

INTRODUCTION

This project consists of a basic calculator to calculate the sum, difference, product or quotient of two values, a value comparison tool to determine the largest of three values and an area calculator to calculate the area of a given shape. It is written in the C programming language, and consists of the following conditions:

1. If- else if
2. Switch case
3. Logical operators
4. Arithmetic operations

This program was tested on a machine running the Ubuntu 22.04 LTS distribution of Linux, however it should also run on machines running other Linux based operating systems as well as Microsoft Windows and Apple macOS.

SYSTEM REQUIREMENTS

CPU: Any 5th generation Intel CPU or above, any AMD Ryzen CPU and any Apple M1 series SoC(System on Chip)

RAM: Atleast 4GB

Storage: Less than 5MB

Operating system: Microsoft Windows 10/11, Apple macOS 11/12, and any Linux distribution

Note: While this program was tested in Ubuntu 22.04 LTS, it will run on Windows as well as macOS given GCC is installed beforehand.

PRE EXECUTION SETUP

1.LINUX

On most Linux systems GCC will be pre-installed, however if it is not installed, it can be done so using the distribution's specific package manager. For instance, on Debian/Ubuntu and systems based on them, entering

```
sudo apt install gcc
```

in the terminal will install GCC. Refer to your specific distribution's documentation to do the same.

```
sid@sid-Lenovo-YOGA-520-14IKB: ~  
sid@sid-Lenovo-YOGA-520-14IKB:~$ sudo apt install gcc  
[sudo] password for sid:  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
gcc is already the newest version (4:11.2.0-1ubuntu1).  
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.  
sid@sid-Lenovo-YOGA-520-14IKB:~$ gcc -v  
Using built-in specs.  
COLLECT_GCC=gcc  
COLLECT_LTO_WRAPPER=/usr/lib/gcc/x86_64-linux-gnu/11/lto-wrapper  
OFFLOAD_TARGET_NAMES=nvptx-none:amdgc-n-amdhsa  
OFFLOAD_TARGET_DEFAULT=1  
Target: x86_64-linux-gnu  
Configured with: ../src/configure -v --with-pkgversion='Ubuntu 11.2.0-19ubuntu1' --with-bugurl=file:///usr/share/doc/gcc-11/README.  
Bugs --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --prefix=/usr --with-gcc-major-version-only --program-suffix=-1  
1 --program-prefix=x86_64-linux-gnu- --enable-shared --enable-linker-build-id --libexecdir=/usr/lib --without-included-gettext --en  
able-threads=posix --libdir=/usr/lib --enable-nls --enable-bootstrap --enable-clocale=gnu --enable-libstdcxx-debug --enable-libstdc  
xx-time=yes --with-default-libstdcxx-abi=new --enable-gnu-unique-object --disable-vtable-verify --enable-plugin --enable-default-pi  
e --with-system-zlib --enable-libphobos-checking=release --with-target-system-zlib=auto --enable-objc-gc=auto --enable-multiarch --  
disable-werror --enable-cet --with-arch=32=i686 --with-abi=m64 --with-multilib-list=m32,m64,mx32 --enable-multilib --with-tune=gene  
ric --enable-offload-targets=nvptx-none=/build/gcc-11-gBFGDP/gcc-11-11.2.0/debian/tmp-nvptx/usr,amdgc-n-amdhsa=/build/gcc-11-gBFGDP/  
gcc-11-11.2.0/debian/tmp-gcn/usr --without-cuda-driver --enable-checking=release --build=x86_64-linux-gnu --host=x86_64-linux-gnu -  
-target=x86_64-linux-gnu --with-build-config=bootstrap-lto-lean --enable-link-serialization=2  
Thread model: posix  
Supported LTO compression algorithms: zlib zstd  
gcc version 11.2.0 (Ubuntu 11.2.0-19ubuntu1)  
sid@sid-Lenovo-YOGA-520-14IKB:~$
```

After installing GCC, run `gcc -v` in the terminal to verify the installation.

2. APPLE macOS

For macOS, entering 'gcc' without quotes in the terminal will prompt the user to install the Developer Tools package which will install GCC.

