

Environment Setup

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Overview

- **You will use RISC-V ISA simulator on Linux: Two options**
 - Refer to experimental setup slide
 - Option 1: Use VirtualBox (recommend)
 - download & install Virtual Box from <https://www.virtualbox.org/wiki/Downloads>
 - download container Image from <https://drive.google.com/file/d/1a1CTfbEbIOAFyXwykXw3OZtrGs8b-Gjr/view?usp=sharing> and import
 - Option 2: Use your own Linux box
 - CAVEAT: Grading will be done on our VM
 - download file from <https://drive.google.com/file/d/1IGsdbDlsnaInFaK0oQDt8iiedYJw3zY/view?usp=sharing>
 - Option 3 : (hidden) Use Docker

Install VirtualBox in Windows

■ Download installer from

<https://www.virtualbox.org/wiki/Downloads>

Download VirtualBox

Here you will find links to VirtualBox binaries and its source code.

VirtualBox binaries

By downloading, you agree to the terms and conditions of the respective license.

If you're looking for the latest VirtualBox 6.1 packages, see [VirtualBox 6.1 builds](#). Version 6.1 will remain supported until December 2023.

VirtualBox 7.0.10 platform packages

- [Windows hosts](#)
- [macOS / Intel hosts](#)
- [Linux distributions](#)
- [Solaris hosts](#)
- [Solaris 11 IPS hosts](#)



