

Practice of Information Processing

(IMACU)

First lecture (part 1): setup

Makoto Hirota

About lecturer

- **Makoto Hirota**

- Institute of Fluid Science, Associate Professor
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Lecture style

- **Google Classroom**

[TB14131] Practice of Information Processing

(情報処理演習)

Class code: f724i3w

- **Announcements**
- Slide files, sample program sources
- Submissions
 - Exercises
 - Mid-term and Final Assignments

- **In-person classes**

- Wednesday 4th-5th periods
- Place: MM104 (Bld. A05) Kawauchi
- **Bring your own devices (windows or mac laptop is recommended)**

Schedule

- **10/2 (Wed) 14:40-17:50 (Setup)**
- **10/9 (Wed) 14:40-17:50 (Introduction \Rightarrow Lecture)**
- **10/16 (Wed) 14:40-17:50**
- **10/23 (Wed) 14:40-17:50 (Mid-term assignments)**
- **10/30 (Wed) 14:40-17:50**
- **11/6 (Wed) 14:40-17:50**
- **11/13 (Wed) 14:40-17:50 (Final assignments)**
- **11/20 (Wed) 14:40-17:50 No class (spare)**

Today's job: Setup software

For Windows 10/11 users,

- **7-zip**
 - Used as a file archiver/unarchiver
- **MinGW-w64**
 - Used as C-language compiler
- **Visual Studio Code**
 - Used as editor

(If you prefer other compilers and editors, you may use them on your own responsibility.)

e.g., Windows Subsystem for Linux (WSL)

For Mac user

Please setup the followings by yourself.

- **Visual Studio Code**
- **Compiler**
 - Please use Xcode
 - You can find it by searching “C language command line tool”

If you have questions

- Please ask me or TA during the class time.
 - Ayapilla Aditya Sai Pranith
(ayapilla.aditya.sai.pranith.t6@dc.tohoku.ac.jp)


If you didn't bring your PC

- Please follow the today's instruction below at home. **Finish the setup until the next class.**

Installation of 7-zip

Download 7-Zip

- Google “7-zip” and access <https://www.7-zip.org/>



Home
[7z Format](#)
[LZMA SDK](#)
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7-Zip

7-Zip is a file archiver with a high compression ratio.

Download 7-Zip 23.01 (2023-06-20) for Windows:

Link	Type	Windows	Size
Download	.exe	64-bit x64	1.5 MB
Download	.exe	32-bit x86	1.2 MB
Download	.exe	64-bit ARM64	1.5 MB

License

7-Zip is **free software** with **open source**. The most of the code is under the **GNU LGPL** license. Some parts of the code are under the BSD 3-clause License. Also there is unRAR license restriction for some parts of the code. Read [7-Zip License](#) information.

You can use 7-Zip on any computer, including a computer in a commercial organization. You don't need to register or pay for 7-Zip.

The main features of 7-Zip

- High compression ratio in [7z format](#) with **LZMA** and **LZMA2** compression
- Supported formats:
 - Packing / unpacking: 7z, XZ, BZIP2, GZIP, TAR, ZIP and WIM
 - Unpacking only: APFS, AR, ARJ, CAB, CHM, CPIO, CramFS, DMG, EXT, FAT, GPT, HFS, IHEX, ISO, LZH, LZMA, MBR, MSI, NSIS, NTFS, QCOW2, RAR, RPM, SquashFS, UDF, UEFI, VDI, VHD, VHDX, VMDK, XAR and Z.
- For ZIP and GZIP formats, **7-Zip** provides a compression ratio that is 2-10 % better than the ratio provided by PKZip and WinZip
- Strong AES-256 encryption in 7z and ZIP formats
- Self-extracting capability for 7z format
- Integration with Windows Shell
- Powerful File Manager
- Powerful command line version
- Plugin for FAR Manager
- Localizations for 87 languages

7-Zip works in Windows 11 / 10 / 8 / 7 / Vista / XP / 2022 / 2019 / 2016 / 2012 / 2008 / 2003 / 2000.

[p7zip](#) - the port of the command line version of 7-Zip to Linux/Posix.

On [7-Zip's SourceForge Page](#) you can find a forum, bug reports, and feature request systems.

Compression ratio

...

7-Zip 23.01	2023-06-20
7-Zip 23.01	

7-Zip 23.00	2023-05-07
7-Zip 23.00 beta	

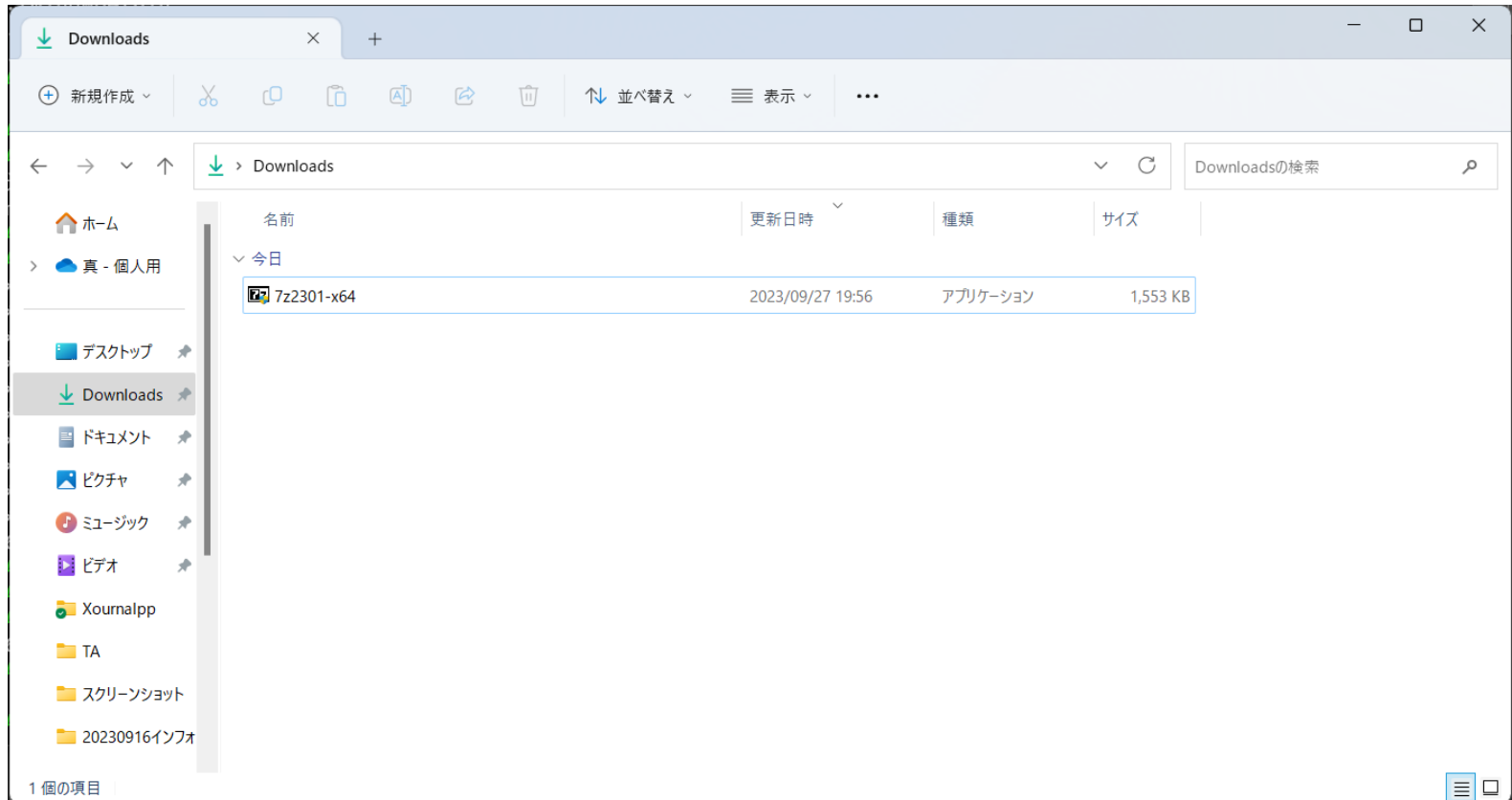
7-Zip 22.01	2022-07-15
7-Zip 22.01	

7-Zip ChangeLog	
History of 7-zip changes	

Download .exe file

Install 7-Zip

- Go to your Downloads folder
- Run “7z2301-x64.exe” and install



Setup of MinGW

1. Setup MinGW
2. Configuration of Path
3. Operation check

Search “mingw builds binaries”



mingw builds binary



動画

画像

ニュース

ショッピング

書籍

地図

フライト

ファイナンス

すべてのフィルタ ▼ | ツール

約 1,440,000 件 (0.42 秒)



GitHub

<https://github.com/niXman/mingw-builds-binaries>

niXman/mingw-builds-binaries

The online installer provides GUI for selection parameters of **build** you need and archive extraction into selected dir. It also creates a shortcut in start menu ...



GitHub

<https://github.com/niXman/releases>

Releases · niXman/mingw-builds-binaries

MinGW-W64 compiler binaries. Contribute to niXman/mingw-builds-binaries development by creating an account on GitHub.



MinGW-w64

<https://www.mingw-w64.org/downloads/>

Downloads

MingW-W64-builds, Rolling, Windows, 13.1.0/11.0.0, C, C++, Fortran, 4 (gdb, libiconf, python ...
binary tools * GNU Make - a tool which controls the generation of ...
[Pre-built toolchains and...](#) · [w64devkit](#) · [WinLibs.com](#) · [Sources](#)

<https://github.com/niXman/mingw-builds-binaries>

MinGW site

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niXman / mingw-builds-binaries Public

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<> Code Issues 7 Pull requests Actions Projects Security Insights

main ▾ 1 branch 12 tags

Go to file Code ▾

niXman Merge pull request #40 from starg2/patch-1 ... ✓ ecaa196 on May 24 42 commits

.github/workflows	Fix build command in build.yml	4 months ago
LICENSE	Initial commit	last year
README.md	Update README.md	8 months ago

README.md

MinGW-W64-binaries [↗](#)

x86_64 and i686 release build passing

MinGW-W64 compiler binaries

[MinGW-W64 online installer \(VirusTotal\)](#), [\(sources\)](#).

About

MinGW-W64 compiler binaries

- Readme
- GPL-3.0 license
- Activity
- 1.2k stars
- 27 watching
- 103 forks
- Report repository

Releases 11


Release of 13.1.0-rt_v11-rev1 Latest on May 24



[+ 10 releases](#)

Download MinGW binaries

May 24

 niXman

 13.1.0-rt_v11-r...

 ecaa196 

Compare ▾











Release of 13.1.0-rt_v11-rev1

Latest

- Release for GCC-13.1.0 with MinGW-W64 runtime version 11

▼ Assets

10

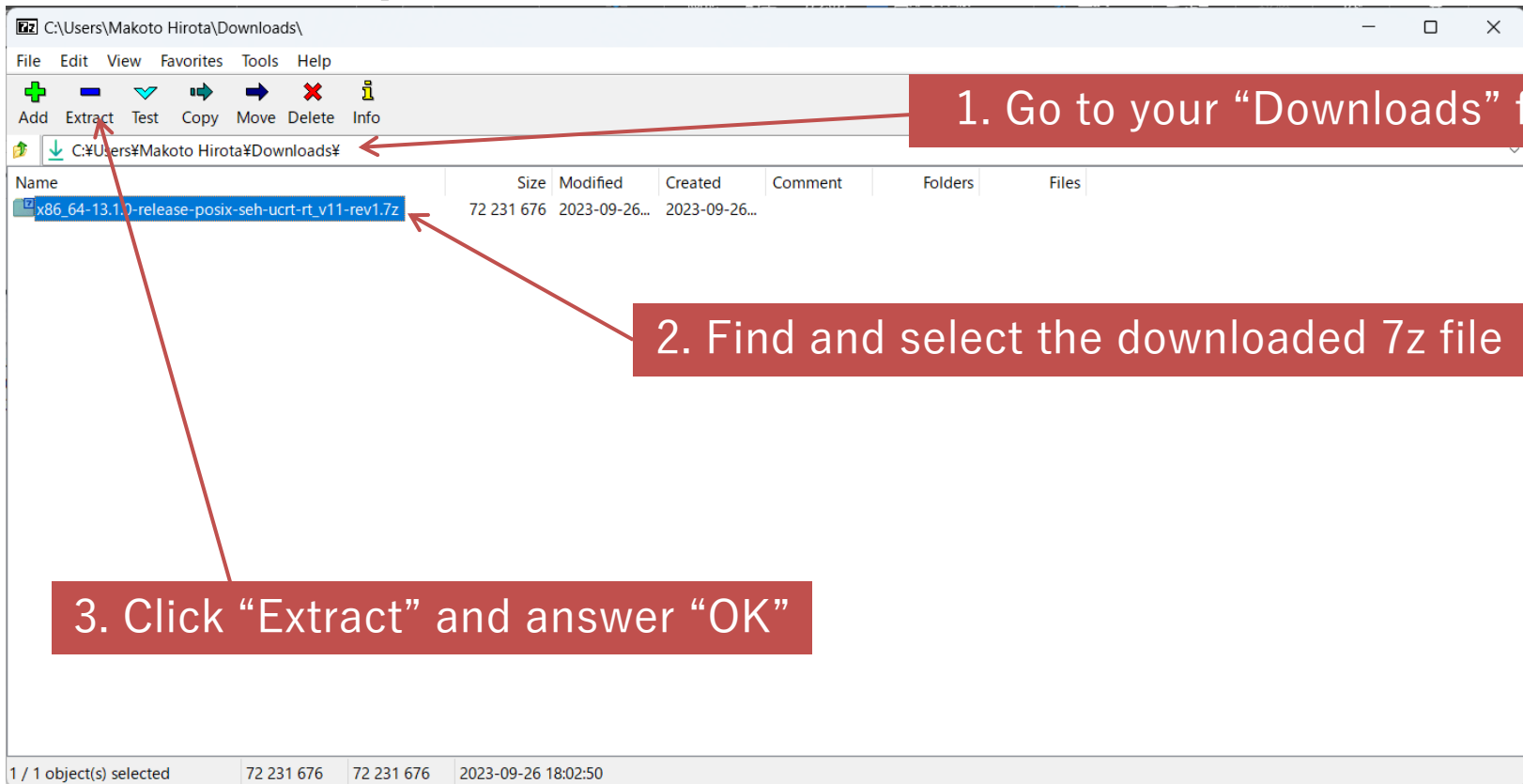
 i686-13.1.0-release-posix-dwarf-msvcrt-rt_v11-rev1.7z	72.7 MB	May 28
 i686-13.1.0-release-posix-dwarf-ucrt-rt_v11-rev1.7z	72.6 MB	May 28
 i686-13.1.0-release-win32-dwarf-msvcrt-rt_v11-rev1.7z	72.7 MB	May 28
 i686-13.1.0-release-win32-dwarf-ucrt-rt_v11-rev1.7z	72.7 MB	May 28
 x86_64-13.1.0-release-posix-seh-msvcrt-rt_v11-rev1.7z	68.9 MB	May 28
 x86_64-13.1.0-release-posix-seh-ucrt-rt_v11-rev1.7z	68.9 MB	May 28
 x86_64-13.1.0-release-win32-seh-msvcrt-rt_v11-rev1.7z	68.9 MB	May 28
 x86_64-13.1.0-release-win32-seh-ucrt-rt_v11-rev1.7z	68.9 MB	May 28
 Source code (zip)		May 24
 Source code (tar.gz)		May 24

Click this and download

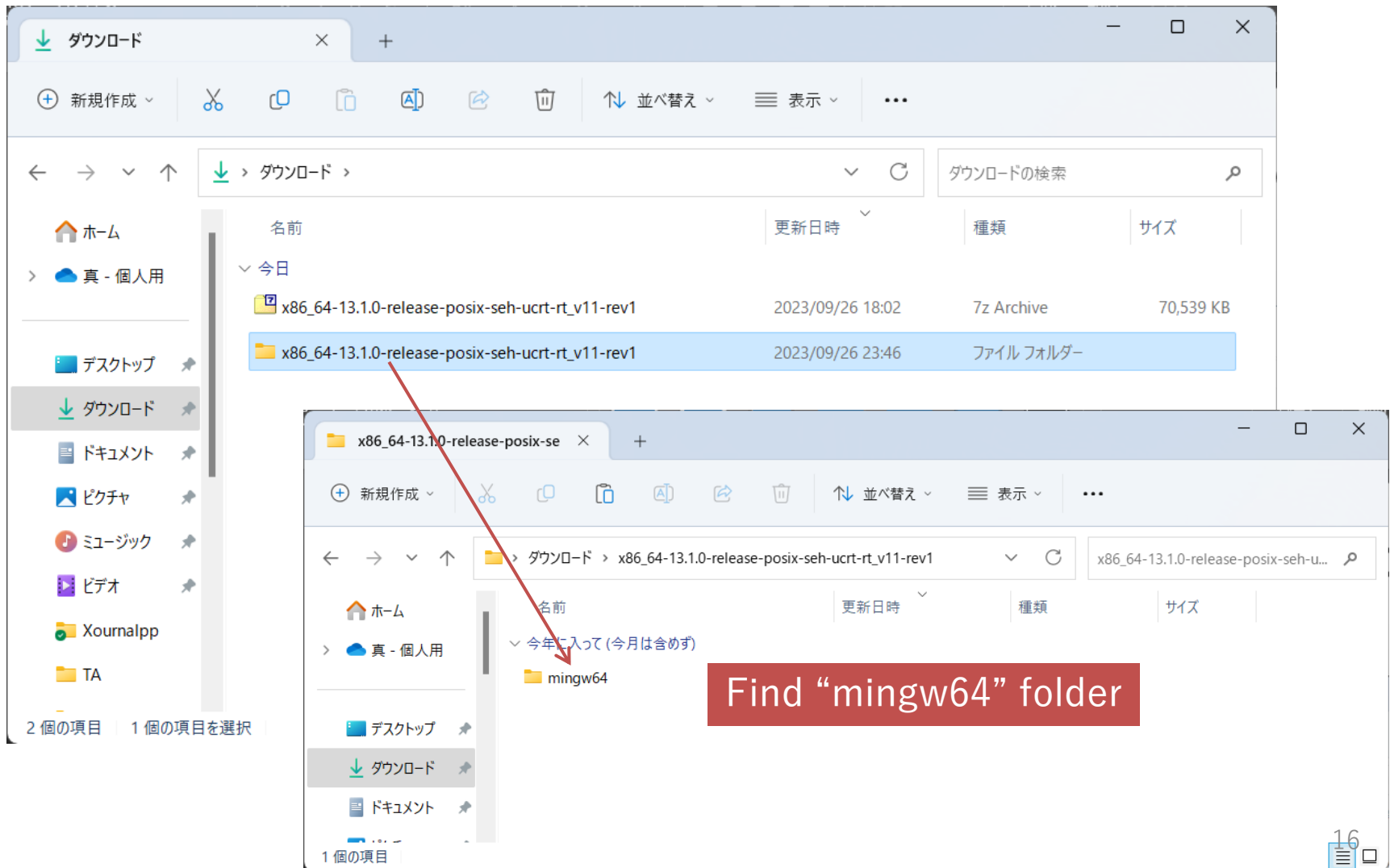
 76  5  13  6  13  10 101 people reacted