After the installation completes, run `gcc -v` in the terminal to verify the installation.

macOS users can also refer to this guide

<https://www.freecodecamp.org/news/install-xcode-command-line-tools/>

3. MICROSOFT WINDOWS

Windows users can refer to this guide for enabling GCC on the platform

<https://code.visualstudio.com/docs/cpp/config-mingw>

Alternatively, Windows users can also use the Windows Subsystem for Linux (WSL) compatibility layer to run a Linux environment inside Windows to execute the code.

<https://docs.microsoft.com/en-us/windows/wsl/install>

After setting up WSL, follow the Linux instructions to setup GCC.

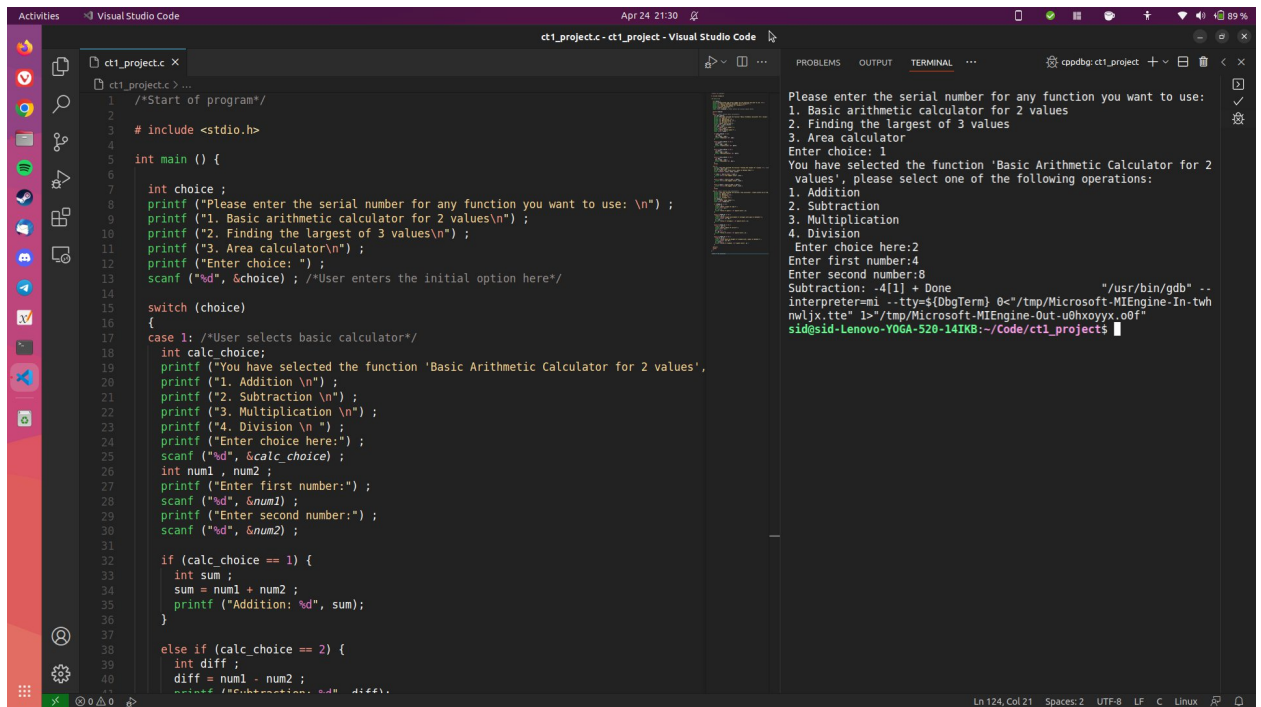
EXECUTION

Once the setup is completed, you can use your preferred IDE or the command line to execute the code. Here, executing it from the command line is shown.

