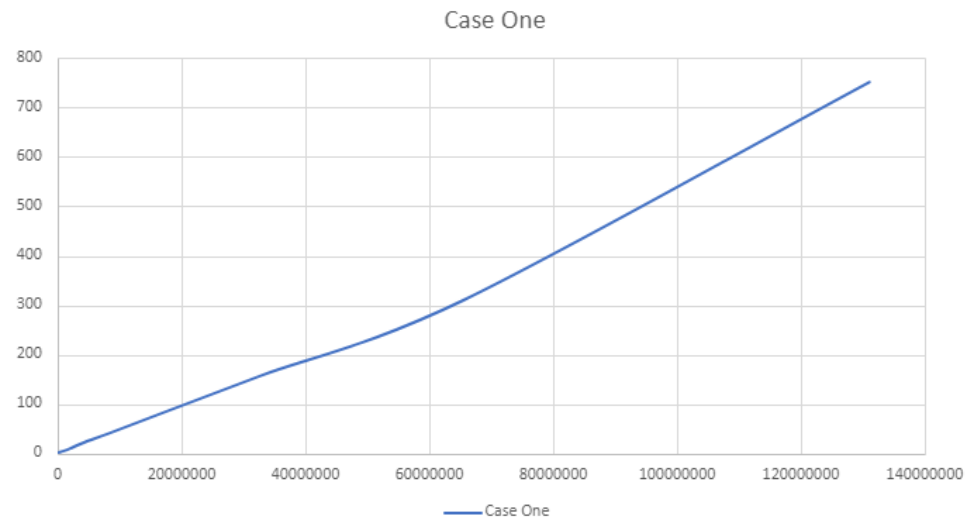
Storage: 1TB HDD (%95 full capacity)

Plots for Algorithm One:

Important note: In my every graph, x-axis is the input size (N) and y-axis is the running time in ms.

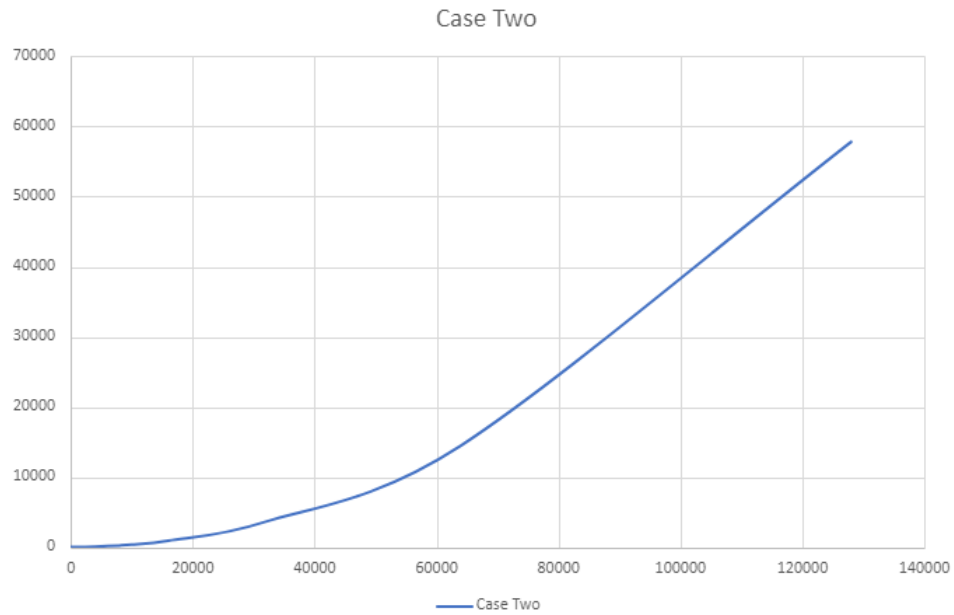
Case One

Input size ▾	Time (ms) ▾
0	0
128000	1
256000	2
512000	3
1024000	5
2048000	10
4096000	21
8192000	40
16384000	79
32768000	157
65536000	310
131072000	752



