**MAT 2540: Data Structures and Algorithms II**

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| **PROJECT 1**  |  | **Professor:** Caner Koca |

The goal of this project is to make you become familiar with the trees, and how they are implemented in a computer programming language, like C++. For this assignment, please first see the link <http://cpp.sh/5o3ra> for the **Binary Search Tree Program**, writtenin C++.

**Assignment 1:**

1. Understand how this BST-program works.
2. Modify the program so that every node has an additional third child, called **mid**. Modify the **insert** program, so that the value is stored in the middle child if it has the same value as its parent.
3. Insert the following numbers 32, 42, 15, 24, 15, 34, 52, 32, 19, 20, 15, 54, 60, 55 in this ternary tree. Ask the user to search for a number. If the number is there, return "yes", otherwise return "no".
4. Save the program on cpp.sh.

**Assignment 2:** *(start working on this assignment after completing Assignment 1!)*

1. On an excel spreadsheet, form a chart with 3 columns which include the name, director and the date (year) of (at least) 20 of your most favorite movies. Make sure that there are **at least two movies** in the list shot **the same year**.
2. Now, our goal is to form a ternary search tree for the movies you picked, by modifying the algorithm you wrote in Assignment 1 as follows:
	1. Create a data structure (using **struct**) called **movie**, which has 6 members: a string for the name of the movie, another string for the director, an integer value for the year, and 3 pointers: left, mid, right.
	2. Modify the **CreateNode** and **Insert** functions; instead of mydata (int), you should have 3 inputs: movie name (string), movie director (string), and year (integer).
	3. Modify the search function, by replacing data with the year of the movie (namely, search for the year!).
	4. Inside the main function, add the 20 movies you picked to your tree, using the **insert** function.
	5. Your program should do this: Ask the user to search for a year. If there is a movie shot that year, it should return a message that gives the name and the director of the movie. If there isn't a movie shot in that year, the program should return "not found". If there is more than one movies shot that year, the program should return the name and the director of ALL of the movies shot that year.

**Grading Scheme:**

**70% for the accuracy**: Your code is expected to do everything what is asked in the assignment. It must be error-free. Expecially if you are working on this assignment in pairs...

**20% for the clarity**: You are expected to write comments within your code that explain the role of each of the line you add to the original code. Pay attention to spacing and indentation. Name your variables and functions appropriately.

**10% for additional work**: Think of other possible uses of the code you've written in Assignment 2, and extend it to make it more useful. Program the extended code, explain what it does, and send the cpp.sh link to me.

**Submit the following by e-mail by the due date:** Three cpp.sh links containing the code for Assignment 1, Assignment 2, and an extended-use-version of Assignment 2. Also, send the excel sheet from Assignment 2.