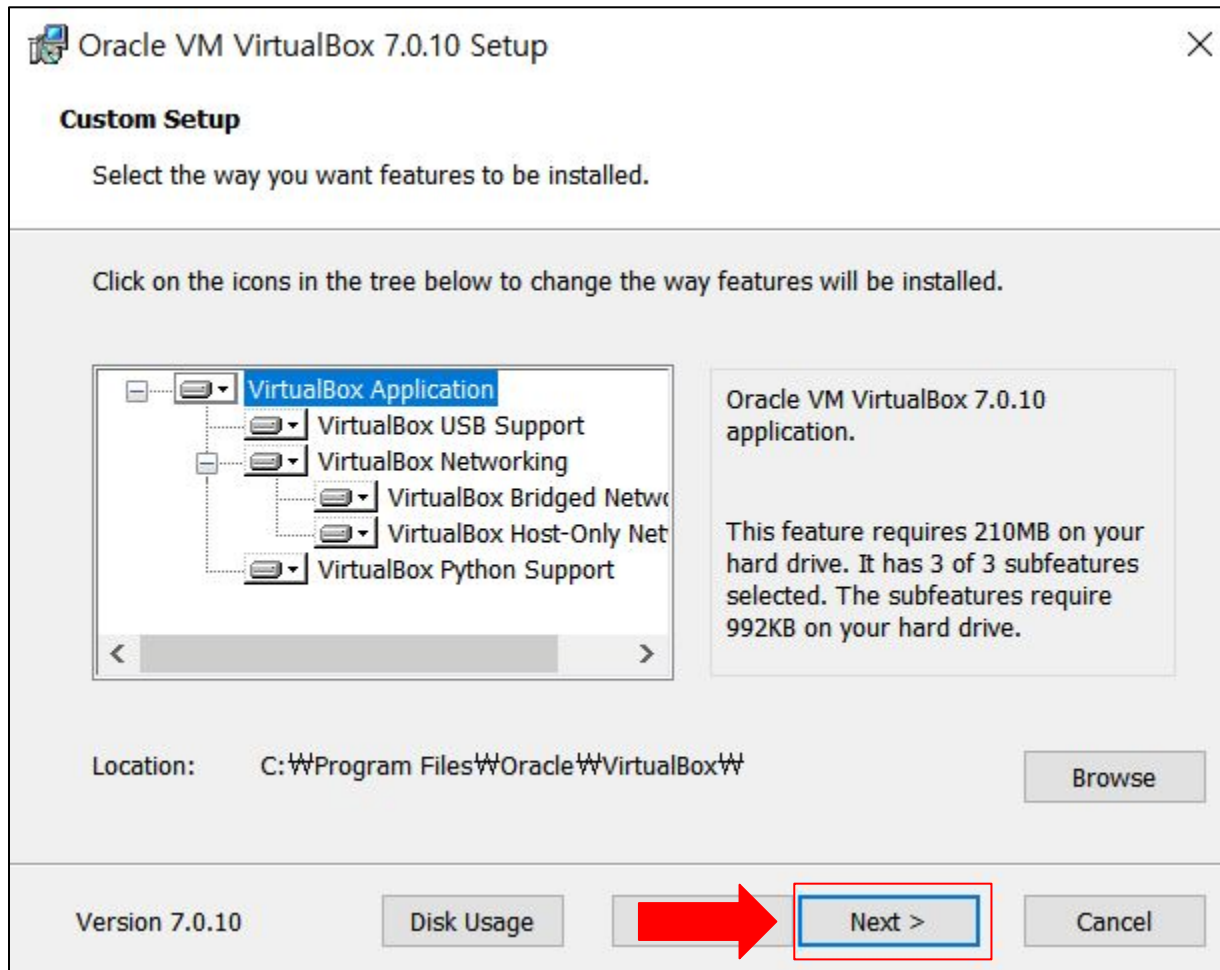
Install VirtualBox in Windows

- Press 'Next' button



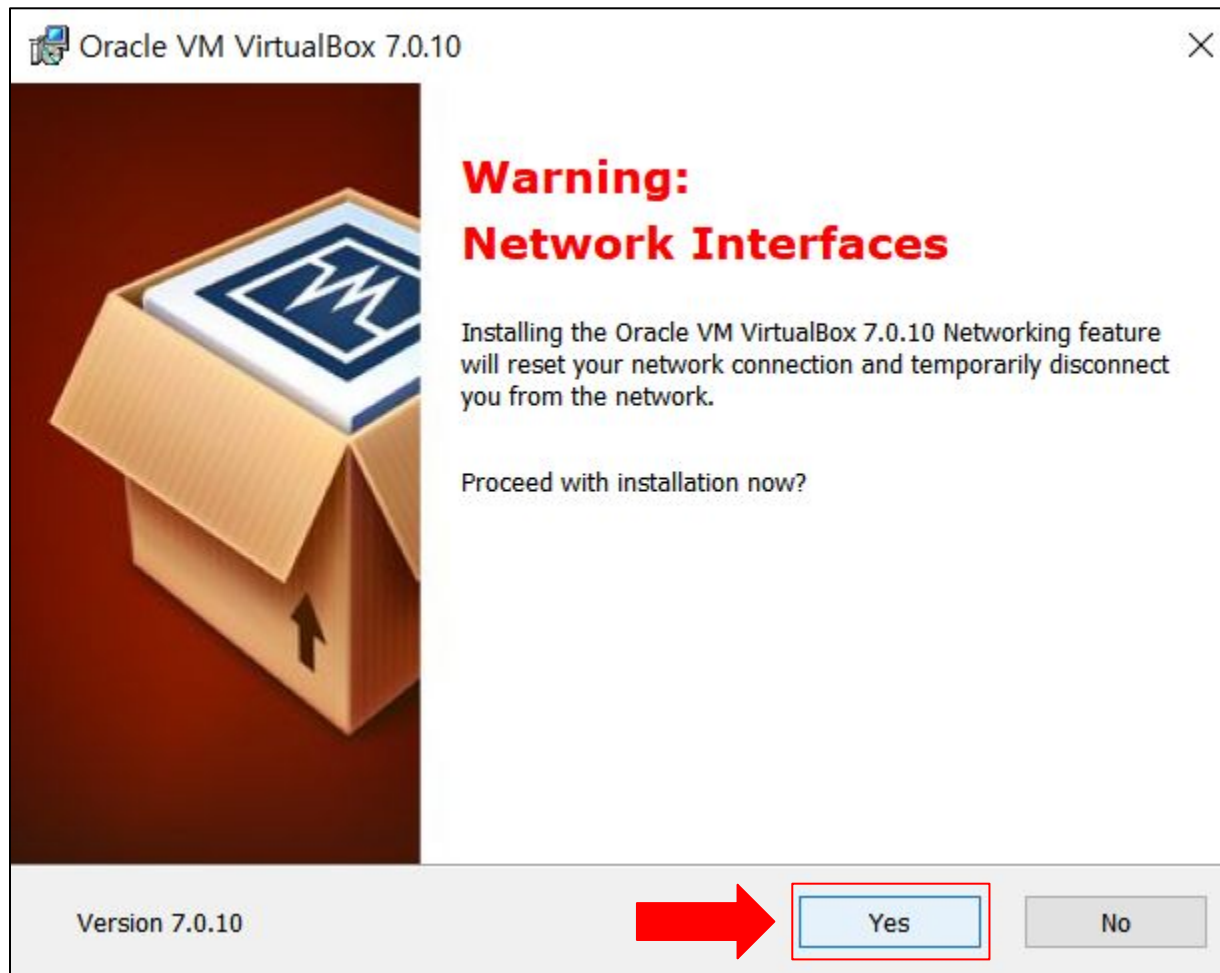
Install VirtualBox in Windows

- Press 'Next' button



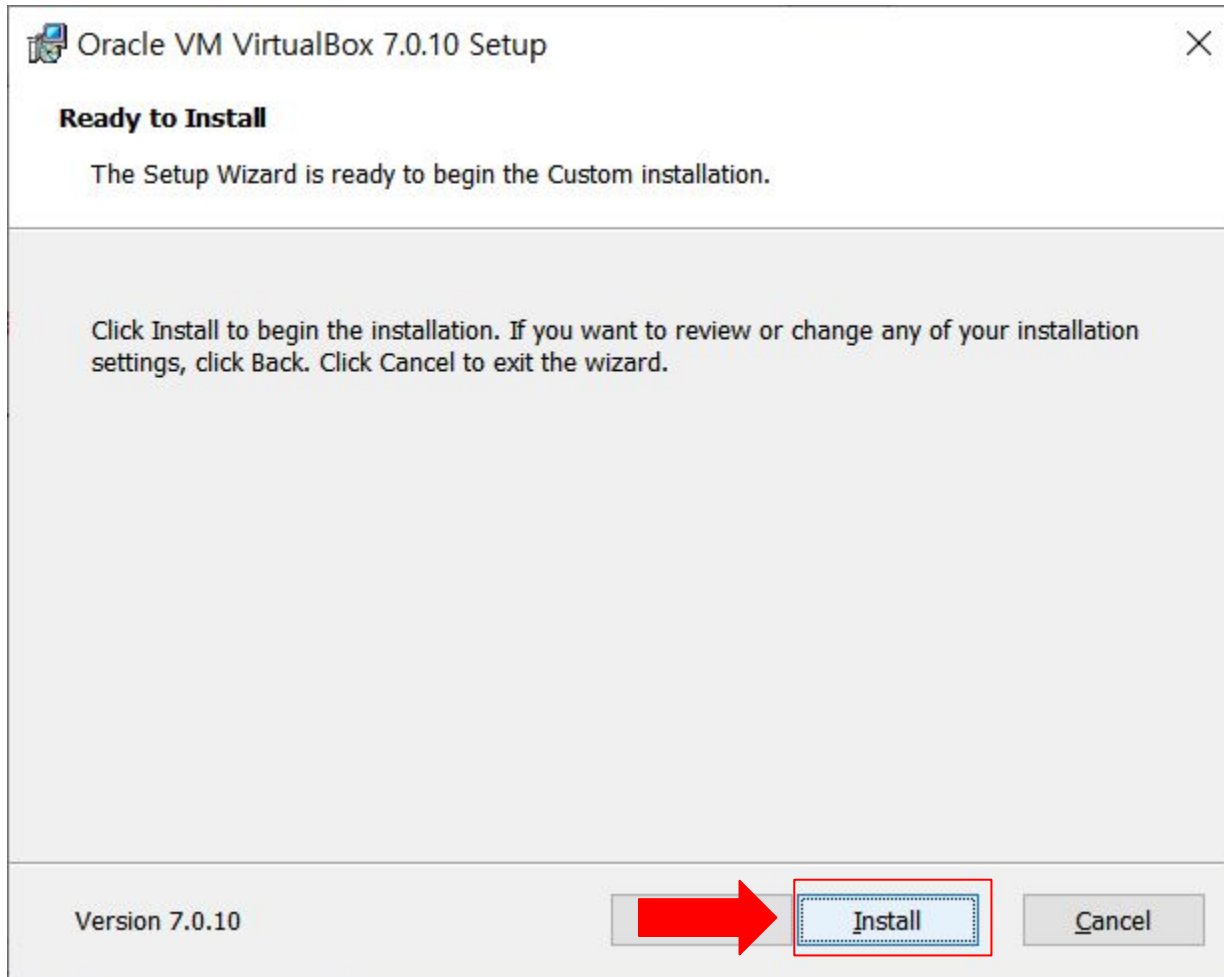
Install VirtualBox in Windows

- Press 'Yes' button



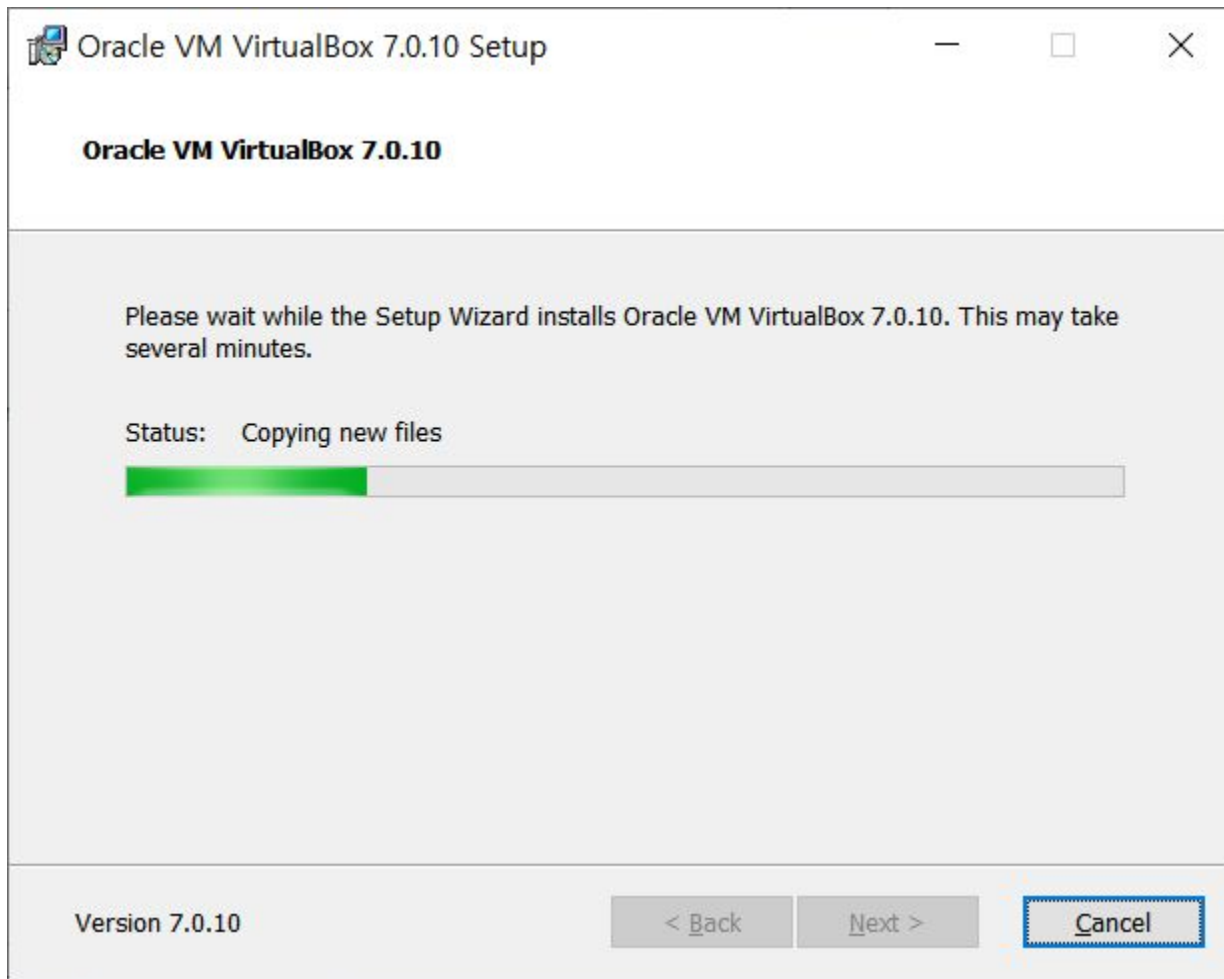
Install VirtualBox in Windows

- Press 'Install' button



Install VirtualBox in Windows

- Wait a moment



Install VirtualBox in Windows

- Press 'Finish' button



Install VirtualBox in Windows

■ Done !



Install VirtualBox in Mac / Intel host

■ Download installer from

<https://www.virtualbox.org/wiki/Downloads>

Download VirtualBox

Here you will find links to VirtualBox binaries and its source code.

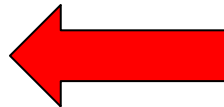
VirtualBox binaries

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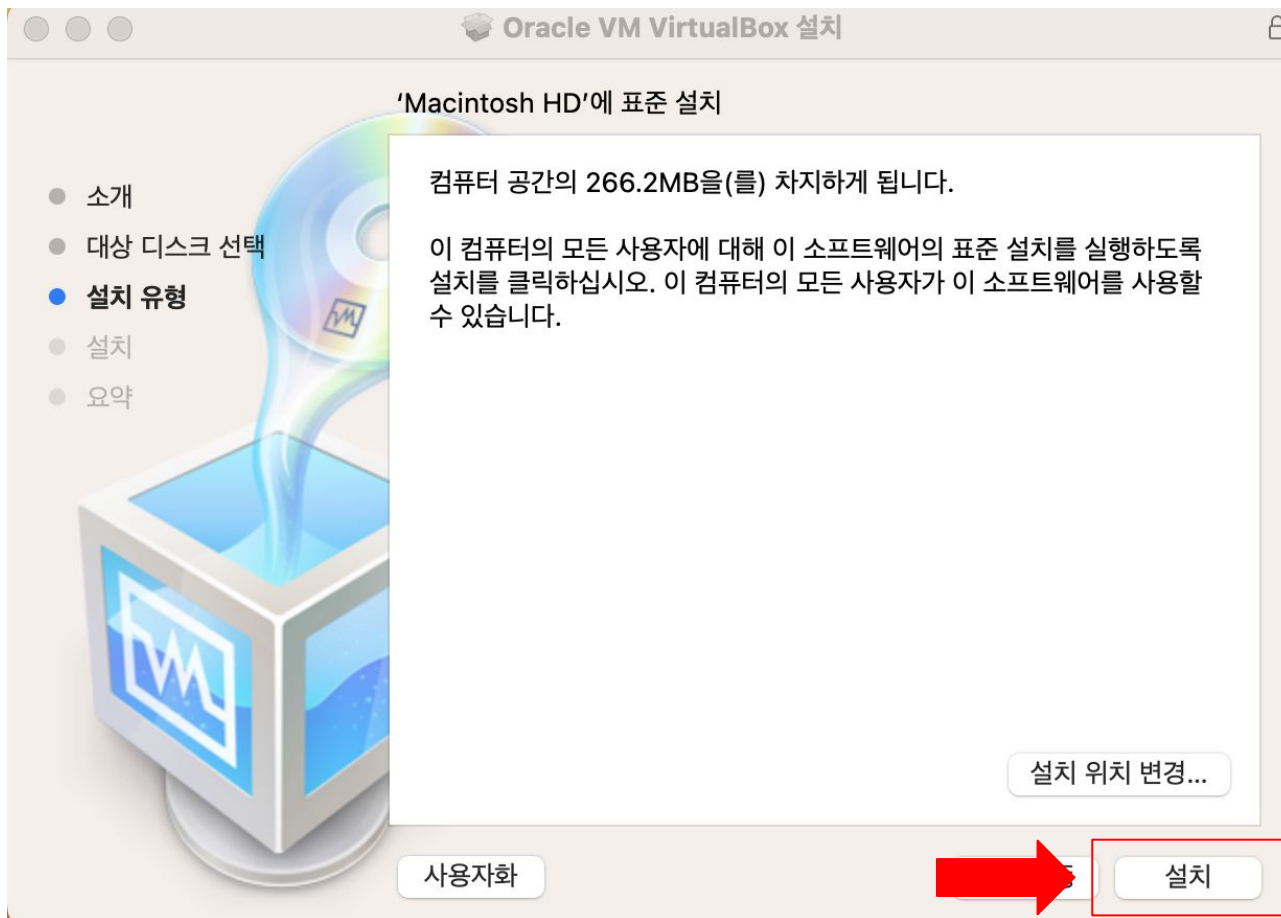
Install VirtualBox in Mac / Intel host

