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Assignment 2 – Structure in Memory and Buffering

Description:
This assignment is to write a C program that fills the personalInfo object, from the data we give it such as student ID, as well as data from the command line arguments, such as first and last name. Then it passes some values to the object fields and buffering data into block. Receiving strings and writing them character by character until it hits null. We ensured there was no data leaks. The purpose of this assignment is to give experience using structures, pointers, character strings, enumerated types, bitmap fields, and dealing with buffering.

Approach / What I Did:
After cloning the assignment folder, I read the steps in the read me very carefully. We were also given many functions in files that we needed to understand well in order to use them in the project, so I started going over them as well. In my newly created c file, the first idea was to fill the personal info data, so using malloc, I populated the personalInfo object, taking info from the command line arguments. Then I had to think about ways to fill the buffer. After some failed attempts, I managed to write a simple while loop code to get the line of characters using the getNext() function, then keep track of the length of the characters as well as keeping in mind the size of the block (256bytes). The code keeps filling the buffer one character at a time, and committing it as well, until it reaches its maximum capacity. Committing one more time, and resetting the variables so that the remaining characters can fill the buffer again. We get another line of text and continue again until we reach NULL.

Issues and Resolutions:

- My first issue was not fully grasping the idea of buffering a block.

I resolved it by asking basic questions from my classmates to better understand the concept. I managed to paint a clearer picture in my head of the steps I need to take to buffer the block properly.

- Next issue was of course writing the code for this (step 6). Dealing with successfully filling the buffer and committing the right way was a bit challenging, and came with a lot of errors.

The issue was the it was not emptying the buffer properly, as well as resetting the location/index after each commit. I managed to set up variables that helped with that process.

- Another issue was not remembering to commit at the very end, as well as not freeing memory.

I managed to solved this by getting an advice from a class mate.

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Analysis:

END-OF-ASSIGNMENT
000000: F9 E1 CD 18 FF 7F 00 00 FF E1 CD 18 FF 7F 00 00 | ???.?..???.?..
000010: CC D6 BC 36 03 00 00 00 0B 00 04 00 46 6F 75 72 | ???6........Four
000020: 20 73 63 6F 72 65 20 61 6E 64 20 73 65 76 65 6E | score and seven
000030: 20 79 65 61 72 73 20 61 67 6F 20 6F 75 72 20 66 | years ago our f
000040: 61 74 68 65 72 73 20 62 72 6F 75 67 68 74 20 66 | athers brought f
000050: 6F 72 74 68 20 6F 6E 20 74 68 69 73 20 63 6F 6E | orth on this con
000060: 74 69 6E 65 6E 74 2C 20 61 20 6E 65 77 20 6E 61 | tinent, a new na
000070: 74 69 6F 6E 2C 20 63 6F 6E 63 65 69 76 65 64 20 | tion, conceived

Looking at the output from left to right:

1 – F9 to 00, represents 8 bytes based on the first name object data

2 - FF to 00, represents 8 bytes based on the last name object data

3 - CC to 36, represents 4 bytes based on the student ID object data

We can verify this by taking the reverse hex numbers: 36 BC D6 CC,
And converting them into decimal numbers which gives us the decimal:
918345420, which is my student ID.

4 - 03 to 00, represents 4 bytes based on the level object data

5 – 0B to 00, represents 4 bytes based on the language object data

6 – The remaining 100 bytes, starting from 46, are based on the message, in hexadecimal.

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Screen shot of compilation:

```
student@student-VirtualBox:~/Desktop/CSC 415/A2/csc415-assignment2-bufferandstru
ct-AbbasMahdavi021$ make
gcc -c -o Mahdavi_Abbas_HW2_main.o Mahdavi_Abbas_HW2_main.c -g -I.
gcc -o Mahdavi_Abbas_HW2_main Mahdavi_Abbas_HW2_main.o assignment2.o -g -I.
student@student-VirtualBox:~/Desktop/CSC 415/A2/csc415-assignment2-bufferandstru
ct-AbbasMahdavi021$
```

Screen shot(s) of the execution of the program:

```
student@student-VirtualBox:~/Desktop/CSC 415/A2/csc415-assignment2-bufferandstruct-AbbasMahdavi021$ make run
./Mahdavi_Abbas_HW2_main Abbas Mahdavi "Four score and seven years ago our fathers brought forth on this cont
inent, a new nation, conceived in Liberty, and dedicated to the proposition that all men are created equal."
---------------------------------- CHECK ----------------------------------
Running the check for Abbas Mahdavi
Name check is 0 by 0
Student ID: 918345420, Grade Level: Senior
Languages: 262155 (4000B)
Message:
Four score and seven years ago our fathers brought forth on this continent, a new nation, conceived

The Check Succeded (0, 0)

END-OF-ASSIGNMENT
000000: F9 81 42 A7 FC 7F 00 00  FF 81 42 A7 FC 7F 00 00 | ??B??..??B??..
000010: CC D6 BC 36 03 00 00 00  0B 00 04 00 46 6F 75 72 | ???6........Four
000020: 20 73 63 6F 72 65 20 61  6E 64 20 73 65 76 65 6E |  score and seven
000030: 20 79 65 61 72 73 20 61  67 6F 20 6F 75 72 20 66 |  years ago our f
000040: 61 74 68 65 72 73 20 62  72 6F 75 67 68 74 20 66 | athers brought f
000050: 6F 72 74 68 20 6F 6E 20  74 68 69 73 20 63 6F 6E | orth on this con
000060: 74 69 6E 65 6E 74 2C 20  61 20 6E 65 77 20 6E 61 | tinent, a new na
000070: 74 69 6F 6E 2C 20 63 6F  6E 63 65 69 76 65 64 20 | tion, conceived

student@student-VirtualBox:~/Desktop/CSC 415/A2/csc415-assignment2-bufferandstruct-AbbasMahdavi021$
```