Extract the 7z file

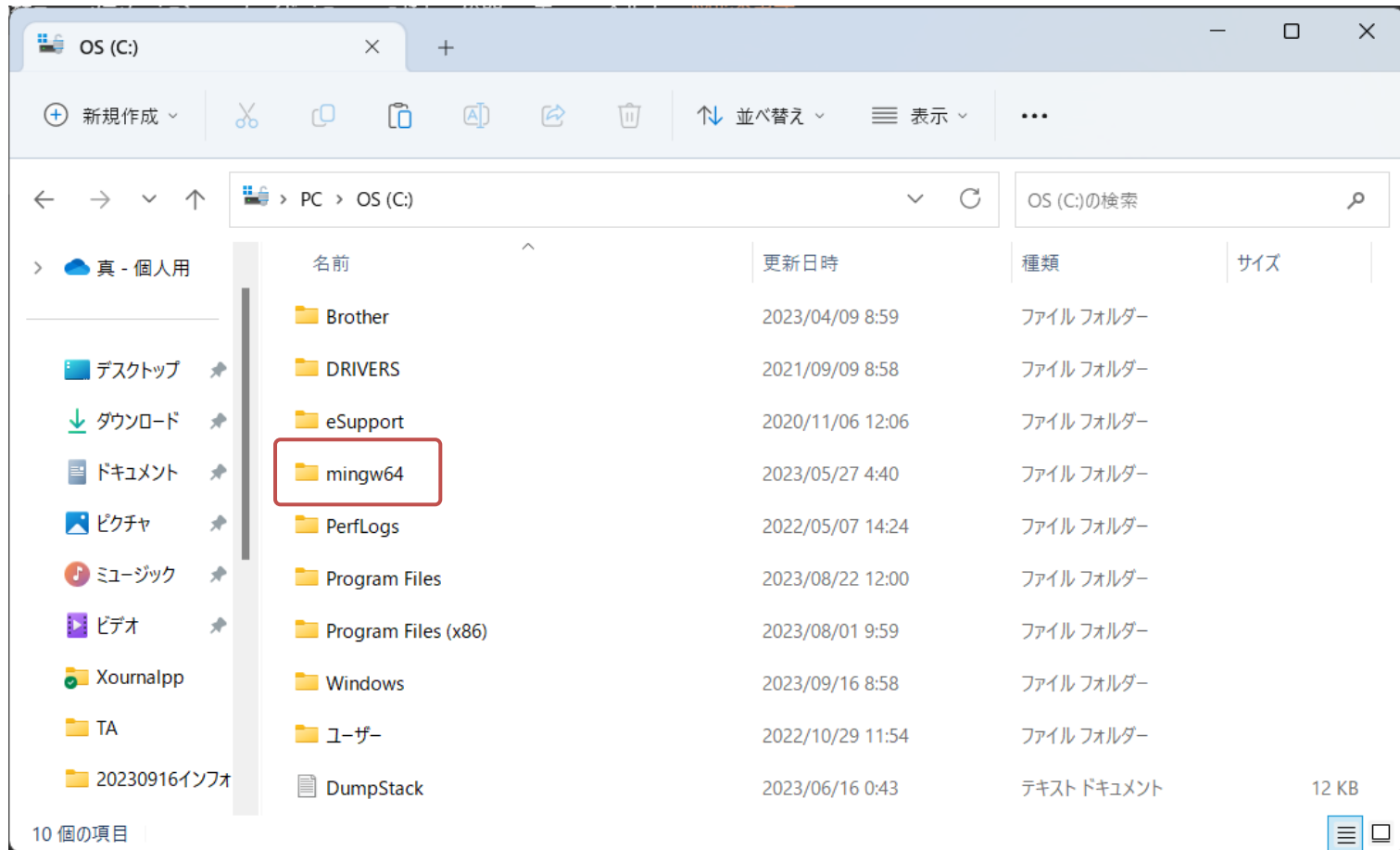
- Run “7-Zip” from the start menu



See “Downloads” in explorer



Move the folder to C:¥

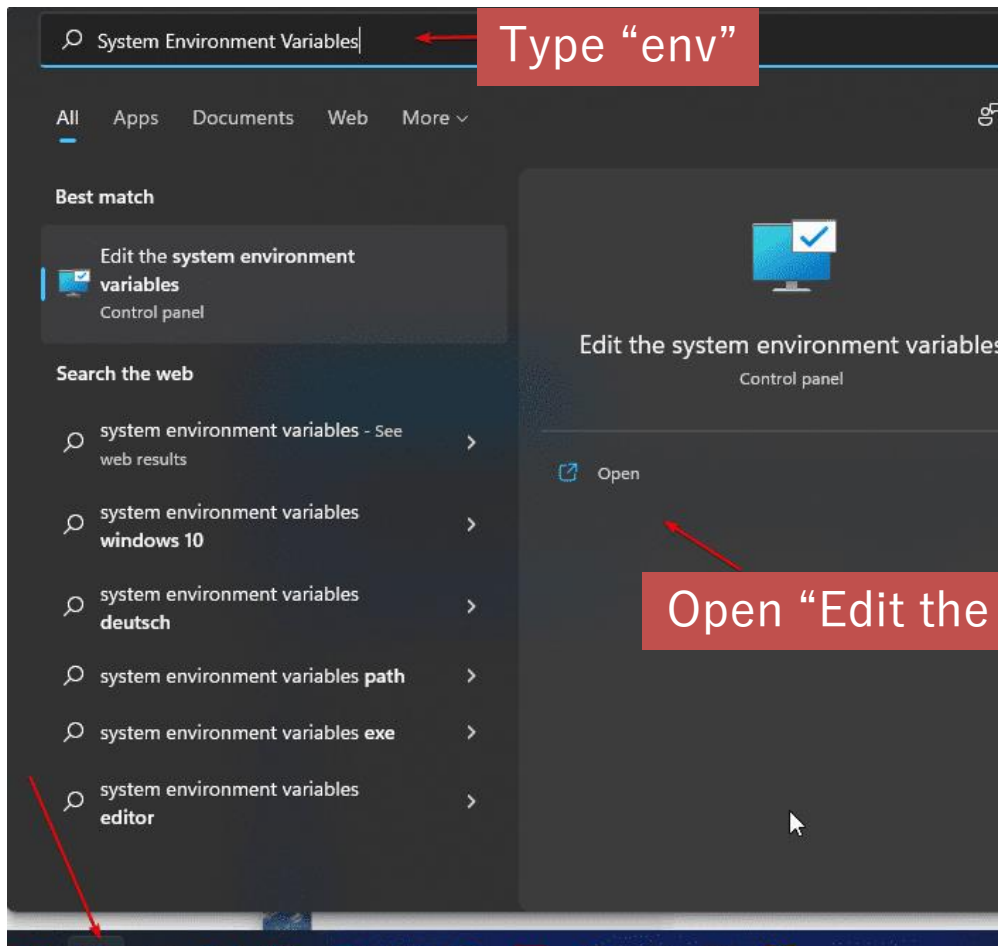


Move the “mignw64” folder to “C:¥mingw64”

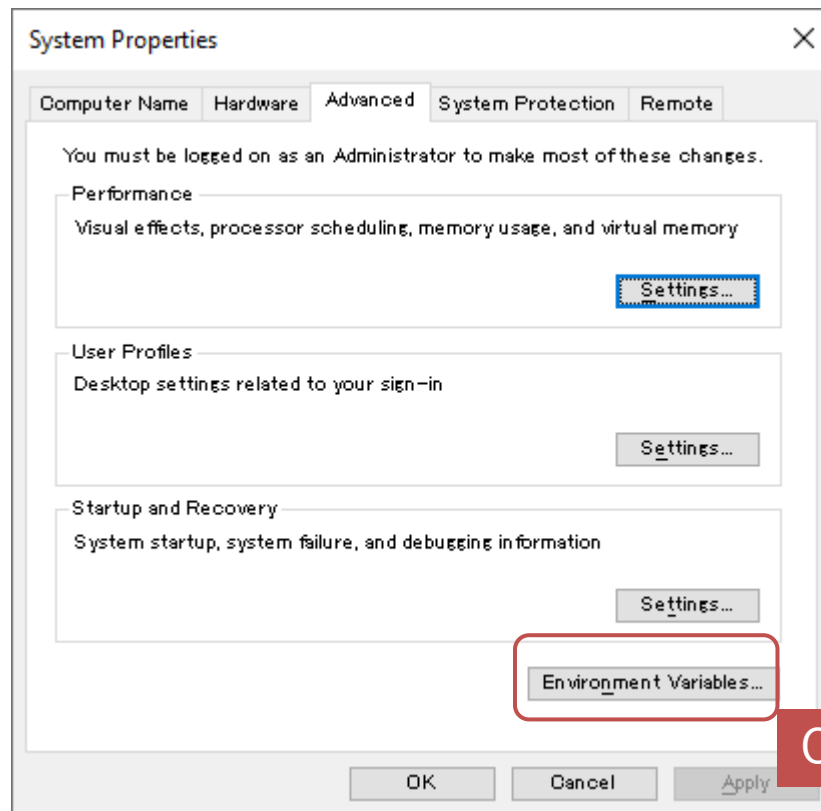
(“¥” is the backslash.)

Configure Environment Variable: Path

- Click the Windows button, type “env” into the search bar and hit Enter.

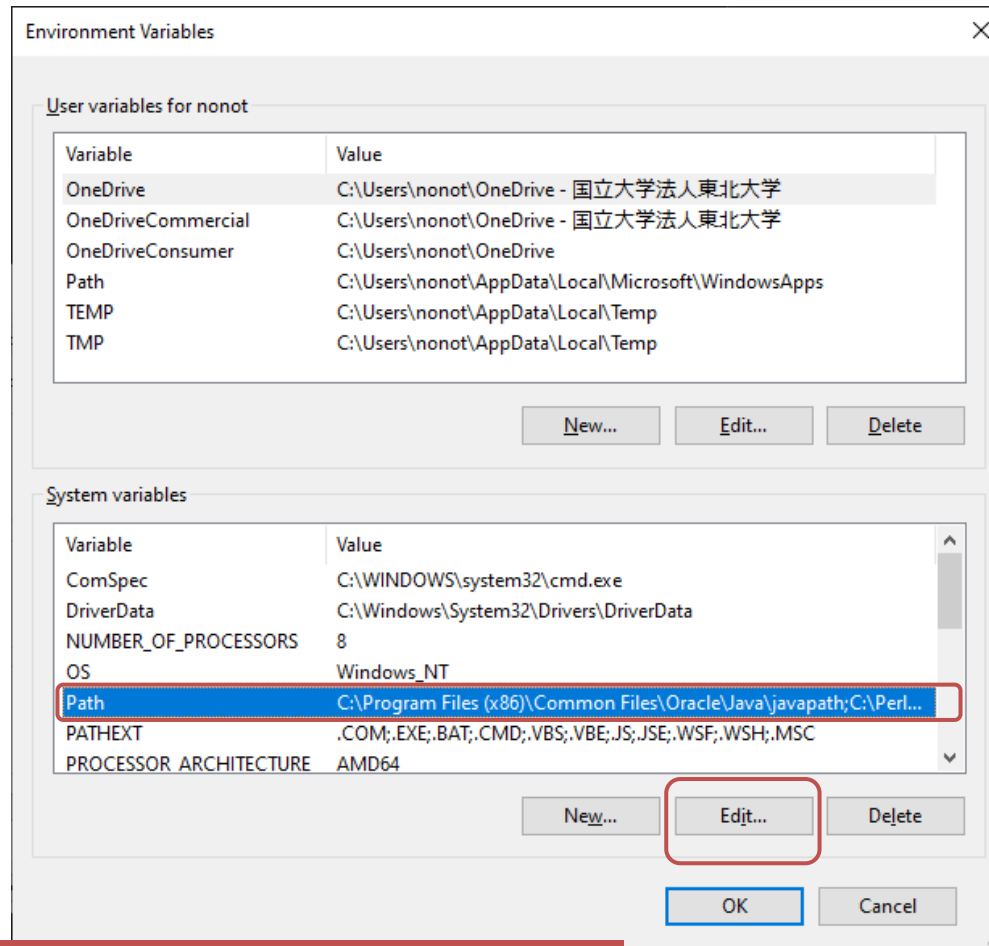


“System Properties” Window



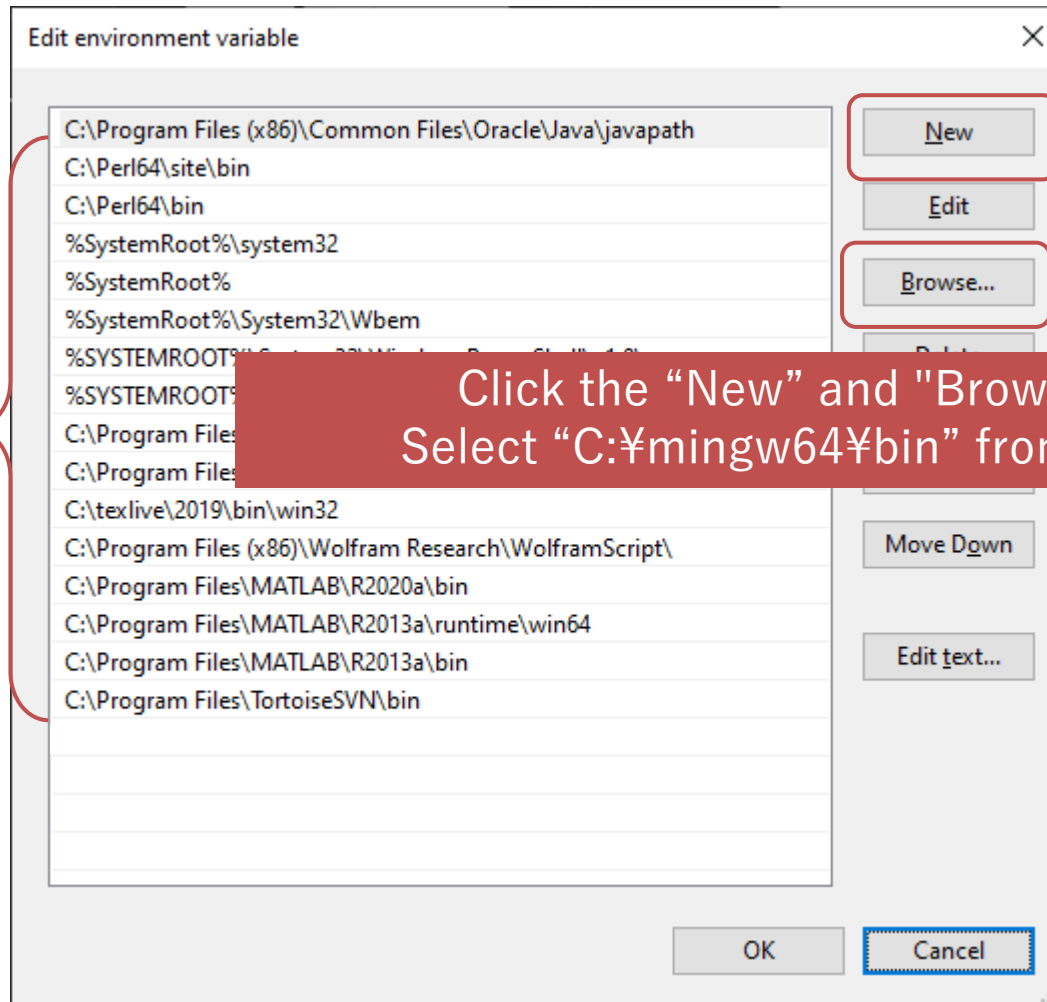
Click “Environment variables”

“Environment Variables” window

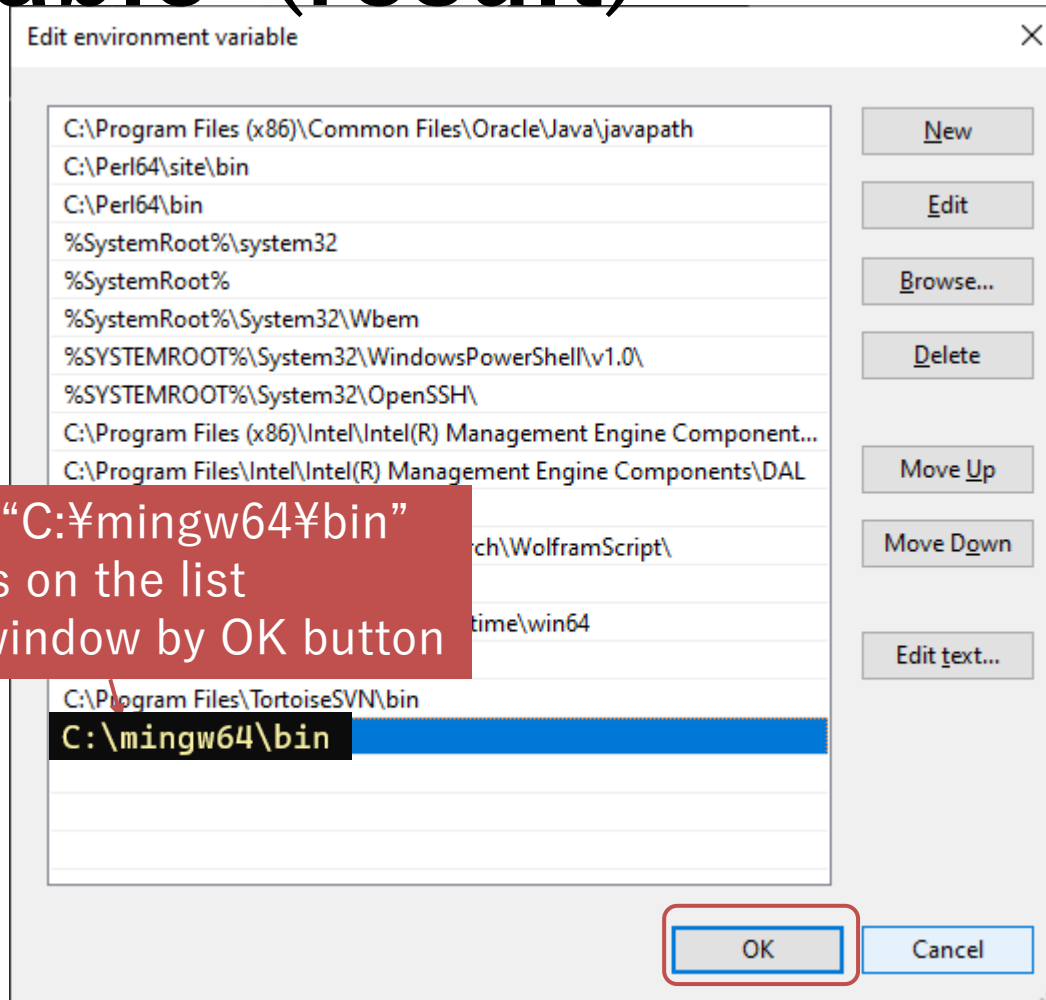


Select “Path” from ”System variables” and
Click edit button

“Edit environment variable”

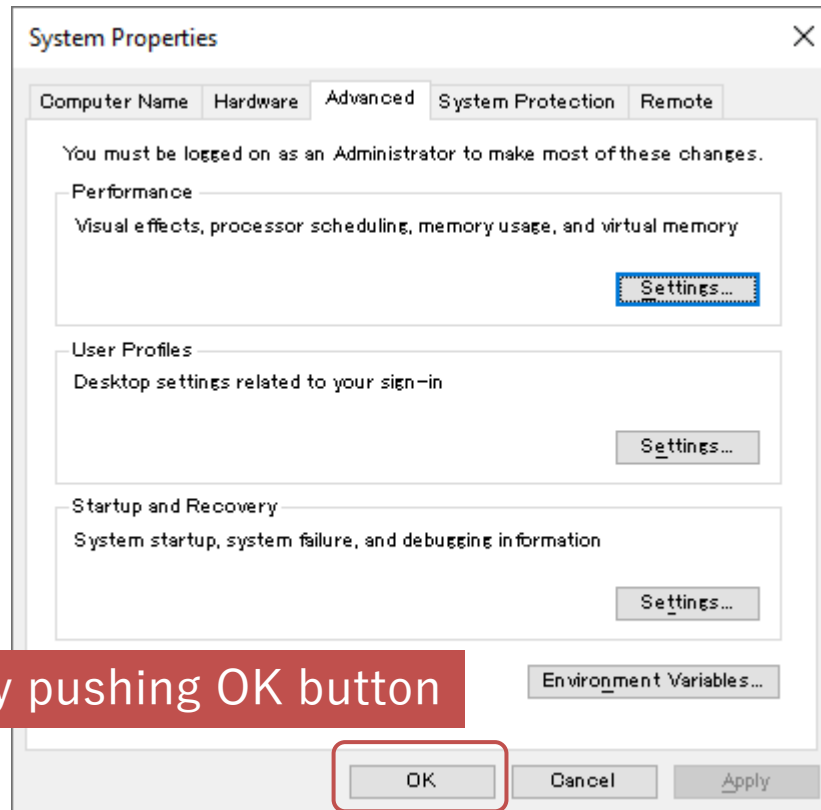


“Edit environment variable” (result)



