南方科技大学
SOUTHERN UNIVERSITY OF SCIENCE AND TECHNOLOGY

C/C++ Program Design

Lab 1, environment configuration

廖琪梅, 王大兴, 于仕琪

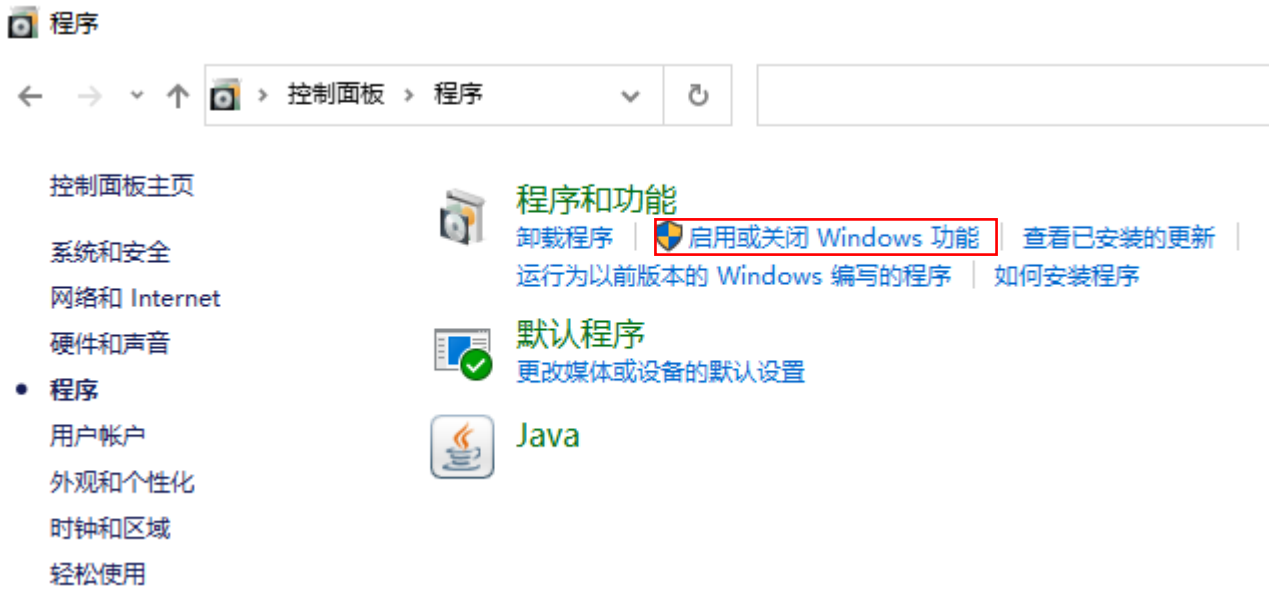
Environment Configuration

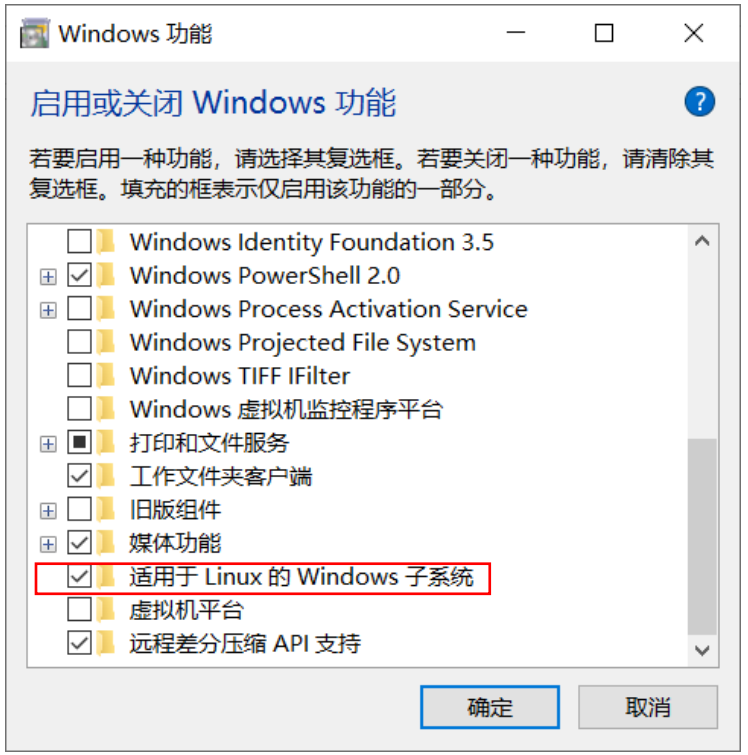
- Download and install GCC on Windows 10 (Based on Windows Subsystem for Linux)
- Download and install LLVM on macOS
- Download and install the editor (VSCode)
- Compile, link and run C/C++ programs
- Set output format

1 Download and install GCC on Windows 10 (Based on WSL)

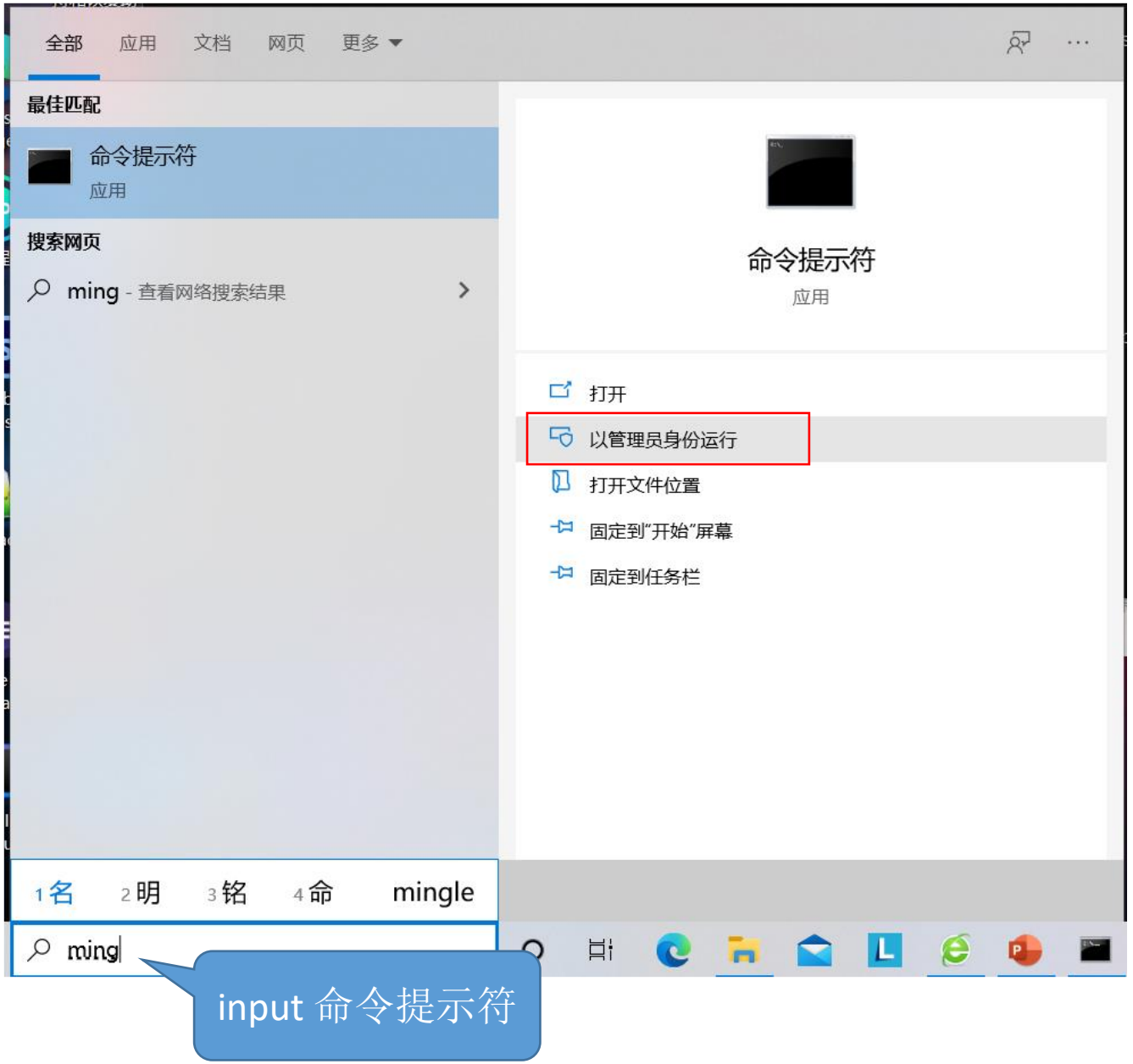
1.1 Install WSL on Windows 10

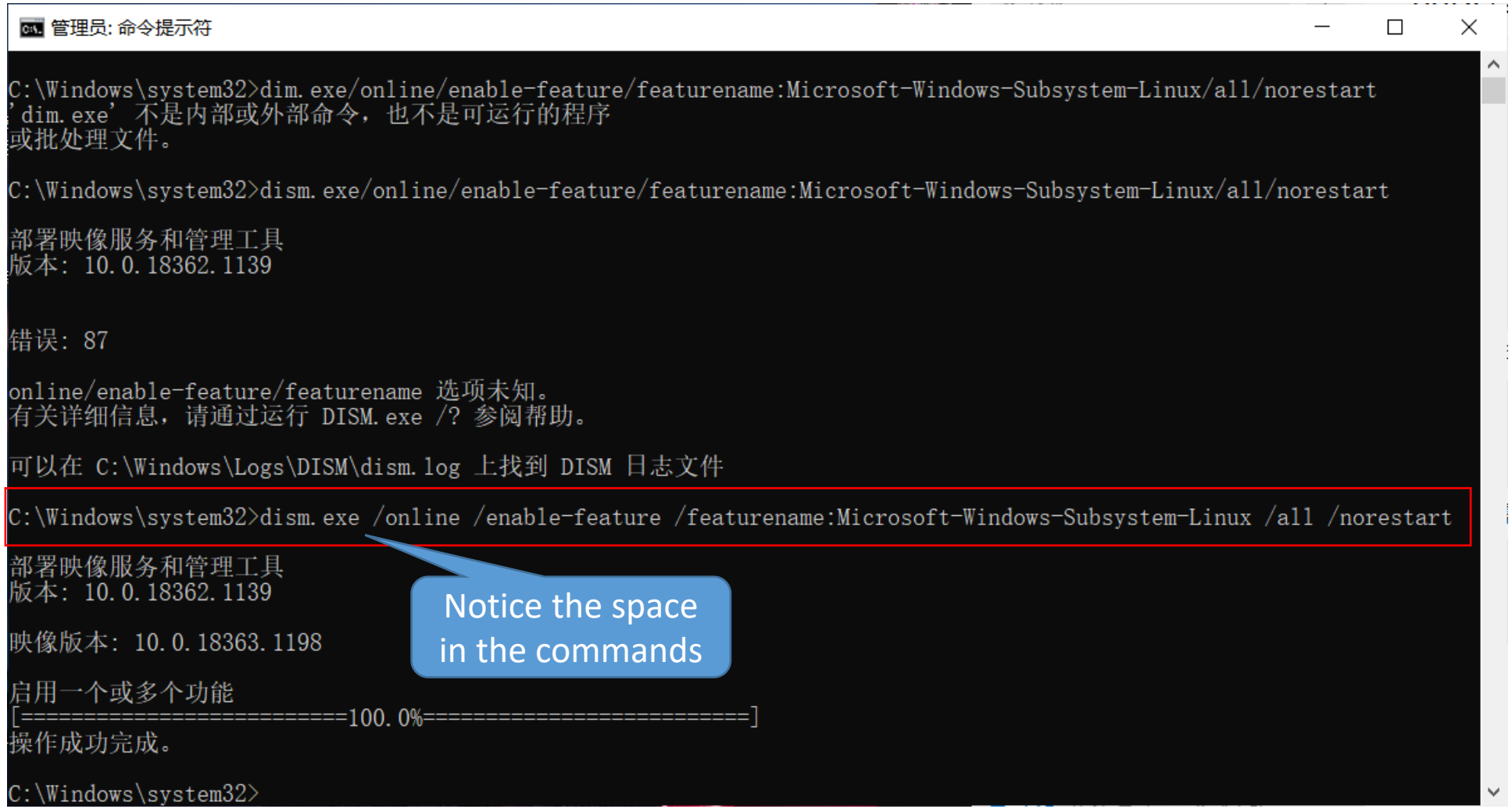
- **Step one**: enable the Windows Subsystem for Linux
  - Open powershell as Administrator and run: dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart





https://docs.microsoft.com/en-us/windows/wsl/install-win10


全部
应用
文档
网页
更多
最佳匹配
命令提示符
应用
搜索网页
ming - 查看网络搜索结果
命令提示符
应用
打开
以管理员身份运行
打开文件位置
固定到"开始"屏幕
固定到任务栏
1名 2明 3铭 4命 mingle
ming
input 命令提示符

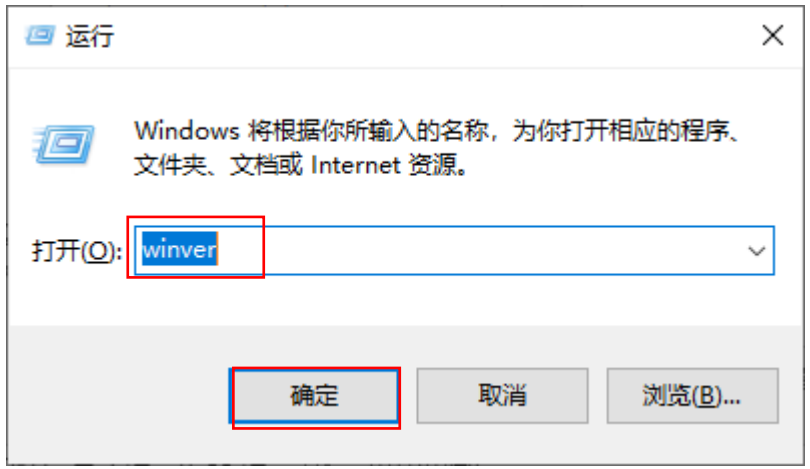

管理员: 命令提示符
C:\Windows\system32>dim.exe/online/enable-feature/featurename:Microsoft-Windows-Subsystem-Linux/all/norestart
'dim.exe' 不是内部或外部命令，也不是可运行的程序
或批处理文件。
C:\Windows\system32>dism.exe/online/enable-feature/featurename:Microsoft-Windows-Subsystem-Linux/all/norestart
部署映像服务和管理工具
版本: 10.0.18362.1139
错误: 87
online/enable-feature/featurename 选项未知。
有关详细信息，请通过运行 DISM.exe /? 参阅帮助。
可以在 C:\Windows\Logs\DISM\dism.log 上找到 DISM 日志文件
C:\Windows\system32>dism.exe /online /enable-feature /featurename:Microsoft-Windows-Subsystem-Linux /all /norestart
部署映像服务和管理工具
版本: 10.0.18362.1139
映像版本: 10.0.18363.1198
启用一个或多个功能
[==========================100.0%==========================]
操作成功完成。
C:\Windows\system32>
Notice the space in the commands

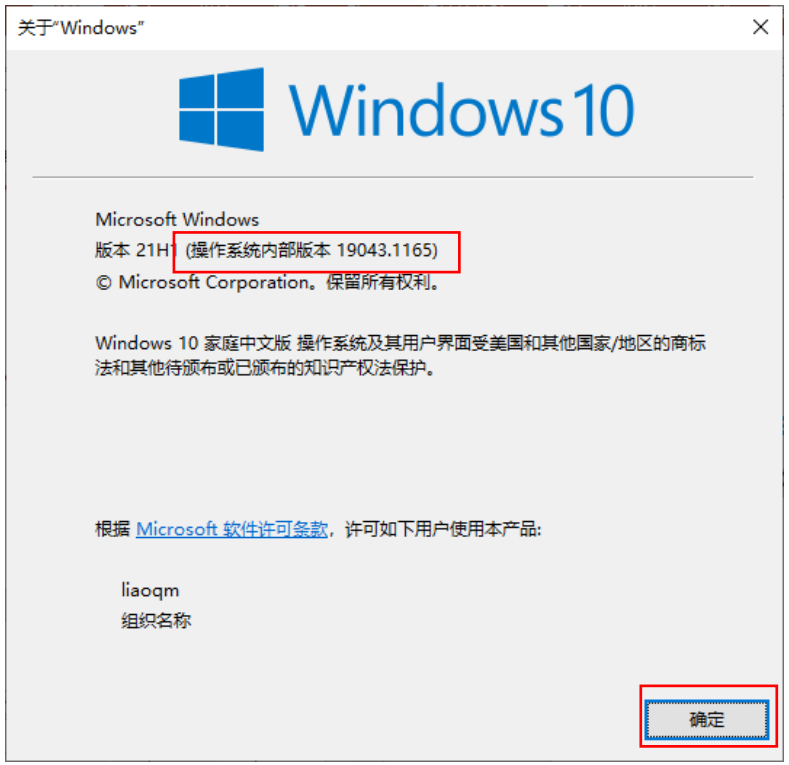
- **Step two**: Check requirements for running WSL 2

To update to WSL 2, you must be running Windows 10.

