CSc 352
The C Preprocessor

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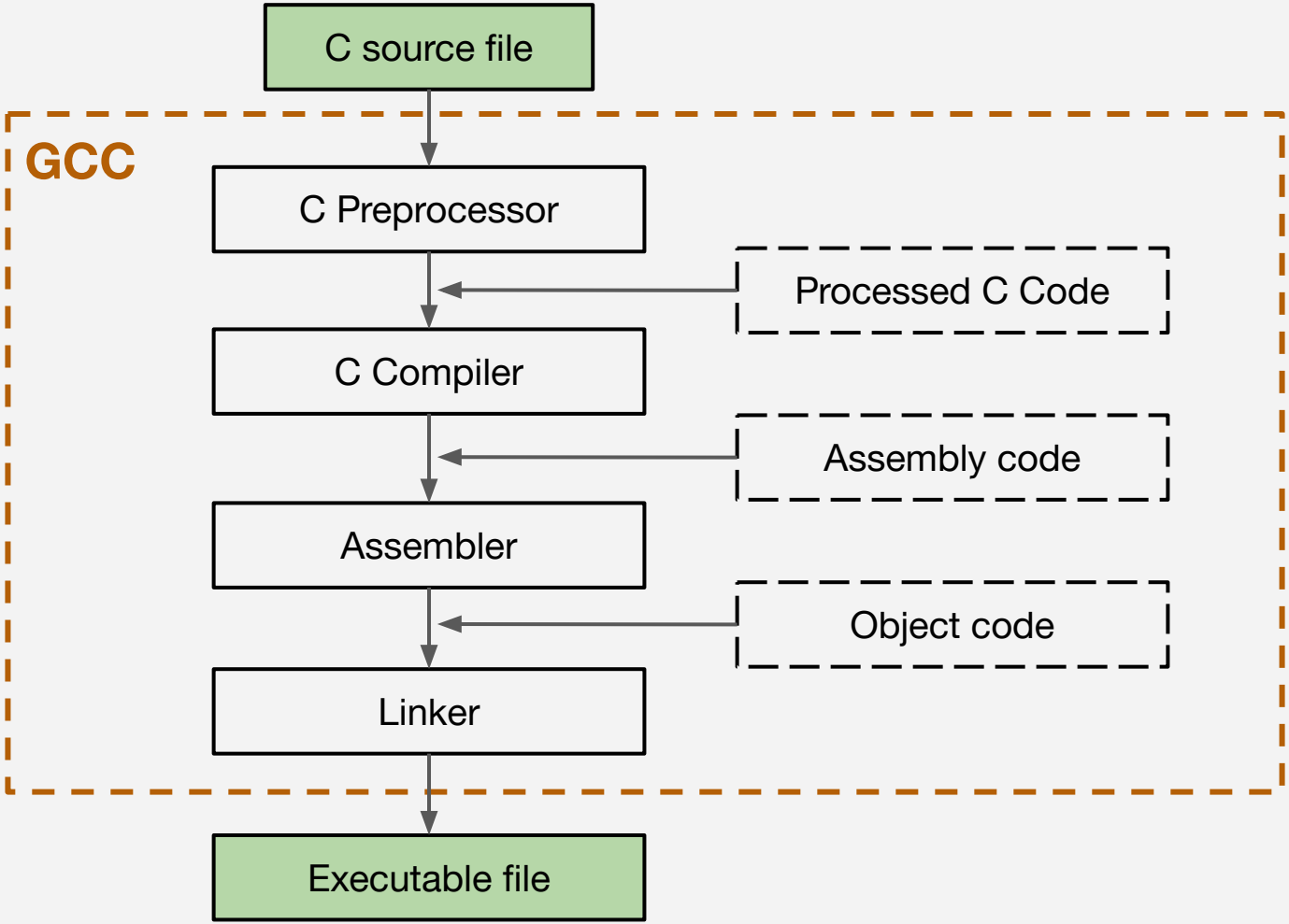
C source file
GCC
C Preprocessor
Processed C Code
C Compiler
Assembly code
Assembler
Object code
Linker
Executable file

The C Preprocessor

- A “mini” language that gives the programmer the ability to include other source files, conditionally include code, define literals, etc

- Many creative ways it can be used, but there are some common patterns

Some C Preprocessor Directives

```
#include
#define
#undef
#ifdef
#ifndef
#endif
#error
#pragma
```

Includes

- **`#include`** allows you to include (copy) code from one file into another
    - Use `<  >` for standard library files
    - Use `"  "` for files within the source code for your project
    - Operates recursively

Defines

- **`#define`** allows you to define keywords that can then be found and replaced throughout the source
    - Usefuls for constants, debug prints, repetitive sequences of code
    - Use **`\`** for multi-line constants
    - Can have parameters too!

Checking / Modifying Definitions

- **`#ifdef`** and **`#ifndef`** check if is a keyword is or is not defined currently
  - Can conditionally include code depending on answer
- **`#undef`** to un-define a previously defined keyword

  - Usefuls for constants, debug prints, repetitive sequences of code

  - Use **`\`** for multi-line constants

  - Can have parameters too!

Fix the program

- COPY the files in **`/tmp/352cptest`** to your home directory

```
$ cp -r /tmp/352cptest ~/
```

- Compile the code with **make**
- What do you see?
- How can you fix it using the preprocessor?

Implement Debug Define

- Implement a **DEBUG_PRINT** directive that prints out a debug line, only if **DEBUG_MODE** is enabled
- Write a makefile to have the option to build in **DEBUG_MODE** or not