Confirm “C:¥mingw64¥bin”
is on the list
→ Close window by OK button

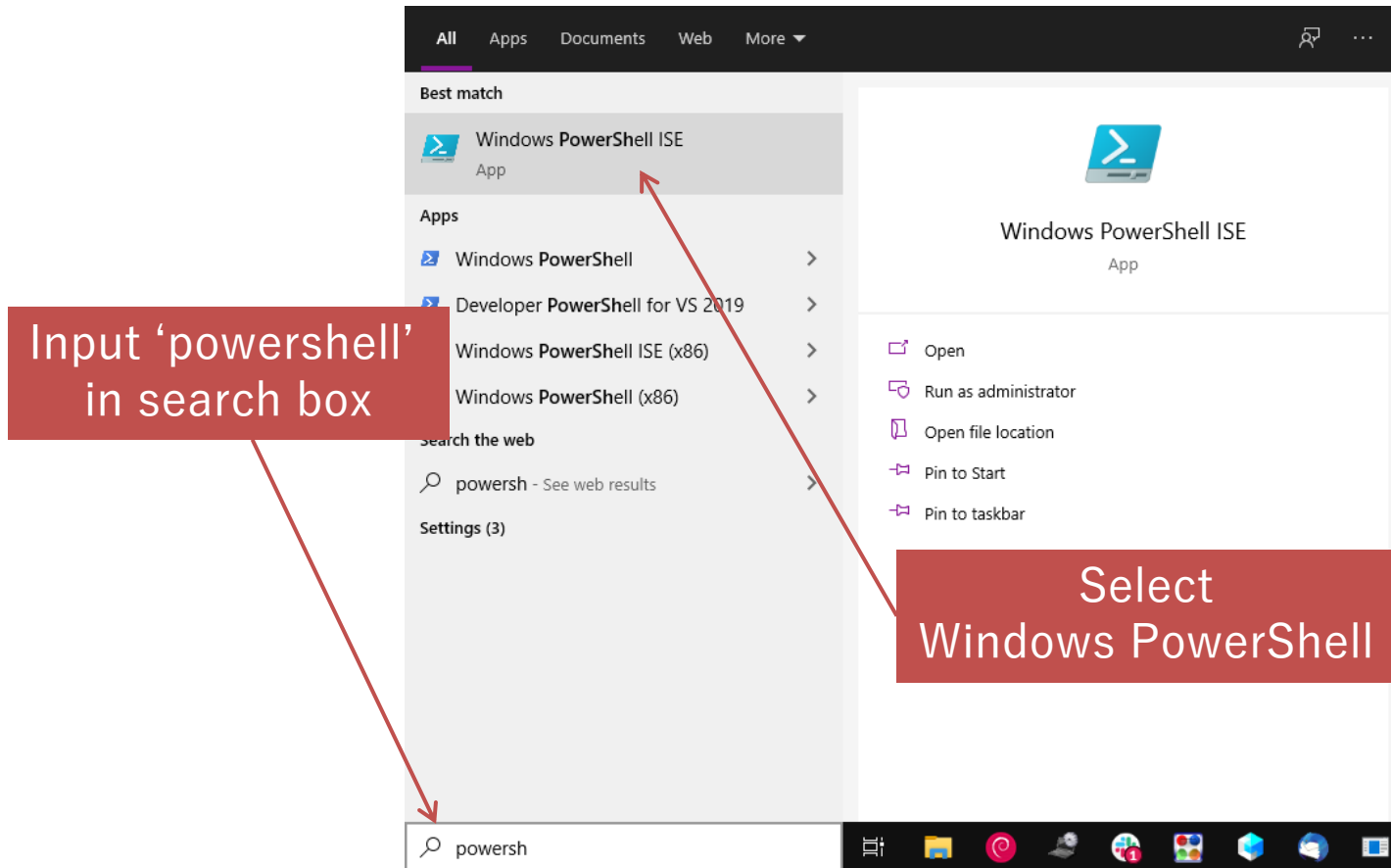
“System Properties” window



Close window by pushing OK button

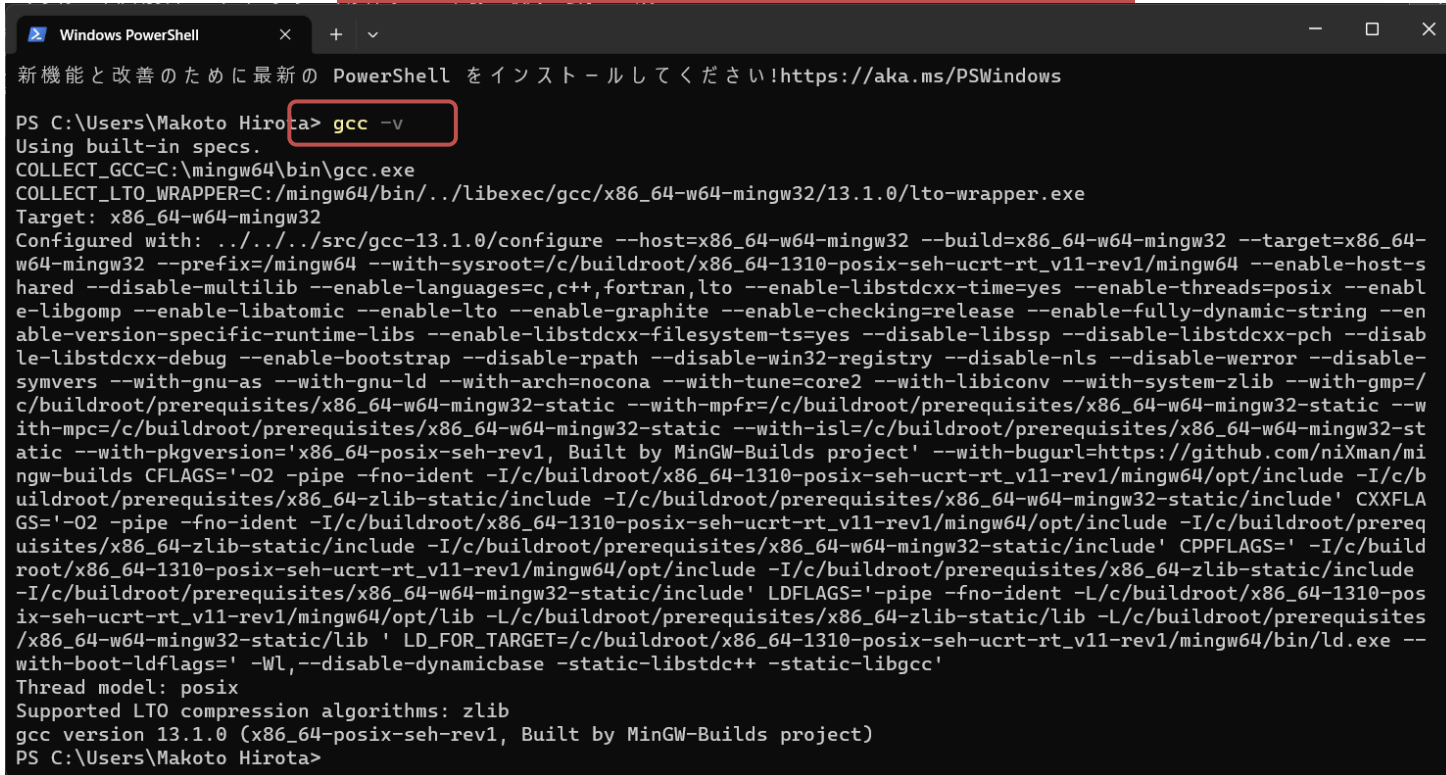
Now, reboot your PC.

Open PowerShell



Check operation of MinGW

Type “gcc -v” and press Enter key



```
Windows PowerShell
新機能と改善のために最新の PowerShell をインストールしてください!https://aka.ms/PSWindows

PS C:\Users\Makoto Hirota> gcc -v
Using built-in specs.
COLLECT_GCC=C:/mingw64/bin/gcc.exe
COLLECT_LTO_WRAPPER=C:/mingw64/bin/./libexec/gcc/x86_64-w64-mingw32/13.1.0/lto-wrapper.exe
Target: x86_64-w64-mingw32
Configured with: ../../src/gcc-13.1.0/configure --host=x86_64-w64-mingw32 --build=x86_64-w64-mingw32 --target=x86_64-w64-mingw32 --prefix=/mingw64 --with-sysroot=/c:/buildroot/x86_64-1310-posix-seh-ucrt-rt_v11-rev1/mingw64 --enable-host-shared --disable-multilib --enable-languages=c,c++,fortran,lto --enable-libstdcxx-time=yes --enable-threads=posix --enable-libgomp --enable-libatomic --enable-lto --enable-graphite --enable-checking=release --enable-fully-dynamic-string --enable-version-specific-runtime-libs --enable-libstdcxx-filesystem-ts=yes --disable-libssp --disable-libstdcxx-pch --disable-libstdcxx-debug --enable-bootstrap --disable-rpath --disable-win32-registry --disable-nls --disable-werror --disable-symvers --with-gnu-as --with-gnu-ld --with-arch=nocona --with-tune=core2 --with-libiconv --with-system-zlib --with-gmp=/c:/buildroot/prerequisites/x86_64-w64-mingw32-static --with-mpfr=/c:/buildroot/prerequisites/x86_64-w64-mingw32-static --with-mpc=/c:/buildroot/prerequisites/x86_64-w64-mingw32-static --with-isl=/c:/buildroot/prerequisites/x86_64-w64-mingw32-static --with-pkgversion='x86_64-posix-seh-rev1, Built by MinGW-Builds project' --with-bugurl=https://github.com/nixman/mingw-builds CFLAGS='-O2 -pipe -fno-ident -I/c:/buildroot/x86_64-1310-posix-seh-ucrt-rt_v11-rev1/mingw64/opt/include -I/c:/buildroot/prerequisites/x86_64-zlib-static/include -I/c:/buildroot/prerequisites/x86_64-w64-mingw32-static/include' CXXFLAGS='-O2 -pipe -fno-ident -I/c:/buildroot/x86_64-1310-posix-seh-ucrt-rt_v11-rev1/mingw64/opt/include -I/c:/buildroot/prerequisites/x86_64-zlib-static/include -I/c:/buildroot/prerequisites/x86_64-w64-mingw32-static/include' CPPFLAGS='-I/c:/buildroot/x86_64-1310-posix-seh-ucrt-rt_v11-rev1/mingw64/opt/include -I/c:/buildroot/prerequisites/x86_64-zlib-static/include -I/c:/buildroot/prerequisites/x86_64-w64-mingw32-static/include' LDFLAGS='-pipe -fno-ident -L/c:/buildroot/x86_64-1310-posix-seh-ucrt-rt_v11-rev1/mingw64/opt/lib -L/c:/buildroot/prerequisites/x86_64-zlib-static/lib -L/c:/buildroot/prerequisites/x86_64-w64-mingw32-static/lib' LD_FOR_TARGET=/c:/buildroot/x86_64-1310-posix-seh-ucrt-rt_v11-rev1/mingw64/bin/ld.exe --with-boot-ldflags='-WL,--disable-dynamicbase -static-libstdc++ -static-libgcc'
Thread model: posix
Supported LTO compression algorithms: zlib
gcc version 13.1.0 (x86_64-posix-seh-rev1, Built by MinGW-Builds project)
PS C:\Users\Makoto Hirota>
```

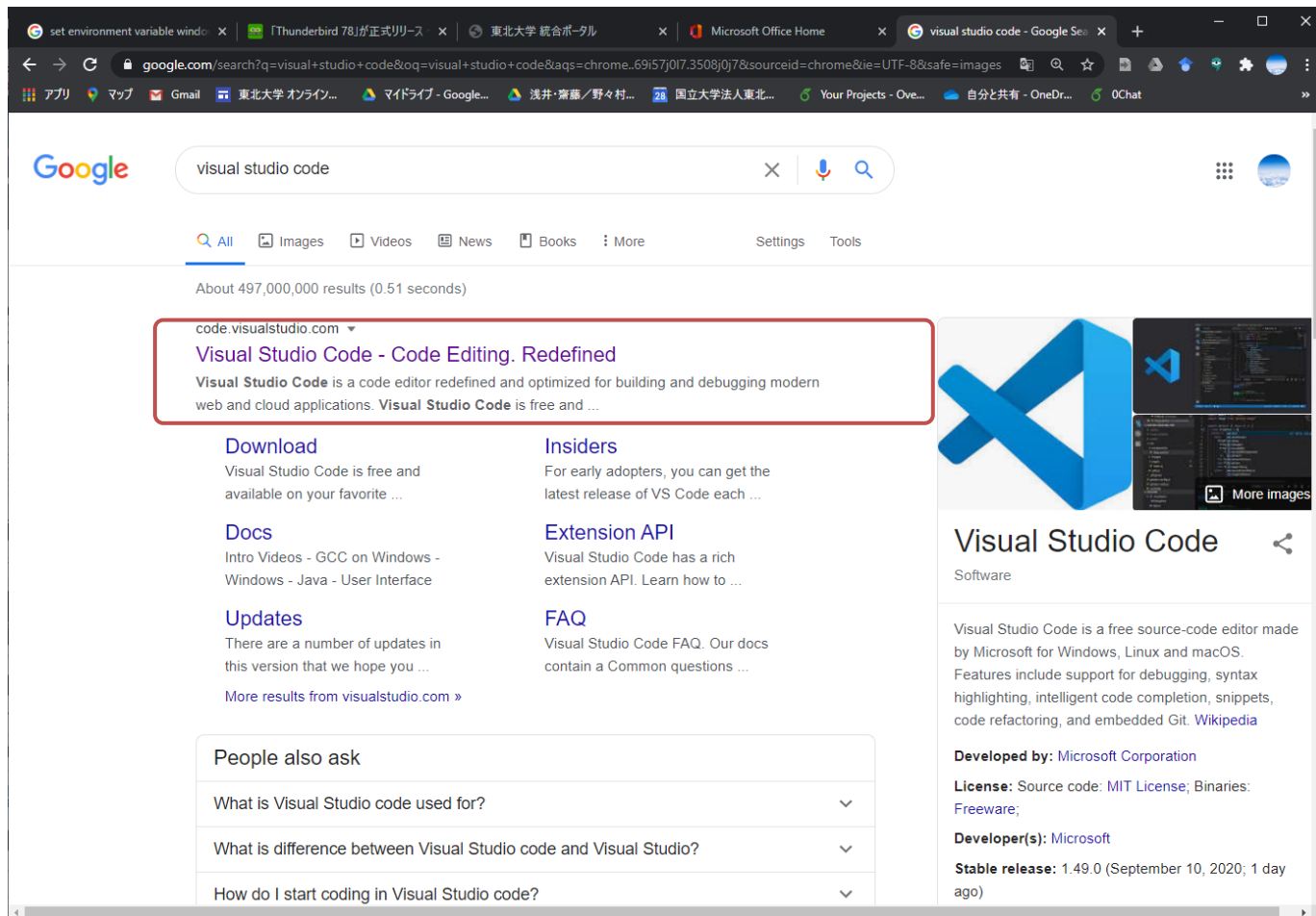
Setup is successful if you can check the version of gcc

Setup of Visual Studio Code

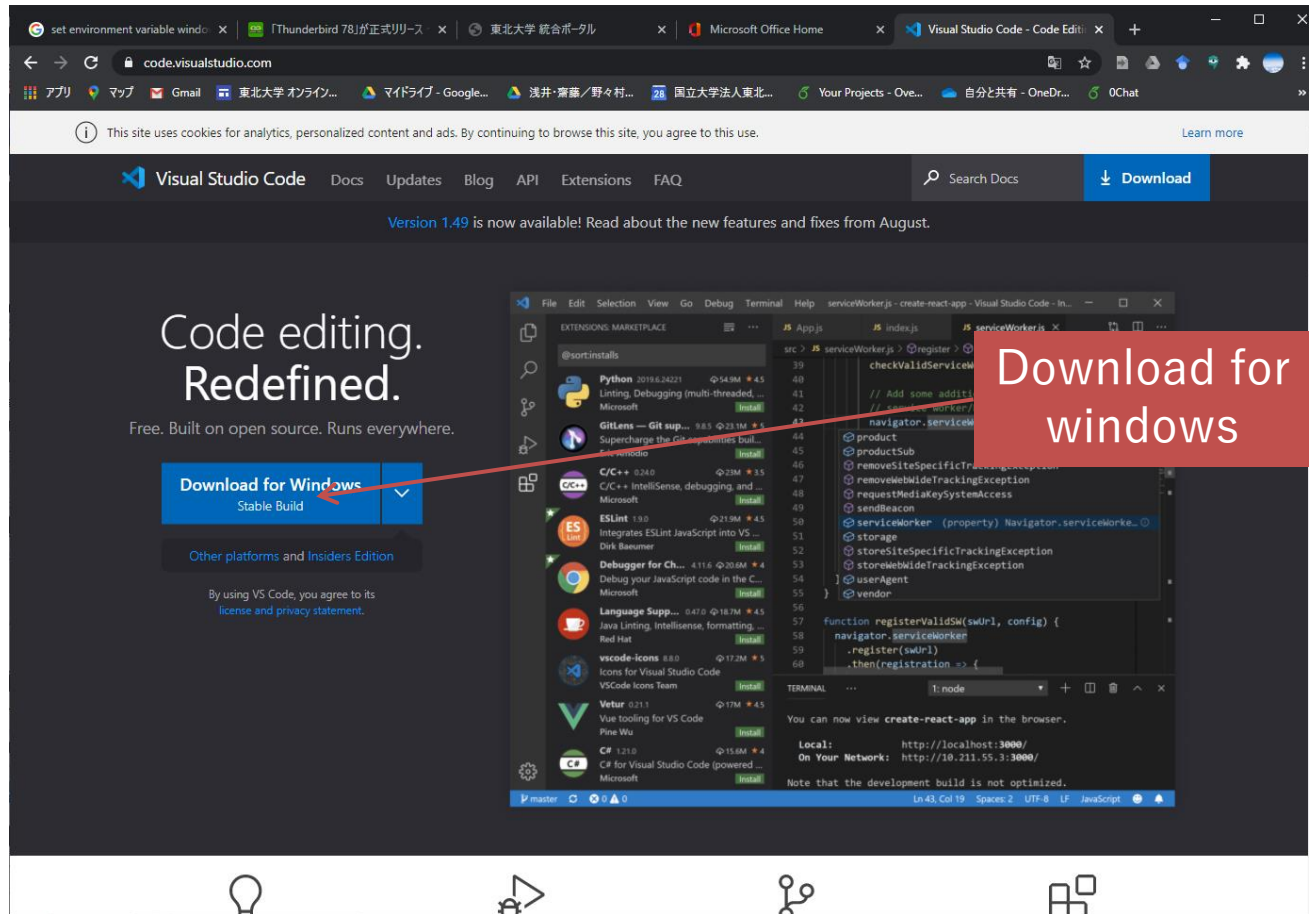
1. Install VSCode
2. Install extension
3. Check operation

You can easily install Visual Studio Code from the “Microsoft Store”.
If you have done it, skip to “Install extension”.

