Workshop on Synopsys ARC CPU with TensorFlow Lite

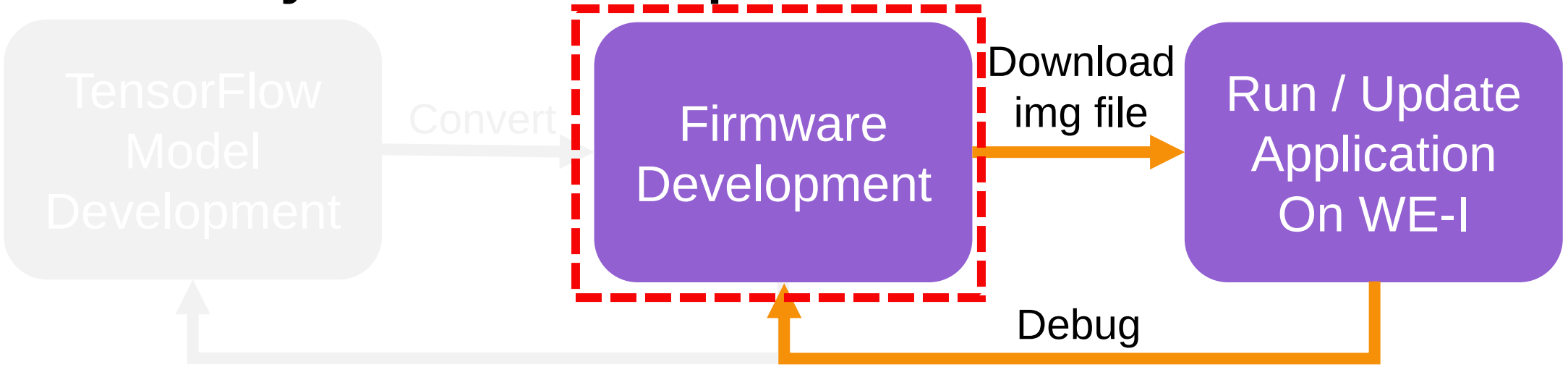
Tutorial 2 - WE-I Project Environment Setup & Development Flow

主辦單位：國立清華大學電機系、新思科技
協辦單位：智慧製造電子應用聯盟
指導單位：教育部資訊及科技教育司

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



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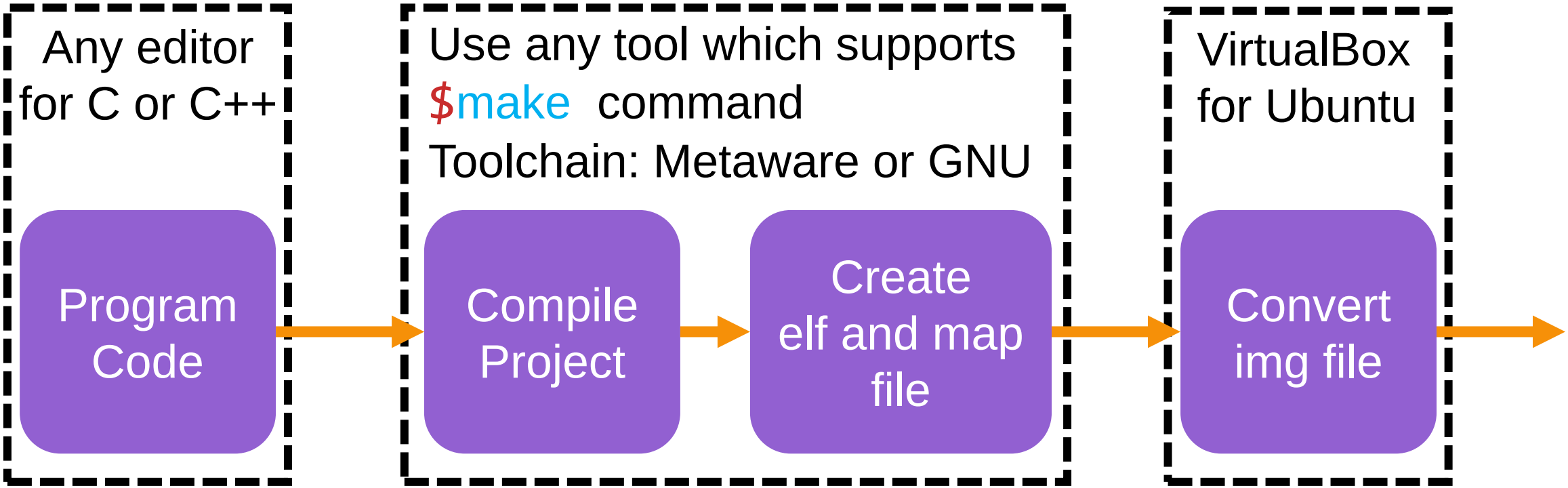
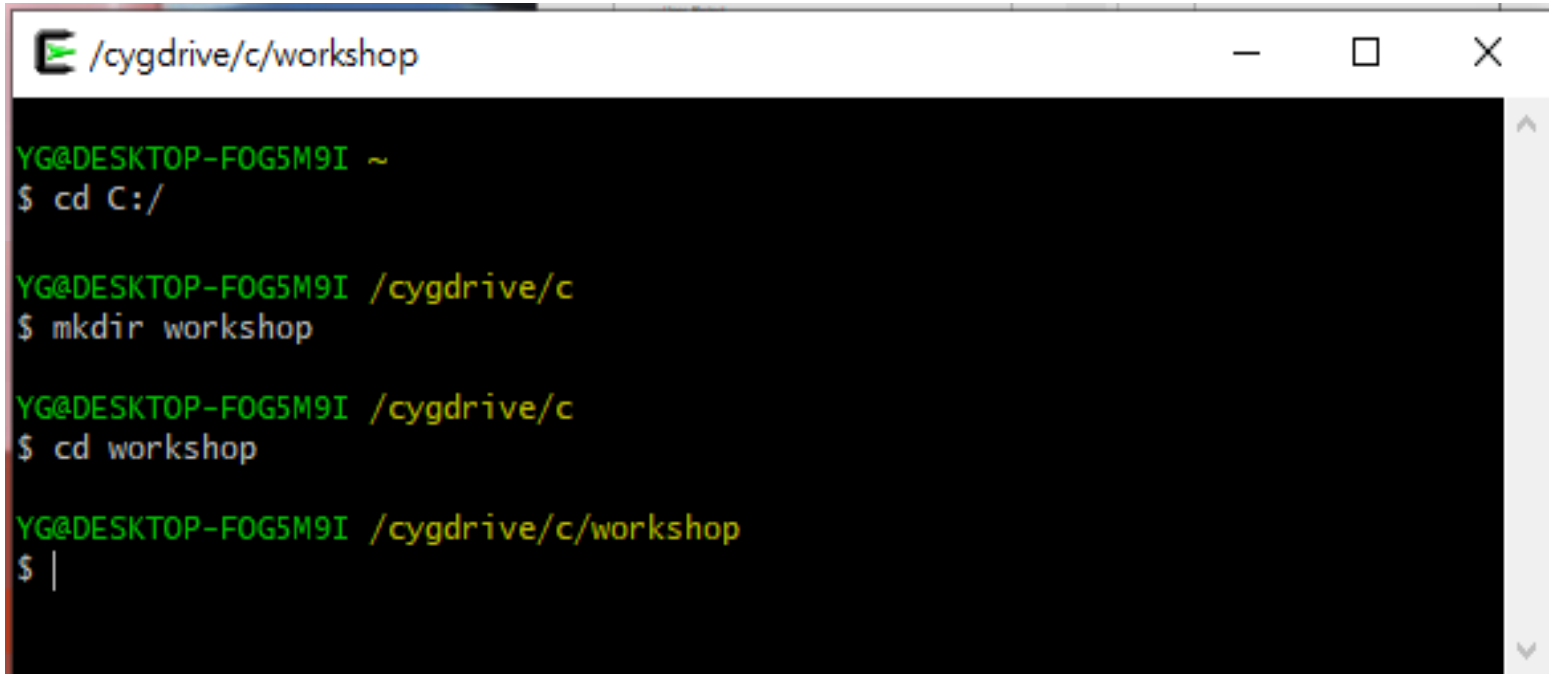
Firmware Development



Download and Setup SDK

Download and Setup SDK

1. Open Cygwin64 Terminal
   $ cd c: (to your working file path)
   $ mkdir workshop (Suggest create a new folder named “workshop”)
   $ cd workshop



Download and Setup SDK

Commands in cygwin64 terminal

2. Download SDK from Himax Github

   $ git clone https://github.com/HimaxWiseEyePlus/himax_tflm.git

3. Go to the root of Himax SDK

   $ cd himax_tflm

4. Download third party files (3 packages)

   $ make download

5. Download SDK from Synopsys Github

   $ git clone https://github.com/worldskills2017tw/Synopsys_WEI.git

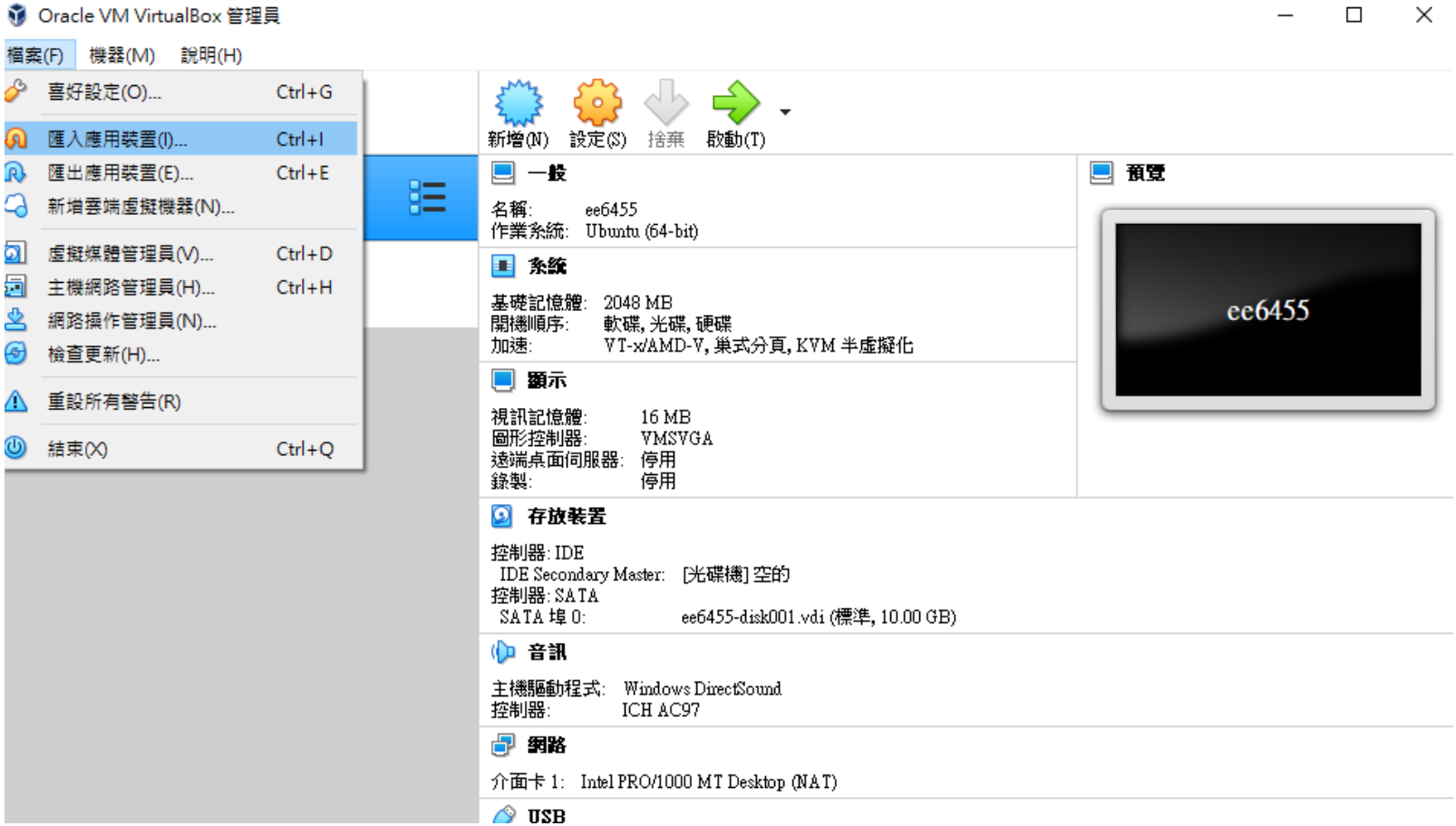
Download and Setup SDK

After these steps, your file structure will be like:

himax_tflm
|
----*himax_we1_sdk*
----*image_gen_linux*
----*tensorflow*
----*third_party*
----*Synopsys_WEI*
    |
    ----*Example_Project*
    ----*User_Project*
    ----*doc_tutorial*
    ----*arc_bin*

