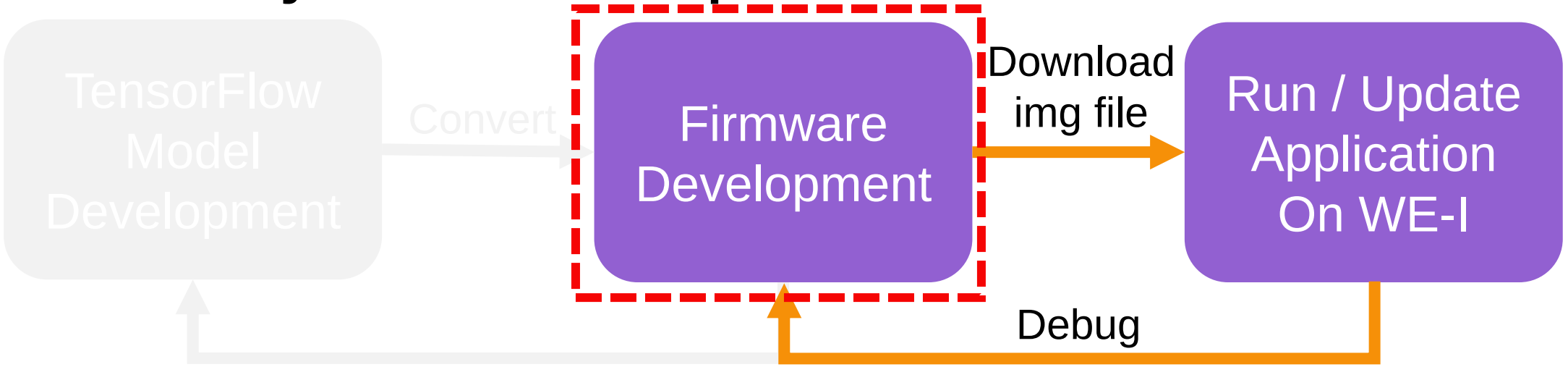
Tutorial 2 – WE-I Project Environment Setup & Development Flow

WE-I Project Development Flow

Stage	TensorFlow Model Development	Firmware Development	Run / Update Application On WE-I
Tool	Anaconda Cygwin	Cygwin Metaware or ARC GNU VirtualBox (Ubuntu 20.04)	Tera Term USB Micro
Language	Python 3	C language C++ language	

WE-I Project Development Flow



Stage	TensorFlow Model Development	Firmware Development	Run / Update Application On WE-I
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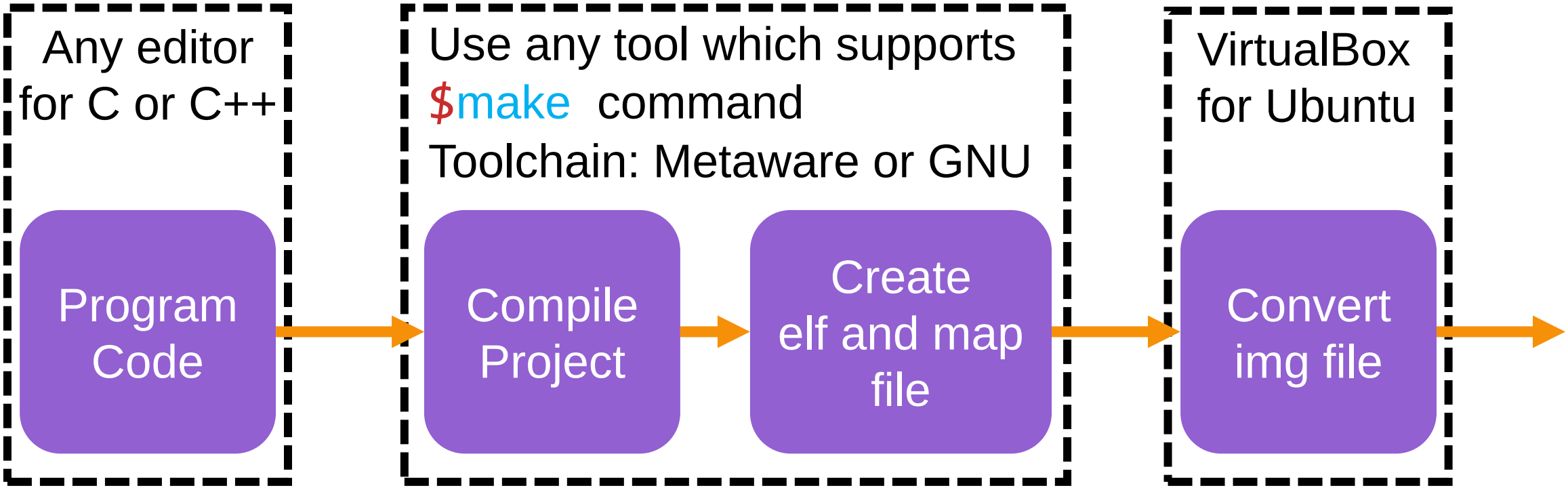
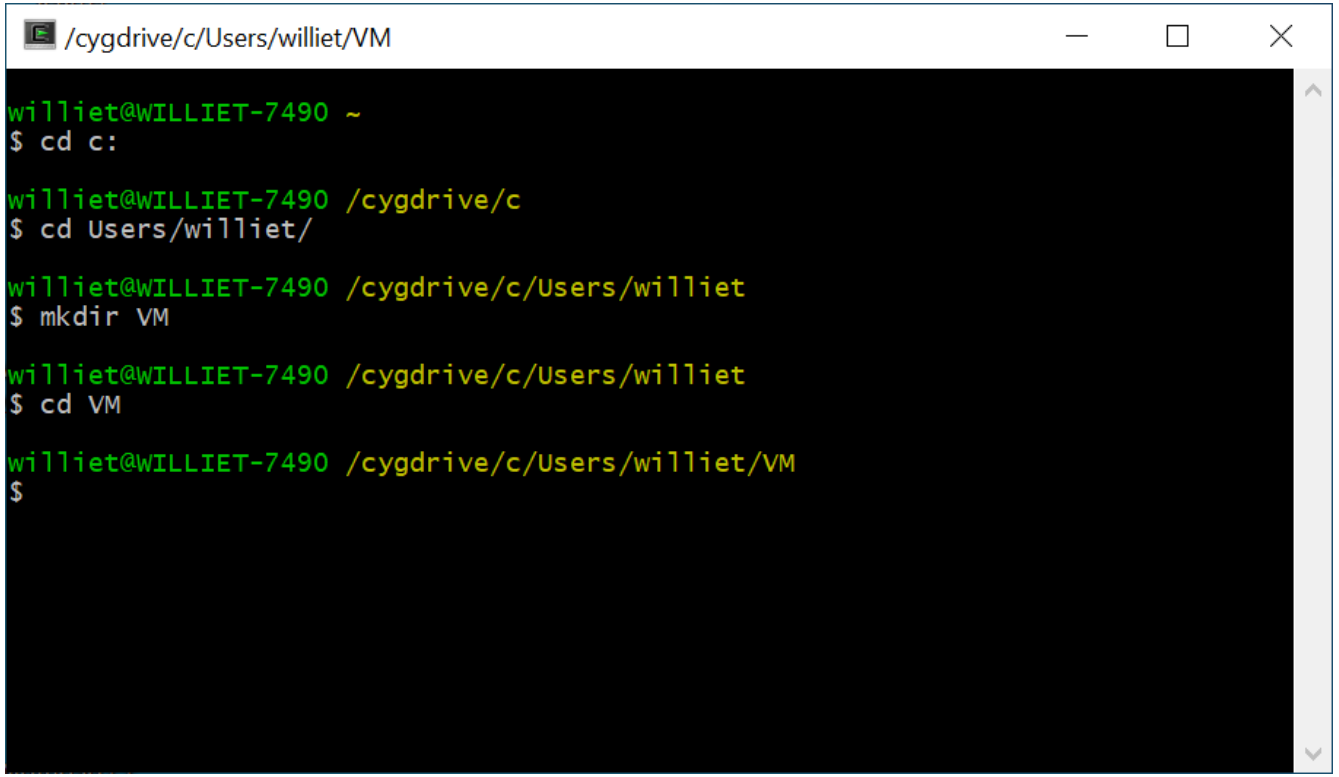
Firmware Development



Download and Setup SDK

Download and Setup SDK

1. Open Cygwin64 Terminal
   $ cd c:
   $ cd Users/{username}/ (to your working file path)
   $ mkdir VM (Suggest create a new folder named “VM”)
   $ cd VM



Download and Setup SDK

Commands in cygwin64 terminal

2. Download SDK from Synopsys Github

```
$ git clone https://github.com/foss-for-synopsys-dwc-arc-processors/arc_contest.git
$ cd arc_contest
$ git submodule init
$ git submodule update
$ cd himax_tflm
$ make download
```

Download and Setup SDK

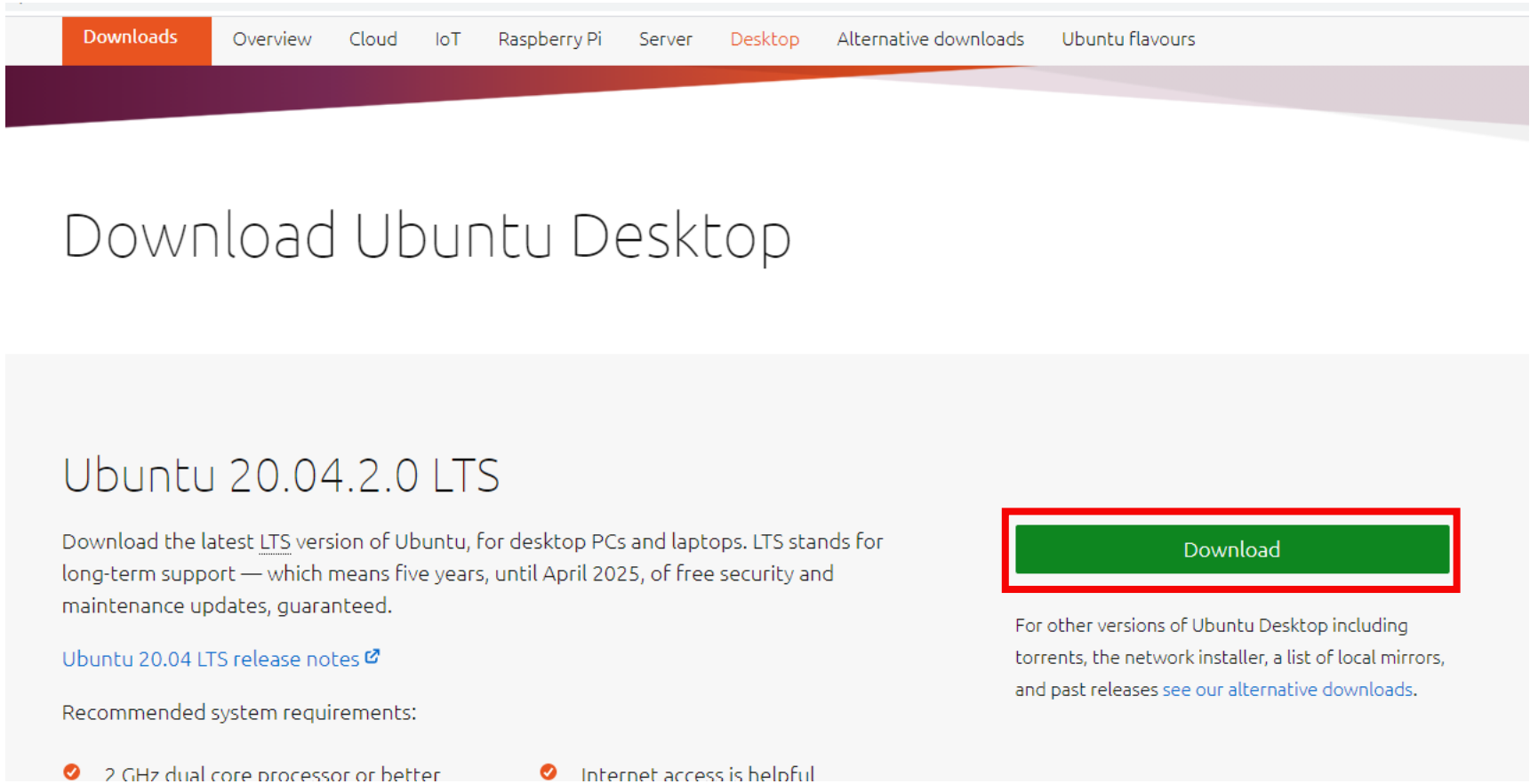
After these steps, your file structure will be like:

arc_contest
|
---- *bsp_tflu*
---- *doc_tutorial*
---- *himax_tflm*
    |
    ---- *himax_we1_sdk*
    ---- *image_gen_linux*
    ---- *tensorflow*
    ---- *third_party*
---- *Synopsys_SDK*
    |
    ---- *Example_Project*
    ---- *User_Project*

Download and Setup SDK

3. 下載Ubuntu映像檔

https://ubuntu.com/download/desktop

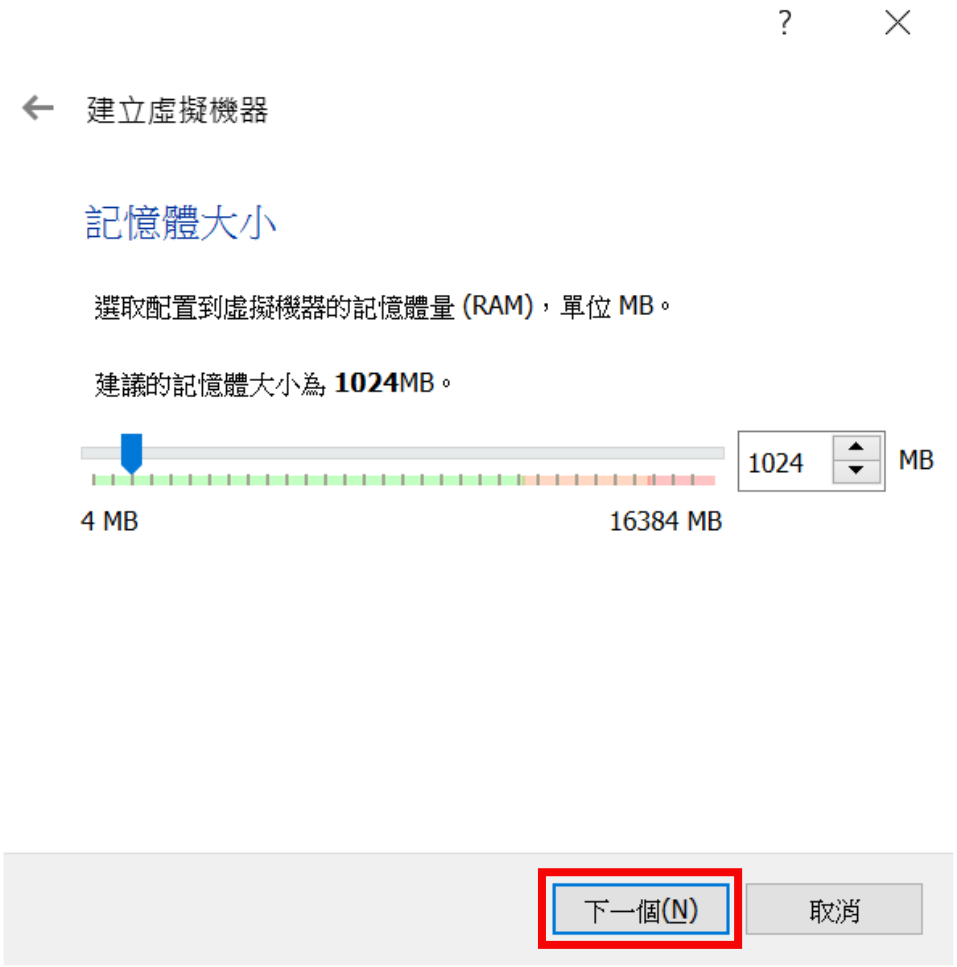


Download and Setup SDK

4. Open VM Oracle VirualBox
5. 新增(N) > 選擇類型Linux、版本Ubuntu (64-bit)

Download and Setup SDK

6. 記憶體大小請依照個人開發需求設定



Download and Setup SDK

7. 硬碟設定請依照個人開發需求設定，建議至少開20GB。

Download and Setup SDK

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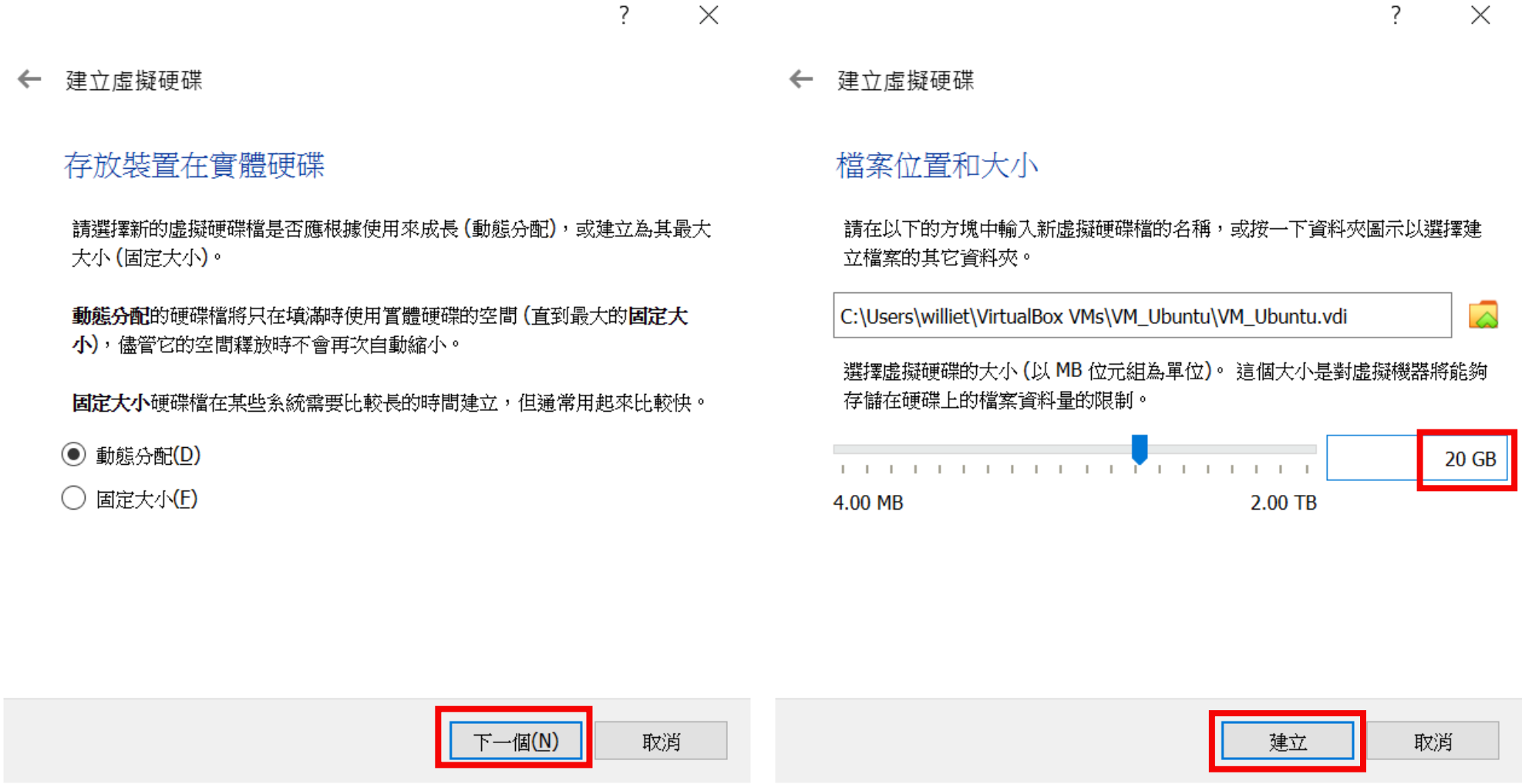