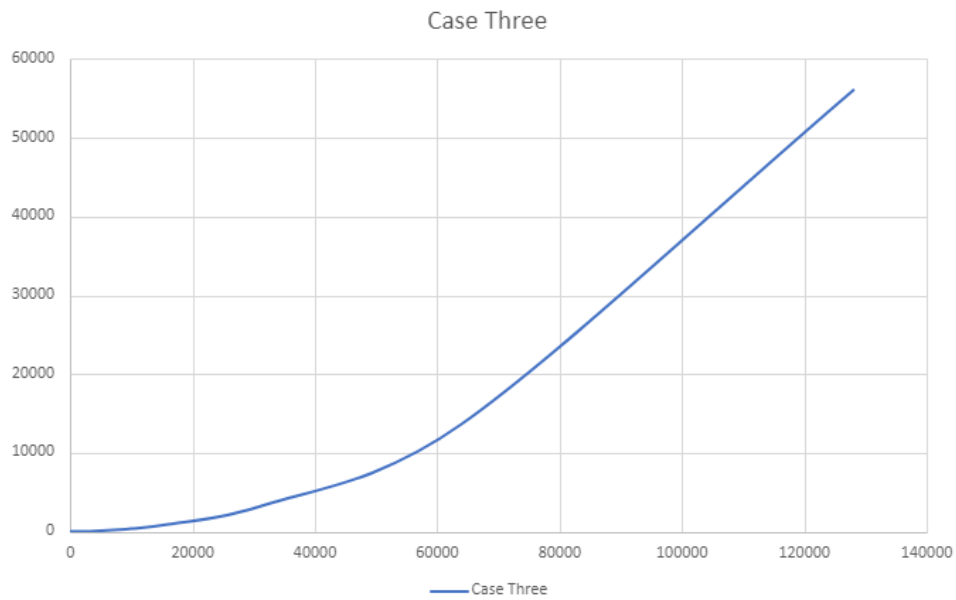
Case Two

Input size	Time (ms)
0	0
300	1
600	2
1000	4
2000	15
4000	59
8000	230
10000	360
16000	910
32000	3628
64000	14500
128000	57819



Case Three

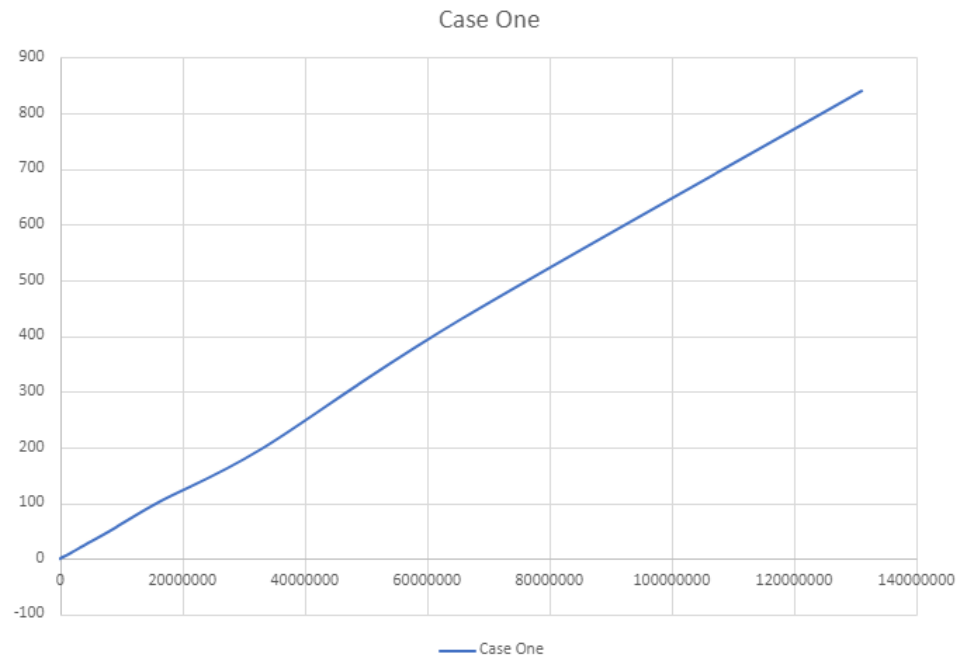
Input size	Time (ms)
0	0
300	1
600	1
1000	4
2000	14
4000	59
8000	225
10000	359
16000	907
32000	3415
64000	13650
128000	56055



Plots for Algorithm Two:

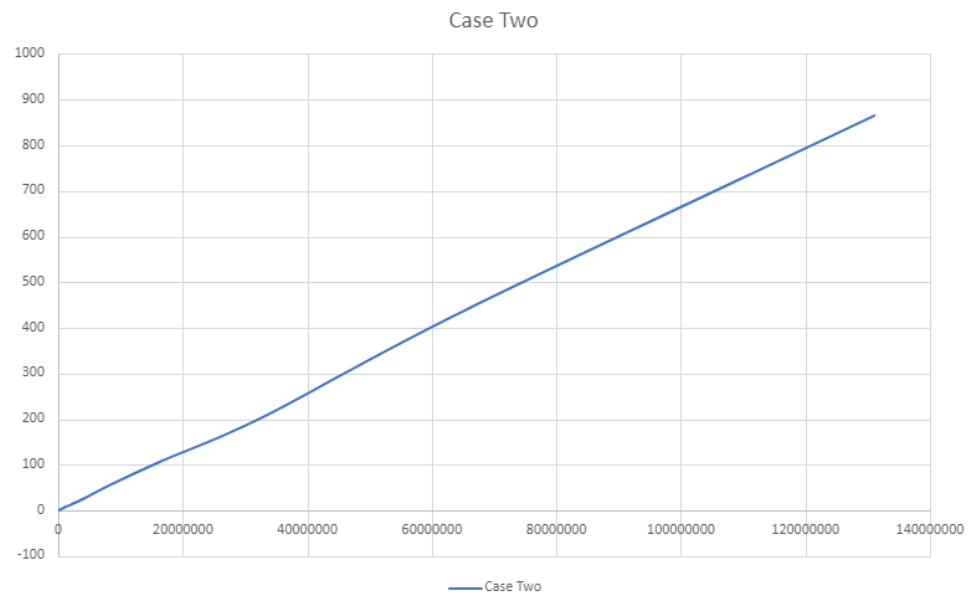
Case One

Input Size	Time (ms)
0	0
64000	0
128000	1
256000	2
512000	3
1024000	6
2048000	12
4096000	25
8192000	50
16384000	103
32768000	196
65536000	430
131072000	840



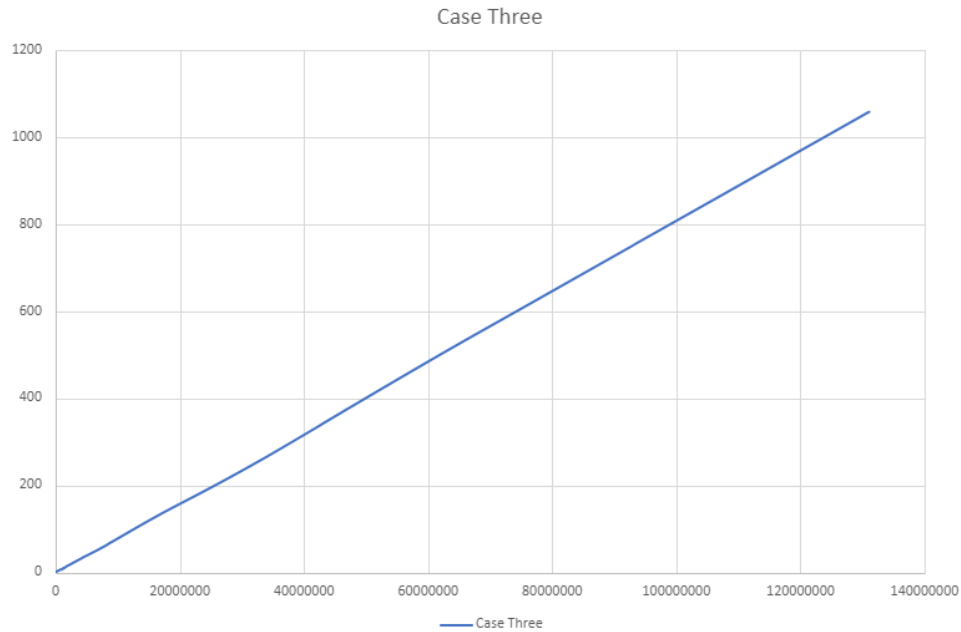
Case Two

Input Size	Time (ms)
0	0
64000	0
128000	1
256000	2
512000	3
1024000	7
2048000	13
4096000	26
8192000	55
16384000	107
32768000	204
65536000	440
131072000	865



Case Three

Input Size	Time (ms)
0	0
64000	1
128000	2
256000	3
512000	5
1024000	8
2048000	16
4096000	32
8192000	63
16384000	130
32768000	256
65536000	530
131072000	1059



Indicating Each Cases and Corresponding Time Complexity

For Algorithm One,

Best case is case one, and complexity of it is $O(n)$.

Average case is case three, and complexity of it is $O(n^2)$.

Worst case is case two, and complexity of it is $O(n^2)$.

For Algorithm Two,

Best case is case one, and complexity of it is $O(n)$.