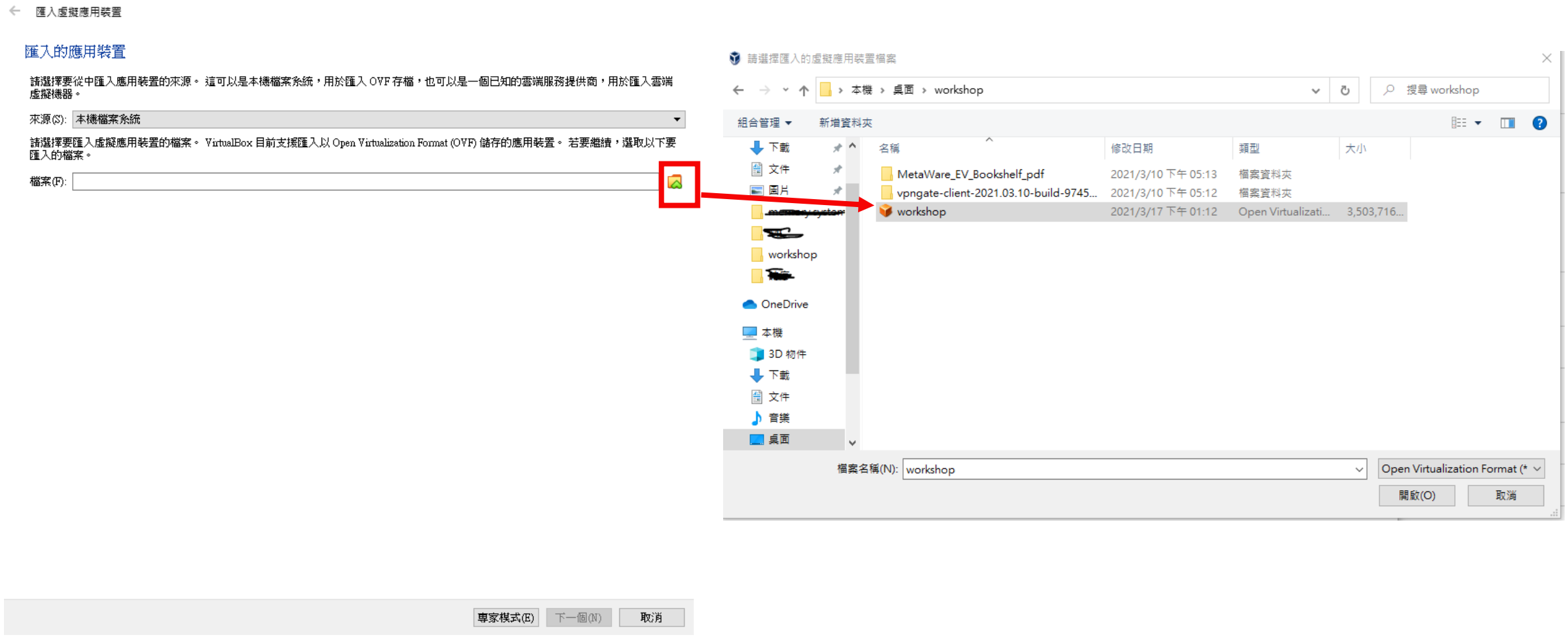
Download and Setup SDK

6. Setting Virtual Box
Open Virtual Box > 檔案 > 匯入應用裝置



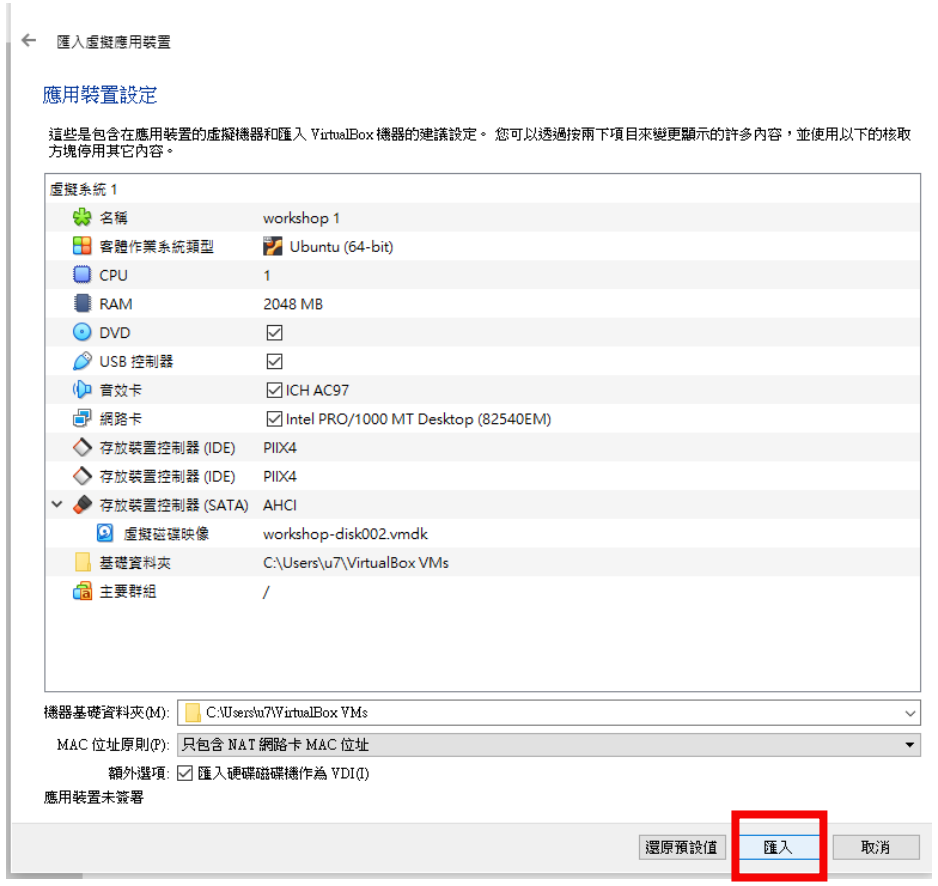
Download and Setup SDK

解壓縮雲端下載的Workshop.zip 匯入workshop.ova



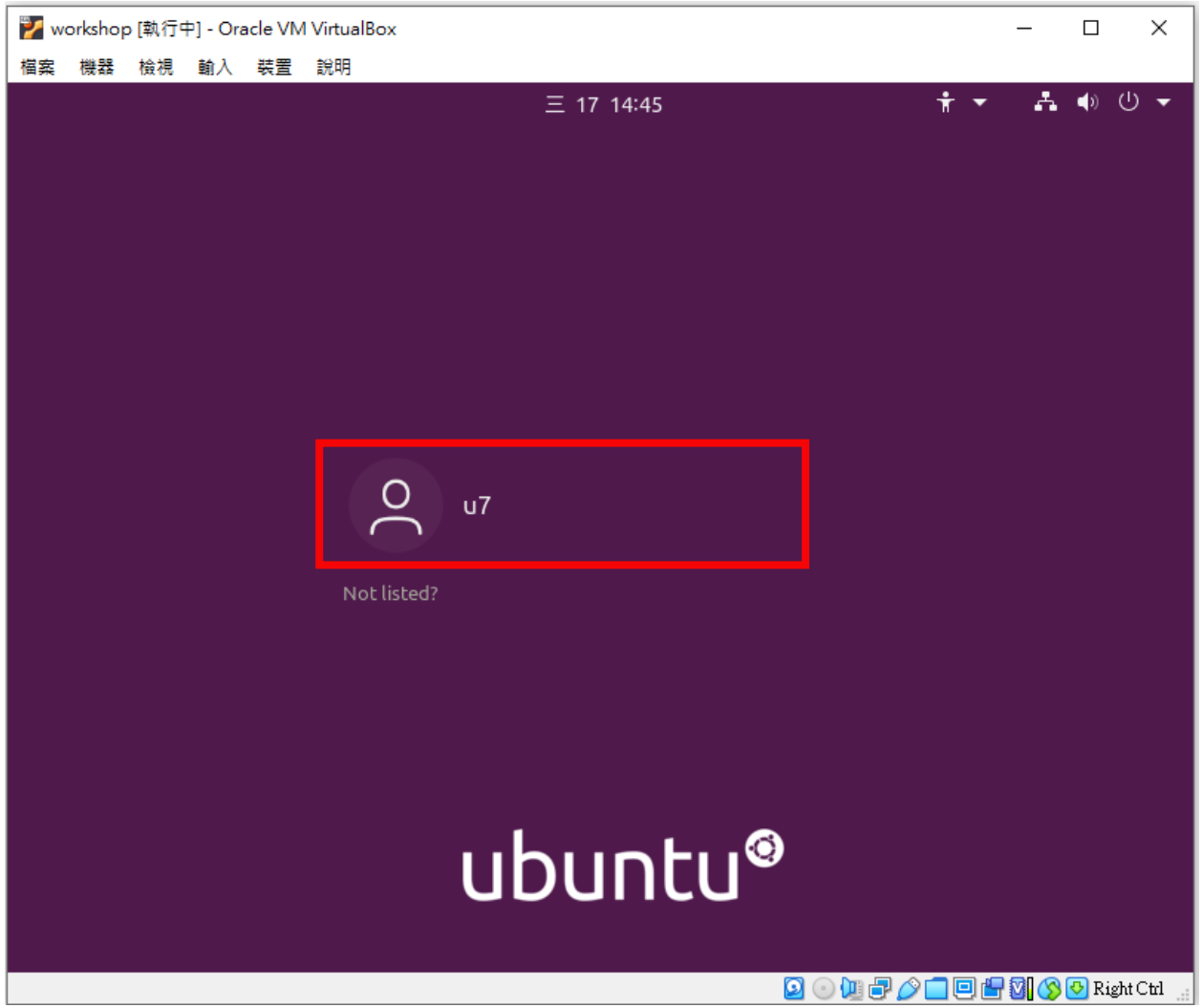
Download and Setup SDK

下一個 > 匯入



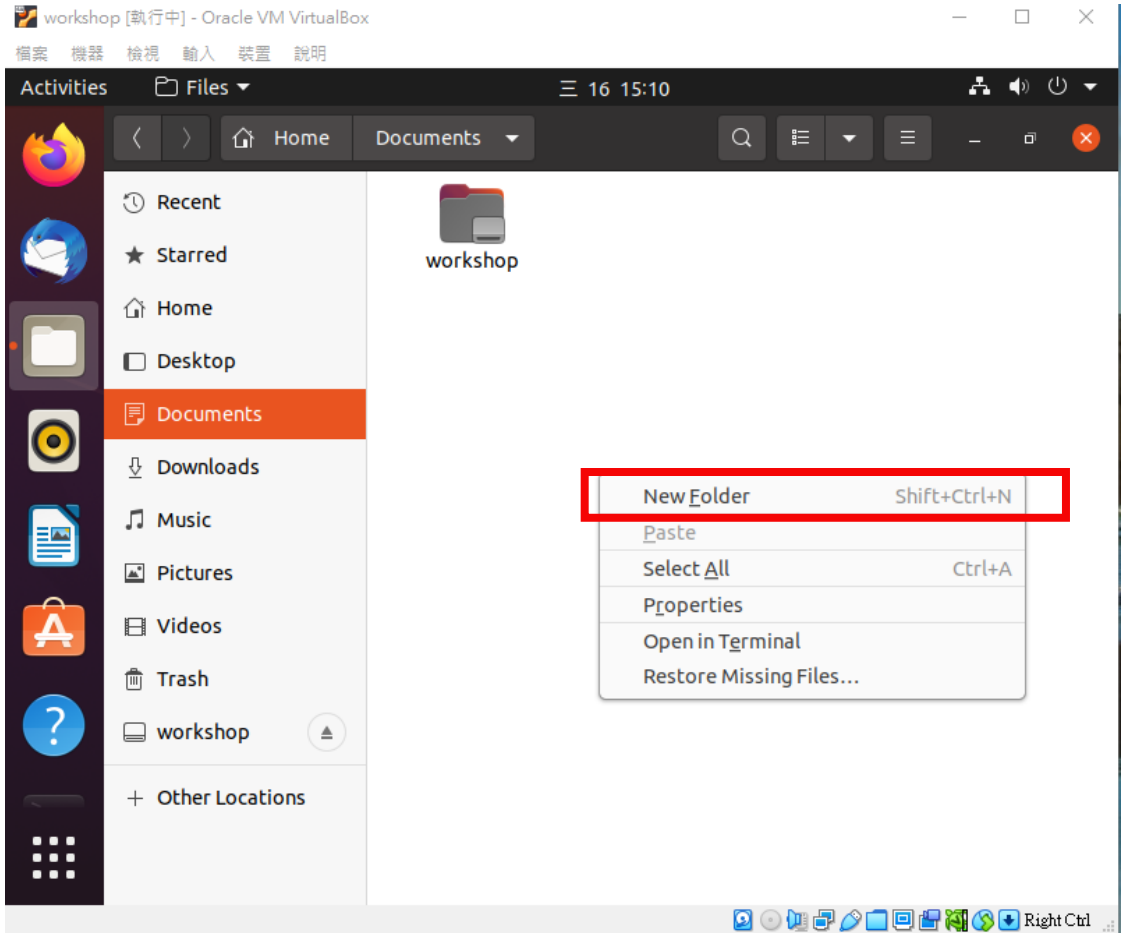
Download and Setup SDK

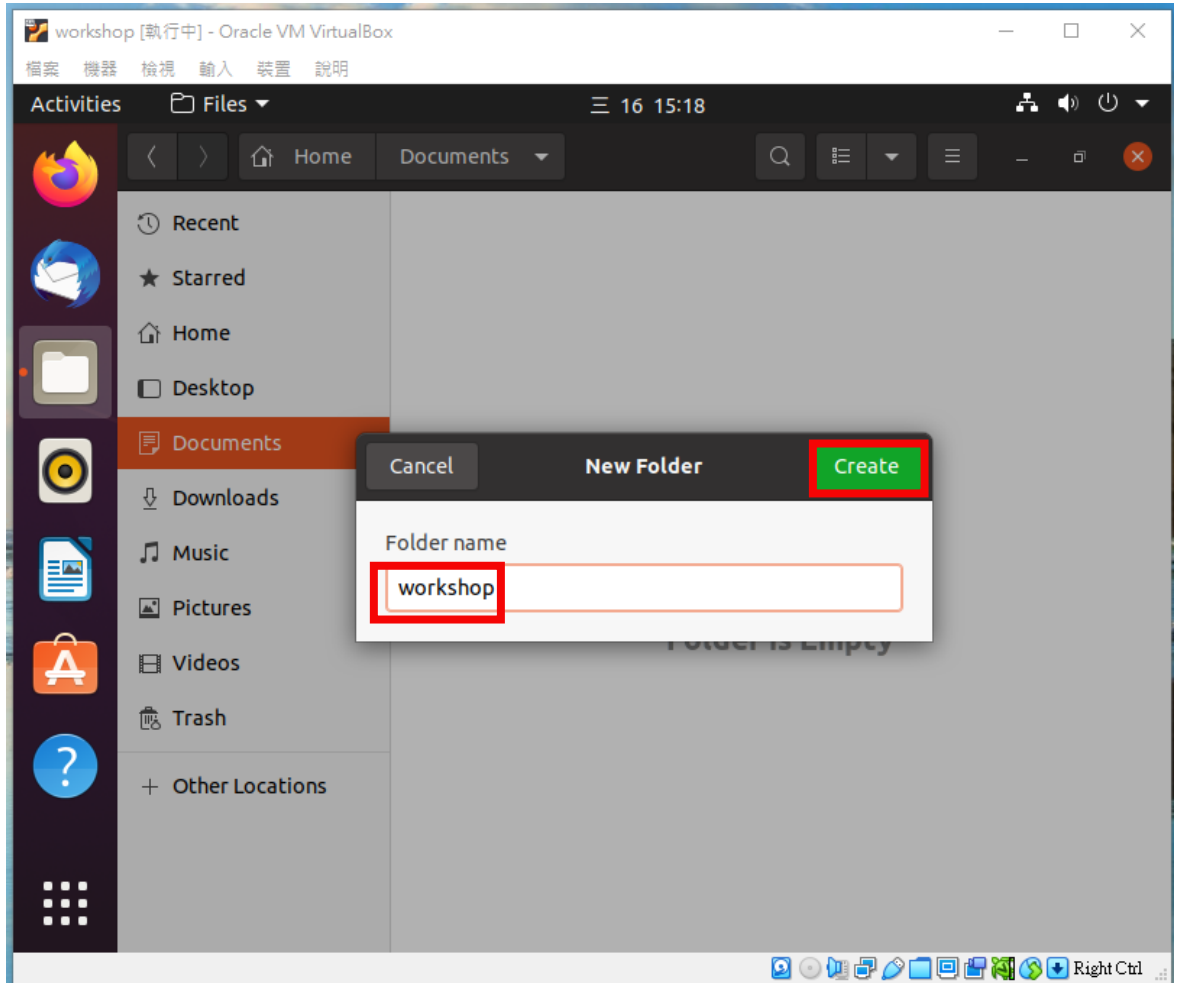
啟動 > 點選u7 > 輸入密碼: u1234567



Download and Setup SDK

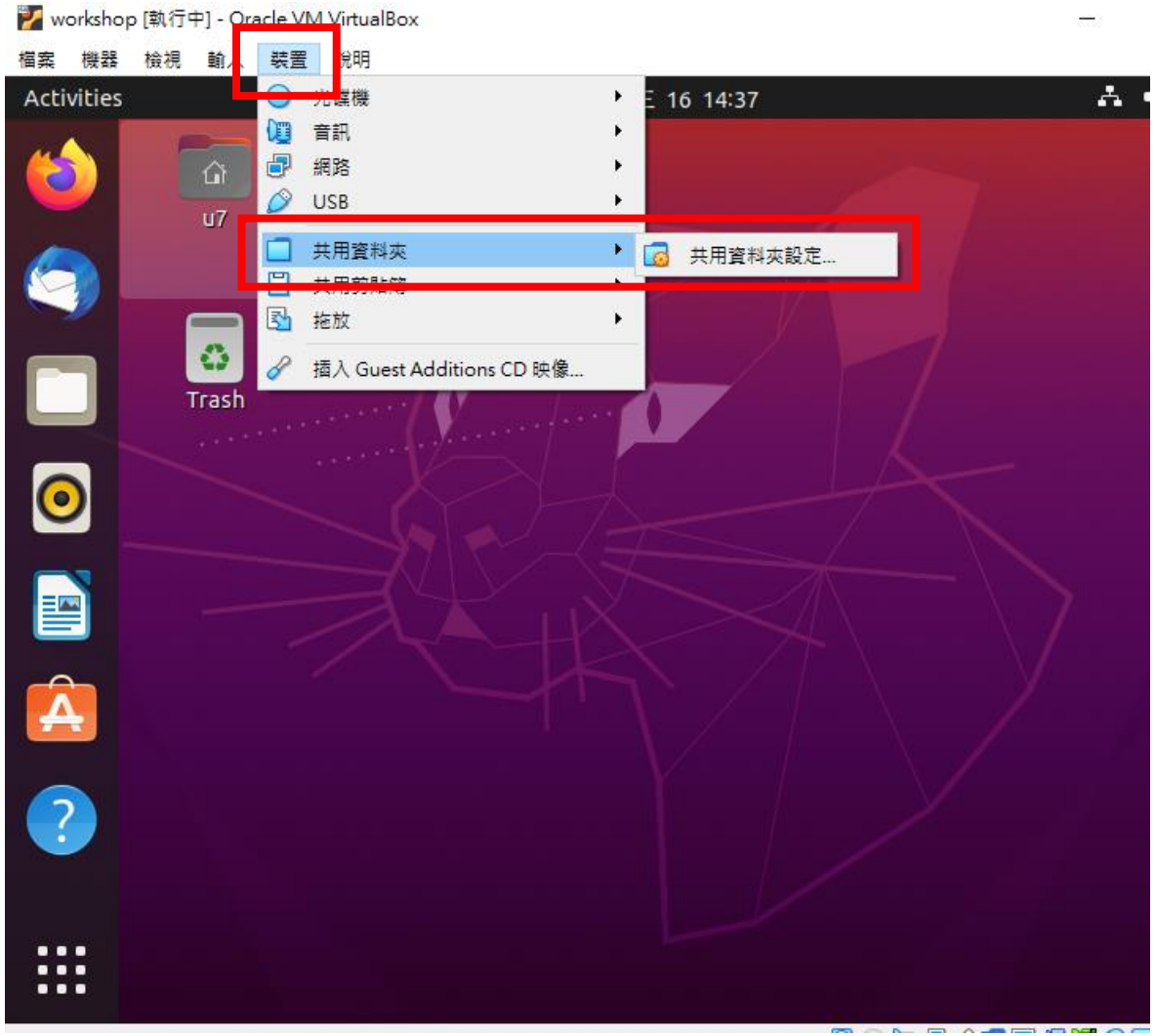
Create a new folder at Home/Documents
(Already done by out workshop.ova)