1. Navigate to the folder where the file is downloaded.
2. Right click on an empty area and select Open in Terminal (macOS/Linux/Windows 11) or Open in CMD/Powershell(Windows 10 or below).
3. Now enter the command `*gcc ct1_project.c -o ct1_project*`

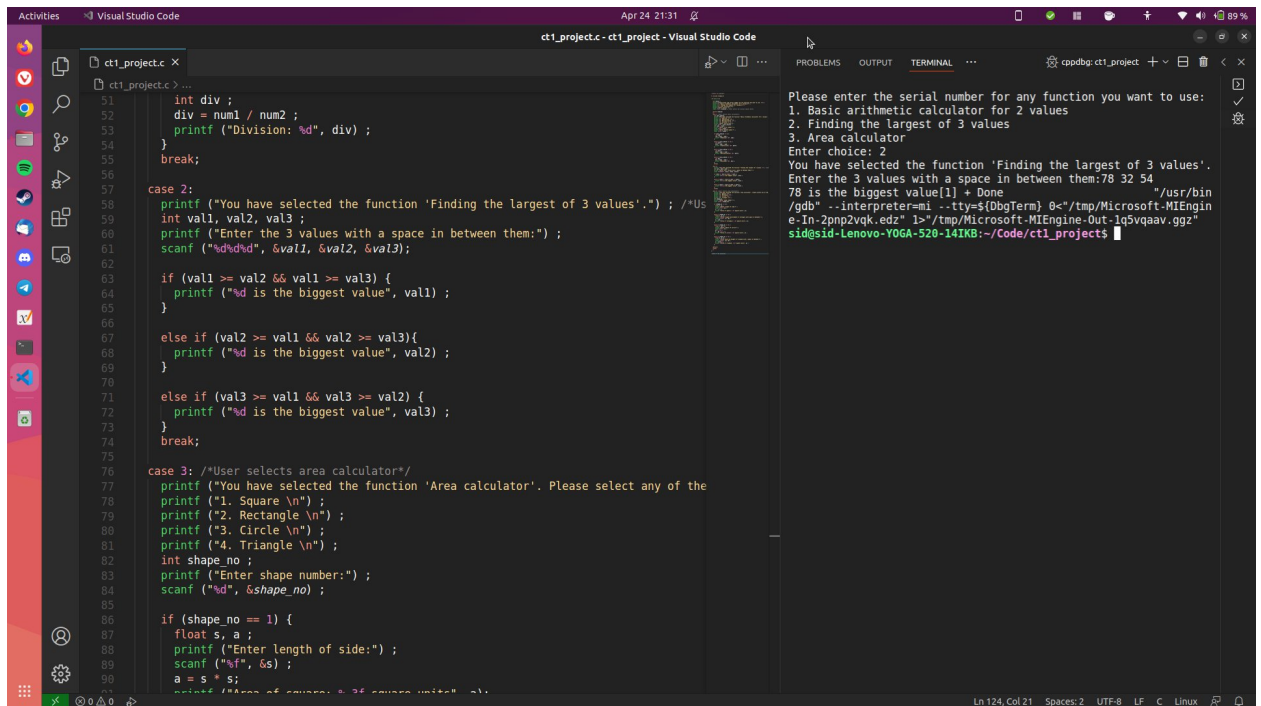
4. After the compilation completes(it will take a few seconds), enter the command `./ct1_project` . This will execute the code.