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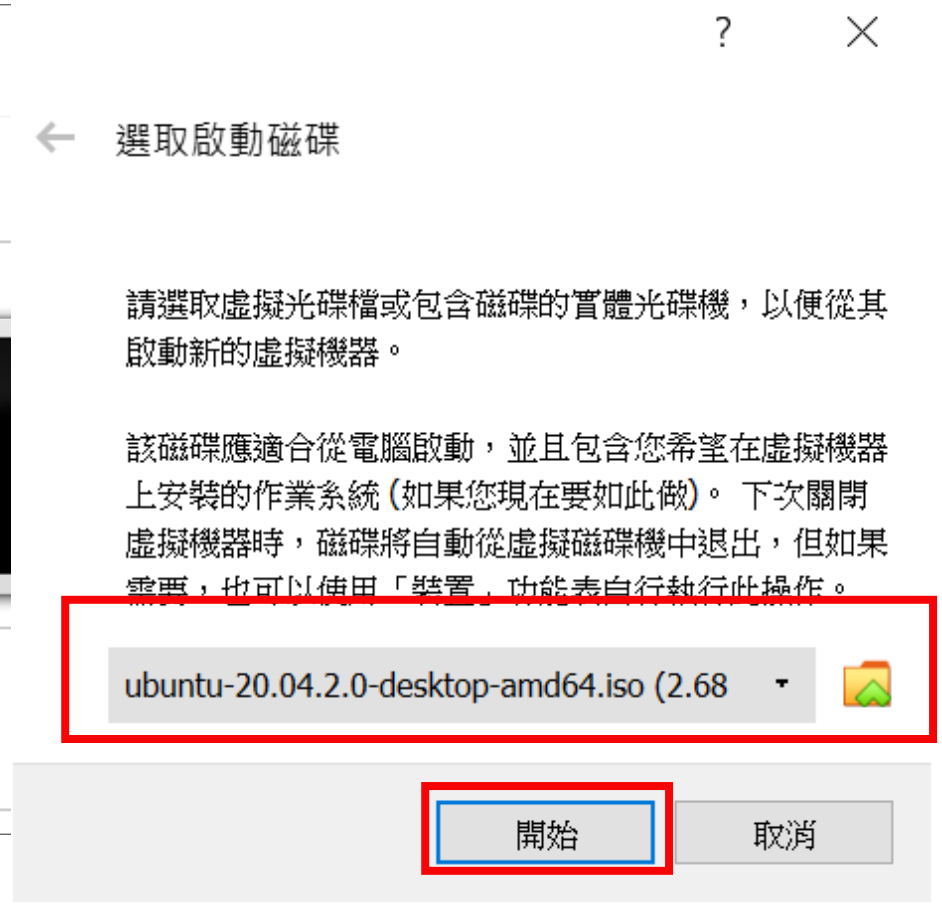
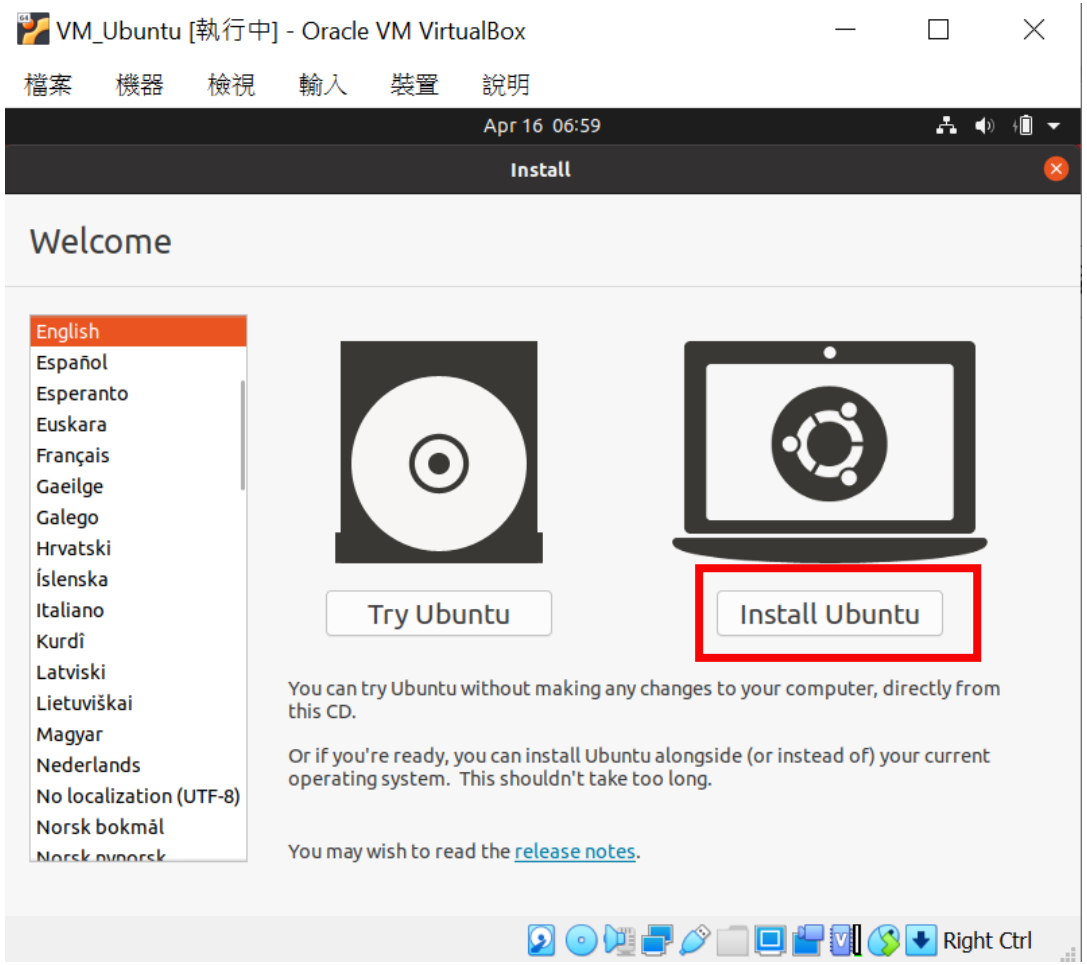
8. 啟動新增的虛擬機，並且設定映像檔(步驟3所抓的檔案)
   (第一次開機需要設定使用者等資訊，請依照各自需求設定，如步驟9所示)



