

```

//COP3530 ~ Exercise2 ~ 19/March/2015 ~ Ricardo Stefano Reyna
//-----
//Exercise2 Programmer's Guide and Report -----
//-----
//-----
// Purpose of Program
//-----
Exercise2 , is a comparison between linear search and binary search.
//-----
// Command Line Options
//-----
Type make to compile the program. Then run it by typing ./Search. You can also add a file to read by
typing ./Search < nameOfFile.filetype (e.g. ./Search < input-1k.in).
//-----
// Organization of Code
//-----
The Organization of the code is as follows:
Search.h is the header file where it has all the libraries being used for the program. Search.cpp has the
meat of the program, it takes care of handling the search functions and both arrays used in the search
program. Search-main.cpp is the main file where it takes the input from the user and calls it's respective
functions to handle the program.
//-----
//Functions, Methods, Procedure
//-----
Exercise2 first takes two number where they determine the size of each array, the big array will take
many input generated numbers and the small array are the numbers the user wants to search. After
creating the array it'll search linearly the array then sort the big array and search it binary.
//-----
// Efficiency
//-----
In terms of the code itself it's efficient in inserting the elements into the array  $O(1)$ , sorting  $O(N \cdot \log(N))$ ,
linear search  $O(N)$ , and binary search  $O(\log(N))$ .
//-----
// Known Bugs
//-----
No bugs have been reported.

```

//-----

//Testing

//-----

Exercise2 has been tested using four different files containing random generated numbers:

input-1k.in

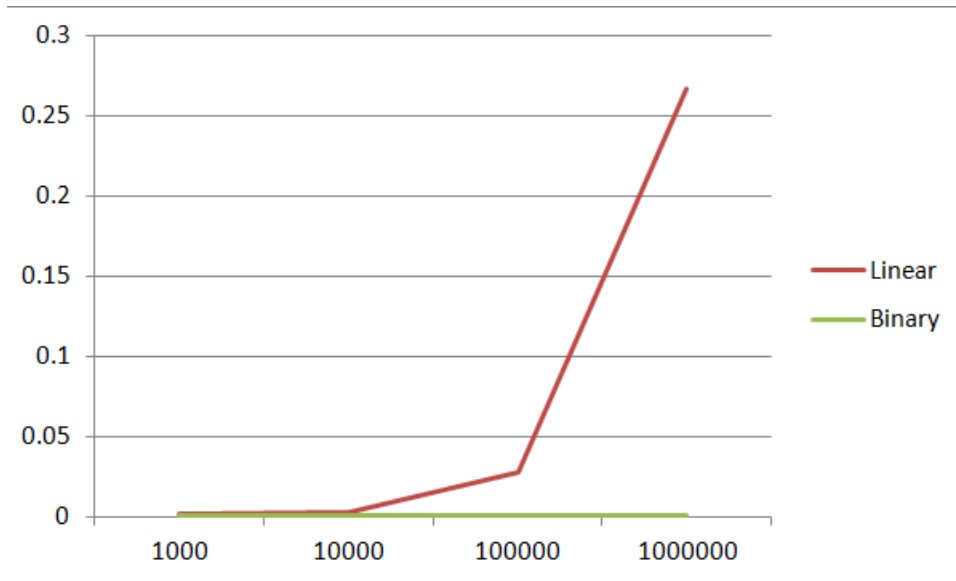
input-10k.in

input-100k.in

input-1m.in

and a manual input to check if the searching works since most of the time the numbers aren't in the array.

N	Time (Linear Search)	Time (Binary Search)
1000	0.001744s	0.000446s
10000	0.003117s	0.000458s
100000	0.028219s	0.000461s
1000000	0.267218s	0.000476s



### Linear Search:

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

[illegible]

No

No

No

No

No

No

No

No

No

No

Time: 0.001744

### Binary Search:

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

No

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No

Time: 0.003117

### Binary Search:

No

No

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No

Time: 0.028219

### Binary Search:

No

No

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[illegible]

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No

Time: 0.000461

```
lin114-11:21% ./search < input-1m.in
```

### Linear Search:

No

No

No

[illegible]



[illegible]

No

Time: 0.267218

Binary Search:

No

No

No

No

No

No

No

No

No

No

No

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[illegible]

No

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No

No

No

No

No

Time: 0.000476

lin114-11:22% ./search

20

10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

1 2 3 4 5 55 56 57 9 98

Linear Search:

Yes

Yes

Yes

Yes

Yes

No

No

No

Yes

No

Time: 8e-05

Binary Search:

Yes

Yes

Yes

Yes

Yes

No

No

No

Yes

No

Time: 4.1e-05