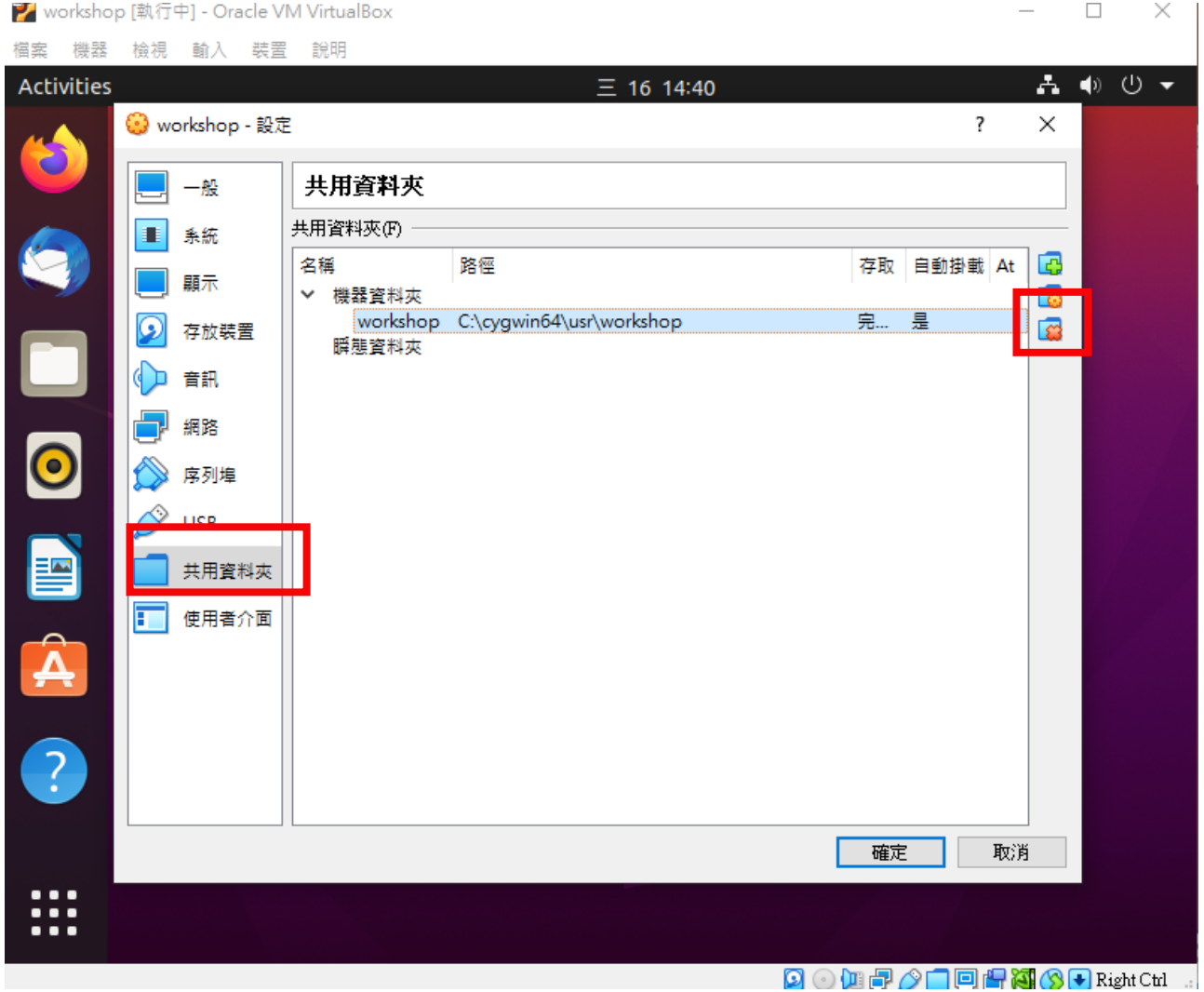
Download and Setup SDK

Set the folder to be shared



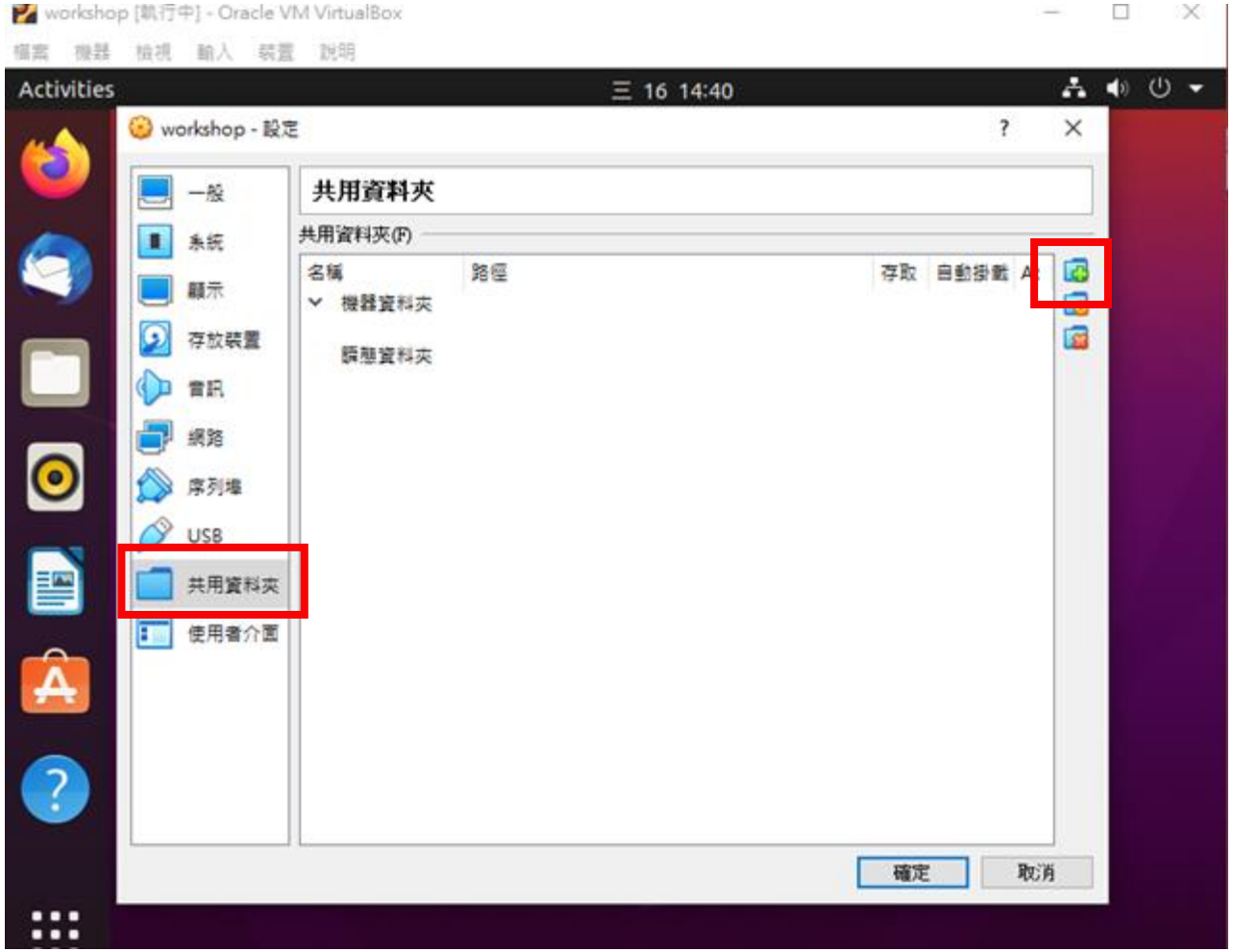
Download and Setup SDK

如果發現已經設定共用資料夾，請先刪除

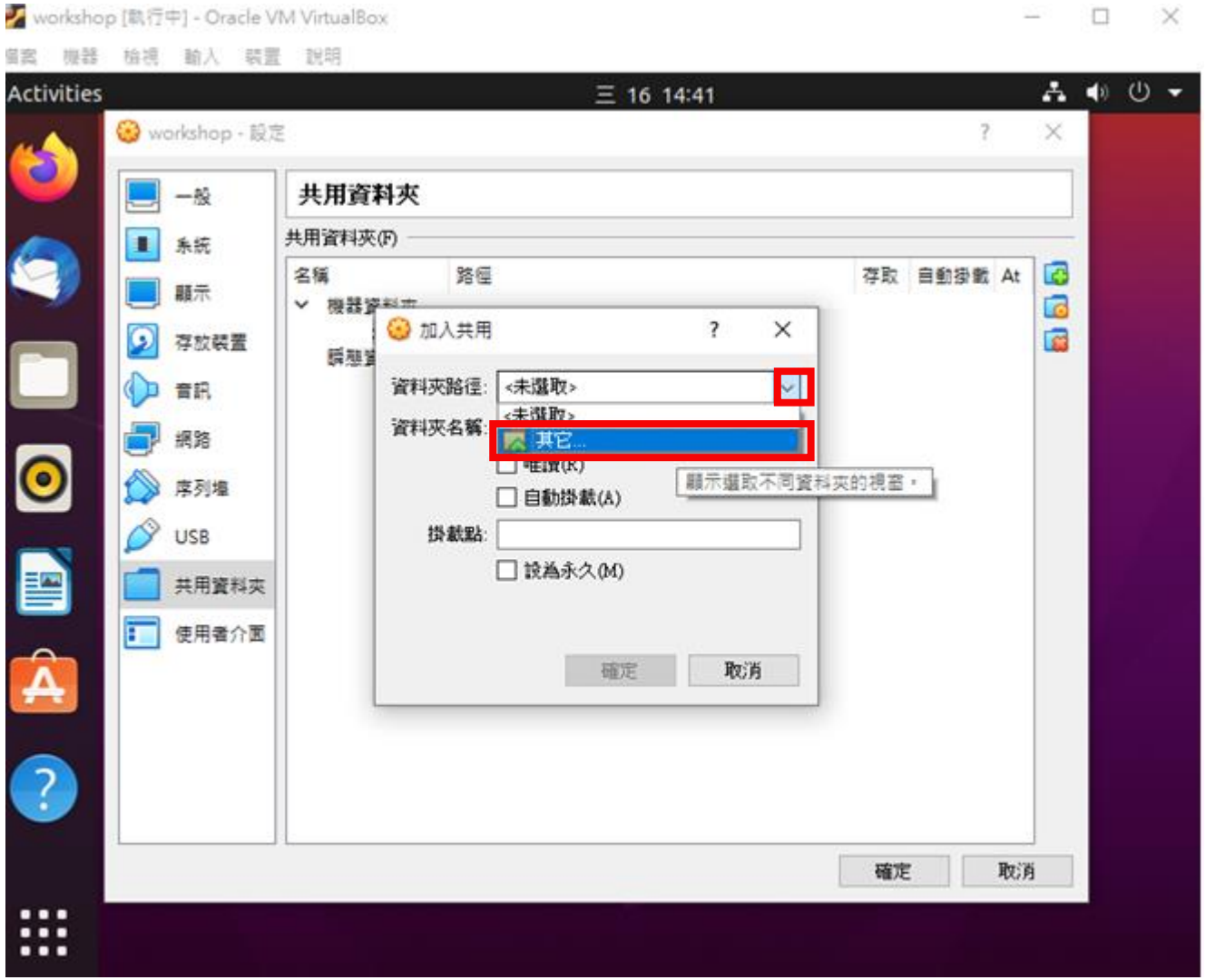


Download and Setup SDK

設定共用資料夾

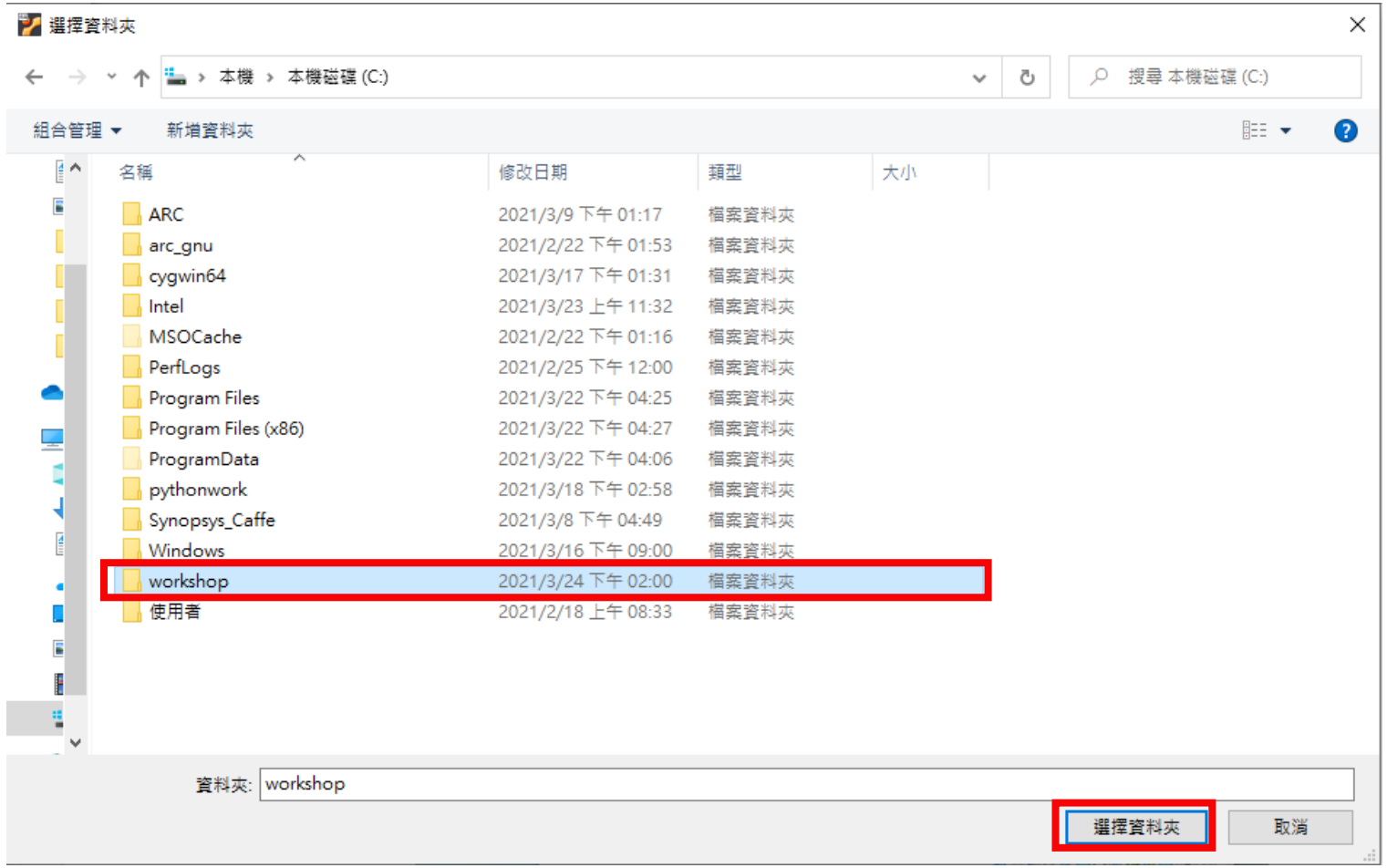


Download and Setup SDK