Download and Setup SDK

9. 選擇安裝，並依照使用者需求自行更改設定(如時區或者鍵盤輸入法)，其餘預設即可，接著等待安裝完畢



Download and Setup SDK

10. 開啟Ubuntu，開始設定共用資料夾。

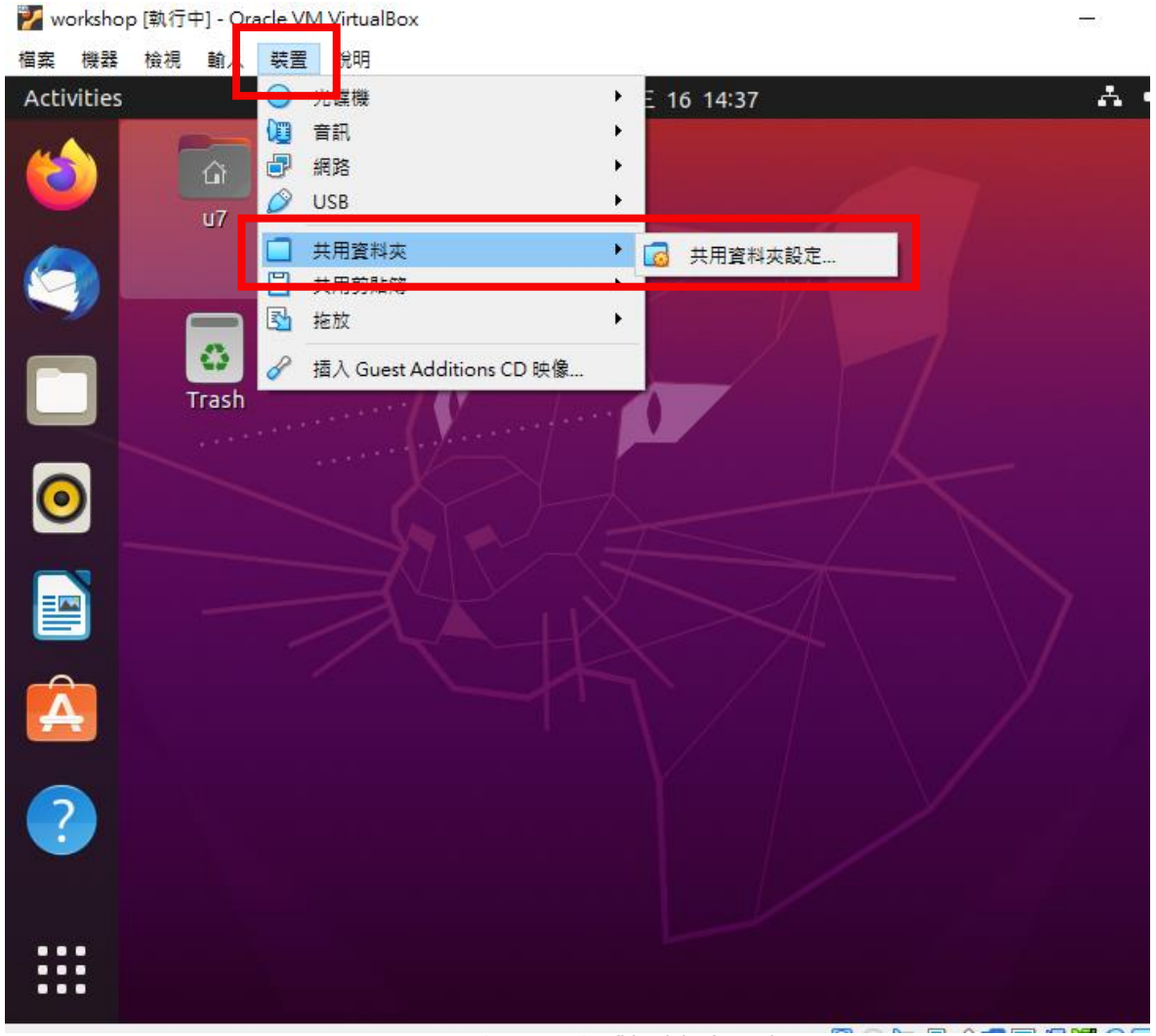
    在開發的過程中，因為編譯是在Windows介面

    轉換燒錄用的Image是在Ubuntu

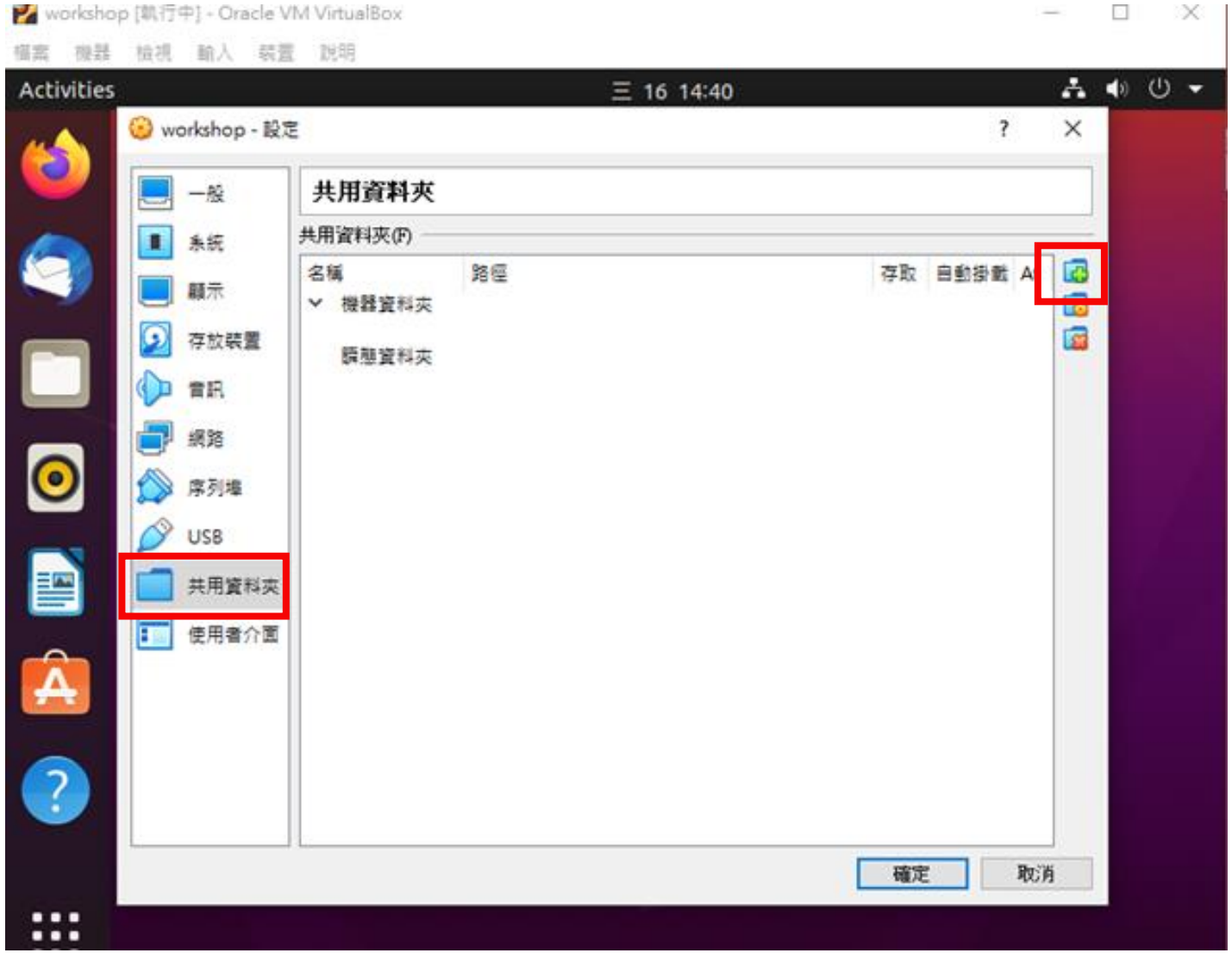
    因此要設定共用資料夾，使兩個開發環境可以看到共同的檔案

Download and Setup SDK

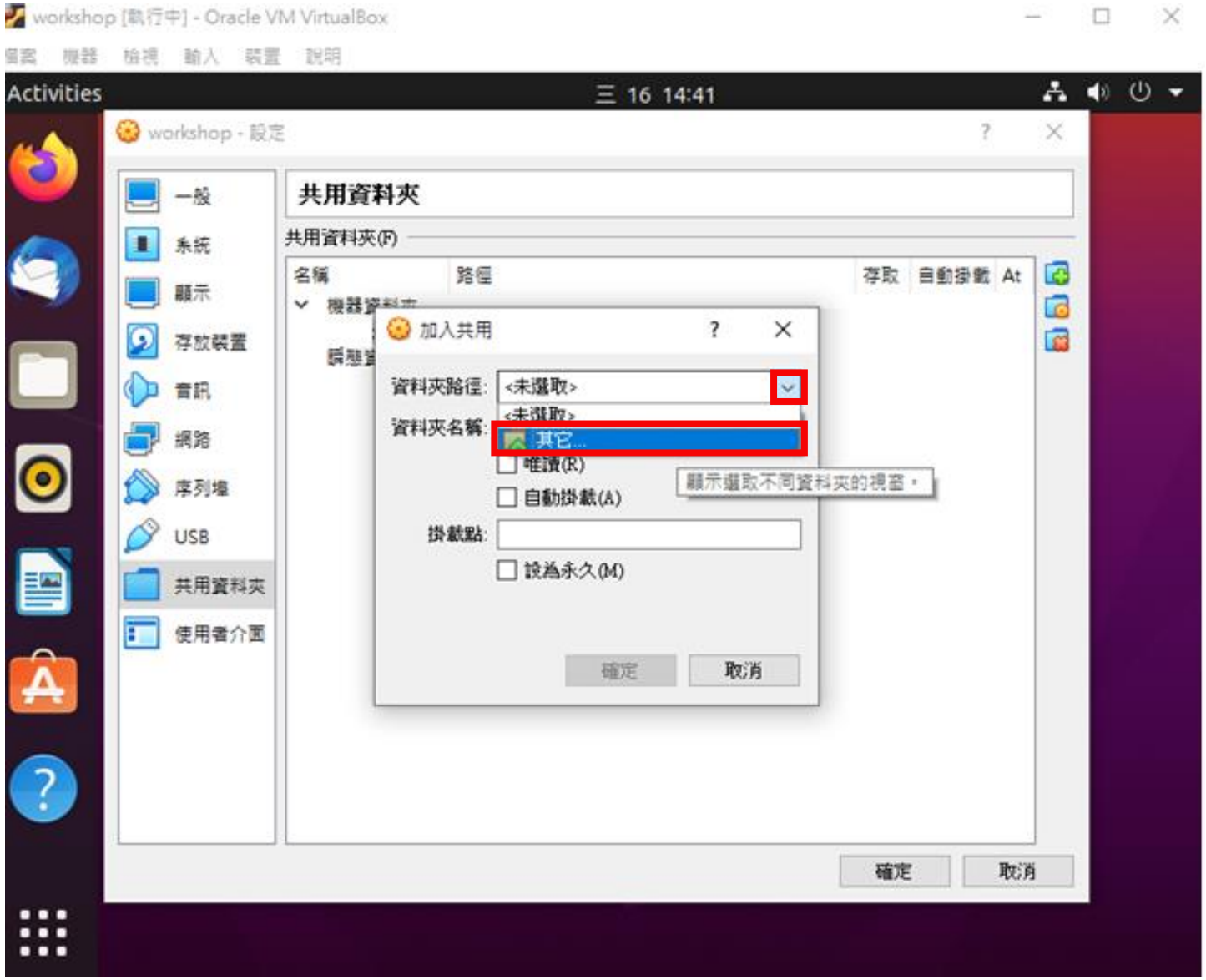
11. Set the folder to be shared



Download and Setup SDK

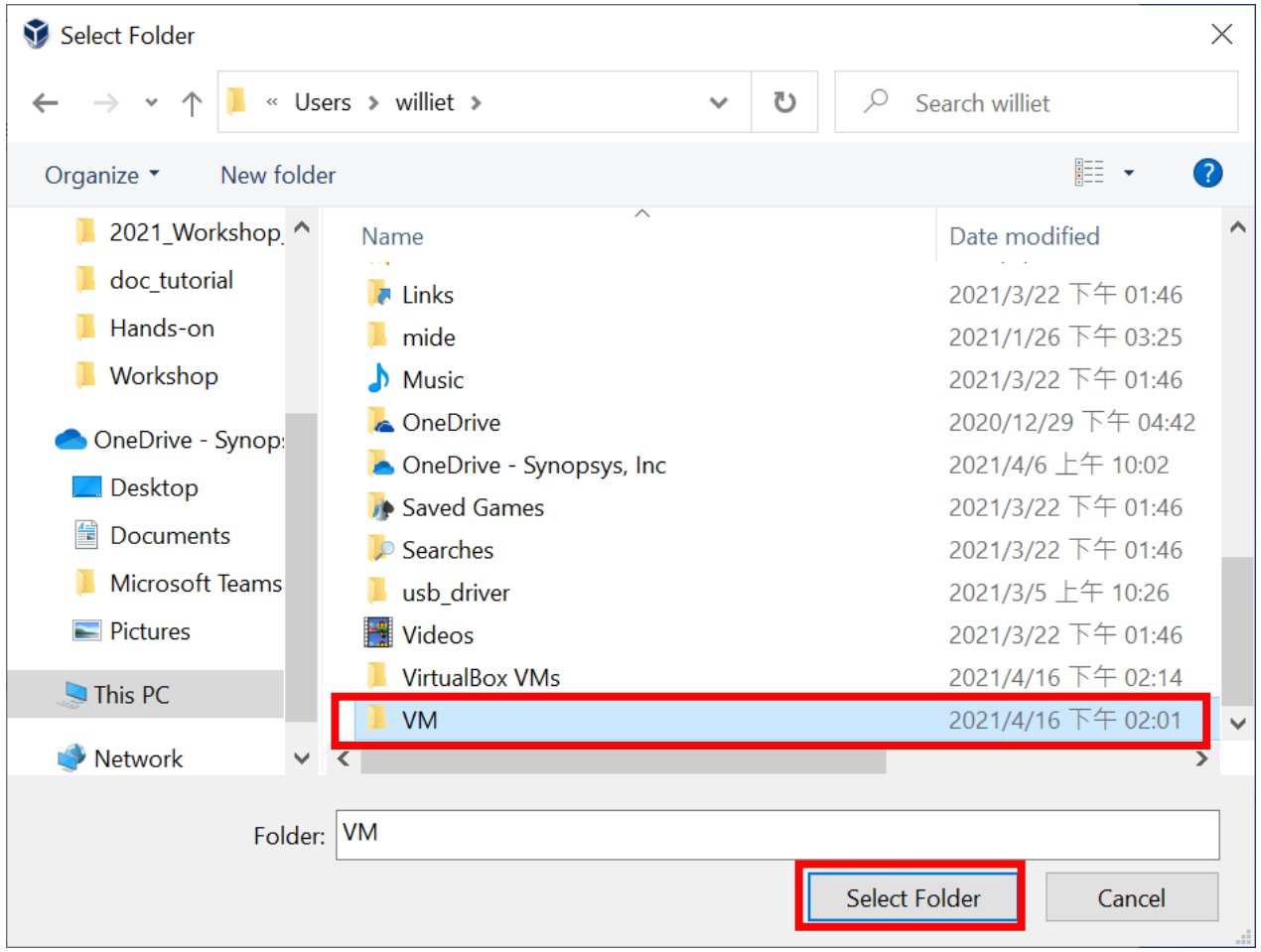


Download and Setup SDK

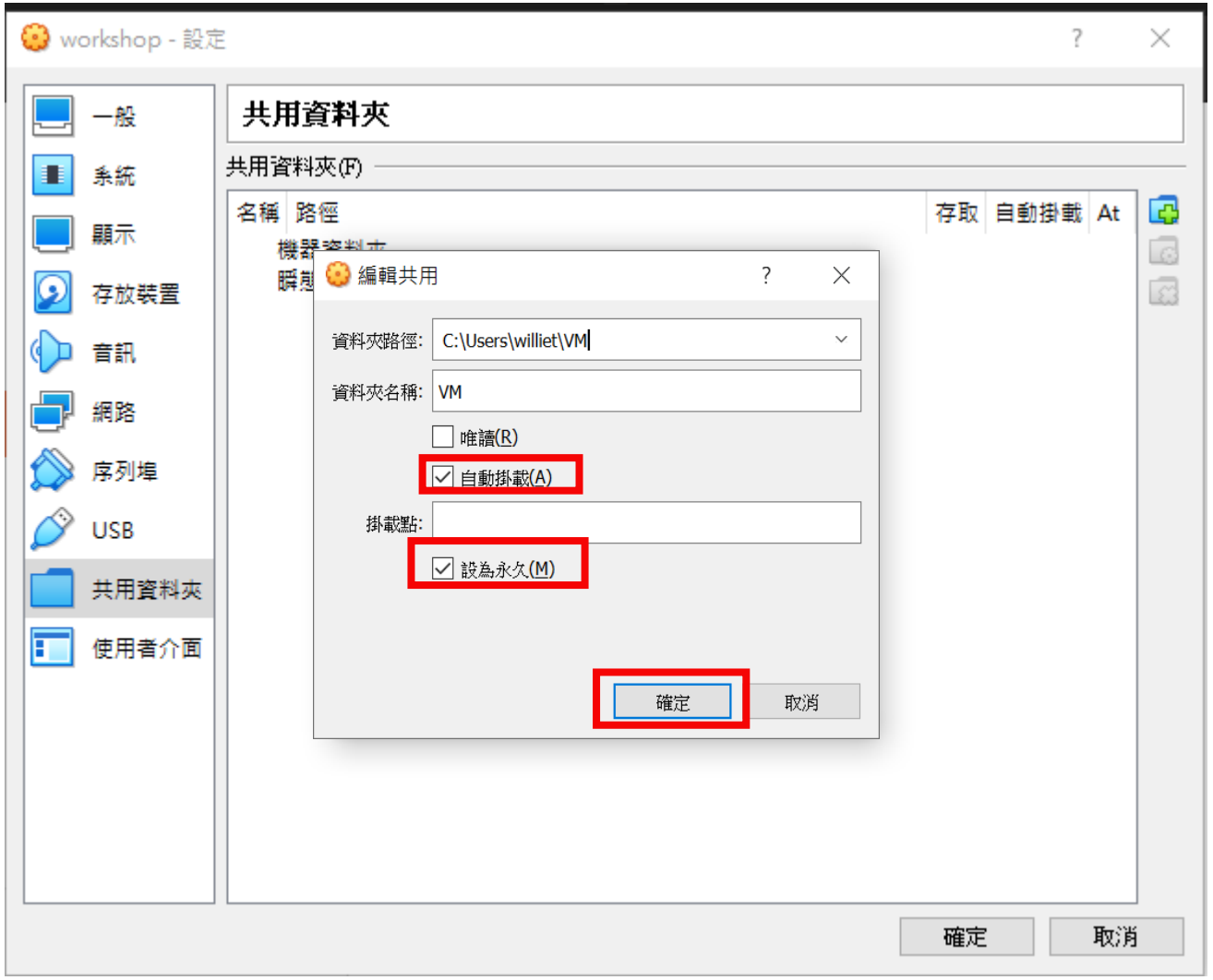


Download and Setup SDK

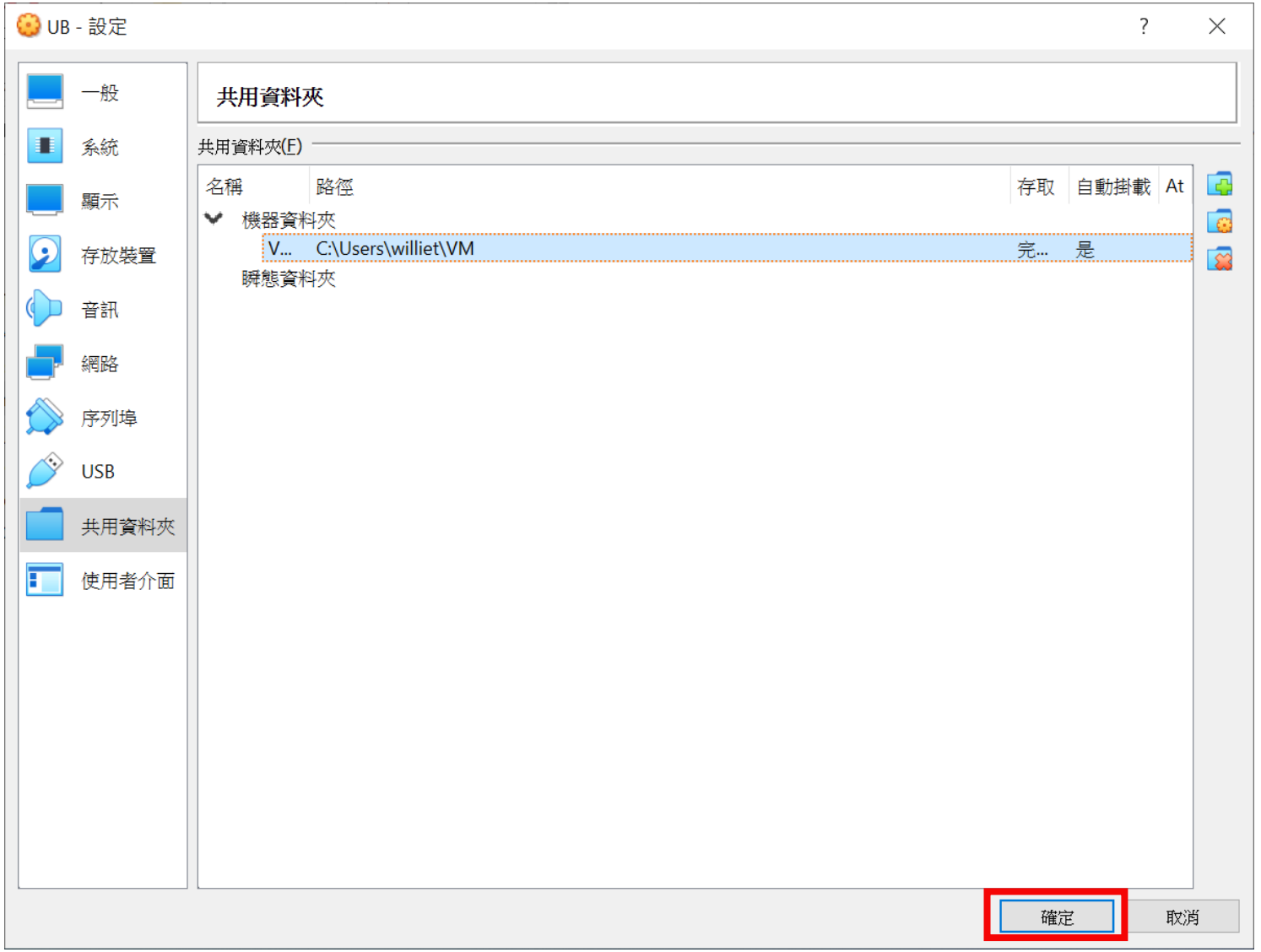
Path “C:\Users\{username}\VM”