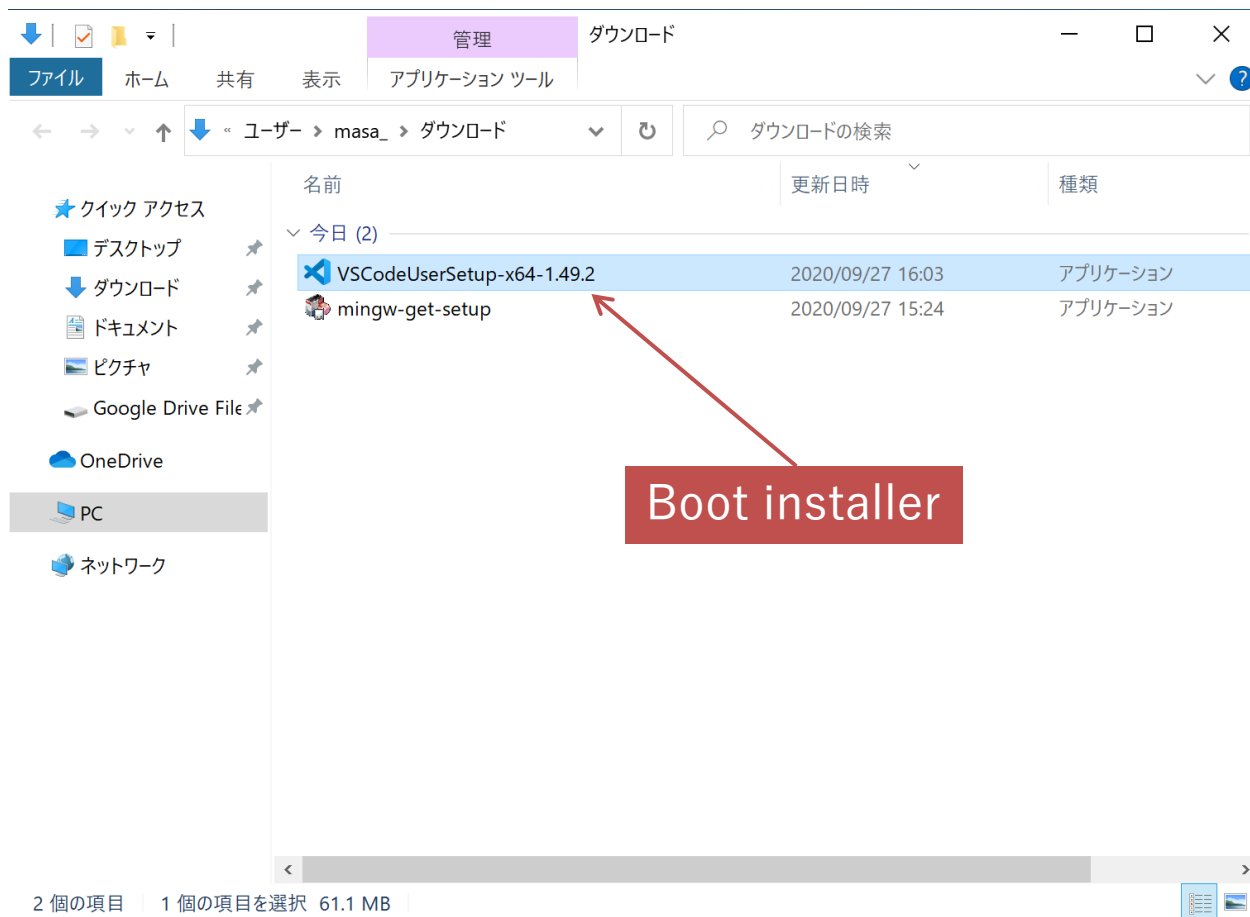
Go to page of Visual Studio Code



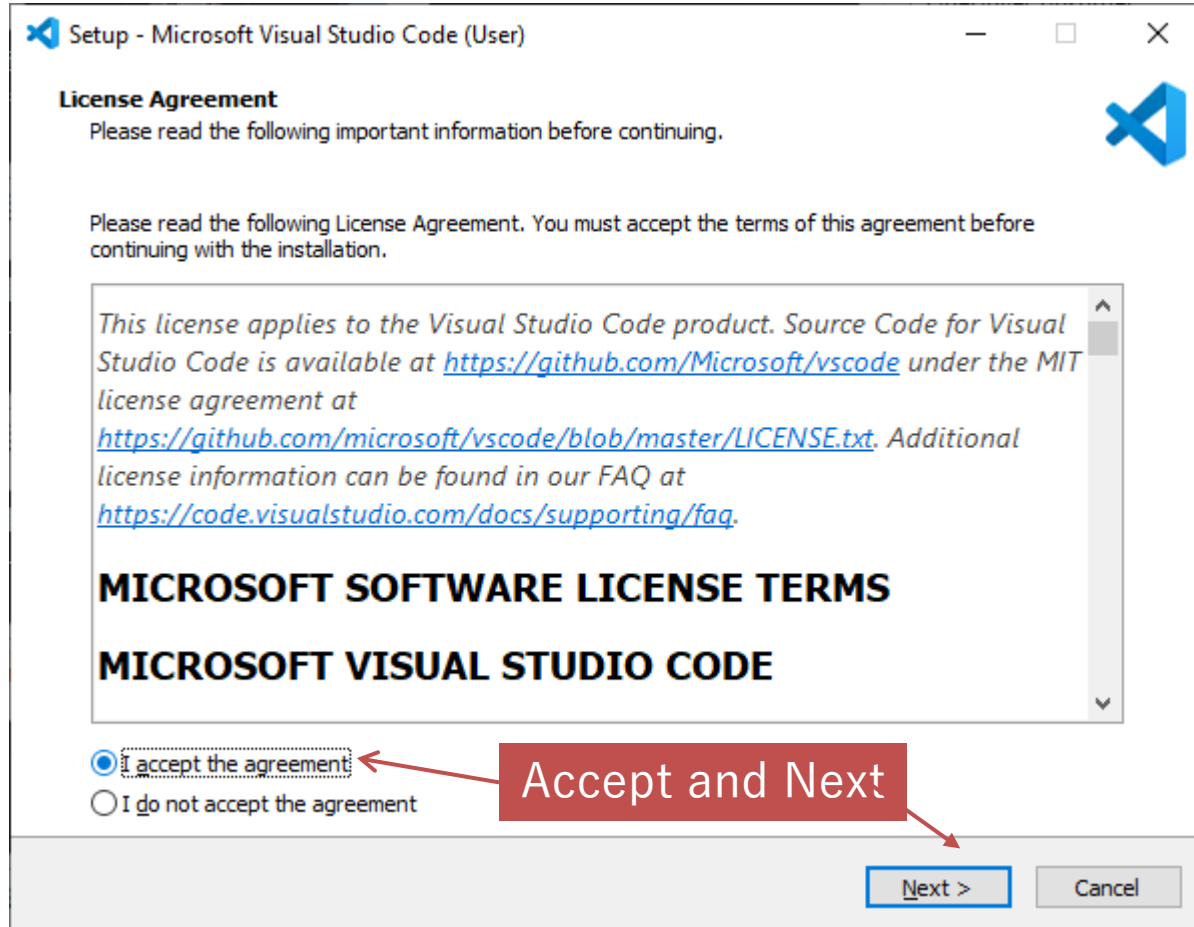
Webpage of Visual Studio Code



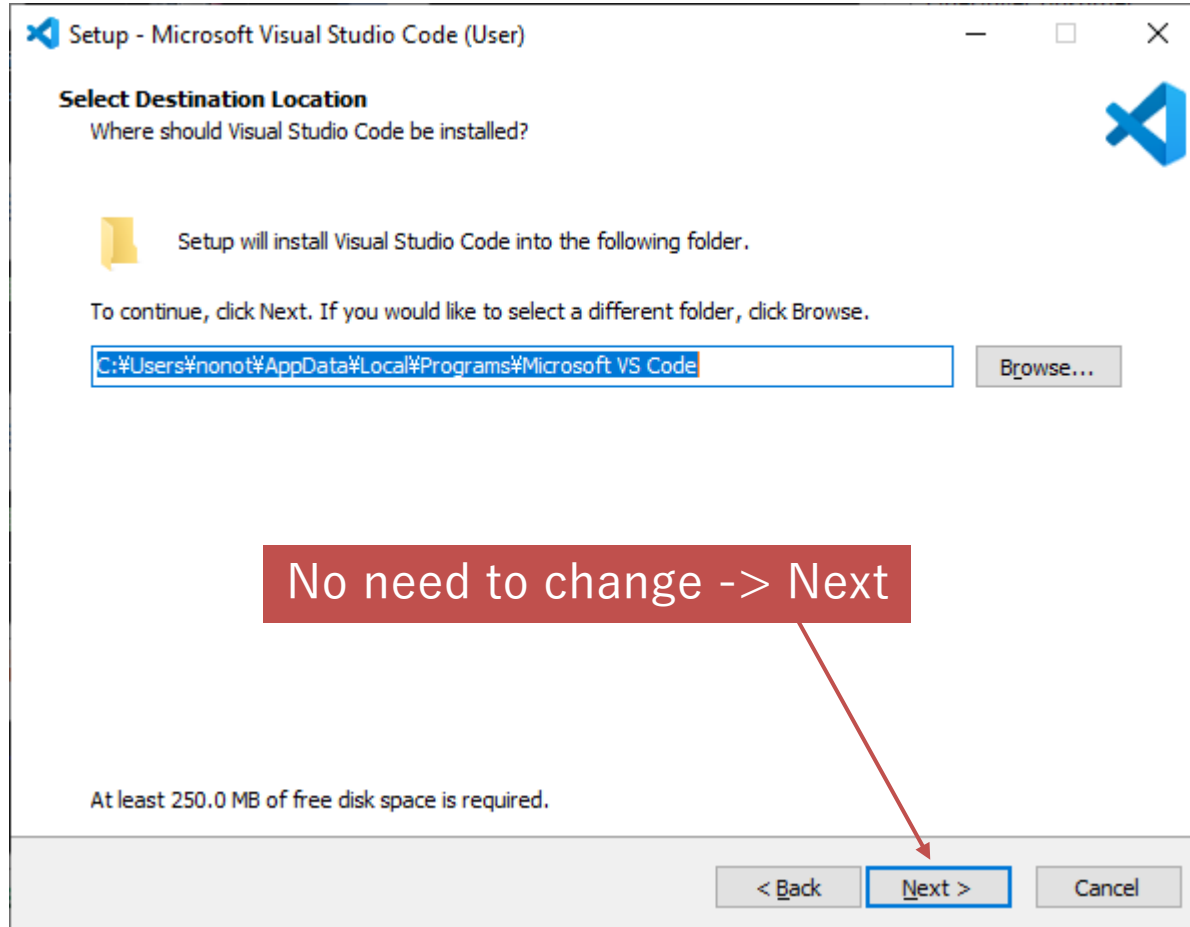
Downloaded file



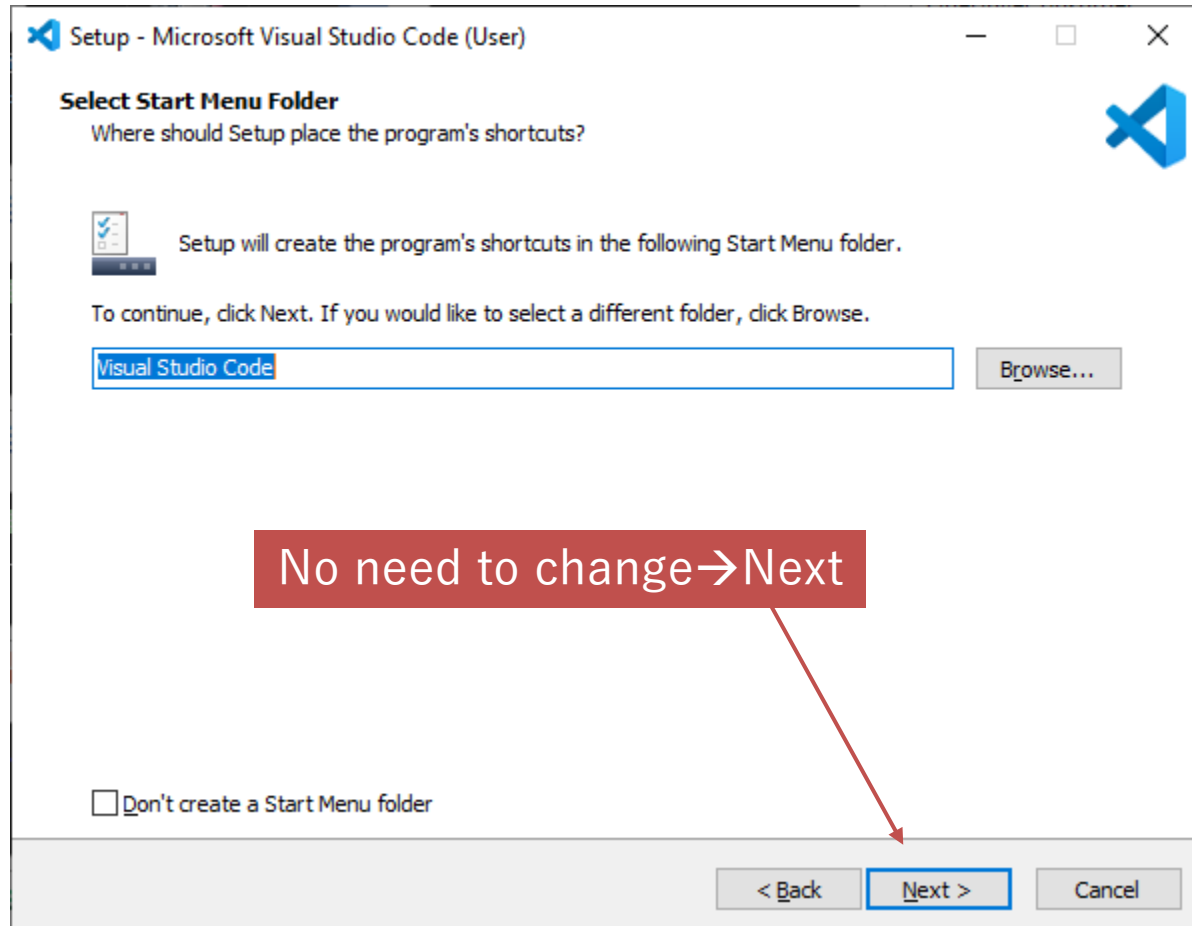
Setup window



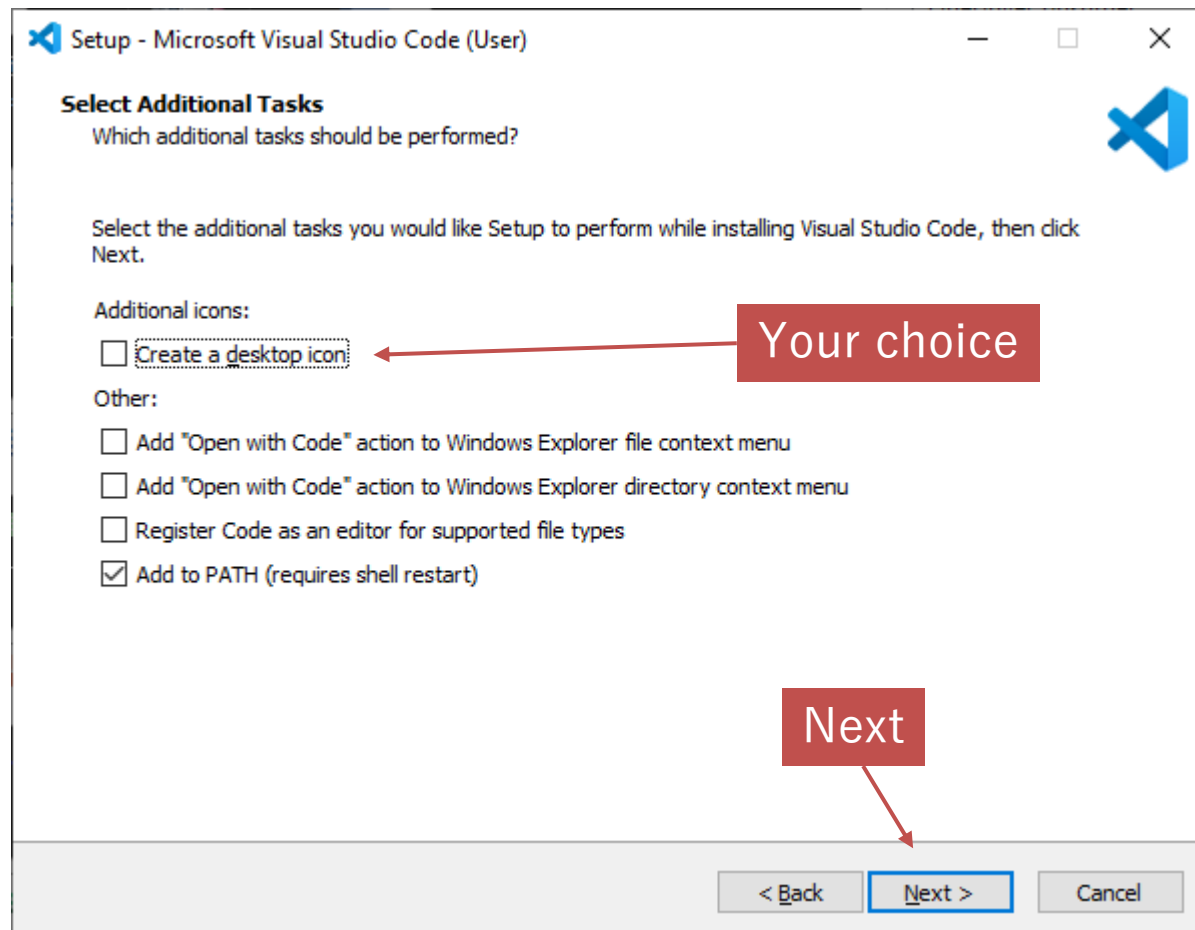
Destination location



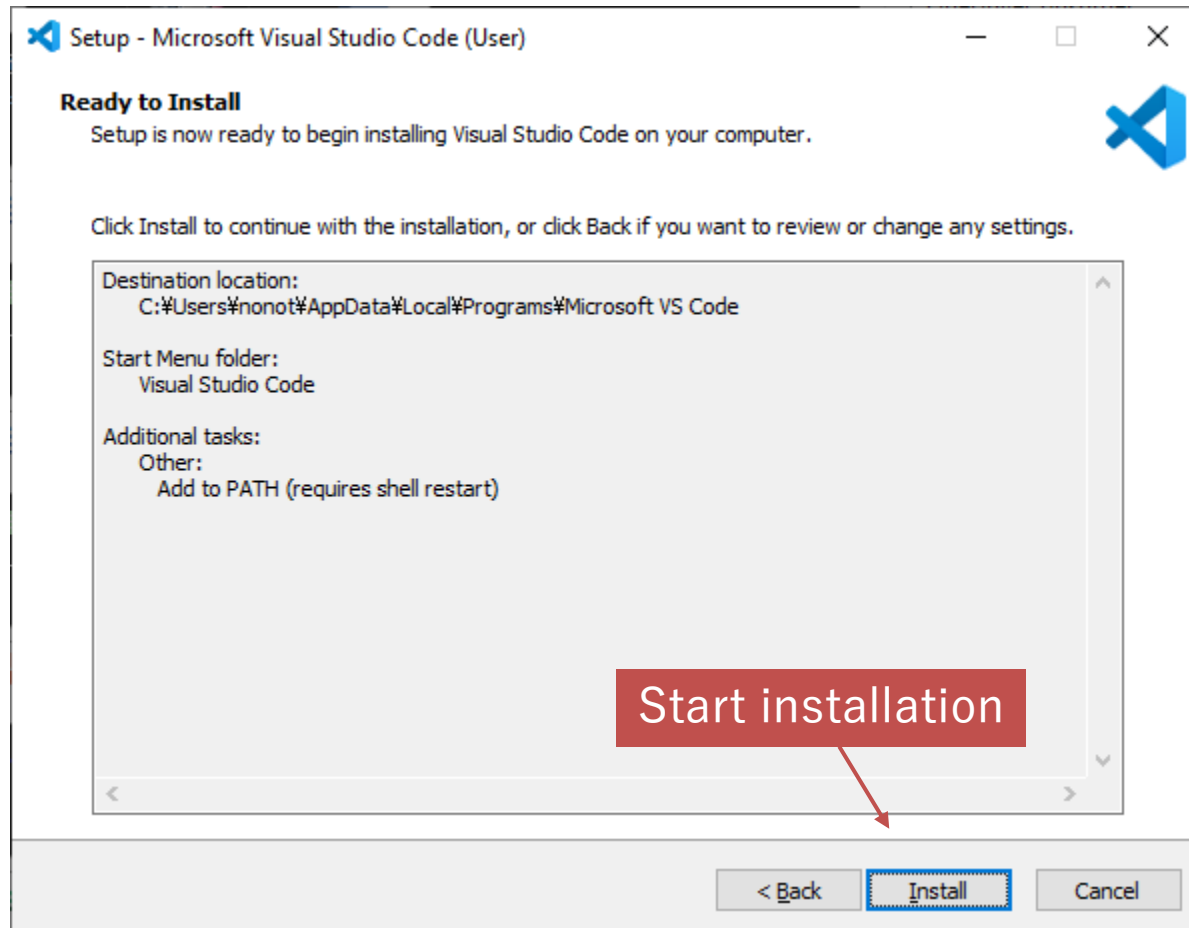
Start Menu Folder setting



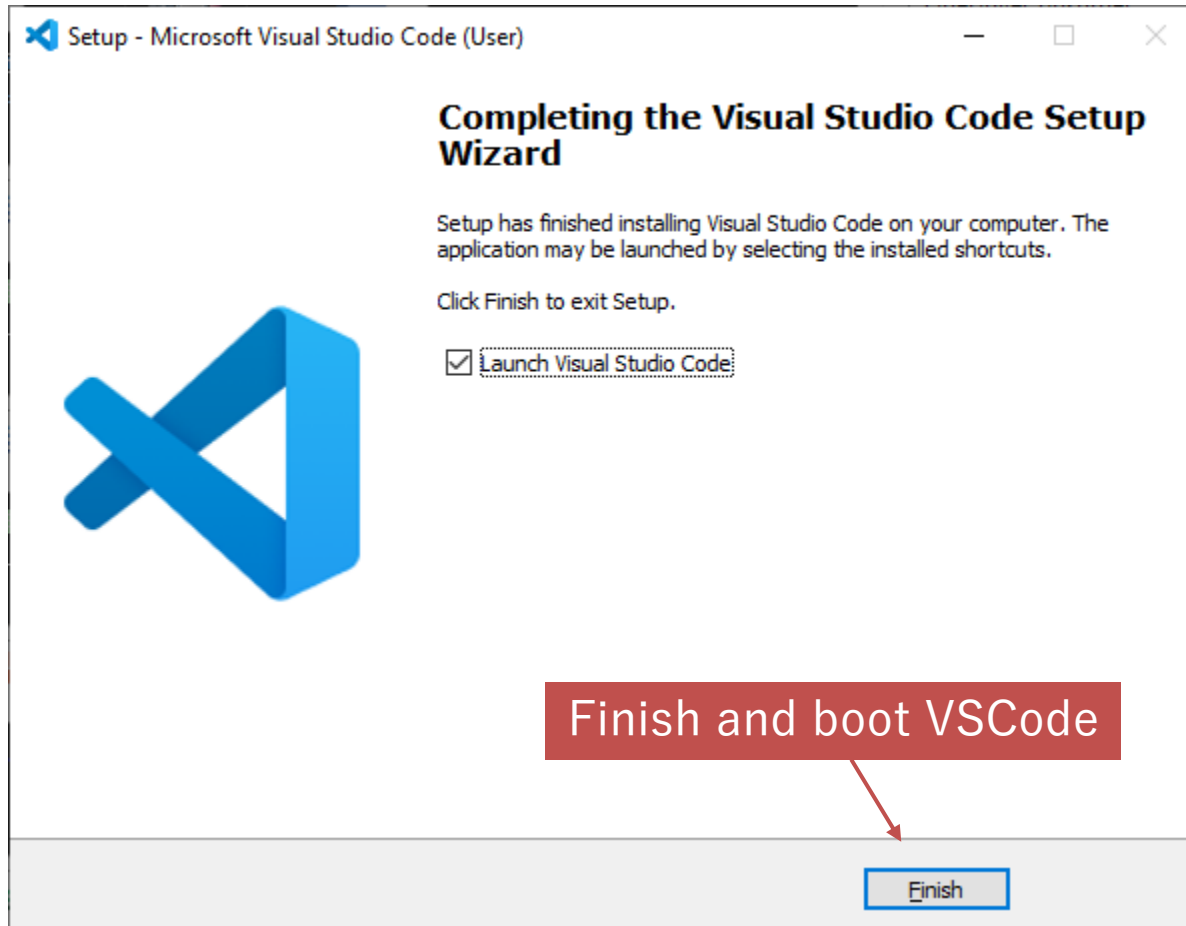
Additional Tasks



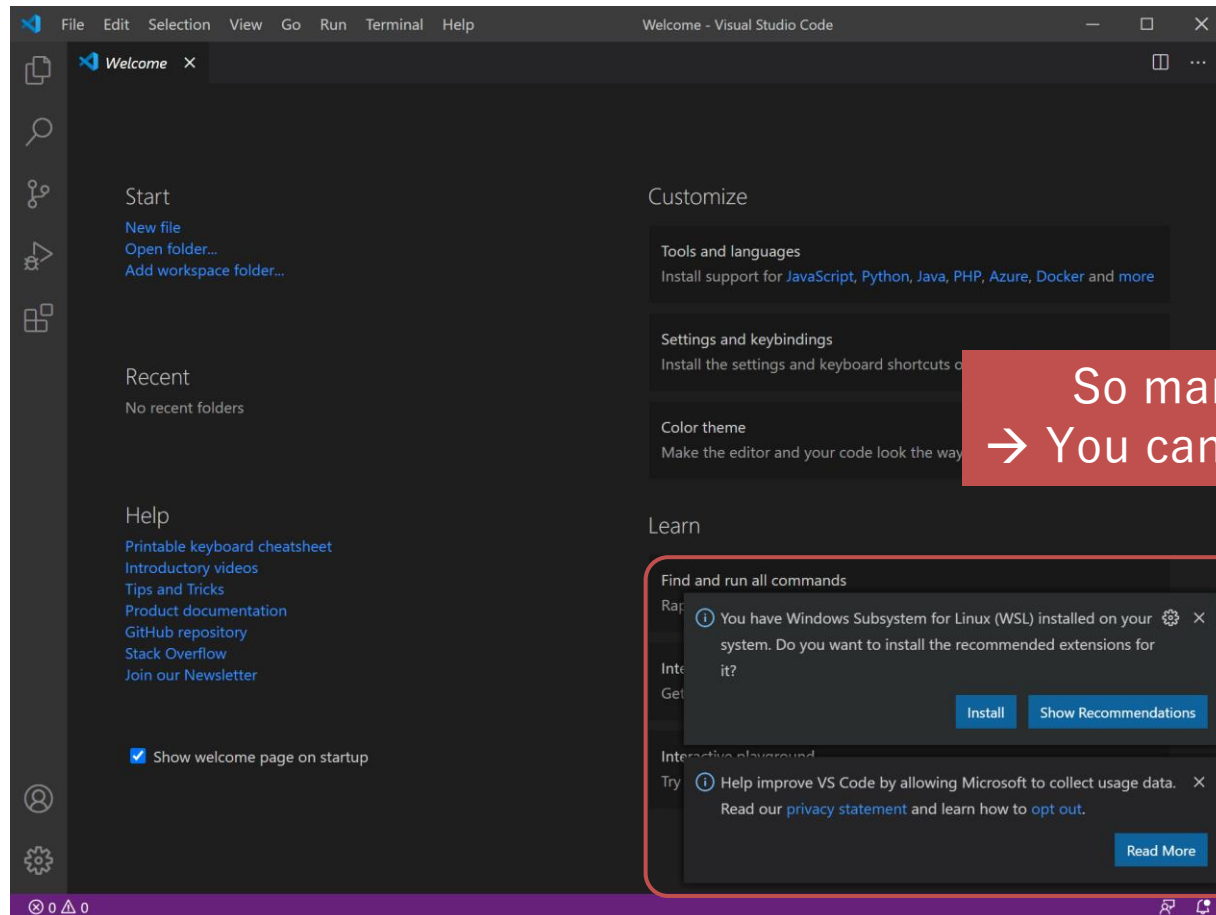
Ready to Install



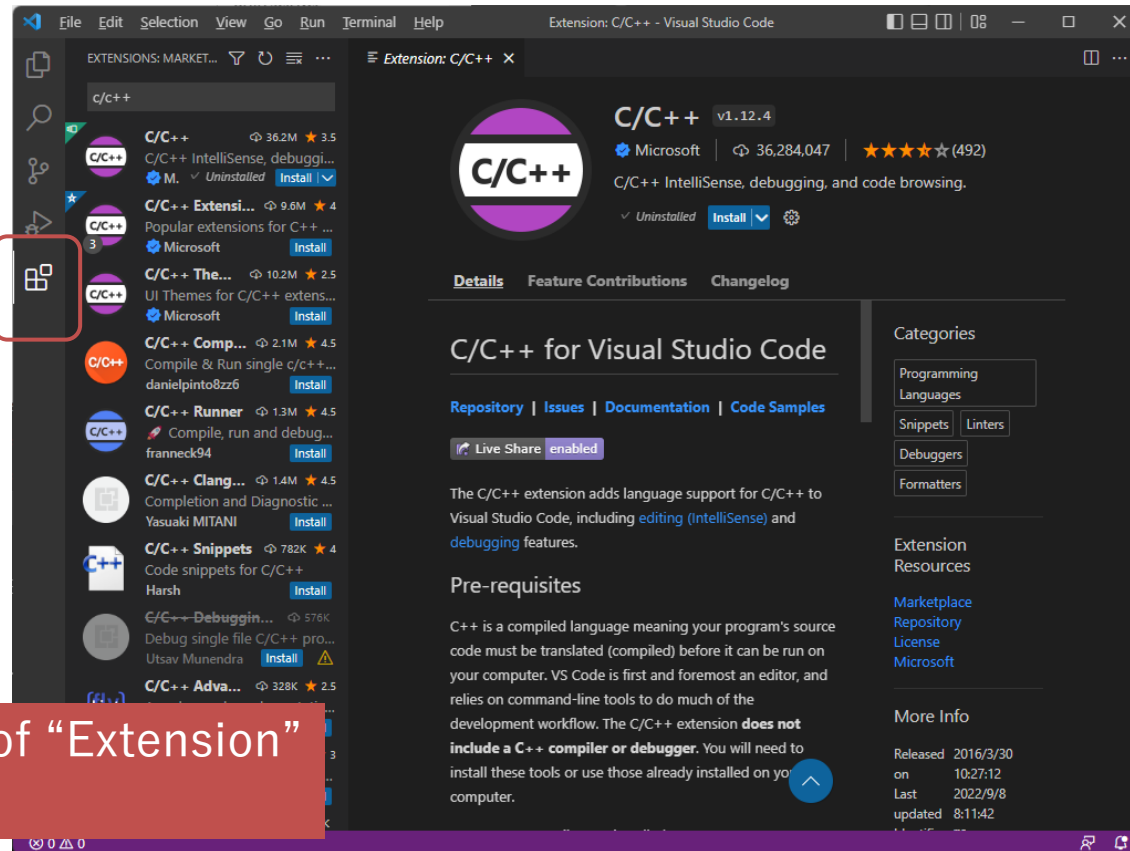
Completing installation



Visual Studio Code



Install extension



Install C/C++ extension

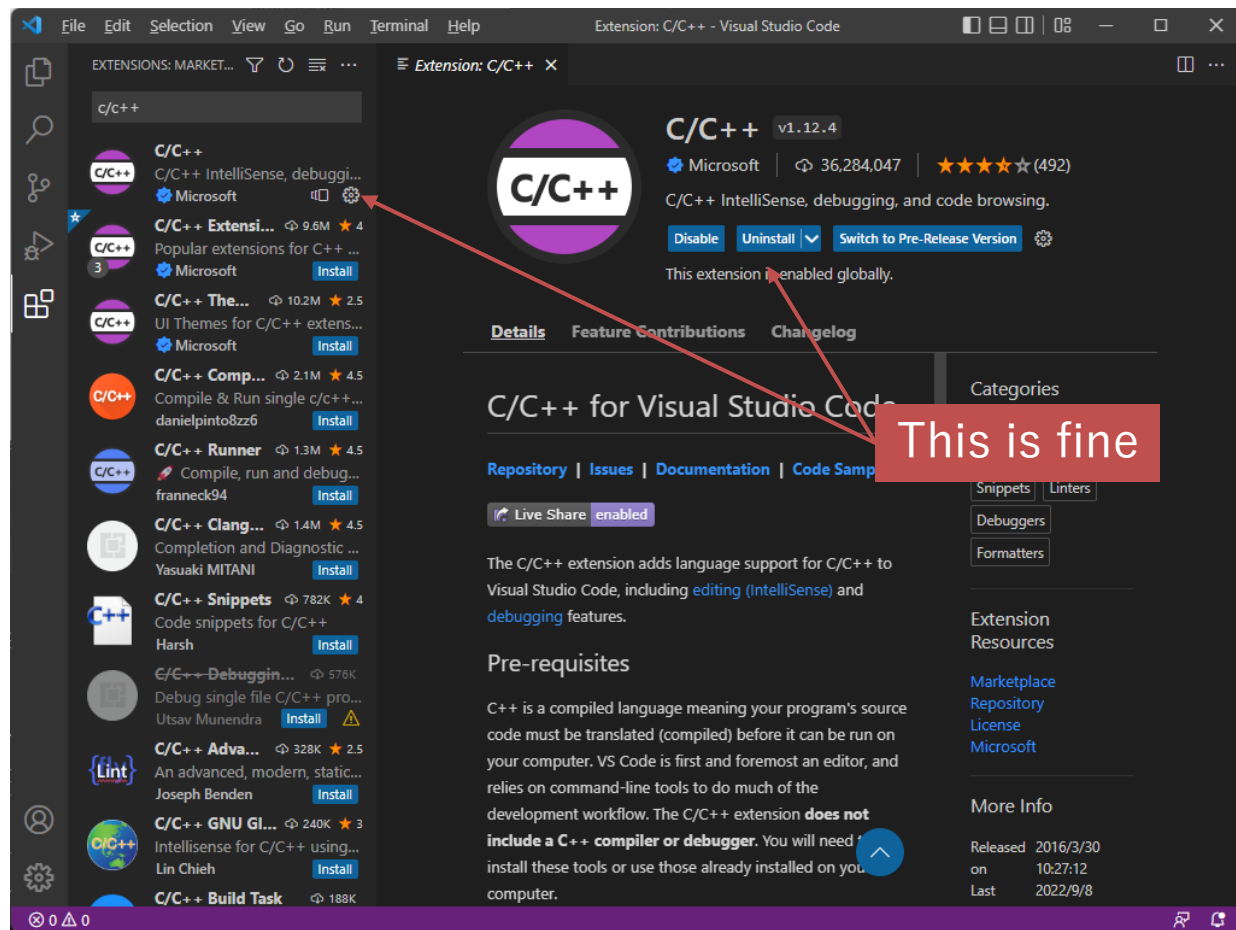


