Assignment 2 – BufferAndStruct

Description:
This assignment is to write a C program that instantiates a structure through the use of a malloc and populates it with the information and write that to a memory address. Then allocate the content of an undefined string to a buffer and commit the buffer to the memory addresses.

Approach / What I Did:
First I read the readMe on github. Then I cloned the repo in my virtual box and changing the make file to fulfill requirements. The I started coding, and the first thing I had to do was instantiate a malloc of personal info. Then I populated it using ->. Then I had to write the info using writePersonalInfo. Then came the tricky part where I had to deal with a buffer. While it was not challenging to use a malloc to allocate the buffer I had to deal with what would happen when the buffer overflowed. I had to create a while look to make sure there was something to commit. Then using memcpy I would add to the buffer if it would not over flow. If it would overflow I had to add the first x characters to the buffer, where x is the number of free characters left in the buffer, and commit that. Then I had to add the remaining characters to the buffer. Finally after the while loop ended I had to commit the buffer if it had anything left in it. The last step I had was running checkIt and returning that in place of the typical 0 in a C main function.

Issues and Resolutions:

My first issue was

Not reading the ReadMe in detail and trying to create my own struct because I did not look at the assignment2.h file and I didn't know it was already there

```
12
13 typedef struct {
14     char first_name [4];
15     char last_name [8];
16     int number;
17     char grade_level [9];
18     char knowledge_of_languages [200];
19     char final_argument [200];
20
21 }
22 personal_info;
```

I resolved it by looking back and reading the ReadMe in detail and seeing I did not need to do that

My next issue was probably about 100 segmentation faults

```
      |        ^~~~~~
gcc -o McGinnis_Rory_HW2_main McGinnis_Rory_HW2_main.o assignment2M1.o -g
-I.
./McGinnis_Rory_HW2_main Rory McGinnis "Four score and seven years ago our
 fathers brought forth on this continent, a new nation, conceived in Liber
ty, and dedicated to the proposition that all men are created equal."
malloc(): corrupted top size
Aborted (core dumped)
make: *** [Makefile:77: run] Error 134
parallels@ubuntu-linux-22-04-desktop:~/Documents/csc415-assignment2-buffer
```

I solved it, by crying, then being more careful about memory allocation in a buffer of length 256

My next issue was I got the program to run entirely, but the output was wrong

```
The Check Failed (-1, 0)

END-OF-ASSIGNMENT
000000: 11 43 28 C6 FF FF 00 00  16 43 28 C6 FF FF 00 00 | .C(???...C(???..
000010: 9D 7D EA 36 03 00 00 00  01 00 00 00 00 00 00 00 | ?}?6............
000020: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000030: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000040: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000050: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000060: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................
000070: 00 00 00 00 00 00 00 00  00 00 00 00 00 00 00 00 | ................

make: *** [Makefile:77: run] Error 255
parallels@ubuntu-linux-22-04-desktop:~/Documents/csc415-assignment2-bufferan
dstruct-rorymcginnis1$
```

I solved this by relooking at the code, my issue ended up being I was not resetting the position of the buffer to 0 when I committed it

My next issue was the message was not loading

```
**ERROR**: Message field is incorrect: ------------------------------------
CHECK ----------------------------------
Running the check for Rory McGinnis
Name check is 0 by 0
Student ID: 921337245, Grade Level: Senior
Languages: 1 (1)
Message:


The Check Succeded (0, 0)

END-OF-ASSIGNMENT
```

```
9        personalInfo * mine = malloc(sizeof(personalInfo));
0        mine -> firstName = argv[1];
1        mine -> lastName = argv[2];
2        mine->message, argv[3];
3        mine -> studentID = 921337245;
```

I ultimately found out I needed to using strncpy for this

```c
personalInfo * mine = malloc(sizeof(personalInfo));
mine -> firstName = argv[1];
mine -> lastName = argv[2];
strncpy(mine->message, argv[3], 100);
mine -> studentID = 921337245;
mine -> level=SENIOR;
mine -> languages= KNOWLEDGE_OF_C;
writePersonalInfo (mine);
free(mine);
char *next;
char * buffer = malloc((BLOCK_SIZE));
```

My final issue was trying to run make

```
dstruct-rorymcginnis1$ make
gcc -c -o McGinnis_Rory_HW2_main.o McGinnis_Rory_HW2_main.c -g -I.
McGinnis_Rory_HW2_main.c: In function 'main':
McGinnis_Rory_HW2_main.c:33:20: warning: assignment discards 'const' qualifi
er from pointer target type [-Wdiscarded-qualifiers]
   33 |         while((next= getNext())!=NULL){
      |                    ^
gcc -o McGinnis_Rory_HW2_main McGinnis_Rory_HW2_main.o assignment2M1.o -g -I
.
parallels@ubuntu-linux-22-04-desktop:~/Documents/csc415-assignment2-bufferan
```

I tried to do next=getNext() in the while loop and apparently that causes a warning. So I fixed that by making next constant and assigning get next outside of the loop.
Analysis:

```
000000: 11 83 78 FF FF FF 00 00   16 83 78 FF FF FF 00 00 | .?x???...?x???..
000010: 9D 7D EA 36 03 00 00 00   01 00 00 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
```

Bytes at 000010 – 000013 represent my student ID number 921337245, which is 36EA7D9D in hex which is address 13 12 11 10
Bytes at address 000014 is the grade level freshman being 0 … senior being 3
Bytes in address 000018 – 000021 are the number of languages you know
And the Bytes beyond that are the message

Screen shot of compilation:

```
parallels@ubuntu-linux-22-04-desktop:~/Documents/csc415-assignment2-bufferan
dstruct-rorymcginnis1$ make
gcc -c -o McGinnis_Rory_HW2_main.o McGinnis_Rory_HW2_main.c -g -I.
gcc -o McGinnis_Rory_HW2_main McGinnis_Rory_HW2_main.o assignment2M1.o -g -I
.
parallels@ubuntu-linux-22-04-desktop:~/Documents/csc415-assignment2-bufferan
dstruct-rorymcginnis1$
```

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

```
parallels@ubuntu-linux-22-04-desktop:~/Documents/csc415-assignment2-bufferan
dstruct-rorymcginnis1$ make run
./McGinnis_Rory_HW2_main Rory McGinnis "Four score and seven years ago our f
athers brought forth on this continent, a new nation, conceived in Liberty,
and dedicated to the proposition that all men are created equal."
-------------------------------- CHECK --------------------------------
---
Running the check for Rory McGinnis
Name check is 0 by 0
Student ID: 921337245, Grade Level: Senior
Languages: 1 (1)
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: 11 83 8E FC FF FF 00 00  16 83 8E FC FF FF 00 00 | .?????...?????..
000010: 9D 7D EA 36 03 00 00 00  01 00 00 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

parallels@ubuntu-linux-22-04-desktop:~/Documents/csc415-assignment2-bufferan
dstruct-rorymcginnis1$
```