Download and Setup SDK

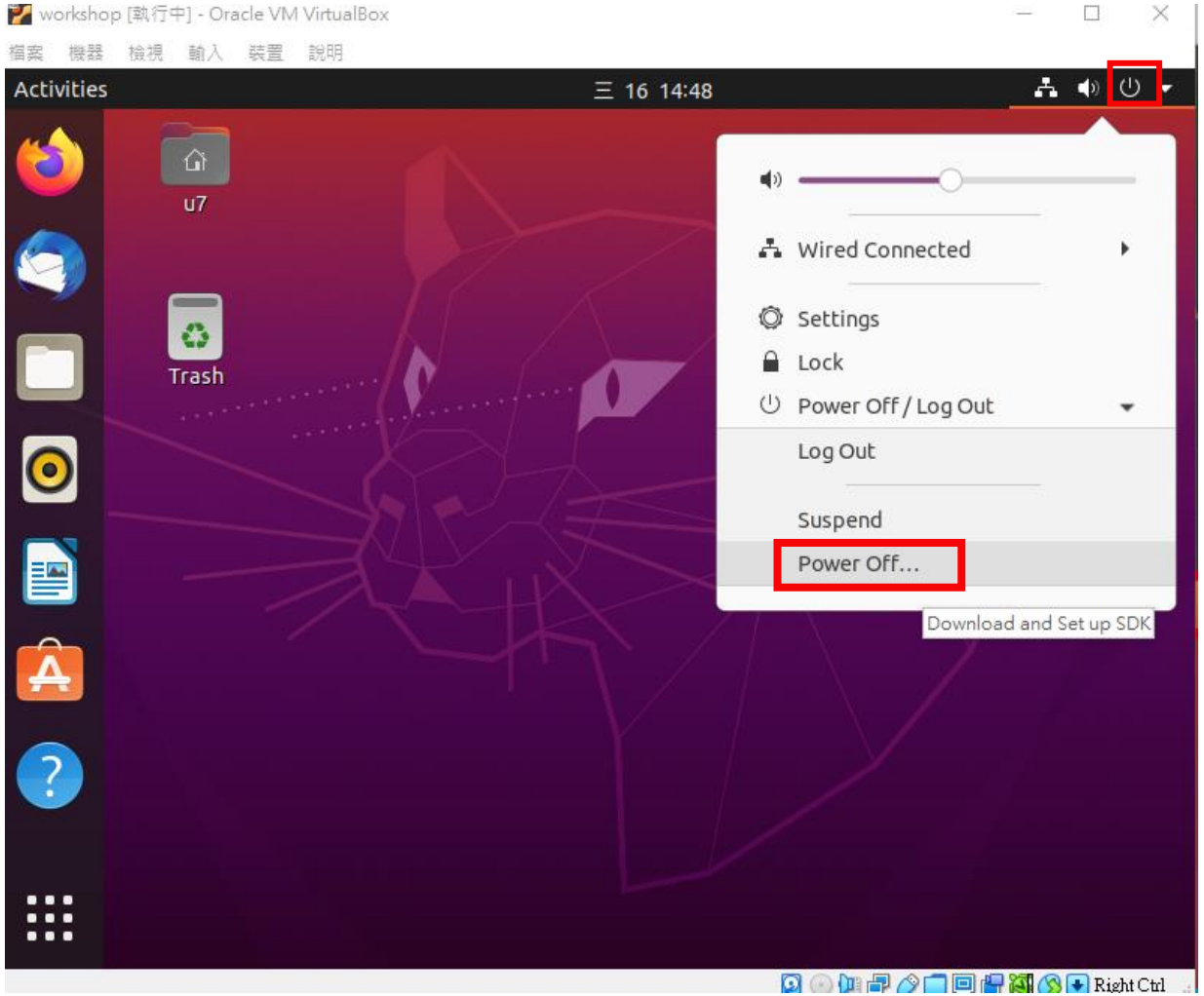


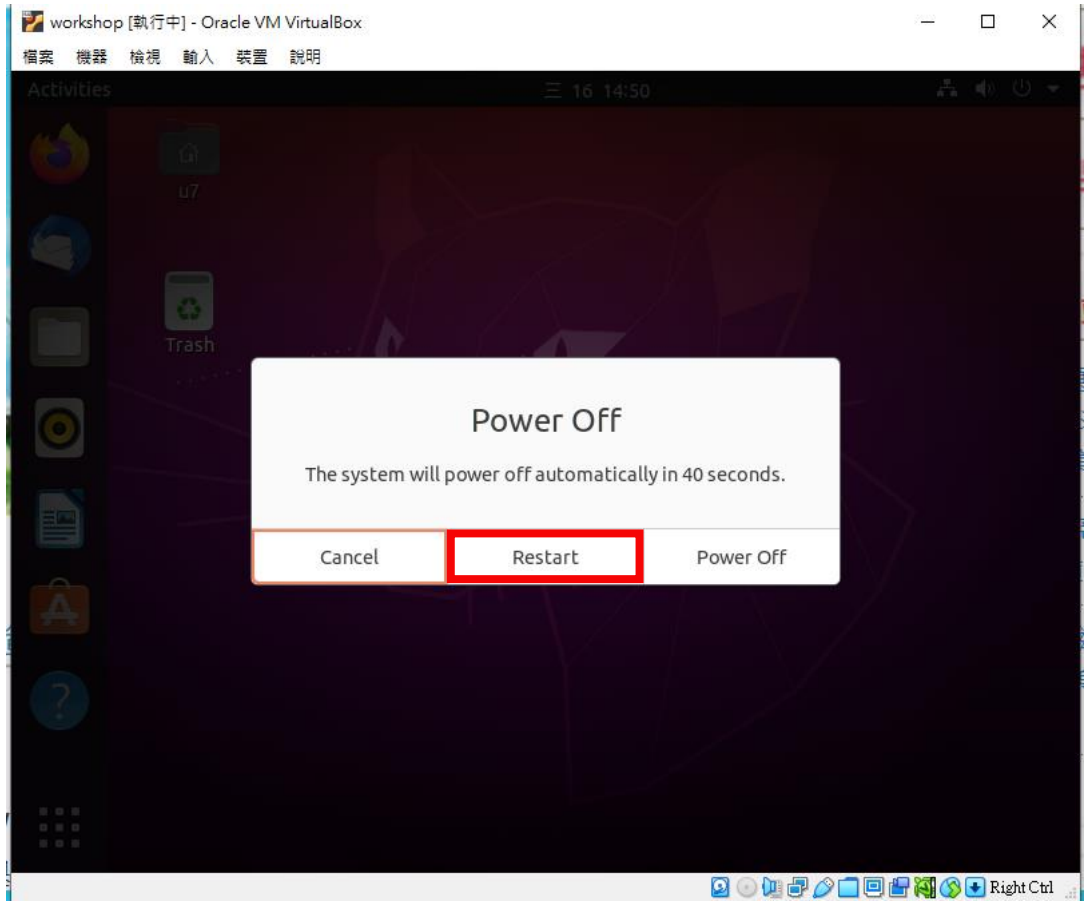
Download and Setup SDK



Download and Setup SDK

Restart 





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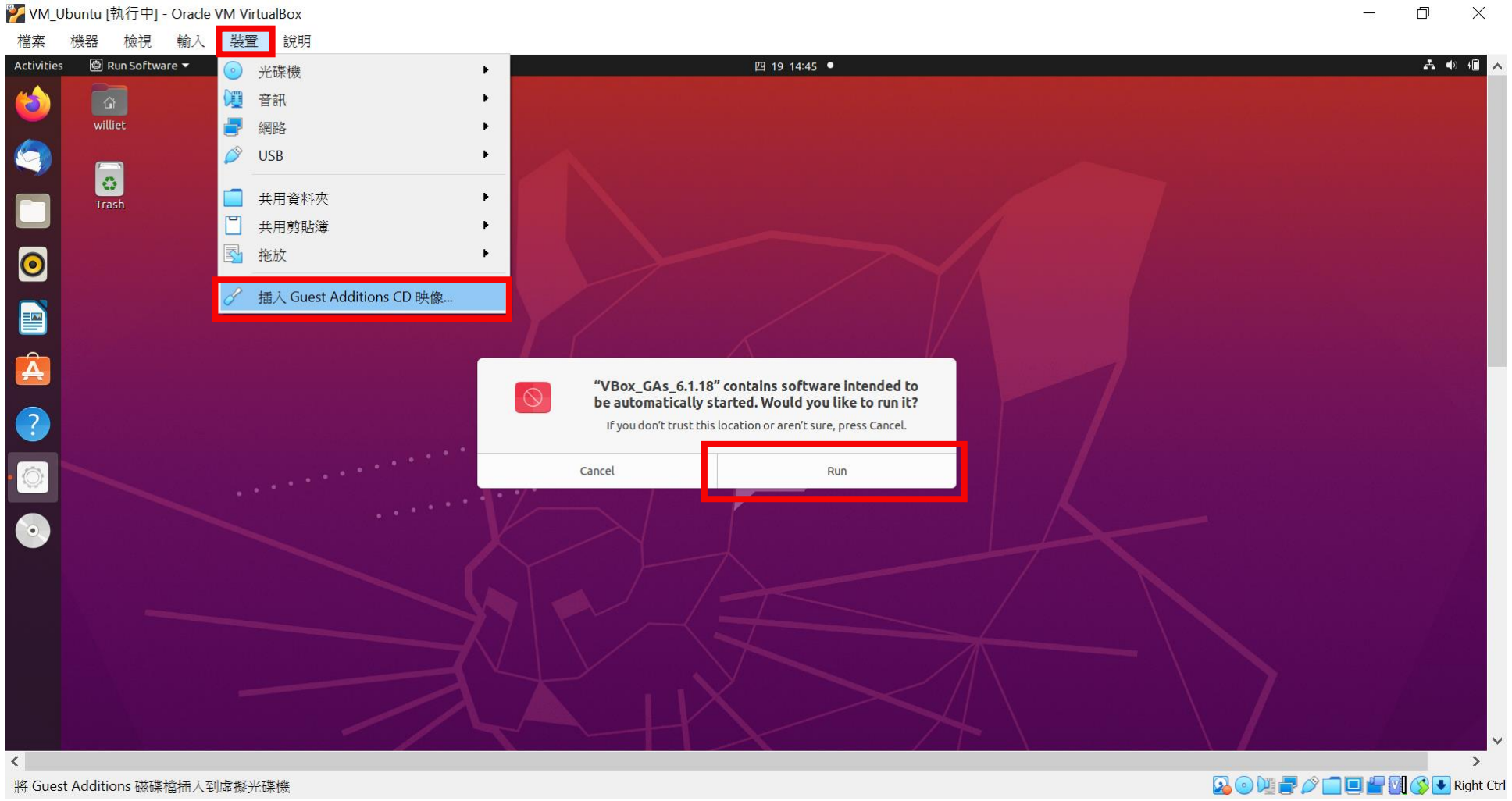
Run Guest Addition CD

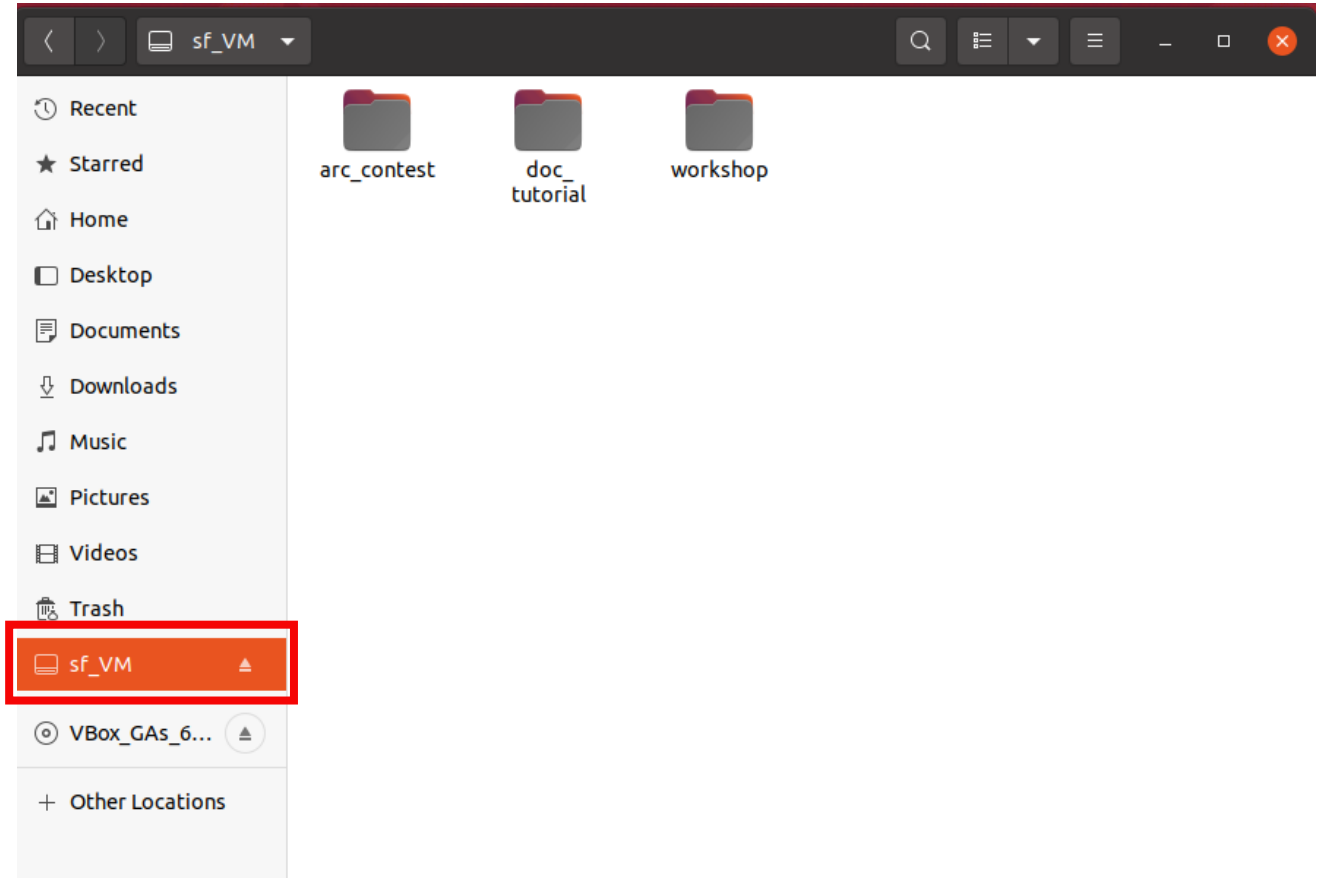


Download and Setup SDK

After you mount, you can see files in Ubuntu “sf_VM” which are also in Windows “C:\Users\{username}\VM”

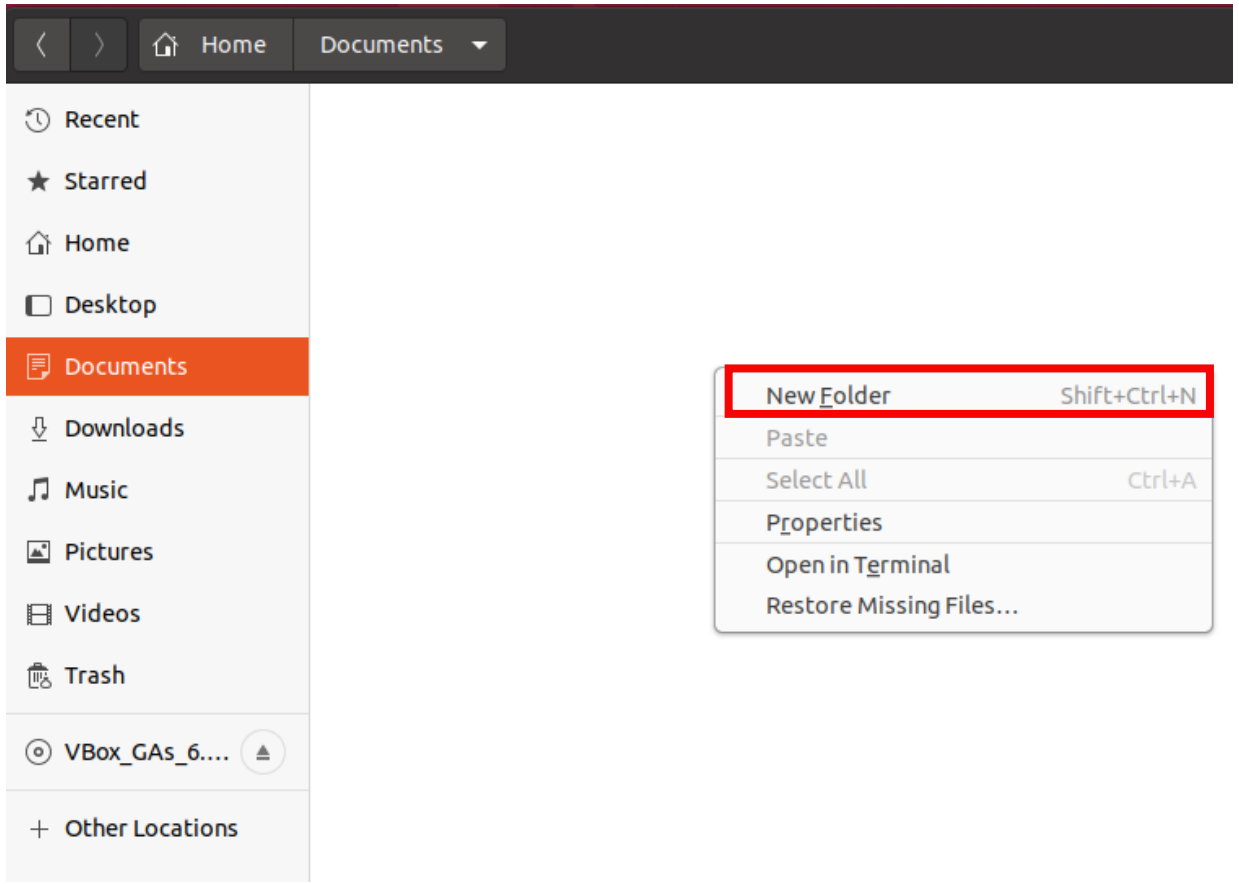
If you mount well, go to step 13.

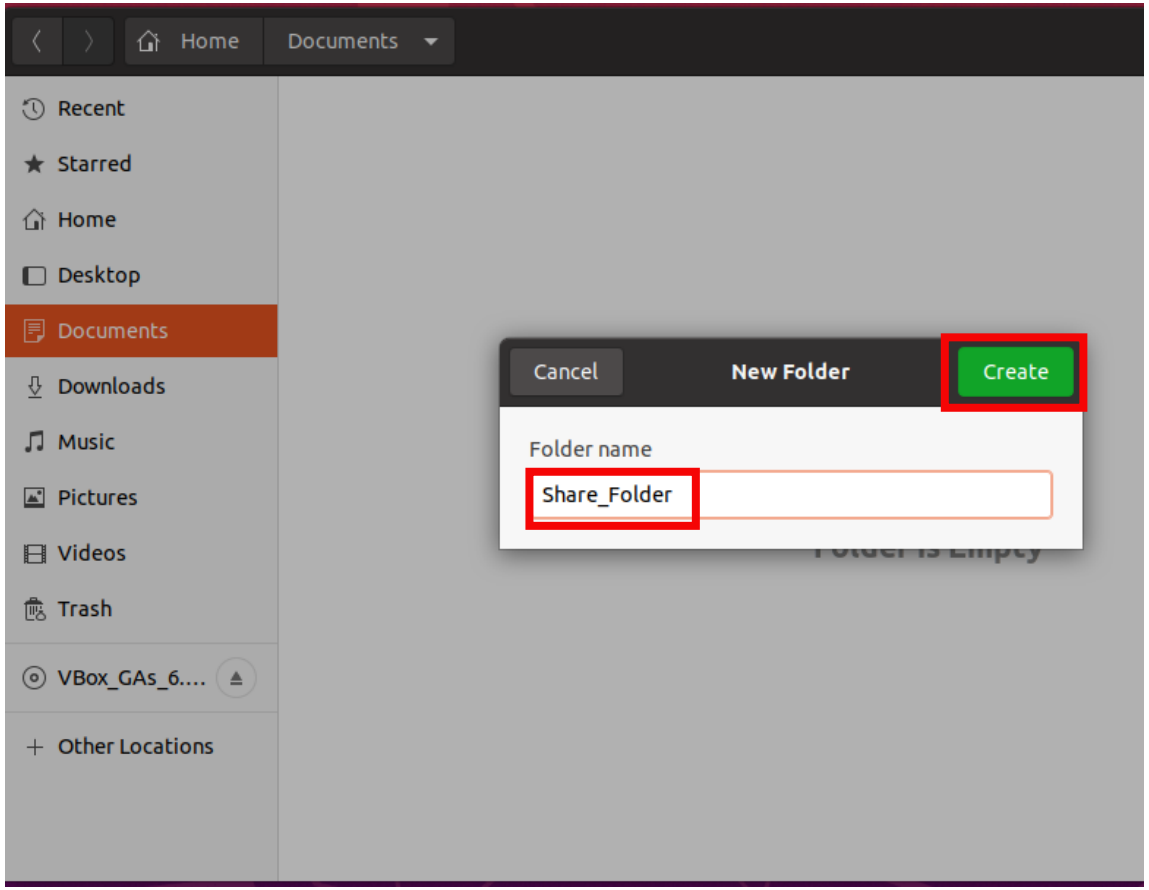
If shared folder doesn’t mount, please run step 12.



Download and Setup SDK

12. Create a new folder at “Home/Documents/Share_Folder”



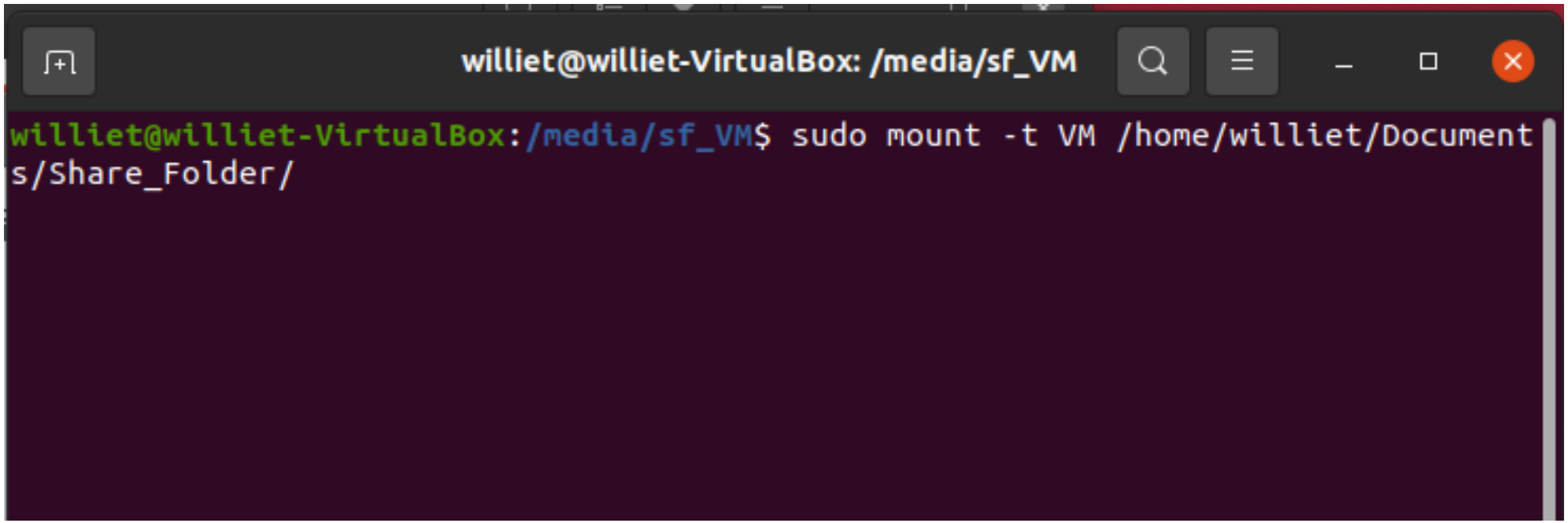


Download and Setup SDK

Open Ubuntu terminal: Ctrl+Alt+t (or right click > Open in Terminal)

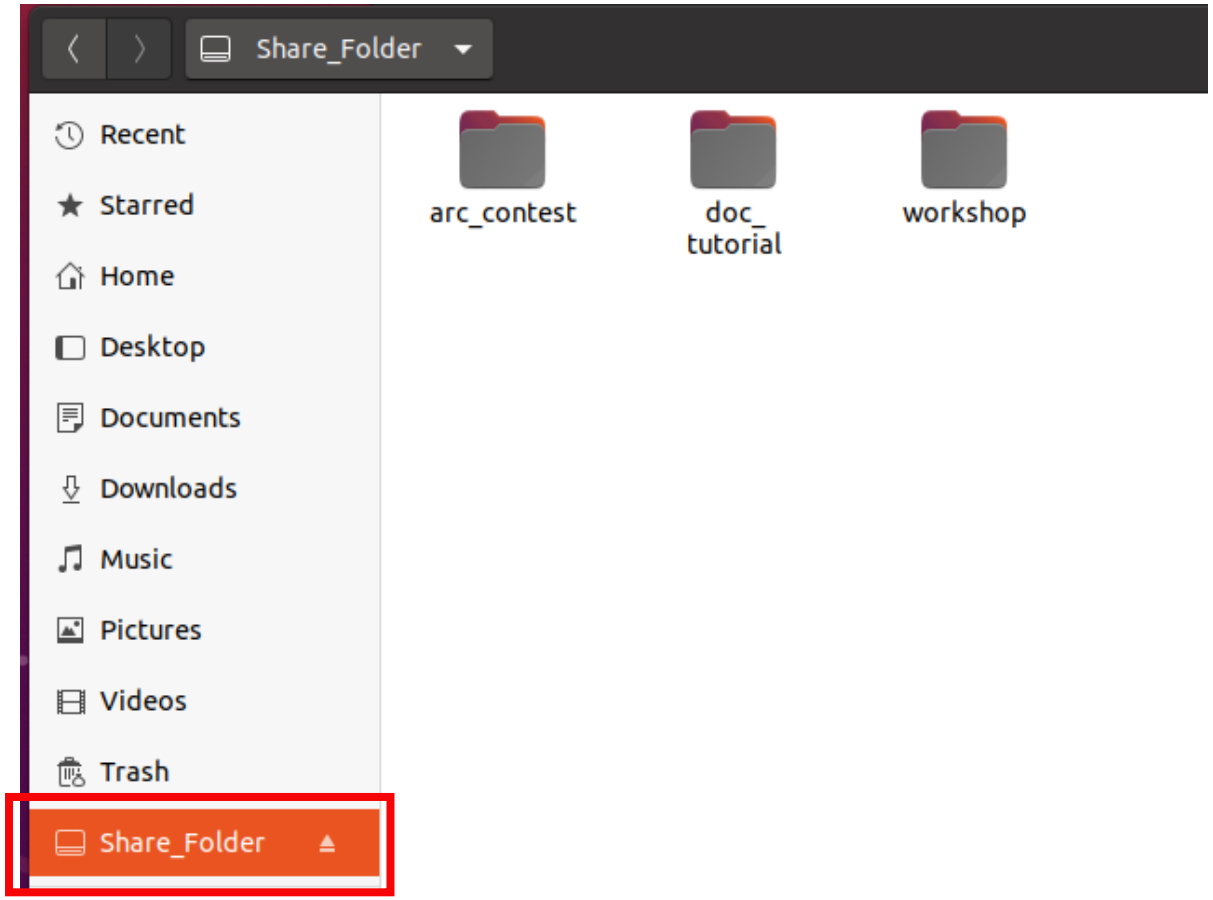
$ sudo mount –t vboxsf VM /home/{username}/Documents/Share_Folder