The screenshot shows the Visual Studio Code interface with the Extensions Marketplace open. The search bar at the top left contains 'c/c++'. A list of extensions is displayed on the left, with 'C/C++' by Microsoft at the top. A red arrow points from the search bar to this extension. On the right, the details for the 'C/C++' extension are shown, including its version (v1.12.4), publisher (Microsoft), and a large 'Install' button. A red arrow points from the 'Install' button to a red callout box. Another red arrow points from the 'C/C++' extension in the list to the same callout box.

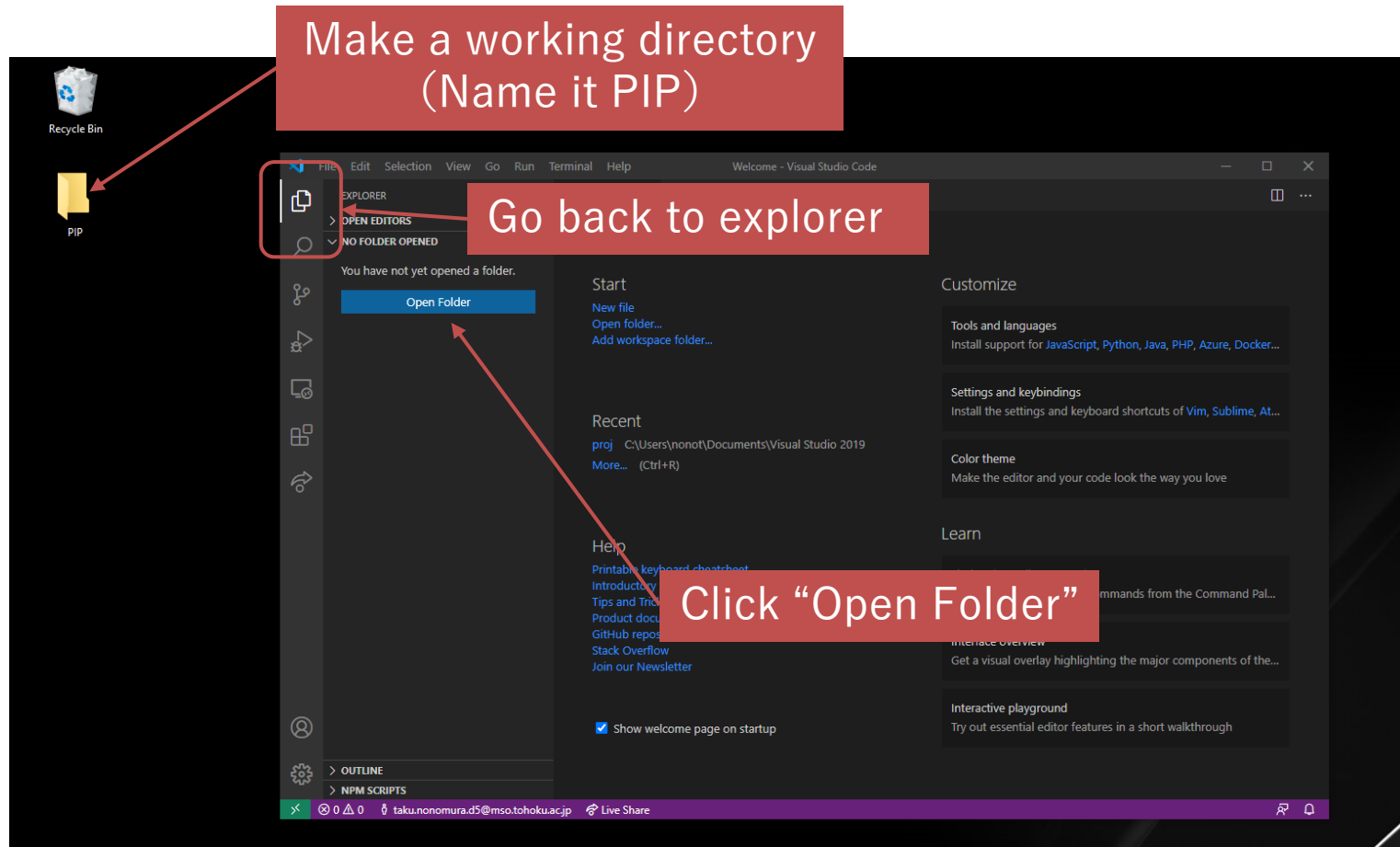
Search and find C/C++

Click "Install" (either of them)

