Labtainer Practical 2: gdblesson

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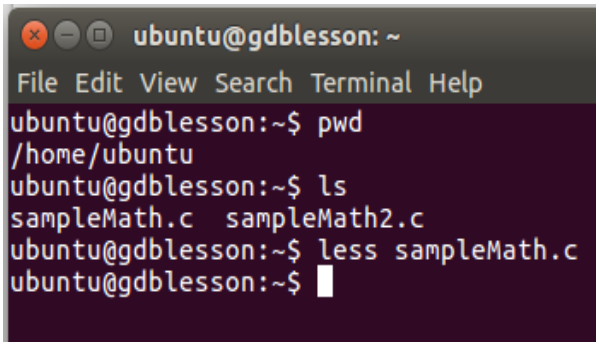
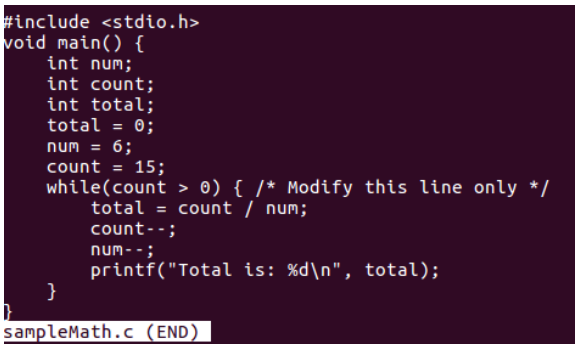
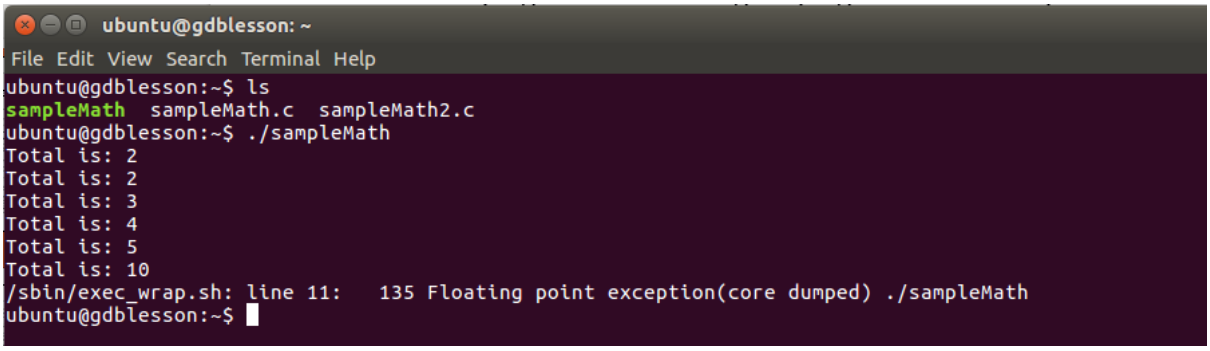
1. I started gdblesson lab session by entering **labtainer gdblesson** command. It opened gdblesson terminal window. I listed files using **ls (**list computer files**)** command in current working directory, found out **sampleMath.c** and **sampleMath2.c** files.





Then I have run **less sampleMath.c** command to see content of sampleMath.c file in a single screen. It displays the content page by page. I entered **q** when I stop the content displaying on the terminal.

2.To compile the **sampleMath.c** programme I run the command **gcc -g sampleMath.c -o sampleMath**. **gcc** stands for GNU Compiler Collections. **–g** stands for default debug information. It compiles the **sampleMath.c** file and output it to sampleMath object file. When I run the compiled file, I saw an exception.



3.Now I want to debug the code to find out in more detail. I used GDB (GNU debugger) to debug the program while executing. I run the command **gdb sampleMath**, now I'm debugging the code. I enter command **r** to run it, I saw the then **list** command list the instructions. Then I add a break at the begging of while loop. Then run (r) it, and printed (p) the value of variable num found out num is zero while stepping out (s) line by line. In the while loop num is reducing, at the end when num is zero we are try to divide a number by zero. Divided by zero gives us arithmetic exception.

```
ubuntu@gdblesson: ~
File Edit View Search Terminal Help
$9 = 2
(gdb)
$10 = 2
(gdb)
$11 = 2
(gdb) s
11              count--;
(gdb)
12              num--;
(gdb)
13              printf("Total is: %d\n", total);
(gdb)
Total is: 5
9           while(count > 0) { /* Modify this line onl
(gdb)
10              total = count / num;
(gdb)
11              count--;
(gdb)
12              num--;
(gdb)
13              printf("Total is: %d\n", total);
(gdb) p num
$12 = 0
(gdb)
```

I open the code from nano editor and make the while loop as while num is greater than zero. Compile and run it again without no more errors.

```
ubuntu@gdblesson: ~
File Edit View Search Terminal Help
  GNU nano 2.5.3                File: sam

#include <stdio.h>
void main() {
    int num;
    int count;
    int total;
    total = 0;
    num = 6;
    count = 15;
    while(num > 0) { /* Modify this line only
        total = count / num;
        count--;
        num--;
        printf("Total is: %d\n", total);
    }
}
```

4. I have compile and run the provided **sampleMath2.c** with one integer argument and saw the given and expected outputs are different. I run the **gdb** and printed the total value. At the beginning total is 32767. So I have understood the issue. At the beginning total should be zero. But in this program we have not defined total. It automatically takes the largest integer it can be saved.

```
ubuntu@gdblesson: ~
File Edit View Search Terminal Help
Your total is: 32774
[Inferior 1 (process 1553) exited with code 0207]
(gdb) b 4
Breakpoint 1 at 0x4005c5: file sampleMath2.c, line 4.
(gdb) r
Starting program: /home/ubuntu/sampleMath2 2

Breakpoint 1, main (argc=2, argv=0x7fffffffe678) at sampleMath2.c:10
10          if(argc > 1) {
(gdb) p total
$1 = 32767
(gdb)
```

5. After I debug and found out the issue I fixed the code by defining the value of total as zero. Again compiled and run the program it showed the expected output.

```
ubuntu@gdblesson: ~
File Edit View Search Terminal Help
  GNU nano 2.5.3                File: sampleMath2.c                Modified

#include <stdio.h>
#include <stdlib.h>
void main(int argc, char *argv[]) {
    int total;
    int n;
    int i;
    /* Your edit goes below */
    total = 0;
    /* Add line above      */
    if(argc > 1) {
        i = atoi(argv[1]);
    }
    else {
        printf("You must provide one integer argument greater than 0.\n");
```