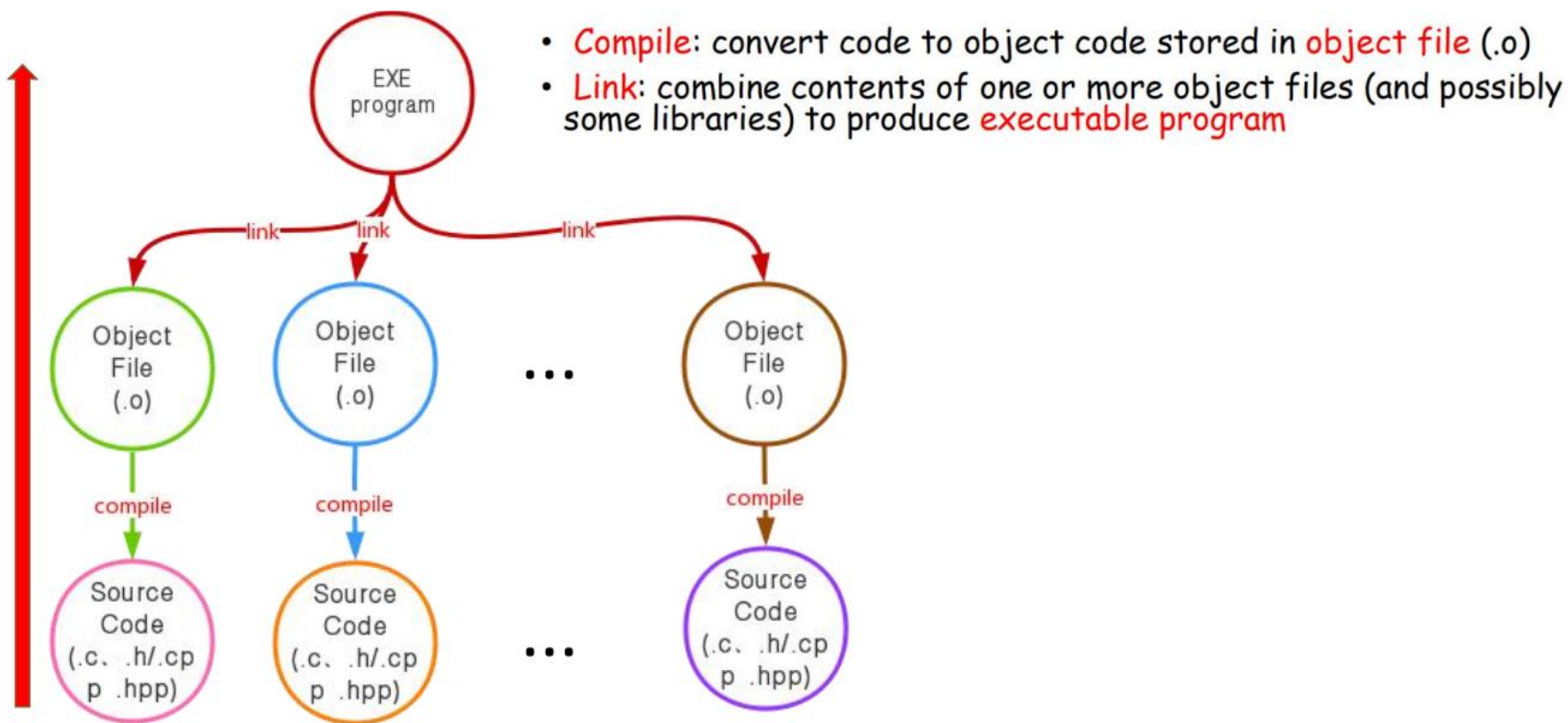




4 Compile, Link and Run C/C++ Programs

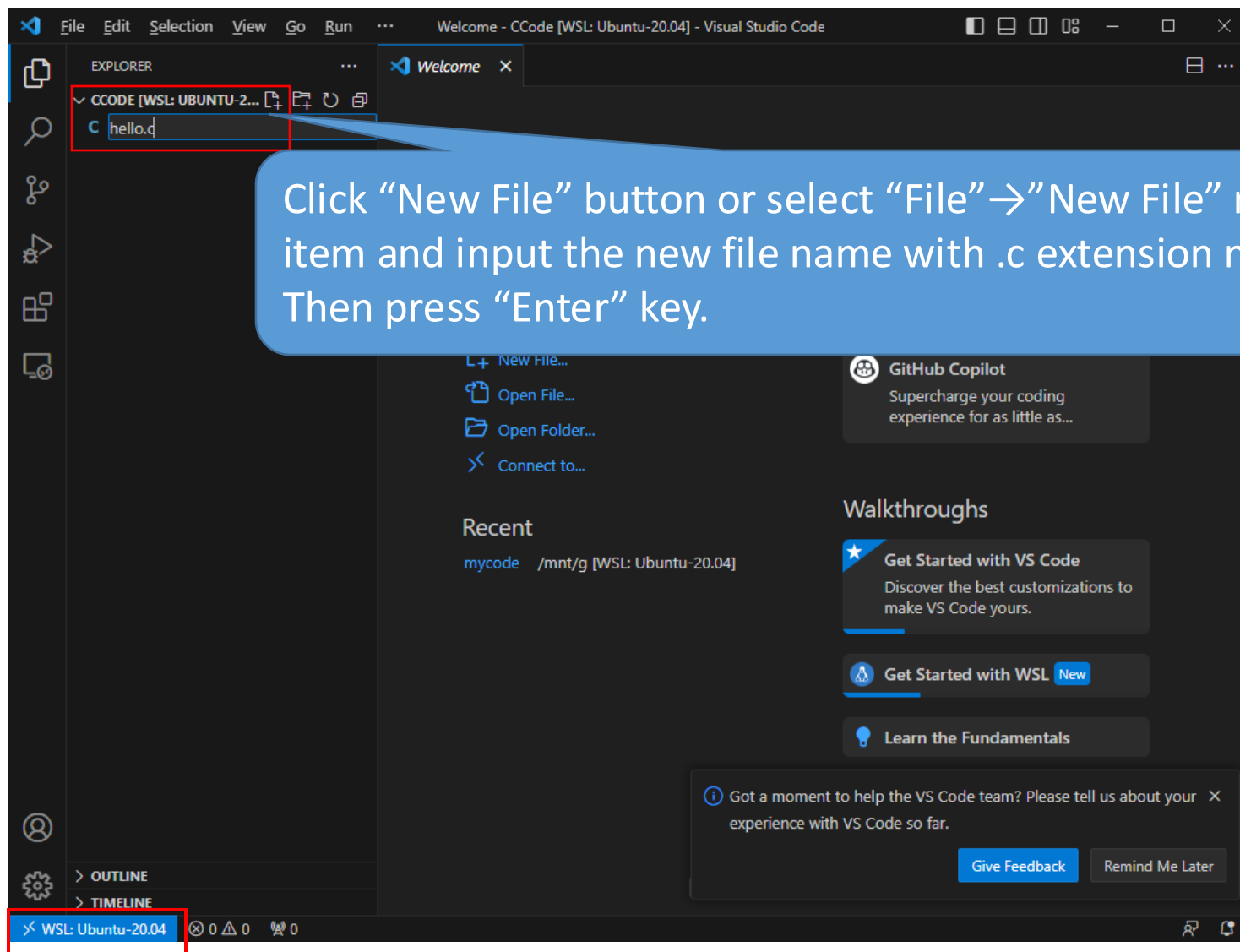
4.1 The program compilation process





4.2 Compile, Link and Run C programs

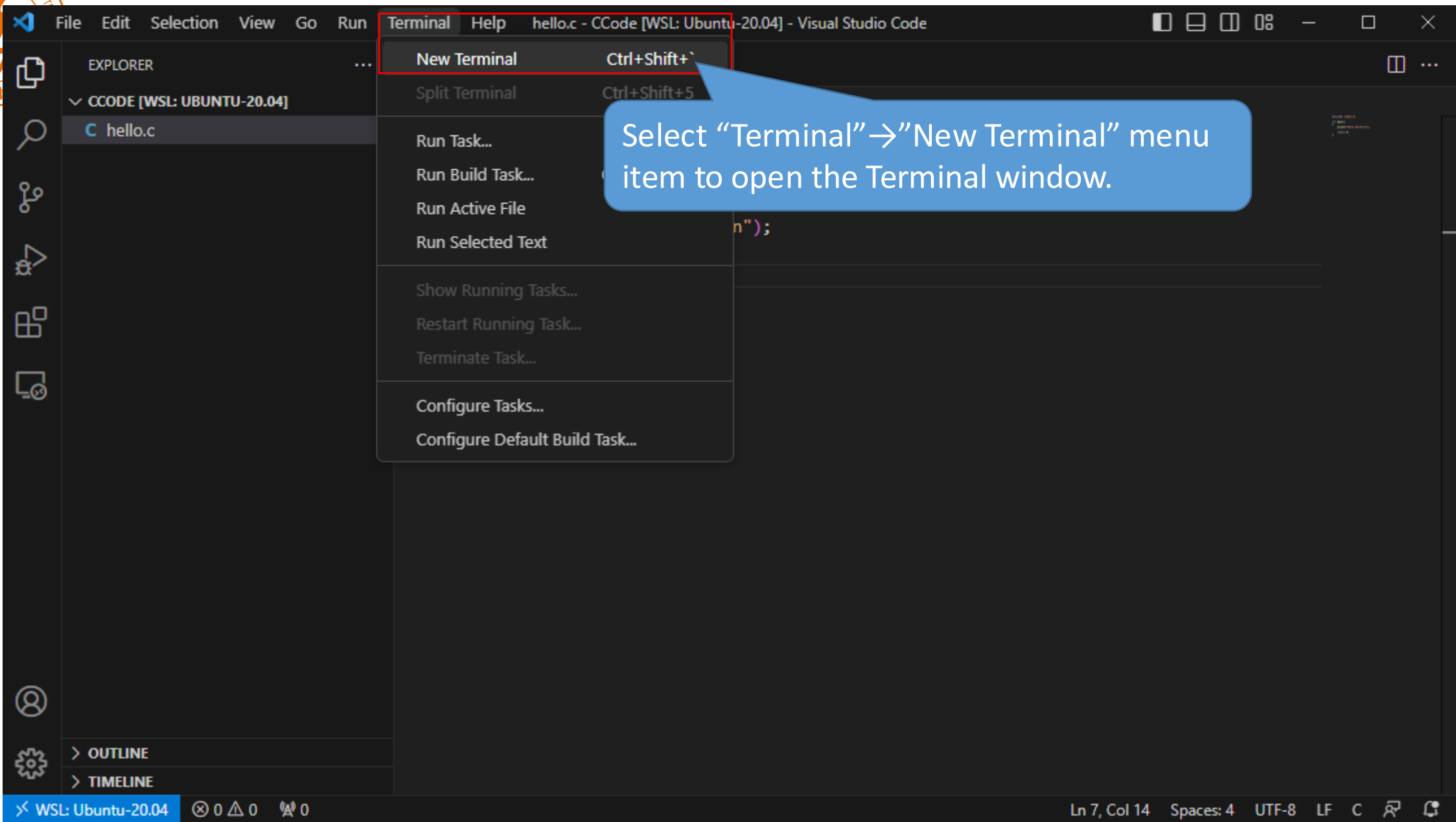
Compile/Link/Run a simple C program – hello.c



The image shows the Visual Studio Code editor interface. The title bar at the top reads "hello.c - CCode [WSL: Ubuntu-20.04] - Visual Studio Code". The Explorer sidebar on the left shows a project named "CCODE [WSL: UBUNTU-20.04]" with a file "C hello.c" selected. The main editor area shows the code for "hello.c":

```
1 #include <stdio.h>
2
3 int main()
4 {
5     printf("Hello World!\n");
6
7     return 0;
8 }
```

A red rectangle highlights the code block from line 1 to line 8. A blue callout bubble points to the "hello.c" tab, which has a white dot indicating it is the active file. The callout bubble contains the text: "Input your code in the new file and save it by Ctrl+s or select 'File'→'Save' menu item." The status bar at the bottom shows "WSL: Ubuntu-20.04", "0 errors", "0 warnings", and "0 info". The current cursor position is "Ln 7, Col 14", with "Spaces: 4", "UTF-8", "LF", and "C" encoding/line ending settings.