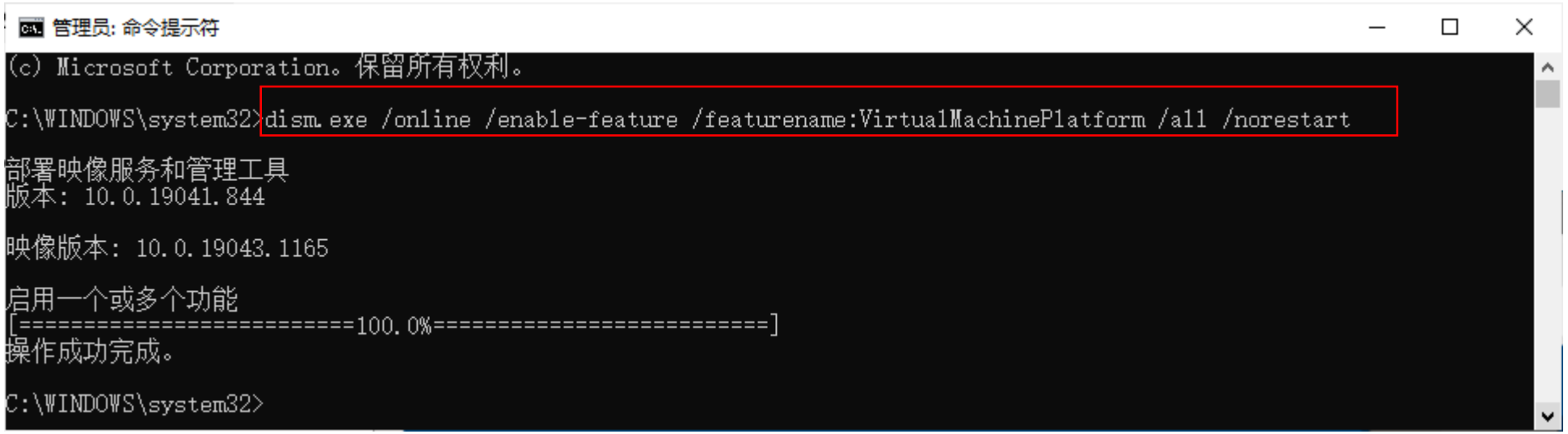
- For x64 systems: **Version 1903** or higher, with **Build 18362** or higher.
- For ARM64 systems: **Version 2004** or higher, with **Build 19041** or higher.

- To check your version and build number, select **Windows logo key + R**, type **winver**, select **OK**.





- **Step three**: Enable Virtual Machine feature
- Open PowerShell as Administrator and run: dism.exe /online /enable-feature /featurename:VirtualMachinePlatform /all /norestart



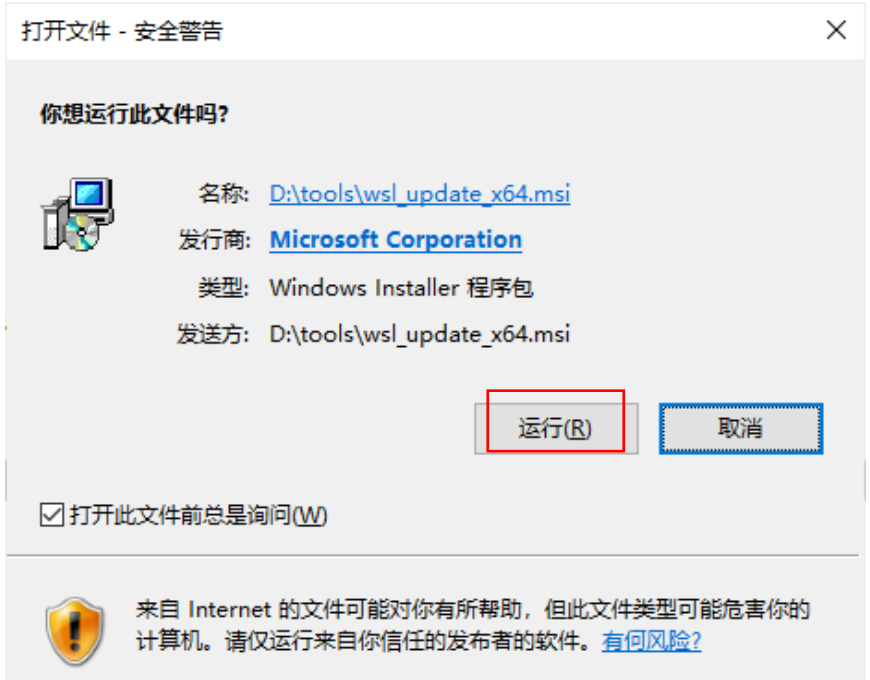
Restart your machine to complete the WSL install and update to WSL 2.

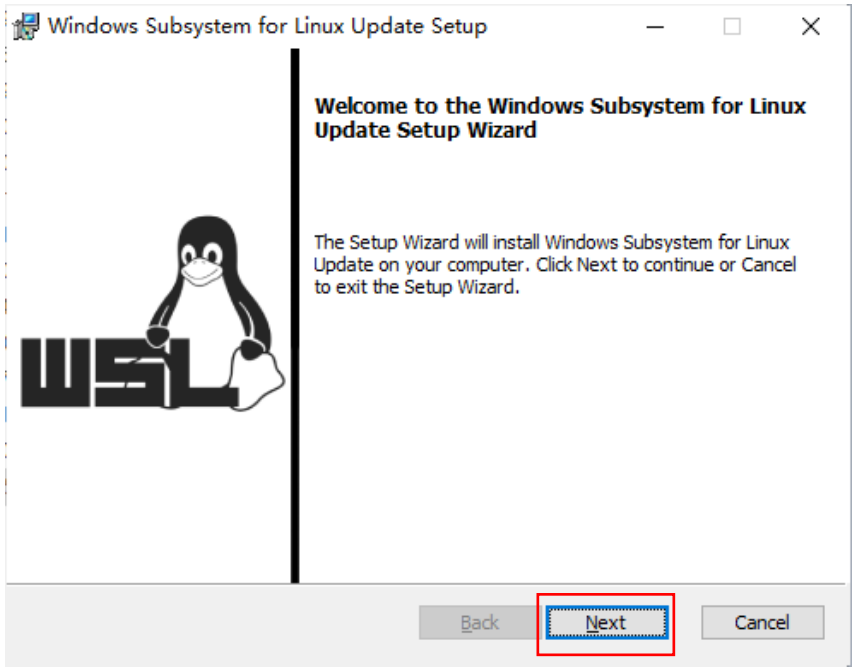
- **Step four**: Download the Linux kernel update package
- Download the latest package and run the update package

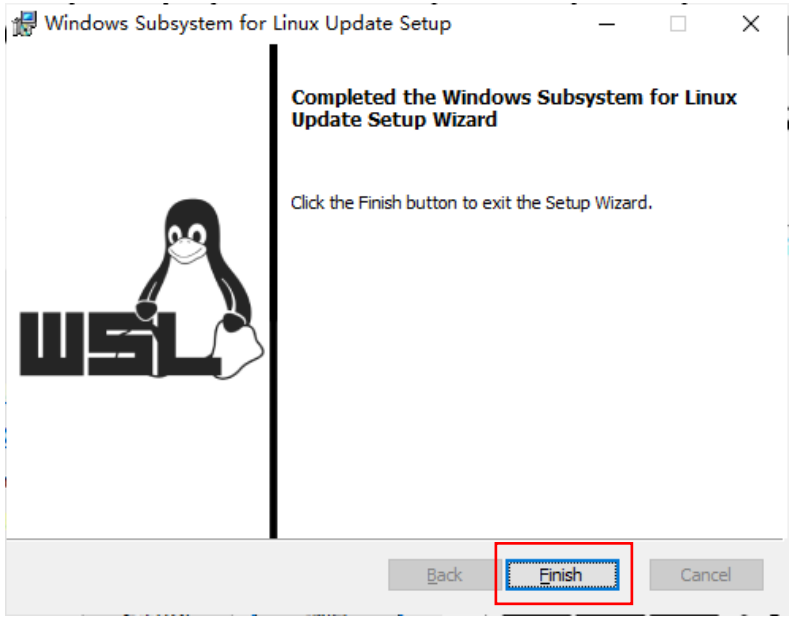
https://wslstorestorage.blob.core.windows.net/wslblob/wsl_update_x64.msi

If you're using an ARM64 machine, please download the **ARM64 package** instead.

https://wslstorestorage.blob.core.windows.net/wslblob/wsl_update_arm64.msi

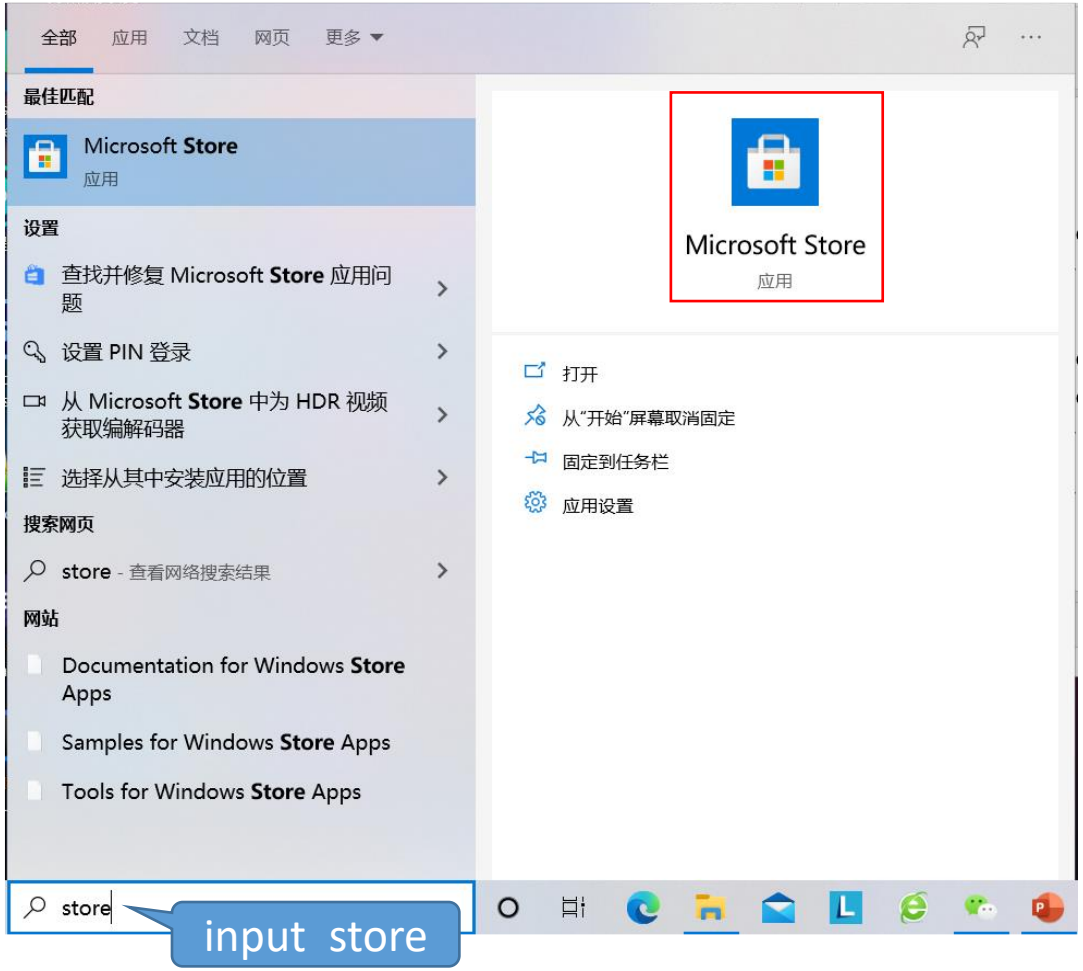


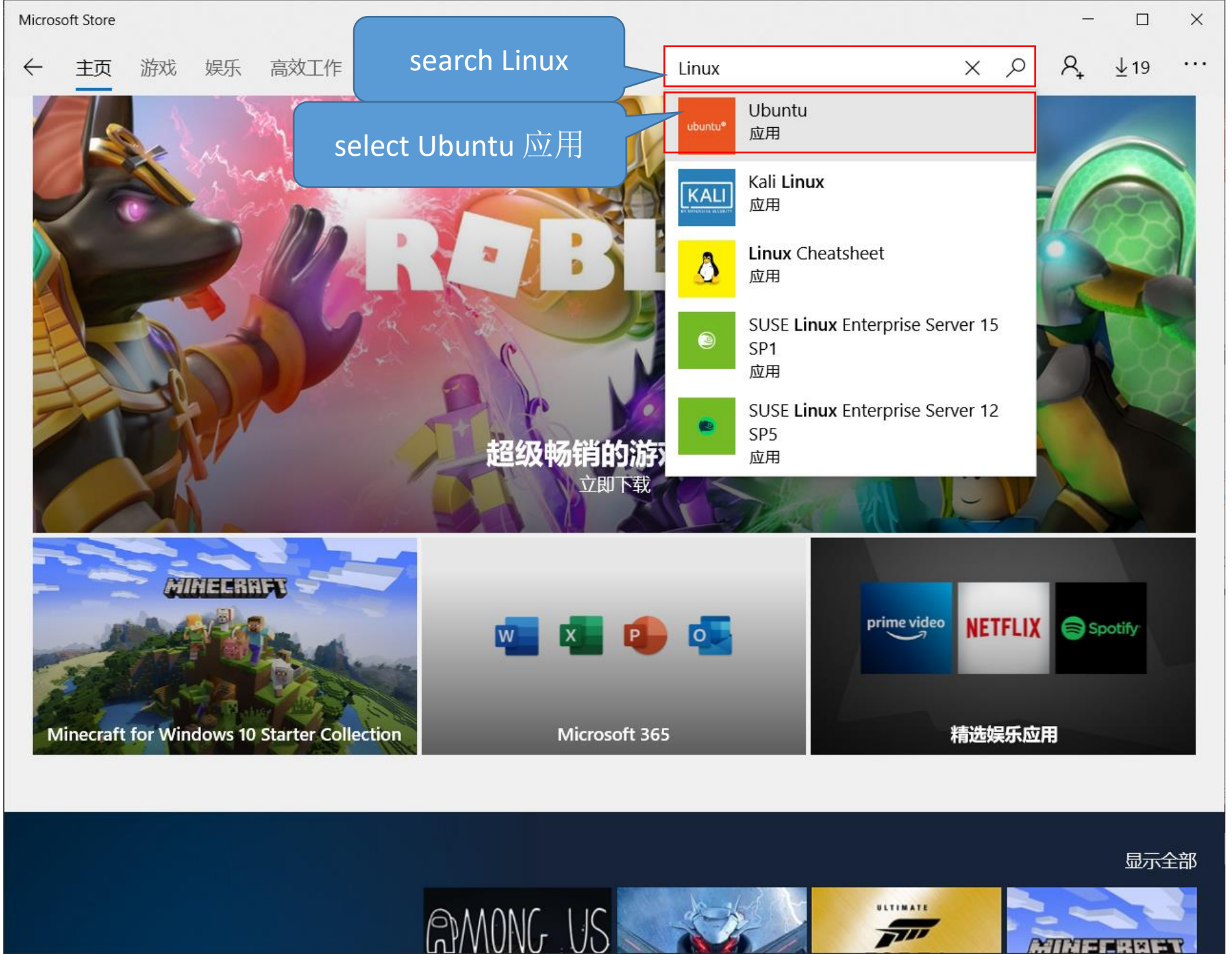




- **Step five**: Set WSL 2 as your default version
- Open PowerShell and run this command to set WSL 2 as the default version : wsl --set-default-version 2

- **Step six**: install your Linux distribution of choice:
  - Open the **Microsoft Store** and select your preferred Linux distribution
  - Search Linux in Microsoft Store




Microsoft Store
主页
游戏
娱乐
高效工作
search Linux
select Ubuntu 应用
Linux
Ubuntu
应用
Kali Linux
应用
Linux Cheatsheet
应用
SUSE Linux Enterprise Server 15 SP1
应用
SUSE Linux Enterprise Server 12 SP5
应用
超级畅销的游
立即下载
Minecraft for Windows 10 Starter Collection
Microsoft 365
精选娱乐应用
显示全部

Microsoft Store

主页 游戏 娱乐 高效工作 促销品 搜索 19

Ubuntu

Canonical Group Limited • 开发人员工具 > 实用程序

共享

Ubuntu on Windows allows you to use Ubuntu Terminal and run Ubuntu command line utilities including bash, ssh, git, apt and many more.

更多

IARC 3+ 3+

免费

获取

你可以在 Xbox One 主机上购买。(你所在的地区不支持通过 microsoft.com 购买。)

概述 系统要求 评论 相关

可用于

电脑

介绍

跨设备使用

通过 Microsoft 登录，并在任何兼容设备上使用。

不，谢谢

登录

Microsoft

登录

input your Microsoft account

maydlee@163.com

没有帐户?创建一个!

If you have no account, you can create one

忘记了用户名

下一步

使用条款 隐私和 cookie ...