- Press 'Next' button



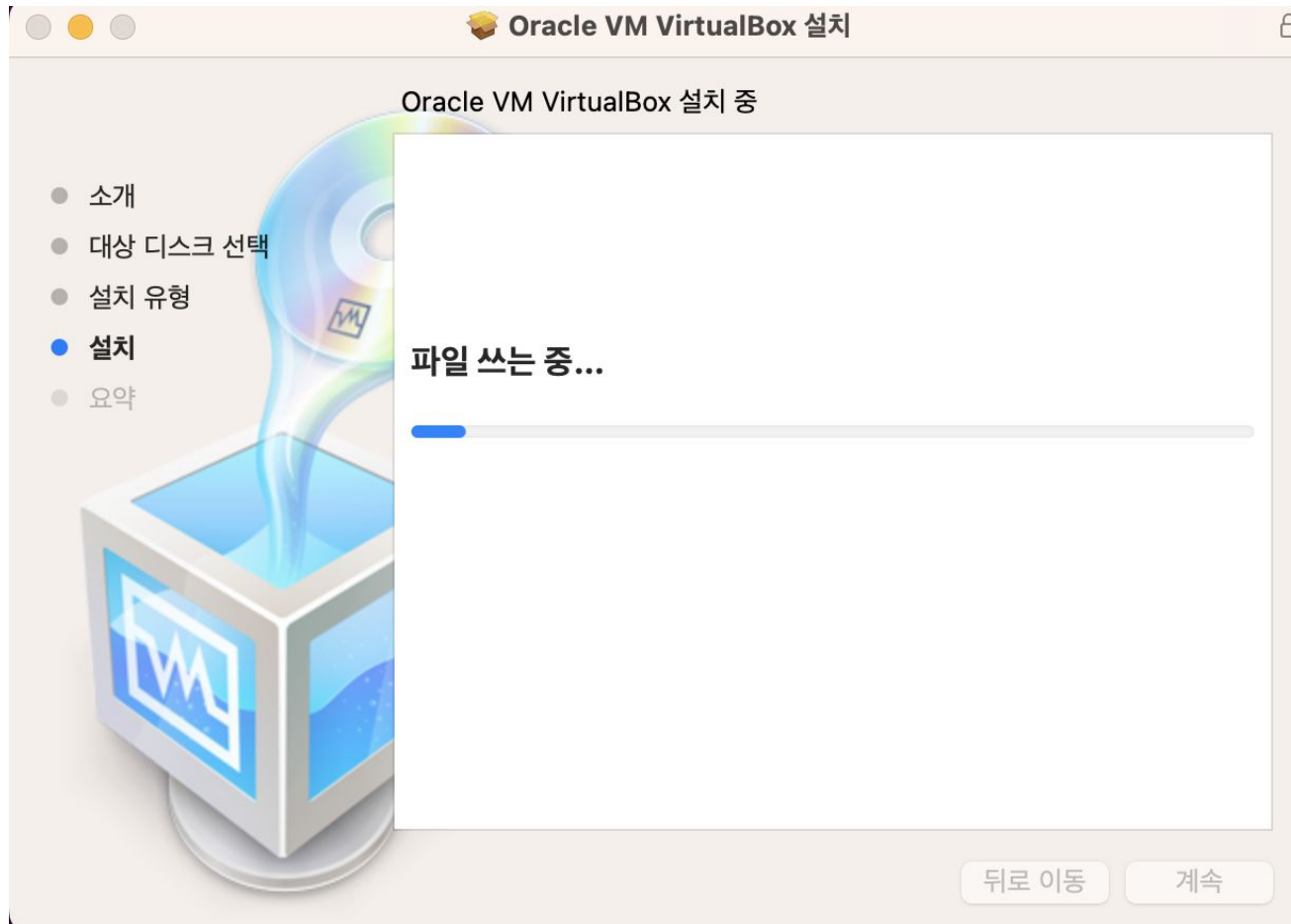
Install VirtualBox in Mac / Intel host

- Press 'Install' button



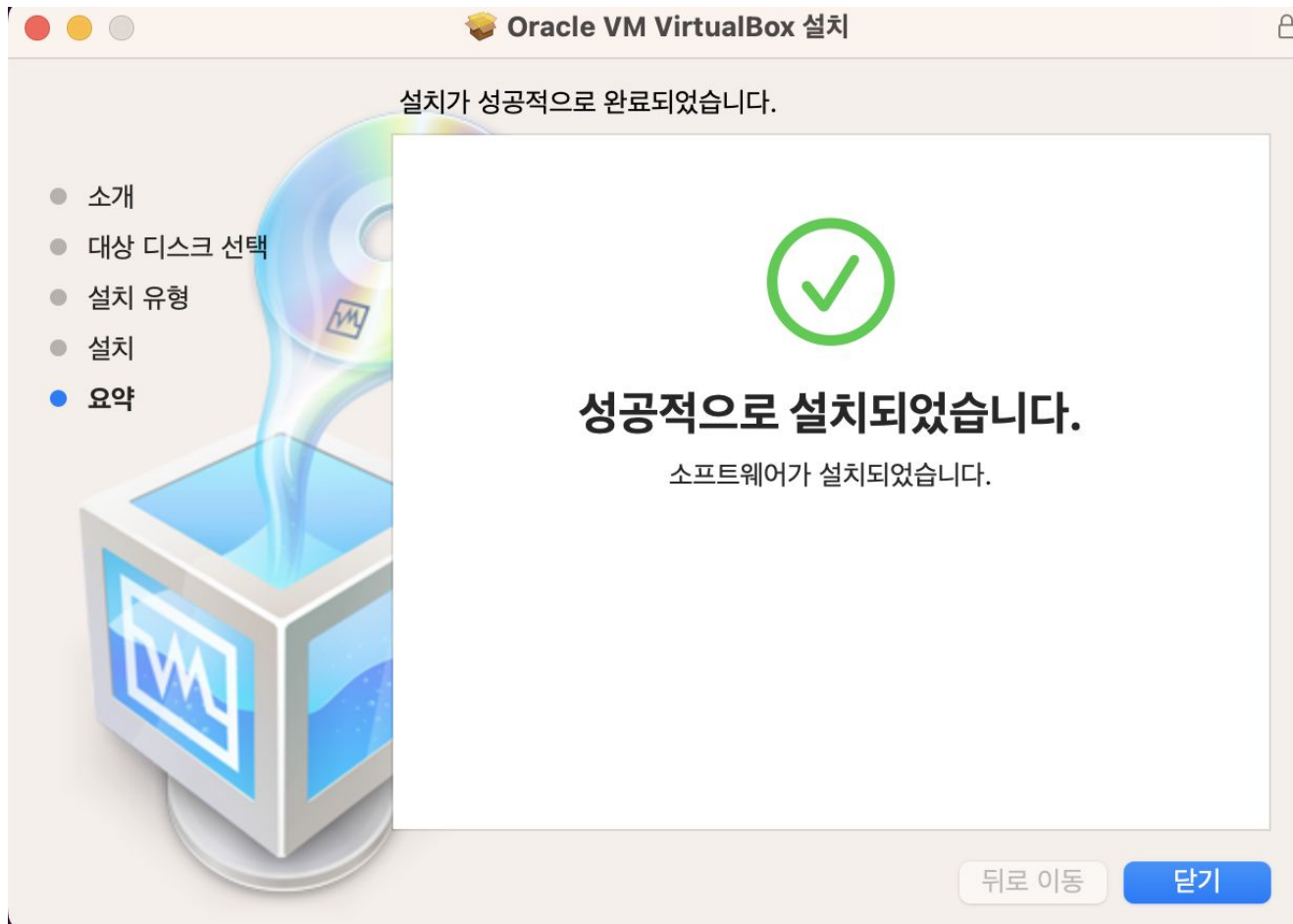
Install VirtualBox in Mac / Intel host

■ Wait a moment



Install VirtualBox in Mac / Intel host

■ Done !



