Getting Started

Writing and Running a C Program

How to Write and Run A C-Program

- To develop and run a C program, you may use an Integrated Development Environment (IDE) tool, such as Visual Studio on PCs, and Xcode on Mac computers.
- Or just edit your code in a text-editor such as Notepad++. Then, compile and run it from a commandline in a terminal window.
- Here are the steps to follow if you want to run your program using a text editor:
  - Use a Text Editor like Notepad++ to edit your program
  - Save it with the `.c` extension. For example: myFirstficfiprogram.cpp
  - Compile it with the g++ command.

    ```
    gcc -Wall myFirstficfiprogram.c
    ```

  - Run the the executable file which its name by default is `a.exe`

    ```
    ./a.exe
    ```

- Another alternative that works for Mac computers and PCs is using Geany.
  - Geany is a GUI text editor which also, includes a basic lightweight IDE features.
  - You may download Geany from: https://www.geany.org

Similarities/Differences Between C, C++, and Java Languages

Similarities Amongst Three Languages

- Many of the basic constructs amongst C, C++ and Java are similar:
  - Rules for naming variables
  - Selection structures: if … else statements
  - Switch statements
  - Repetition structures: while loop, do loop, for loop
  - Jump statements: break, continue
  - General format of function: rules for the function name, arguments, and return value(s).
  - Most of the operators:
    - Arithmetic operators: addition, subtraction, multiplication, modulus, division: +, -, *, %, /
    - Relational operators: <, >, <=, >=, ==, etc.
    - Logical operators: &&, ||, !
    - Assignment and updating operators: =, +=, -=, *=, /=, %=
    - Increment and decrement operators: ++, -- (prefix and post-fix)

Differences Amongst Three languages

- Standard Input output. Every language has different method(s).
- Minor differences among some data type
- C and C++ doesn't support data type **byte**
- C is a procedural programming language and doesn't support **class** type.
- C doesn't support any library class such as: String (in Java), string (in C++), vector (in C++), etc.
- C uses different syntax for dynamic allocation of memory, C and C++ don't support garbage collection approach Java, and uses different syntax for memory de-allocation.
- The three languages use different methods and libraries for File I/O
- The three languages use more or less different syntax to **import** or **include** files necessary to use library functions or data type.
- While C and C++ support pointer, Java doesn't.
- There are more difference that we will discuss as we go.

Anatomy of a Simple C Program

Problem Statement

- Let's write another simple program that interacts with the user: Asks the user to enter the length in feet and displays the value of the length in inches.
- Here is a sample run of the program on the screen, when user enters 10 for the length:

```
Enter the length in feet:  10
10 feet equals 120 inches
```

- Now let's review the organization and the anatomy of the program on the next slide

Anatomy of a Simple Computer Program

```
// File: convertFeetToInch.c
// My first C program

#include <stdio.h>

int main (void)
{
   int lengthft;
   int lengthinches;

   const int conversionfactor = 12;

   printf("Enter the length in feet:");

   scanf("%d", &lengthft);

   lengthinches = lengthft * conversionfactor;

   printf( "%d feet equals: %d.\n", lengthft, lengthinches);

   return 0;
}
```