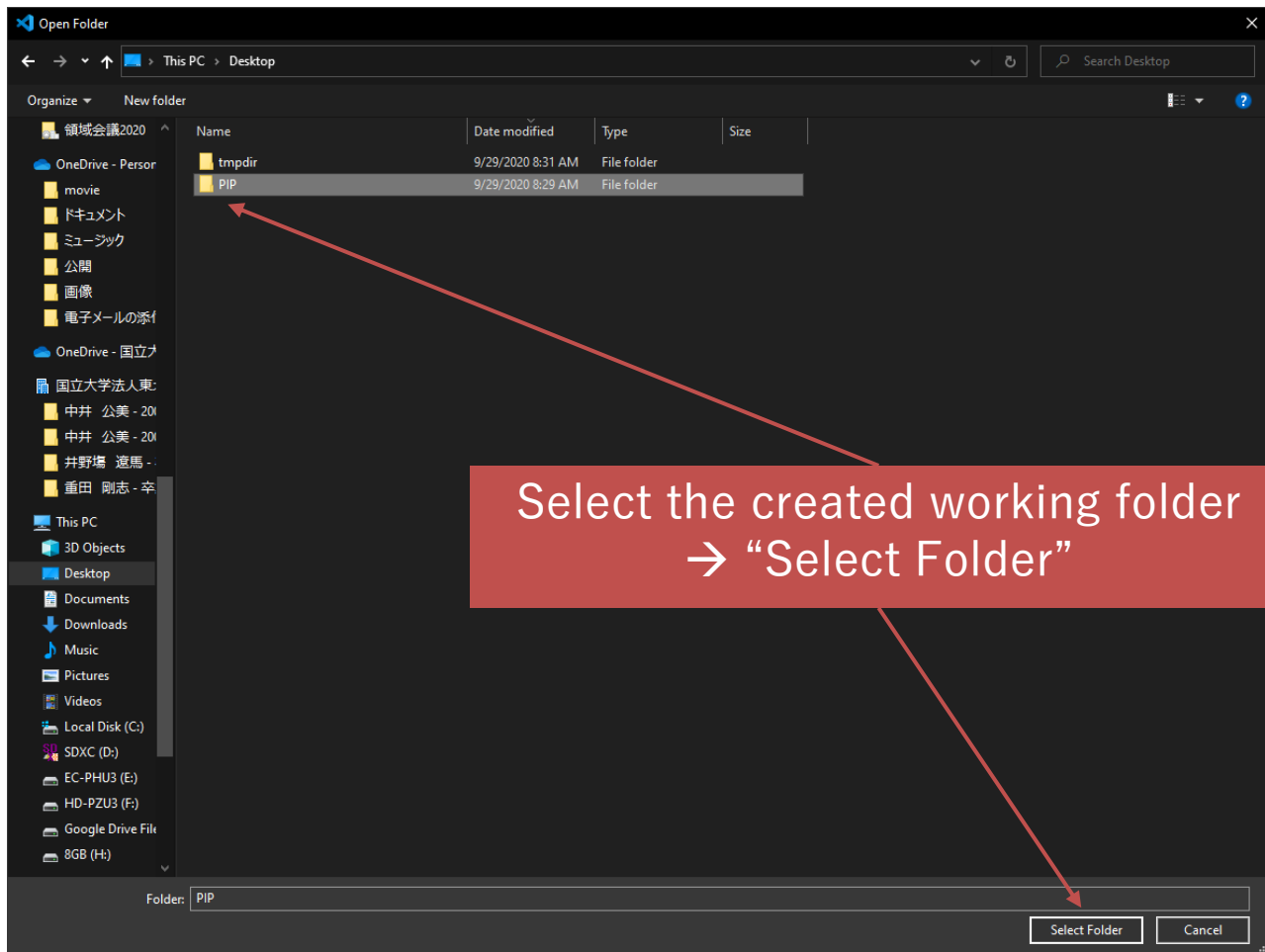
Finish installation of C/C++ extension



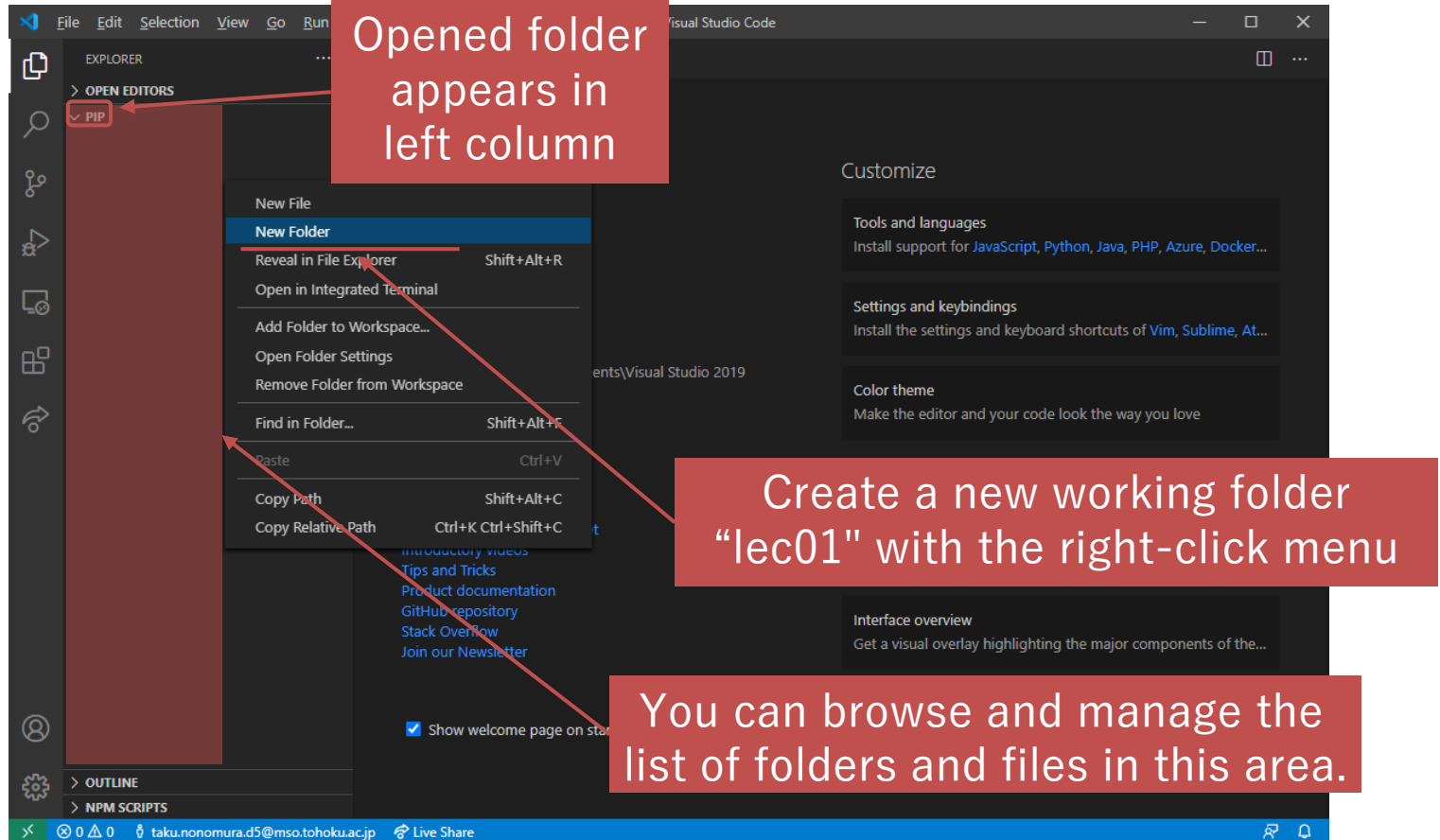
Operation test : Make a C language program and Execute it



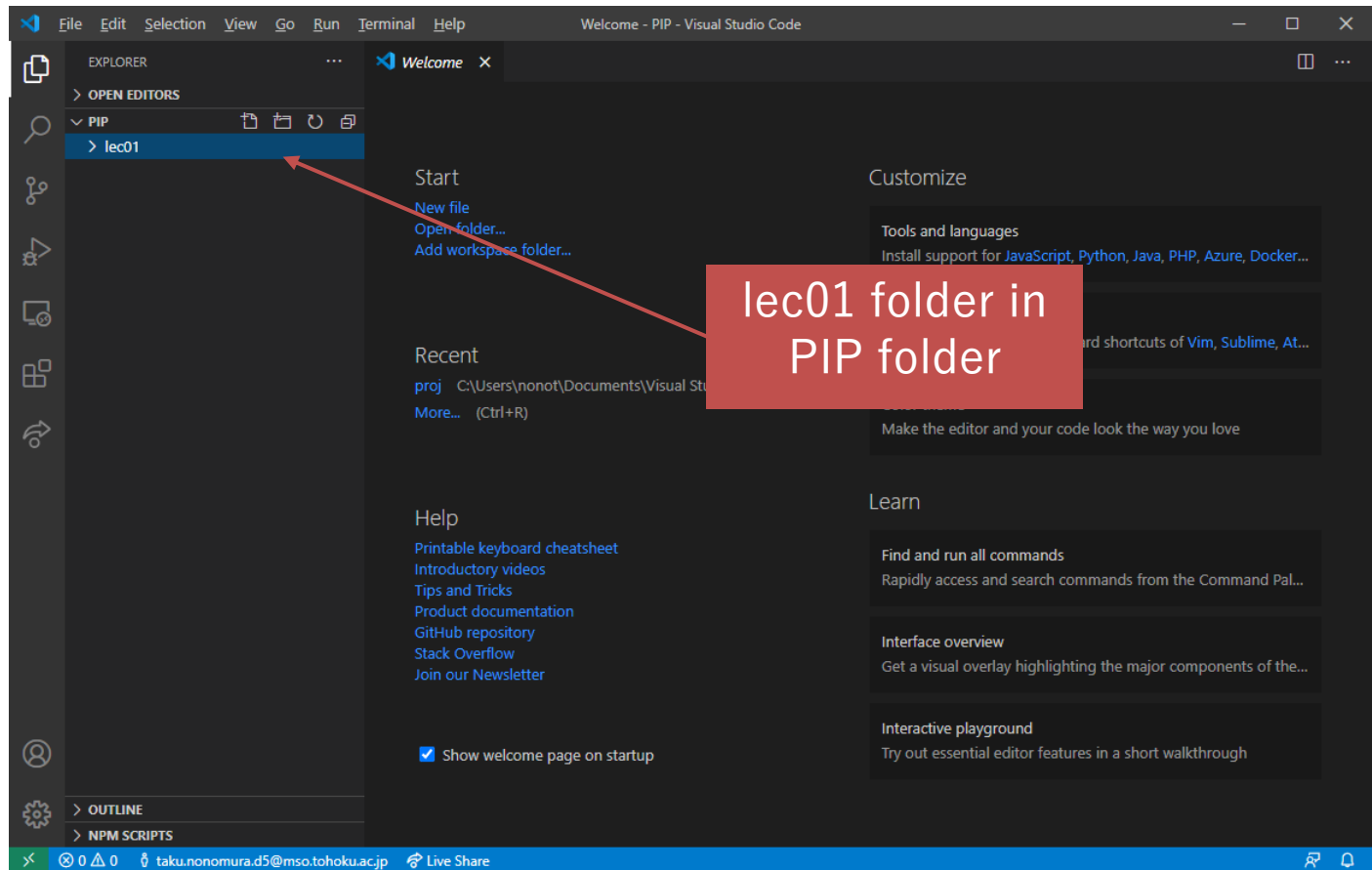
“Open folder” window



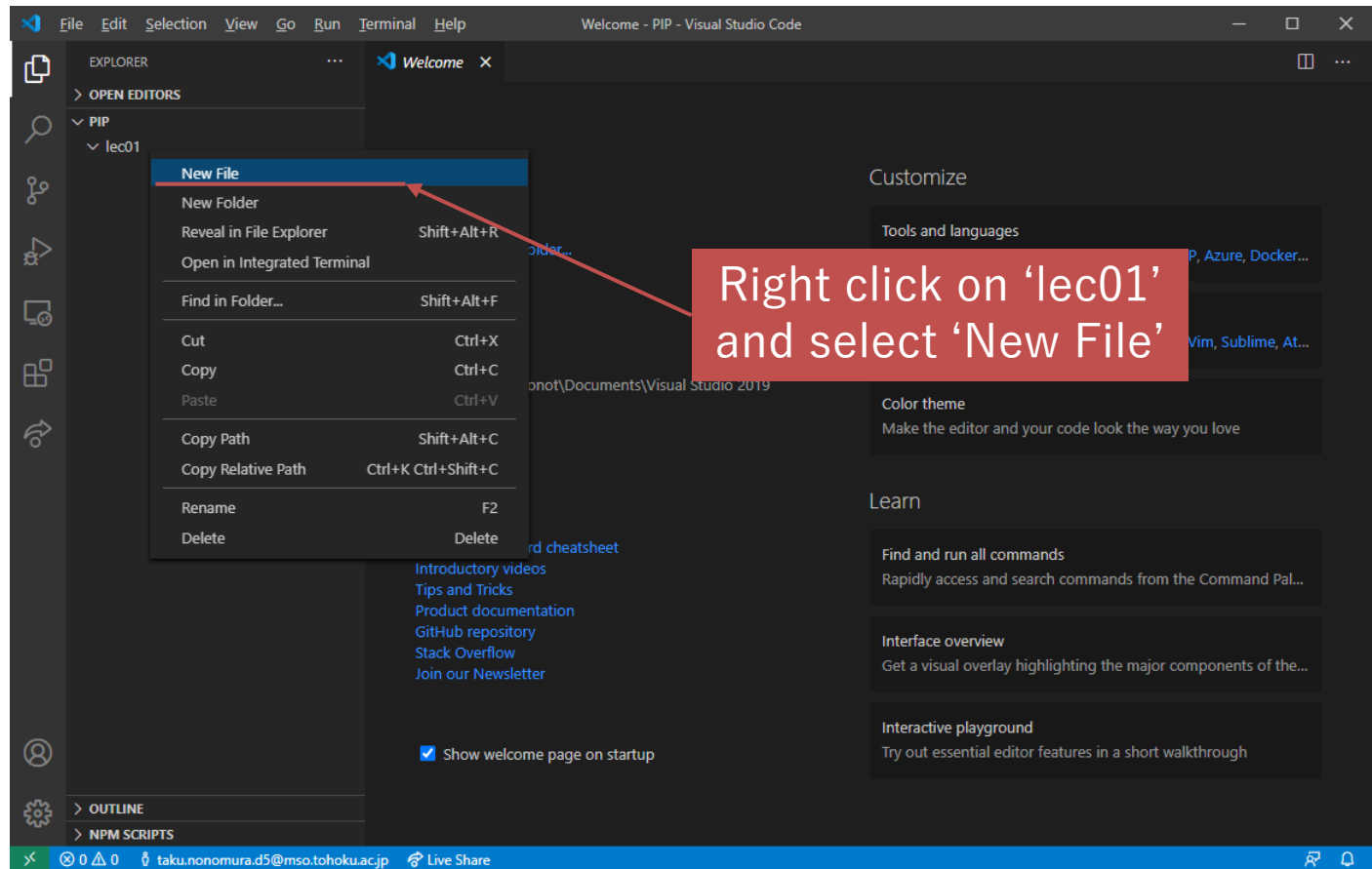
Open folder in VSCode and make a new subfolder



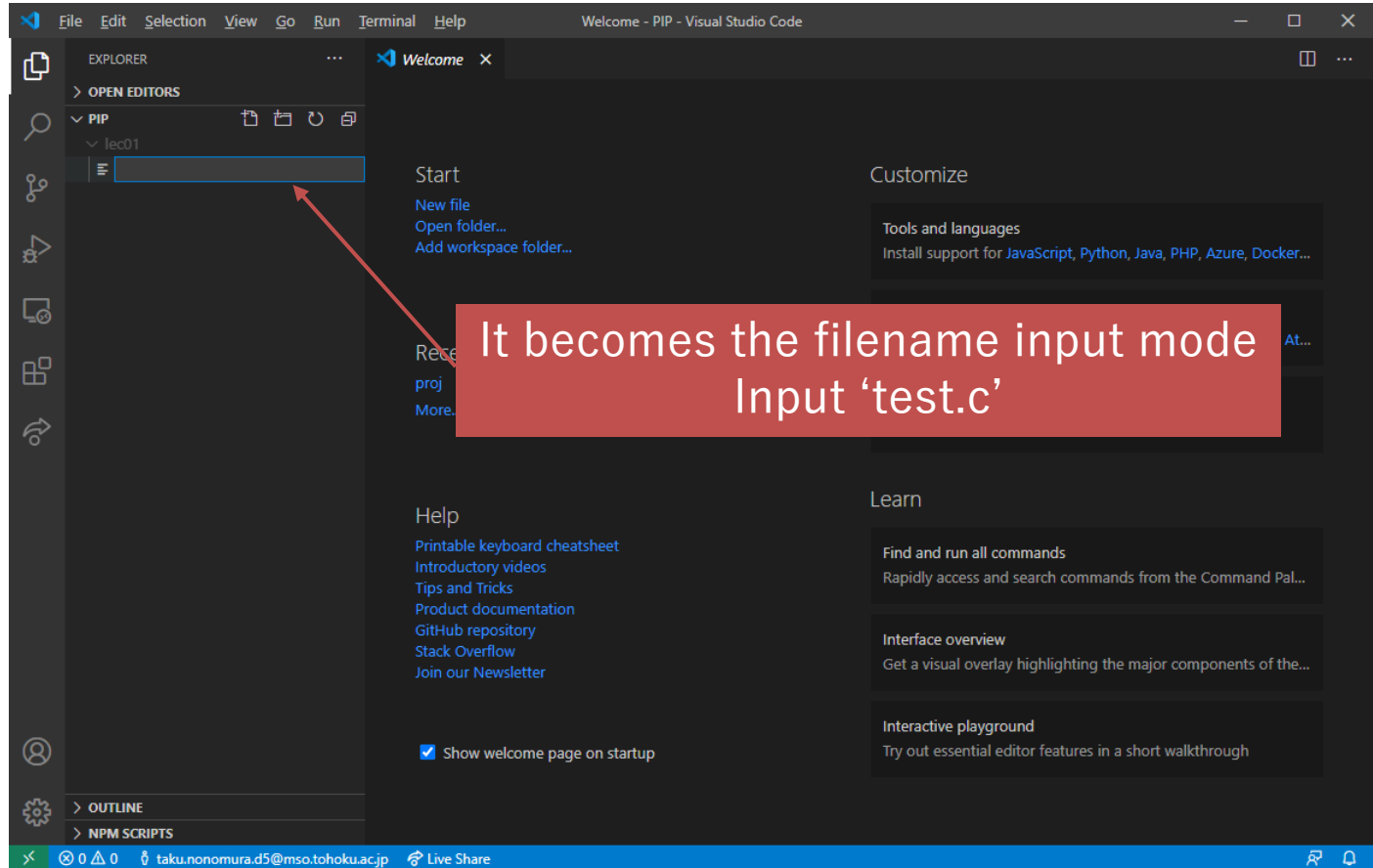
Subfolder for lecture in folder



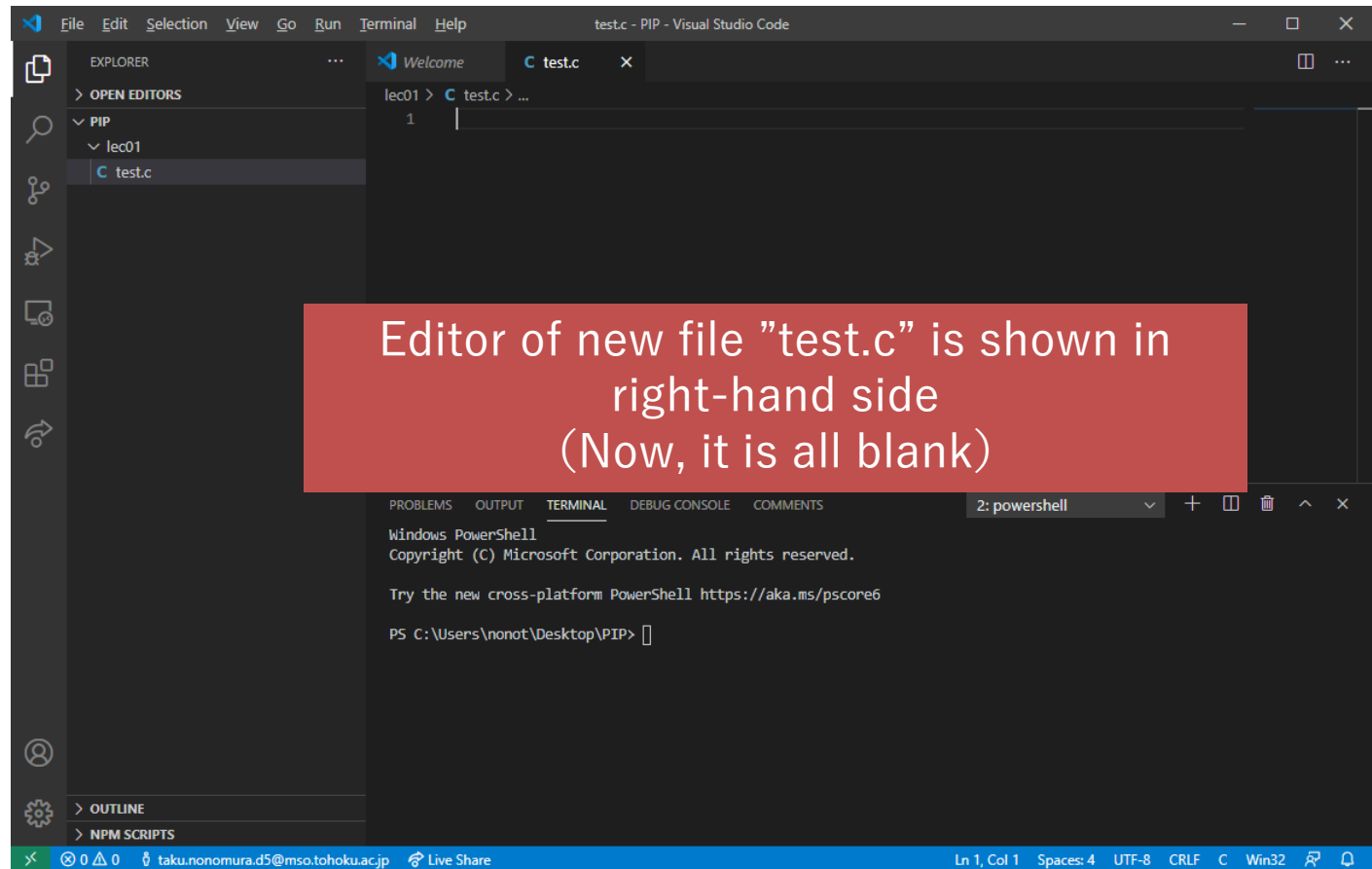
Create source file in lec01



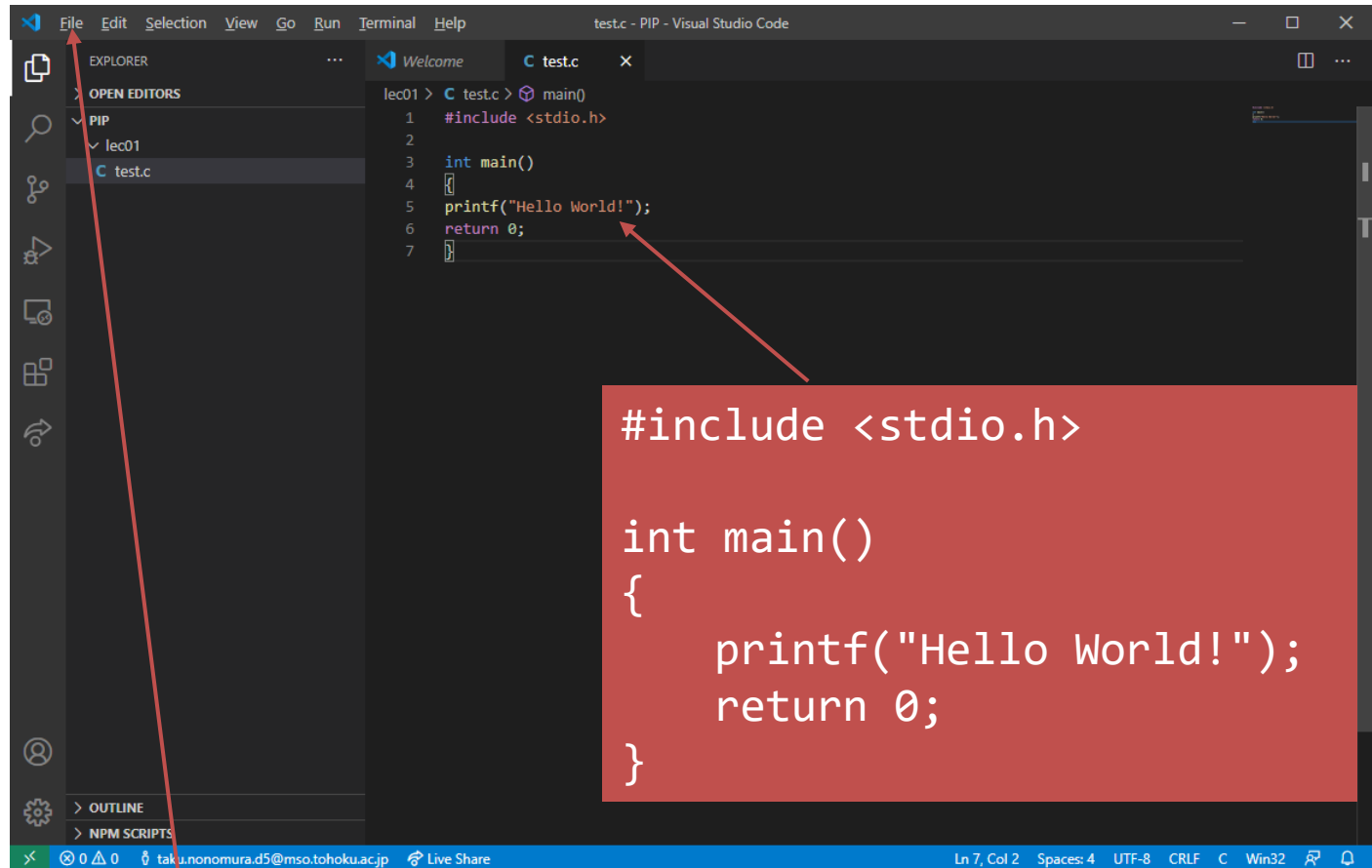
Input name of “New File”