Install VirtualBox in Linux

■ 1. Add repository

```
$ wget -q https://www.virtualbox.org/download/oracle_vbox_2016.asc -O- | sudo apt-key add -  
$ wget -q https://www.virtualbox.org/download/oracle_vbox.asc -O- | sudo apt-key add -  
$ sudo apt install software-properties-common  
$ echo "deb [arch=amd64] https://download.virtualbox.org/virtualbox/debian $(lsb_release -sc)  
contrib" | sudo tee /etc/apt/sources.list.d/virtualbox.list
```

■ 2. apt-get install

```
$ sudo apt-get install virtualbox-7.0
```

■ 3. execute

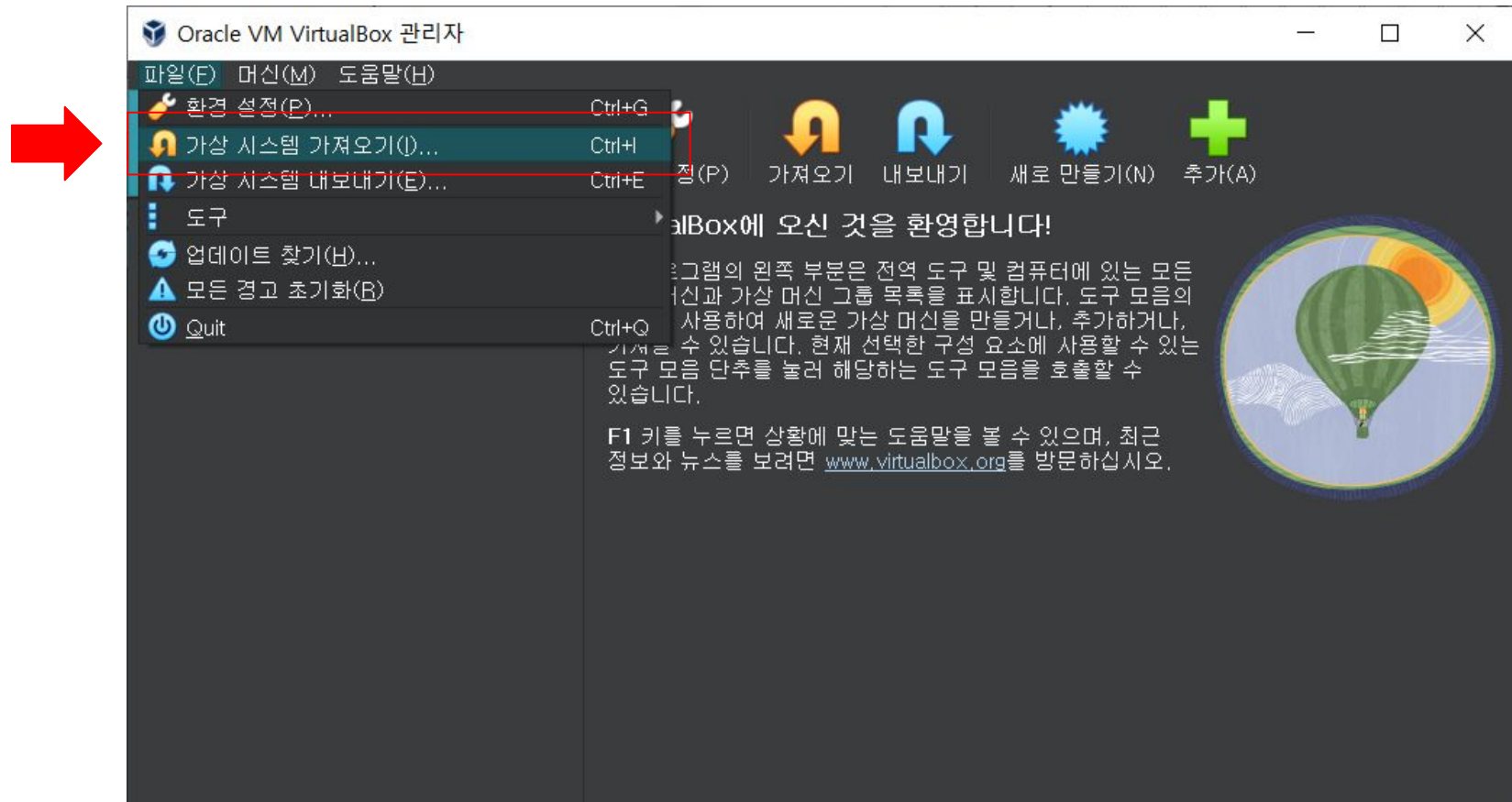
```
$ virtualbox
```

Import Virtual Machine

- Download OVA file from
<https://drive.google.com/file/d/1a1CTfbbebIOAFyXwykXw3OZtrGs8b-Gjr/view?usp=sharing>