Use **gcc** to compile the .c file.

EXPLORER

CCODE [WSL: UBUNTU-20.04]

hello.c

hello.c

```
1 #include <stdio.h>
2
3 int main()
4 {
5     printf("Hello World!\n");
6
7     return 0;
8 }
```

PROBLEMS

OUTPUT

DEBUG CONSOLE

TERMINAL

PORTS

bash - CCode

liao@DESKTOP-00C4F37:/mnt/e/CCode\$ gcc -c hello.c
liao@DESKTOP-00C4F37:/mnt/e/CCode\$ ls
hello.c hello.o
liao@DESKTOP-00C4F37:/mnt/e/CCode\$ gcc hello.o -o hello
liao@DESKTOP-00C4F37:/mnt/e/CCode\$ ls
hello hello.c hello.o
liao@DESKTOP-00C4F37:/mnt/e/CCode\$./hello
Hello World!
liao@DESKTOP-00C4F37:/mnt/e/CCode\$

OUTLINE

TIMELINE

WSL: Ubuntu-20.04

Ln 7, Col 14 Spaces: 4 UTF-8 LF C

compile

link

run

The output



The default output executable file is called “a.exe”(Windows) or “a.out”(Unix and Mac OS) if you don’t specify the name in compiling and linking step.

```
File Edit Selection View Go Run Terminal Help hello.c - CCode [WSL: Ubuntu-20.04] - Visual Studio Code

EXPLORER
CCODE [WSL: UBUNTU-20.04]
  hello
  C hello.c
  hello.o

C hello.c
1 #include <stdio.h>
2
3 int main()
4 {
5     printf("Hello World!\n");
6
7     return 0;
8 }

TERMINAL
bash - CCode
liao@DESKTOP-00C4F37:/mnt/e/CCode$ gcc -c hello.c
liao@DESKTOP-00C4F37:/mnt/e/CCode$ ls
hello.c hello.o
liao@DESKTOP-00C4F37:/mnt/e/CCode$ gcc hello.o -o hello
liao@DESKTOP-00C4F37:/mnt/e/CCode$ ls
hello hello.c hello.o
liao@DESKTOP-00C4F37:/mnt/e/CCode$ ./hello
Hello World!
liao@DESKTOP-00C4F37:/mnt/e/CCode$ gcc hello.c
liao@DESKTOP-00C4F37:/mnt/e/CCode$ ls
a.out hello hello.c hello.o
liao@DESKTOP-00C4F37:/mnt/e/CCode$ ./a.out
Hello World!
liao@DESKTOP-00C4F37:/mnt/e/CCode$
```

The output

compile and link

run



4.3 Compile, Link and Run C++ programs

Compile/Link/Run a simple C++ program – helloworld.cpp

The screenshot shows the Visual Studio Code interface with the following components:

- EXPLORER:** The left sidebar shows the file explorer. A red box highlights the "New Folder" button (represented by a folder icon with a plus sign) in the top right corner of the explorer. A blue callout bubble points to this button with the text: "Click 'New Folder' button to create a new folder in the current directory and input the folder name."
- Editor:** The main editor area shows a file named "hello.c" with the following content:

```
1 #include <stdio.h>
```
- TERMINAL:** The bottom panel shows the terminal output for the compilation and execution of the program:

```
lia@DESKTOP-00C4F37:/mnt/e/CCode$ gcc -c hello.c
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ls
hello.c hello.o
lia@DESKTOP-00C4F37:/mnt/e/CCode$ gcc hello.o -o hello
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ls
hello hello.c hello.o
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ./hello
Hello World!
lia@DESKTOP-00C4F37:/mnt/e/CCode$ gcc hello.c
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ls
a.out hello hello.c hello.o
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ./a.out
Hello World!
lia@DESKTOP-00C4F37:/mnt/e/CCode$
```



File Edit Selection View Go Run Terminal Help

hello.c - CCode [WSL: Ubuntu-20.04] - Visual Studio Code

EXPLORER

CCODE [WSL: UBUNTU-2...]