Download and Setup SDK

Path C:\workshop



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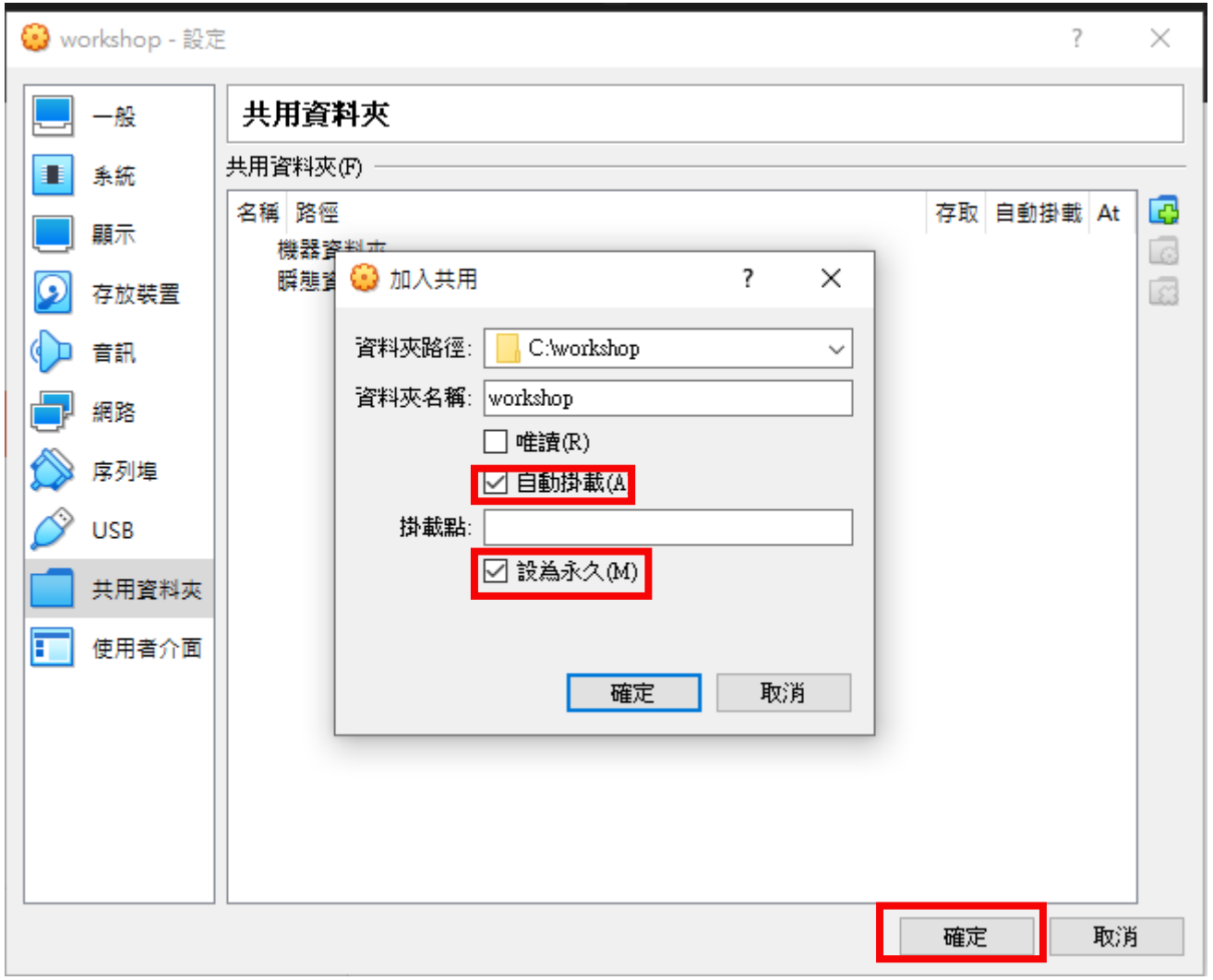

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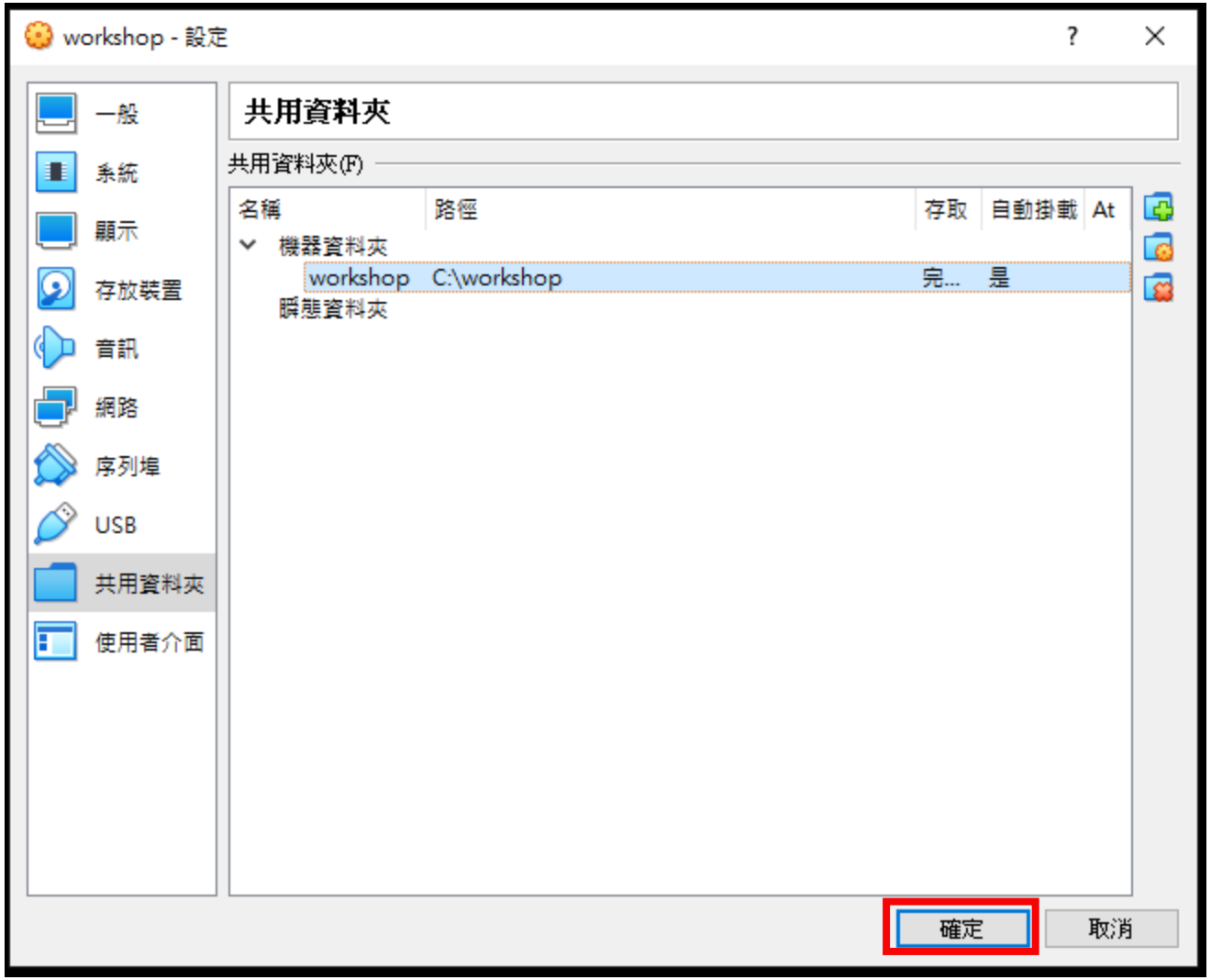
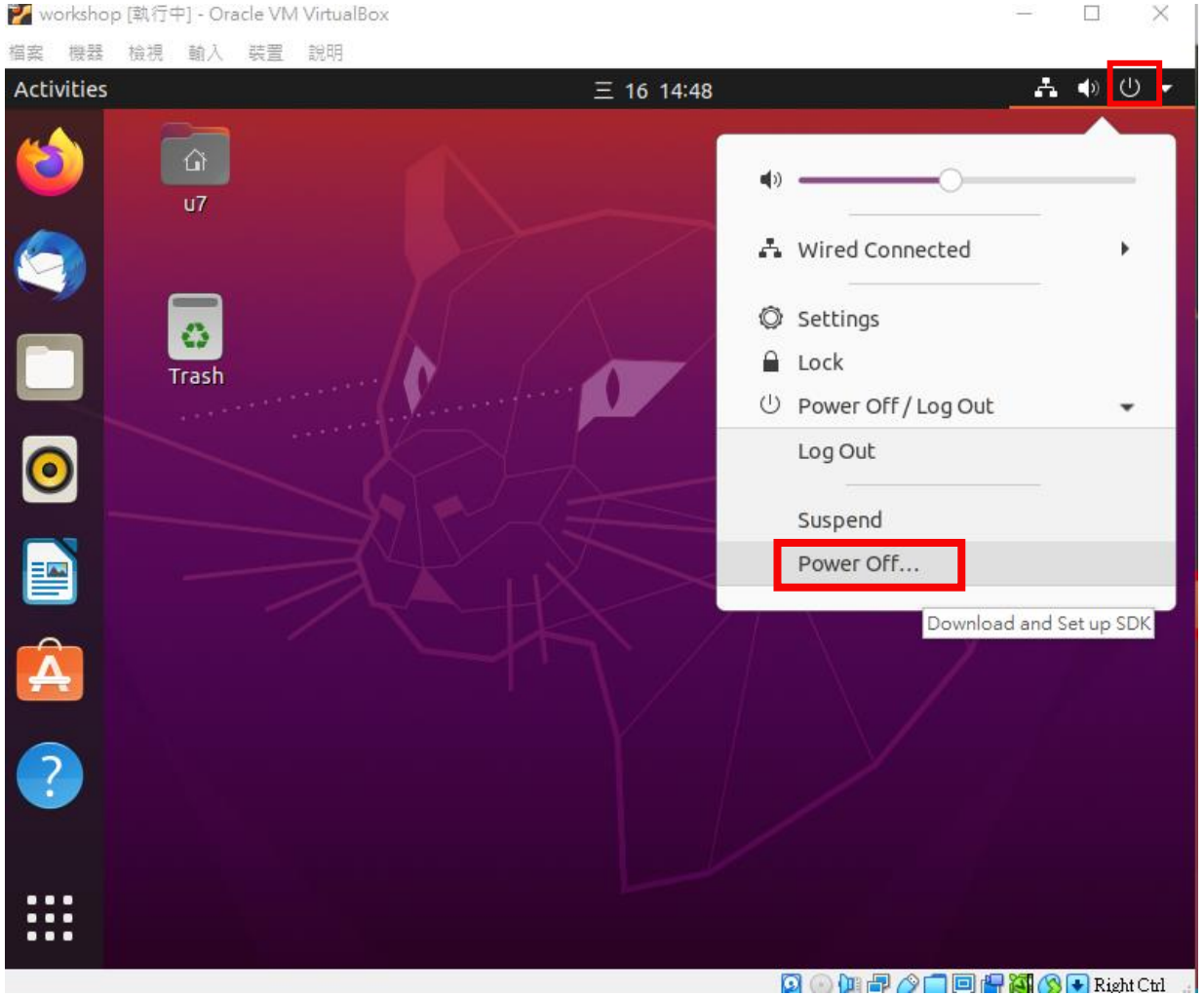
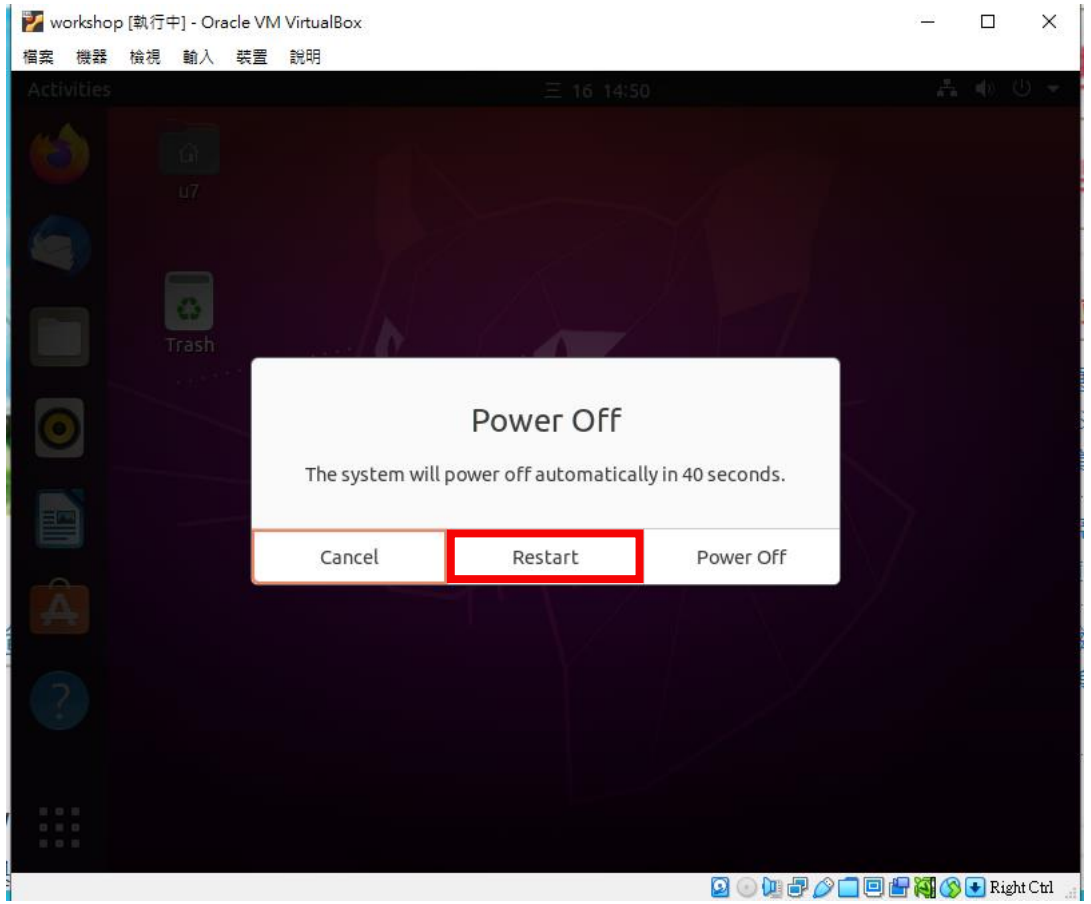