Completion of new file generation

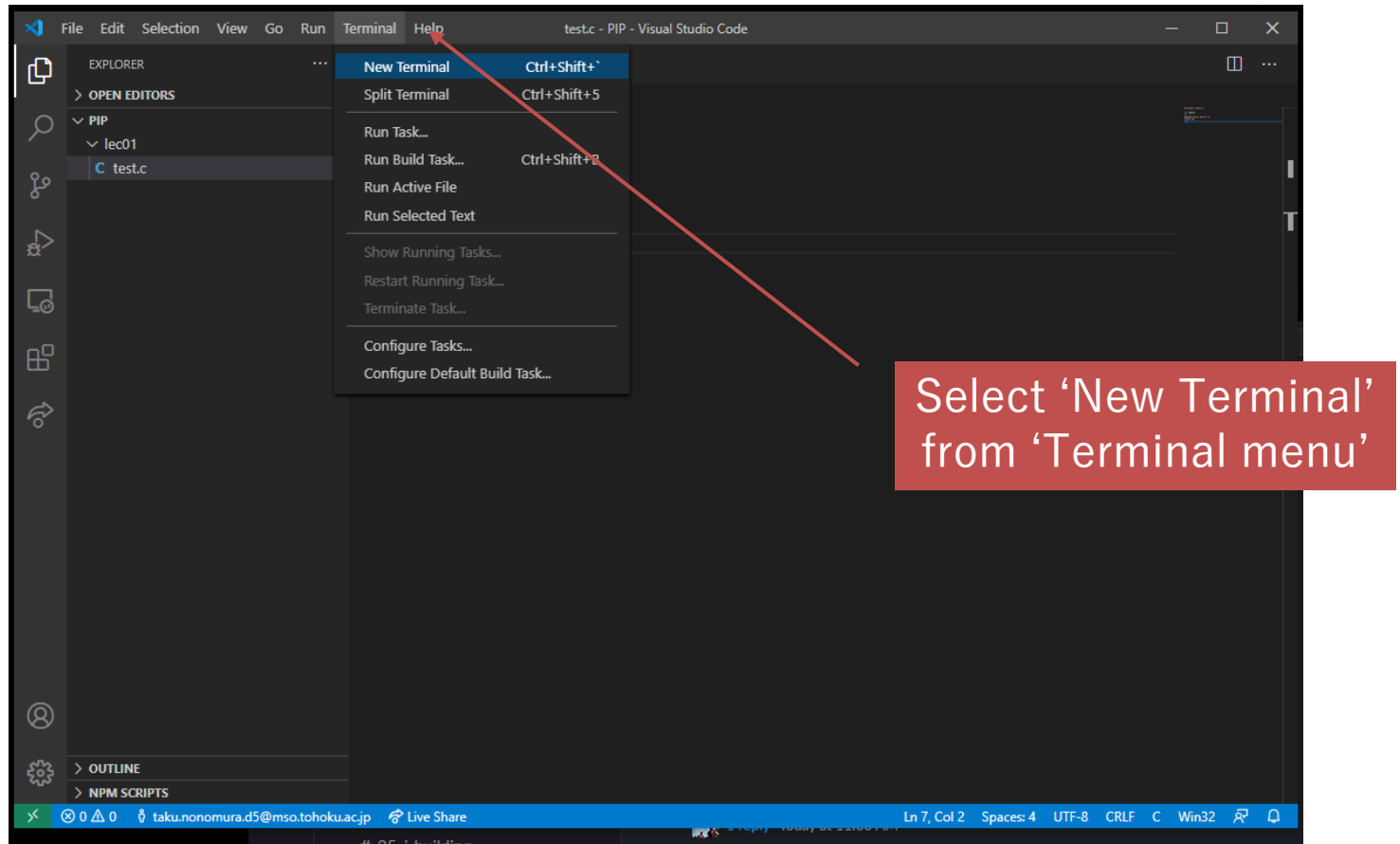


Write source code contents:

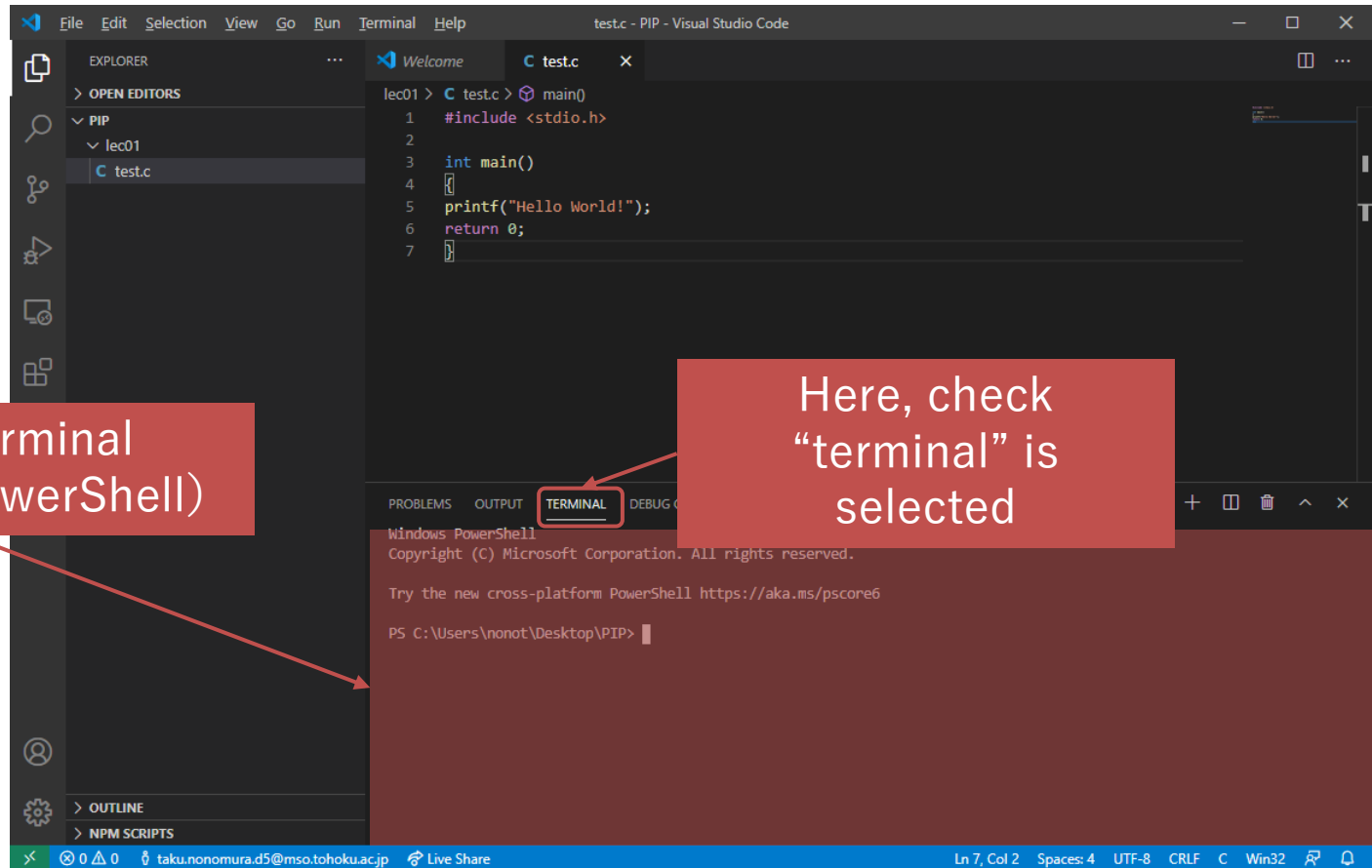


‘Save’ file from ‘File’ menu after you write the program

Open Terminal



Terminal opens



Command for list display

```
Copyright (C) Microsoft Corporation. All rights reserved.  
Try the new cross-platform PowerShell https://aka.ms/pscore6  
PS C:\Users\nonot\Desktop\PIP> ls  
  
Directory: C:\Users\nonot\Desktop\PIP  
  
Mode                LastWriteTime         Length Name  
----                -  
d-----          9/29/2020 11:24 AM             lec01  
  
PS C:\Users\nonot\Desktop\PIP> 
```

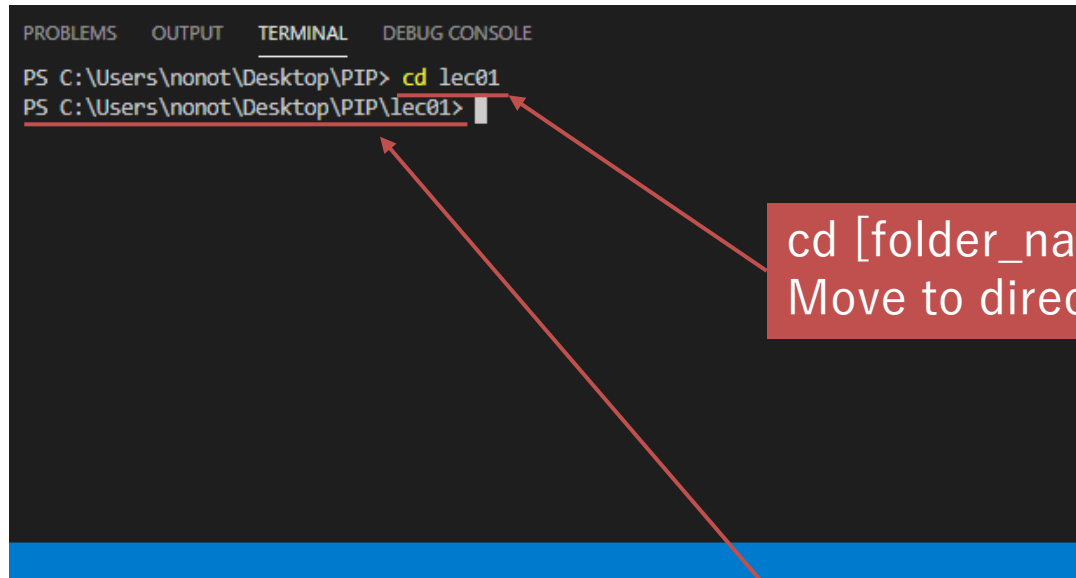
Current directory (where you are)

Your input

'ls' command :
File list in folder is displayed

After command execution is finished,
next command can be accepted

Move to subfolder



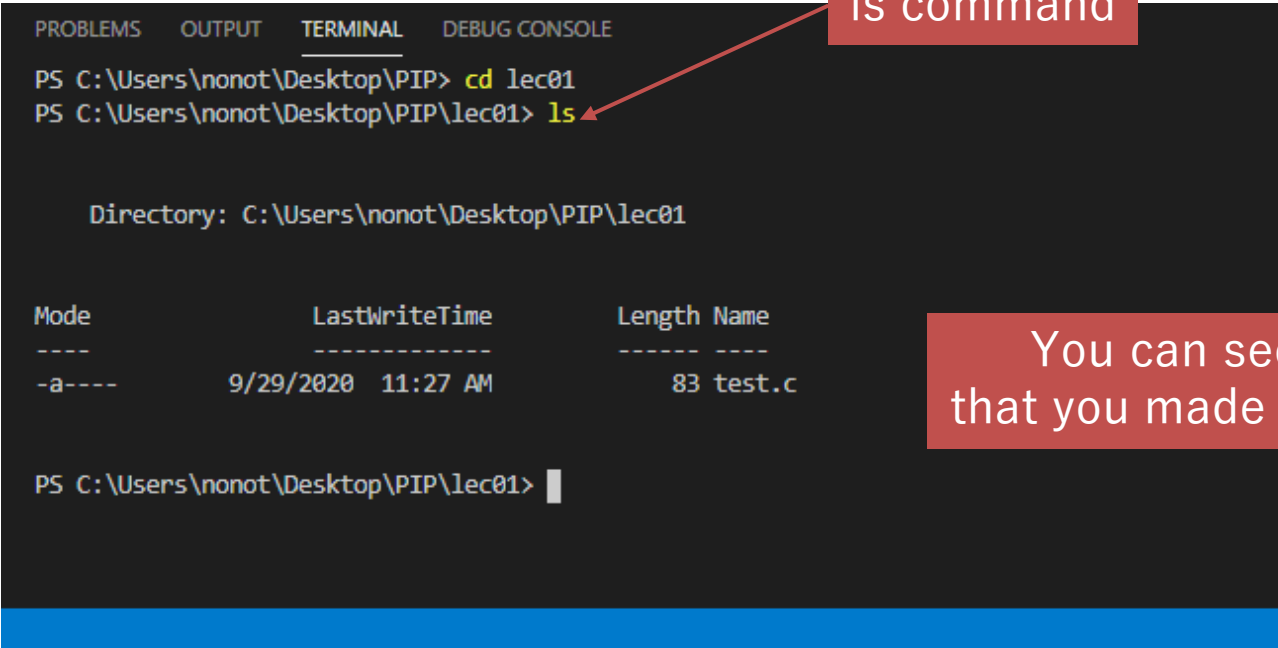
A screenshot of a terminal window with a dark background. At the top, there are four tabs: 'PROBLEMS', 'OUTPUT', 'TERMINAL' (which is selected), and 'DEBUG CONSOLE'. The terminal shows two lines of text. The first line is 'PS C:\Users\nonot\Desktop\PIP> cd lec01', where 'cd' is highlighted in yellow. The second line is 'PS C:\Users\nonot\Desktop\PIP\lec01>', which is underlined in red. A red arrow points from a text box on the right to the second line. Another red arrow points from a text box at the bottom to the second line.

```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE
PS C:\Users\nonot\Desktop\PIP> cd lec01
PS C:\Users\nonot\Desktop\PIP\lec01>
```

cd [folder_name]:
Move to directory 'folder_name'

Moved into 'lec01'

Confirm the contents of folder



The screenshot shows a terminal window with the following content:

```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE
PS C:\Users\nonot\Desktop\PIP> cd lec01
PS C:\Users\nonot\Desktop\PIP\lec01> ls
```

Below the command prompt, the output shows the directory path and a table of files:

Directory: C:\Users\nonot\Desktop\PIP\lec01

Mode	LastWriteTime	Length	Name
----	-----	-----	----
-a----	9/29/2020 11:27 AM	83	test.c

The terminal prompt is now at the end of the line: PS C:\Users\nonot\Desktop\PIP\lec01> |

ls command

You can see test.c that you made previously.

Compile of source code

```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE
PS C:\Users\nonot\Desktop\PIP> cd lec01
PS C:\Users\nonot\Desktop\PIP\lec01> ls

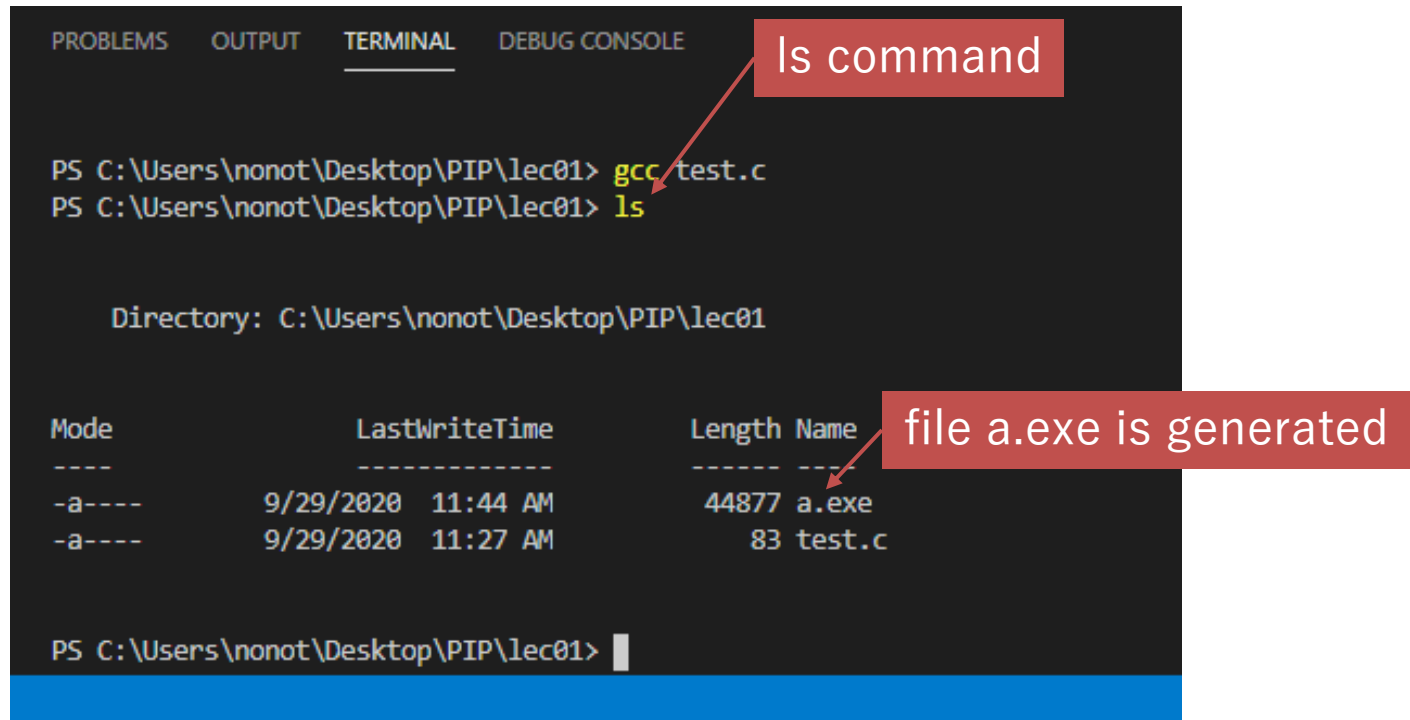
Directory: C:\Users\nonot\Desktop\PIP\lec01

Mode                LastWriteTime         Length Name
----                -
-a-----          9/29/2020  11:27 AM             83 test.c

PS C:\Users\nonot\Desktop\PIP\lec01> gcc test.c
```

Type 'gcc test.c'
Push Enter key

Execution file is generated



```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE

PS C:\Users\nonot\Desktop\PIP\lec01> gcc test.c
PS C:\Users\nonot\Desktop\PIP\lec01> ls

Directory: C:\Users\nonot\Desktop\PIP\lec01

Mode                LastWriteTime         Length Name
----                -
-a----           9/29/2020  11:44 AM        44877 a.exe
-a----           9/29/2020  11:27 AM         83 test.c

PS C:\Users\nonot\Desktop\PIP\lec01> 
```

ls command

file a.exe is generated

Execution of program

```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE
PS C:\Users\nonot\Desktop\PIP\lec01> ls

Directory: C:\Users\nonot\Desktop\PIP\lec01

Mode                LastWriteTime         Length Name
----                -
-a----            9/29/2020  11:44 AM        44877 a.exe
-a----            9/29/2020  11:27 AM         83 test.c

PS C:\Users\nonot\Desktop\PIP\lec01> .\a.exe
```

Execute program a.exe
Type ".\a.exe"