SCREENSHOTS



```
1 /*Start of program*/
2
3 # include <stdio.h>
4
5 int main () {
6
7     int choice ;
8     printf ("Please enter the serial number for any function you want to use: \n") ;
9     printf ("1. Basic arithmetic calculator for 2 values\n") ;
10    printf ("2. Finding the largest of 3 values\n") ;
11    printf ("3. Area calculator\n") ;
12    printf ("Enter choice: ") ;
13    scanf ("%d", &choice) ; /*User enters the initial option here*/
14
15    switch (choice)
16    {
17        case 1: /*User selects basic calculator*/
18            int calc_choice;
19            printf ("You have selected the function 'Basic Arithmetic Calculator for 2 values',
20                printf ("1. Addition \n") ;
21                printf ("2. Subtraction \n") ;
22                printf ("3. Multiplication \n") ;
23                printf ("4. Division \n") ;
24                printf ("Enter choice here:") ;
25                scanf ("%d", &calc_choice) ;
26                int num1 , num2 ;
27                printf ("Enter first number:") ;
28                scanf ("%d", &num1) ;
29                printf ("Enter second number:") ;
30                scanf ("%d", &num2) ;
31
32                if (calc_choice == 1) {
33                    int sum ;
34                    sum = num1 + num2 ;
35                    printf ("Addition: %d", sum);
36                }
37
38                else if (calc_choice == 2) {
39                    int diff ;
40                    diff = num1 - num2 ;
41                    printf ("Subtraction: %d", diff);
42                }
43            }
44        case 2: /*User selects finding the largest of 3 values*/
45            int val1, val2, val3 ;
46            printf ("Enter the 3 values with a space in between them:") ;
47            scanf ("%d%d%d", &val1, &val2, &val3);
48
49            if (val1 >= val2 && val1 >= val3) {
50                printf ("%d is the biggest value", val1) ;
51            }
52
53            else if (val2 >= val1 && val2 >= val3){
54                printf ("%d is the biggest value", val2) ;
55            }
56
57            else if (val3 >= val1 && val3 >= val2) {
58                printf ("%d is the biggest value", val3) ;
59            }
60            break;
61        case 3: /*User selects area calculator*/
62            printf ("You have selected the function 'Area calculator'. Please select any of the
63                printf ("1. Square \n") ;
64                printf ("2. Rectangle \n") ;
65                printf ("3. Circle \n") ;
66                printf ("4. Triangle \n") ;
67                int shape_no ;
68                printf ("Enter shape number:") ;
69                scanf ("%d", &shape_no) ;
70
71                if (shape_no == 1) {
72                    float s, a ;
73                    printf ("Enter length of side:") ;
74                    scanf ("%f", &s) ;
75                    a = s * s ;
76                    printf ("Area of square: %f square units", a);
77                }
78                else if (shape_no == 2) {
79                    float l, b, a ;
80                    printf ("Enter length of rectangle:") ;
81                    scanf ("%f", &l) ;
82                    printf ("Enter breadth of rectangle:") ;
83                    scanf ("%f", &b) ;
84                    a = l * b ;
85                    printf ("Area of rectangle: %f square units", a);
86                }
87                else if (shape_no == 3) {
88                    float r, a ;
89                    printf ("Enter radius of circle:") ;
90                    scanf ("%f", &r) ;
91                    a = 3.14 * r * r ;
92                    printf ("Area of circle: %f square units", a);
93                }
94                else if (shape_no == 4) {
95                    float b, h, a ;
96                    printf ("Enter base of triangle:") ;