Microsoft

← maydlee@163.com

输入密码

input your password

••••••••••

忘记了密码?

登录

使用条款　隐私和 cookie　...

Microsoft

maydlee@163.com

在设备上的任何位置使用此帐户

Windows 会记住帐户，并简化登录应用和网站的过程。单击“下一步”即表示能够查找丢失设备、将设置同步到其他设备和向 Cortana 寻求帮助。

仅限 Microsoft 应用

下一步

使用条款　隐私和 cookie　...

对你的帐户使用 Windows Hello

若要使用 maydlee@163.com 轻松安全地访问应用，需要为它设置 Windows Hello 人脸、指纹或 PIN。

如果你已设置，我们将为此帐户自动添加它。系统可能会要求你使用 Windows Hello 重新验证。

确定

Microsoft Store

主页 游戏 娱乐 高效工作 促销品

搜索 20

正在下载 Ubuntu .. 136.7 MB，共 444.5 MB

获取关于更快速下载的详细信息 8.6 Mb/秒

启动

ubuntu

Ubuntu

Canonical Group Limited • 开发人员工具 > 实用程序

共享

Ubuntu on Windows allows you to use Ubuntu Terminal and run Ubuntu command line utilities including bash, ssh, git, apt and many more.

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IARC 3+

3+

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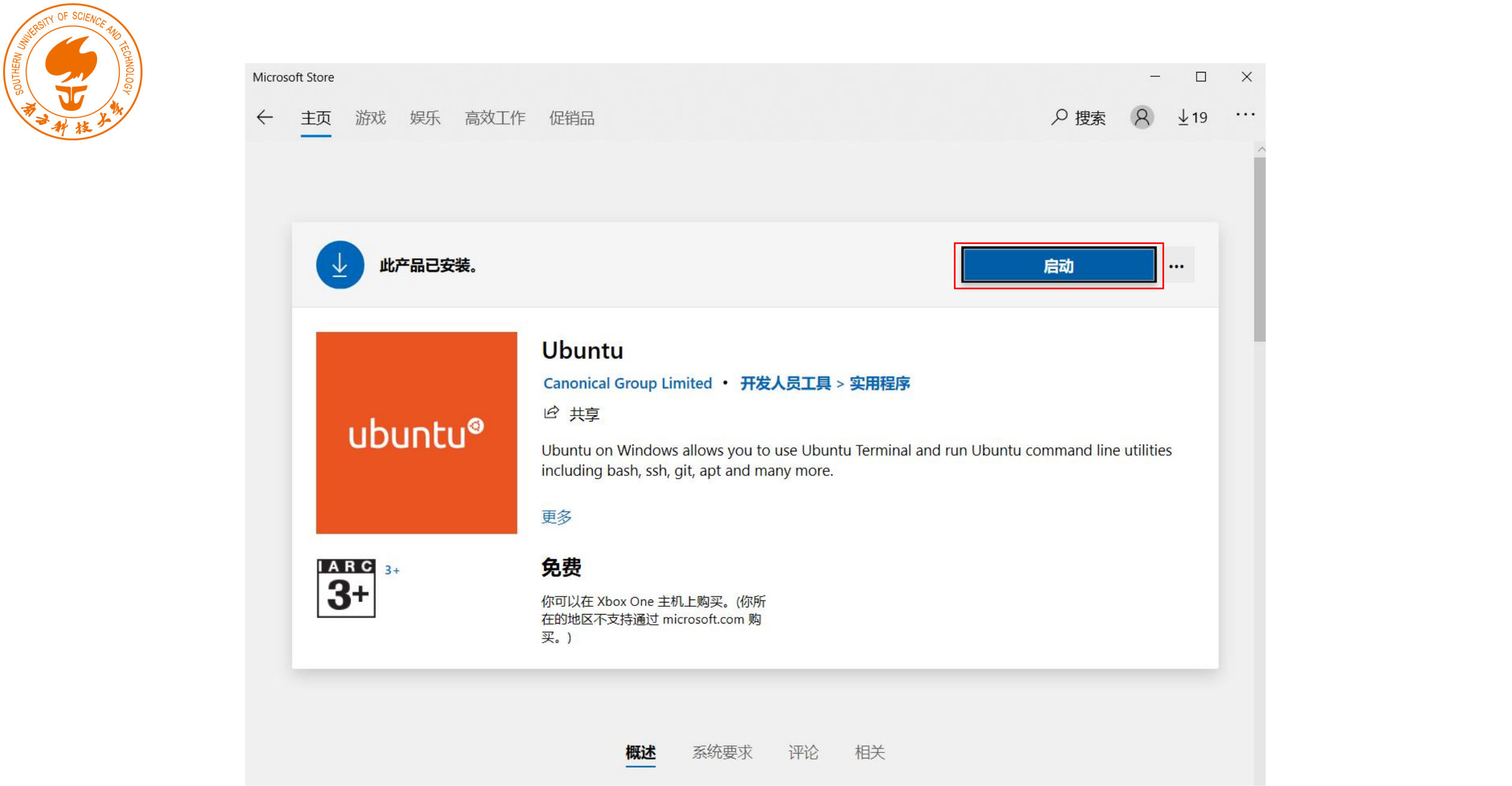
概述 系统要求 评论 相关


Microsoft Store
主页
游戏
娱乐
高效工作
促销品
搜索
19
此产品已安装。
启动
ubuntu
Ubuntu
Canonical Group Limited • 开发人员工具 > 实用程序
共享
Ubuntu on Windows allows you to use Ubuntu Terminal and run Ubuntu command line utilities including bash, ssh, git, apt and many more.
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3+
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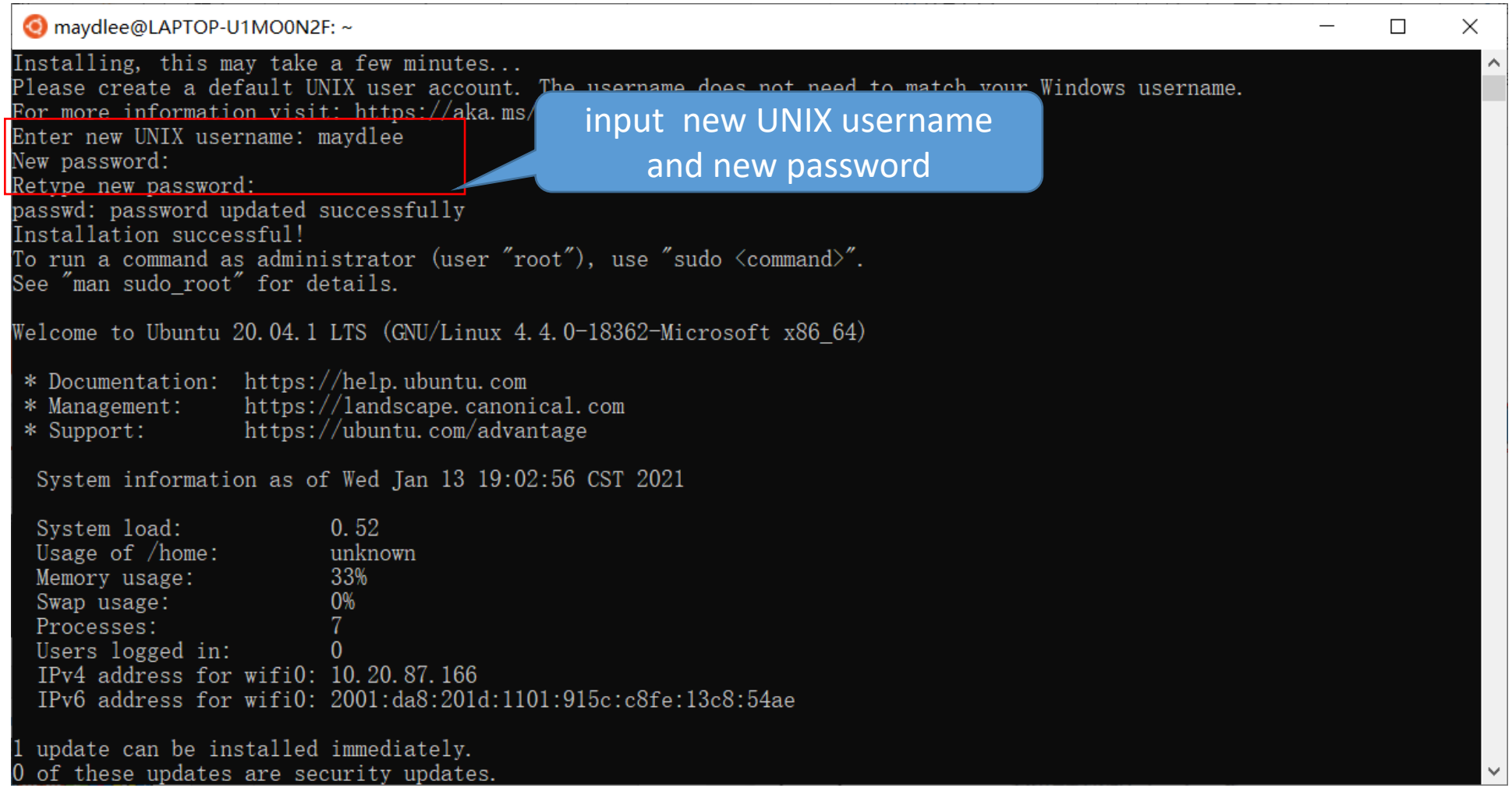
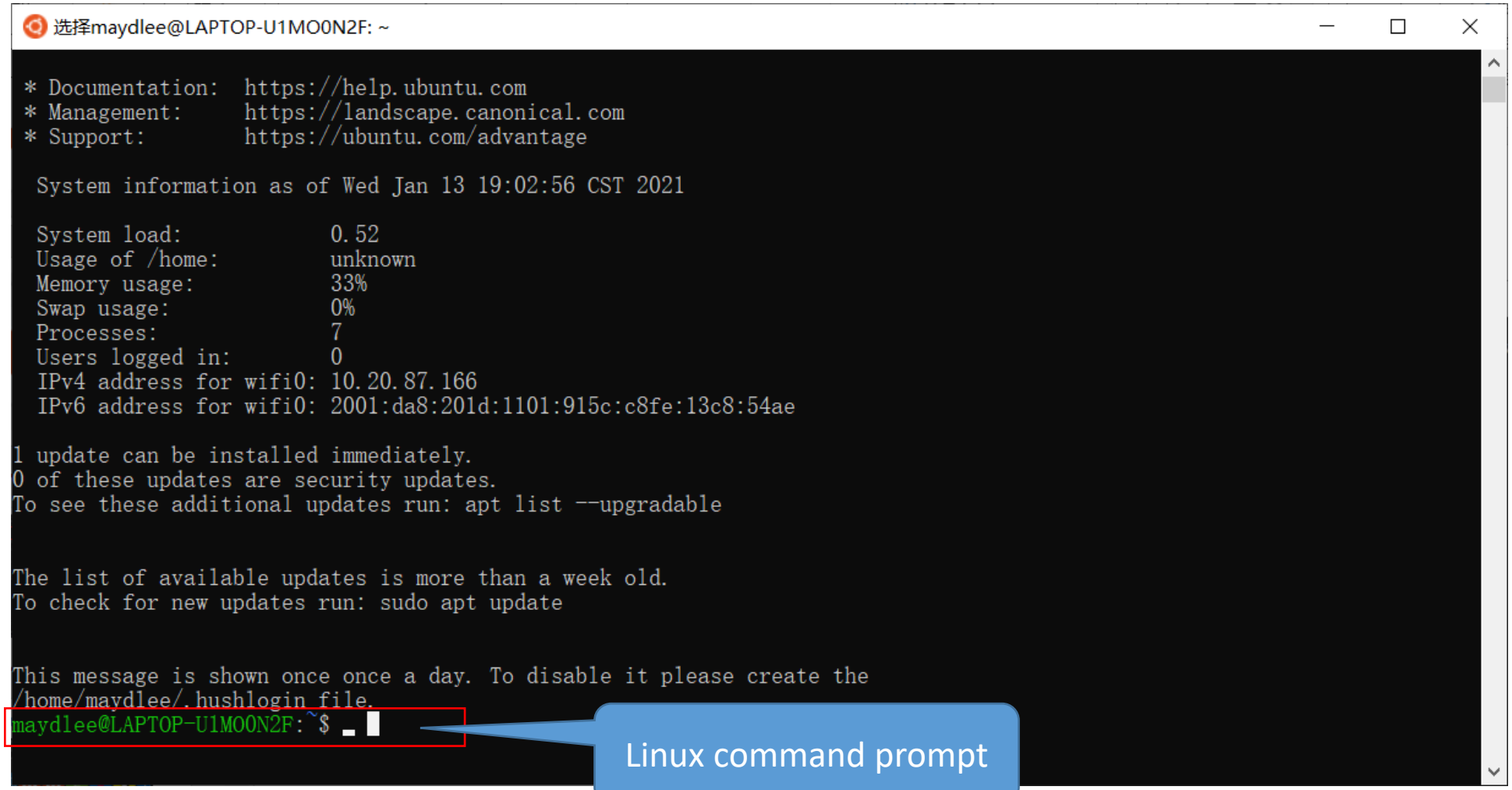
你可以在 Xbox One 主机上购买。(你所在的地区不支持通过 microsoft.com 购买。)
概述
系统要求
评论
相关


maydlee@LAPTOP-U1MO0N2F: ~
Installing, this may take a few minutes...
Please create a default UNIX user account. The username does not need to match your Windows username.
For more information visit: https://aka.ms/
Enter new UNIX username: maydlee
New password:
Retype new password:
passwd: password updated successfully
Installation successful!
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
Welcome to Ubuntu 20.04.1 LTS (GNU/Linux 4.4.0-18362-Microsoft x86_64)
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage
System information as of Wed Jan 13 19:02:56 CST 2021
System load: 0.52
Usage of /home: unknown
Memory usage: 33%
Swap usage: 0%
Processes: 7
Users logged in: 0
IPv4 address for wifi0: 10.20.87.166
IPv6 address for wifi0: 2001:da8:201d:1101:915c:c8fe:13c8:54ae
1 update can be installed immediately.
0 of these updates are security updates.
input new UNIX username
and new password


选择maydlee@LAPTOP-U1MO0N2F: ~
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage
System information as of Wed Jan 13 19:02:56 CST 2021
System load: 0.52
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Processes: 7
Users logged in: 0
IPv4 address for wifi0: 10.20.87.166
IPv6 address for wifi0: 2001:da8:201d:1101:915c:c8fe:13c8:54ae
1 update can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable
The list of available updates is more than a week old.
To check for new updates run: sudo apt update
This message is shown once once a day. To disable it please create the
/home/maydlee/.hushlogin file.
maydlee@LAPTOP-U1MO0N2F:~$
Linux command prompt

1.1 Install WSL on Windows 10 (Cont.)

We prefer Ubuntu 20.04 LTS and use this as an example in our class as this is the latest LTS version.