Download and Setup SDK

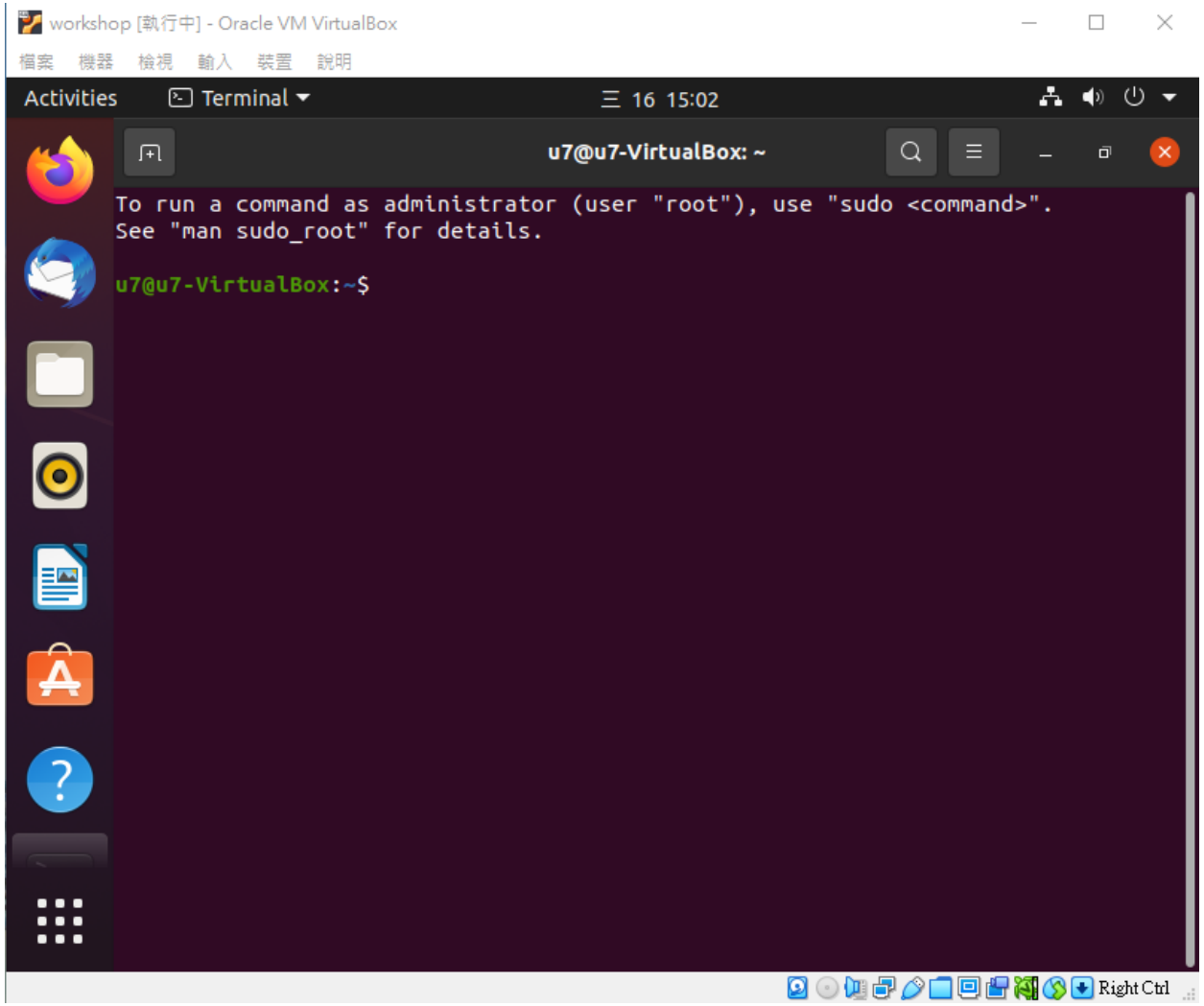
Restart 





Download and Setup SDK

Open Ubuntu terminal: Ctrl+Alt+t



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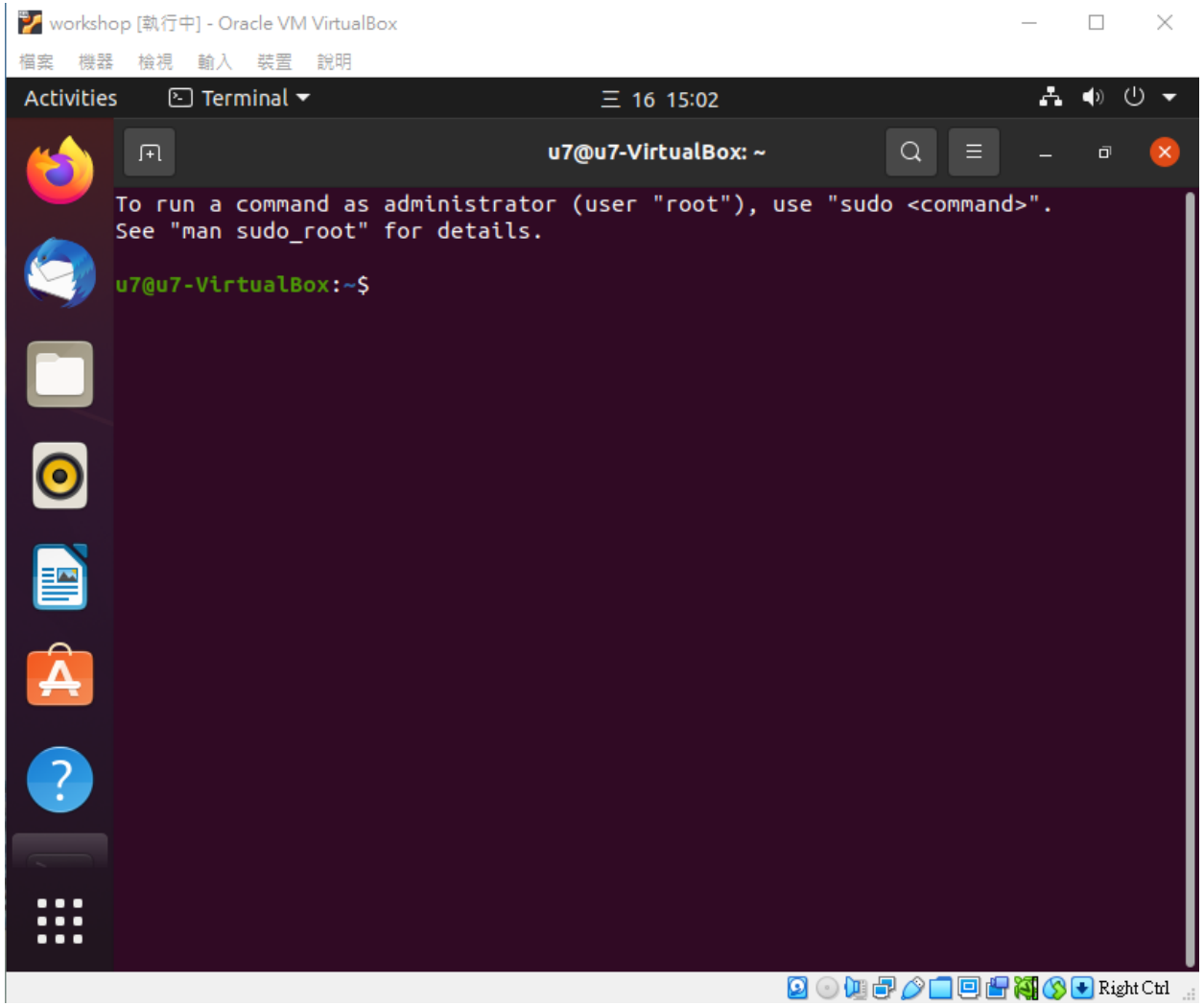
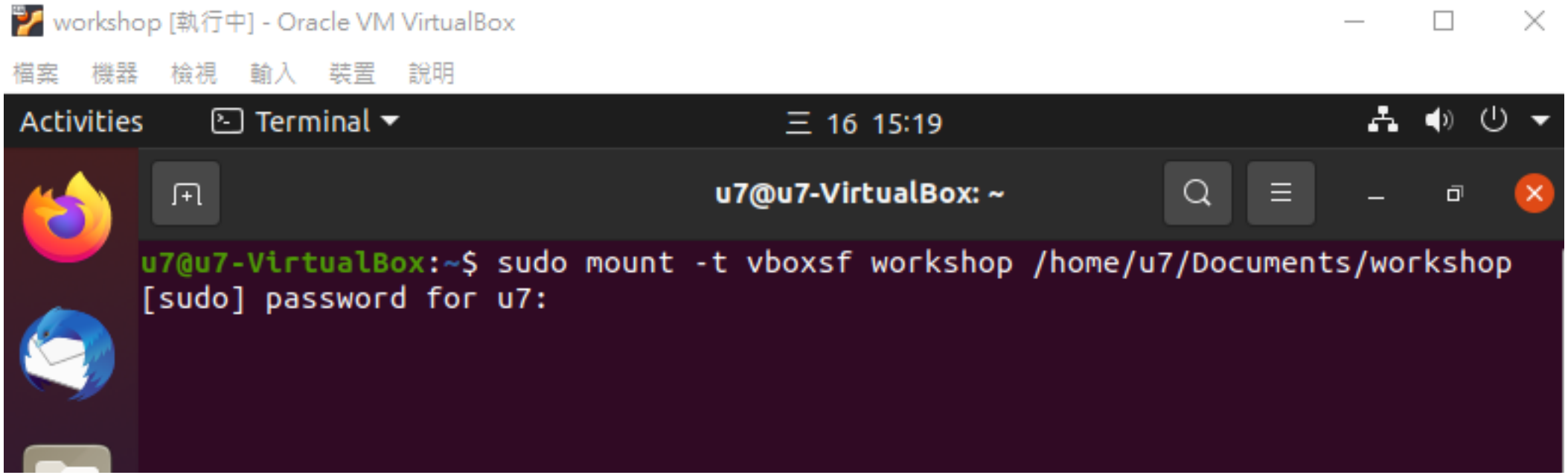


Download and Setup SDK

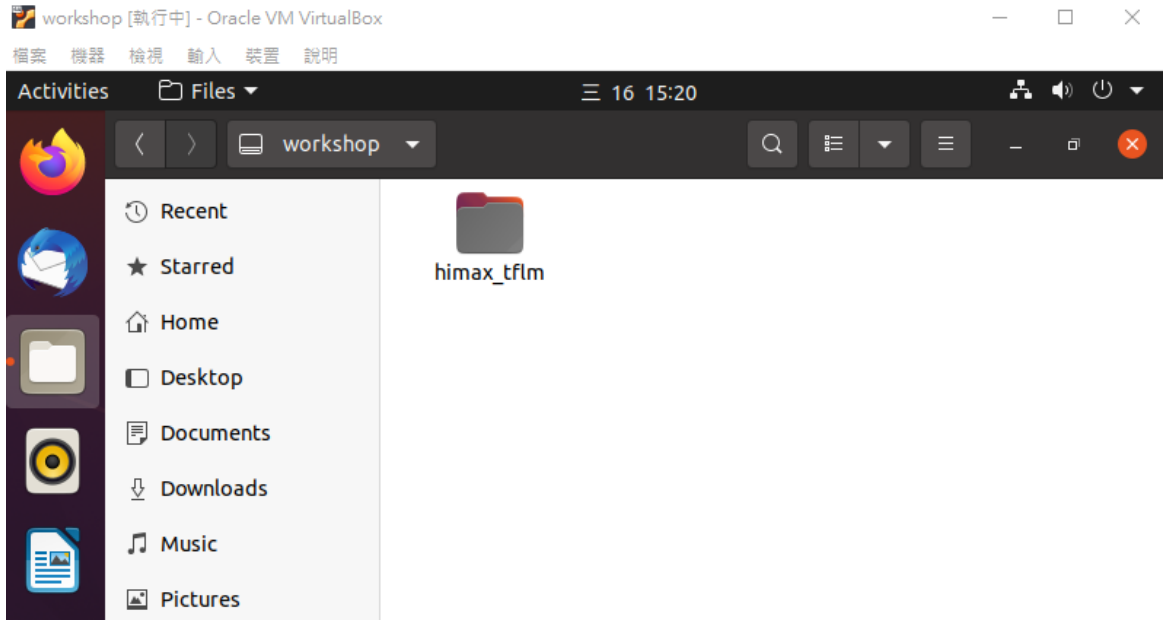
$ sudo mount –t vboxsf workshop /home/u7/Documents/workshop

