Lab #11

CS-2050 - Section D

Week of April 26, 2021

1 Requirements

In this lab, you will write a set of functions for performing a binary search on an array of structs.

Your implementation of the required functions should match the performance requirement *exactly*, and no functions should perform **faster or slower** than expected. Given the performance requirements in this document, you must declare *at least one* helper function to complete this lab.

```
typedef struct {
        float squareFeet;
        int baths;
        int houseNumber;
} House;
```

1.1 Support Functions

```
// Complexity: O(1)
void* createArray(size_t size, size_t elemSize);
// Complexity: O(1)
size_t arraySize(void *array);
// Complexity: O(1)
void freeArray(void *array);
```

Info: These functions are required for grading purposes, but are not part of the testing for this lab. You are expected to implement these functions to support your implementation, but they are being counted as a single "function group" and will not be a significant part of your grade for this lab.

1.2 compareHouses

```
// Complexity: O(1)
int compareHouses(House *a, House *b);
```

Info: This function compares the two structs given by their **houseNumber** members. It should return a *strictly negative* number if $a < b$, a *strictly positive* number if $a > b$, or 0 if they are equal.

1.3 searchHouses

```
// Complexity: O(log(n))
size_t searchHouses(House *array, House *query);
```

Info: This function performs a *binary search* on the given struct array using **recursion**. This function will return the index of the query struct when it is located, or **SIZE_MAX** on error.

2 Notice

Grading: Total 15 points

1. Write required *support* functions
   * 5 points
2. Write required *compare* function
   * 2 points
3. Write required *search* function
   * 8 points

Notice:

1. All of your lab submissions must compile under GCC using the $-Wall$ and $-Werror$ flags to be considered for a grade.
2. You are expected to provide proper documentation in every lab submission, in the form of code comments. For an example of proper lab documentation and a clear description of our expectations, see the lab policy document.