COMP20290 Algorithms Practical 4: Elementary Sorting
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1. How many compares does insertion sort make on an input array that is already sorted?
Linear

2. What is a stable sorting algorithm?
A stable sorting algorithm is stable if two elements have equal values and do not need to change order because they are already sorted. If they have to be swapped, then it becomes unstable. Stable sorting preserves the position of two equal elements relative to one another.

3. What is an external sorting algorithm?
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4. Identify 6 ways of classifying sorting algorithms?

1. Comparison vs. Non comparison: comparison sorts compare two items at a time whereas non comparison simply sorts one, it doesn't compare two items.

2. Time complexity: how much time it takes the algorithm based on size of input

3. Space complexity: how much memory or space the algorithm will need based on size of the input

4. Stability: stable sorting algorithms preserve existing relative order of elements when when comparing equal keys

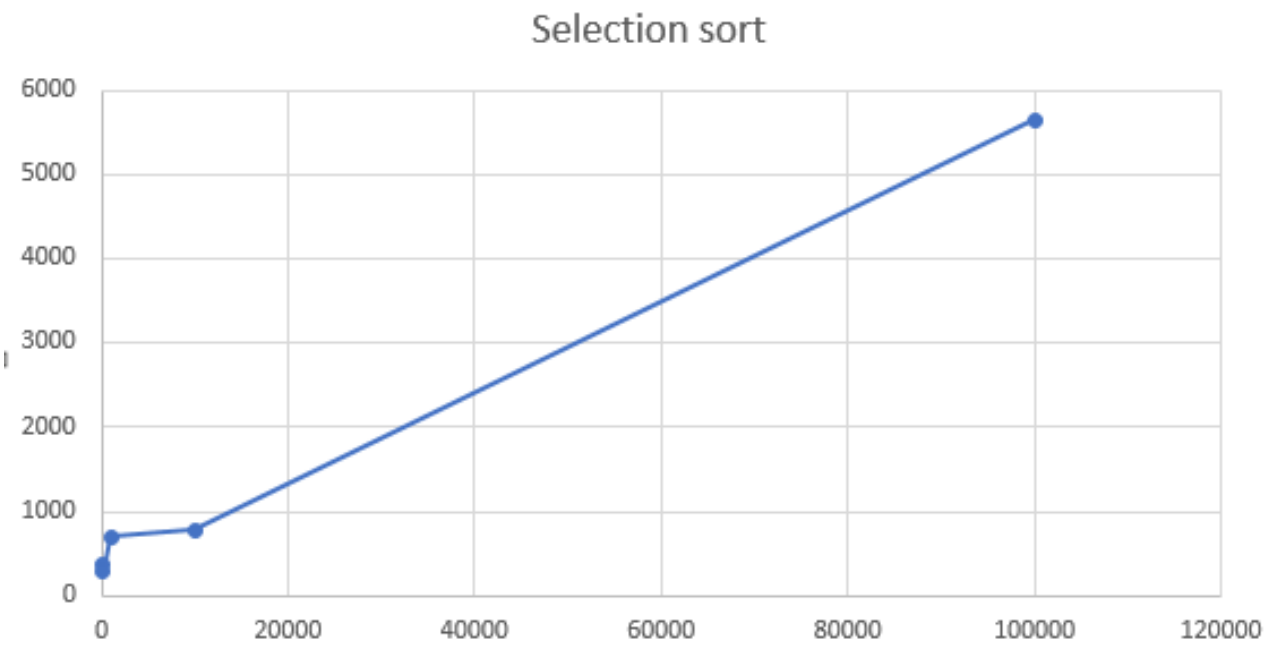
5. Internal vs. External: Internal sort is one where items being sorted can be kept in main memory/ram. External is one where items being sorted need to use external memory