Check the version of WSL, make sure the version is 2. Input command: wsl -l -v

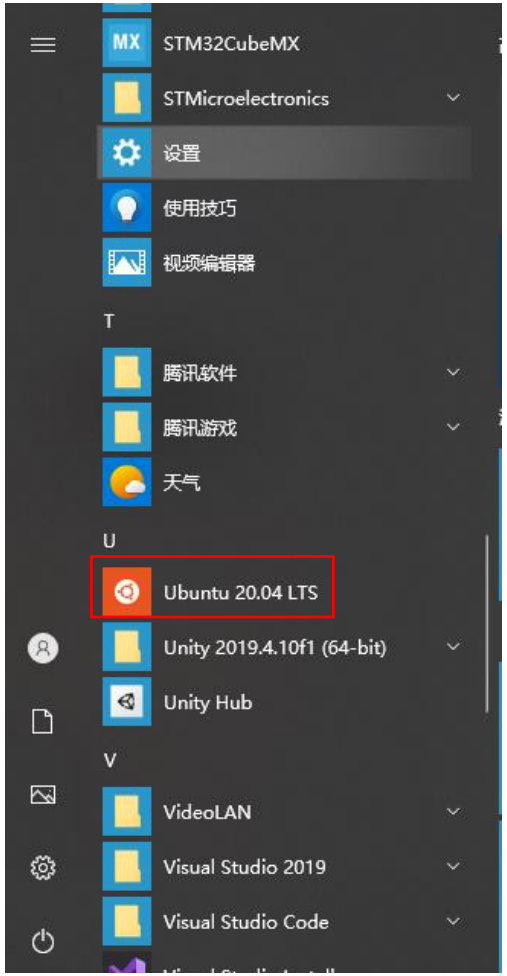
The version of WSL is 1

Input command: wsl –set-version Ubuntu 2

Input command: wsl -l –v again and check the version of WSL

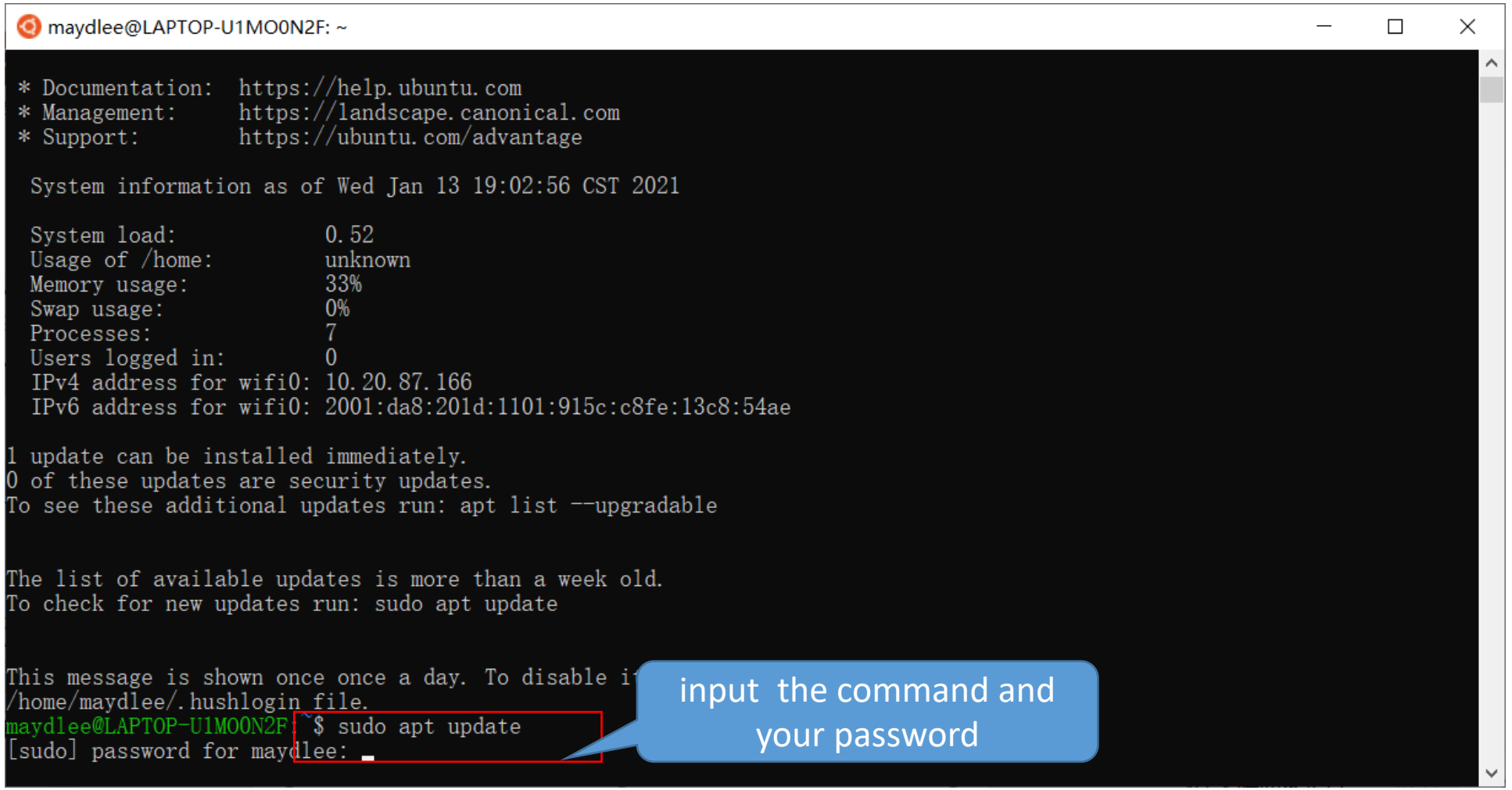
1.2 Install GCC on WSL

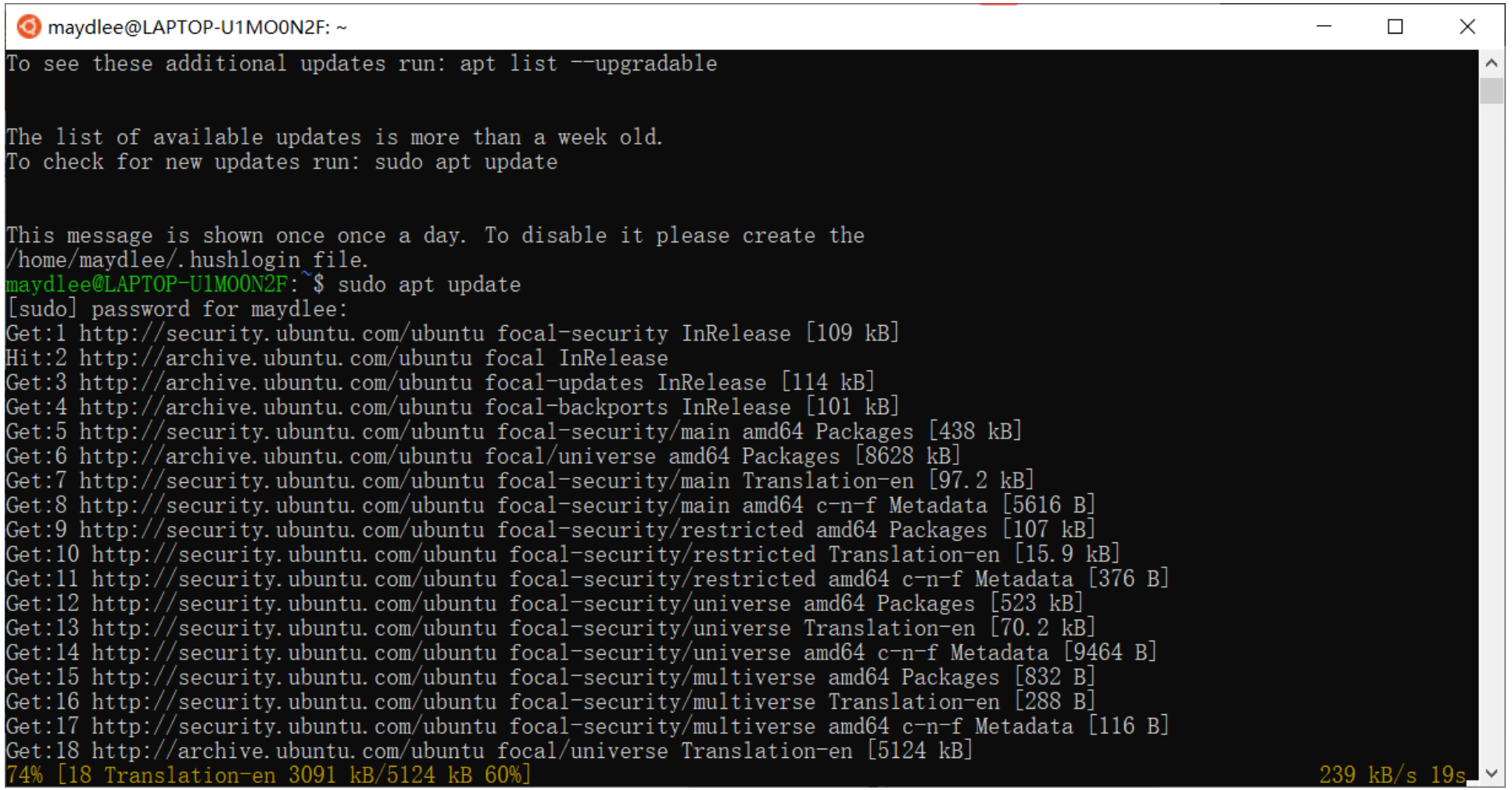
- Once you finished the installation of Ubuntu 20.04 LTS, you can find it on your start menu.
- Open it and you will see a Terminal for Linux
- You can set username and password for your system (Please remember this password as you need it to switch to root user later)

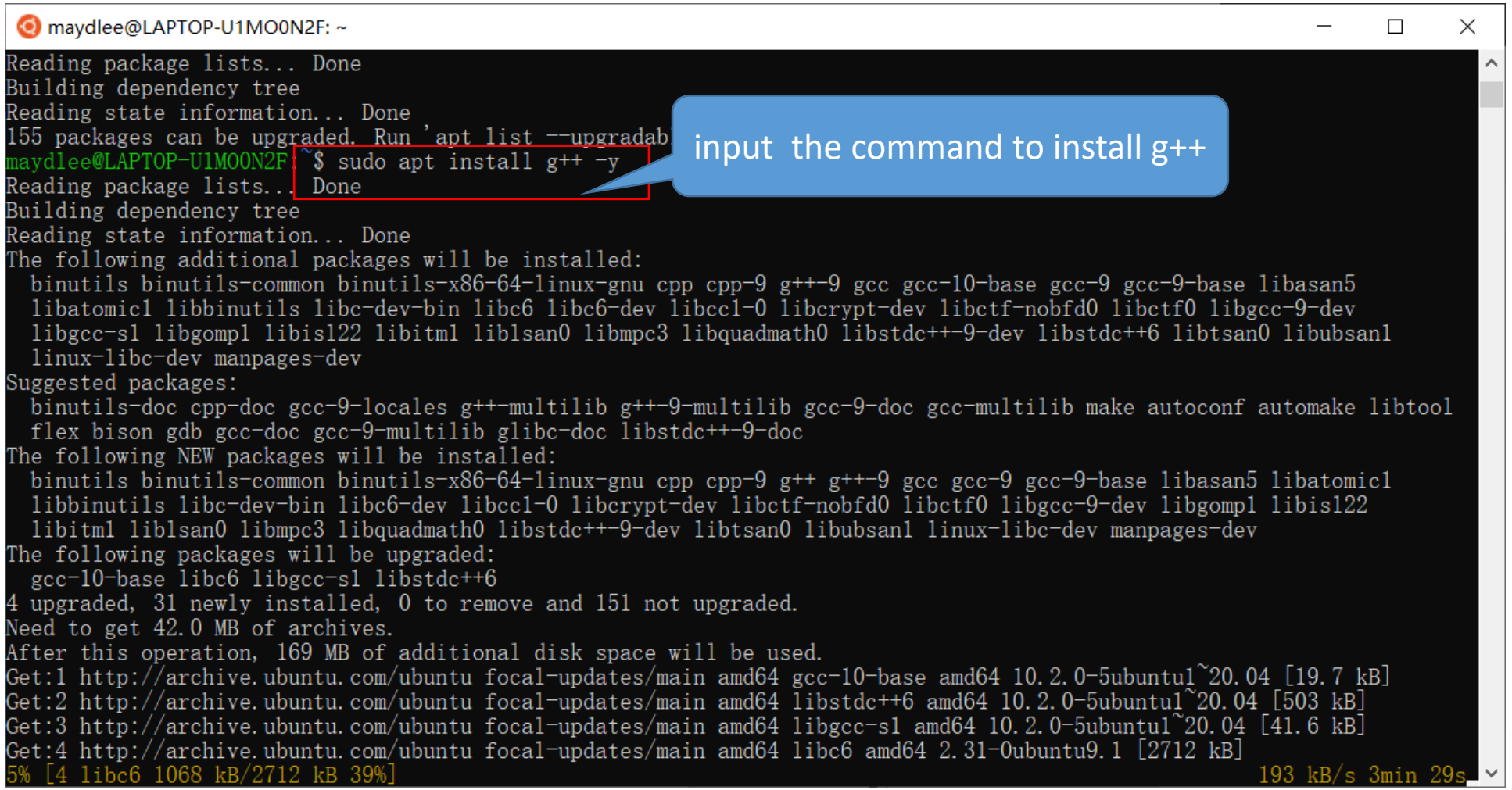


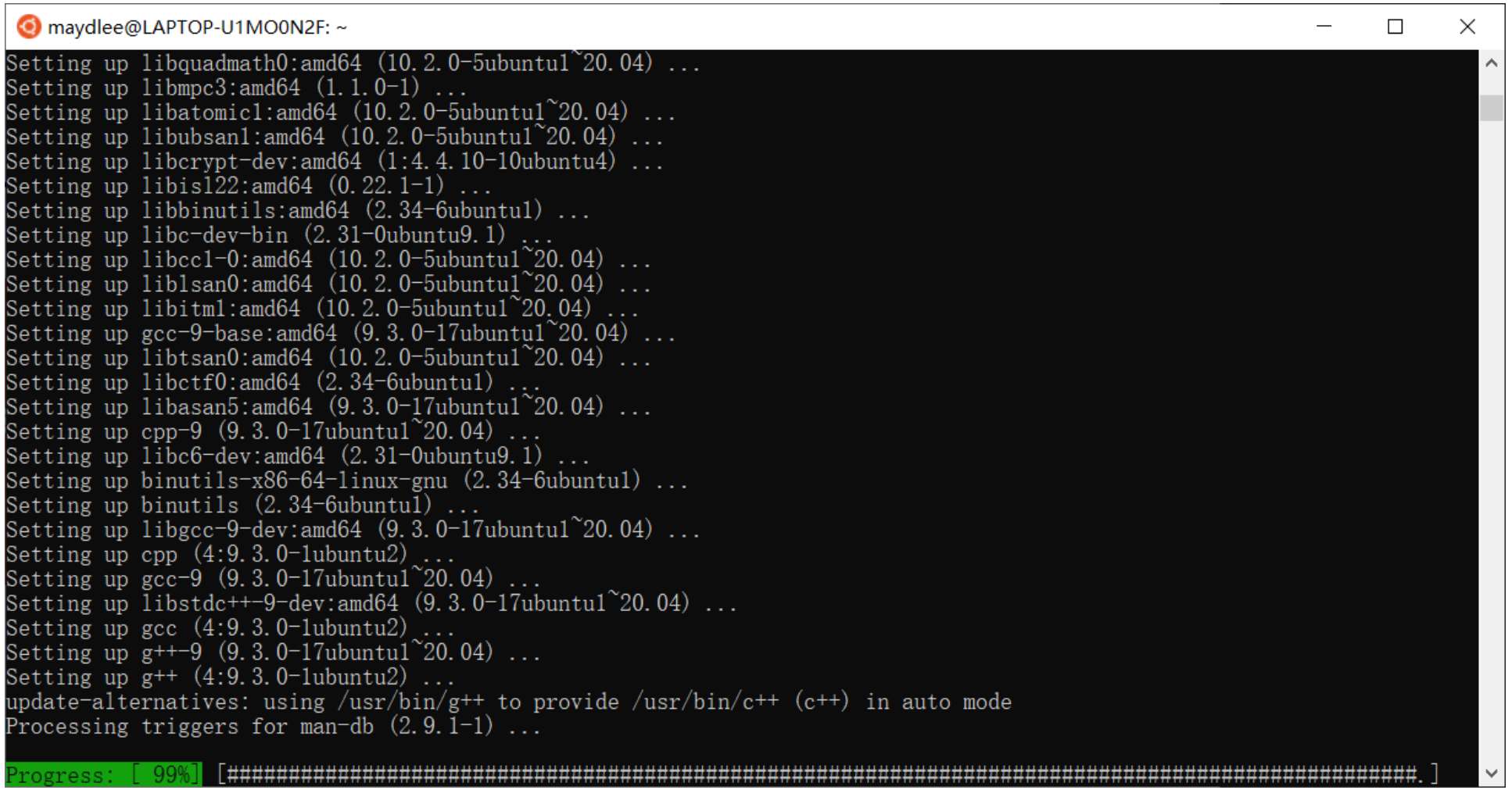
1.2 Install GCC on WSL (Cont.)

