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COS 285

Assignment 2

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Analysis for Program 2 sub-tasks

File Input

As discussed in Lab 1, The time complexity of the file input method is $O(10n)$ as each line element has ten comma separated values which are all parsed one time. This time complexity simplifies to $O(n)$.

MyArrayList's Insertion Sort without parameters (6.a and 6.b)

By running two '.sort()' method calls sequentially the output times were 159 milliseconds, and 1 millisecond respectively. This is to be expected, as an Insertion Sort has a time complexity of $O(n^2)$ for average and worst cases, and a time complexity of O(n) for best cases. In the first case, the MyArrayList data structure was unsorted, therefore its runtime approached a quadratic time complexity. However, with the second method call the program executed in linear time because the data structure had already been sorted in the first method call.

MyArrayList's Insertion Sort with Comparator<Flight> Parameter (7.a and 7.b)

By running two sequential '.sort()' method calls with a Comparator object as a parameter, the output times were 96 milliseconds, and 1 millisecond respectively. As stated above, it is expected that the first method call would have a significantly longer runtime. The first method calls runs in quadratic time as the elements are unsorted. The second method call runs in linear time as the data was still sorted from the first method call.

One final note, the runtime for both 6.a and 7.a will always be slowed due to the absence of caching during the first reference to an object in memory. Additionally, two separate MyArrayList data structures were used for exercises 6 and 7 because the sorting methods used in exercise 6.b would affect the runtime for exercise 7.a.