password for u7: u1234567



Download and Setup SDK

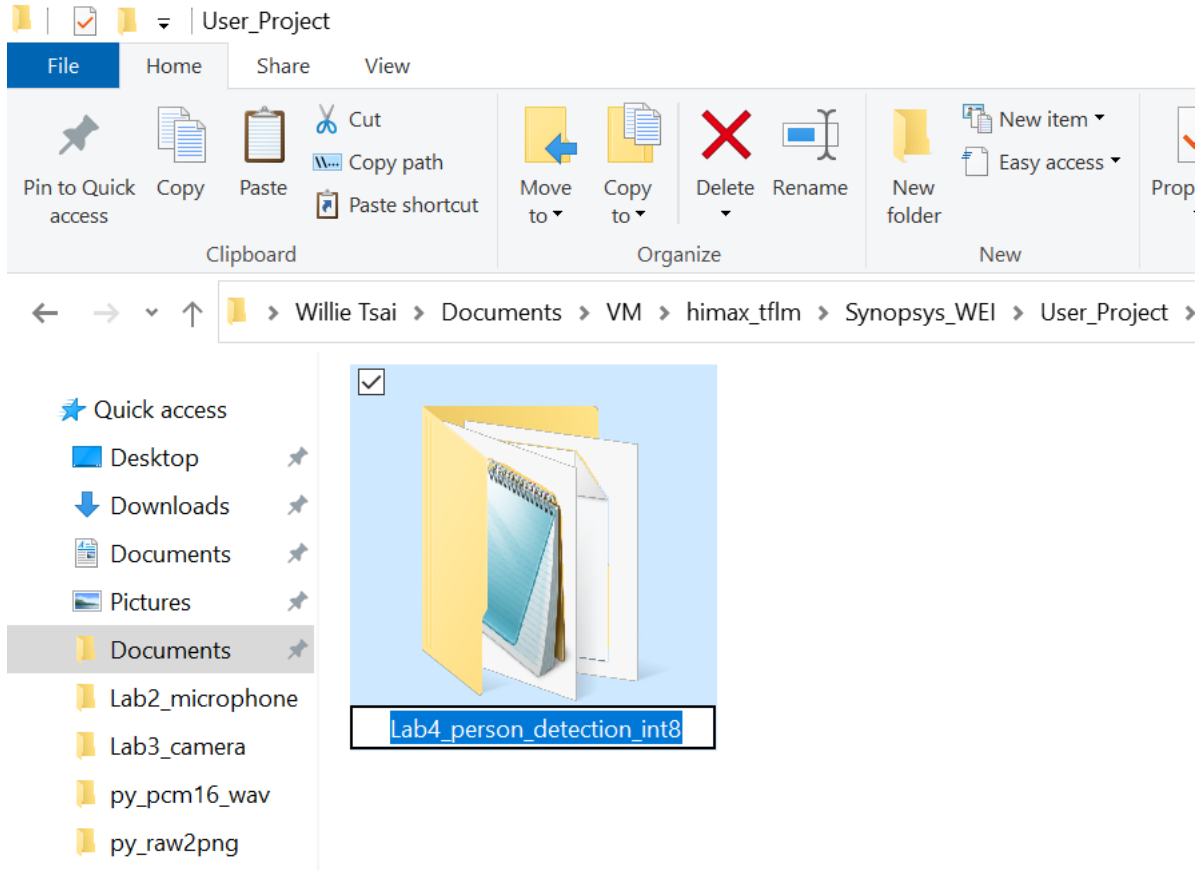
7. Check workshop file again to confirm whether file is shared.
   Step 8 & 9 has already done by workshop.ova file.
   If you create Ubuntu by yourself, please do step 8 & 9.
8. (SKIP) Copy *"…\himax_tflm\Synopsys_WEI\arc_bin"* to "*Home/arc_bin*"
9. (SKIP) Edit /home/.bashrc for setting environment variable, add *"export PATH=$PATH:$HOME/arc_bin"* at the last line



Program Code & Make Project & Make Flash File

Program Code

1. Copy folder *“Synopsys_WEI/Example Project/Lab4_person_detection_int8”* to folder “*Synopsys_WEI/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

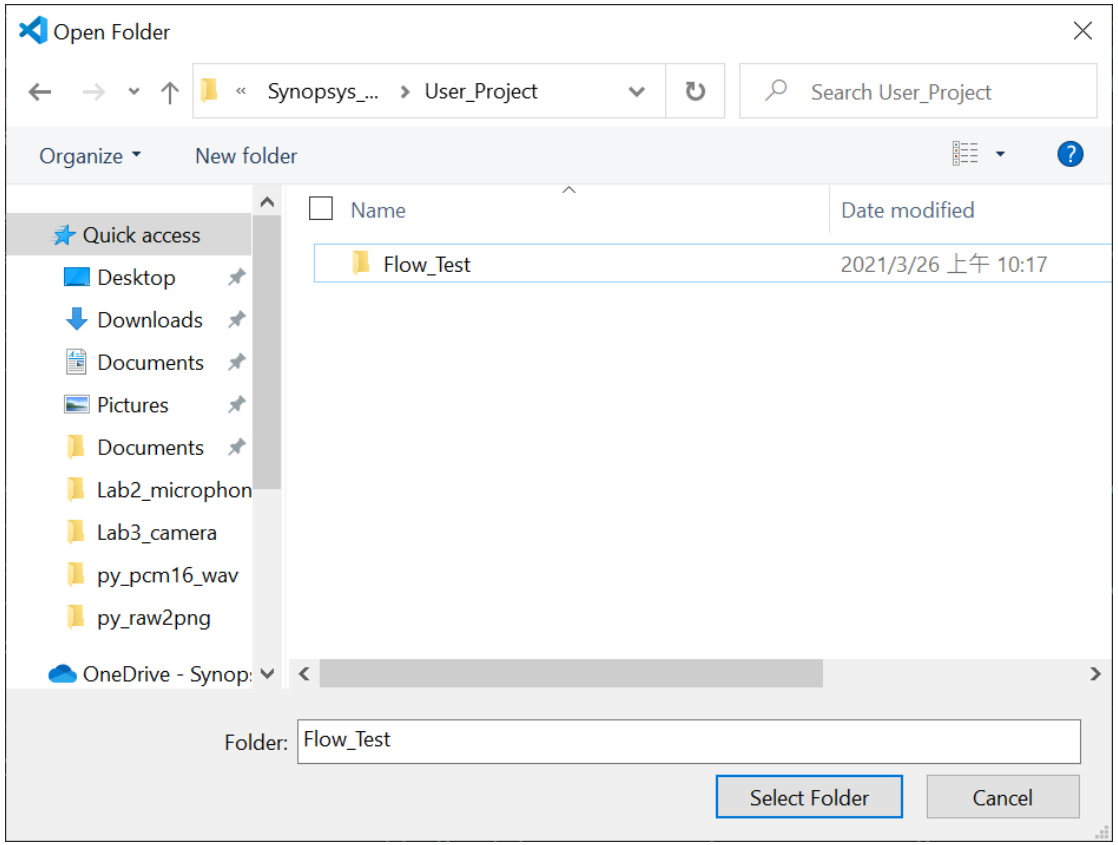
   $ cd C:

   $ cd /workshop/himax_tflm/Synopsys_WEI/User_Project/Flow_Test

   $ make

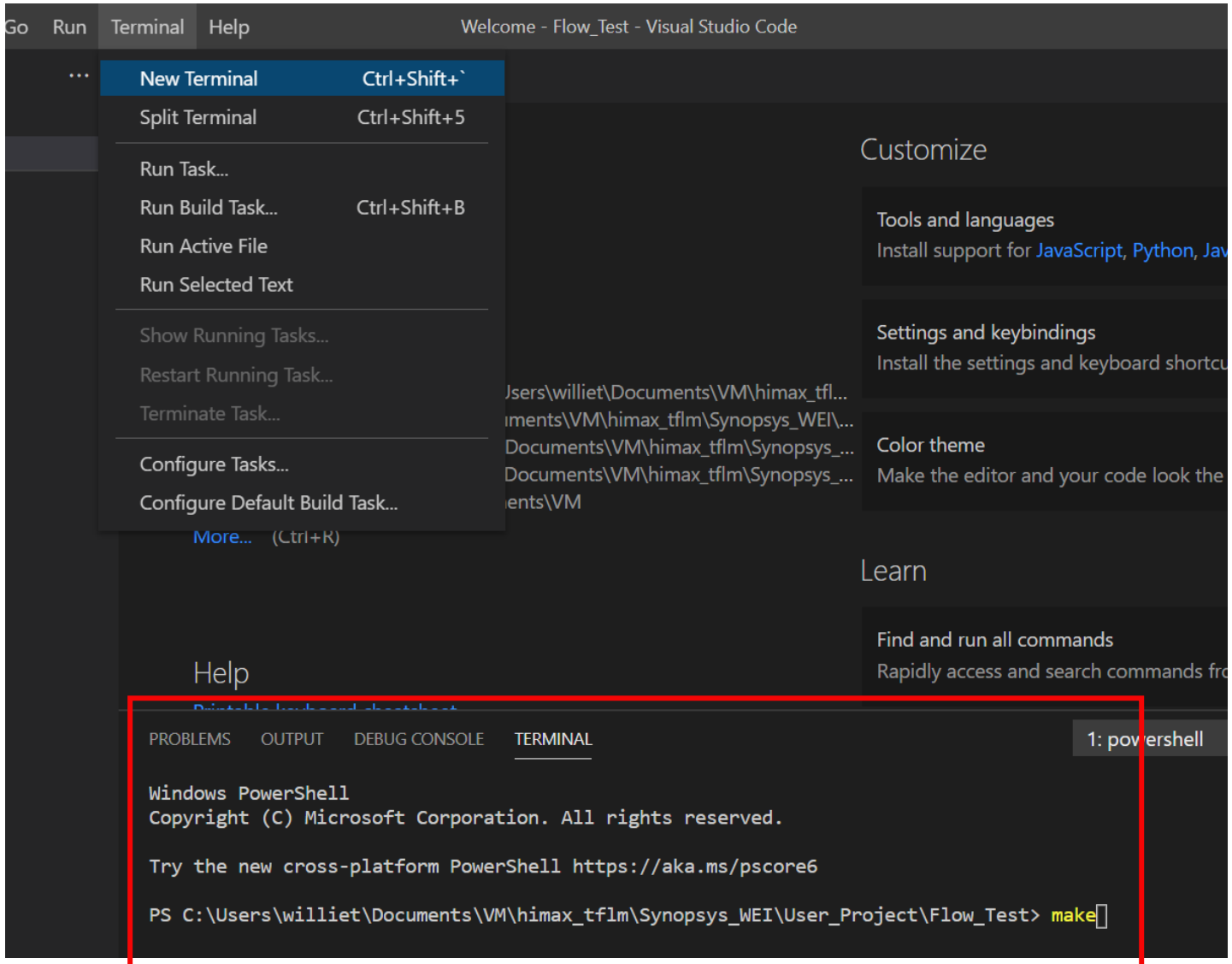
Make Project (Visual Studio Code)

4. You can also use Visual Studio Code to make project.
   Open Folder and Select Folder:
   /workshop/himax_tflm/Synopsys_WEI/User_Project/Flow_Tes



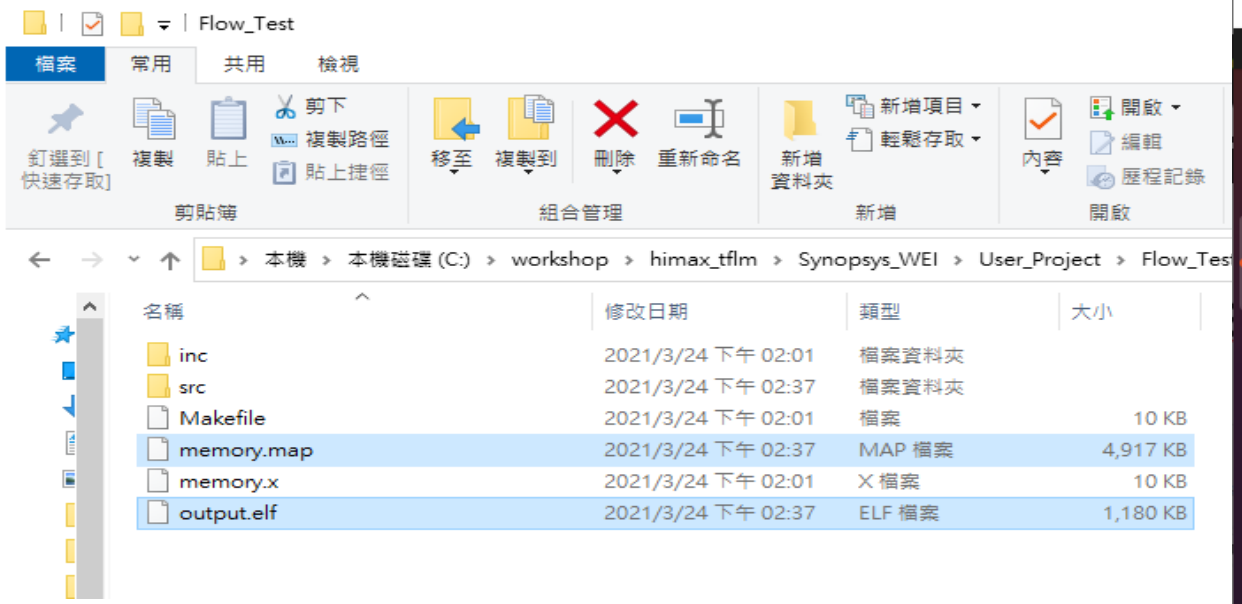
Make Project (Visual Studio Code)

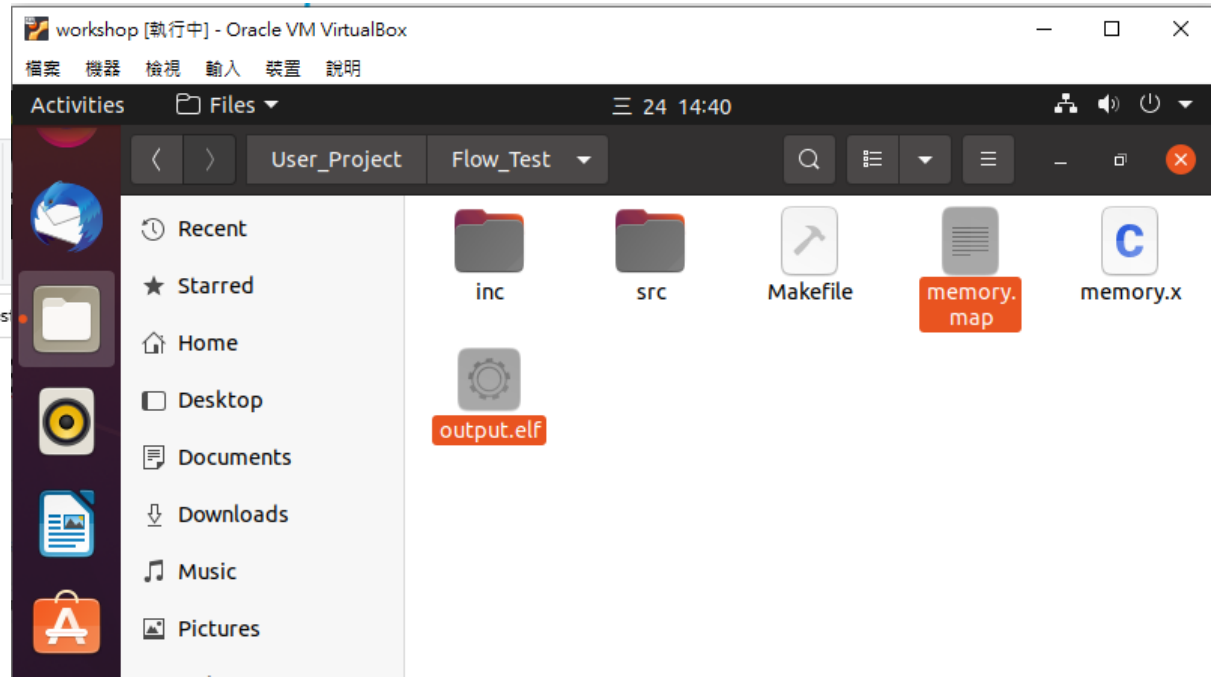
Terminal > New Terminal
You will see terminal block.
Type command:
$ make