- You can change the source list of apt if you want. (This step may improve your download speed later)
  - For more information you can visit: https://mirrors.sustech.edu.cn/help/ubuntu.html#introduction
- Use the command below to install GNU: (If you are using any Linux distribution based on debian you can use below to install, too)
  - sudo apt update;sudo apt install g++ -y
  - The first command will update your apt library (apt:Advanced Packaging Tools)
  - The second will install g++ and its independence


maydlee@LAPTOP-U1MO0N2F: ~
* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage
System information as of Wed Jan 13 19:02:56 CST 2021
System load: 0.52
Usage of /home: unknown
Memory usage: 33%
Swap usage: 0%
Processes: 7
Users logged in: 0
IPv4 address for wifi0: 10.20.87.166
IPv6 address for wifi0: 2001:da8:201d:1101:915c:c8fe:13c8:54ae
1 update can be installed immediately.
0 of these updates are security updates.
To see these additional updates run: apt list --upgradable
The list of available updates is more than a week old.
To check for new updates run: sudo apt update
This message is shown once once a day. To disable it
/home/maydlee/.hushlogin file.
maydlee@LAPTOP-U1MO0N2F:~$ sudo apt update
[sudo] password for maydlee:
input the command and your password

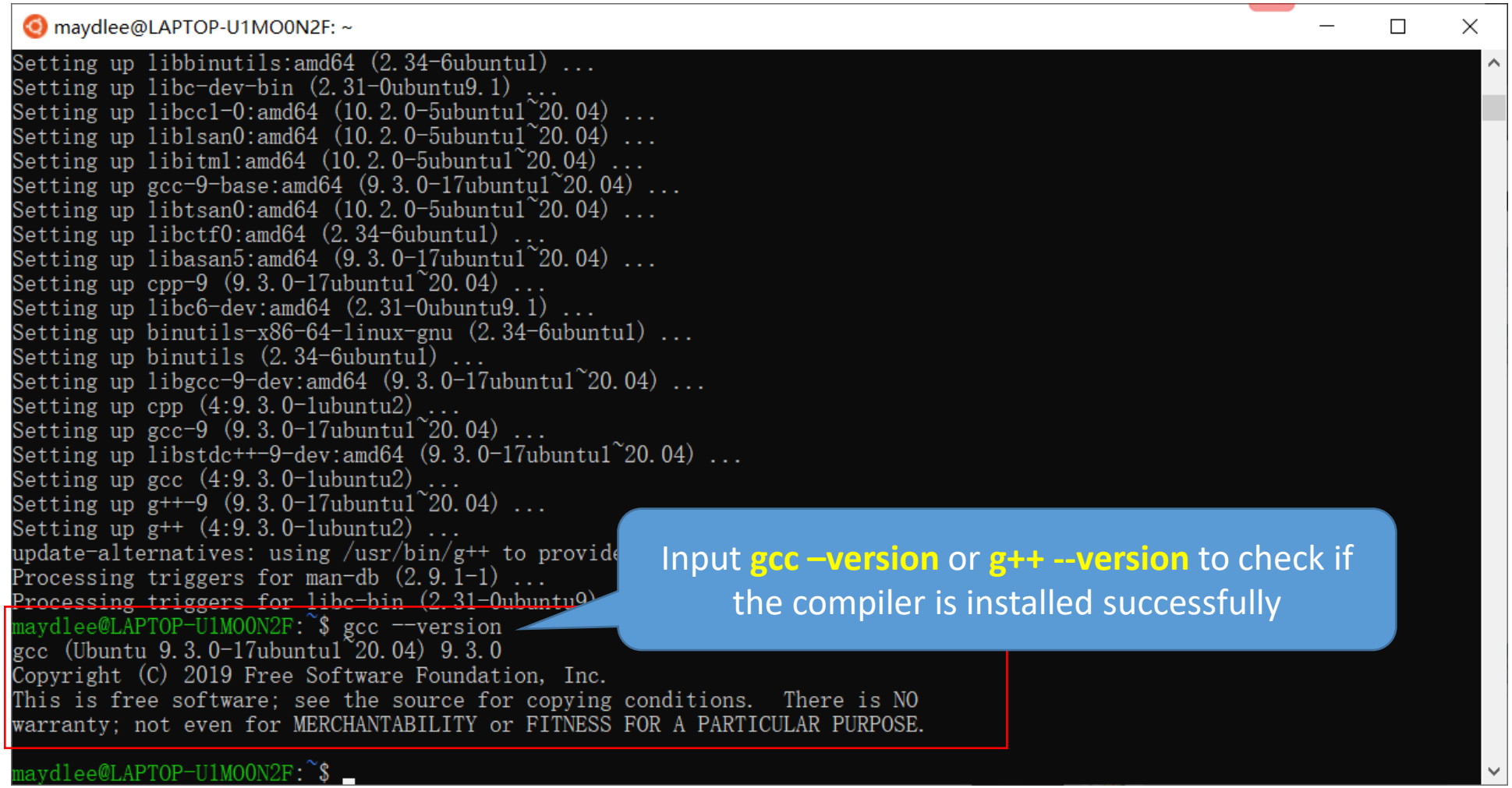

maydlee@LAPTOP-U1MO0N2F: ~
To see these additional updates run: apt list --upgradable
The list of available updates is more than a week old.
To check for new updates run: sudo apt update
This message is shown once once a day. To disable it please create the
/home/maydlee/.hushlogin file.
maydlee@LAPTOP-U1MO0N2F:~$ sudo apt update
[sudo] password for maydlee:
Get:1 http://security.ubuntu.com/ubuntu focal-security InRelease [109 kB]
Hit:2 http://archive.ubuntu.com/ubuntu focal InRelease
Get:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal-backports InRelease [101 kB]
Get:5 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [438 kB]
Get:6 http://archive.ubuntu.com/ubuntu focal/universe amd64 Packages [8628 kB]
Get:7 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [97.2 kB]
Get:8 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [5616 B]
Get:9 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [107 kB]
Get:10 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [15.9 kB]
Get:11 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 c-n-f Metadata [376 B]
Get:12 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [523 kB]
Get:13 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [70.2 kB]
Get:14 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [9464 B]
Get:15 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 Packages [832 B]
Get:16 http://security.ubuntu.com/ubuntu focal-security/multiverse Translation-en [288 B]
Get:17 http://security.ubuntu.com/ubuntu focal-security/multiverse amd64 c-n-f Metadata [116 B]
Get:18 http://archive.ubuntu.com/ubuntu focal/universe Translation-en [5124 kB]
74% [18 Translation-en 3091 kB/5124 kB 60%] 239 kB/s 19s


maydlee@LAPTOP-U1MO0N2F: ~
Reading package lists... Done
Building dependency tree
Reading state information... Done
155 packages can be upgraded. Run 'apt list --upgradab
maydlee@LAPTOP-U1MO0N2F:~$ sudo apt install g++ -y
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
binutils binutils-common binutils-x86-64-linux-gnu cpp cpp-9 g++-9 gcc gcc-10-base gcc-9 gcc-9-base libasan5
libatomic1 libbinutils libc-dev-bin libc6 libc6-dev libcc1-0 libcrypt-dev libctf-nobfd0 libctf0 libgcc-9-dev
libgcc-s1 libgompl libisl22 libitm1 liblsan0 libmpc3 libquadmath0 libstdc++-9-dev libstdc++6 libtsan0 libubsan1
linux-libc-dev manpages-dev
Suggested packages:
binutils-doc cpp-doc gcc-9-locales g++-multilib g++-9-multilib gcc-9-doc gcc-multilib make autoconf automake libtool
flex bison gdb gcc-doc gcc-9-multilib glibc-doc libstdc++-9-doc
The following NEW packages will be installed:
binutils binutils-common binutils-x86-64-linux-gnu cpp cpp-9 g++ g++-9 gcc gcc-9 gcc-9-base libasan5 libatomic1
libbinutils libc-dev-bin libc6-dev libcc1-0 libcrypt-dev libctf-nobfd0 libctf0 libgcc-9-dev libgompl libisl22
libitm1 liblsan0 libmpc3 libquadmath0 libstdc++-9-dev libtsan0 libubsan1 linux-libc-dev manpages-dev
The following packages will be upgraded:
gcc-10-base libc6 libgcc-s1 libstdc++6
4 upgraded, 31 newly installed, 0 to remove and 151 not upgraded.
Need to get 42.0 MB of archives.
After this operation, 169 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 gcc-10-base amd64 10.2.0-5ubuntu1~20.04 [19.7 kB]
Get:2 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libstdc++6 amd64 10.2.0-5ubuntu1~20.04 [503 kB]
Get:3 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libgcc-s1 amd64 10.2.0-5ubuntu1~20.04 [41.6 kB]
Get:4 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libc6 amd64 2.31-0ubuntu9.1 [2712 kB]
5% [4 libc6 1068 kB/2712 kB 39%]
193 kB/s 3min 29s
input the command to install g++


maydlee@LAPTOP-U1MO0N2F: ~
Setting up libquadmath0:amd64 (10.2.0-5ubuntu1~20.04) ...
Setting up libmpc3:amd64 (1.1.0-1) ...
Setting up libatomic1:amd64 (10.2.0-5ubuntu1~20.04) ...
Setting up libubsan1:amd64 (10.2.0-5ubuntu1~20.04) ...
Setting up libcrypt-dev:amd64 (1:4.4.10-10ubuntu4) ...
Setting up libisl22:amd64 (0.22.1-1) ...
Setting up libbinutils:amd64 (2.34-6ubuntu1) ...
Setting up libc-dev-bin (2.31-0ubuntu9.1) ...
Setting up libcc1-0:amd64 (10.2.0-5ubuntu1~20.04) ...
Setting up liblsan0:amd64 (10.2.0-5ubuntu1~20.04) ...
Setting up libitm1:amd64 (10.2.0-5ubuntu1~20.04) ...
Setting up gcc-9-base:amd64 (9.3.0-17ubuntu1~20.04) ...
Setting up libtsan0:amd64 (10.2.0-5ubuntu1~20.04) ...
Setting up libctf0:amd64 (2.34-6ubuntu1) ...
Setting up libasan5:amd64 (9.3.0-17ubuntu1~20.04) ...
Setting up cpp-9 (9.3.0-17ubuntu1~20.04) ...
Setting up libc6-dev:amd64 (2.31-0ubuntu9.1) ...
Setting up binutils-x86-64-linux-gnu (2.34-6ubuntu1) ...
Setting up binutils (2.34-6ubuntu1) ...
Setting up libgcc-9-dev:amd64 (9.3.0-17ubuntu1~20.04) ...
Setting up cpp (4:9.3.0-1ubuntu2) ...
Setting up gcc-9 (9.3.0-17ubuntu1~20.04) ...
Setting up libstdc++-9-dev:amd64 (9.3.0-17ubuntu1~20.04) ...
Setting up gcc (4:9.3.0-1ubuntu2) ...
Setting up g++-9 (9.3.0-17ubuntu1~20.04) ...
Setting up g++ (4:9.3.0-1ubuntu2) ...
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode
Processing triggers for man-db (2.9.1-1) ...
Progress: [99%] [###.]

1.3 Verify GCC on WSL

- You can input command: gcc --version or g++ --version to check whether the GCC is installed well



2 Download and install LLVM on macOS

2.1 Install CLT on macOS

- Open the Terminal on your Mac
- Input g++ to check whether the CLT or GCC is installed
- If not, the system will guide you to install CLT
- You can also install CLT by package provided by Apple: https://developer.apple.com/download/more/

2.2 Verify LLVM on macOS

- The same as verifying GNU, using: g++ --version

```
gdjs2@xiaozhaoqideMacBook-Pro ~
$ g++ --version
Configured with: --prefix=/Library/Developer/CommandLineTools/usr --with-gxx-inc
lude-dir=/Library/Developer/CommandLineTools/SDKs/MacOSX.sdk/usr/include/c++/4.2
.1
Apple clang version 12.0.0 (clang-1200.0.32.28)
Target: x86_64-apple-darwin20.2.0
Thread model: posix
InstalledDir: /Library/Developer/CommandLineTools/usr/bin
```

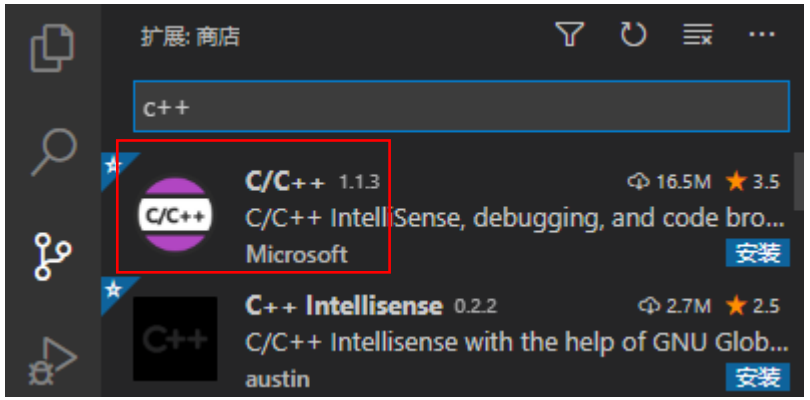
3.Download and install editor

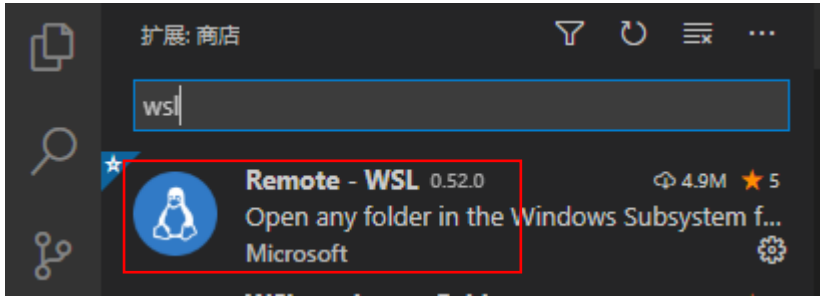
To install **VSCode**, you can visit: https://code.visualstudio.com/ to download the package for your platform (Linux, Windows or macOS).

After you install VSCode, you need to install two plugins at least to support our development:

1. C/C++ plugin
2. Remote - WSL plugin

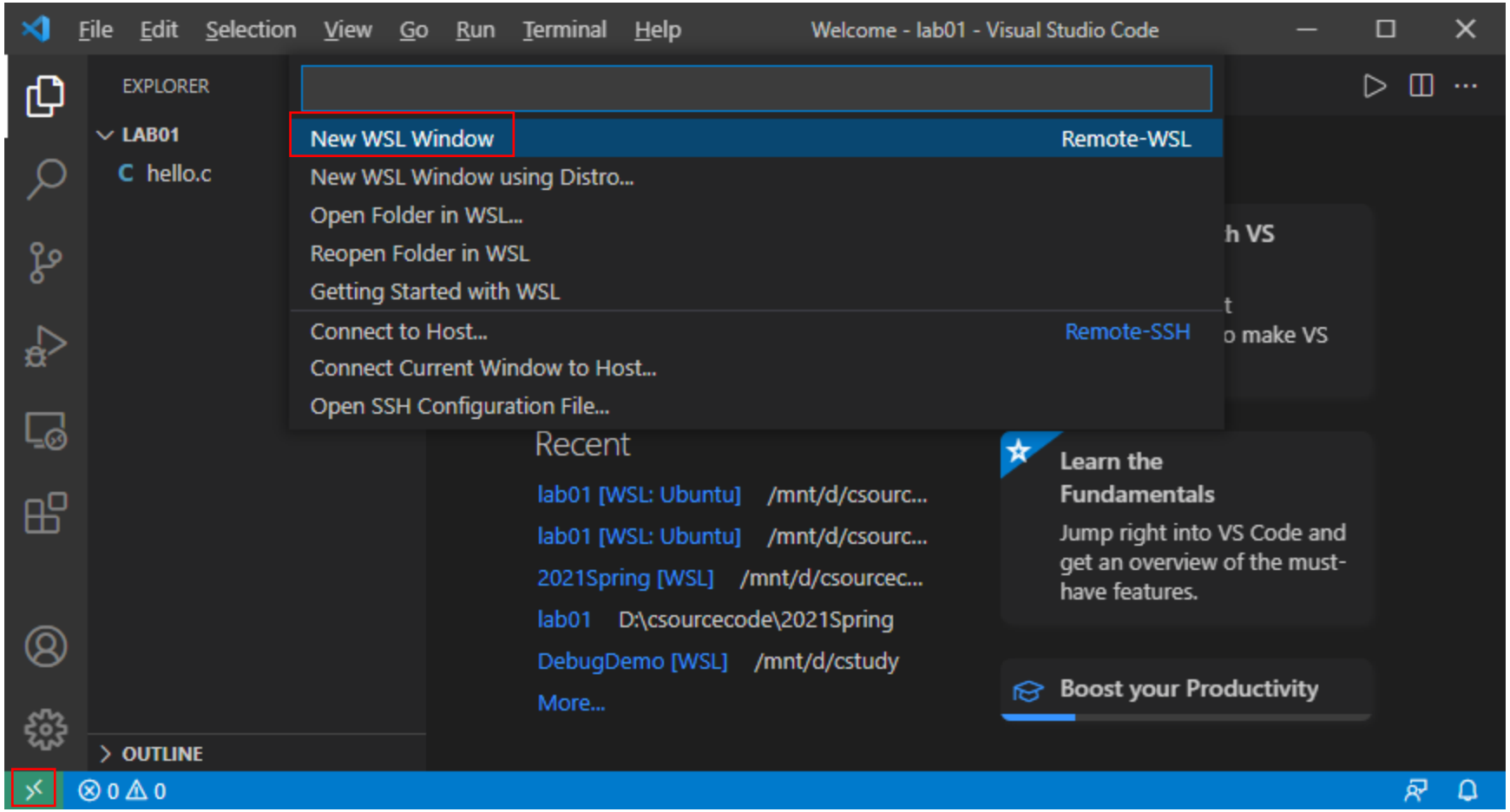
To install them, you can search c++ and wsl respectively.



