

## Programming Assignment 2

### I/O Times and Sorting times on different input files sizes

Number of input elements	Sorting Times (s)	I/O Times (s)
15	1e-05	0
1000	4.26e-03	0
10000	4.41e-01	0
100000	4.96e+01	0
1000000	-	-

The Space complexity of my algorithm is of  $O(1)$  complexity. The algorithm works by solely manipulating the address of the existing linked list.

I/O run time of the algorithm is extremely small approximately 0s seconds regardless of the size of the input. But the time complexity of the sorting time varies from  $O(n)$  for the best case scenario and  $O(n^2)$  as the worst case scenario and  $O(n^2)$  for the average time complexity.

Number of input elements	Sorting Times PA2 (s)	Sorting Times PA1 (s)
15	1e-05	0
1000	4.26e-03	0
10000	4.41e-01	0
100000	4.96e+01	7.0e-2
1000000	-	1.01

There is a significant difference between my implementation of shell sort using arrays and the implementation of shell sort using linked lists. Though both are of the time complexity  $O(n^2)$ , the rate at which the algorithm increases when using linked lists is much faster than rate of increase of the algorithm when arrays are used.