Coding Exercise: 1- Introduction to Data Structures and Algorithms [1]

Chapter 1: Introduction to Data Structures and Algorithms[2]

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[1]A coding exercise for Chapter 1 of the Study Guide on the course Data Structures and Algorithms.
[2]This chapter introduces the basic concepts of data structures and algorithms.
[3]https://github.com/godkingjay

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For Loop

In C++, the `for` loop is used to execute a block of code repeatedly. It is often used when the number of iterations is known. The syntax of the `for` loop is as follows:

```
for (initialization; condition; advancement) {
    // code block to be executed
}
```

Code 1: Syntax of the for loop

- **Initialization:** It is executed only once when the loop starts.
- **Condition:** It is evaluated before each iteration. If it is true, the code block is executed.
- **Advancement:** It is executed after the code block has been executed.

The following example demonstrates the use of the `for` loop to print the elements of an array.

```
#include <iostream>
using namespace std;

int main() {
    int arr[5] = {1, 2, 3, 4, 5};
    int n = sizeof(arr) / sizeof(arr[0]);

    for (int i = 0; i < n; i++) {
        cout << arr[i] << " ";
    }

    return 0;
}
```

Code 2: Example of the for loop

The code above shows a simple program that prints the elements of an array. It initializes an array of integers with five elements and then uses a `for` loop to print the elements to the console. The 'n' variable stores the size of the array, which is used as the condition for the loop.

The output of the program is as follows:

```
1 2 3 4 5
```

Code 3: Output of the for loop

Coding Exercises

> *"C makes it easy to shoot yourself in the foot; C++ makes it harder, but when you do, it blows away your whole leg."*
>
> – Bjarne Stroustrup

Instructions: Write a program that solves the following problems. Submit your code to the Google Drive folder provided by the instructor.

1. Implement a C++ program that demonstrates the primitive data types.
   (a) Declare and initialize variables of the following different data types.
      i. Integer
      ii. Float
      iii. Double
      iv. Character
      v. Boolean
   (b) Print the values of the variables to the console.
2. Implement a C++ program to find the maximum element in an array using linear time complexity.
   (a) Declare an array of integers.

   int arr[6];

   (b) Initialize the array with random values.

   arr[6] = {19, 10, 8, 17, 9, 15};

   (c) Find the maximum element in the array.
   (d) Print the maximum element to the console.

   Output: 19

   (e) Determine the **time complexity** and **space complexity** of the program.
3. Implement a C++ program to find the sum of all elements in an array using linear time complexity.
   (a) Declare an array of integers.

   int arr[6];

   (b) Initialize the array with random values.

   arr[6] = {19, 10, 8, 17, 9, 15};

   (c) Find the sum of all elements in the array.
   (d) Print the sum to the console.

   Output: 78

   (e) Determine the **time complexity** and **space complexity** of the program.

Submission of Coding Exercises

Instructions:

1. Go to the Google Drive folder provided by the instructor:

   BSIT 2-4:
   https://drive.google.com/drive/folders/1uc3ehhK4Mv84KXPe8oV3l3AGI6czVhBx?usp=sharing

   BSIT 2-5:
   https://drive.google.com/drive/folders/1eIkUp3t2cAKIpd9KZGbQlZEGU516S_sE?usp=sharing

2. Inside the folder, create another folder for your group with the following format:

   Group Number - LastName1_FirstName1, LastName2_FirstName2
   Example: **Group 1 - Doe_John, Smith_Jane**

3. Inside the sub-folder, create another folder with the name:

   Chapter 1- Coding Exercise 1- Introduction to Data Structures and Algorithms

4. Inside the folder, upload the file of your submission.

   Fill in the template provided in the following link and upload it inside the folder:
   https://docs.google.com/document/d/1zZf3W0Hj6NfCGU7sKAaz_cztSER5e7Vx/edit?usp=sharing&ouid=112709378145681657270&rtpof=true&sd=true

5. The activity must be submitted **on or before October 11, 2024**.

6. Late submissions will not be accepted.