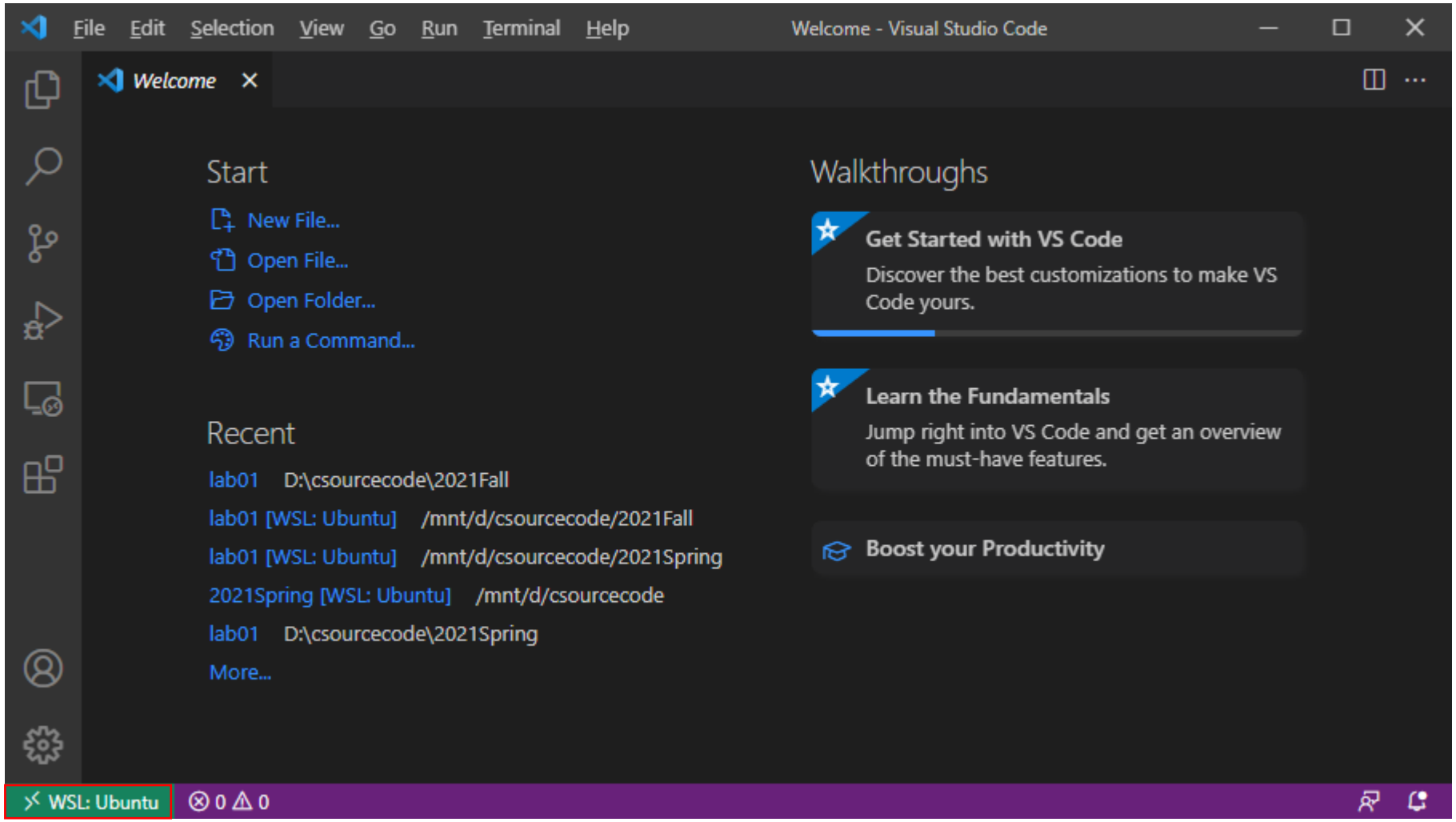


Now, you need to switch your VSCode to WSL system.

Click the green button on left of the bottom, and choose **Remote WSL: New window** (or others you need).



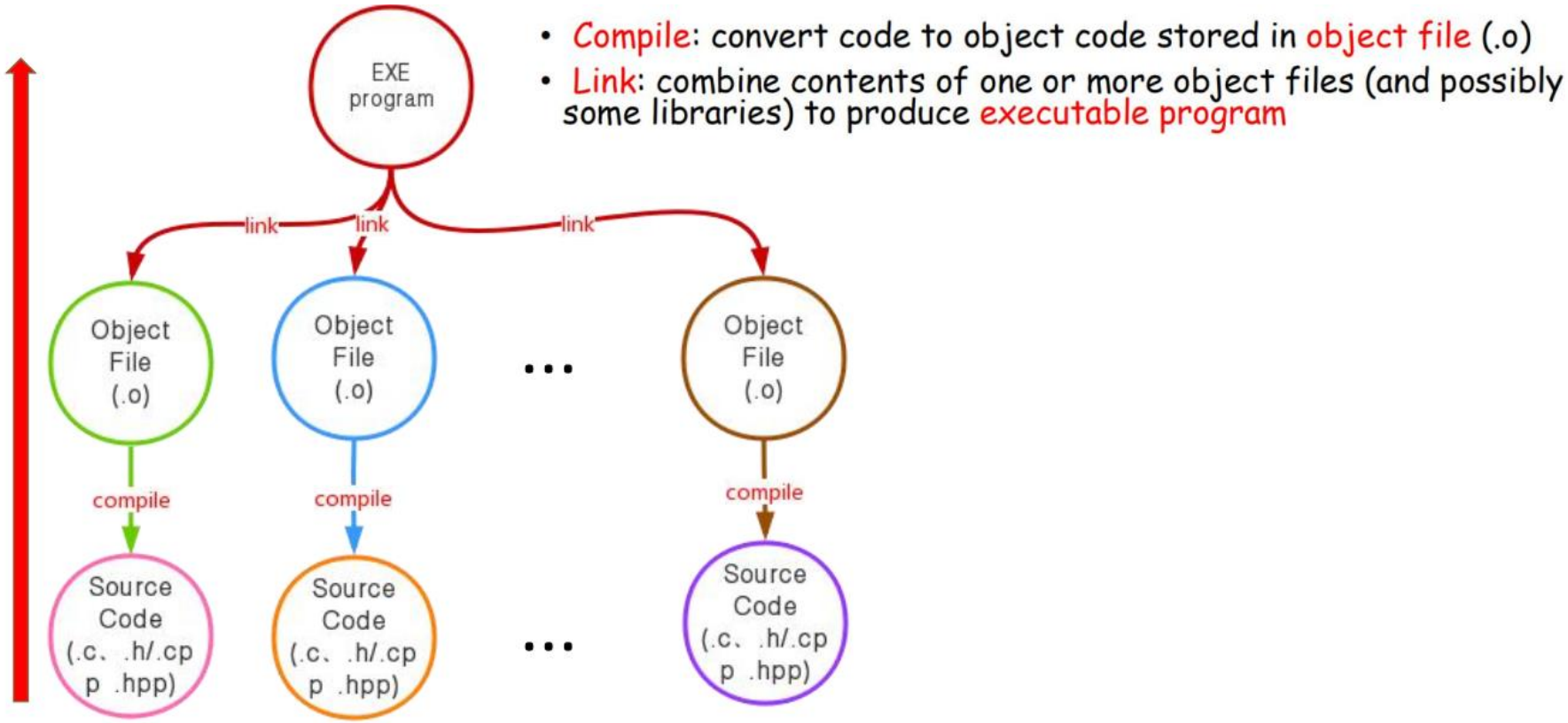
Now your VSCode is working on the WSL system. We can create our first C/C++ program.



Note: The suffix of the program must be .c or .cpp for c program and c++ program respectively.

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

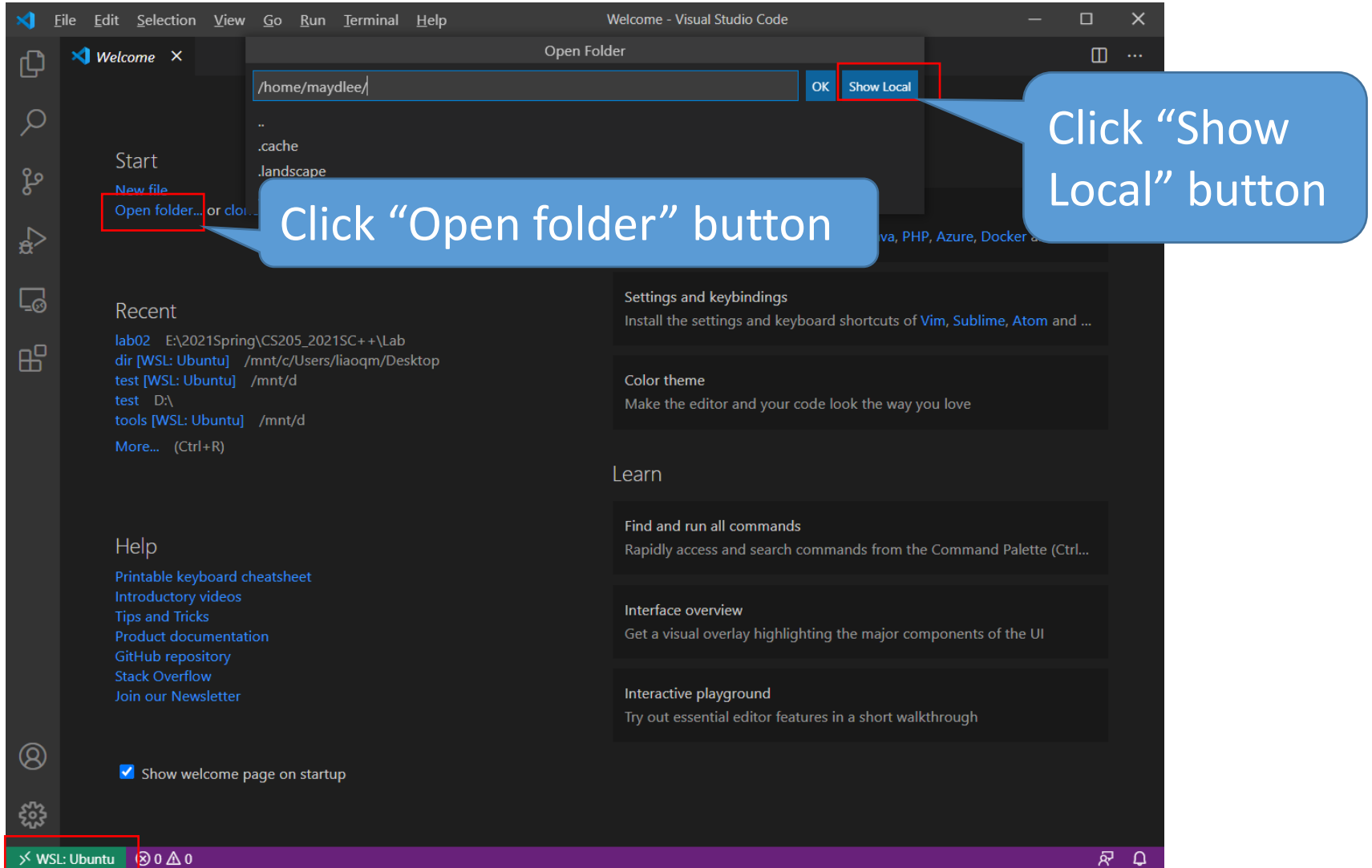
4.1 The program compilation process



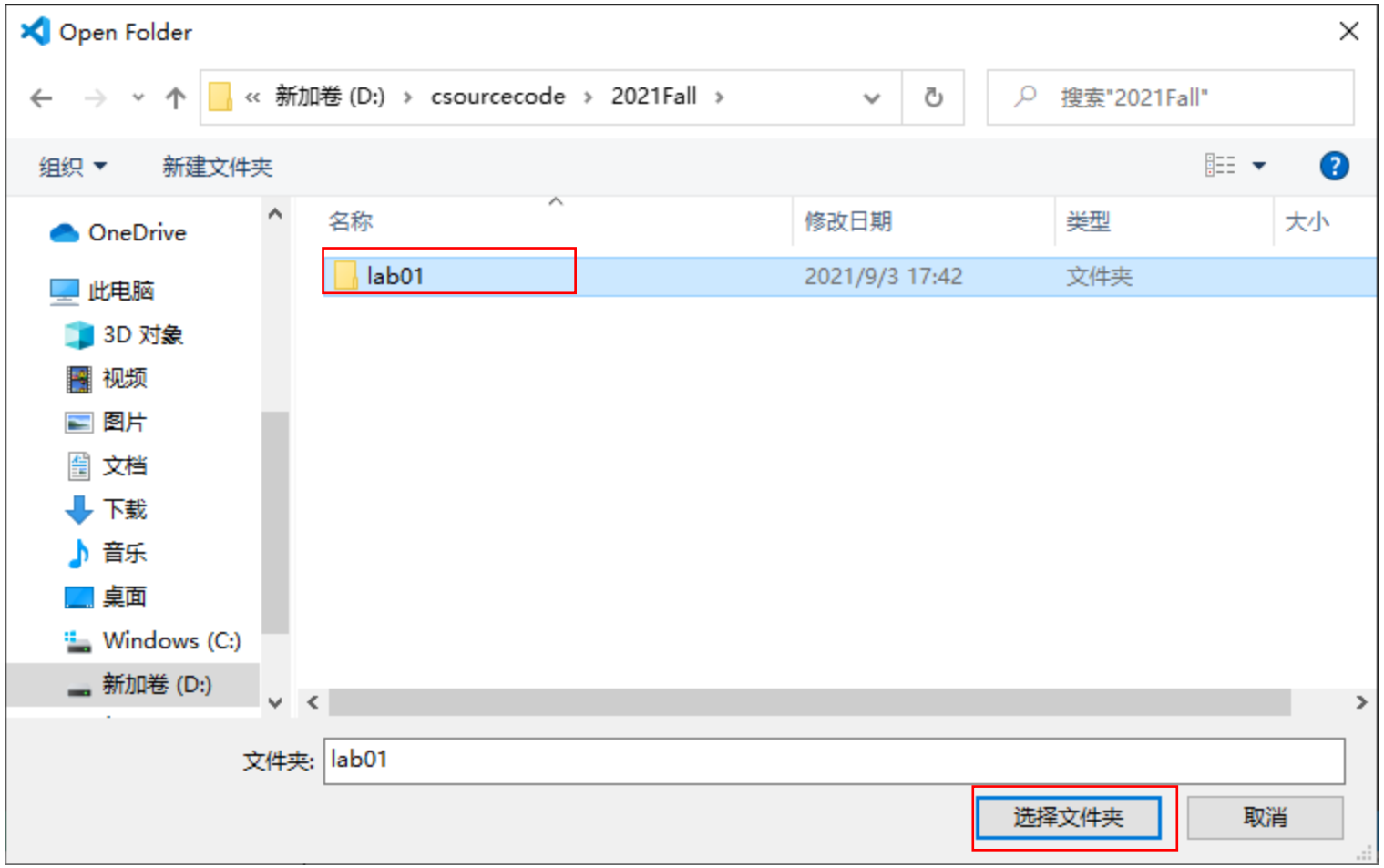
4.2 Compile, Link and Run C programs

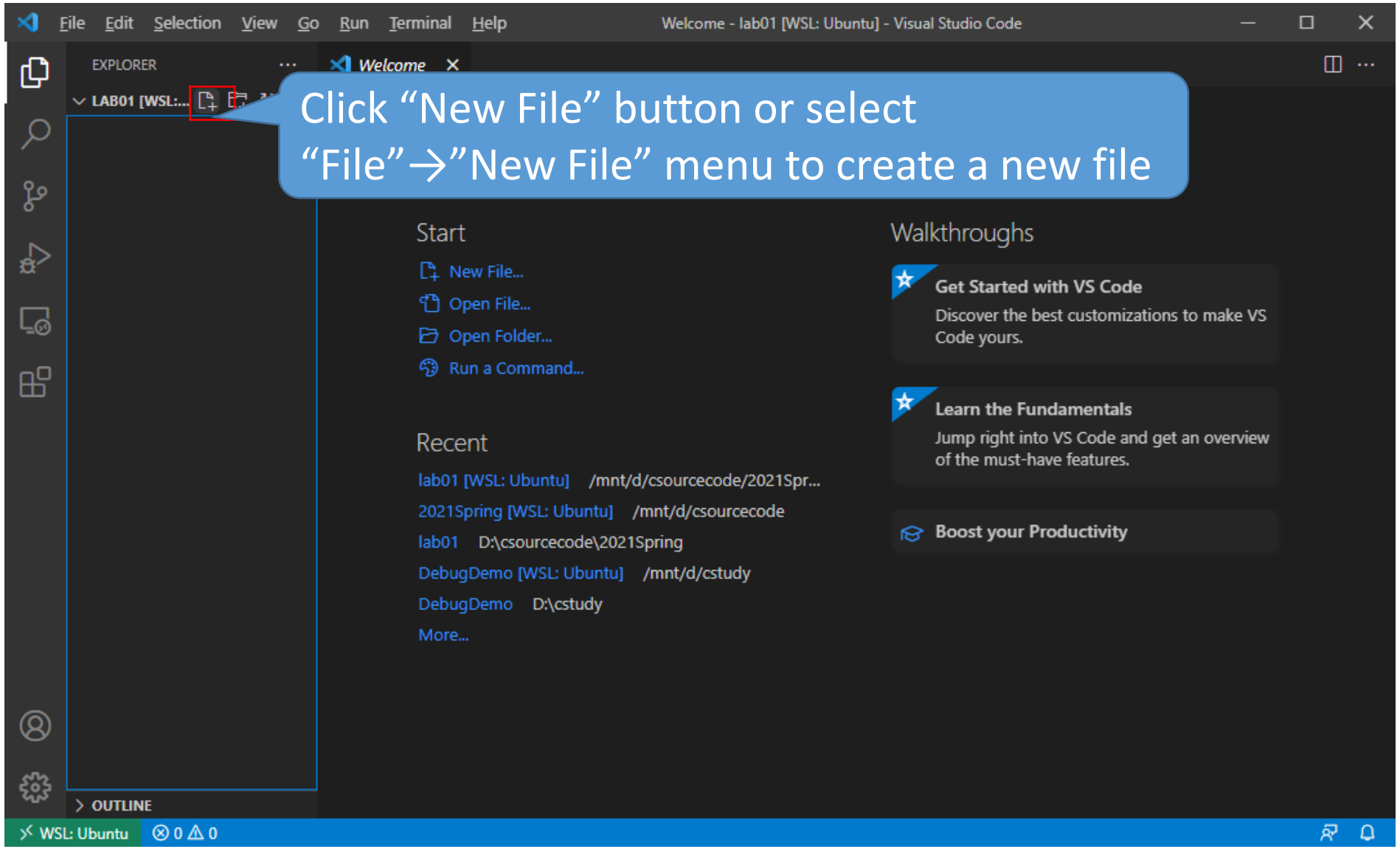
Compile/Link/Run a simple C program – hello.c