comments

Including standard library info

Variables declaration

Constant declaration

Prompt for input

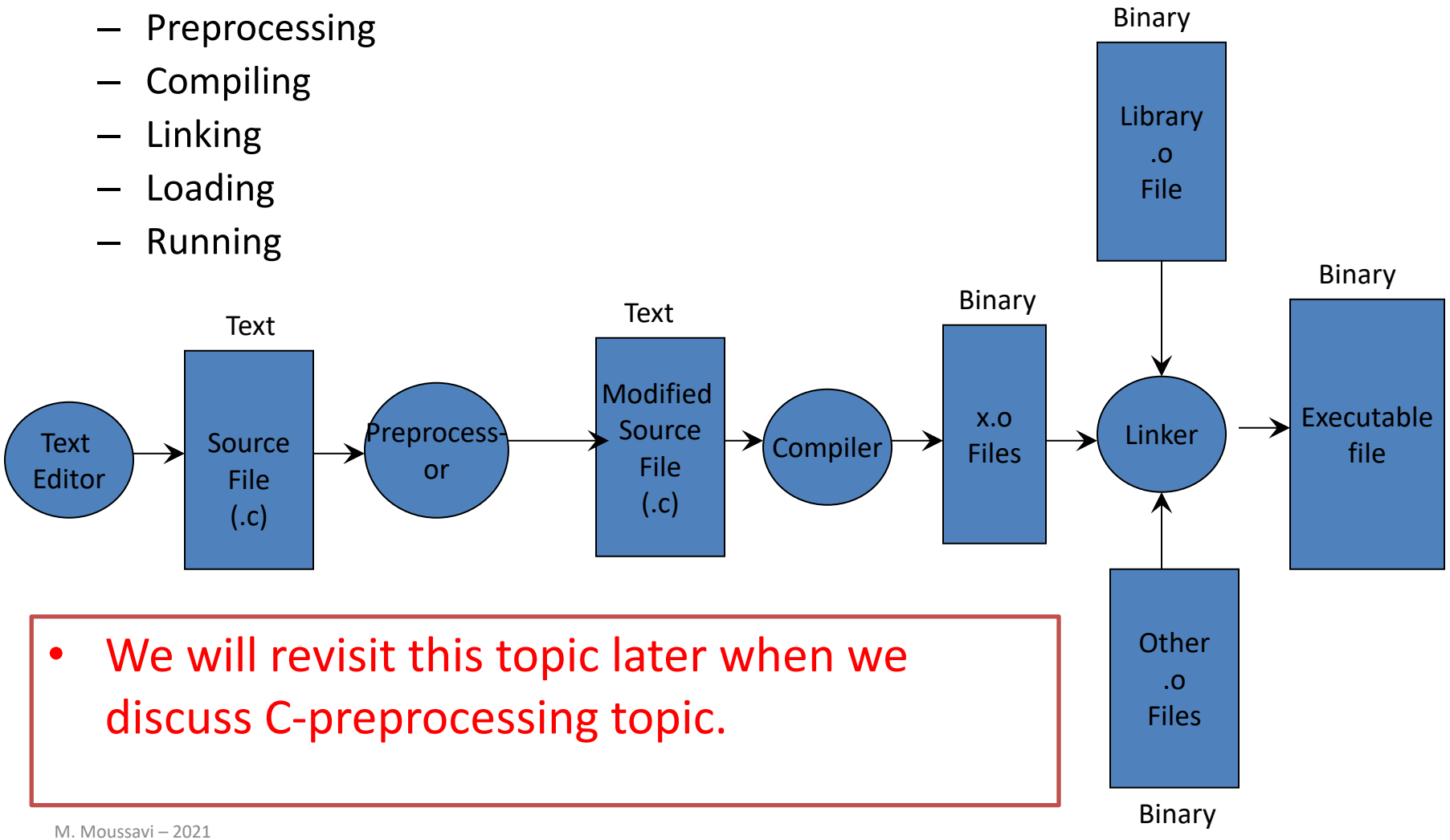
Read user input from keyboard

Arithmetic expression

Quick Look at the Development Process

Program Development

- The process of developing a program and running an executable file consists of several operations:
  - Editing
  - Preprocessing
  - Compiling
  - Linking
  - Loading
  - Running



- We will revisit this topic later when we discuss C-preprocessing topic.

A Simple Exercise/Homework

- Write a C program that prompts the user to enter two integer numbers and displays the sum of two integers.

Solution: Program Edited in Notepad++

C:\Users\moussam\lab1\myFirst_C_Program.c - Notepad++

File Edit Search View Encoding Language Settings Macro Run Plugins Window ? X

myFirst_C_Program.c

```
1  #include <stdio.h>
2
3  int main(void)
4  {
5      int a, b;
6      printf("please enter an integer number: ");
7      scanf("%d", &a);
8      printf("The value of %d is stored in a.", a);
9
10     printf("\npplease enter another integer number: ");
11     scanf("%d", &b);
12     printf("The value of %d is stored in b.\n", b);
13
14     printf("Sum of two numbers %d and %d is %d", a, b, a+b);
15     return 0;
16 }
```