- CPP
 - helloworld.cpp
- a.out
- hello
- hello.c
- hello.o

Welcome

hello.c

```
1 #include <stdio.h>
2
3 int main()
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

bash - CCode

```
lia@DESKTOP-00C4F37:/mnt/e/CCode$ gcc -c hello.c
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ls
hello.c hello.o
lia@DESKTOP-00C4F37:/mnt/e/CCode$ gcc hello.o -o hello
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ls
hello hello.c hello.o
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ./hello
Hello World!
lia@DESKTOP-00C4F37:/mnt/e/CCode$ gcc hello.c
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ls
a.out hello hello.c hello.o
lia@DESKTOP-00C4F37:/mnt/e/CCode$ ./a.out
Hello World!
lia@DESKTOP-00C4F37:/mnt/e/CCode$
```

> OUTLINE

> TIMELINE

> WSL: Ubuntu-20.04

Ln 7, Col 14 Spaces: 4 UTF-8 LF C

Click "New File" button and input the file name with .cpp extension name in the current folder.



File Edit Selection View Go Run

helloworld.cpp - CCode [WSL: Ubuntu-20.04] - Visual Studio Code

EXPLORERCPP helloworld.cppa.outhellohello.chello.o

helloworld.cpp

1#include <iostream>
2using namespace std;
3
4int main()
5{
6cout << "Hello World!!!" << endl;
7
8return 0;
9}

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

bash - CCode

liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$ gcc -c hello.c
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$ ls
hello.c hello.o
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$ gcc hello.o -o hello
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$ ls
hello hello.c hello.o
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$./hello
Hello World!
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$ gcc hello.c
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$ ls
a.out hello hello.c hello.o
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$./a.out
Hello World!
liaoo@DESKTOP-00C4F37:/mnt/e/CCode\$ clear

WSL: Ubuntu-20.04

Input your code in the file .

Input "clear" command to delete all the commands.



You need to use **g++** to compile C++ program. The **-o** option is used to specify the output file name.

```
helloworld.cpp - CCode [WSL: Ubuntu-20.04] - Visual Studio Code

CPP > helloworld.cpp
1  #include <iostream>
2  using namespace std;
3
4  int main()
5  {
6      cout << "Hello World!!!" << endl;
7
8      return 0;
9  }
```

Terminal Output:

```
lia@DESKTOP-OOC4F37:/mnt/e/CCode$ cd CPP
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ g++ -c helloworld.cpp
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ ls
helloworld.cpp helloworld.o
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ g++ -o helloworld helloworld.o
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ ls
helloworld helloworld.cpp helloworld.o
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ ./helloworld
Hello World!!!
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ g++ helloworld.cpp
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ ls
a.out helloworld helloworld.cpp helloworld.o
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ ./a.out
Hello World!!!
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ g++ -o helloworld2 helloworld.cpp
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ ls
a.out helloworld helloworld.cpp helloworld.o helloworld2
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$ ./helloworld2
Hello World!!!
lia@DESKTOP-OOC4F37:/mnt/e/CCode/CPP$
```

Annotations:

- compile**: points to `g++ -c helloworld.cpp`
- link**: points to `g++ -o helloworld helloworld.o`
- run**: points to `./helloworld`
- compile and link**: points to `g++ helloworld.cpp`
- run**: points to `./a.out`
- compile and link**: points to `g++ -o helloworld2 helloworld.cpp`
- run**: points to `./helloworld2`

Callouts:

- The output: points to `Hello World!!!` (first instance)
- The output: points to `Hello World!!!` (second instance)
- The output: points to `Hello World!!!` (third instance)