Homework 9

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Assignment 9: Fortran implementation of linear search and binary serach algorithms. The main idea of these algorithms to find the index where a specific value of interest (x) is located in a given array. For the present assignment, both were implemented and tested for the case of sorted and unsorted arrays with a size of 10000000 components. The results of the output from both algorithms is shown in Figure 1.

Figure 1 Raw output from search algorithms codes

The runtimes for each of the algorithms is summarized in the following table.

Functions	CPU Time (s)	Was the value found?
linearSearch	3.226800000000001E-002	True
binarySearch	3.000000000002000E-006	True

Conclusions: The CPU times have a significant difference in efficiency between the two algorithms. The linear Search function took approximately 0.03227 seconds to execute, while the binarySearch function completed in only 3.0E-006 seconds. The considerable gap in execution time shows better efficiency of the binarySearch function, especially for large datasets. While linear search may fit better small datasets or unsorted arrays, binary search offers a much faster alternative for sorted arrays, significantly reducing search time. However, noticeable for arrays with higher-dimensionality sorting the elements in the array may be extremely expensive hindering the efficiency of the binary search algorithm.