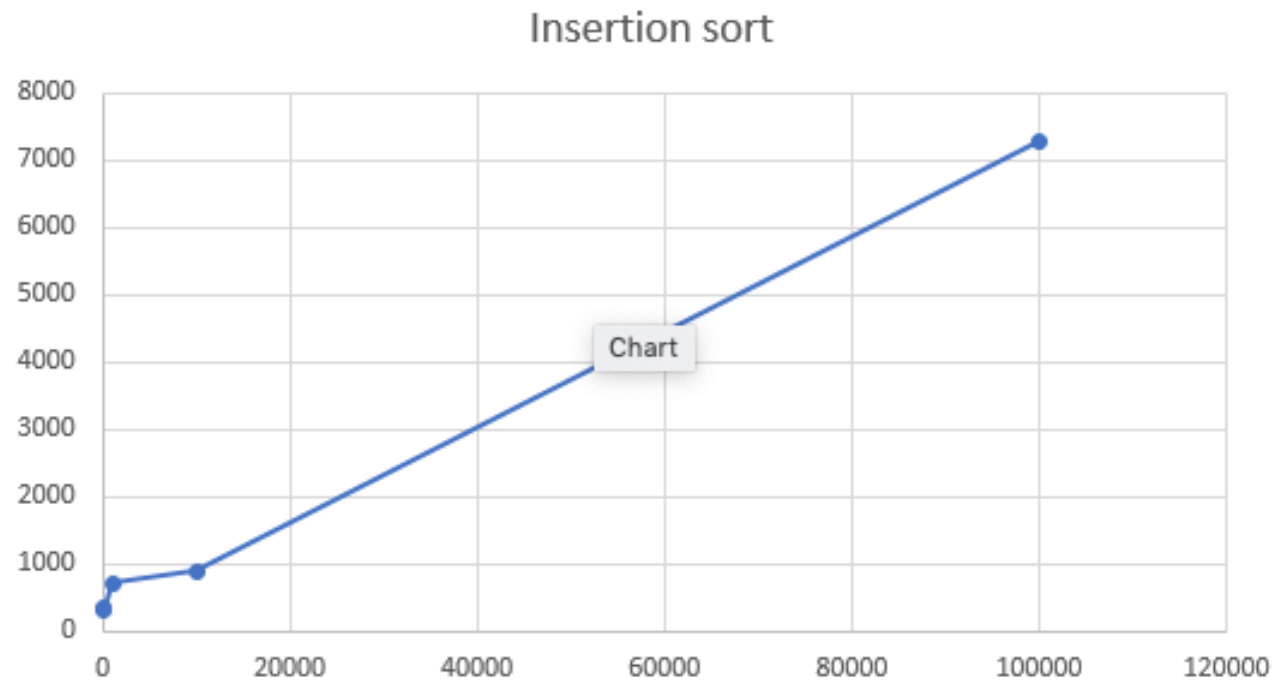
6. Recursive vs. Non-recursive: recursive sorting uses divide & conquer approach splitting up dataset into smaller inputs, non recursive simply does not use recursion / does not split the data set up

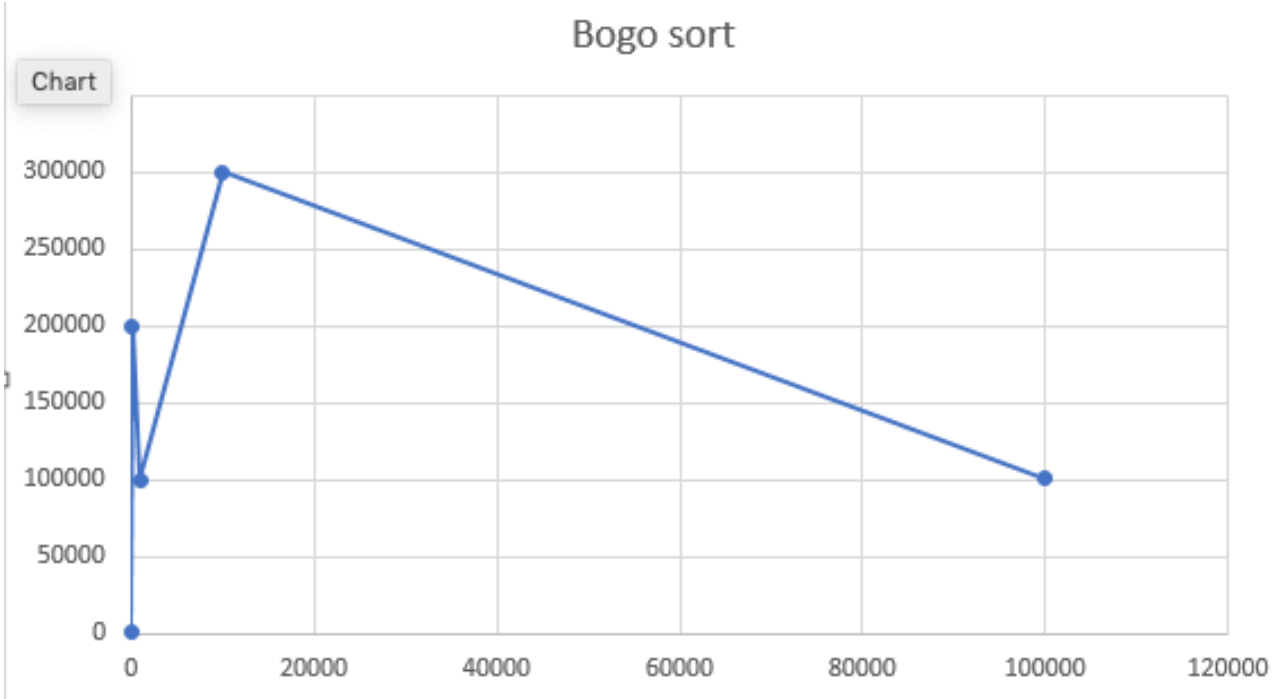
Input size	Selection sort	Insert sort	Bogo sort
10	363	365	463
100	279	320	Undefined
1000	702	719	Undefined
10 000	781	890	Undefined
100 000	5660	7289	Undefined

Time complexity for each sort:

- SelectionSort: O(n^2)
- InsertSort: O(n)
- BogoSort: O(n)


Selection sort
6000
5000
4000
3000
2000
1000
0
0
20000
40000
60000
80000
100000
120000


Insertion sort
8000
7000
6000
5000
4000
3000
2000
1000
0
Chart
0
20000
40000
60000
80000
100000
120000


Bogo sort
Chart
300000
250000
200000
150000
100000
50000
0
0
20000
40000
60000
80000
100000
120000