$ Key-in your user password



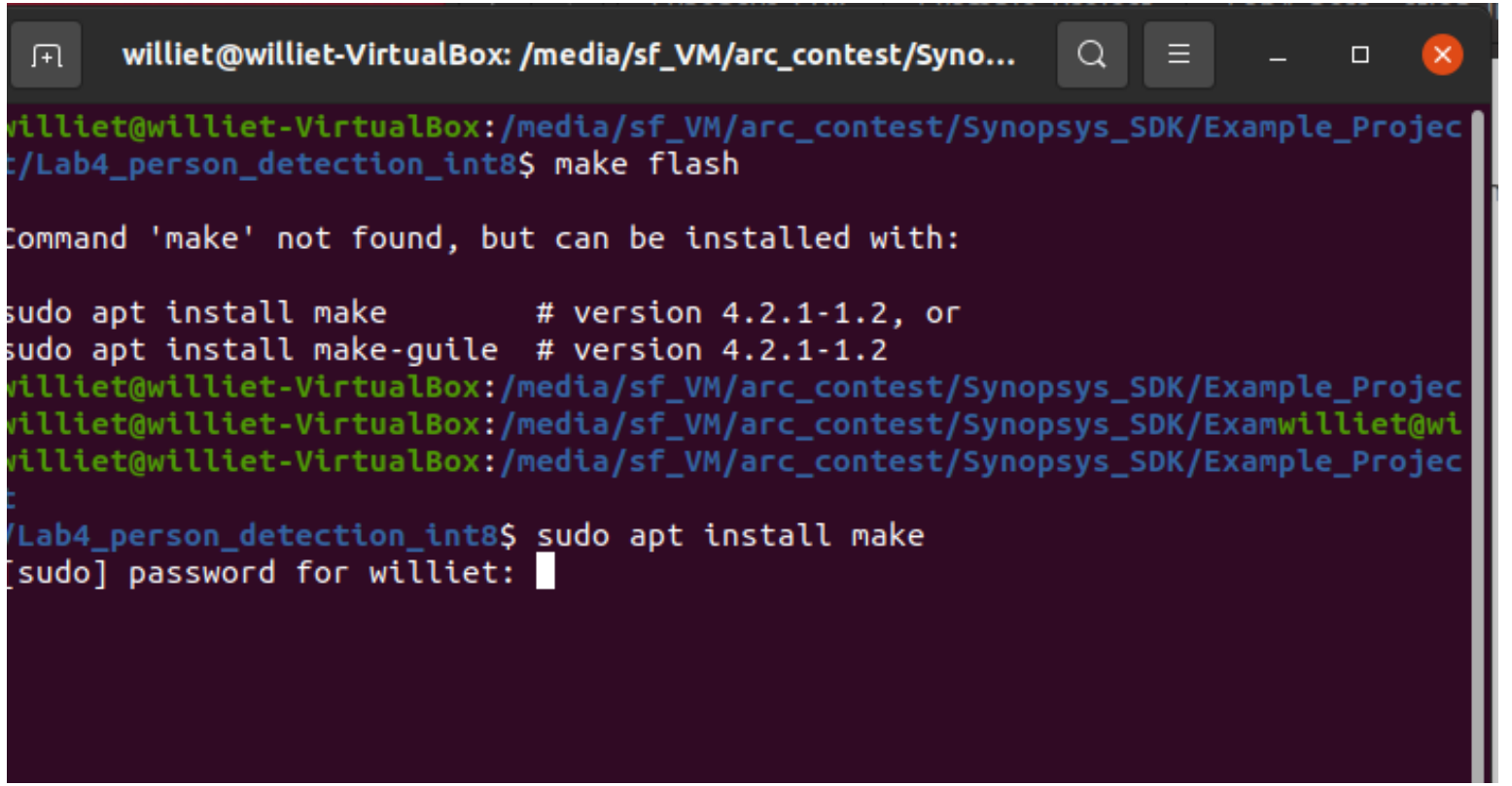
Download and Setup SDK

After you mount, you can see files in Ubuntu “home/{username}/Documents/Share_Folder” which are also in Windows “C:\Users\{username}\VM”



Download and Setup SDK

13. Install “make” and “git” command
    $ sudo apt install make
    $ Key-in your user password



Download and Setup SDK

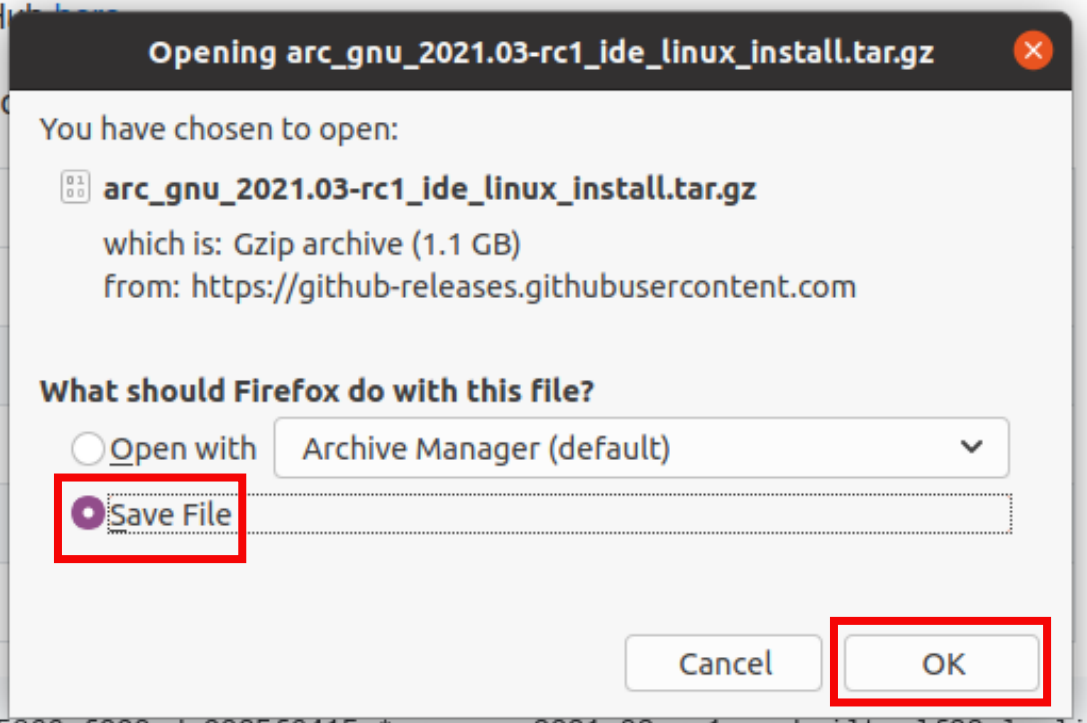
14. Download and setup arc-elf bin file
    https://github.com/foss-for-synopsys-dwc-arc-processors/toolchain/releases

6. Native toolchain for ARC HS is not usable due to wrong build configuration.

Please report any problems by filing an Issue in GitH

Note: The toolchain is only supported for 64-bit versi

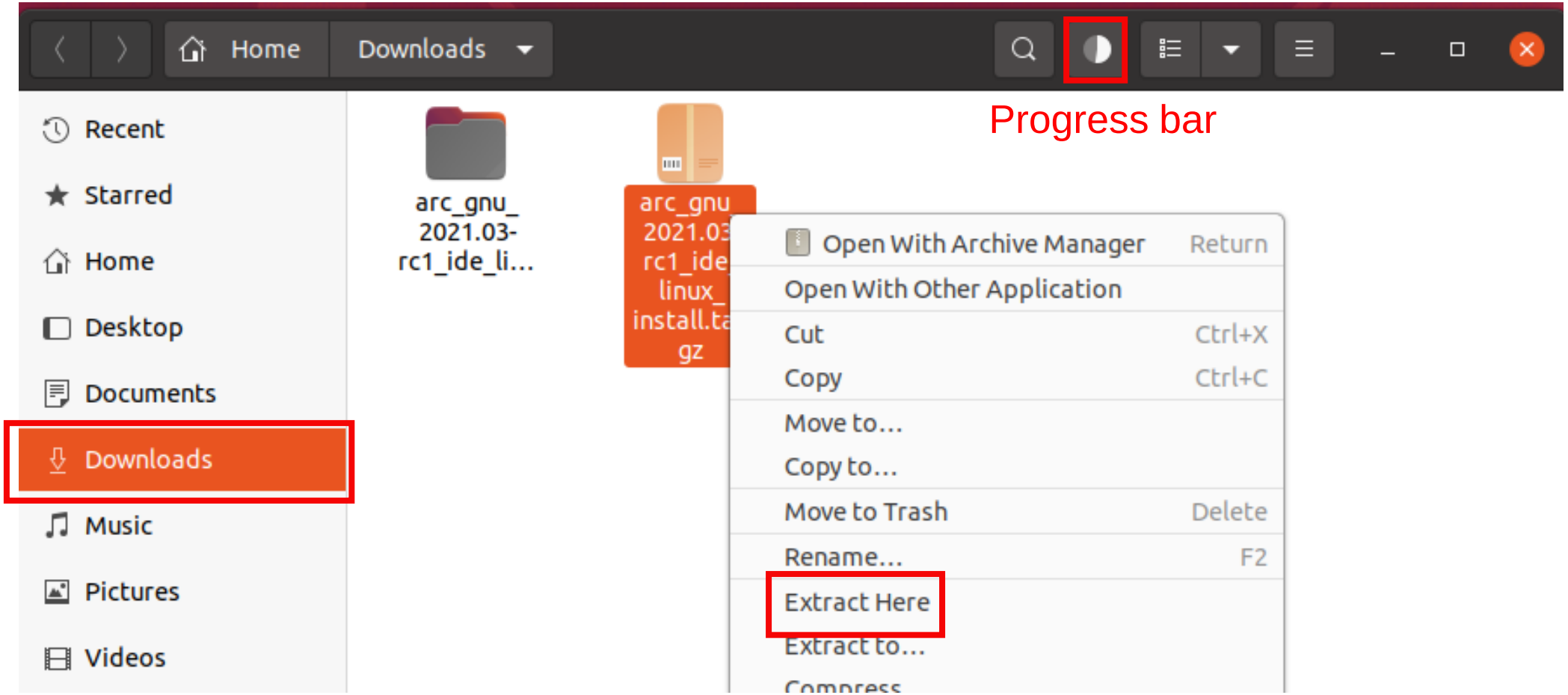
	Linux x86_64
Baremetal	Little endian \ Big endian
Linux/uClibc ARC700	Little endian \ Big endian
Linux/uClibc ARC HS	Little endian \ Big endian
Linux/glibc ARC HS	Little endian \ Big endian
IDE	Download




```
3ab6d863c12948484c7ae5e37ae1ffe8c32b3b1eacb5866ef090ade9025f6415 *arc_gnu_2021.03-rc1_prebuilt_elf32_le_linux
d4fb3a6a9c67bcd088a624b266adc3bad47da42cab45aabf6112532ea1854f22 *arc_gnu_2021.03-rc1_sources.tar.gz
```

Download and Setup SDK

15. Go to “Downloads” and unzip install package (Right Click > Extract Here)



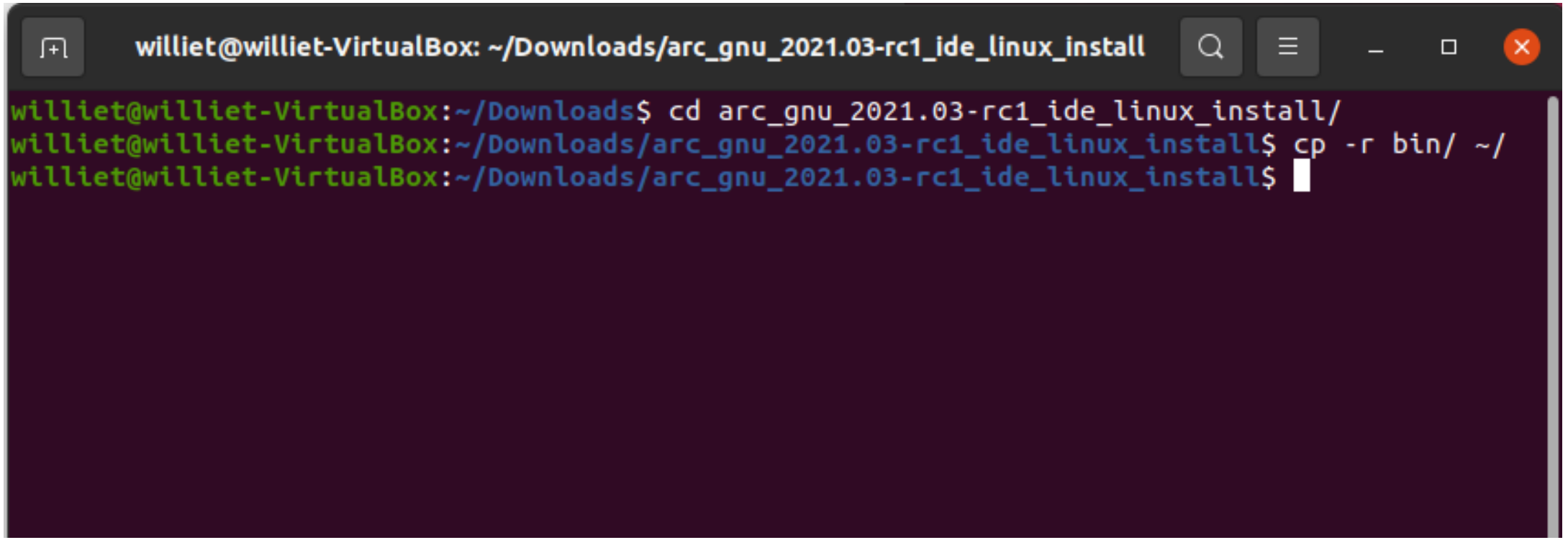
Download and Setup SDK

16. Open Terminal, go to folder and copy “bin” folder to “Documents”

    $ cd arc_gnu_2021.03-rc1_ide_linux_install/

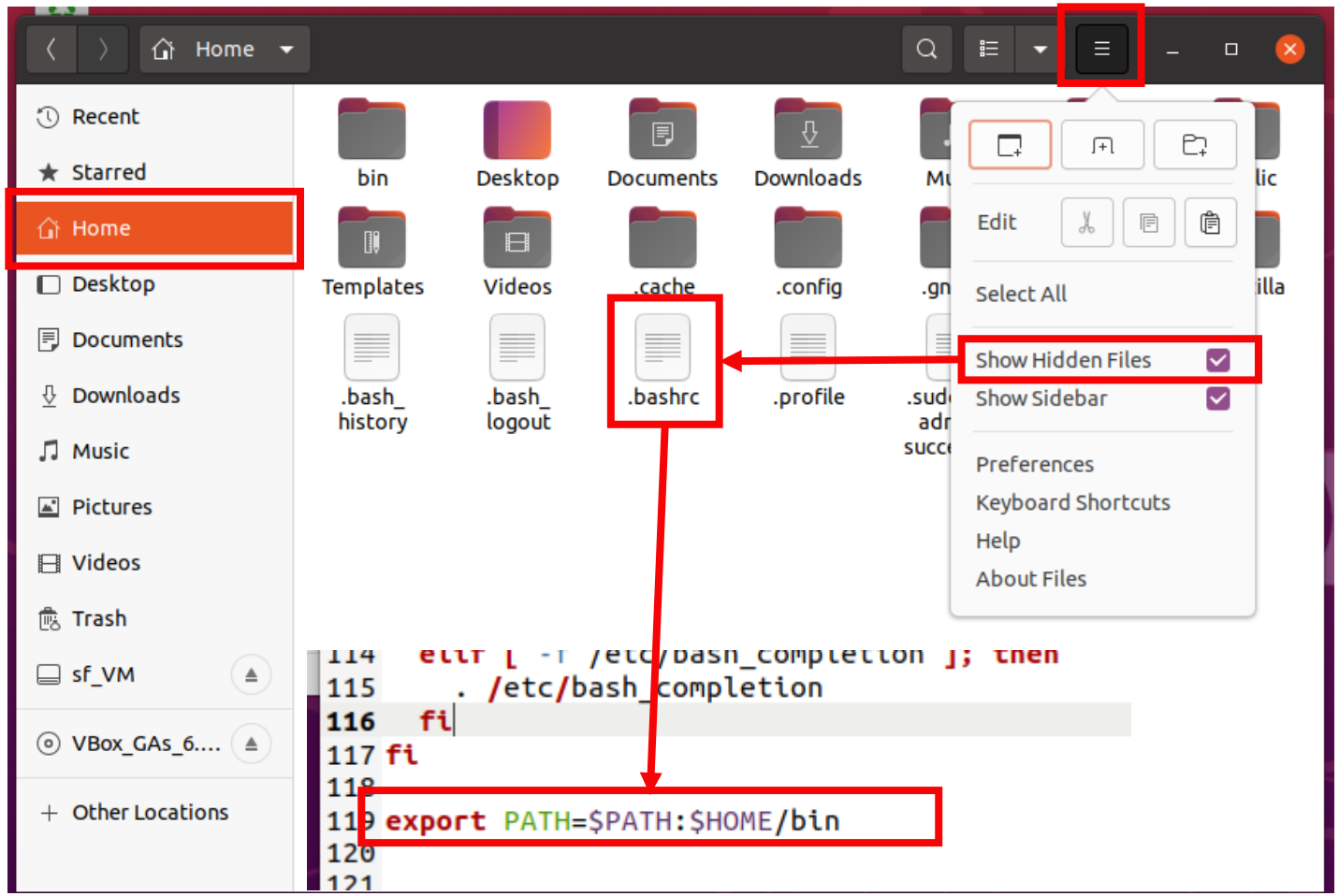
    (Each version is different folder name)