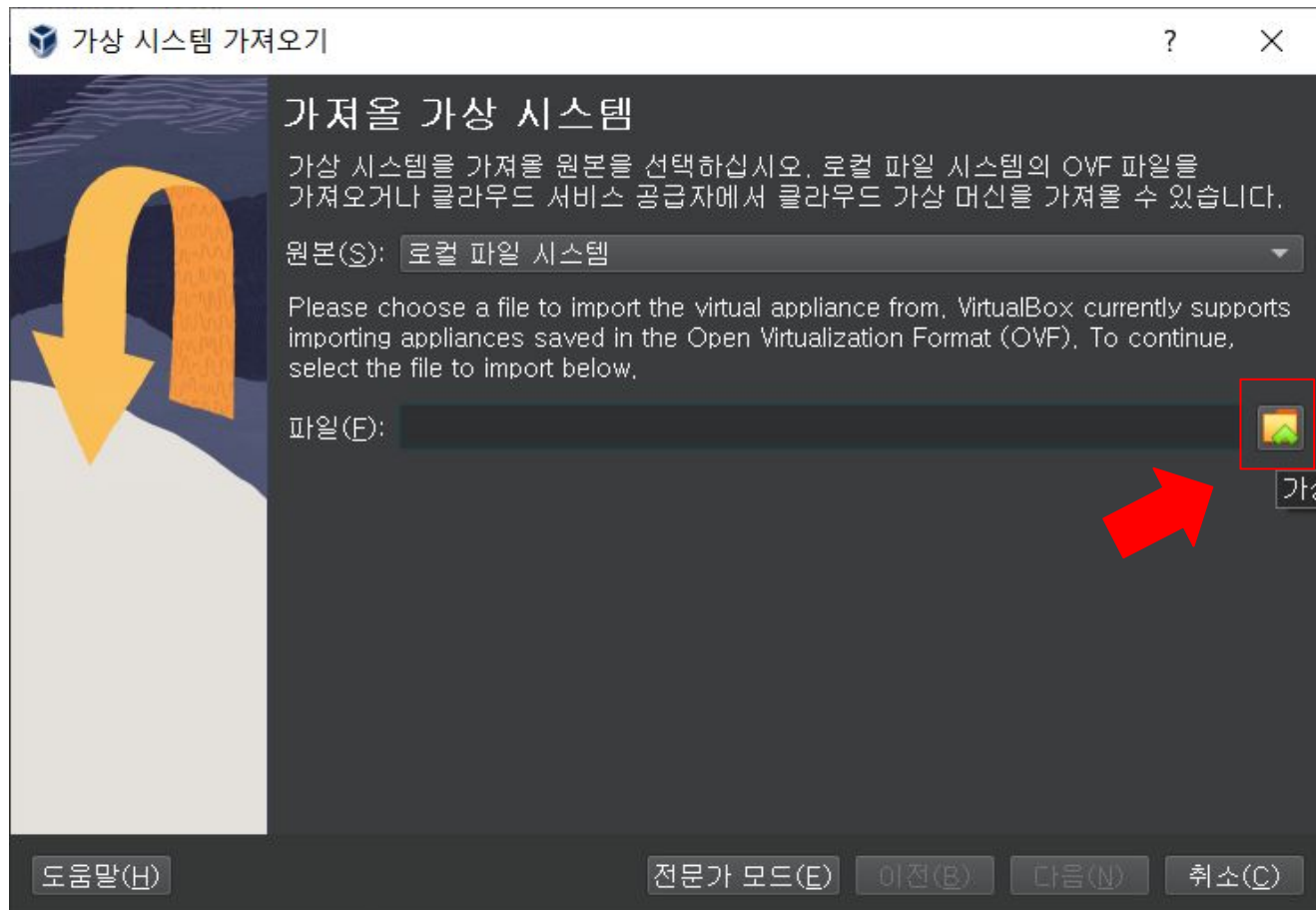
Import Virtual Machine

- Press 'Import' button



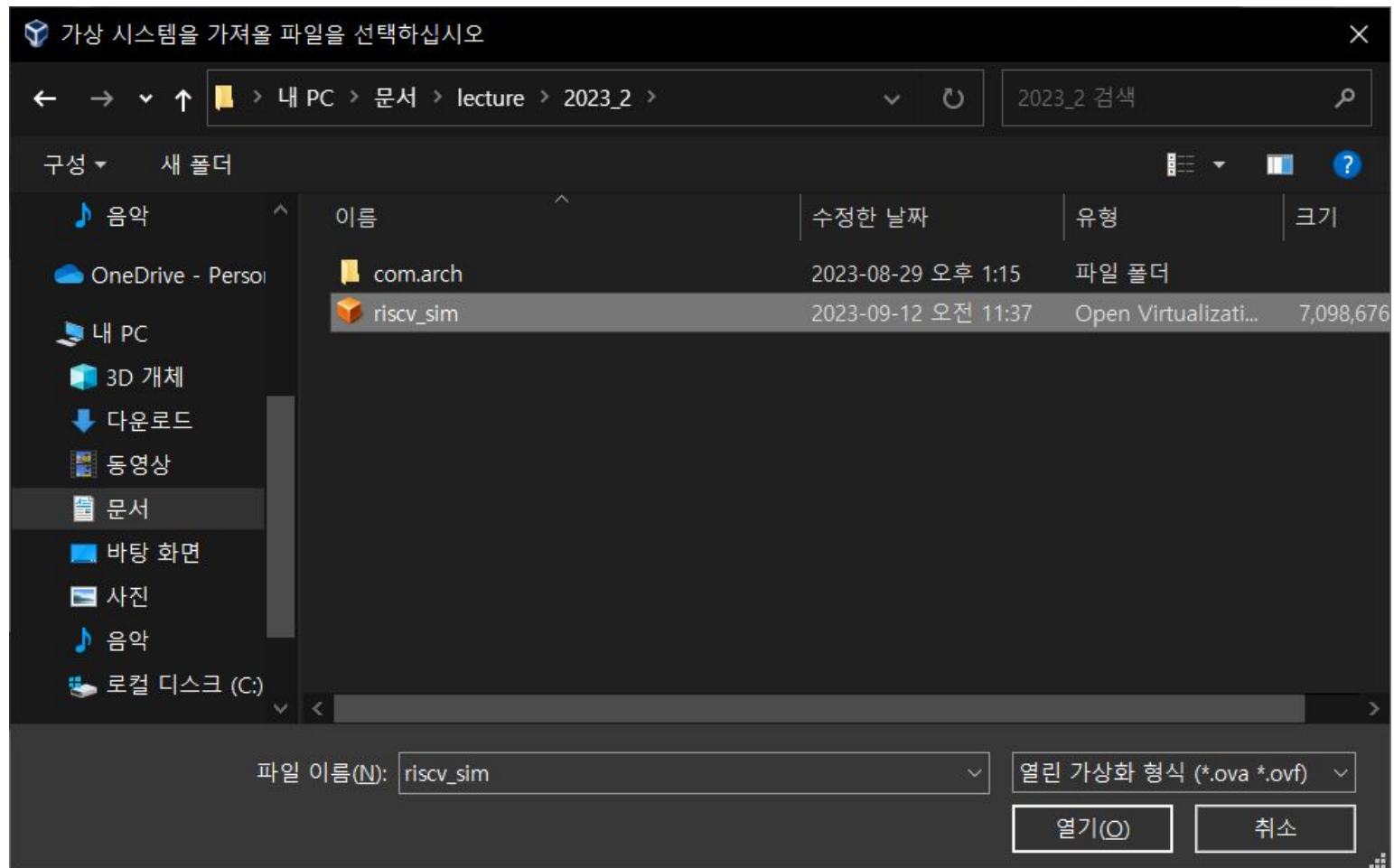
Import Virtual Machine

- Press button to find OVA file.