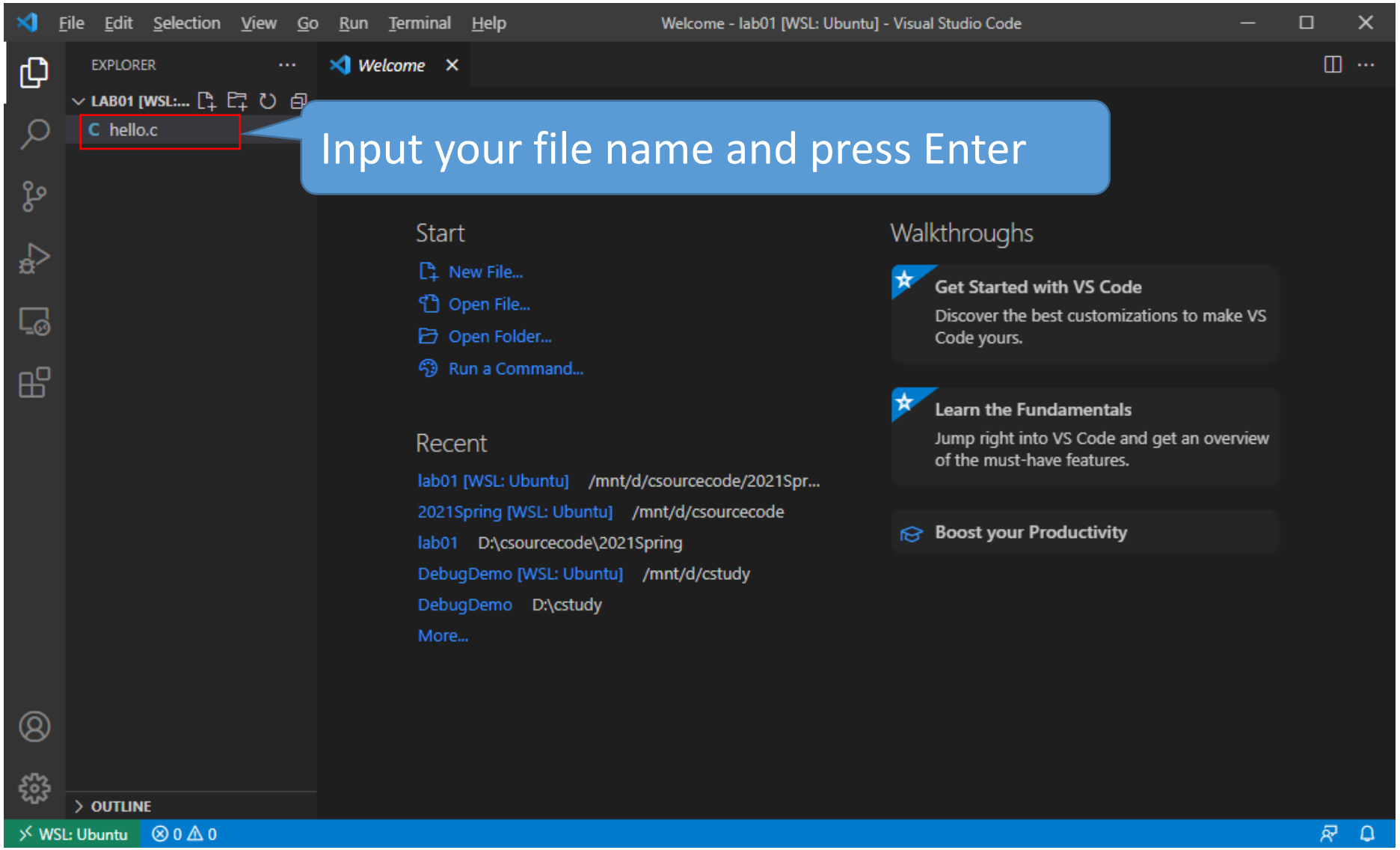
Write your codes in VScode



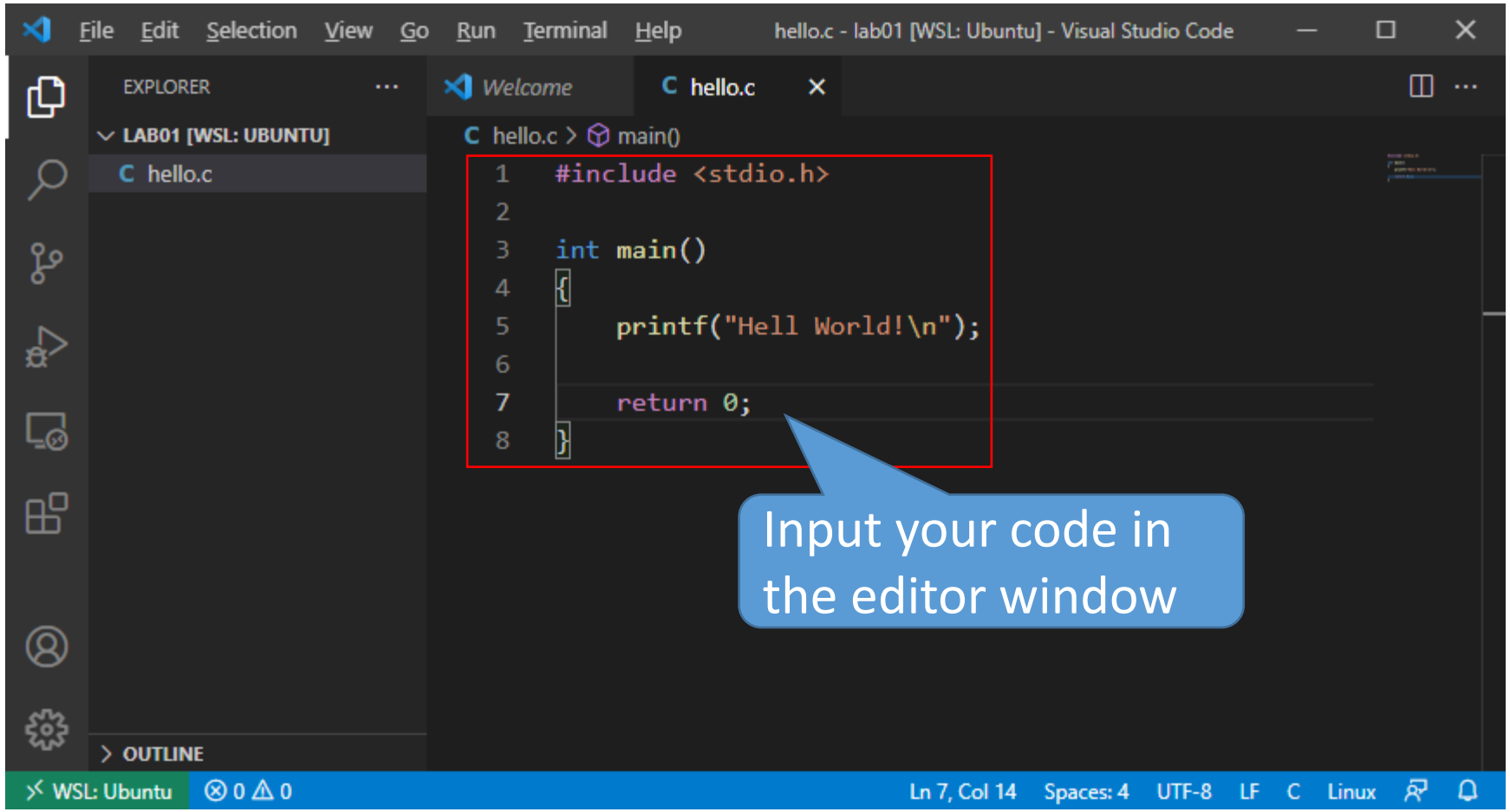
Find your folder where the code will be stored and select the folder.

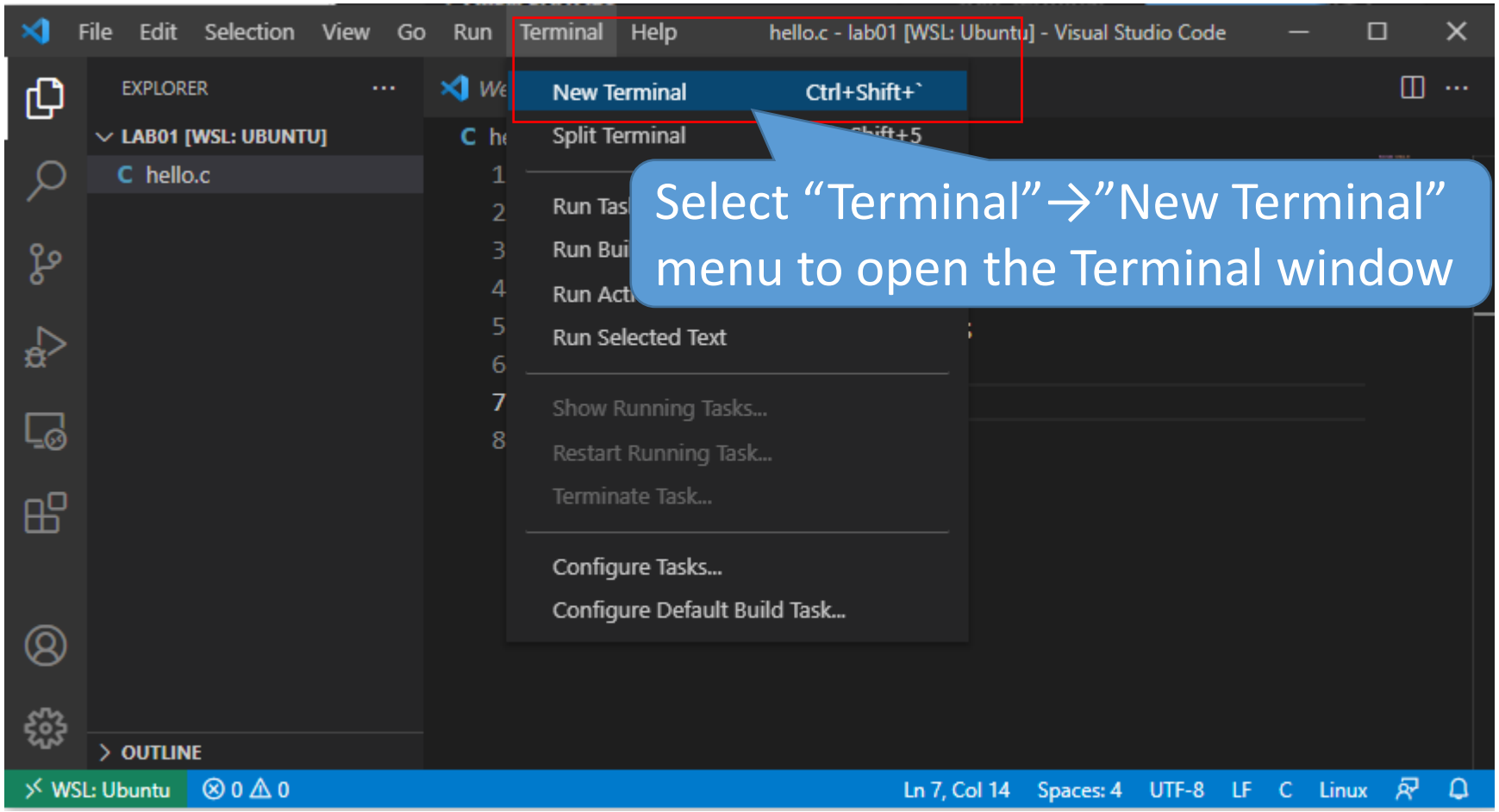



File Edit Selection View Go Run Terminal Help
Welcome - lab01 [WSL: Ubuntu] - Visual Studio Code
EXPLORER
Welcome
LAB01 [WSL:...
Click “New File” button or select
“File”→”New File” menu to create a new file
Start
New File...
Open File...
Open Folder...
Run a Command...
Recent
lab01 [WSL: Ubuntu] /mnt/d/csourcecode/2021Spr...
2021Spring [WSL: Ubuntu] /mnt/d/csourcecode
lab01 D:\csourcecode\2021Spring
DebugDemo [WSL: Ubuntu] /mnt/d/cstudy
DebugDemo D:\cstudy
More...
Walkthroughs
Get Started with VS Code
Discover the best customizations to make VS Code yours.
Learn the Fundamentals
Jump right into VS Code and get an overview of the must-have features.
Boost your Productivity
OUTLINE
WSL: Ubuntu
0 0


File Edit Selection View Go Run Terminal Help
Welcome - lab01 [WSL: Ubuntu] - Visual Studio Code
EXPLORER
LAB01 [WSL:...
hello.c
Welcome
Input your file name and press Enter
Start
New File...
Open File...
Open Folder...
Run a Command...
Recent
lab01 [WSL: Ubuntu] /mnt/d/csourcecode/2021Spr...
2021Spring [WSL: Ubuntu] /mnt/d/csourcecode
lab01 D:\csourcecode\2021Spring
DebugDemo [WSL: Ubuntu] /mnt/d/cstudy
DebugDemo D:\cstudy
More...
Walkthroughs
Get Started with VS Code
Discover the best customizations to make VS Code yours.
Learn the Fundamentals
Jump right into VS Code and get an overview of the must-have features.
Boost your Productivity
OUTLINE
WSL: Ubuntu
0 0

Input the code below and save the file.




File Edit Selection View Go Run Terminal Help
hello.c - lab01 [WSL: Ubuntu] - Visual Studio Code
EXPLORER
LAB01 [WSL: UBUNTU]
hello.c
New Terminal Ctrl+Shift+`
Split Terminal
Run Selected Text
Show Running Tasks...
Restart Running Task...
Terminate Task...
Configure Tasks...
Configure Default Build Task...
Select “Terminal”→”New Terminal” menu to open the Terminal window
OUTLINE
WSL: Ubuntu
Ln 7, Col 14 Spaces: 4 UTF-8 LF C Linux

Use gcc to compile the .c file.

hello.c

```c
#include <stdio.h>

int main()
{
    printf("Hello World!\n");

    return 0;
}
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL

maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ gcc -c hello.c
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ls
hello.c  hello.o
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ gcc hello.o -o hello
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ls
hello  hello.c  hello.o
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ./hello
Hello World!
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$
```