    $ cp –r /bin/ ~/



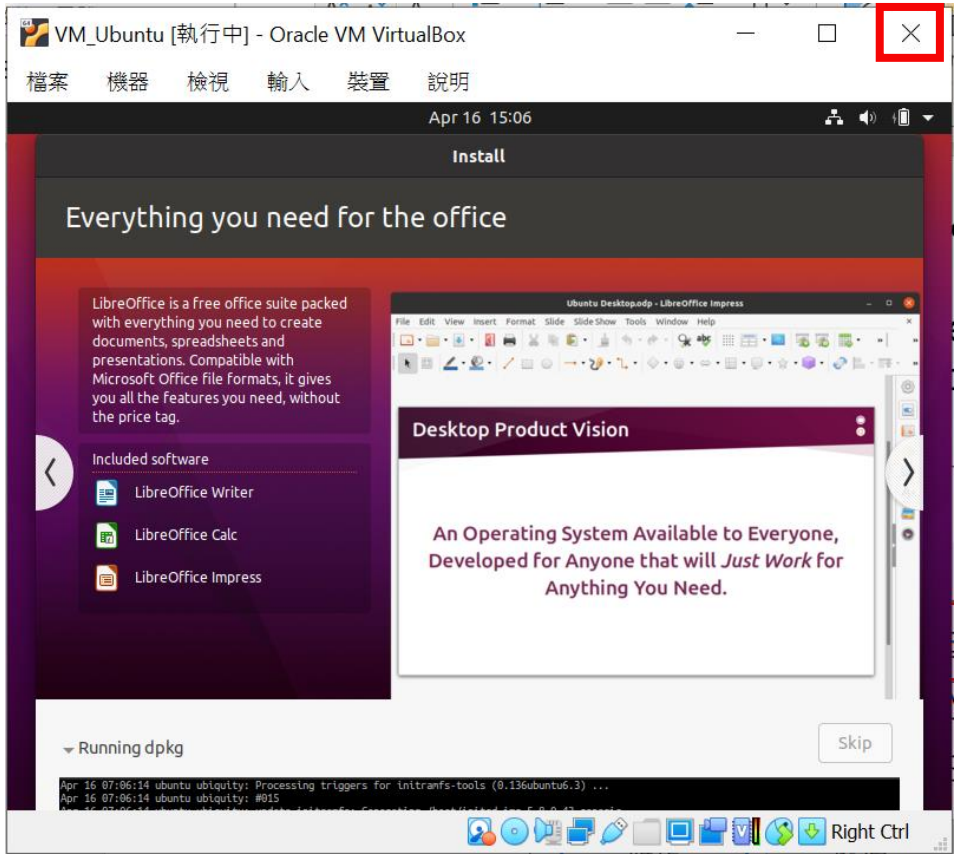
Download and Setup SDK

17. Edit /home/.bashrc for setting environment variable,
    add “export PATH=$PATH:$HOME/bin” at the last line.
18. After edit it, restart Ubuntu.



Download and Setup SDK

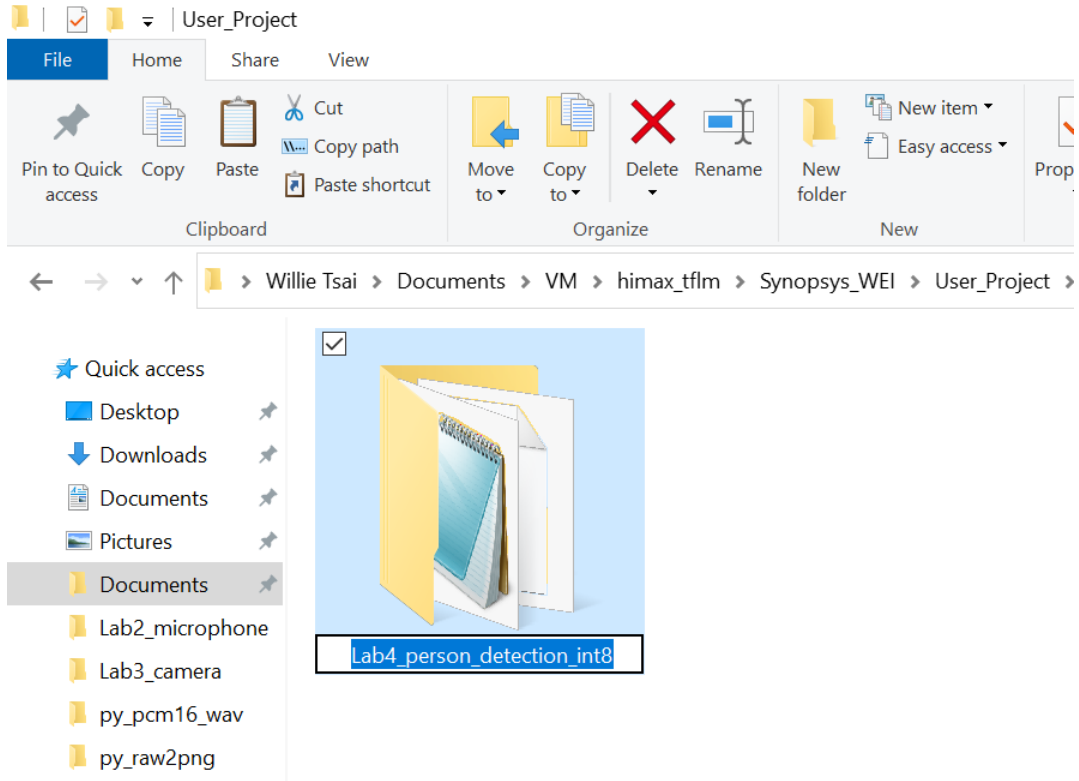
19. Suggest! Close your VirtualBox with “Store Computer Stage”
    If not, you may need to remount shard folder every time.



Program Code & Make Project & Make Flash File

Program Code

1. Copy folder *“arc_contest/Synopsys_SDK/Example_Project/Lab4_person_detection_int8”* to folder “*arc_contest/Synopsys_SDK/User Project/”*
2. Rename the folder “*Lab4_person_detection_int8”* to “*Flow_Test*”

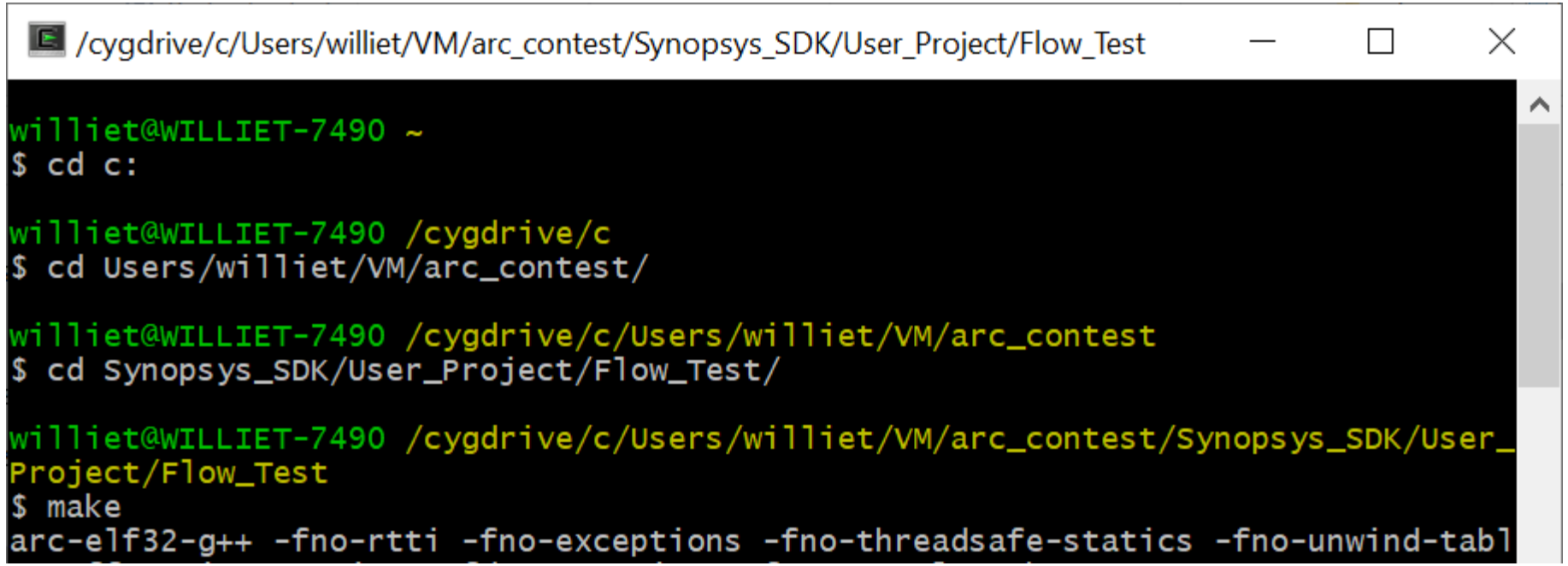


Program Code

3. Go into folder “*Flow_Test*” you will see folder “src” and “inc”
   “src” folder: always keep your .c and .cc file in here.
   “inc” folder: always keep your .h file in here.
   (c file: c language)
   (cc file: c++ language)

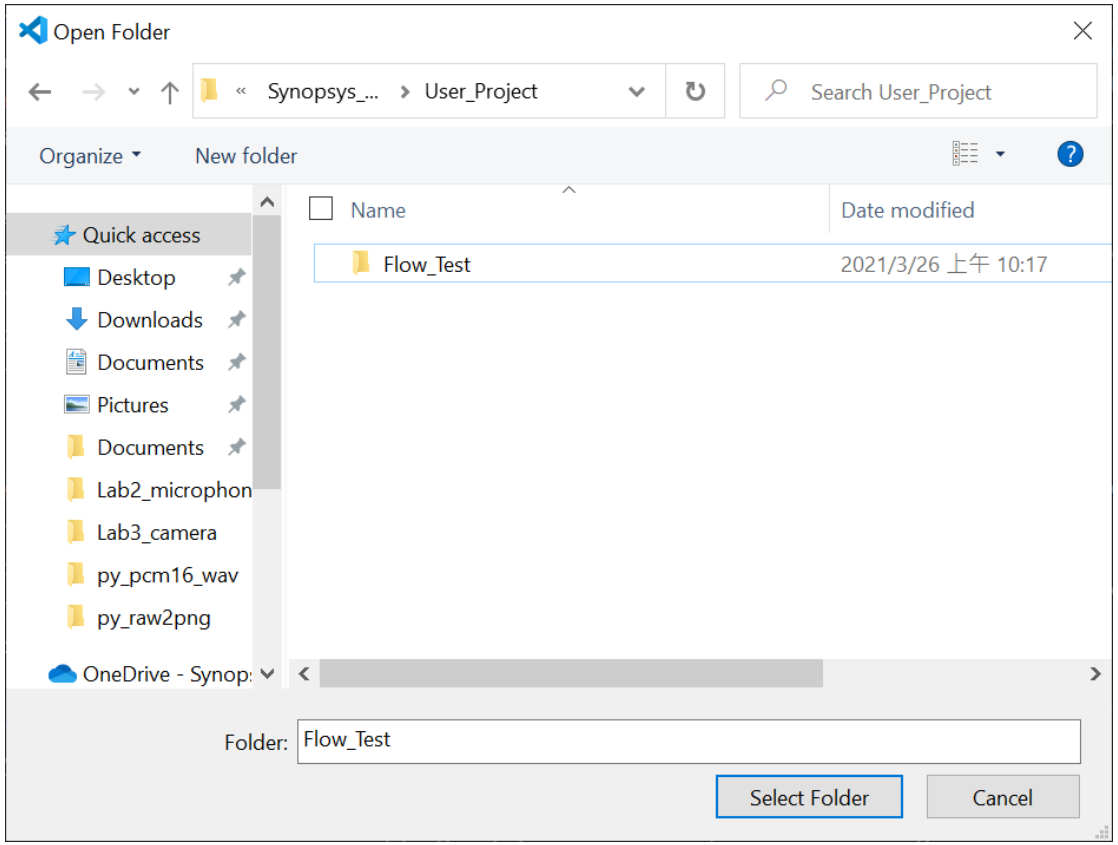
Make Project (By cygwin64)

4. Go to your project path in cygwin64 terminal
   $ cd c:
   $ cd Users\{username}\VM\arc_contest
   $ cd Synopsys_SDK/User_Project/Flow_Test
   $ make



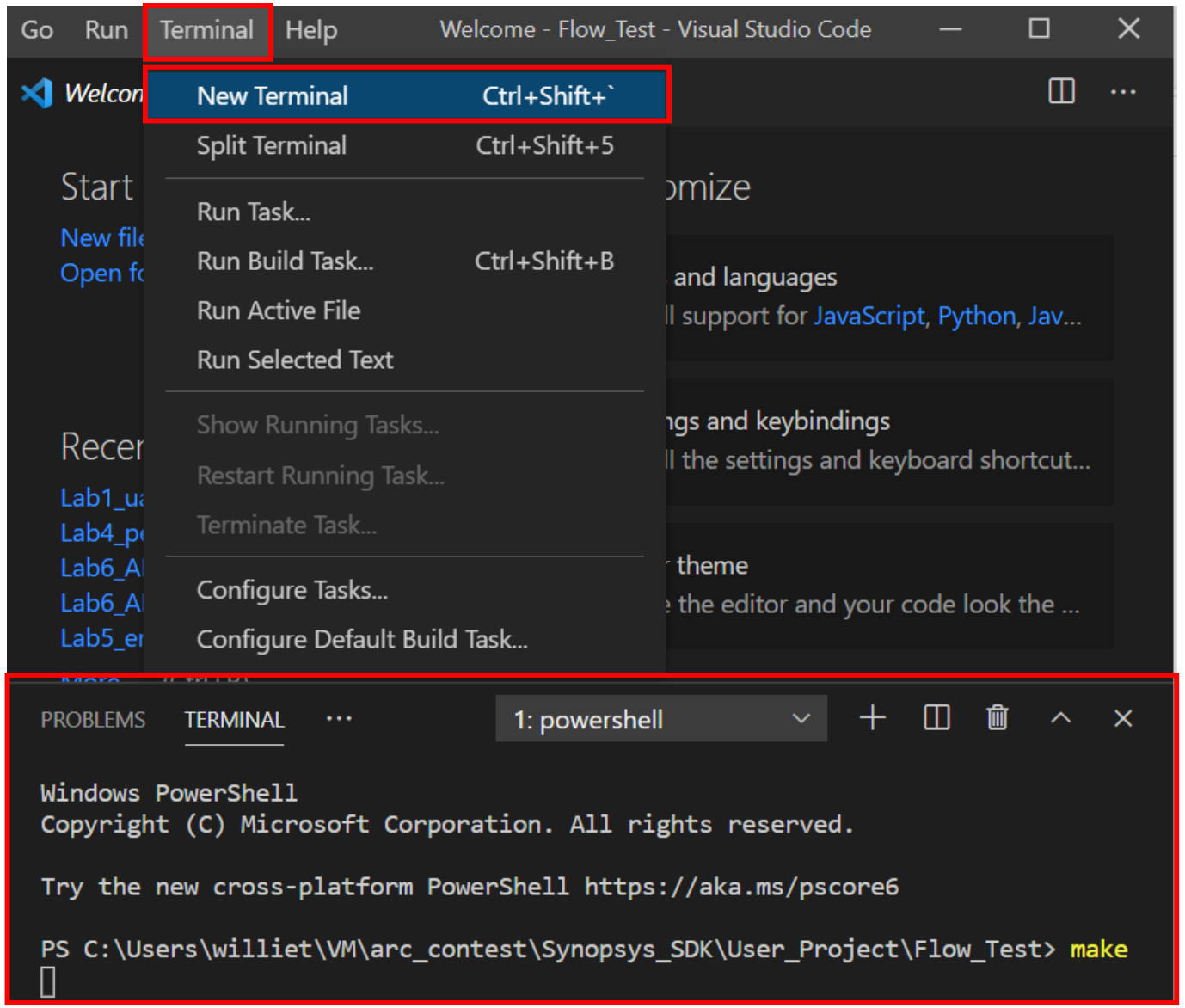
Make Project (By Visual Studio Code)

4. You can also use Visual Studio Code to make project.
   Open Folder and Select Folder:
   “……/arc_contest/Synopsys_SDK/User_Project/Flow_Test”



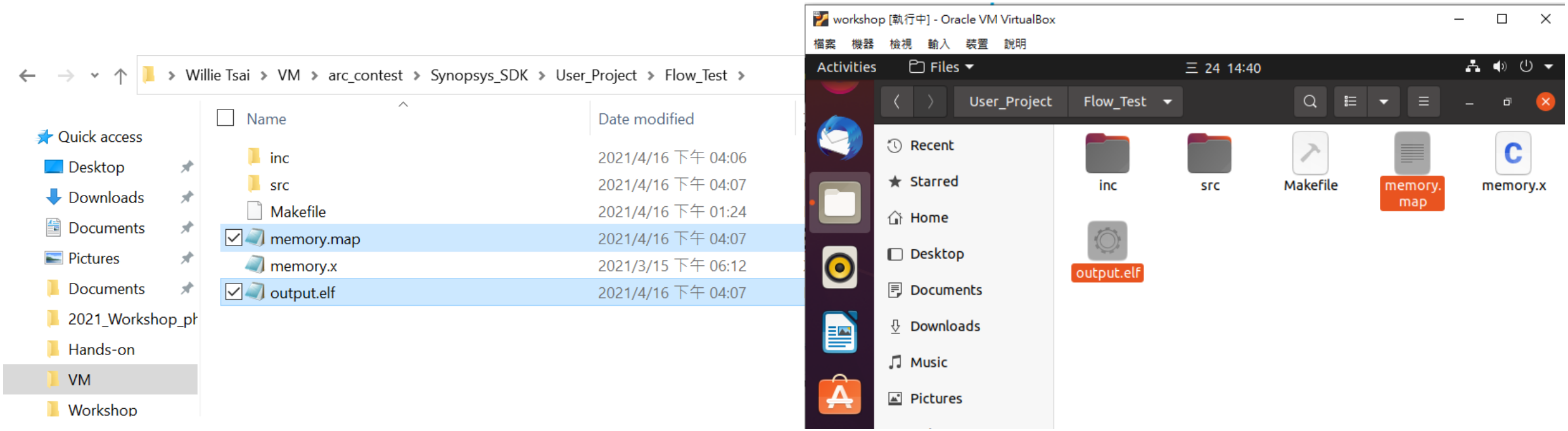
Make Project (Visual Studio Code)