97                    scanf ("%f", &b) ;
98                    printf ("Enter height of triangle:") ;
99                    scanf ("%f", &h) ;
100                   a = 0.5 * b * h ;
101                   printf ("Area of triangle: %f square units", a);
102                }
103            }
104    }
```

```
Please enter the serial number for any function you want to use:
1. Basic arithmetic calculator for 2 values
2. Finding the largest of 3 values
3. Area calculator
Enter choice: 1
You have selected the function 'Basic Arithmetic Calculator for 2 values', please select one of the following operations:
1. Addition
2. Subtraction
3. Multiplication
4. Division
Enter choice here:2
Enter first number:4
Enter second number:8
Subtraction: -4|1| + Done
/usr/bin/gdb" --
interpreter=mi -tty=${DbgTerm} 0<"/tmp/Microsoft.MIEngine-In-twh
mlix.tte" 1>"/tmp/Microsoft.MIEngine-Out-u0hxoyx.o0f"
sid@sid-Lenovo-YOGA-520-14IKB:~/Code/ct1_project$
```



```
51    int div ;
52    div = num1 / num2 ;
53    printf ("Division: %d", div) ;
54    }
55    break;
56
57    case 2:
58        printf ("You have selected the function 'Finding the largest of 3 values'.") ; /*Us
59        int val1, val2, val3 ;
60        printf ("Enter the 3 values with a space in between them:") ;
61        scanf ("%d%d%d", &val1, &val2, &val3);
62
63        if (val1 >= val2 && val1 >= val3) {
64            printf ("%d is the biggest value", val1) ;
65        }
66
67        else if (val2 >= val1 && val2 >= val3){
68            printf ("%d is the biggest value", val2) ;
69        }
70
71        else if (val3 >= val1 && val3 >= val2) {
72            printf ("%d is the biggest value", val3) ;
73        }
74        break;
75
76    case 3: /*User selects area calculator*/
77        printf ("You have selected the function 'Area calculator'. Please select any of the
78        printf ("1. Square \n") ;
79        printf ("2. Rectangle \n") ;
80        printf ("3. Circle \n") ;
81        printf ("4. Triangle \n") ;
82        int shape_no ;
83        printf ("Enter shape number:") ;
84        scanf ("%d", &shape_no) ;
85
86        if (shape_no == 1) {
87            float s, a ;
88            printf ("Enter length of side:") ;
89            scanf ("%f", &s) ;
90            a = s * s ;
91            printf ("Area of square: %f square units", a);
92        }
93        else if (shape_no == 2) {
94            float l, b, a ;
95            printf ("Enter length of rectangle:") ;
96            scanf ("%f", &l) ;
97            printf ("Enter breadth of rectangle:") ;
98            scanf ("%f", &b) ;
99            a = l * b ;
100            printf ("Area of rectangle: %f square units", a);
101        }
102        else if (shape_no == 3) {
103            float r, a ;
104            printf ("Enter radius of circle:") ;
105            scanf ("%f", &r) ;
106            a = 3.14 * r * r ;
107            printf ("Area of circle: %f square units", a);
108        }
109        else if (shape_no == 4) {
110            float b, h, a ;
111            printf ("Enter base of triangle:") ;
112            scanf ("%f", &b) ;
113            printf ("Enter height of triangle:") ;
114            scanf ("%f", &h) ;
115            a = 0.5 * b * h ;
116            printf ("Area of triangle: %f square units", a);
117        }
118    }
```

```
Please enter the serial number for any function you want to use:
1. Basic arithmetic calculator for 2 values
2. Finding the largest of 3 values
3. Area calculator
Enter choice: 2
You have selected the function 'Finding the largest of 3 values'.
Enter the 3 values with a space in between them:78 32 54
78 is the biggest value|1| + Done
/usr/bin
/gdb" --interpreter=mi -tty=${DbgTerm} 0<"/tmp/Microsoft.MIEngin
e-In-2pn2vqk.edz" 1>"/tmp/Microsoft.MIEngine-Out-lq5vqaav.ggz"
sid@sid-Lenovo-YOGA-520-14IKB:~/Code/ct1_project$
```