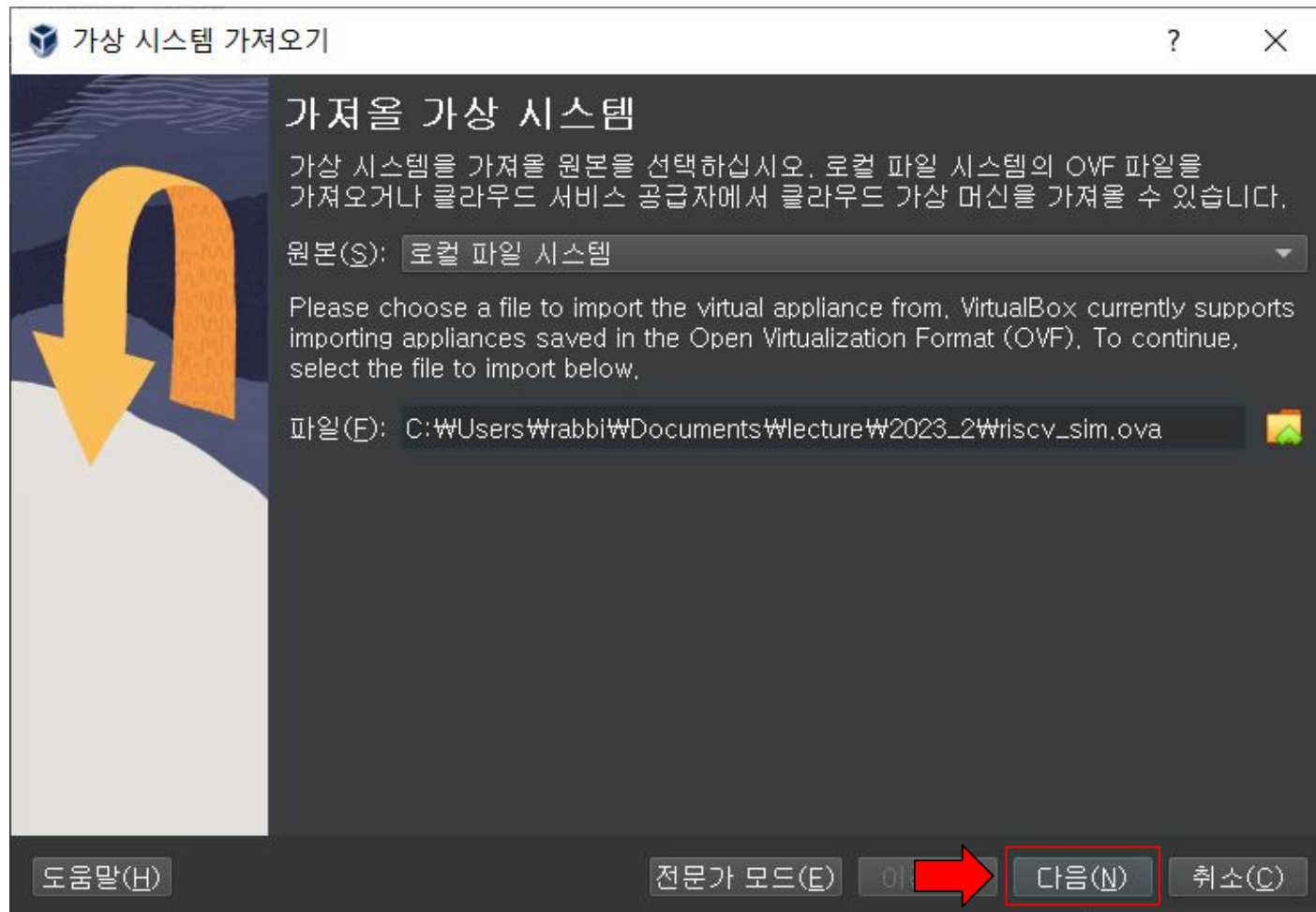
Import Virtual Machine

■ Locate downloaded ova file for import



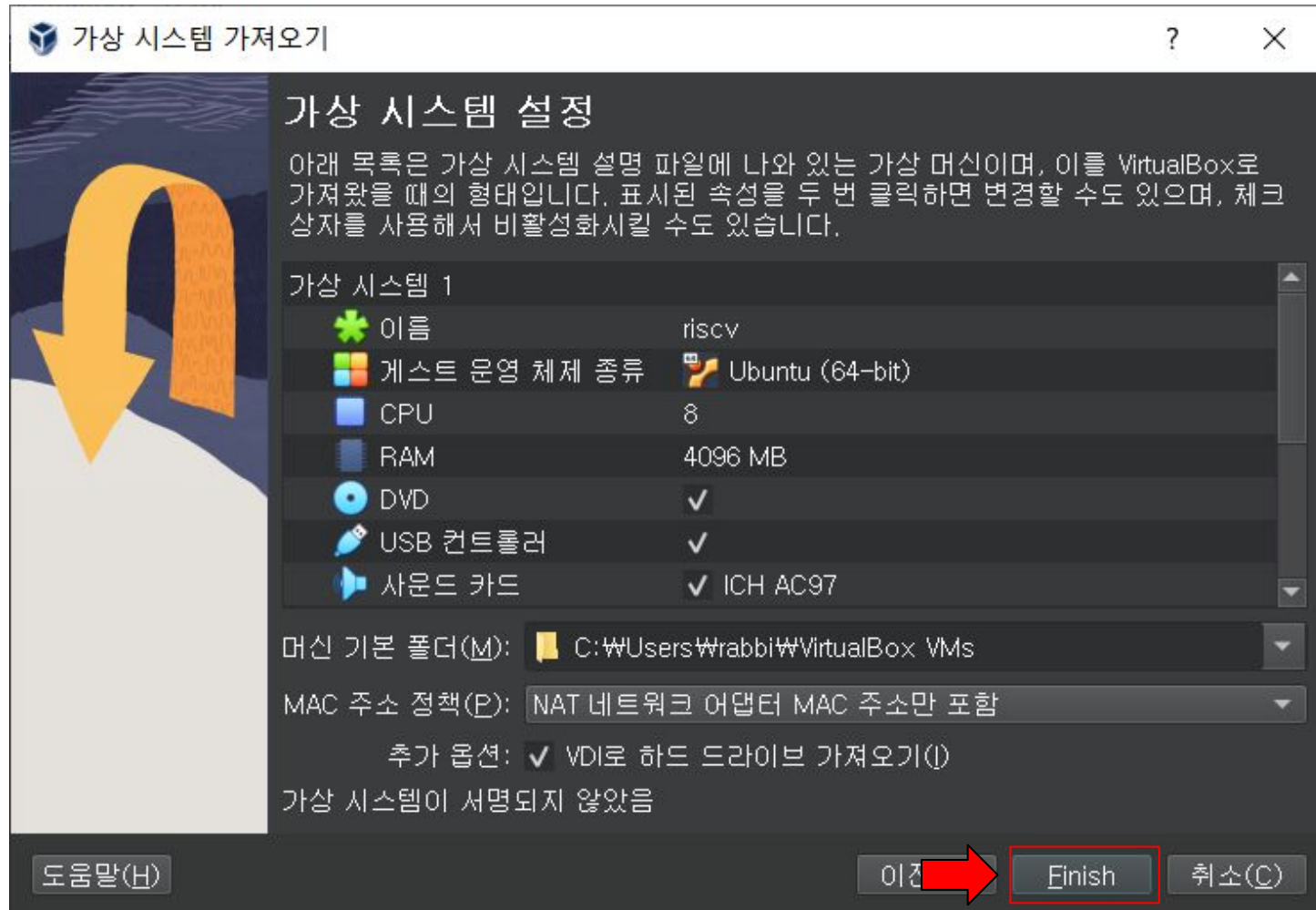
Import Virtual Machine

■ Press 'Next' button



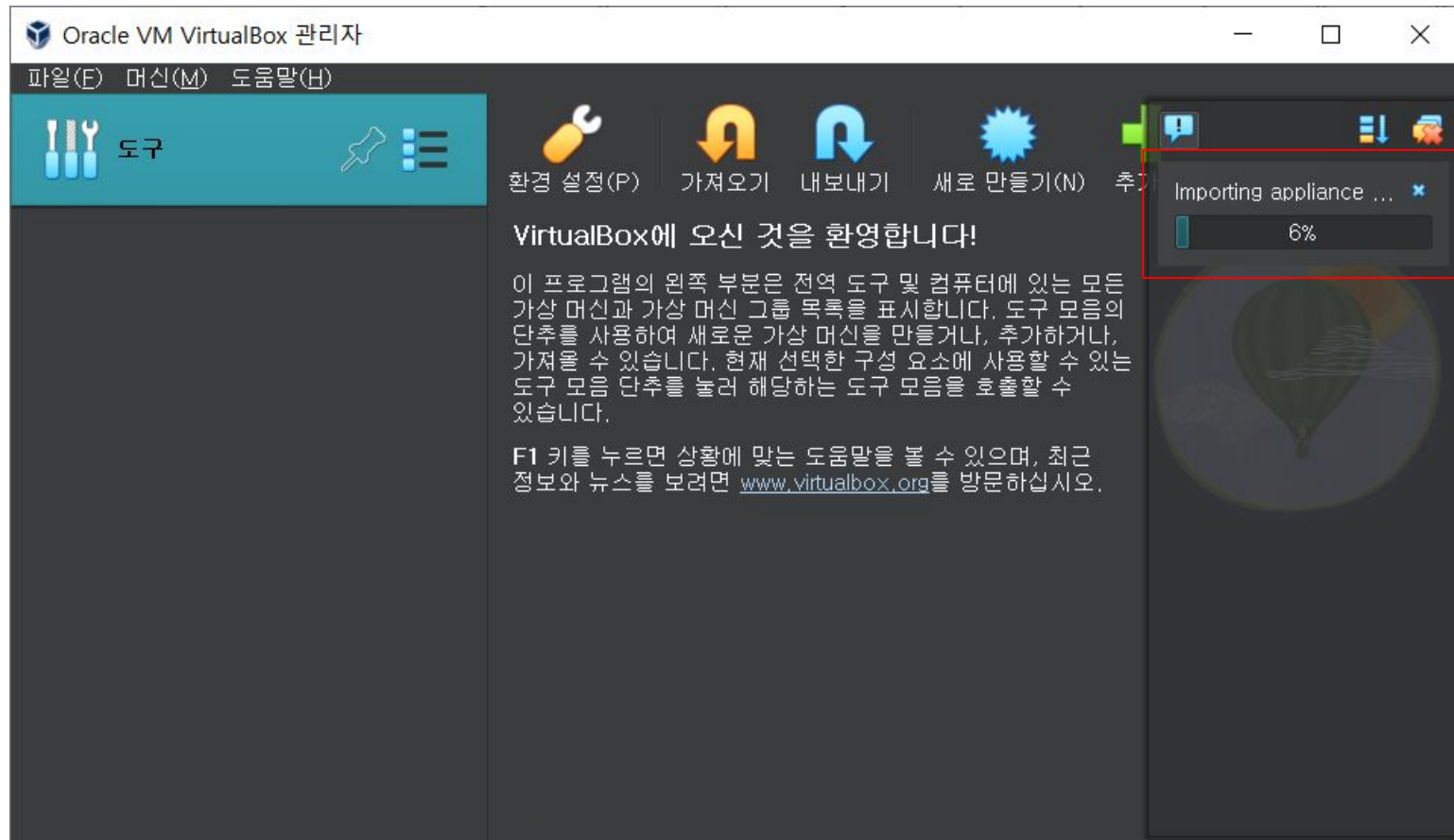
Import Virtual Machine

■ Press Finish Button



Import Virtual Machine

■ wait for importing



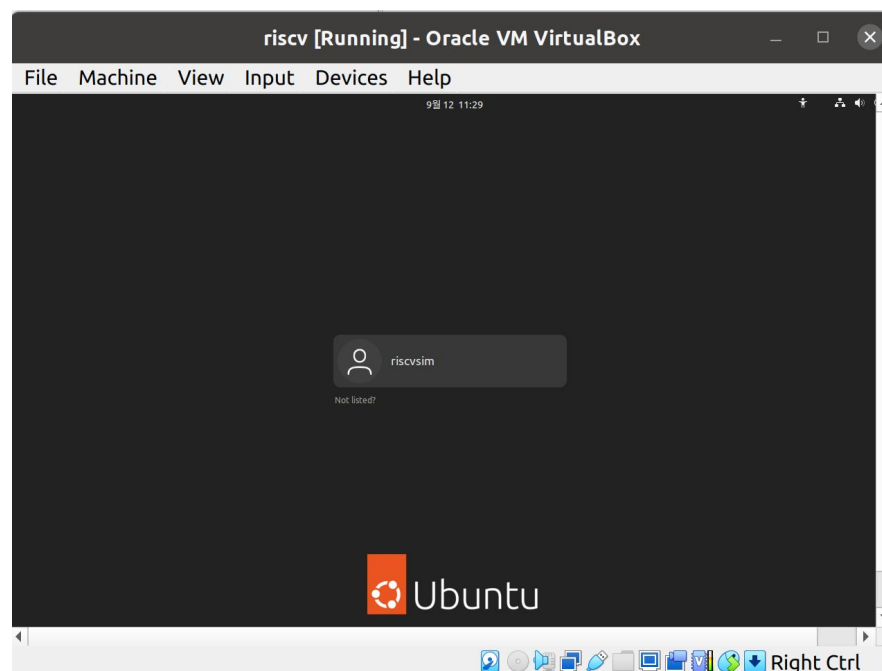
Import Virtual Machine

- Done ! Press 'Start' button to start VM



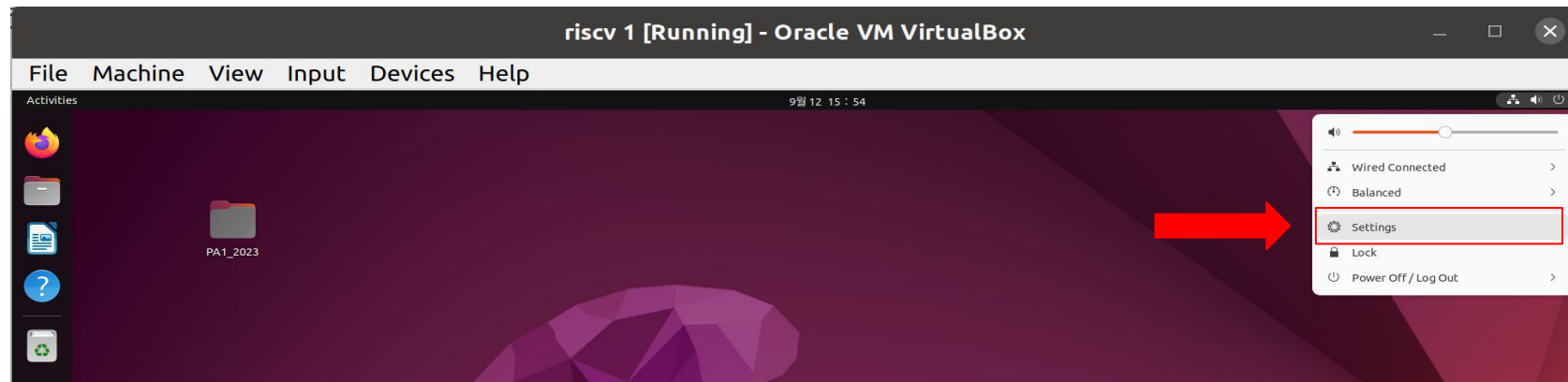
Import Virtual Machine

- id : riscvsim / pw : **1234**
- VM OS is ubuntu 22.04

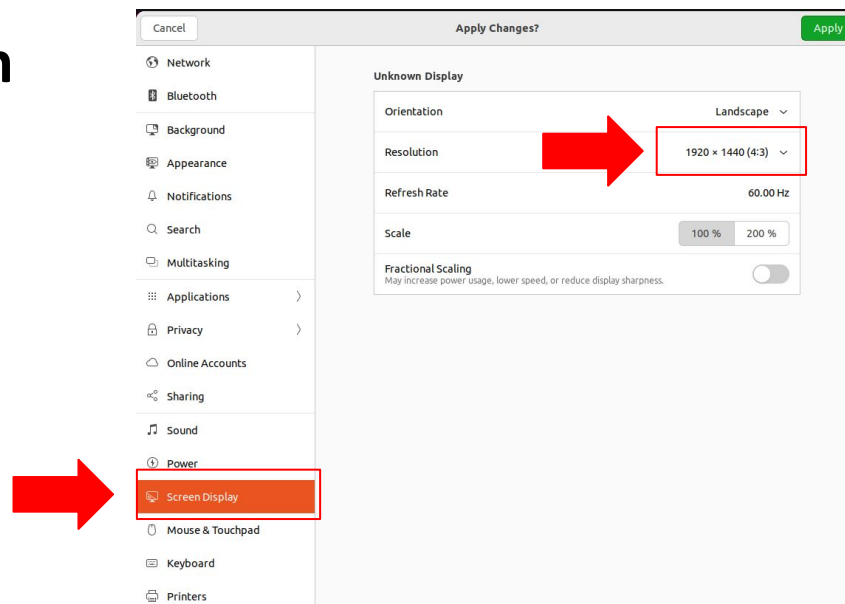


Troubleshooting on resolution

- 1. press power button and go to setting



- 2. set resolution



Experimental setup

■ Option 2: Use your own Linux box

- Ubuntu/Debian distributions are assumed.
- Takes ~3 hours, needs ~30GB (for download git and build)
- Before get started, add these two lines on your ~/.bashrc
 - You can use a different RISC-V installation path if you want.
 - `export RISC_V='/opt/riscv'`
 - `PATH="$PATH:$RISC_V/bin"`
- Apply bashrc to terminal with
 - `source ~/.bashrc`
- Make your directory.
 - `sudo mkdir $RISC_V`
 - `sudo chown -R [your_username] $RISC_V`

```
# sources /etc/bash.bashrc).  
#if [ -f /etc/bash_completion  
#    . /etc/bash_completion  
#fi  
  
