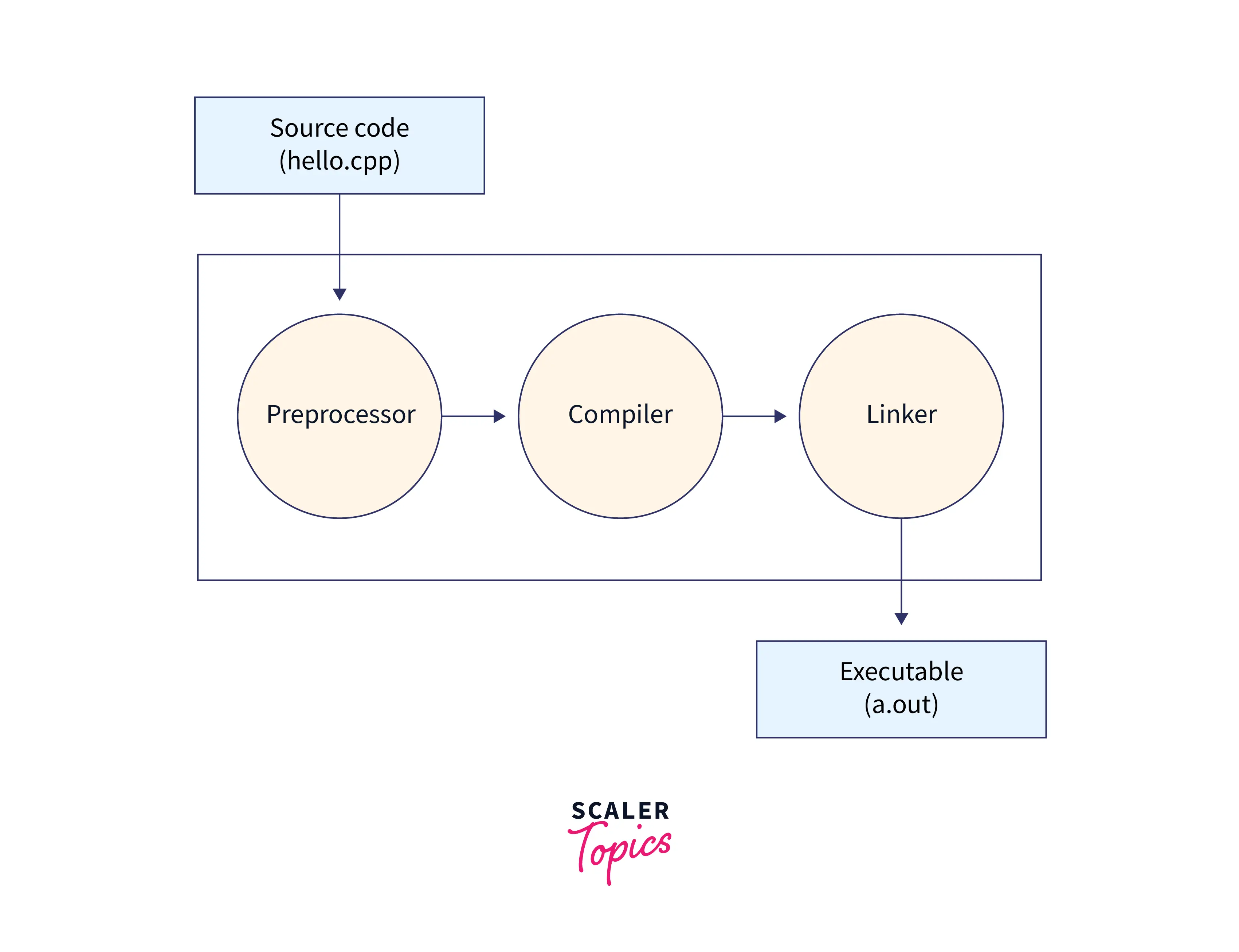
When we write code, we write it in a high-level language that machines can't understand, known as source code. The code that machines can understand & execute is in binary form (0's and 1's) and is known as machine code, object code, or executable code.

Translating source code (high-level language code) into machine-readable code consists of the following four processes.

1. Pre-processing the source code
2. Compiling the source code
3. Assembling the compiled file
4. Linking the object code file to create an executable file



**1. Source Code (hello.cpp):**

* This is the C++ code written by the programmer and saved in a file, typically with the extension .cpp. For example:

#include <iostream>

using namespace std;

int main() {

cout << "Hello, World!" << endl;

return 0;

}

* This source code is the input to the process.

**2. Preprocessor:**

* The preprocessor processes directives starting with #, such as #include and #define.
* Tasks of the preprocessor:
  + Includes header files (e.g., <iostream> is included in the code).
  + Expands macros (if any #define macros are present).
  + Removes comments from the code.
* The output is **preprocessed code**, ready for compilation.

**3. Compiler:**

* The compiler takes the preprocessed code and translates it into **object code** (low-level machine instructions).
* Object code is usually stored in a file with a .o or .obj extension.
* If there are syntax errors (like missing semicolons), the compiler will stop here and report the errors.

**4. Linker:**

* The linker combines one or more object files and links them with the necessary libraries (e.g., the C++ Standard Library).
* It resolves external references, such as function calls or global variables, and creates a single **executable file** (e.g., a.out on Linux or program.exe on Windows).

**5. Executable (a.out):**

* The final result is the executable file that can be run directly on the computer.
* When executed, the operating system loads the executable into memory and starts execution from the main() function.

**Summary of Flow:**

1. **Source Code (hello.cpp)** → Preprocessed by **Preprocessor**.
2. Preprocessed code → Compiled by the **Compiler** into Object Code.
3. Object Code → Linked by the **Linker** into an Executable (a.out).
4. **Executable** → Ready to run on the system.

This entire process ensures that the human-readable C++ code is converted into machine-executable instructions.