Program will finish with displaying HelloWorld! If it is success

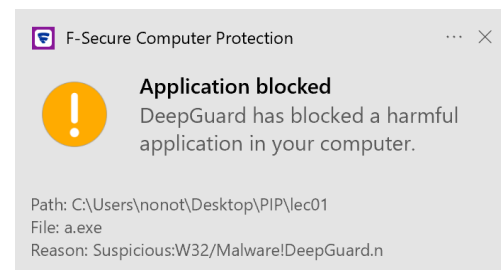
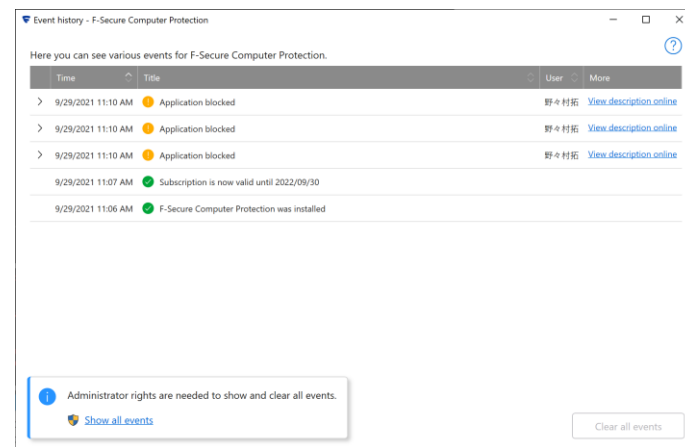
Failed to run : Anti-virus software

```
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Try the new cross-platform PowerShell https://aka.ms/pscore6

PS C:\Users\nonot\Desktop\PIP> cd lec01
PS C:\Users\nonot\Desktop\PIP\lec01> .\a.exe
Program 'a.exe' failed to run: Access is deniedAt line:1 char:1
+ .\a.exe
+ ~~~~~
At line:1 char:1
+ .\a.exe
+ ~~~~~
+ CategoryInfo          : ResourceUnavailable: (:) [], ApplicationFailedException
+ FullyQualifiedErrorId : NativeCommandFailed

PS C:\Users\nonot\Desktop\PIP\lec01> |
```

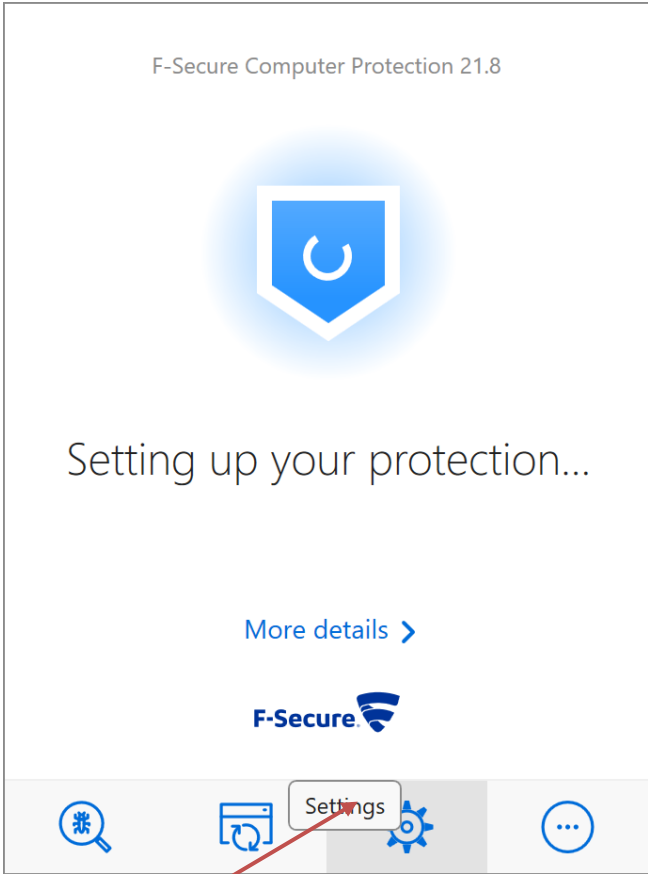


Sometimes the program you just created is judged to be a suspicious program and execution is blocked.

If required

Configuration of with-secure that is distributed by University

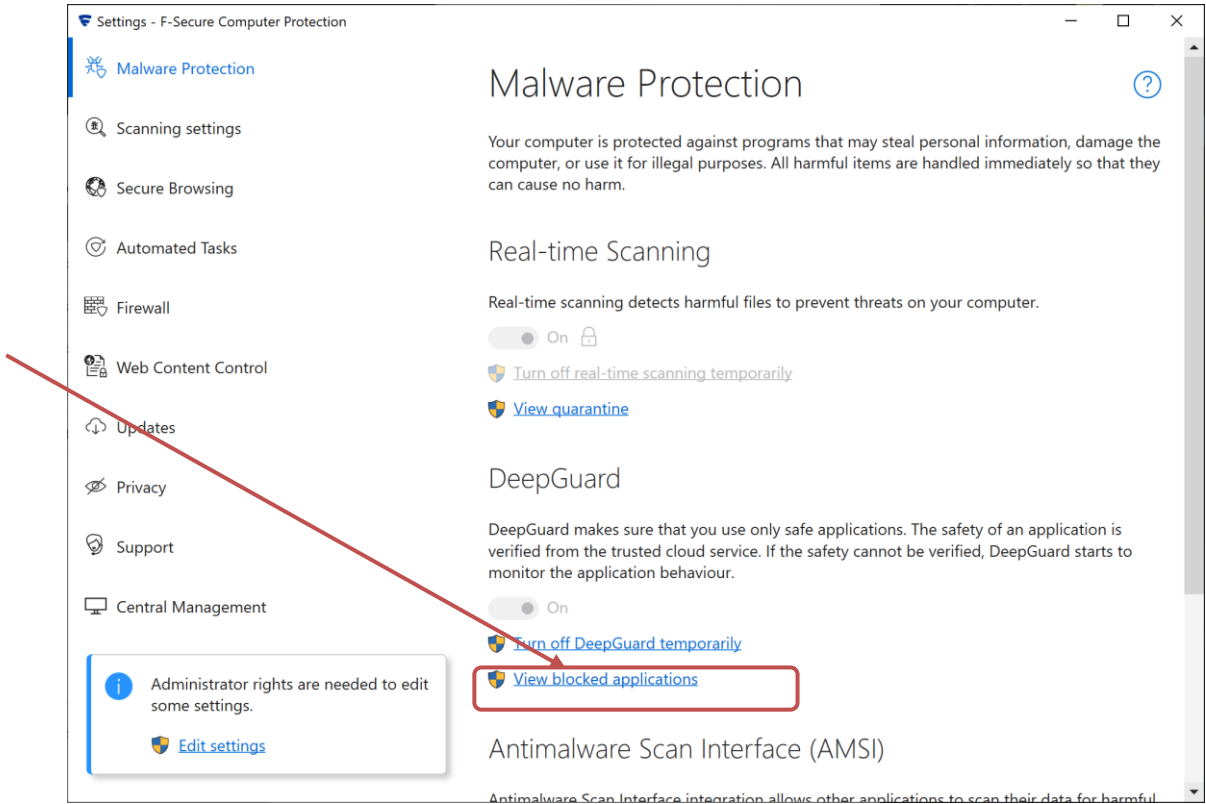
Click F-Secure of the right bottom bar of windows



Click Settings

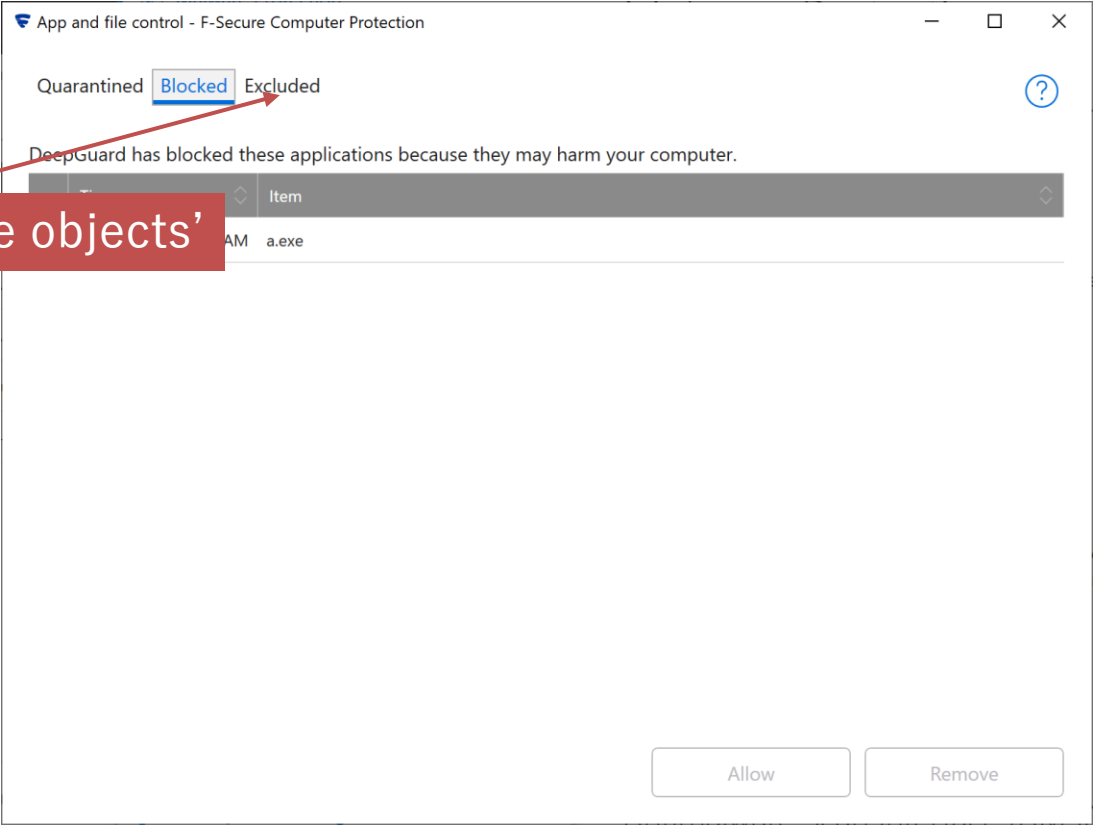
F-Secure set up

Select
“View blocked application”

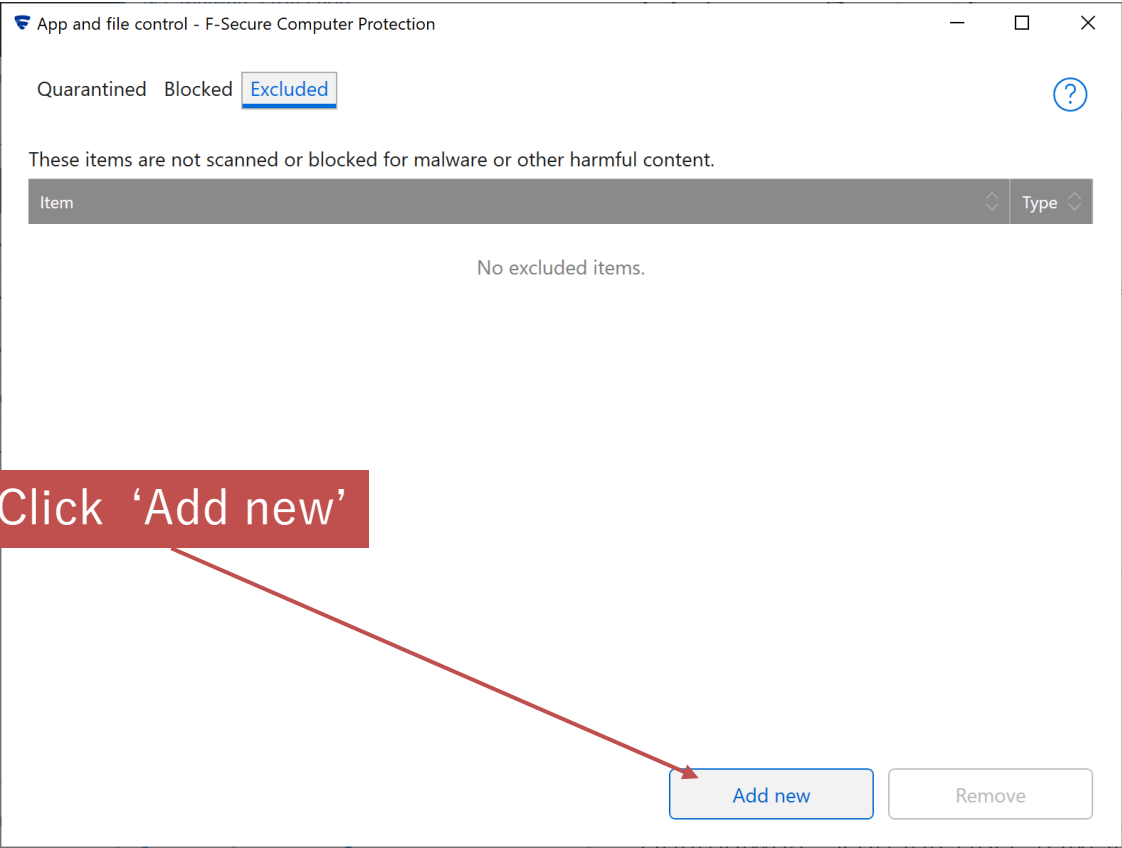


“App and file control” window

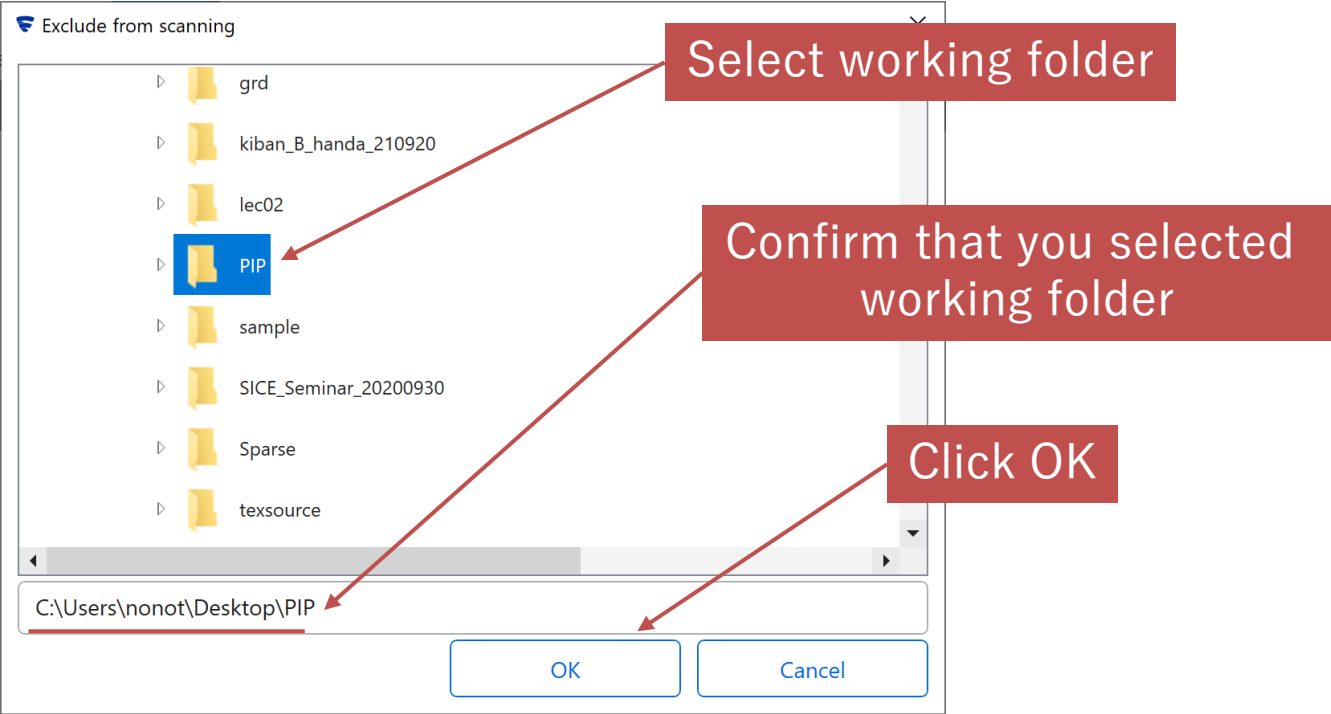
Check in ‘Exclude objects’



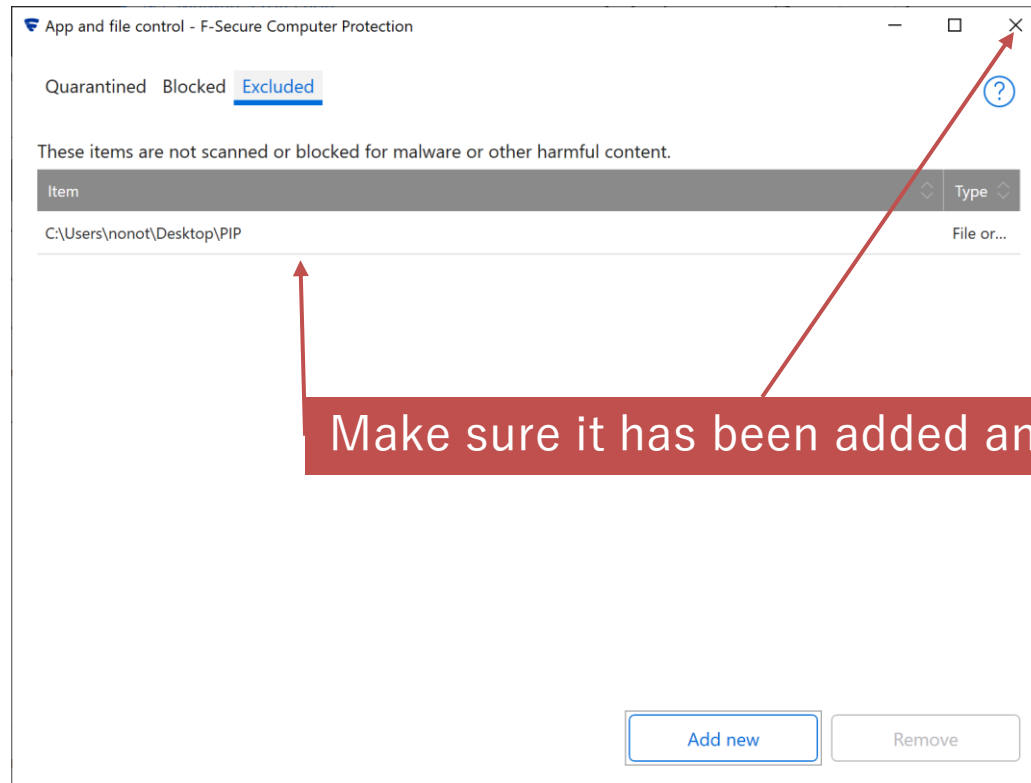
“App and file control” window



Specify the “Exclude folder”



“Exclude from scanning” Window



- Basically, do not work on this lecture outside this directory
- Delete this setting when this lecture is over

Confirm it works

```
Hello World
PS C:\Users\nonot\Desktop\PIP\lec01> rm .\b.exe
PS C:\Users\nonot\Desktop\PIP\lec01> gcc .\test.c
PS C:\Users\nonot\Desktop\PIP\lec01> .\a.exe
Program 'a.exe' failed to run: Access is deniedAt line:1 char:1
+ .\a.exe
+ ~~~~~
At line:1 char:1
+ .\a.exe
+ ~~~~~
+ CategoryInfo          : ResourceUnavailable: (:) [], ApplicationFailedException
+ FullyQualifiedErrorId : NativeCommandFailed

PS C:\Users\nonot\Desktop\PIP\lec01> .\a.exe
Hello World
PS C:\Users\nonot\Desktop\PIP\lec01> |
```

p Live Share Ln 8, Col 1 Spaces: 4

Run the program a.exe again
Enter “.\a.exe”

Completion!!

```
Hello World
PS C:\Users\nonot\Desktop\PIP\lec01> rm .\b.exe
PS C:\Users\nonot\Desktop\PIP\lec01> gcc .\test.c
PS C:\Users\nonot\Desktop\PIP\lec01> .\a.exe
Program 'a.exe' failed to run: Access is deniedAt line:1 char:1
+ .\a.exe
+ ~~~~~
At line:1 char:1
+ .\a.exe
+ ~~~~~
+ CategoryInfo          : ResourceUnavailable: (:) [], ApplicationFailedException
+ FullyQualifiedErrorId : NativeCommandFailed

PS C:\Users\nonot\Desktop\PIP\lec01> .\a.exe
Hello World
PS C:\Users\nonot\Desktop\PIP\lec01> |
```

p Live Share Ln 8, Col 1 Spaces: 4

Results