Assignment 1

5 – Points

Assigned: 22nd Jan 2024

Deadline: 29th Jan 2024

CS 2124: DATA STRUCTURES
Spring 2024

Assignment – 1

(The assignment file can only be uploaded **once**. To avoid any issues do read the instructions carefully before submitting the assignment)

- Students should submit a one zip file (As you can only upload one file) containing:
    - All .c and .h (and makefile if there is one) for each question in the assignment (questions 1 to 12, each code file should be named as C1, C2, …, C12)
    - PDF file containing the output of the program (So that if your program do not compile the output PDF file can be checked)
        - To create the PDF file run you program and take screenshot, then use paint (or any other application) to paste the screen shot on it. Example:
            - Spring 2024 – CS2124 <Section>
            - abc123
        - Then only select the output of the file then paste it on MS word (or any software you are using for creating the document file). The output must contain the line i.e. Spring 2024 – CS2124 <section>, ABC 123.
        - One PDF file should be make for the entire assignment (i.e. Containing all the output screen shots and Dynamic Memory related answers).

File Operations

- Write a code for each of the following and submit code with its output.

1. Creation of a new file (Points: 0.3)
   - Create <first_name>.txt file of your name
   - As output display the file name and location of the file created

2. Opening and closing an existing file (Points: 0.3)
   - Open and close the file you created <first_name>.txt
   - As output display the location of the file opened and closed

3. Writing to a file (Points: 0.3)
   - Write the three digits of your abc in the file you created <first_name>.txt (i.e. abc123, you should write '123' in the file)
   - As output display the location of the file

4. Reading from file (Points: 0.3)
   - Read from the file you created <first_name>.txt
   - As output display the content of the file you created and wrote in i.e. file of Q.3

5. Moving to a specific location in a file i.e End of file. (Points: 0.3)
   - Use the file <first_name>.txt which already have the three digits in it.
   - As output the program should print the position of the pointer.
     - i.e. In the file <first_name>.txt you already have 123 written. As the result the file pointer will move 3 time so reach the end of file content.
     - Output: 3

Total: 1.5 points (Q.1 to Q.5)

String Manipulation

6. Computes string's length and copy one string into another string (points: 0.3)
   - Use your first name as the string

7. Concatenates(joins) two strings (points: 0.3)
   - Use your first and last name as strings

8. Compares two strings (points: 0.3)
   - Use your last name to compare

9. Converts string to lowercase (points: 0.3)
   - Use your last name as string

10. Converts string to uppercase(points: 0.3)
    - Use your last name as string

Total: 1.5 points (Q.6 to Q.10)

Dynamic Memory

```
Enter number of elements(Malloc): 3
Enter elements:
1
2
3

Memory Address of 1 is 0x7fff72519560
Memory Address of 2 is 0x7fff72519568
Memory Address of 3 is 0x7fff72519570
```

```
Enter number of elements (Calloc): 3
Enter elements:
1
2
3

Memory Address of 1 is 0x7fffb688f7d0
Memory Address of 2 is 0x7fffb688f7d8
Memory Address of 3 is 0x7fffb688f7e0
```

11. Memory allocation, malloc() (points: 0.5)

12. Contiguous allocation, calloc() (points: 0.5)

- Programs for questions 11 & 12:
    - The programs will take the last 3 digits of your abc as input.
    - Assign the 3 digits memory and print the input numbers and memory as output.

13. In your own words describe the difference between the two types of memory allocation i.e. malloc and calloc (points: 0.5).
    - Not more then 10 lines (for each malloc and calloc)
    - Some useful links: **IBM guide** on malloc and calloc, **Microsoft guide** on malloc and calloc

14. Explain pointers and pointers to pointers using code (points: 0.5).
    - Write code for pointer and use that code to explain pointers in your own words
    - Write a code for pointer to pointer and use that code to explain pointer to pointer in your own words

Total: 2 points (Q.11 to Q.14)