Make Project

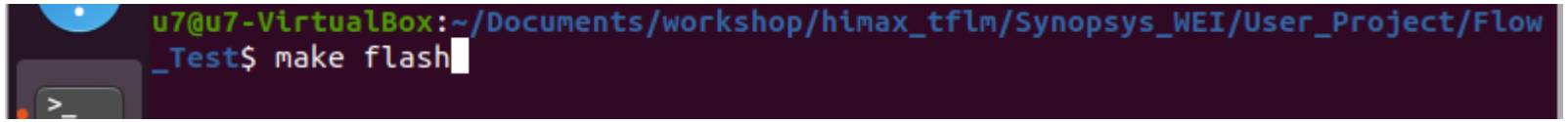
5. Check your folder whether contains .elf and .map files.
   GNU: output.elf & memory.map
   MetaWare: output.elf & output.map



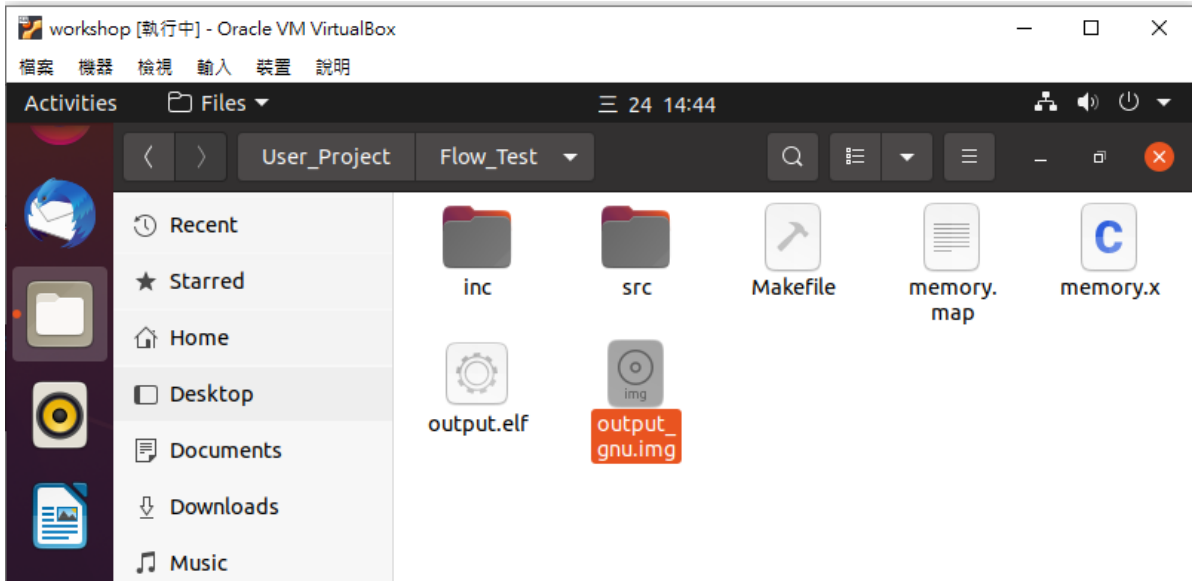


Make Flash File

6. Open terminal in VM, and go to the same path:
   “Documents/workshop/himax_tflm/Synopsys_WEI/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

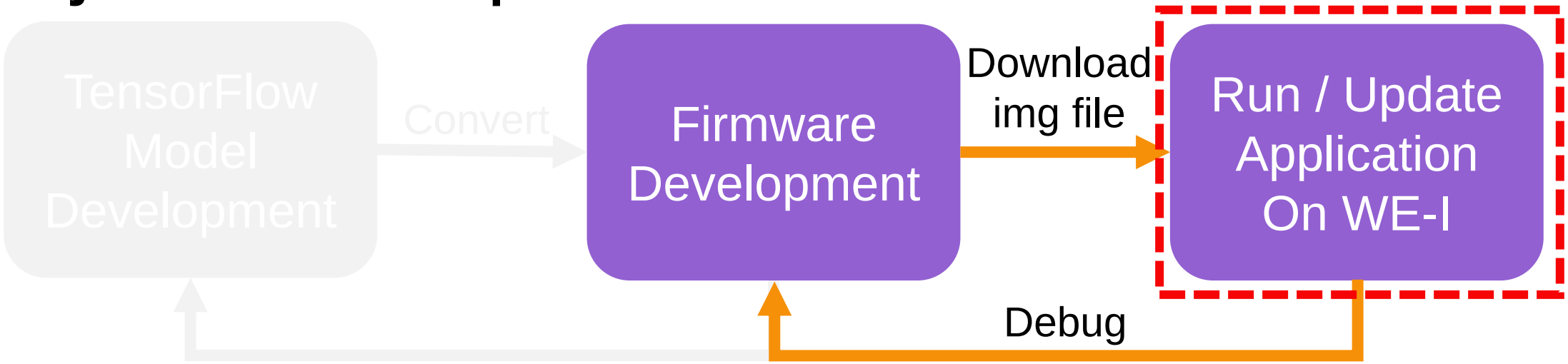
$ make flash : combine .elf and .map file to .img file

$ 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.

Project Development Flow



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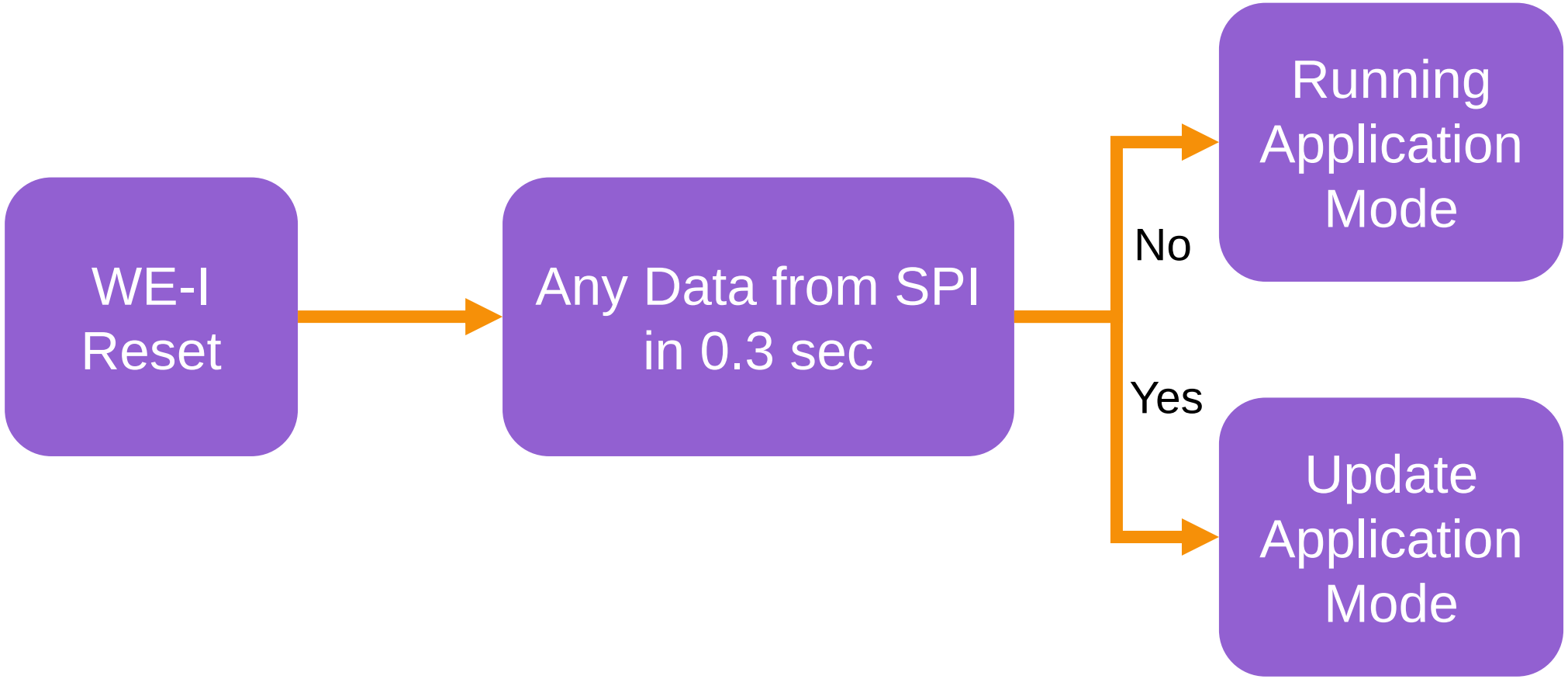
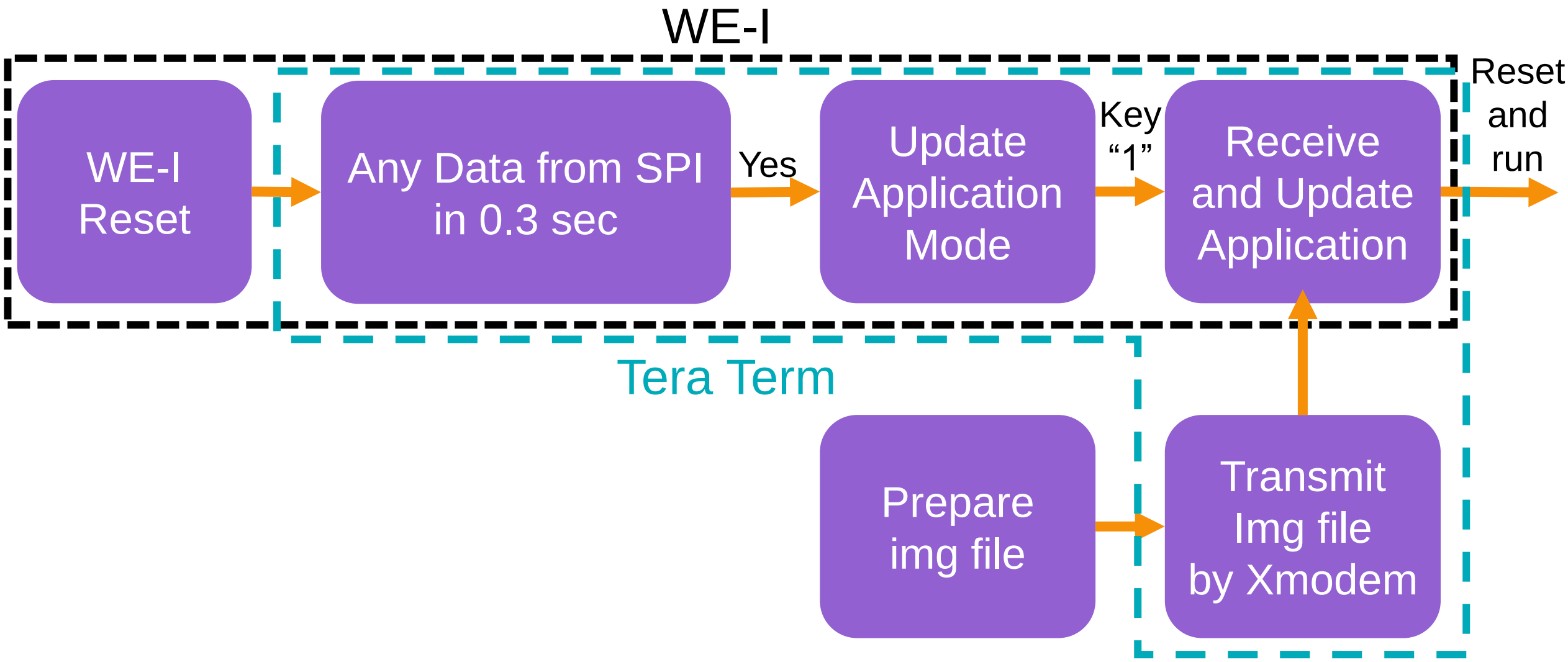
Run / Update Application On WE-I



