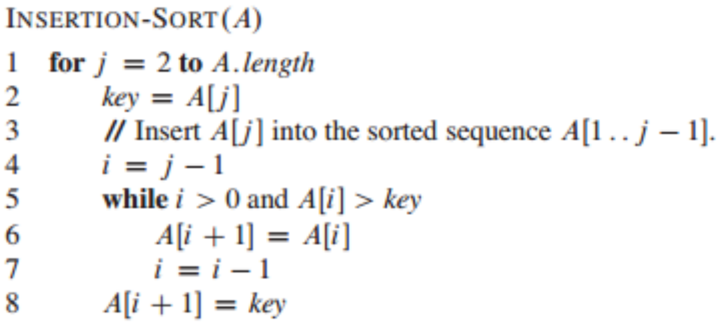
Fall 2024 – CS 303 Algorithms and Data Structures
Lab 2

Objectives:

- Implement insertion sort algorithm
- Evaluate performance of insertion sort with increasing array size

Problems

1. Implement a method that will sort a given array using the insertion sort algorithm (given below).
2. Write a driver program to test the insertion algorithms implemented in Question 1. Read the input file “1000.txt” for the input numbers and store them in an array. Sort this array using insertion sort.
3. Test the program for the different size input files provided in Canvas.
4. Record the runtime for insertion sort on various sized arrays by using the provided files. Comment on how the execution time of insertion sort varies with size of the input array. Use a table or plot to summarize the results and document your observations and explanations in the report.



```
INSERTION-SORT($A$)
for $j = 2$ to $A.length$
    $key = A[j]$
    // Insert $A[j]$ into the sorted sequence $A[1..j-1]$.
    $i = j - 1$
    while $i > 0$ and $A[i] > key$
        $A[i+1] = A[i]$
        $i = i - 1$
    $A[i+1] = key$
```

Note: The above pseudo code assumes that the array indexing is starting from 1. If you are using a programming language that uses array indexing starting from 0, you have to modify the pseudo code accordingly.

Submission:

- This algorithm will be first part of your report. Prepare your results and save them. You will be using your results to compare with the next algorithm and write your report.

DATA

1000, 2500,5000,10000,25000,50000,100000,250000,500000,1000000