

Compile and  
run!

```
darrell — -bash — 40x12
pascal:~ darrell$ cc -o hello hello.c
pascal:~ darrell$ ./hello
Hello, world!
pascal:~ darrell$
```

↑ Run

← Compile

printf()

Is just a function in the standard i/o library

- “%6.1f” is called a format string.
- It says: there is a floating point number, 6 characters wide, with one digit after the decimal place.

While loop is a top test loop

For loop is a top test loop

The initialization is explicit

## Declaring Variables

```
int main(void) {
    char *s, c;
    int i;
    float f;
    double d;

    s = "This is a string";
    c = 47; // This is a small integer
    i = 12345678; // This is a bigger integer
    f = 3.1415; // This is a floating point number
    d = 2.7182818284590452354; // This is more precise
}
```

- In C, you must declare a variable before you can use it.
- Declaring it means to specify its *type*.
- For now, we will be concerned with the scalar types:
  - char, int, and
  - float, and double.

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```
{
    float x = 1.61803; // Golden ratio
    {
        float y = 1.0 - x; // y is only here, but x is out there
    }
    {
        int x = 1962; // Both x and y exist only here
        int y = 1962 - 1967;
    }
}
```

Single quote for character

Double quote for strings

## COMPILATION PROCESS OF A C PROGRAM

The compiling process is a sequence of four phases. The input for each phase is the output of the previous phase.

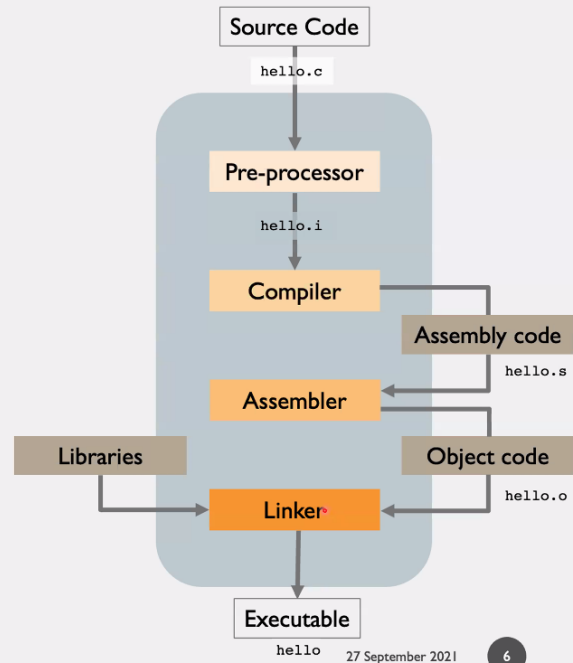
### 1. Pre-processor

- Including Macros, and the Macroprocessor

### 2. Compiler

### 3. Assembler

### 4. Linker



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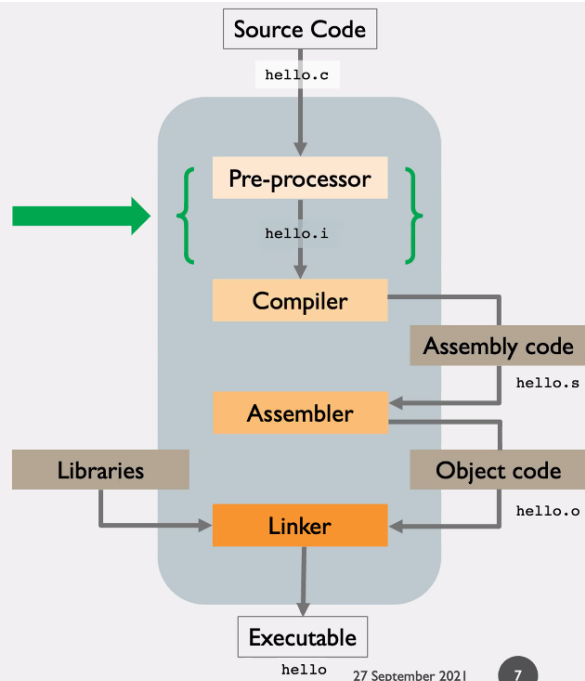
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## I. THE PRE-PROCESSOR (AND THE MACROPROCESSOR)

Source code is passed into preprocessor:

- Execute preprocessor directives, all beginning with a #
  - (Ex. #include, #ifndef, #endif, etc.)
- Include header files from other libraries
  - If header guards are used, include IFF the condition has been met
- Comments are removed
- Macroprocessor will replace each macro instruction with its corresponding definition
- Output is stored in intermediate file, hello.i, ready for the compiler
- Can be generated with gcc -E <FILE>.c



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The linker -> library

Loaders is in the operating system

Memory

Stack

Heap

Compilers vs interpreters

Compiler

A translator that takes a high level programming language, goes through a sequence of translations and outputs an executable

Translates entire program/code at once

Interpreter

A program that directly executes code without needing to compile

Translates program one line at a time

Compiler is faster

Gcc - default on Linux

Cc - Unix/linux environment variable that points to the default compiler

Clang - default on Mac and FreeBSD

Makefiles

The make utility automates the mundane aspects of building executables from source code

Make uses a specific file called a Makefile, which contains rules on how to build the executable

All slides belong to the professor