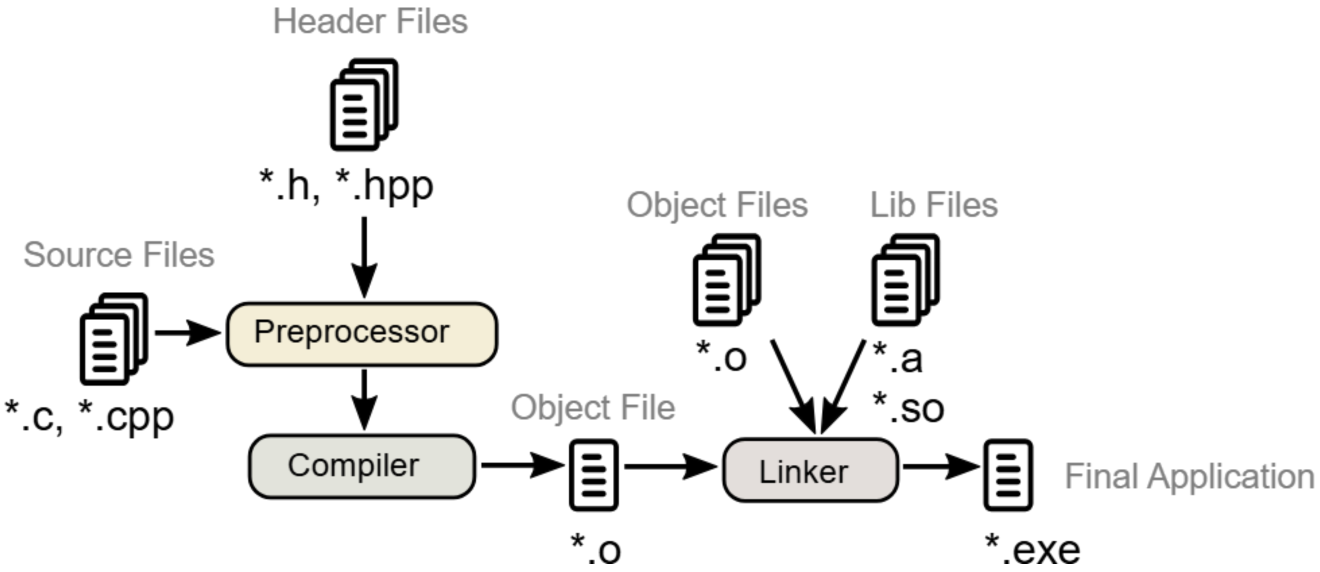
C++

1. C++ Build Process



As C++ programmers, we primarily work with source (.cpp) and header (.h) files during development. The build process consists of three main stages:

1. Preprocessing

- Processes all preprocessor directives (like `#include`, `#define`)
- Includes necessary header files from the file system
- Prepares the code in a ready-to-be-compiled form

2. Compilation

- Converts the preprocessed code into machine code
- Processes each source file separately
- Some compilers (like GCC) first generate assembly code before machine code

3. Linking

- Combines all compiled object files
- Incorporates precompiled object files and libraries
- Produces the final executable file ready for execution

This multi-stage process transforms our human-readable code into a program that can be run on a computer.

2. Hello World Program

```
#include <iostream>

int main() {
    std::cout << "Hello, World!" << std::endl;
    return 0;
}
```

Understanding the Components:

1. `#include <iostream>`

- Includes the Input-Output Stream library
- Provides essential I/O functionalities like `std::cout`, `std::cin`, and `std::cerr`
- Required for any program that needs to display output or read input

2. `std::` Namespace

- `std::` prefix indicates we're using elements from the C++ Standard Library namespace
- Helps avoid naming conflicts in larger programs
- Alternative approach: `using namespace std;` (though generally discouraged in larger codebases)

3. `return 0;` Statement

- Indicates successful program execution to the operating system
- Non-zero return values typically indicate errors
- In modern C++, `main()` implicitly returns 0 if no return statement is provided

Did you really think I would just type out cout << "Hello, World!"; like some beginner? Nah, I prefer to overanalyze every tiny detail and make sure you understand why we even say hello to the world in the first place! 😆