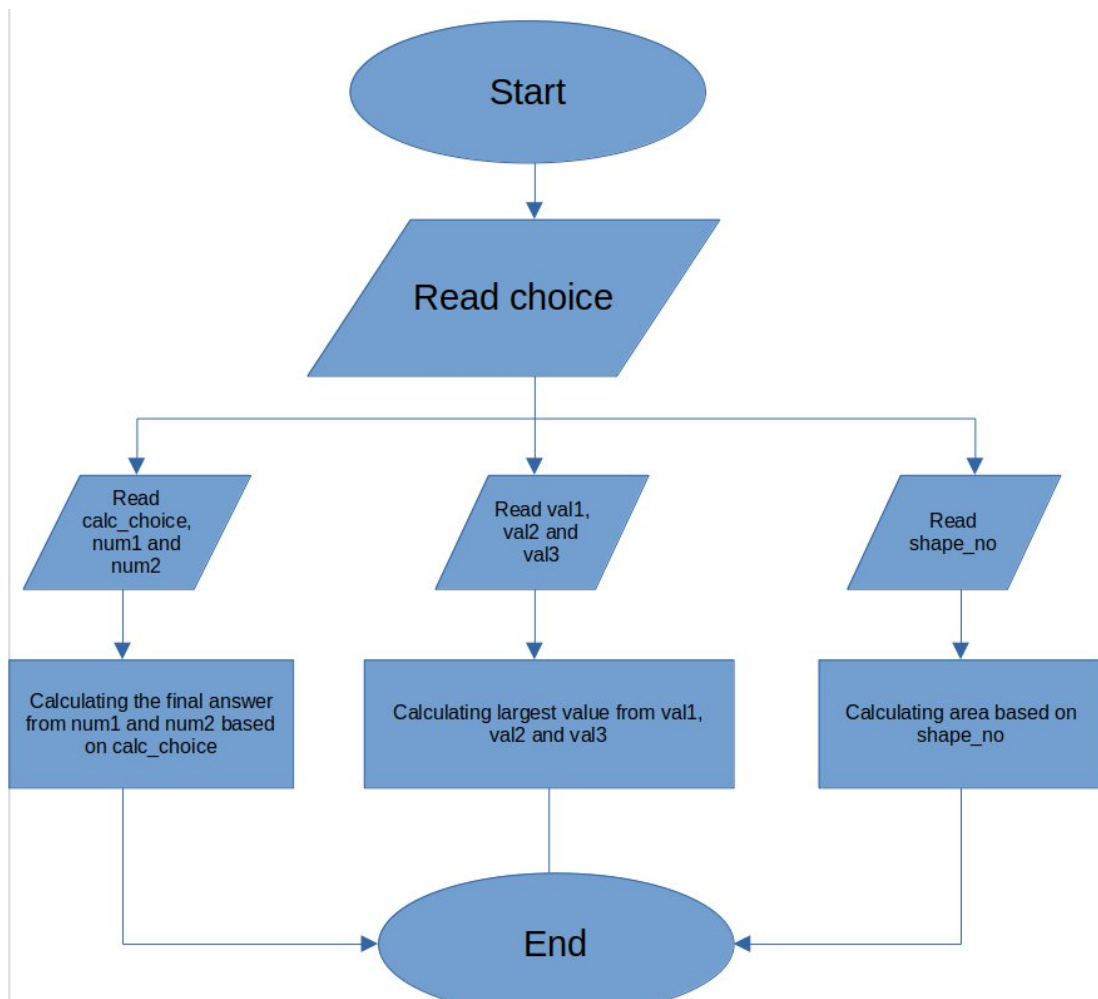
Visual Studio Code interface showing a C program for area calculation and its terminal output.

```
75 case 3: /*User selects area calculator*/
76 printf ("You have selected the function 'Area calculator'. Please select any of the
77 printf ("1. Square \n");
78 printf ("2. Rectangle \n");
79 printf ("3. Circle \n");
80 printf ("4. Triangle \n");
81 int shape_no;
82 printf ("Enter shape number:");
83 scanf ("%d", &shape_no);
84
85 if (shape_no == 1) {
86 float s, a;
87 printf ("Enter length of side:");
88 scanf ("%f", &s);
89 a = s * s;
90 printf ("Area of square: %.3f square units", a);
91 }
92
93 else if (shape_no == 2) {
94 float l, b, a;
95 printf ("Enter length and breadth of rectangle with space in between:");
96 scanf ("%f%f", &l, &b);
97 a = l*b;
98 printf ("Area of rectangle: %.3f square units", a);
99 }
100
101 else if (shape_no == 3) {
102 float r, pi, a;
103 printf ("Enter radius of circle:");
104 scanf ("%f", &r);
105 pi = 3.14;
106 a = pi * r * r;
107 printf ("Area of circle: %.3f square units", a);
108 }
109
110 else if (shape_no == 4) {
111 float h, b, a;
112 printf ("Enter base and height of triangle with a space in between:");
113 scanf ("%f%f", &b, &h);
114 }
```

Terminal Output:

```
Please enter the serial number for any function you want to use:
1. Basic arithmetic calculator for 2 values
2. Finding the largest of 3 values
3. Area calculator
Enter choice: 3
You have selected the function 'Area calculator'. Please select any of the following shapes:
1. Square
2. Rectangle
3. Circle
4. Triangle
Enter shape number:2
Enter length and breadth of rectangle with space in between:5 6
Area of rectangle: 30.000 square units[1] + Done
/usr/bin/gdb --interpreter=mi --tty=${DbgTerm} 0</tmp/Microsoft-MIEngine-In-fxn4sqlo.yex" l>/tmp/Microsoft-MIEngine-Out-fzp2tsck.gxx"
sid@sid-Lenovo-YOGA-520-14IKB:~/Code/ct1_project$
```

FLOWCHART



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GitHub: <https://github.com/sr6865/github-assignment-ct1>