export RISC_V='/opt/riscv'  
PATH=$PATH:$RISC_V/bin
```

Experimental setup

■ Option 2: Use your own Linux box

- Download files from
- <https://drive.google.com/file/d/1IGsdbDIlnaInFaK0oQDt8iiedYJwt3zY/view?usp=sharing>
- Before get started, check the number of CPU cores of your PC with `lscpu` command.
- `NUM_THREADS=24 ./build.sh` to setup environment.
 - Default number of threads is 8 if not specified.
- This script will automatically download and setup your environment.
 - It will ask for your password during installation.

```
root@fed5319f0937:/# lscpu
Architecture:          x86_
CPU op-mode(s):        32-
Address sizes:          46
Byte Order:             Lit
CPU(s):                 24
```

```
root@fed5319f0937:/# NUM_THREADS=24 ./build.sh
```

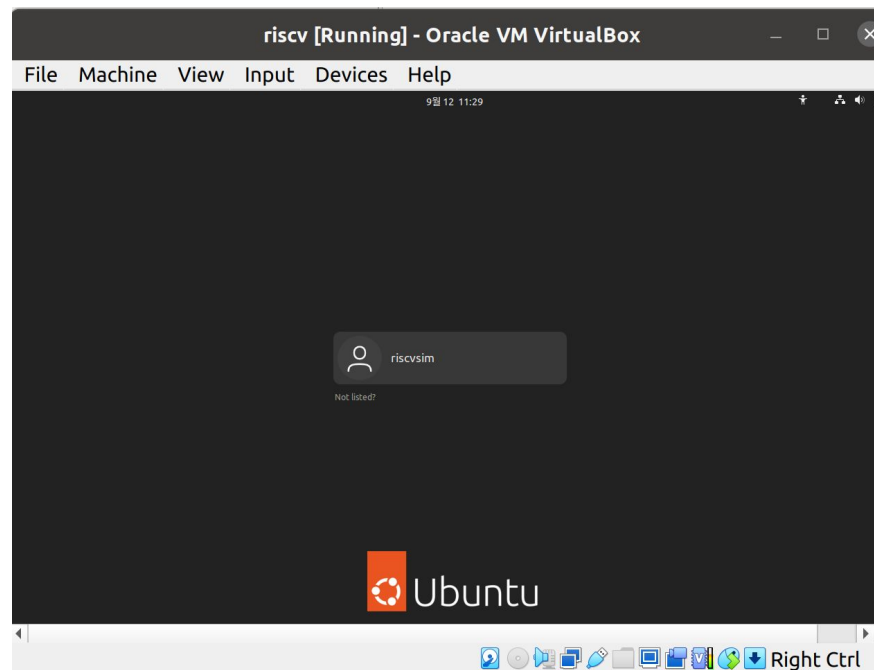


Option 3 - Docker (hidden)

- **Someone who really wants to work on Docker or has problem to working on Option 1,2
Please contact TA for using Docker**

How to work in Linux

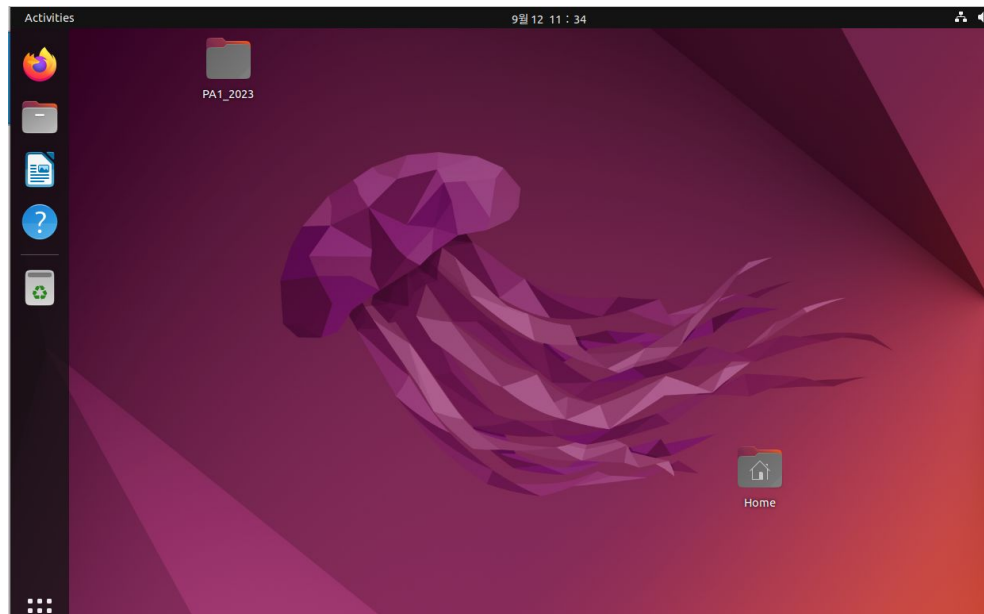
- id : riscvsim / pw : **1234**
- VM OS is ubuntu 22.04



How to work in Linux

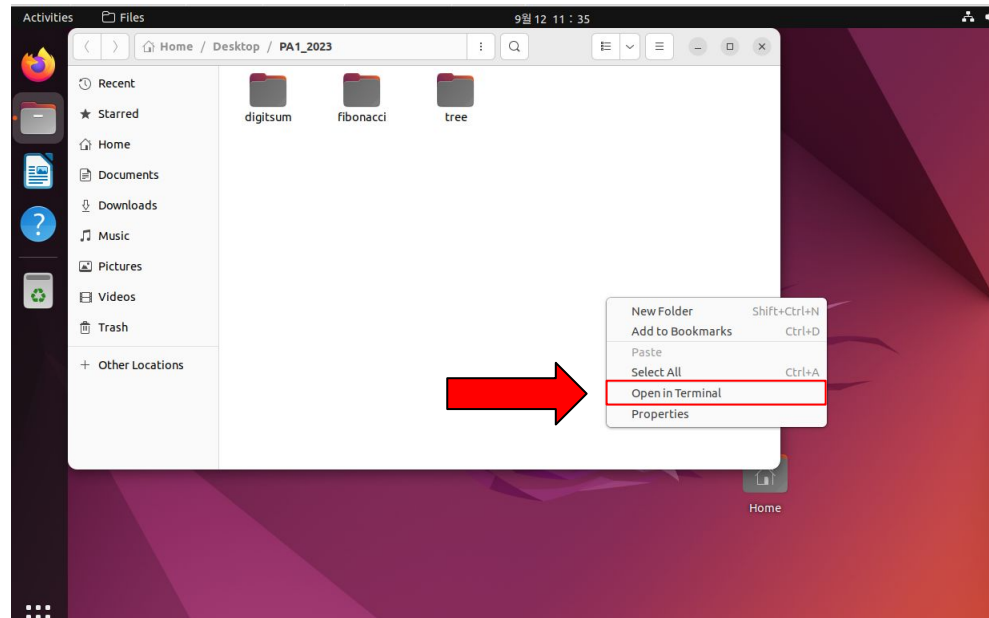
- There is 'PA1_2023' directory on desktop
- Or you can download it from

https://drive.google.com/file/d/1IGsdbDlsnaInFaK0oQDt8iiedYJwt3zY/view?usp=drive_link



