

CE4703 Assignment Unit 2

SW Development Practises & Tools

1 Task

Your task is to write an application for the following geometric calculations:

1.1 Two-Dimensional Shapes

- Square with side s :
Area $A = s^2$
Perimeter $P = 4s$
- Rectangle with sides l, w :
Area $A = lw$
Perimeter $P = 2l + 2w$
- Circle with radius r
Area $A = \pi r^2$
Circumference $C = 2\pi r$
- Triangle with base b and height h and sides a, b, c
Area $A = \frac{bh}{2}$
Perimeter $P = a + b + c$
- Parallelogram with base b , height h and side a
Area $A = bh$
Perimeter $P = 2a + 2b$

1.2 Three-Dimensional Shapes

- Cube with side s :
Surface Area $A = 6s^2$
Volume $V = s^3$
- Rectangular Prism with length s , height h , width w :
Surface Area $A = 2lw + 2lh + 2wh$
Volume $V = lwh$

- Sphere with radius r :
Surface Area $A = 4\pi r^2$
Volume $V = \frac{4\pi r^3}{3}$
- Right Circular Cylinder with radius r and height h :
Surface Area $A = 2\pi r h + 2\pi r^2$
Volume $V = \pi r^2 h$

1.3 Features

Follow the “Steps to Develop Large Applications” as discussed in the lecture (slide 56 Unit 2) to develop your application. It must have the following features:

- Distributed over suitable files (must be more than one) - your module identification should be reflected in the file structure.
- Declarations for each module should be available in separate header files.
- Header files must have include guards.
- Your program must define and use at least one pre-processor macro with parameter(s).
- Suitable text-based user interface in `main()`.
- You must provide your own Makefile (this must be written by yourself - no IDE generated Makefile will be accepted). Your Makefile must have the following features:
 - Use separate targets for compilation and linking.
 - Use at least one make file variable.
 - Provide a “clean” target that removes temporary files, object files and executables created by this Makefile.
 - Does **not use any implicit rules**.
 - Running make without a target should compile & link your application and also automatically execute your application.

2 Marking

The following items will impact on your marks:

- Does your solution perform the required actions correctly?
- Make sure to declare all your functions at the beginning of your source file.
- Overall quality of your code (including choice of names for variables and structure of your code).
- Do not use global variables - unless you provide a very good justification why global variables make sense, you will lose marks!
- Quality of your comments (cf. slide “Commenting Guidelines” on page 102 in Unit 1). Lack of comments will result in very significant loss of marks!!!
- Quality of your code format - follow K&R Coding Style as discussed in lecture (slides 100-101 in Unit 1).
- Presence of warnings will cause loss of marks.
- If your code **does not compile** (i.e. the gcc command will end with a compile time error) you will receive 0 marks!
- Thus, if you are not able to finish any part of the exercise successfully, comment out the sections of code that cause the problem (don't delete it - I might find some merit in it and you may gain some marks).

The marking scheme for this assignment is as follows:

Feature	Marks
Calculations correct	2
Suitable File Structure	2
Header Files as requested	2
Suitable interface in <code>main()</code>	2
Makefile as requested	2
Penalties:	
Insufficient comments:	Up to -30%
Poor code format:	Up to -30%
Bad coding style (e.g. using <code>goto</code> or global variables)	Up to -50%
Total	10

3 Deadline & Submission

Deadline for submission is 9am on 20.11.2018.

Please submit your solution as a single tar archive via the SULIS page. Your archive should contain all source files (.c), all header files (.h) and your **make** file (Makefile).

To create a tar archive, use the command:

```
tar cvf projectArchive.tar projectFolder
```

where `projectArchive.tar` is the name you want to give to your archive and `projectFolder` is the directory that contains **all** your deliverables (you can enter “`man tar`” to read information about tar - press ‘q’ to quit). Please make sure:

- **not** to compress you archive, as this sometimes causes problem when extracting on other machines (do not use the ‘z’ option or similar).
- you are using tar and no other archiving tool.
- you are using a “.tar” extension.
- your archieve contains **all** deliverables - I cannot accept any modifications to your submission after the deadline.

4 Q & A Forum

If you have any queries regarding this exercise, please post them in the Assignment 2 Q & A Forum on the module’s SULIS page.