Terminal > New Terminal
You will see terminal block.
Type command:
$ make



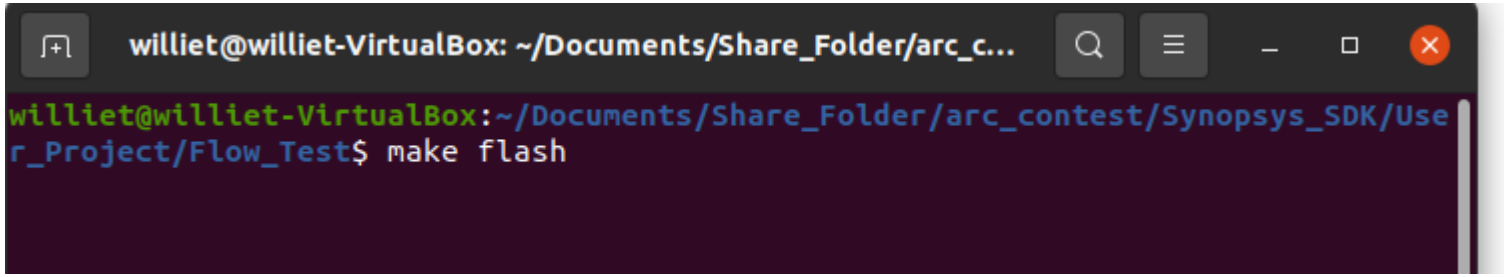
Make Project

5. Check your folder whether contains .elf and .map files.
   GNU: output.elf & memory.map
   MetaWare: output.elf & output.map

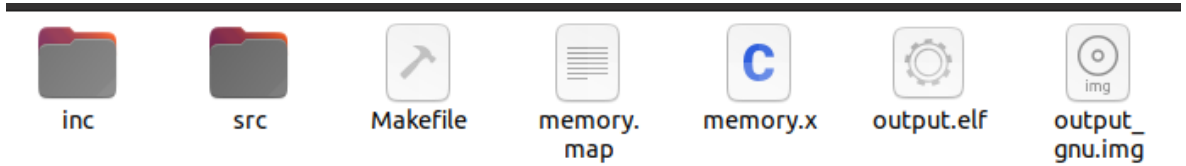


Make Flash File

6. Open terminal in VirtualBox Ubuntu, and go to the same path:
   "……/arc_contest/Synopsys_SDK/User_Project/Flow_Test"
   $ make flash



7. Check your img file in directory, it will be downloaded to WE-I.
   GNU: output_gnu.img
   MetaWare: output_mwdt.img



Make Project and Flash File

There are some commands can be used,

$ make : compile and link your project, then create .elf and .map file

$ make flash : combine .elf and .map file to .img file

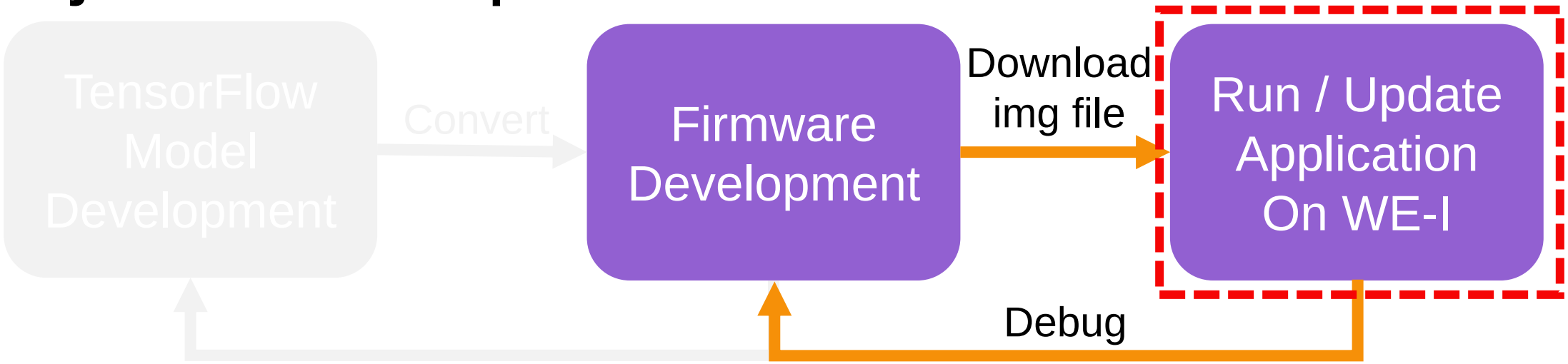
$ make clean : remove all .o file of this project

$ make clean_all : remove all .o file of this project and third party

You can add a command for changing toolchain
(default toolchain is gnu, define in makefile)
“ARC_TOOLCHAIN=mwdt”: compile with MetaWare
“ARC_TOOLCHAIN=gnu”: compile with ARC GNU Toolchain
Please use $ make clean_all before you change toolchain.

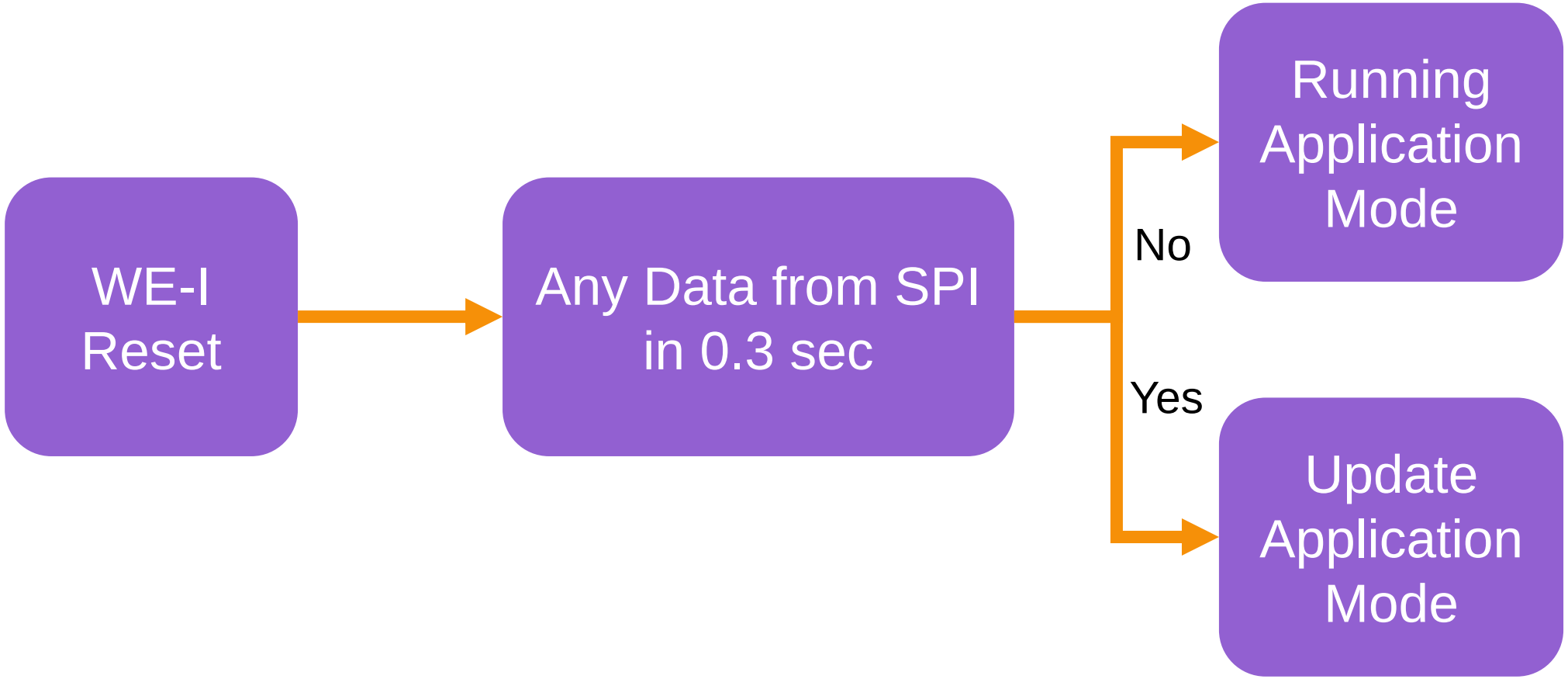
Update and Run Application On WE-I

Project Development Flow

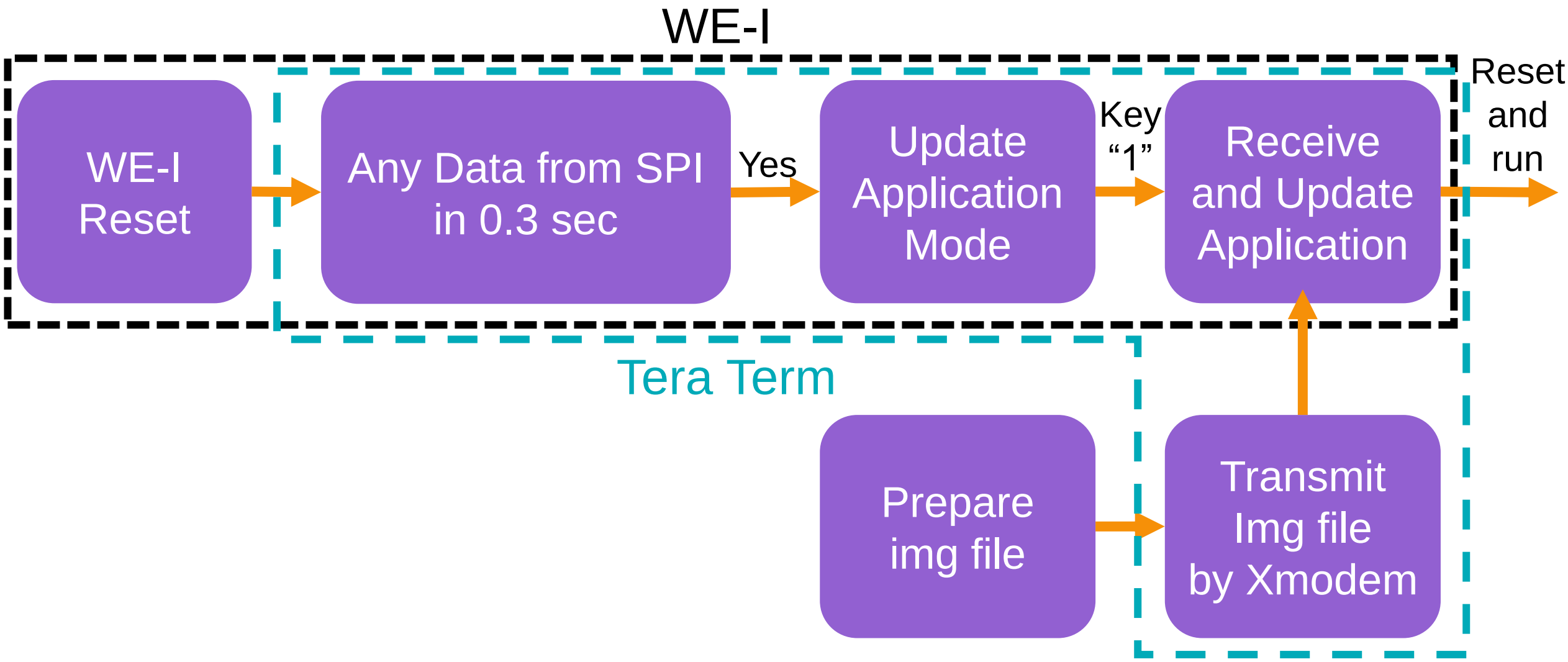


Stage	TensorFlow Model Development	Firmware Development	Run / Update Application On WE-I
Tool	Anaconda Cygwin	Cygwin Metaware or ARC GNU VirtualBox (Ubuntu 20.04)	Tera Term USB Micro
Language	Python 3	C language C++ language	

Run / Update Application On WE-I



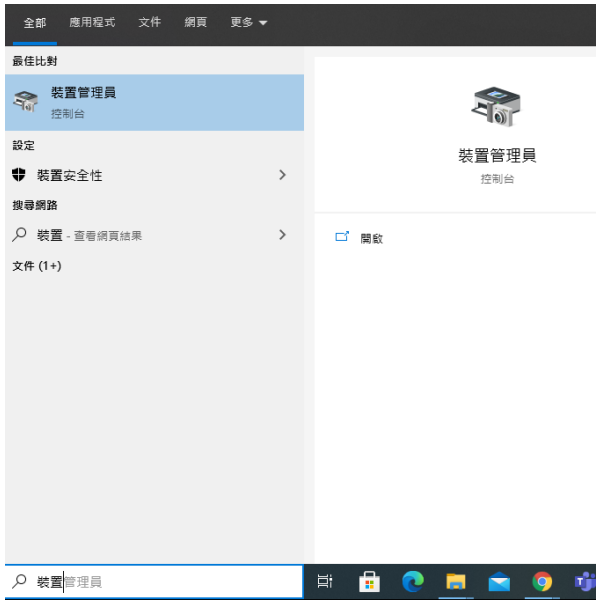
Update Application On WE-I

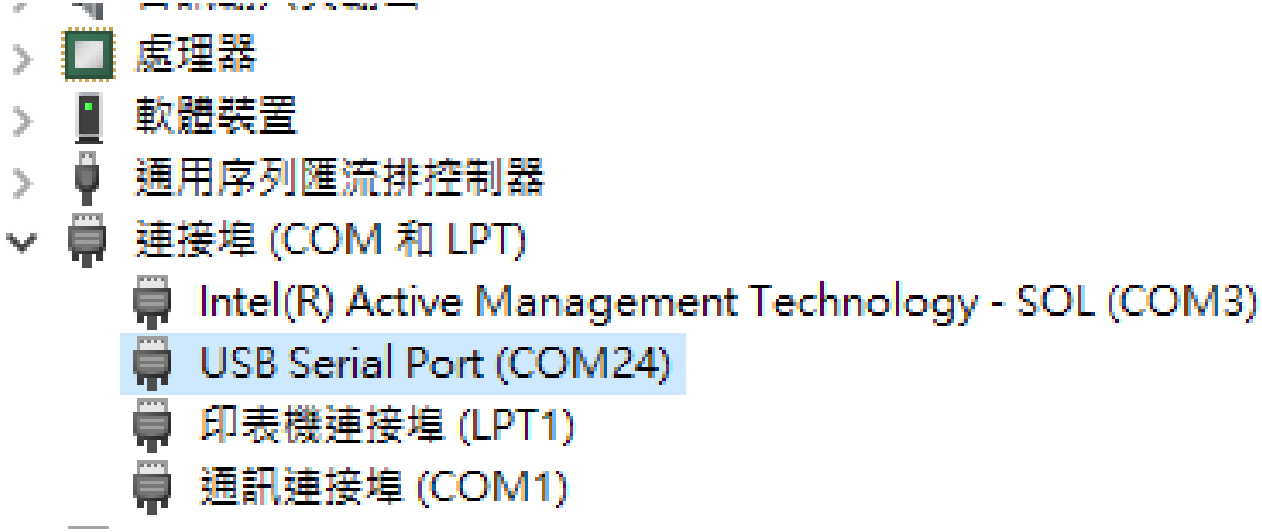


Update Application On WE-I

Connect WE-I with Tera Term

1. Connect WE-I and PC by USB Cable
2. Check your WE-I usb port number
   裝置管理員> 連接埠(COM & LPT) > USB Serial Port (COMx)
   x: This is your WE-I usb port number
   (If USB Serial Port is not shown here, please refer to Appendix-2)

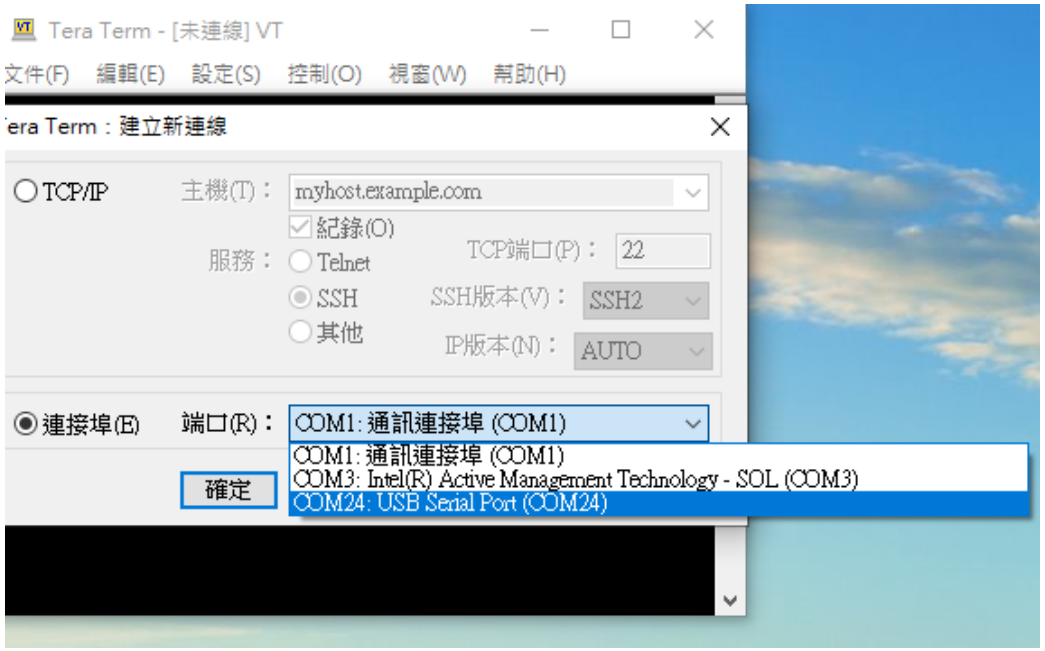


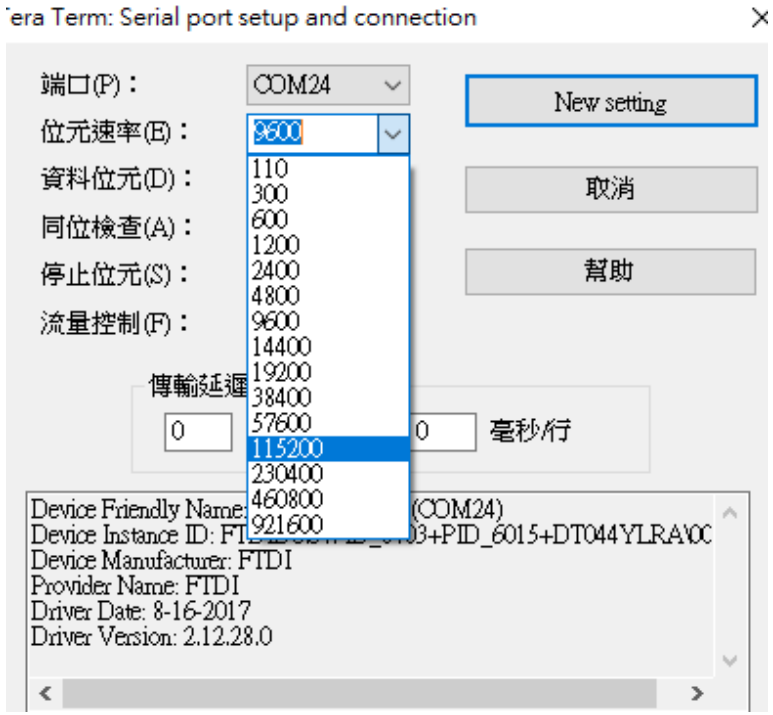


Update Application On WE-I

Connect WE-I with Tera Term

3. Open tera term and select “COMx: USB Serial Port (COMx)”
4. Tera term Setup > Serial Port > Change Baud to 115200, and keep other setting.