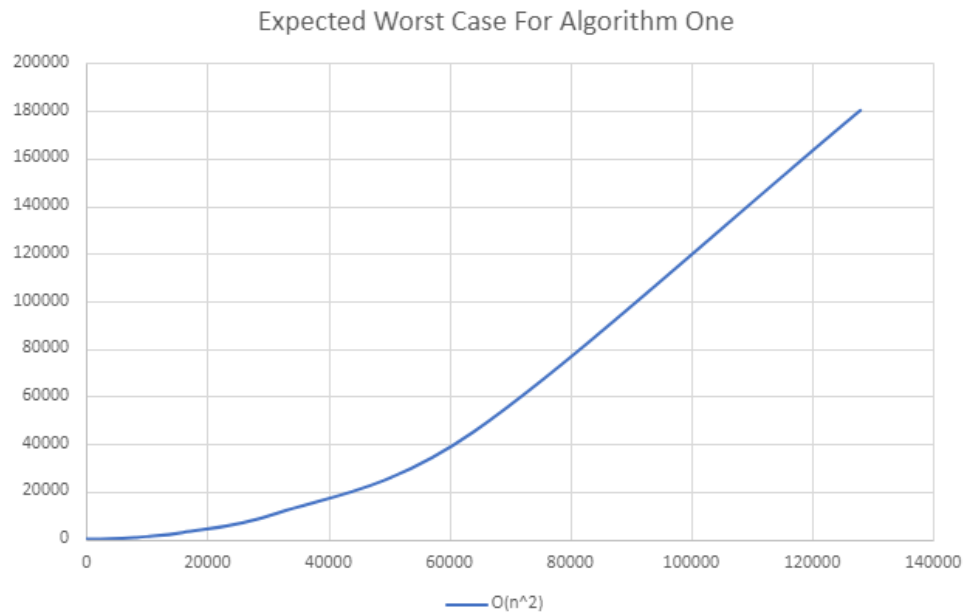
Average case is case two, and complexity of it is $O(n)$.

Worst case is case three, and complexity of it is $O(n)$.

Expected Worst Case Growth Rates

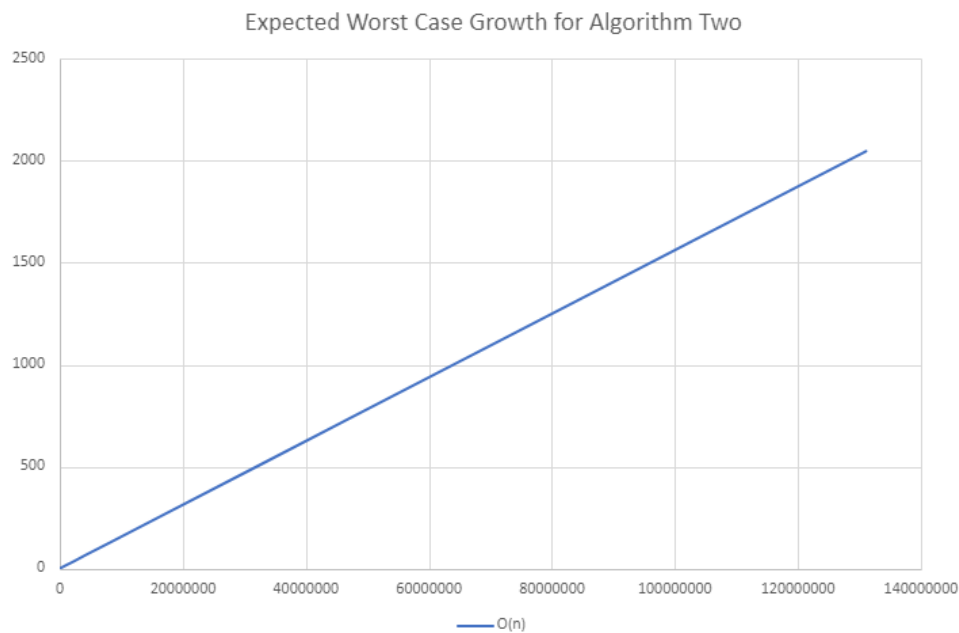
For Algorithm One,

Expected worst case for algorithm one was $O(n^2)$. Therefore, graph of it is



For Algorithm Two,

Expected worst case for algorithm two was $O(n)$. Therefore, graph of it is



Comparison and Discussion

For algorithm one, expected growth rate plot and worst-case plot (case two) looked pretty similar, but not identical. In worst-case plot, we have some differences around the input value of 30,000. For algorithm two, expected growth rate plot and worst-case plot is presumably identical. Worst-case plot of algorithm two is pretty smooth at every input value. The worst-

case plot in algorithm one is probably different due to pure luck, since I generated array values by creating random numbers and runtime of an algorithm can be affected by even the programs that are running in the background. And luck was with me in algorithm two, since algorithm didn't get affected by crazy-generated random values. Another reason beyond my control why plots are different is that my computer is not working with one hundred percent efficiency. Even the temperature change in the room affects my computer's speed. For example, I was getting faster running times for algorithm one in the night that I had in the mornings. So, I was cautious about obtaining the whole data in the same environment (I even paid attention to the programs that are running in the background!). Therefore, I can say that I did a pretty good job finding running times of algorithms despite some differences between expected worst-case growth rate.