How to work in Linux

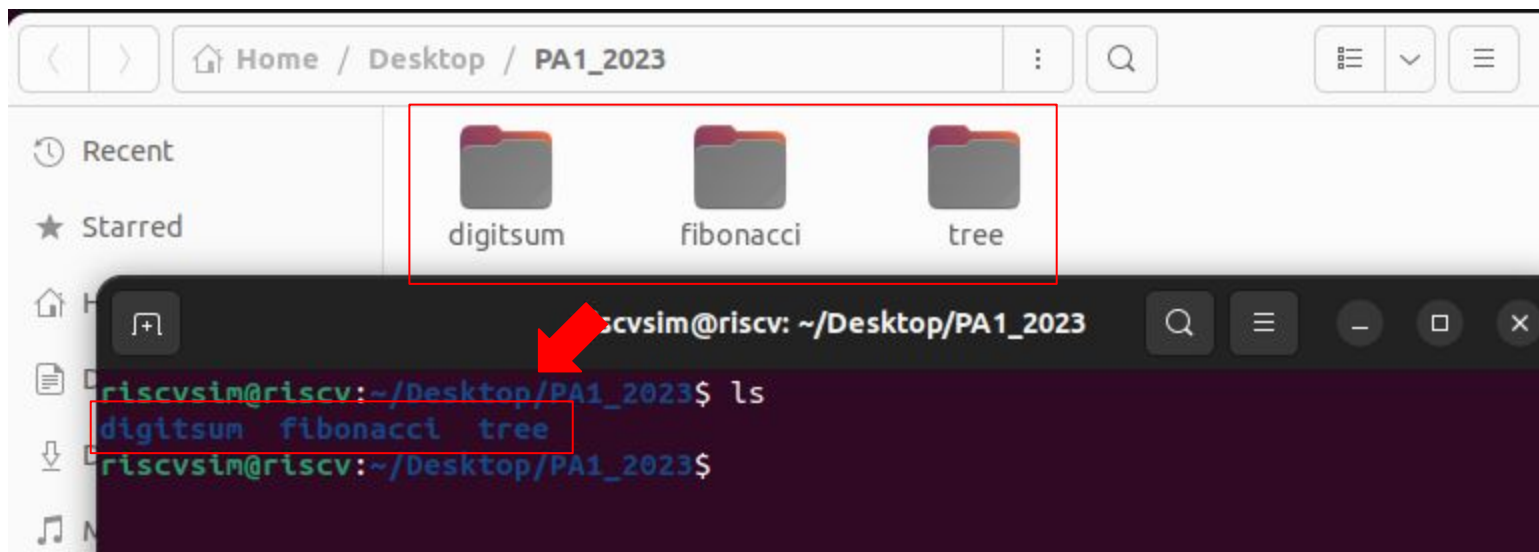
- Inside the directory, there is 3 problems you will solve
- press right-click button inside of the directory
- click 'Open in Terminal' button.



How to work in Linux

■ some useful commands

- ls : show list contents in the directory



- pwd : print current path

```
riscvsim@riscv:~/Desktop/PA1_2023$ pwd
/home/riscvsim/Desktop/PA1_2023
```

How to work in Linux

■ some useful commands

- `cd` : change directory
- directory named `..` means parent directory
- tip : Using the Tab key to autocomplete commands
 - for example, type `cd d` in terminal and press tab to complete cd command to `cd digitsum/`

```
riscvsim@riscv:~/Desktop/PA1_2023$ cd digitsum/  
riscvsim@riscv:~/Desktop/PA1_2023/digitsum$ pwd  
/home/riscvsim/Desktop/PA1_2023/digitsum  
riscvsim@riscv:~/Desktop/PA1_2023/digitsum$ cd ..  
riscvsim@riscv:~/Desktop/PA1_2023$ pwd  
/home/riscvsim/Desktop/PA1_2023
```

How to work in Linux

■ some useful commands

- make : compile sources using “Makefile” in current directory
- some files are created after using make

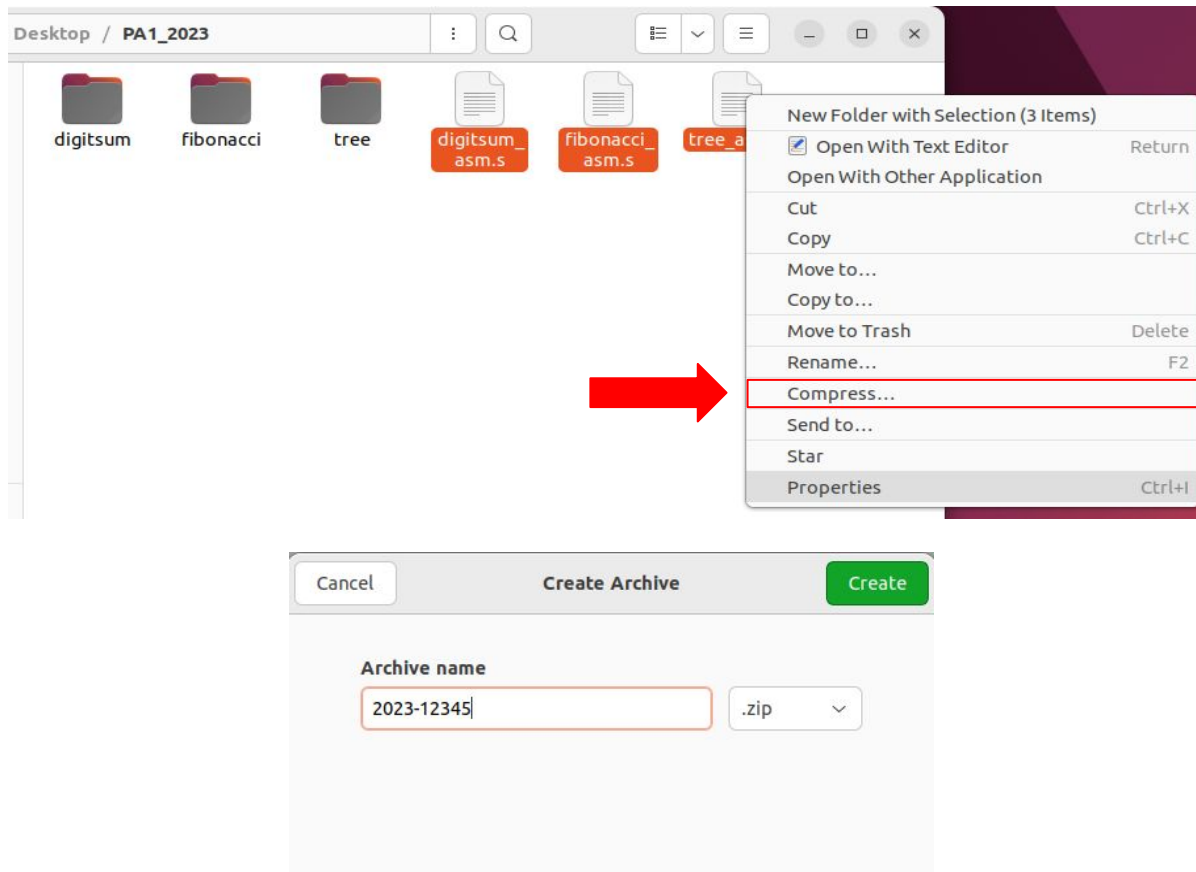
```
riscvsim@riscv:~/Desktop/PA1_2023/digitsum$ ls
digitsum_asm.s digitsum.c digitsum.h main.c Makefile run.sh
riscvsim@riscv:~/Desktop/PA1_2023/digitsum$ make
riscv32-unknown-elf-gcc -Wall -Werror -std=c99 -c main.c -o main.o
riscv32-unknown-elf-gcc -c digitsum_asm.s -o digitsum_asm.o
riscv32-unknown-elf-gcc main.o digitsum_asm.o -o digitsum
riscvsim@riscv:~/Desktop/PA1_2023/digitsum$ ls
digitsum digitsum_asm.s digitsum.h main.o run.sh
digitsum_asm.o digitsum.c main.c Makefile
```

- make clean : remove files that are created by make

```
riscvsim@riscv:~/Desktop/PA1_2023/digitsum$ make clean
rm -f main.o digitsum_asm.o digitsum
riscvsim@riscv:~/Desktop/PA1_2023/digitsum$ ls
digitsum_asm.s digitsum.c digitsum.h main.c Makefile run.sh
```

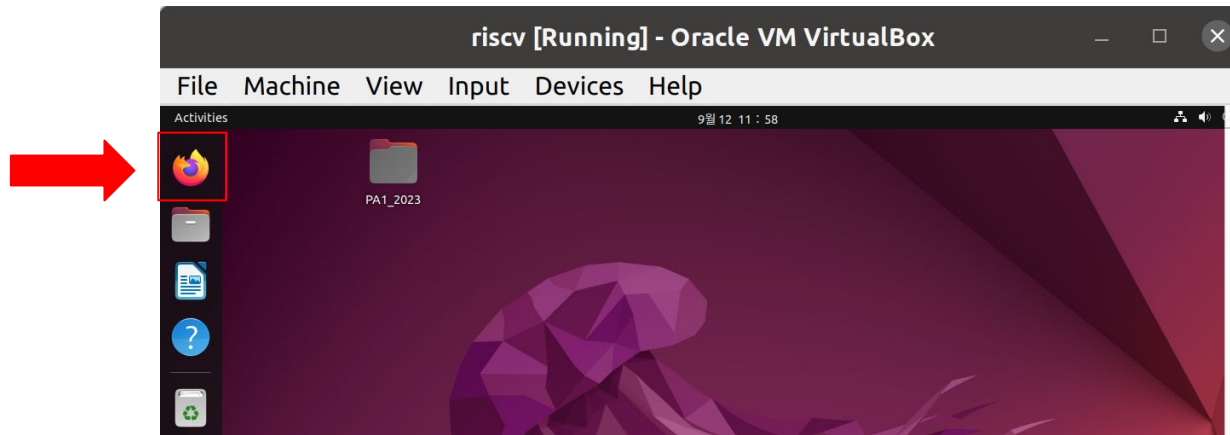
How to work in Linux

- You can compress files for submission
 - Drag files to group and right-click to compress



How to work in Linux

- You can use Firefox for using internet



- You can email yourself, or submit zip to etl directly