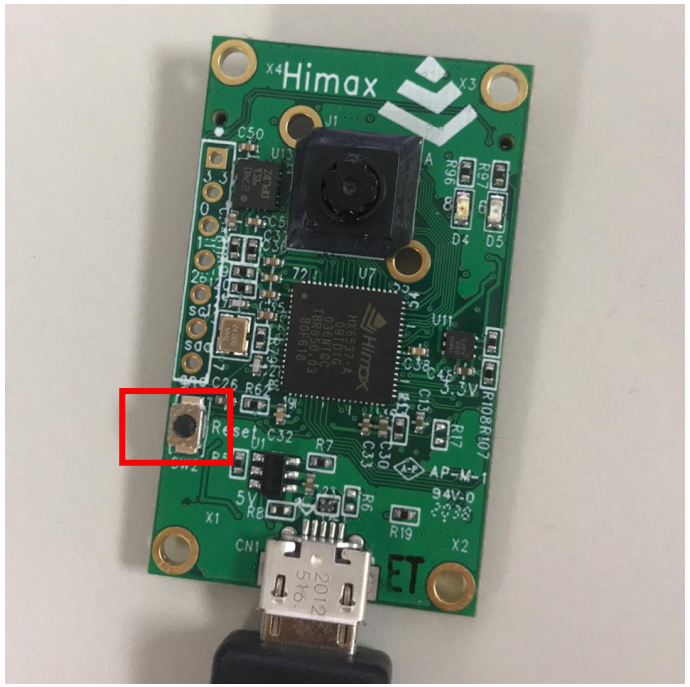




Update Application On WE-I

Connect WE-I with Tera Term

5. Reset WE-I by pushing SW2, you will see startup information on tera term.



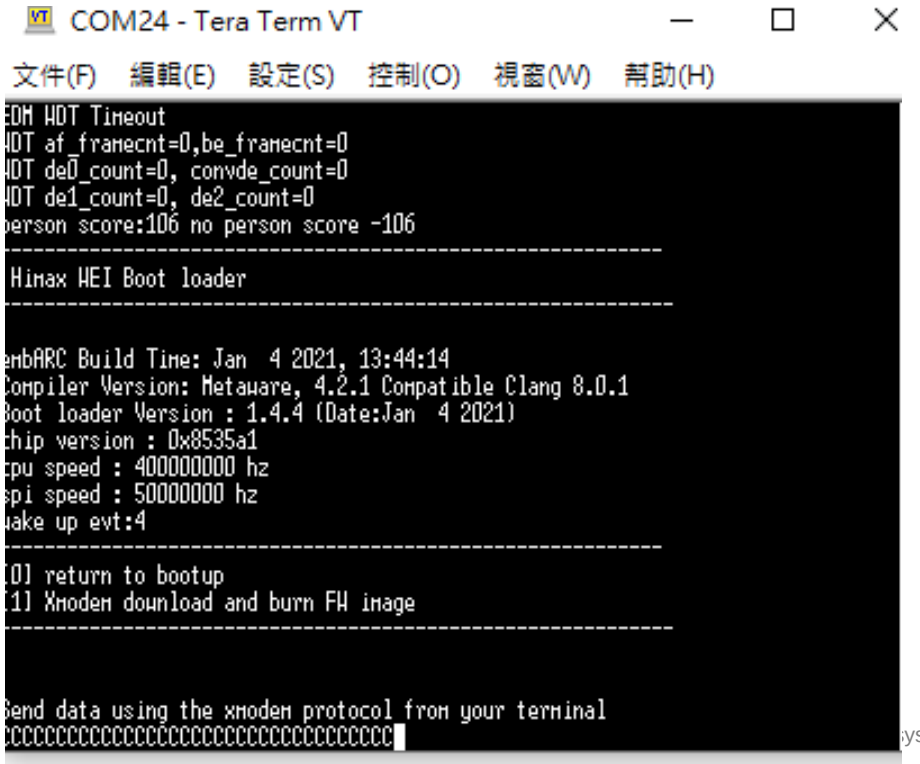

```
------------------------------------------------------------
 Himax WEI Boot loader
------------------------------------------------------------

embARC Build Time: Jan  4 2021, 13:44:14
Compiler Version: Metaware, 4.2.1 Compatible Clang 8.0.1
Boot loader Version : 1.4.4 (Date:Jan  4 2021)
chip version : 0x8535a1
cpu speed : 400000000 hz
spi speed : 50000000 hz
wake up evt:4
...secure lib version = 352380df9a347b1187d2361bfcd4455178a1ebcb
1st APPLICATION addr[3]=21000 (main-1966)
Bootloader Done !!!!!!
jump to app FW : 0x10000004
12 bytes lost due to alignment. To avoid this loss, please make sure the t
HM0360 RevB,C,D Config
person score:-2 no person score 2
person score:-6 no person score 6
```

Update Application On WE-I

Enable Update Application Mode with Tera Term

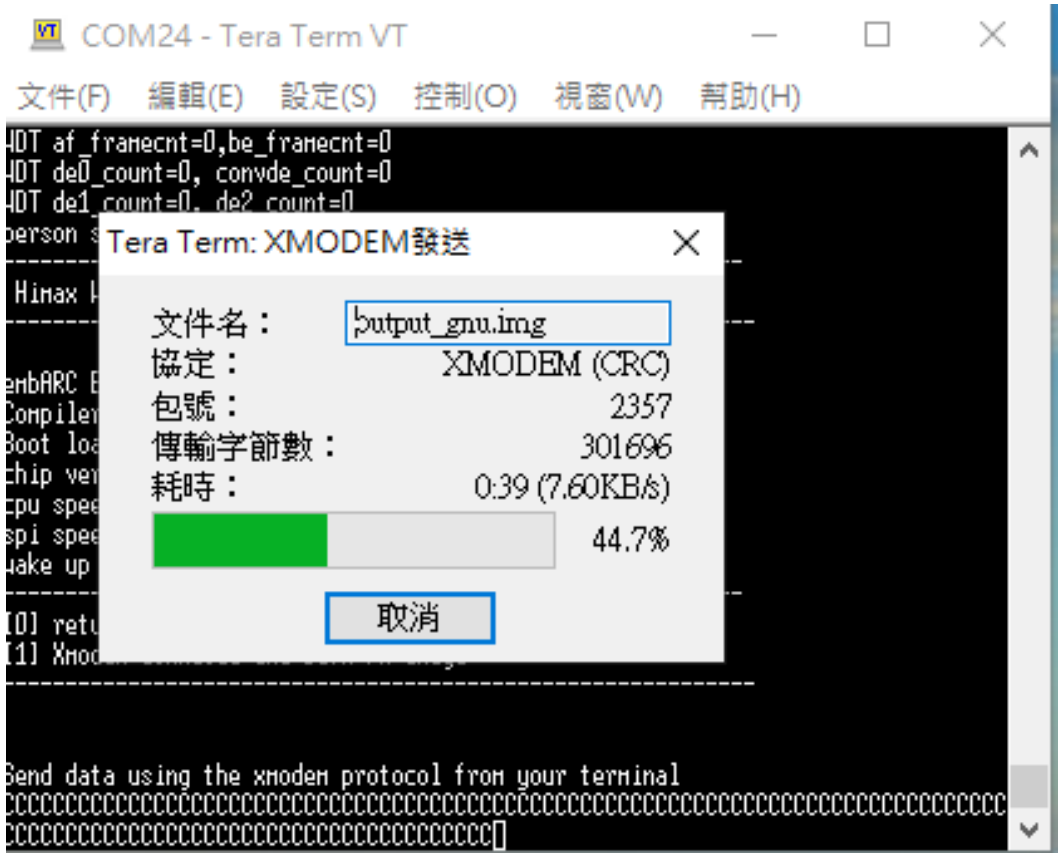
1. Finish to connect WE-I with Tera Term
2. Click on any display area
3. Keep to press key “1” on the keyboard, and press reset button
4. WE-I will start to receive img file by Xmodem



Update Application On WE-I

Enable Update Application Mode with Tera Term

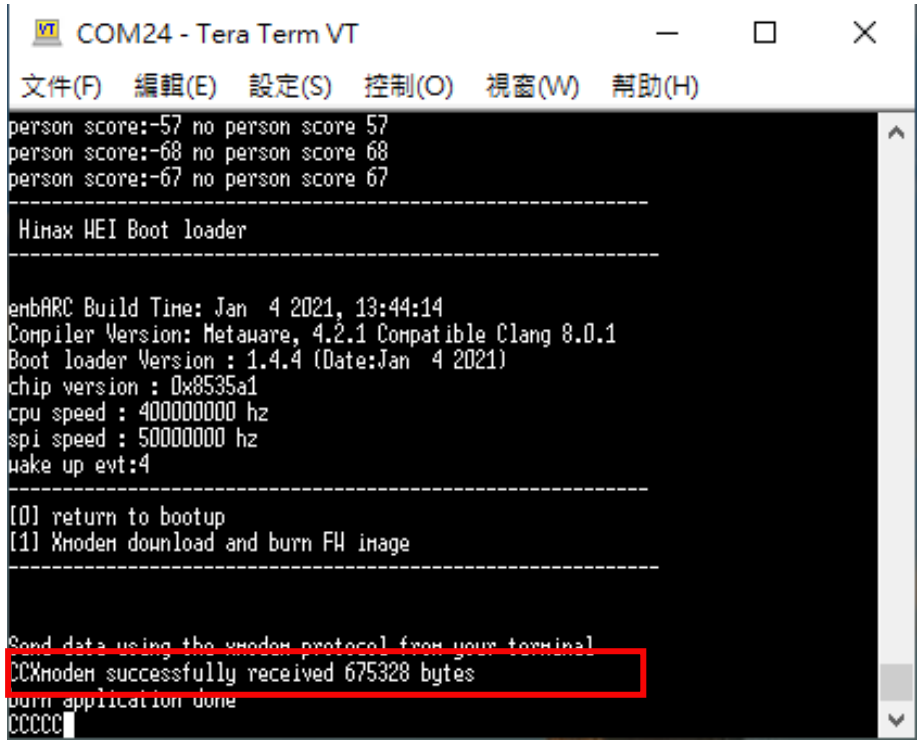
5. Tera term File > Transfer > XMODEM > Send > select img file
6. Wait for Transmit



Update Application On WE-I

Enable Update Application Mode with Tera Term

7. Terminal will show “Xmodem successfully received xxx bytes” after transmission
8. Press reset button to run your application



Run Application On WE-I

1. Connect USB cable to power up WE-I
   you can also power up by 2.54 pitch connector
2. For debug easily, suggest to use Tera Term and print date or result
3. Start to develop your project, and debug your code

Appendix-2: Troubleshooting - Update VCP Driver

Troubleshooting – Update VCP driver

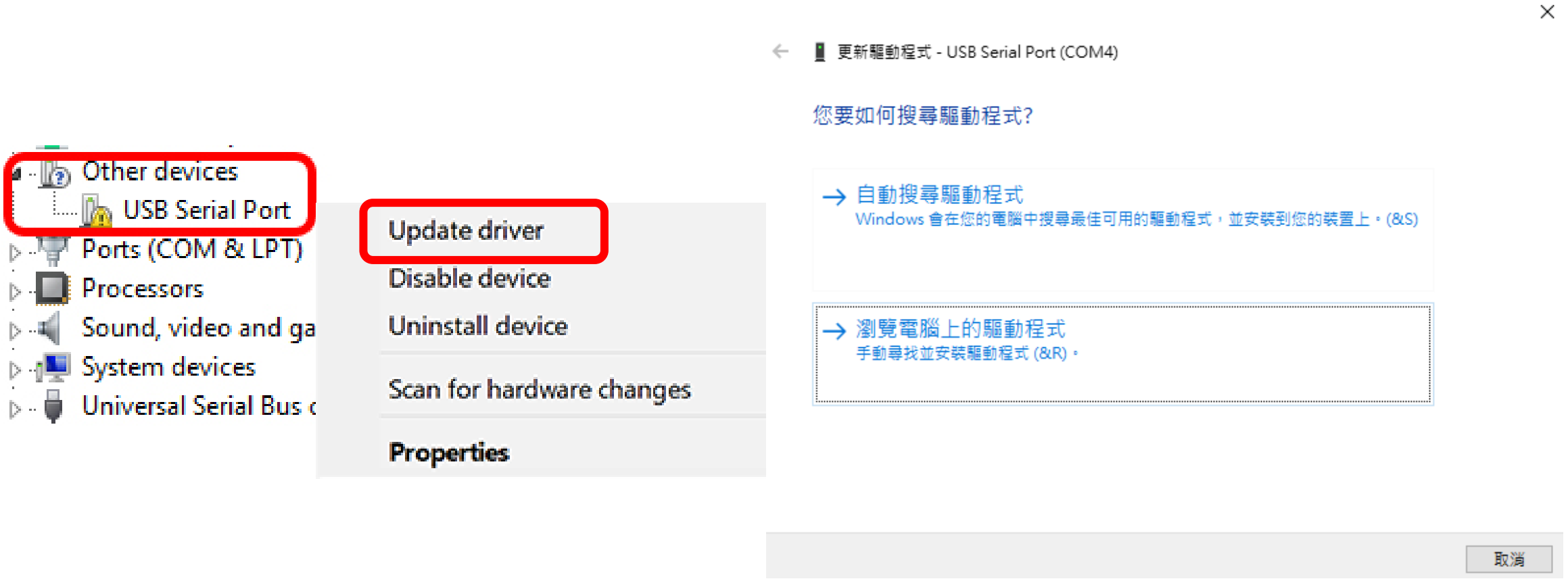
If the USB serial port is not shown in Ports (COM & LPT):

1. Download VCP driver: https://ftdichip.com/drivers/vcp-drivers/
   Select Windows/X64 version
2. Unzip the downloaded file (CDM v2.12.28 WHQL Certified)

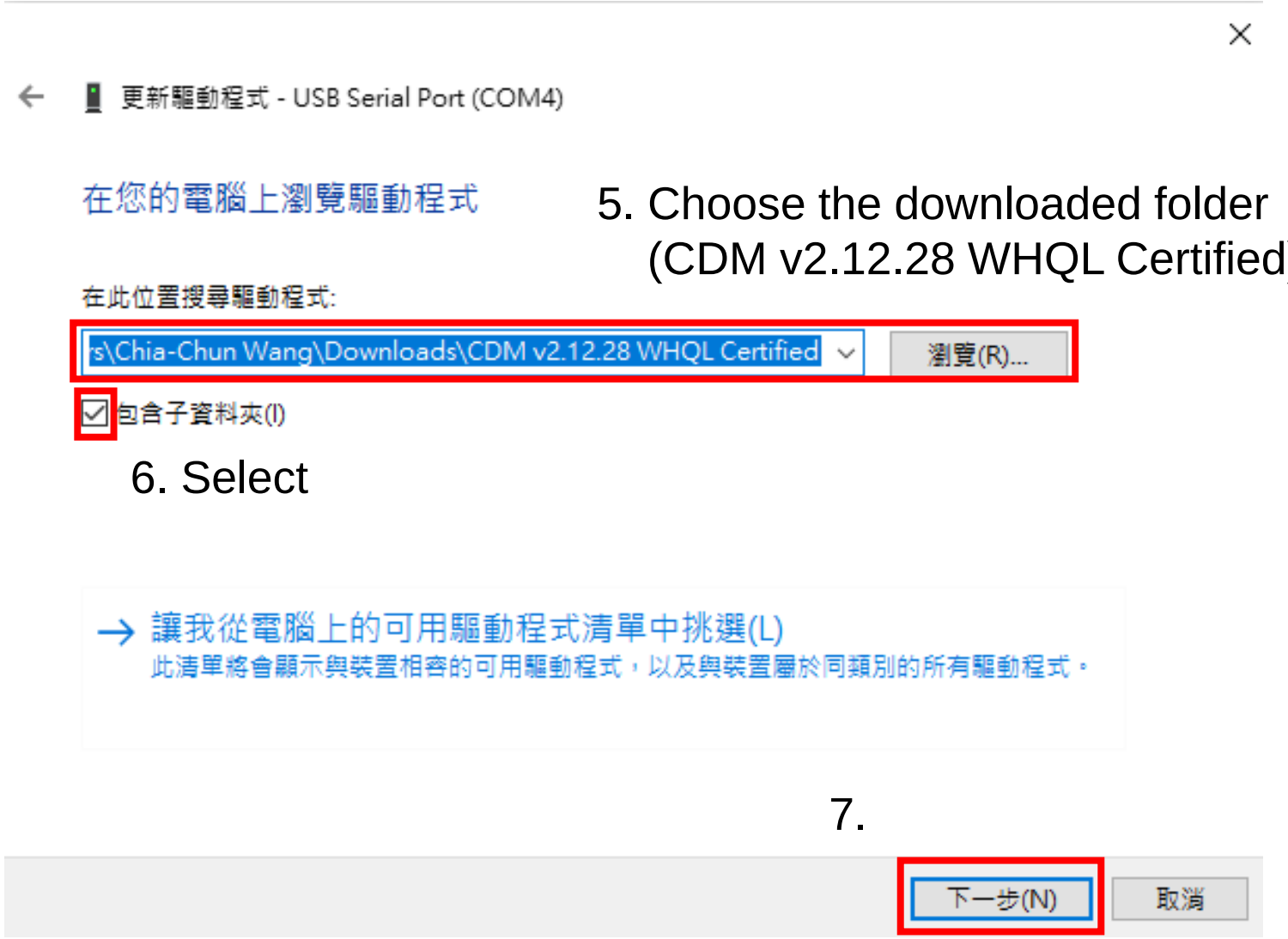
		Processor Architecture				
Operating System	**Release Date**	**X86 (32-Bit)**	**X64 (64-Bit)**	**PPC**	**ARM**	**MIPSII**
Windows*	2017–08-30	2.12.28	2.12.28	–	–	–
Linux	–	–	=	–	–	–

Troubleshooting – Update VCP driver

3. Click Other devices > USB Serial Port > Update driver
4. Choose “瀏覽電腦上的驅動程式”



Troubleshooting – Update VCP driver



5. Choose the downloaded folder (CDM v2.12.28 WHQL Certified)

6. Select

7.

Troubleshooting – Update VCP driver

8. Finish