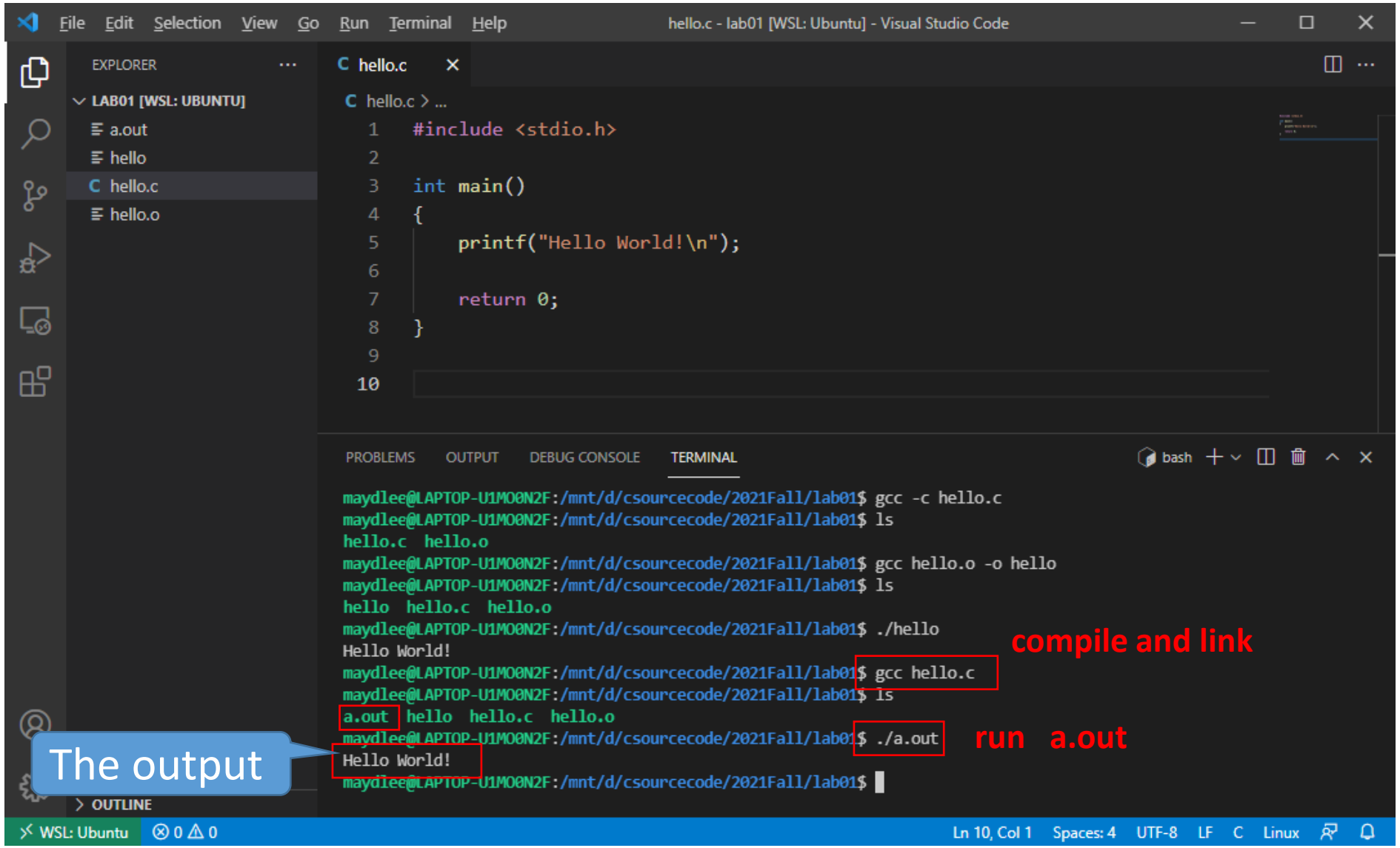
compile

link

run

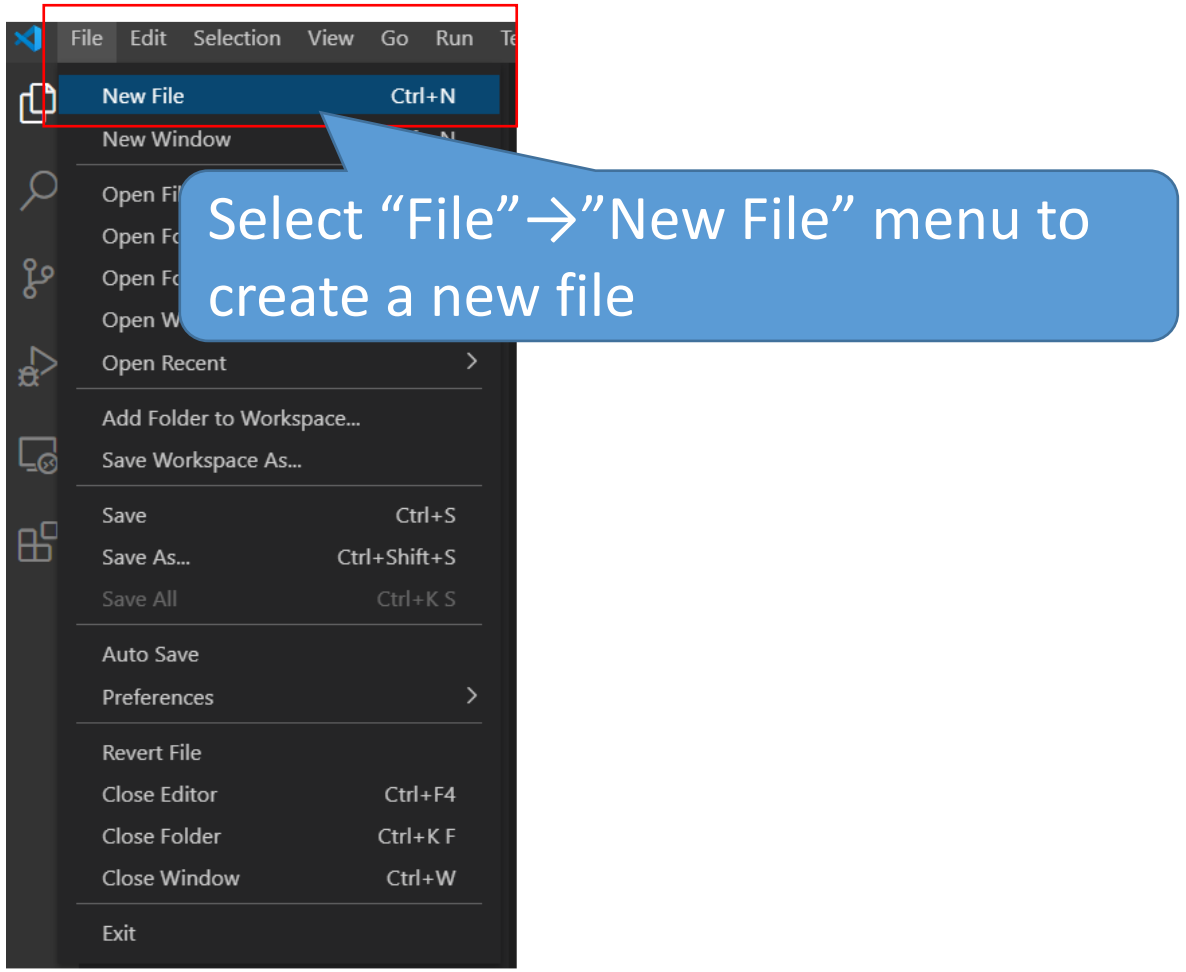
The output

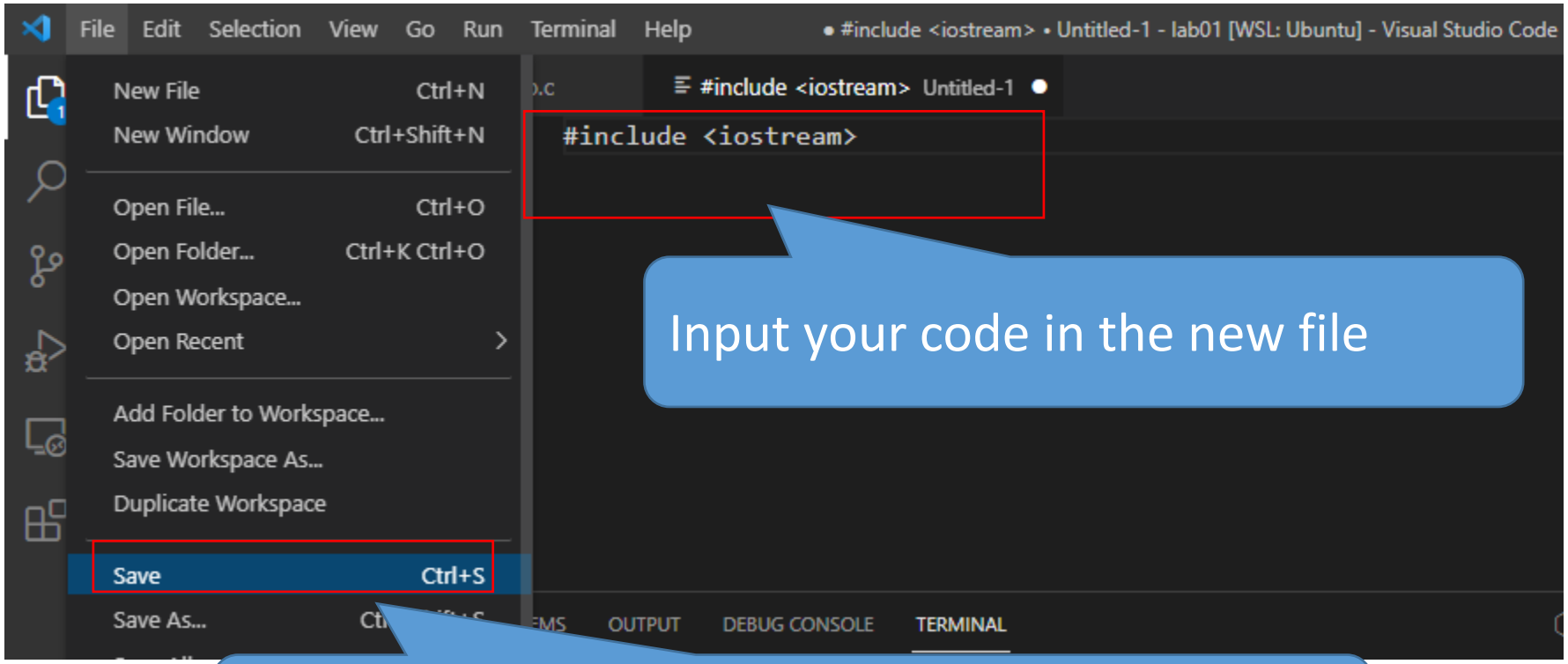
The default output executable file is called “a.out”(Unix and Mac OS) if you don’t specify the name in compiling and linking step.

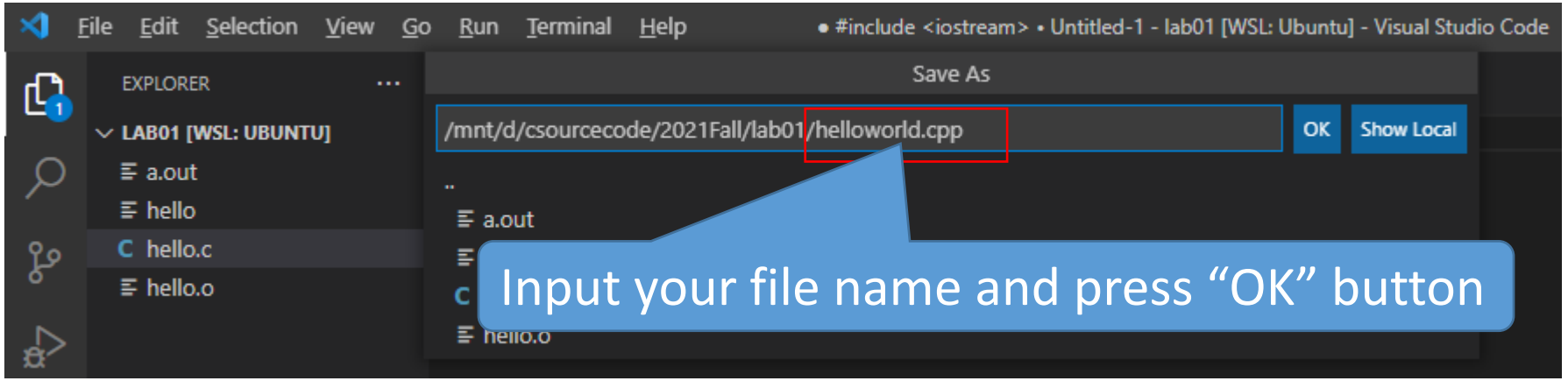


4.3 Compile, Link and Run C++ programs

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




File Edit Selection View Go Run Terminal Help
• #include <iostream> • Untitled-1 - lab01 [WSL: Ubuntu] - Visual Studio Code
New File Ctrl+N
New Window Ctrl+Shift+N
Open File... Ctrl+O
Open Folder... Ctrl+K Ctrl+O
Open Workspace...
Open Recent
Add Folder to Workspace...
Save Workspace As...
Duplicate Workspace
Save Ctrl+S
Save As...
#include <iostream> Untitled-1
#include <iostream>
OUTPUT
DEBUG CONSOLE
TERMINAL
Input your code in the new file
Select “File”→”Save” menu to save the new file



hello.c helloworld.cpp ×

helloworld.cpp > main()

```cpp
#include <iostream>

using namespace std;

int main()
{
    cout << "Hello World!!!" << endl;

    return 0;
}
```

You need to use **g++** to compile C++ program, as follows. We use the **-o** option to specify the output file name.

```
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ g++ -c helloworld.cpp
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ls
a.out  hello  hello.c  hello.o  helloworld.cpp  helloworld.o
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ g++ helloworld.o -o helloworld
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ls
a.out  hello  hello.c  hello.o  helloworld  helloworld.cpp  helloworld.o
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ./helloworld
Hello World!!!
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$
```

compile

link

run

The output

```
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ g++ -o helloworld2 helloworld.cpp
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ls
a.out  hello  hello.c  hello.o  helloworld  helloworld.cpp  helloworld.o  helloworld2
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ./helloworld2
Hello World!!!
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$
```

compile and link

run

The output

5 Terminal Output

5.1 Formatting output with ***printf***

printf (*format-control-string, other-arguments*)

format-control-string describes the output format, which consists of conversion specifiers, field widths, precisions and literal characters with percent sign(%).

Conversion specifier	Description
`d`	Display as a *signed decimal integer*.
`i`	Display as a *signed decimal integer*. [*Note:* The `i` and `d` specifiers are *different* when used with `scanf`.]
`o`	Display as an *unsigned octal integer*.
`u`	Display as an *unsigned decimal integer*.
`x` or `X`	Display as an *unsigned hexadecimal integer*. `X` causes the digits `0-9` and the *uppercase* letters `A-F` to be used in the display and `x` causes the digits `0-9` and the *lowercase* letters `a-f` to be used in the display.
`h`, `l` or `ll` (letter "ell")	Place *before* any integer conversion specifier to indicate that a `short`, `long` or `long long` integer is displayed, respectively. These are called length modifiers.
`e` or `E`	Display a floating-point value in *exponential notation*.
`f` or `F`	Display floating-point values in *fixed-point notation* (`F` is supported in the Microsoft Visual C++ compiler in Visual Studio 2015 and higher).
`g` or `G`	Display a floating-point value in either the *floating-point form* `f` or the exponential form `e` (or `E`), based on the magnitude of the value.
`L`	Place before any floating-point conversion specifier to indicate that a `long double` floating-point value should be displayed.

Type	Format Specifier
int	%d
char	%c
float	%f
double	%lf
short int	%hd
unsigned int	%u
long int	%li
long long int	%lli
unsigned long int	%lu
unsigned long long int	%llu
signed char	%c
unsigned char	%c
long double	%Lf

Example:

```
int a=1234;
float f=123.456;
char ch='a';
printf("%8d,%2d\n",a,a);
printf("%f,%8f,%8.1f,%.2f,%.2e\n",f,f,f,f,f);
printf("%3c\n",ch);
```

Sample output:

```
    1234,1234
123.456000,123.456000,    123.5,123.46,1.23e+02
   a
```

5.2 *cout*

cout << variable1(expression1) [<< variable2 << variable n];

hello.c | outdemo.cpp

outdemo.cpp > main()

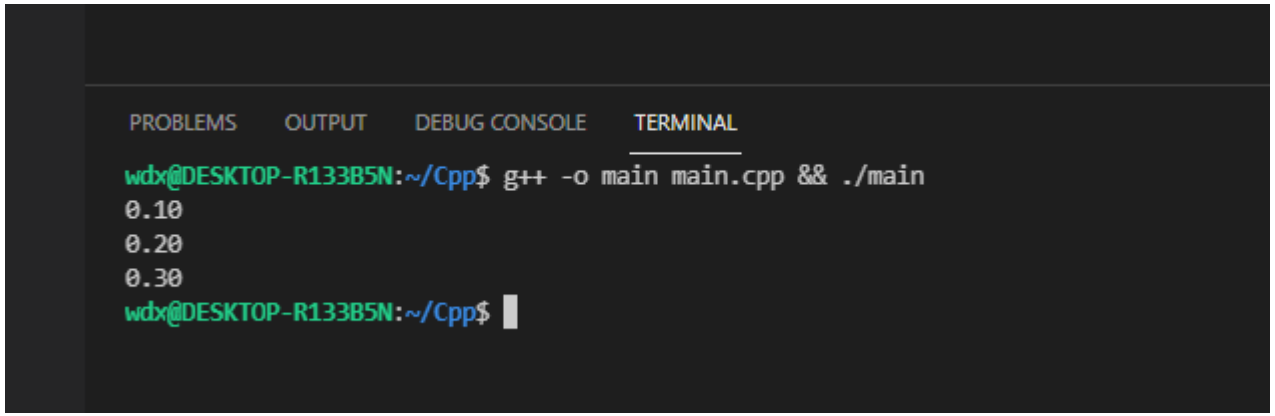
```
4
5   int main()
6   {
7       int a = 10;
8       float b = 45.7;
9       char c = 'A';
10
11      cout << "a = " << a << ",b = " << b << ",c = " << c << endl;
12
13      return 0;
14  }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL bash

```
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ g++ outdemo.cpp
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$ ./a.out
a = 10,b = 45.7,c = A
maydlee@LAPTOP-U1MO0N2F:/mnt/d/csourcecode/2021Fall/lab01$
```

6.1 Exercises

Write a program to initialize three variables which equal to 0.1, 0.2, 0.3, then print them with two decimal points.



Your output should look like something above. You can use printf to achieve this, or you can explore the cout way.

6.2 Exercises

Copy the following code into 3 files, and compile them together to an executable file. Find the bugs if there are some.

main.cpp

```
#include <iostream>
#include "Add.h"

int main()
{
   int num1 =   2147483647;
   int num2 =   1;
   int result =   0;

   result = add(num1, num2);

   cout << “The result is ” << result << endl;
   return 0;
}
```

add.h

```
#pragma once

int add(int n1, int n2);
```

add.cpp

```
#include "add.h"

int Add(int number1, int number2);
{
return n1 + n2;
}
```