Preprocessor includes the content of stdio.h

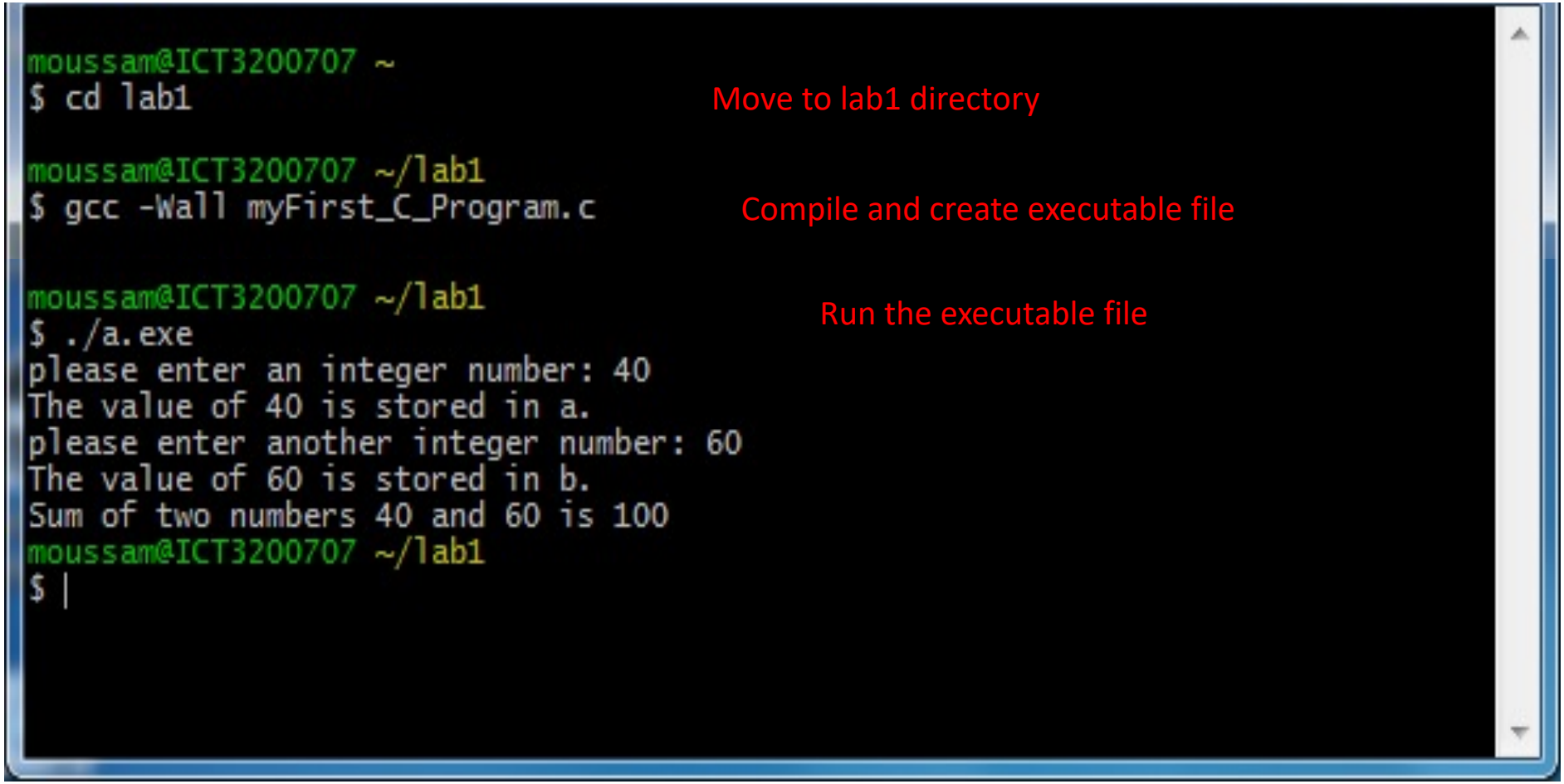
Local variable declaration

Call to the library function

length : 365 lines Ln : 7 Col : 21 Sel : 0 | 0 Dos\Windows ANSI as UTF-8 INS

Compiled and Executed from Commandline

- Assume the source file that was edited in Notepad++, was saved as `myFirstProgram.c` in the directory called `lab1`. The following figure show how the program was complied and ran in our computer lab in the ICT building, before COVID 19.