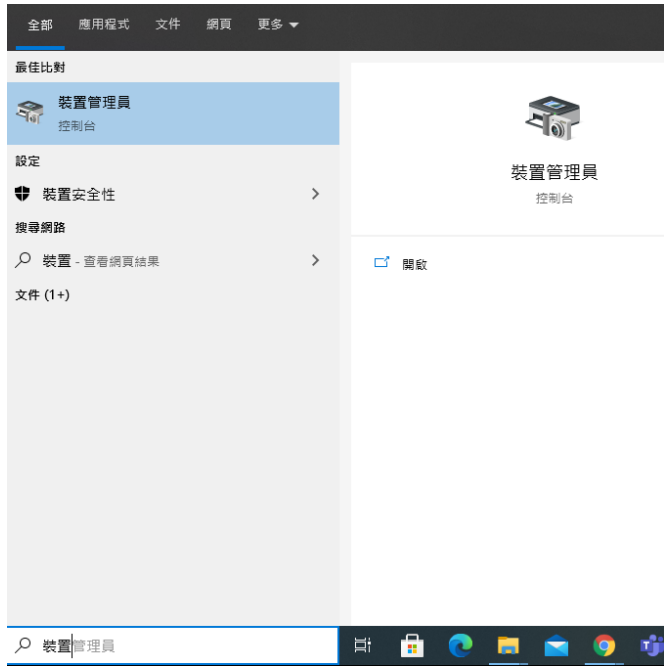
Update Application On WE-I

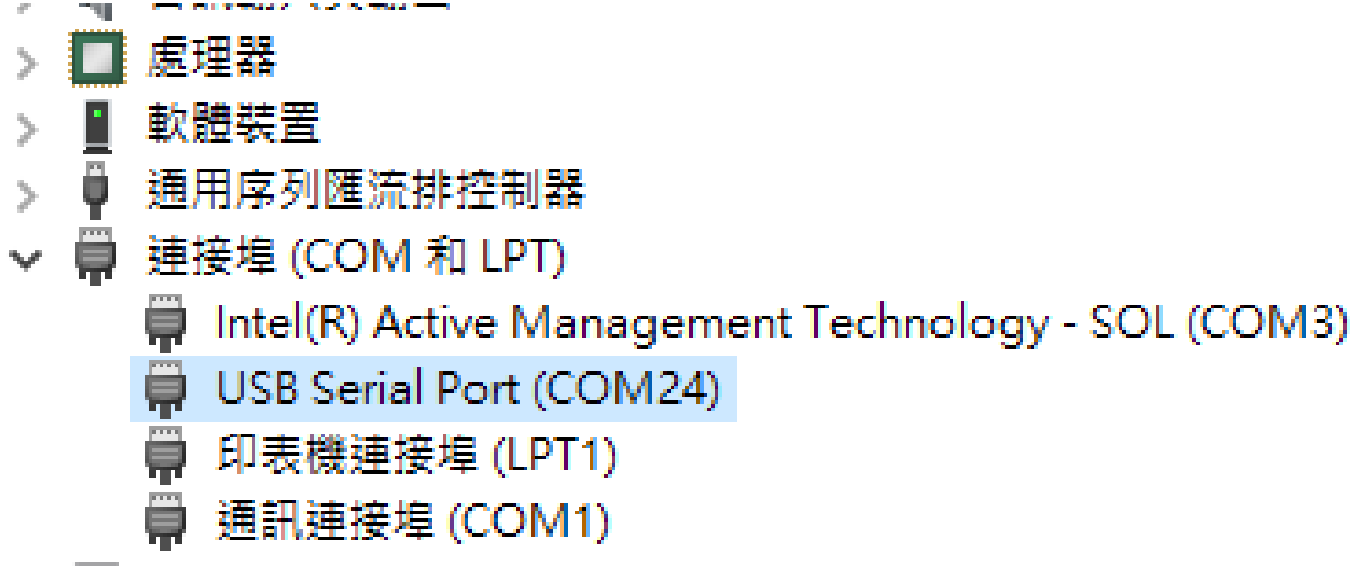


Update Application On WE-I

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

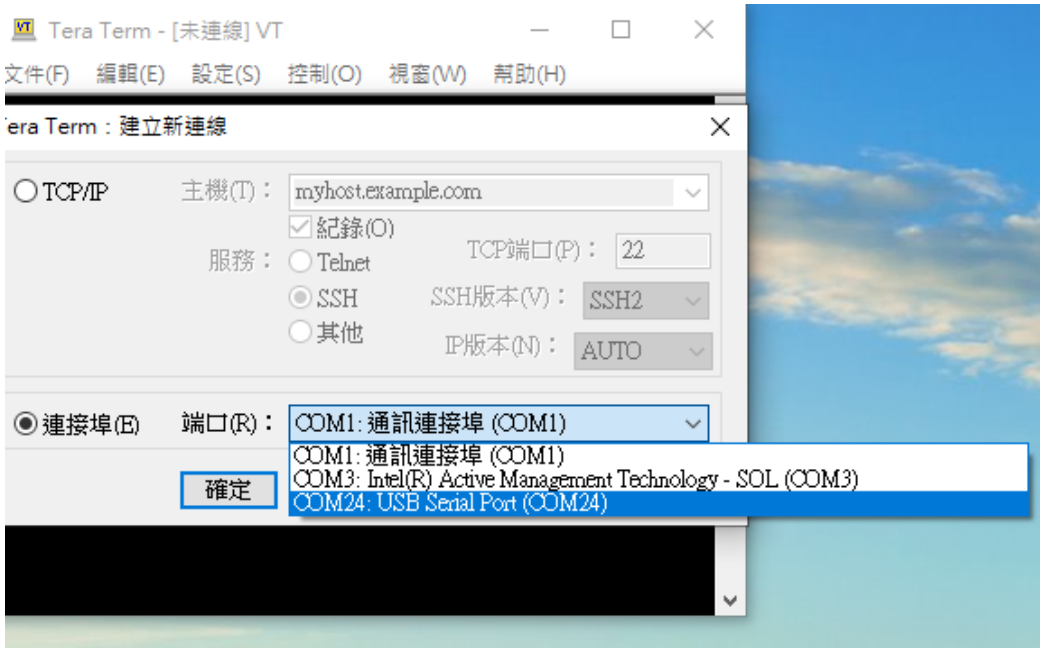


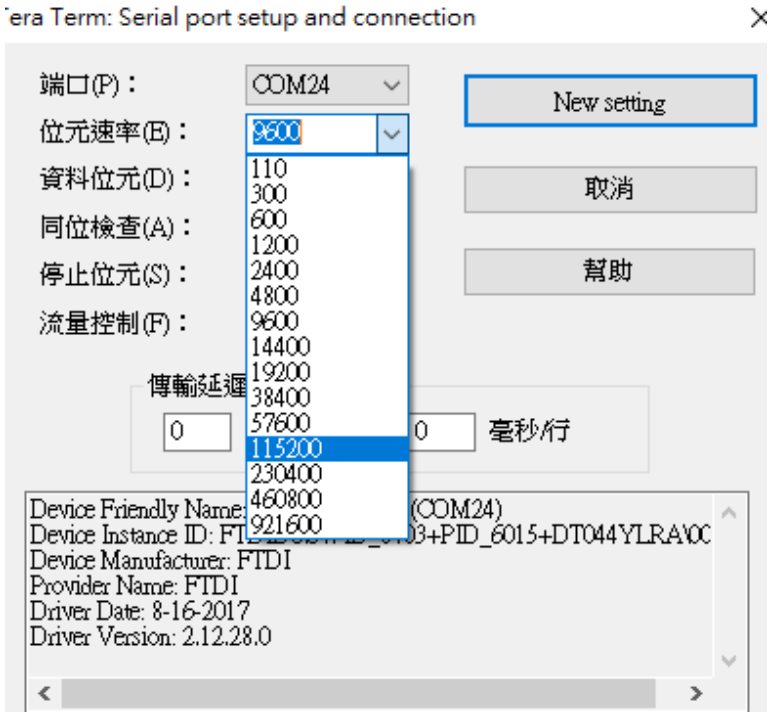


Update Application On WE-I

Connect WE-I with Tera Term

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

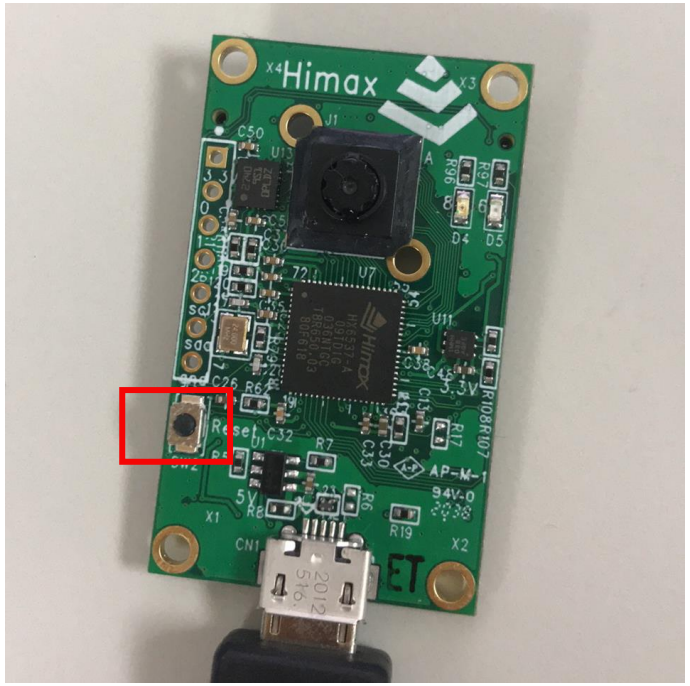




Update Application On WE-I

Connect WE-I with Tera Term

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



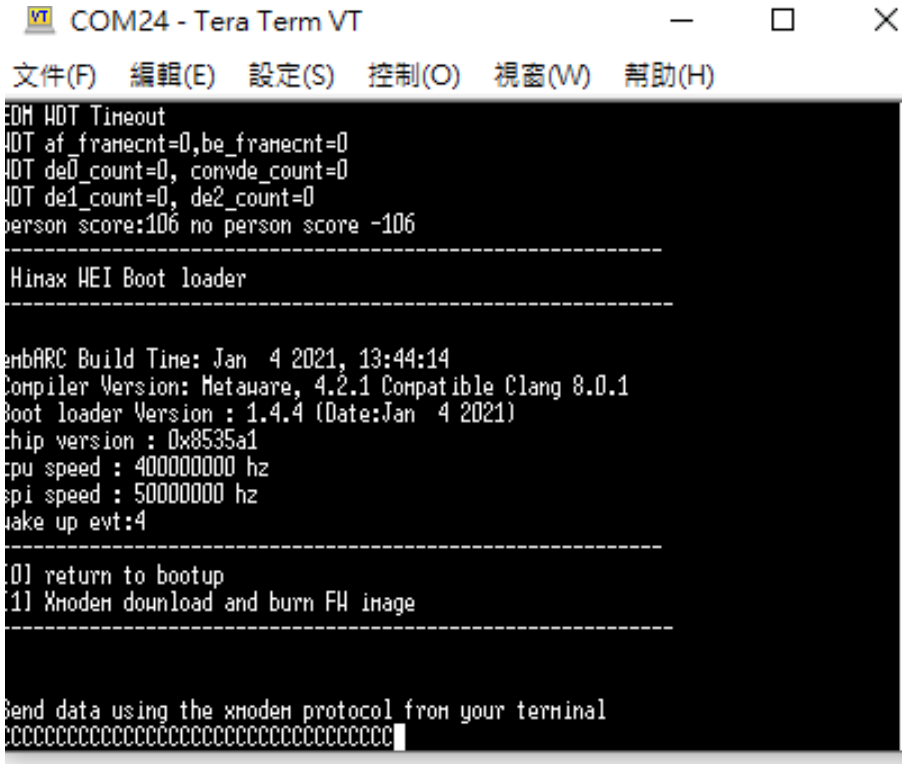

```
------------------------------------------------------------
 Himax WEI Boot loader
------------------------------------------------------------

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

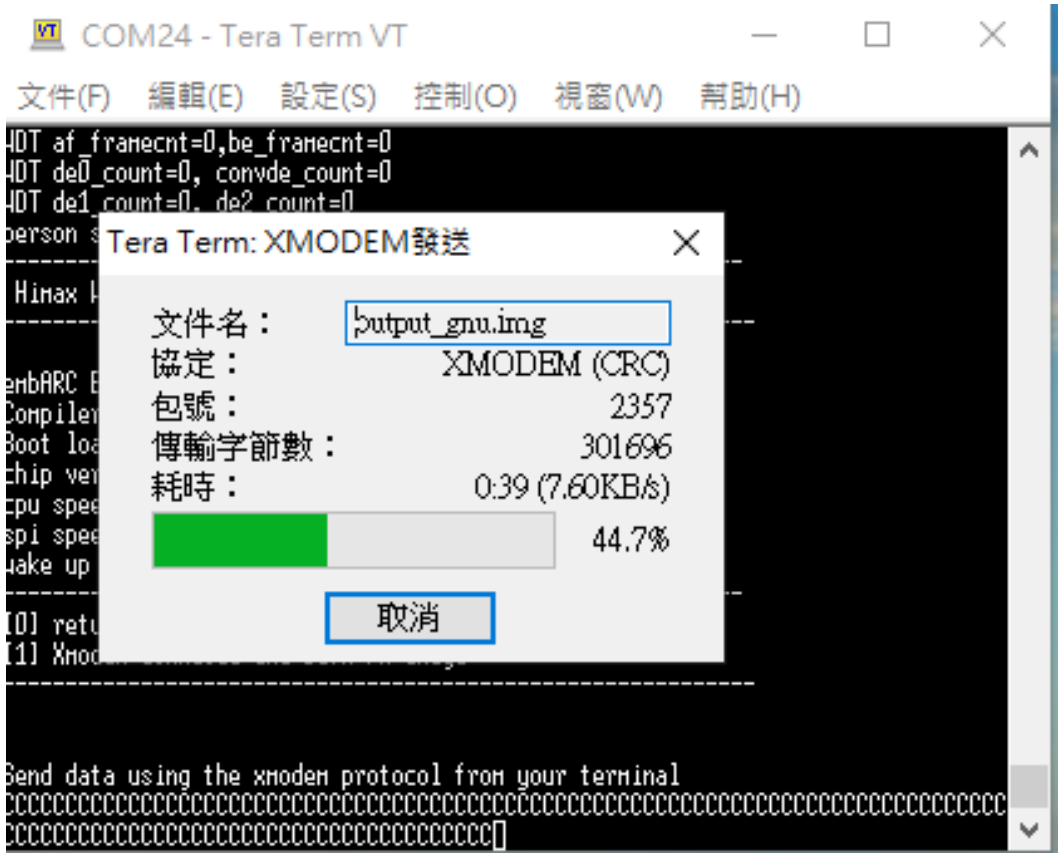
1. Finish to connect WE-I with Tera Term
2. Click on any display area
3. Keep to press key “1” on the keyboard, and press reset button
4. WE-I will start to receive img file by Xmodem



Update Application On WE-I

Enable Update Application Mode with Tera Term

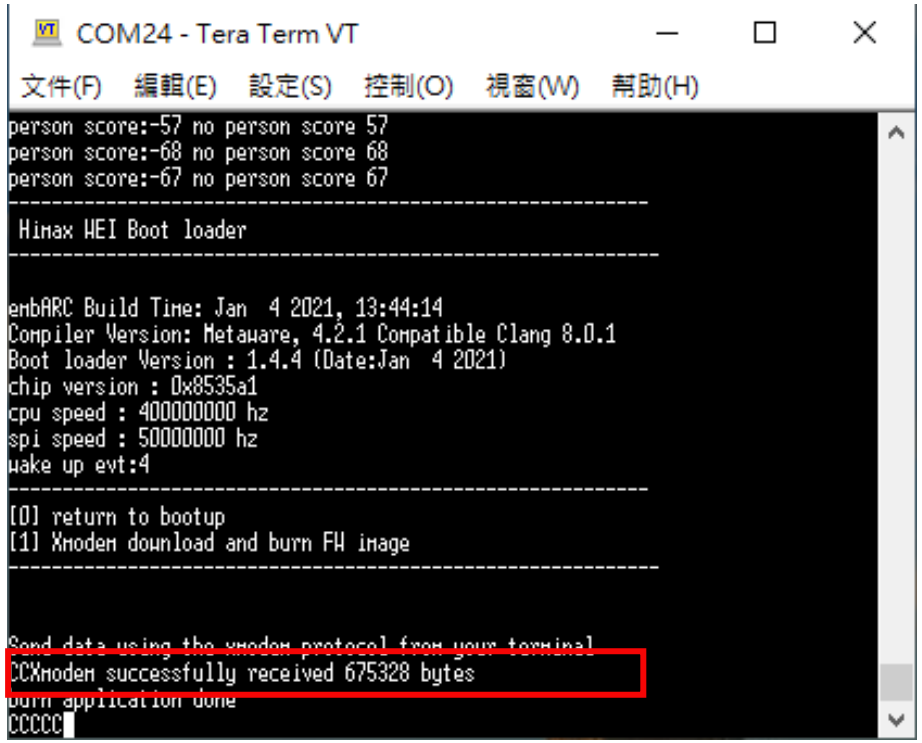
5. Tera term File > Transmit > XMODEM > Transmit > select img file
6. Wait for Transmit



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