Running C Programs on Mac

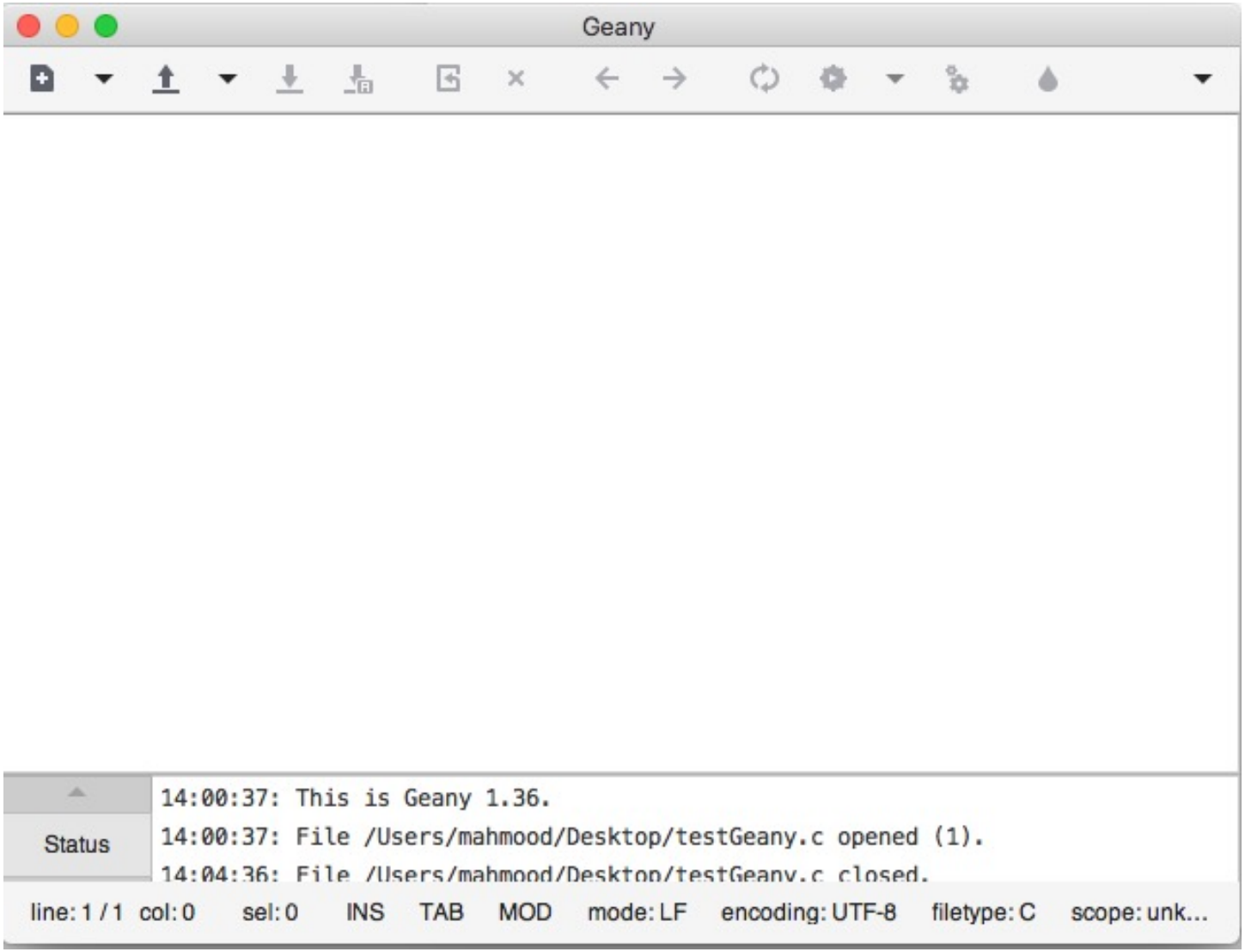
Download XCode

- Xcode is the application Apple supplies to developers who want to create software for macOS or iOS.
- It can be found using the macOS App Store.
- Xcode is free, but it's huge! Depending on the speed of your internet connection, it may take over and hour to download and install it. It also occupies several GB of your disk space.
- Even if you are not going to use Xcode as your Integrated Development Environment you need to install it to be able to use C and C++ compilers such as: gcc, g++, or clang.

Screenshots of Using Geany Editor on a Mac Computer

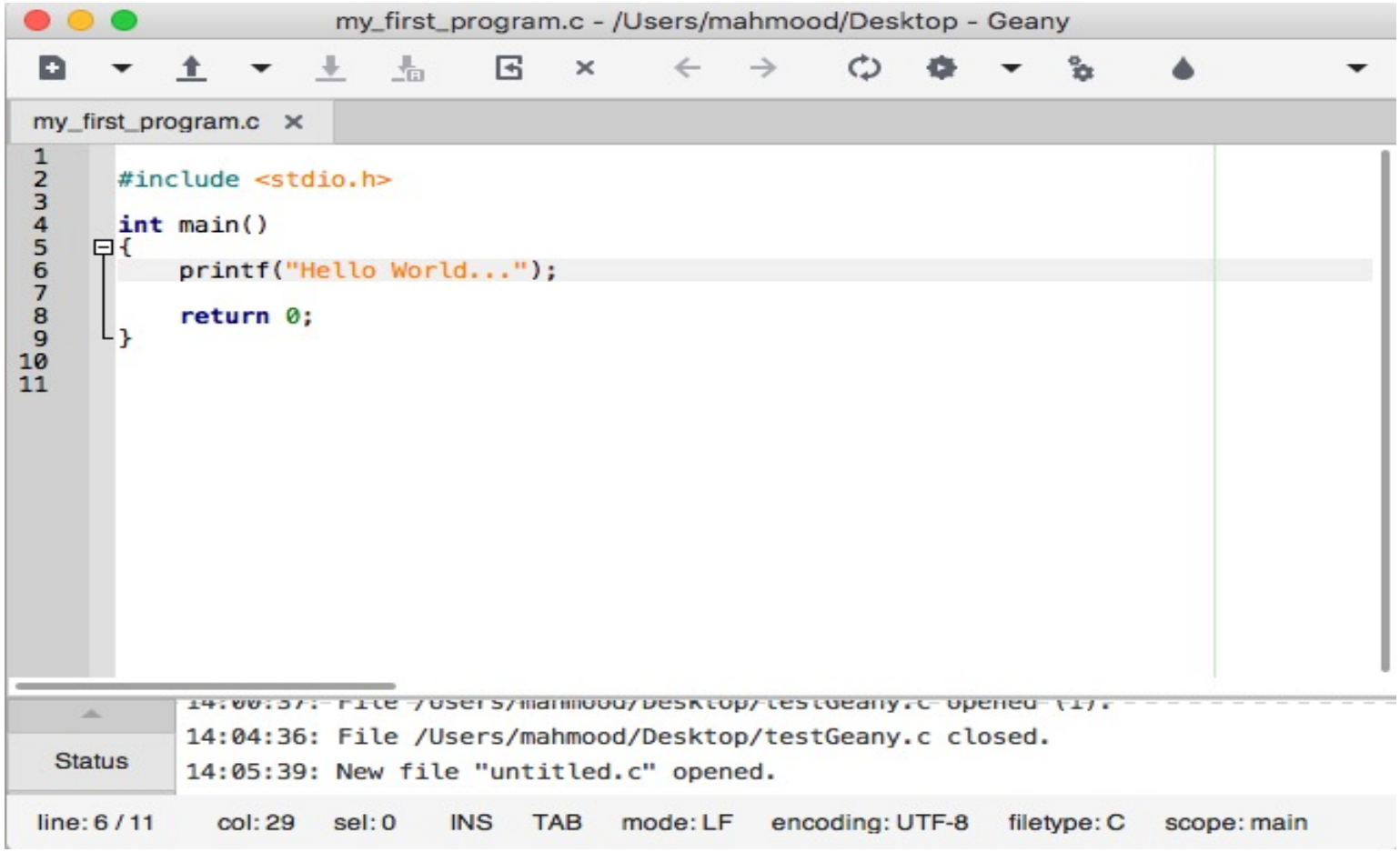
Steps to Compile and Run a C Program

- Run Geany Editor:



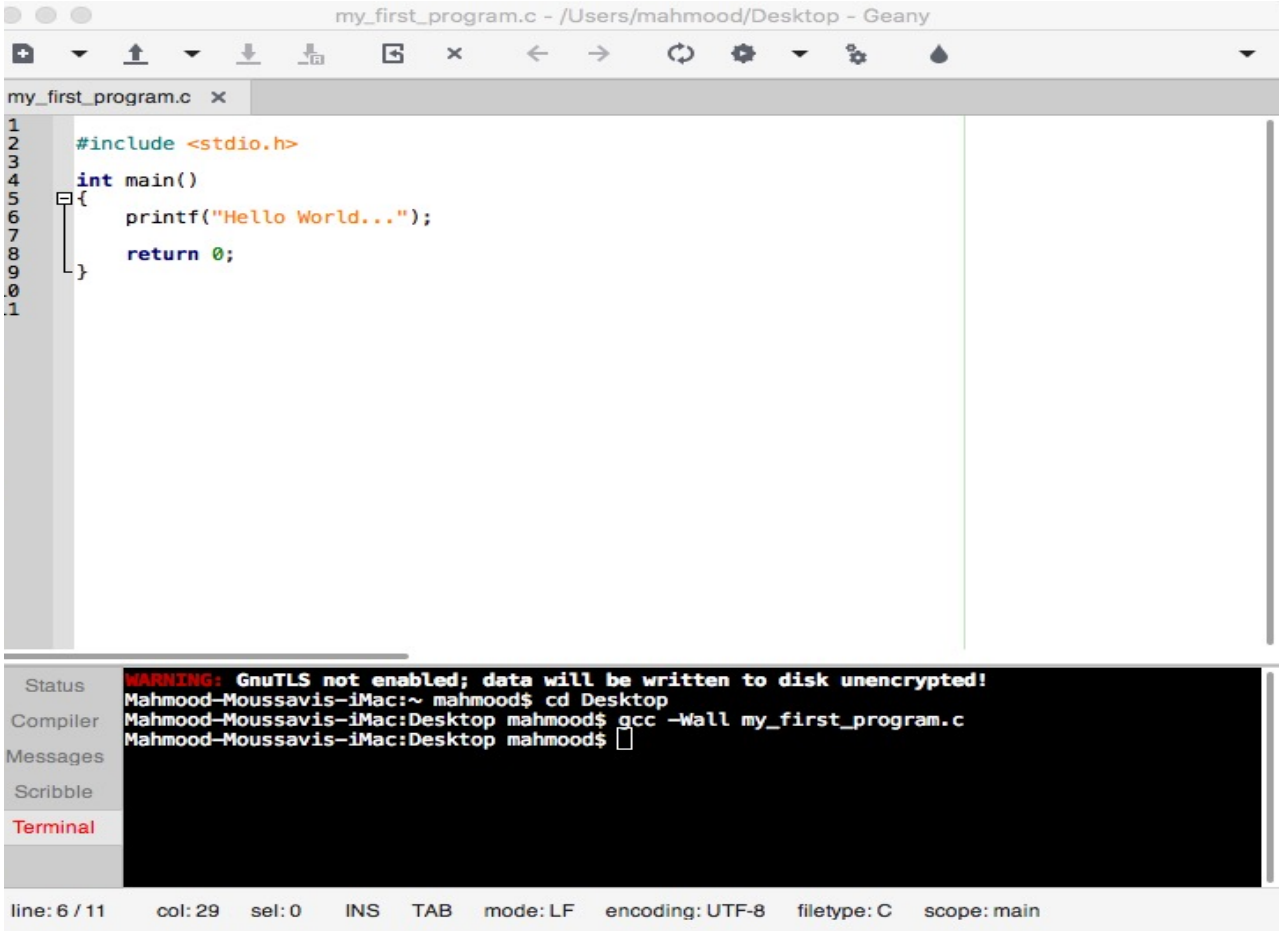
Edit your C code

- Type your C code in the editing area of your editor, and save with a file name extension .c. For example **my_first_program.c**



Compile your program

- Using appropriate commands navigate to the directory that your file is saved into it. If you are not familiar with the terminal commands on your Windows or Mac computer a very short list of the commands that you may need for this course is given in the next slide.
  - For example, lets assume your file is saved in your director: “Desktop”
- Now at the lower pane of your compiler, select terminal, and on the command line enter gcc command as shown in the following figure:



Equivalency of Windows and Mac/Linux Command:
https://www.lemoda.net/windows/windows2unix/windows2unix.html]

Windows command	Unix command	Notes
cd	**cd**	On Windows, **cd** alone prints the current directory, but on Unix **cd** alone returns the user to his home directory.
cd	**pwd**	On Windows, **cd** alone prints the current directory.
cls	**clear** **Control-L**	Clear the terminal screen
copy	**cp**	
date **time**	**date**	**Date** on Unix prints the current date and time. **Date** and **time** on Windows print the date and time respectively, and prompt for a new date or time.
del	**rm**	
deltree	**rm -r**	Recursively deletes entire directory tree
dir	**ls**	"dir" also works on some versions of Unix.
help	**man**	"help" by itself prints all the commands
mkdir	**mkdir**	
rmdir	**rmdir**	
rmdir /s	**rm -r**	Windows has a y/n prompt. To get the prompt with Unix, use **rm -i**. The **i** means "interactive".

Run your C program

- Assuming that there are no errors in your program, you can type the name of your executable file, which by default is a.out on Mac Computers to run your program. See the following figure: