

# AI On Chip 2023

## Environment Lab

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# Outline



- **Environment Setup**
- **Change your passwd**
- **Introduction to Linux commands**
- **How to run Verilog code?**
- **如何看波形**

# Outline



- **Environment Setup**
- Change your passwd
- Introduction to Linux commands
- How to run Verilog code?
- 如何看波形

# Environment Setup

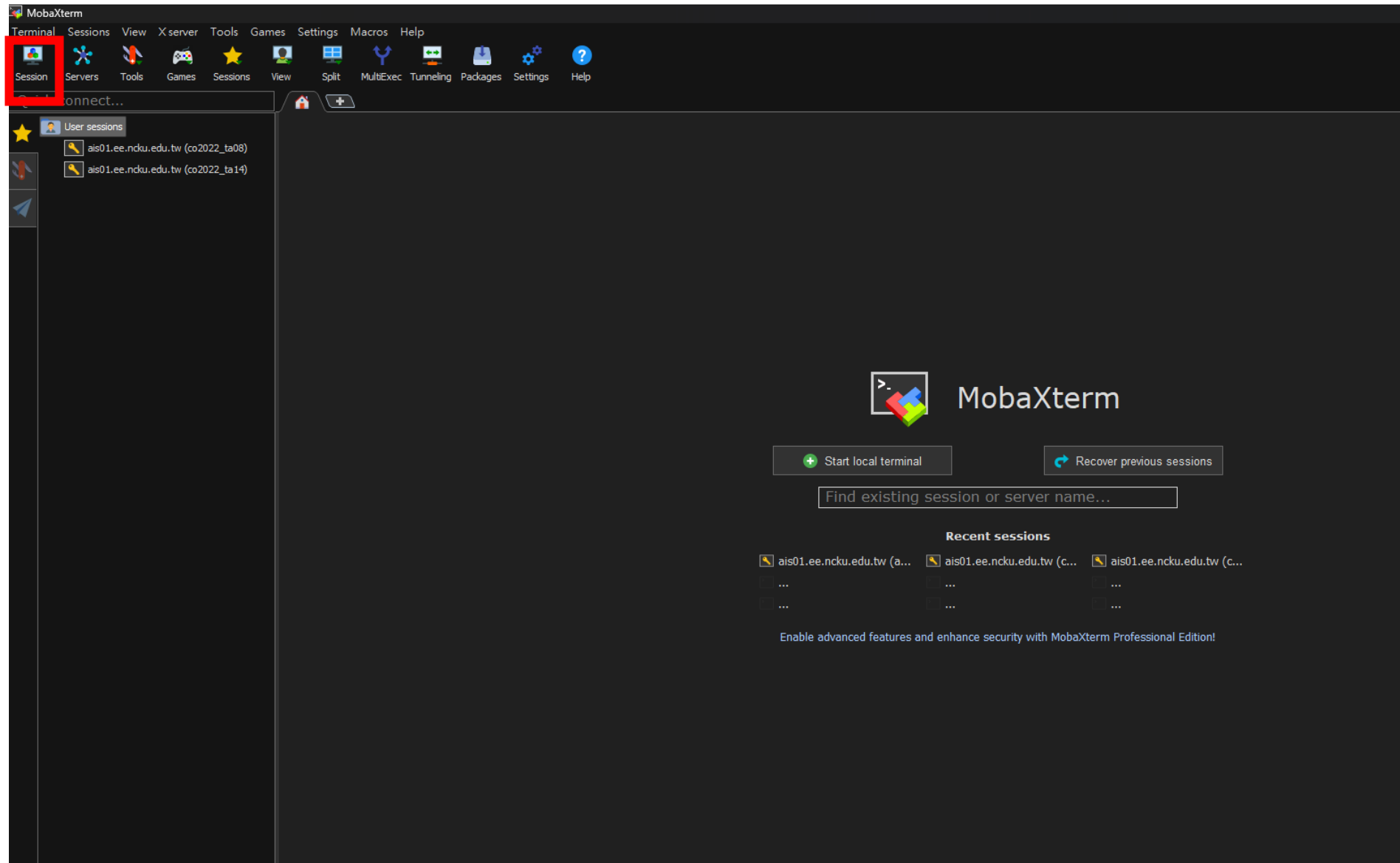


- Introduction to MobaXterm
  - **MobaXterm** is a free software for remote computing.
  - It provides a **graphical user interface** and **command line shell** for the server
- Download
  - [MobaXterm download](#)



A screenshot of the MobaXterm website. The page has a navigation bar at the top with links for Home, Demo, Features, Download, Plugins, Help, and Contact. There are also social media icons and buttons for 'Customer area' and 'Buy'. The main content area is divided into two columns. The left column is for the 'Home Edition', which is 'Free' and lists features like Full X server and SSH support, Remote desktop (RDP, VNC, Xdmcp), Remote terminal (SSH, telnet, rlogin, Mosh), X11-Forwarding, Automatic SFTP browser, Master password protection, Plugins support, Portable and installer versions, Full documentation, Max. 12 sessions, Max. 2 SSH tunnels, Max. 4 macros, and Max. 360 seconds for Tftp, Nfs and Cron. A 'Download now' button is at the bottom. The right column is for the 'Professional Edition', priced at '\$69 / 49€ per user\*'. It lists additional features like Customizable startup message and logo, Modify your profile script, Remove unwanted games, screensaver or tools, Unlimited number of sessions, Unlimited number of tunnels and macros, Unlimited run time for network daemons, Enhanced security settings, 12-months updates included, Deployment inside company, and Lifetime right to use. A 'Subscribe online / Get a quote' button is at the bottom.

# Environment Setup



# Environment Setup



Session settings

SSH Telnet Rsh Xdmcp RDP VNC FTP SFTP Serial File Shell Browser Mosh Aws S3 WSL

1 2 輸入個人帳號(excel 檔)

Basic SSH settings

Remote host: ais01.ee.ncku.edu.tw

Specify username: aoc\_074

Port: 22

Advanced SSH settings

Terminal settings Network settings Bookmark settings

3 打勾

☒ X11-Forwarding ☒ Compression Remote environment: Interactive shell

Execute command:

SSH-browser type: SFTP protocol

☐ Use private key

☐ Do not exit after command ends

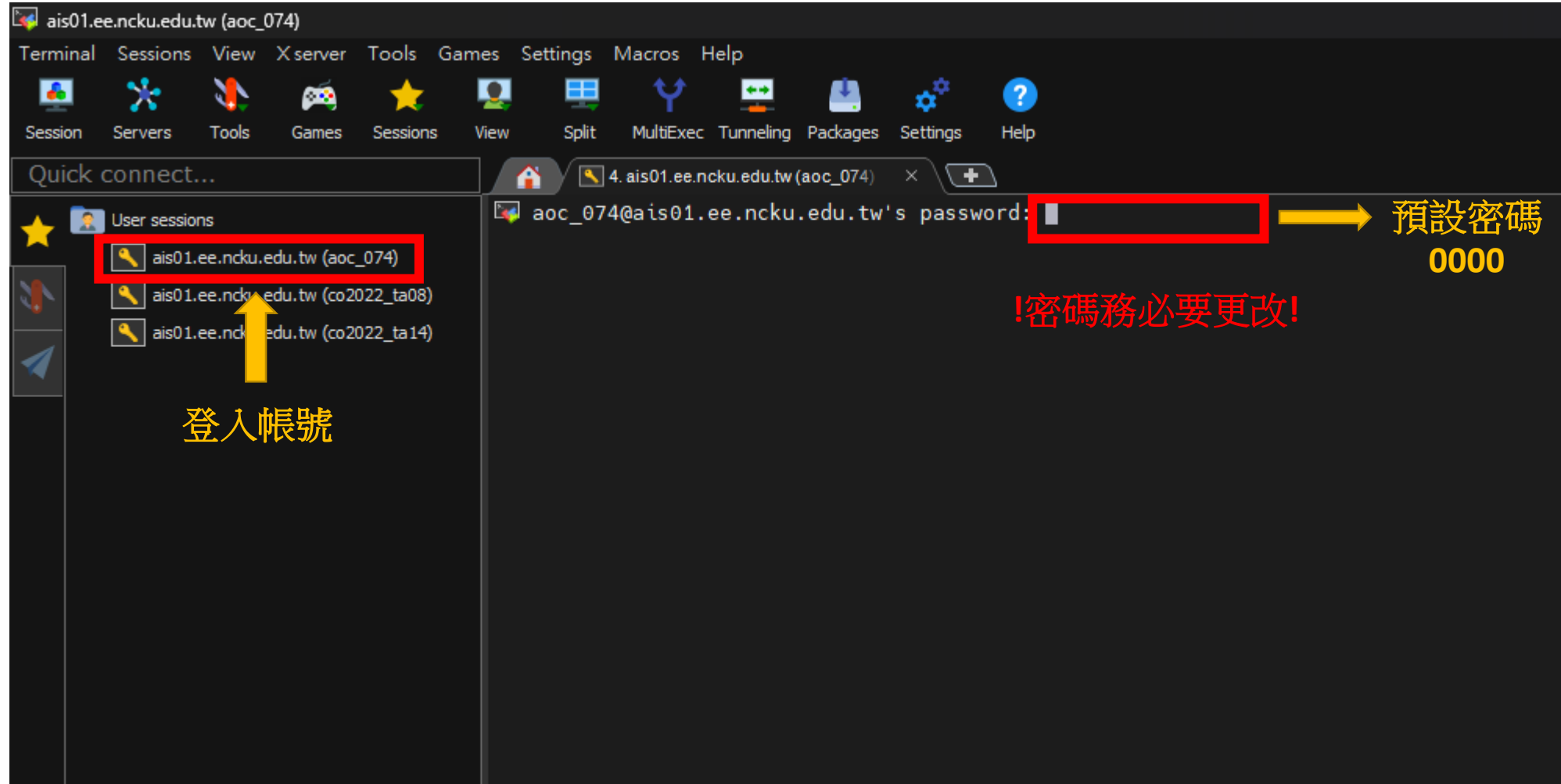
☐ Follow SSH path (experimental)

☐ Adapt locales on remote server

Execute macro at session start: <none>

OK Cancel

# Environment Setup



# Outline



- Environment Setup
- **Change your passwd**
- Introduction to Linux commands
- How to run Verilog code?
- 如何看波形



# Change your passwd (重要)



- 第一次登入密碼: 0000

- 登入結果，如右圖

The screenshot shows the MobaXterm interface. On the left, a file explorer displays the directory structure of the user's home directory. The main terminal window shows the output of an SSH session to ais01.ee.ncku.edu.tw. The terminal text includes the MobaXterm version, SSH session details, Ubuntu 20.04.3 LTS welcome message, and available updates.

```
ais01.ee.ncku.edu.tw (aoc_074)
Terminal Sessions View Xserver Tools Games Settings Macros Help
Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help

Quick connect...
/home/AOC2023/aoc2023_074/
Name Size (KB)
..
.cache
.config
.local
.bash_logout 1
.bashrc 3
.kshrc 2
.profile 1
.Xauthority 1

MobaXterm Personal Edition v22.1
(SSH client, X server and network tools)

SSH session to aoc_074@ais01.ee.ncku.edu.tw
• Direct SSH : ✓
• SSH compression : ✓
• SSH-browser : ✓
• X11-forwarding : ✓ (remote display is forwarded through SSH)

For more info, ctrl+click on help or visit our website.

Welcome to Ubuntu 20.04.3 LTS (GNU/Linux 5.13.0-40-generic x86_64)

* Documentation: https://help.ubuntu.com
* Management: https://landscape.canonical.com
* Support: https://ubuntu.com/advantage

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166 updates can be applied immediately.
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The list of available updates is more than a week old.
To check for new updates run: sudo apt update
Your Hardware Enablement Stack (HWE) is supported until April 2025.
Last login: Fri Mar 17 15:45:02 2023 from 140.116.178.177
set XCELIUM version: XCELIUM_22.03.003 (default)
set verdi version: 2019.06/ (default)
user:~>
```

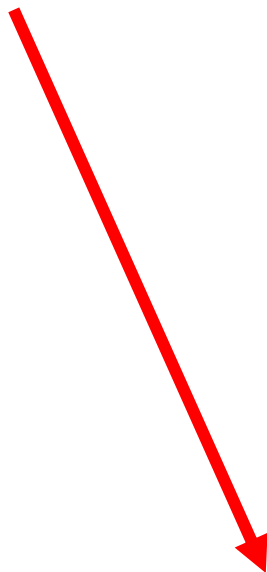
# Change your passwd (重要)



- 修改方式:

輸入指令

passwd



```
6. ais01.ee.ncku.edu.tw (aoc_074) x +
• MobaXterm Personal Edition v22.1 •
  (SSH client, X server and network tools)
▶ SSH session to aoc_074@ais01.ee.ncku.edu.tw
  • Direct SSH : ✓
  • SSH compression : ✓
  • SSH-browser : ✓
  • X11-forwarding : ✓ (remote display is forwarded through SSH)
▶ For more info, ctrl+click on help or visit our website.

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Last login: Fri Mar 17 15:45:02 2023 from 140.116.178.177
set XCELIUM version: XCELIUM 22.03.003 (default)
set verdi version: 2019.06/ (default)
user:~> passwd
```

# Change your passwd (重要)



- 修改方式:

Current password 0000

A screenshot of a terminal window titled "6. ais01.ee.ncku.edu.tw (aoc\_074)". The terminal shows the output of an SSH session. It displays the MobaXterm version (v22.1) and lists SSH session details: Direct SSH, SSH compression, SSH-browser, and X11-forwarding, all marked as successful. Below this, it shows the Ubuntu 20.04.3 LTS welcome message, documentation links, and update information. The terminal then prompts for a password change. The current password is entered as "0000", which is highlighted by a red box and a red arrow pointing from the text "Current password 0000" on the left. The terminal shows "Changing password for aoc 074." and "Current password: " followed by the input "0000".

```
• MobaXterm Personal Edition v22.1 •
  (SSH client, X server and network tools)

> SSH session to aoc_074@ais01.ee.ncku.edu.tw
  • Direct SSH : ✓
  • SSH compression : ✓
  • SSH-browser : ✓
  • X11-forwarding : ✓ (remote display is forwarded through SSH)

> For more info, ctrl+click on help or visit our website.

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Last login: Fri Mar 17 15:45:02 2023 from 140.116.178.177
set XCELIUM version: XCELIUM_22.03.003 (default)
set verdi version: 2019.06/ (default)
user:~> passwd
Changing password for aoc 074.
Current password: 0000
```

# Outline



- Environment Setup
- Change your passwd
- **Introduction to Linux commands(有需要再回來用就好)**
- How to run Verilog code?
- 如何看波形

# Linux commands



- **pwd (Print Working Directory) :**

```
user:~> pwd  
/home/A0C2023/aoc2023_074
```

Display the full pathname of the current working directory.

- **ls (List) :**

```
user:~> ls  
test1.txt  test2.txt  test_dir1
```

List the file & directory in current working directory.

- **ls -a (List All) :**

```
user:~> ls -a  
.  .bash_history  .bashrc  .config  .local  test1.txt  test_dir1  
.. .bash_logout  .cache  .kshrc  .profile  test2.txt  .Xauthority
```

List the (all) hidden files & directories in current working directory.

# Linux commands



- **cd (Change Directory) :**

1. Change the current working directory

- **cd + Path(relative path)**
- **cd ..**
- **cd user**
- **cd + Path(absolutive path)**

```
user:/home/C02022> cd ..  
user:/home>
```

```
user:/home> ls  
C02022 user  
user:/home> cd user  
user:/home/user>
```

```
user:/usr> cd /home/C02022/  
user:/home/C02022>
```

2. Change directory to previous directory

- **cd -**

```
user:/usr> cd /home/C02022/  
user:/home/C02022> cd -  
user:/usr>
```

# Linux commands



- **mkdir (Make Directory) :**

mkdir + new\_directory\_name

(e.g. mkdir dirdir)

```
user:~> ls
test1.txt test2.txt test_dir1
user:~> mkdir dirdir
user:~> ls
dirdir test1.txt test2.txt test_dir1
```

(relative or absolute path)

- **touch (Create an empty file):**

touch + file\_name

```
user:~> ls
ddd dirdir test1.txt xyz.txt
user:~> touch abc.txt
user:~> ls
abc.txt ddd dirdir test1.txt xyz.txt
```

- **clear :**

```
2. co2022_ta14@140.116.178.181
user:~> ls
ddd dirdir test1.txt test_dir1 xyz.txt
user:~> rm -rf test_dir1/
user:~> ls
ddd dirdir test1.txt xyz.txt
user:~> touch abc.txt
user:~> ls
abc.txt ddd dirdir test1.txt xyz.txt
user:~> clear
```



```
2. co2022_ta14@140.116.178.181
user:~>
```

Clear the terminal screen

# Linux commands



- **Copy a file** (relative or absolute path)

- **cp + file + new\_file\_name**
  - cp test1.txt abc.txt

```
user:~> ls
dirdir  test1.txt  test2.txt  test_dir1
user:~> cp test1.txt abc.txt
user:~> ls
abc.txt dirdir  test1.txt  test2.txt  test_dir1
```

- **Copy a file to a directory**

- **cp + file + directory\_path**  
(relative or absolute path)
  - cp test1.txt dirdir

```
user:~> ls
abc.txt dirdir  test1.txt  test2.txt  test_dir1
user:~> cp test1.txt dirdir
user:~> cd dirdir
user:~/dirdir> ls
test1.txt
```

- **Copy a directory**

- **cp + -rf + directory\_name + new\_directory\_name**  
(relative or absolute path)
  - cp -rf dirdir ddd

```
user:~> ls
abc.txt dirdir  test1.txt  test2.txt  test_dir1
user:~> cp -rf dirdir ddd
user:~> ls
abc.txt ddd dirdir  test1.txt  test2.txt  test_dir1
user:~>
```




# Linux commands



- **tab**

Autocomplete commands, filenames or folder names.

`user:~> rm`  `r:~> touch abc.txt`

Type **tab**

- **↑ , ↓ (up and down arrow key)**

Recall previously-entered commands to the command line.

- **ctrl + c (It's not a copy function.)**

Terminate the current running process

# Outline



- Environment Setup
- Change your passwd
- Introduction to Linux commands
- **How to run Verilog code?(重要)**
- 如何看波形

# How to run verilog code?



- (必要) Step1—Create/upload folder:

AOClab0

- (必要) Step2—Change Directory :

cd AOClab0

- (非必要) Step3—List the file & directory in current working directory :

ls(檢查要執行的.v檔)

- (必要) Step4—run .v檔 :

格式: **ncverilog 檔名.v**

ncverilog Mux2\_1.v

# How to run verilog code?



- (必要) Step 5—run testbench 測試檔：

格式： `ncverilog 測試檔名.v +access+r`

`ncverilog tb_Mux2_1.v +access+r`

- (必要) Step 6—run Wave：

`nWave &`

!!!注意注意!!! 有空一格

# Step1



ais01.ee.ncku.edu.tw (aoc\_074)

Terminal Sessions View Xserver Tools Games Settings Macros Help

Session Servers Tools Games Sessions View Split MultiExec Tunneling Packages Settings Help

Quick connect...

/home/AOC2023/aoc2023\_074/

Name Size (KB)

- ..
- .cache
- .config
- .local
- .bash\_logout 1
- .bashrc 3
- .kshrc 2
- .profile 1
- .Xauthority 1

MobaXterm Personal Edition v22.1  
(SSH client, X server and network tools)

- SSH session to aoc\_074@ais01.ee.ncku.edu.tw
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To check for new updates run: `sudo apt update`  
Your Hardware Enablement Stack (HWE) is supported until Apr  
Last login: Fri Mar 17 15:47:09 2023 from 140.116.178.177  
set XCELIUM version: XCELIUM\_22.03.003 (default)  
set verdi version: 2019.06/ (default)  
user:~>

MobaXterm 2 建立資料夾

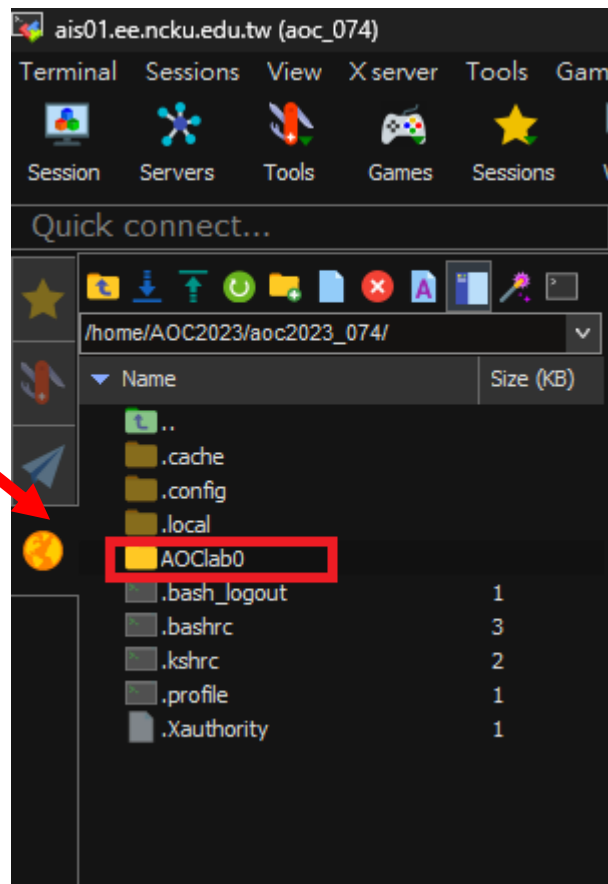
Please enter the new directory name

AOCLab0

OK Cancel

# Step1

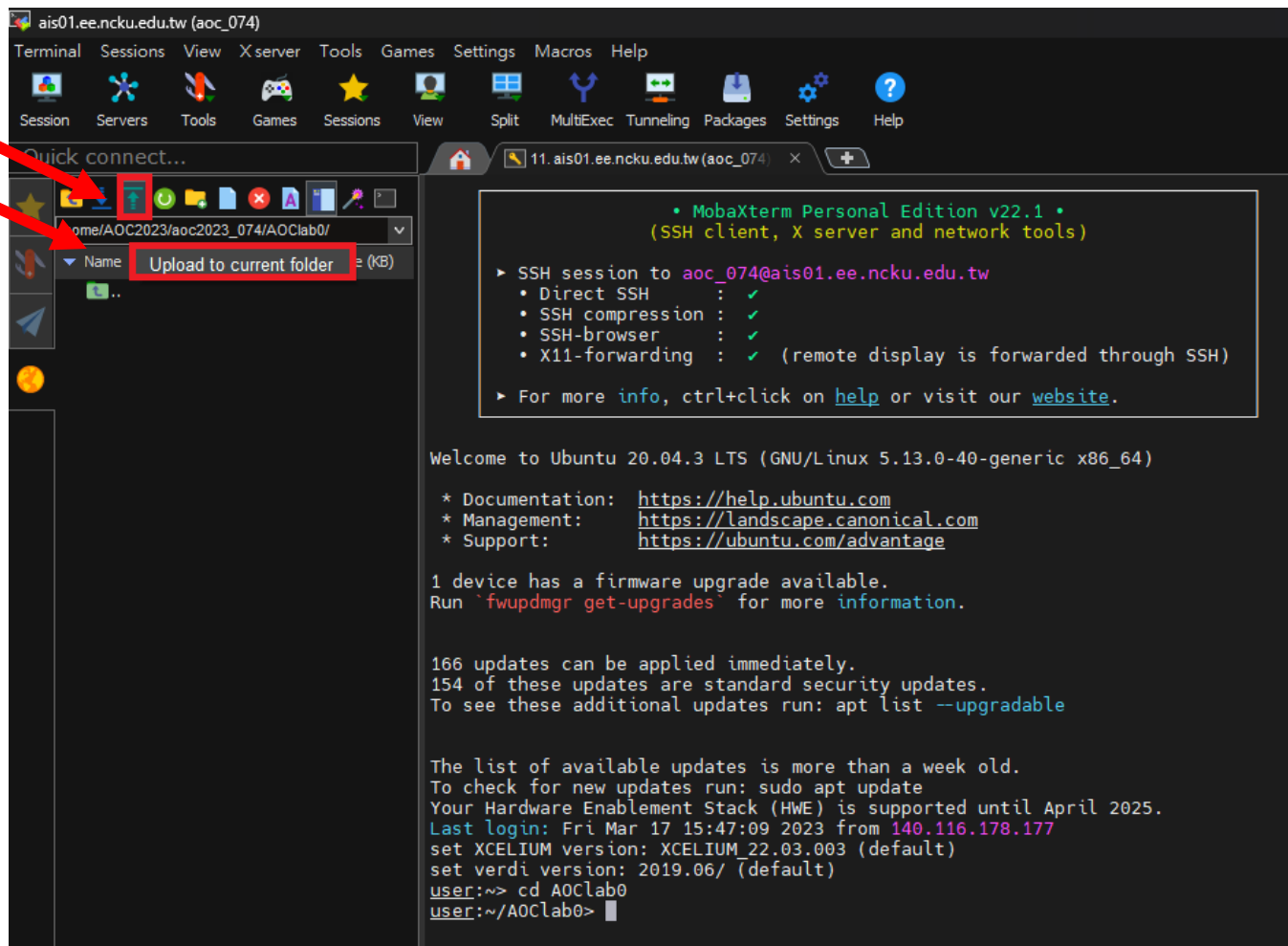
- 確認所建立的資料夾



# Step1



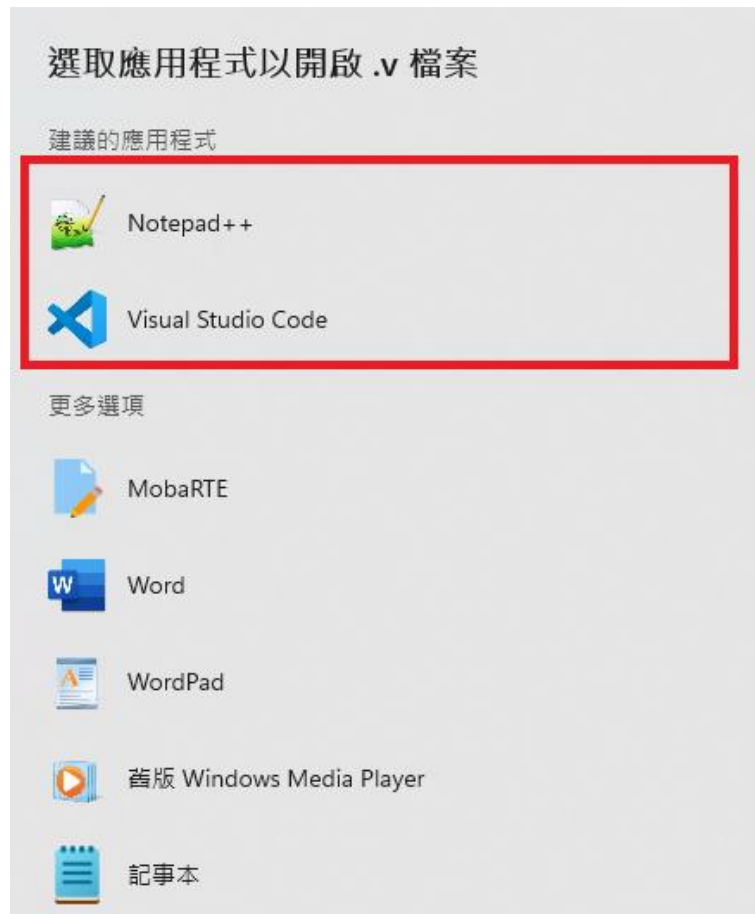
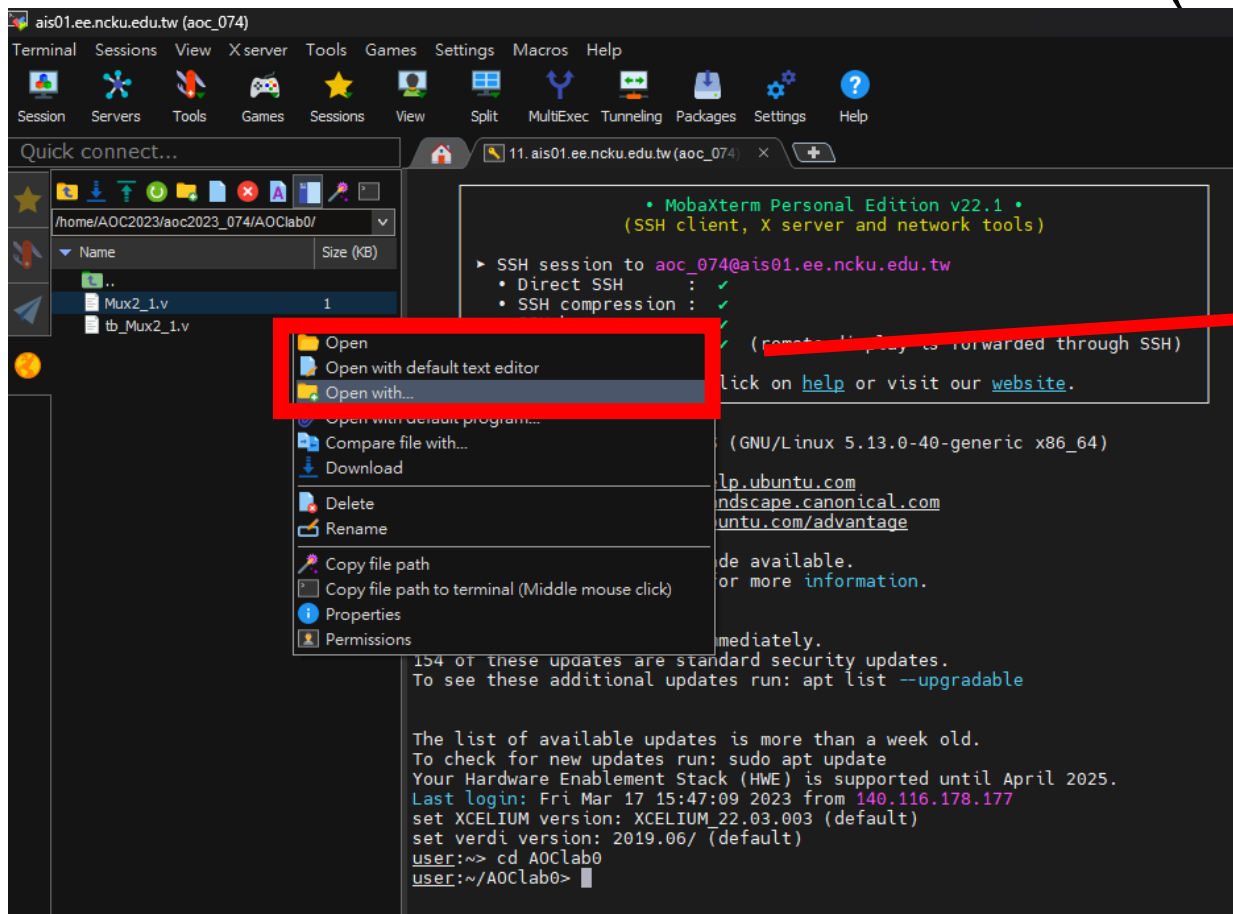
- 上傳.v檔以及測試檔



# Step1



- 依照個人喜好在編輯器上編輯檔案(推薦Notepad++或Visual Studio Code)

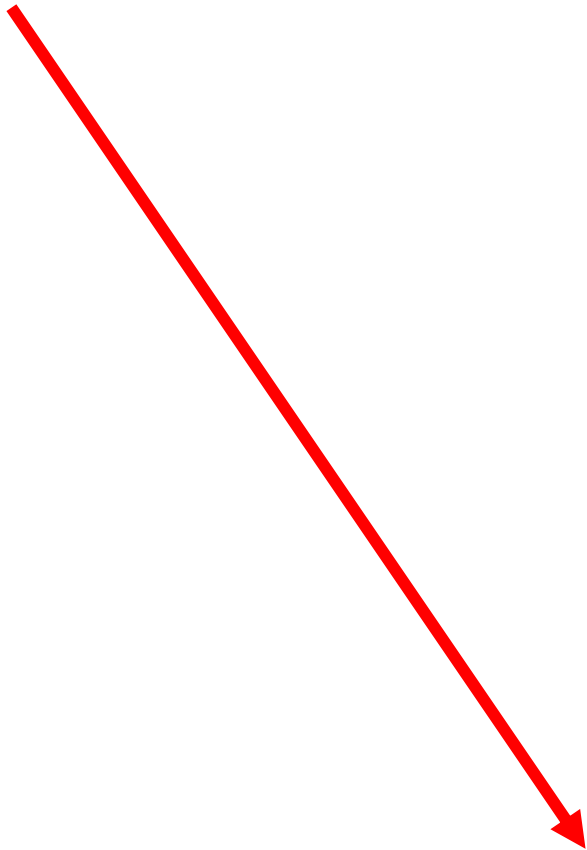




# Step2



## • 切換工作目錄



```
11. ais01.ee.ncku.edu.tw (aoc_074) x
• MobaXterm Personal Edition v22.1 •
  (SSH client, X server and network tools)

▶ SSH session to aoc_074@ais01.ee.ncku.edu.tw
  • Direct SSH : ✓
  • SSH compression : ✓
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set XCELIUM version: XCELIUM 22.03.003 (default)
set verdi version: 2019.06/ (default)
user:~> cd AOClab0
user:~/AOClab0> 
```

# Step4 (以執行2-to-1 Mux為例)



- ncverilog Mux2\_1.v



```
user:~/AOClab0: ncverilog Mux2_1.v
TOOL:  xmverilog      22.03-s003: Started on Mar 17, 2023 at 22:02:50 CST
xmverilog(64): 22.03-s003: (c) Copyright 1995-2022 Cadence Design Systems, Inc.
xmverilog: *W,NCEXDEP: Executable (ncverilog) is deprecated. Use (xmverilog) instead.
      Caching library 'worklib' ..... Done
      Elaborating the design hierarchy:
      Building instance overlay tables: ..... Done
      Building instance specific data structures.
      Loading native compiled code: ..... Done
      Design hierarchy summary:
              Instances  Unique
      Modules:           1      1
      Vectored wires:    1      -
      Cont. assignments: 0      1
      Writing initial simulation snapshot: worklib.Mux2_1:v
Loading snapshot worklib.Mux2_1:v ..... Done
*Verdi* Loading libsscore_xcelium171.so
xcelium> source /usr/cad/cadence/XCELIUM/XCELIUM_22.03.003/tools/xcelium/files/xmsimrc
xcelium> run
xmsim: *W,RNQUIE Simulation is complete.
xcelium> exit
TOOL:  xmverilog      22.03-s003: Exiting on Mar 17, 2023 at 22:02:51 CST (total: 00:00:01)
user:~/AOClab0>
```




.v檔順利跑過

# Step4 (以執行2-to-1 Mux為例)



- ncverilog Mux2\_1.v



```
user:~/AOClab0> ncverilog Mux2_1.v
TOOL:  xmverilog 22.03-s003: Started on Mar 17, 2023 at 22:05:30 CST
xmverilog(64): 22.03-s003: (c) Copyright 1995-2022 Cadence Design Systems, Inc.
xmverilog: *W,NCEXDEP: Executable (ncverilog) is deprecated. Use (xmverilog) instead.
Recompiling... reason: file './Mux2_1.v' is newer than expected.
expected: Fri Mar 17 21:40:18 2023
actual:   Fri Mar 17 22:05:26 2023
file: Mux2_1.v
endmodule
xmverilog: *E,EXPSMC (Mux2_1.v,5|8): expecting a semicolon(';') [6.1(IEEE)].
module worklib.Mux2_1.v
  errors: 1, warnings: 0
xmverilog: *W,NOTOPL: no top-level unit found, must have recursive instances.
Total errors/warnings found outside modules and primitives:
  errors: 0, warnings: 1
xmverilog: *E,VLGERR: An error occurred during parsing. Review the log file for errors with the code *E and fix those identified problems to proceed. Exiting with code (status 1).
TOOL:  xmverilog 22.03-s003: Exiting on Mar 17, 2023 at 22:05:30 CST (total: 00:00:00)
user:~/AOClab0>
```

在Mux2\_1.v檔的第五行、第八欄有errors及warnings

# Step5



- ncverilog tb\_Mux2\_1.v +access+r

```
user:~/AOC/lab0> ncverilog tb_Mux2_1.v +access+r
TOOL:  xmverilog 22.03-s003: started on Mar 17, 2023 at 22:14:22 CST
xmverilog(64): 22.03-s003: (c) Copyright 1995-2022 Cadence Design Systems, Inc.
xmverilog: W,NCEXDEP: Executable (ncverilog) is deprecated. Use (xmverilog) instead.
file: tb_Mux2_1.v
module worklib.tb_Mux2_1:v
  errors: 0, warnings: 0
  Caching library 'worklib' ..... Done
Elaborating the design hierarchy:
Building instance overlay tables: ..... Done
Generating native compiled code:
  worklib.Mux2_1:v <0x59ca9e45>
    streams: 1, words: 208
  worklib.tb_Mux2_1:v <0x38857ac0>
    streams: 7, words: 6441
Building instance specific data structures.
Loading native compiled code: ..... Done
Design hierarchy summary:
      Instances  Unique
Modules:           2      2
Registers:         3      3
Scalar wires:      1      -
Vectored wires:    3      -
Initial blocks:    3      3
Cont. assignments: 1      1
Pseudo assignments: 3      3
Simulation timescale: 10ps
Writing initial simulation snapshot: worklib.tb_Mux2_1:v
Loading snapshot worklib.tb_Mux2_1:v ..... Done
*Verdi* Loading libsscore_xcelium171.so
xcelium> source /usr/cad/cadence/XCELIUM/XCELIUM_22.03.003/tools/xcelium/files/xmsimrc
xcelium> run
FSDB Dumper for Xcelium, Release Verdi_P-2019.06, Linux x86_64/64bit, 05/26/2019
(C) 1996 - 2019 by Synopsys, Inc.
*****
* WARNING -
* The simulator version is newer than the FSDB Writer version which
* may cause abnormal behavior, please contact Cadence support for
* assistance.
*****
*Verdi* : Create FSDB file 'Mux2_1.fsdb'
*Verdi* : Begin traversing the scopes, layer (0).
*Verdi* : End of traversing.
      驗證測試結果
      0In0=    20,In1=    10,sel=1,out=    10
      20In0=    5,In1=    10,sel=0,out=    5
      40In0=    20,In1=    10,sel=0,out=    20
Simulation complete via $finish(1) at time 140 NS + 0
./tb_Mux2_1.v:17 #100 $finish;
xcelium> exit
TOOL:  xmverilog 22.03-s003: Exiting on Mar 17, 2023 at 22:14:23 CST (total: 00:00:01)
```

# Step6



## • nWave & 波形驗證



```
user:~/A0Clab0> nwave &  
[1] 470253  
user:~/A0Clab0> logDir = /home/A0C2023/aoc2023_074/A0Clab0/nWaveLog  
  
Verdi (R)  
  
Release Verdi_P-2019.06 for (RH Linux x86_64/64bit) -- Sun May 26 03:05:40 PDT 2019  
  
Copyright (c) 1999 - 2019 Synopsys, Inc.  
This software and the associated documentation are proprietary to Synopsys, Inc.  
This software may only be used in accordance with the terms and conditions of a written license agreement with Synopsys, Inc.  
All other use, reproduction, or distribution of this software is strictly prohibited.
```

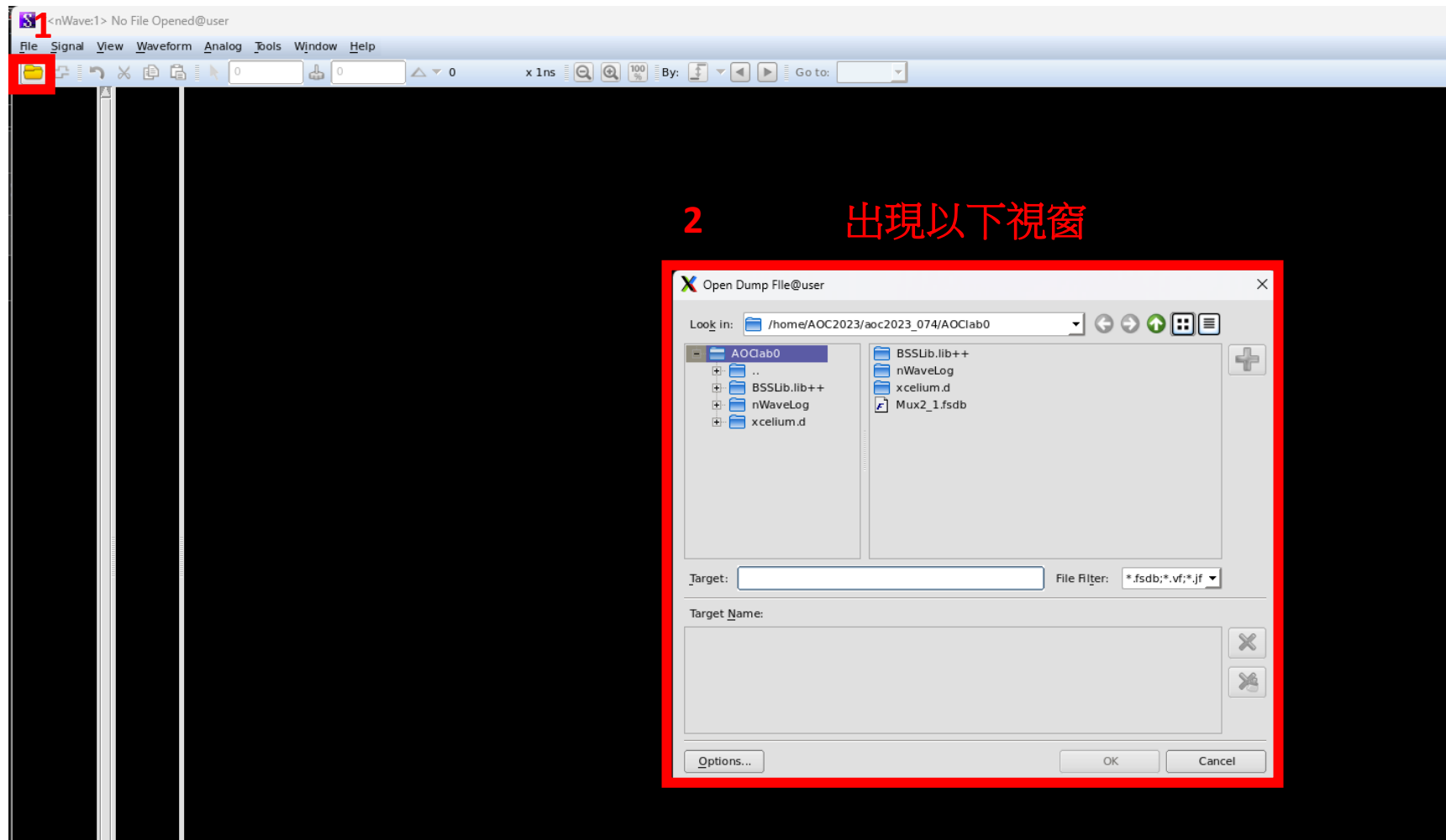
# Outline



- Environment Setup
- Change your passwd
- Introduction to Linux commands
- How to run Verilog code?
- 如何看波形

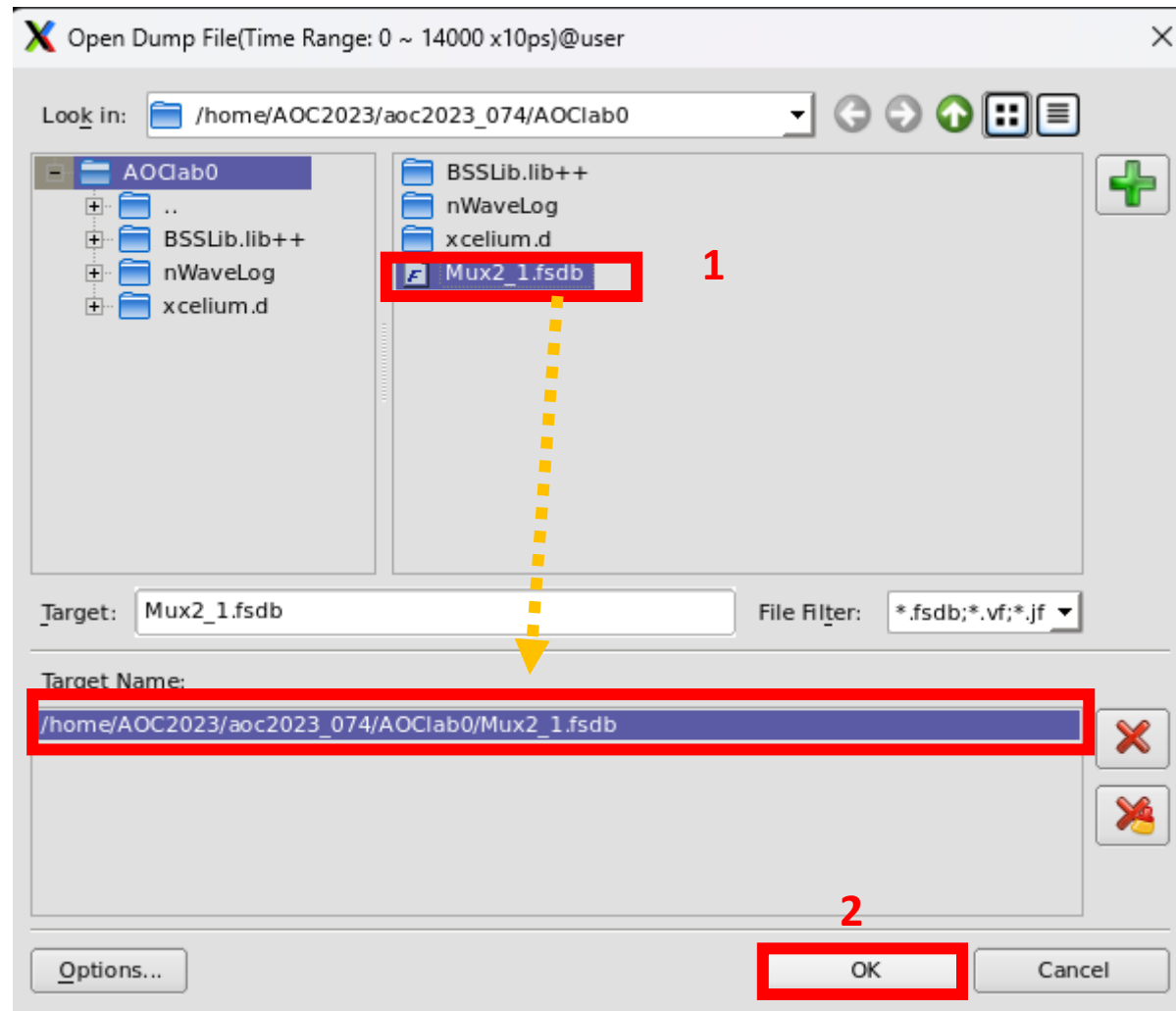
# 如何看波形

- (i) Open File



# 如何看波形

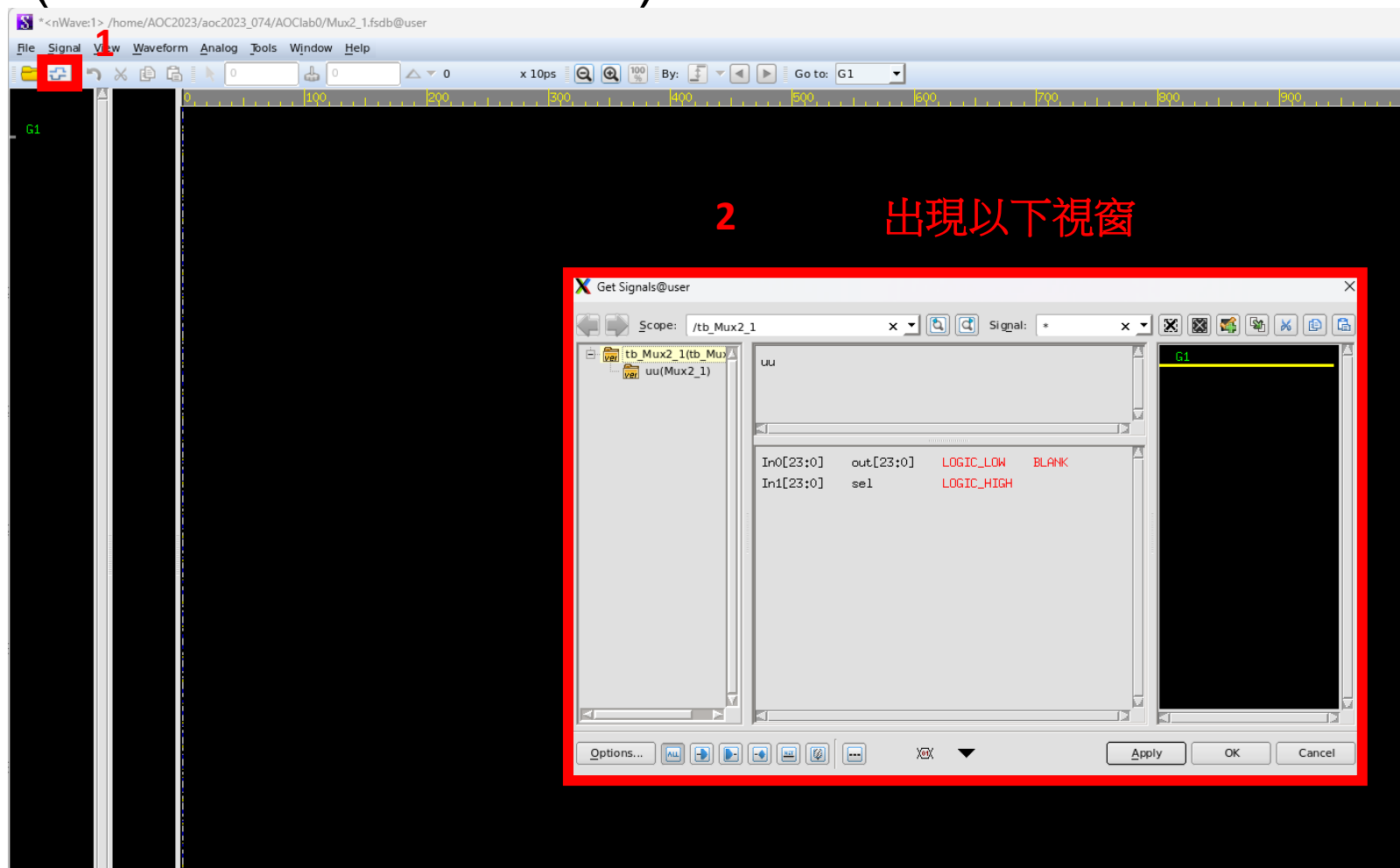
- (ii) Choose Mux2\_1.fsdb





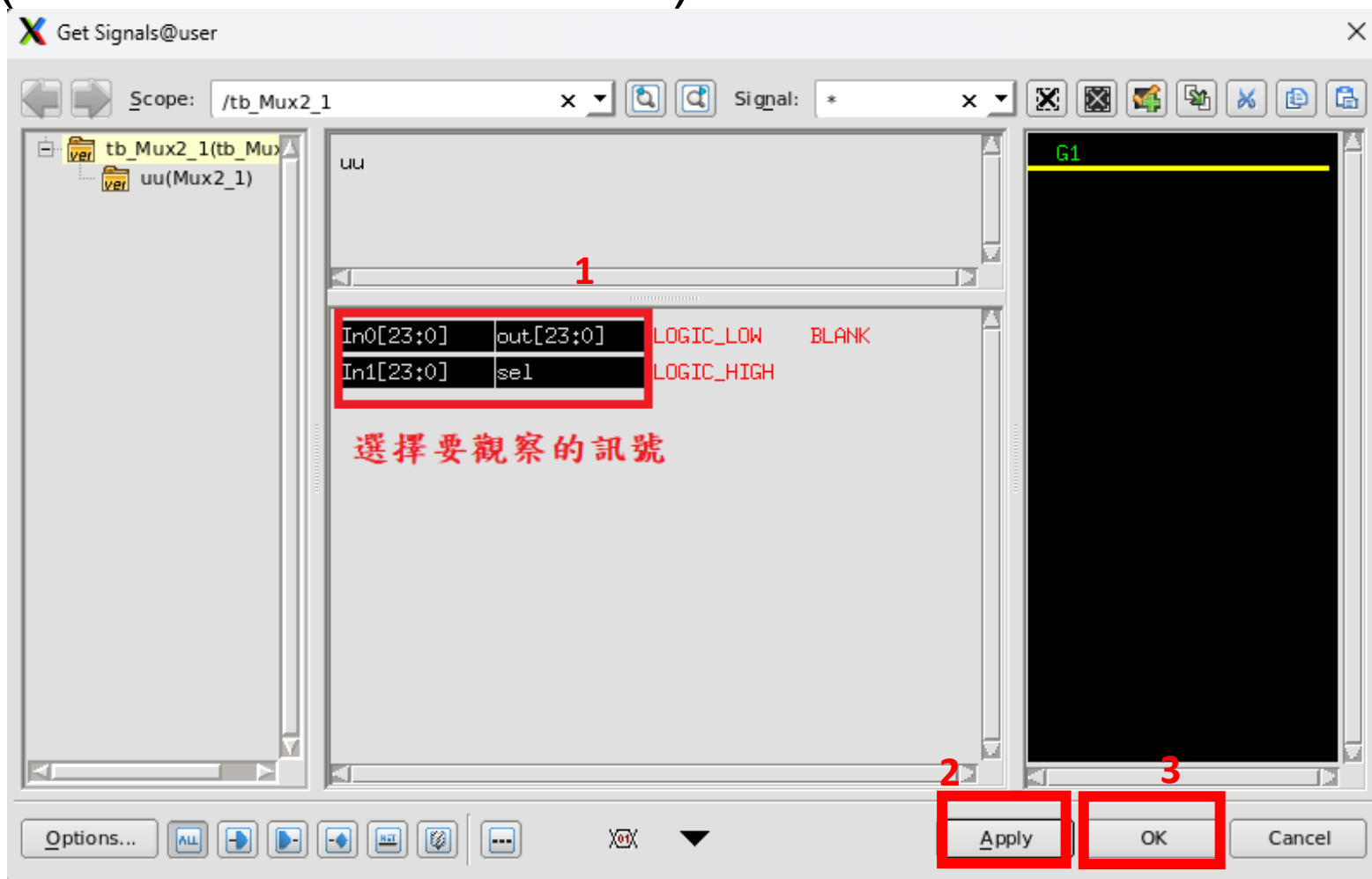
# 如何看波形

- (iii) Get signals (選擇要看的訊號就好)



# 如何看波形

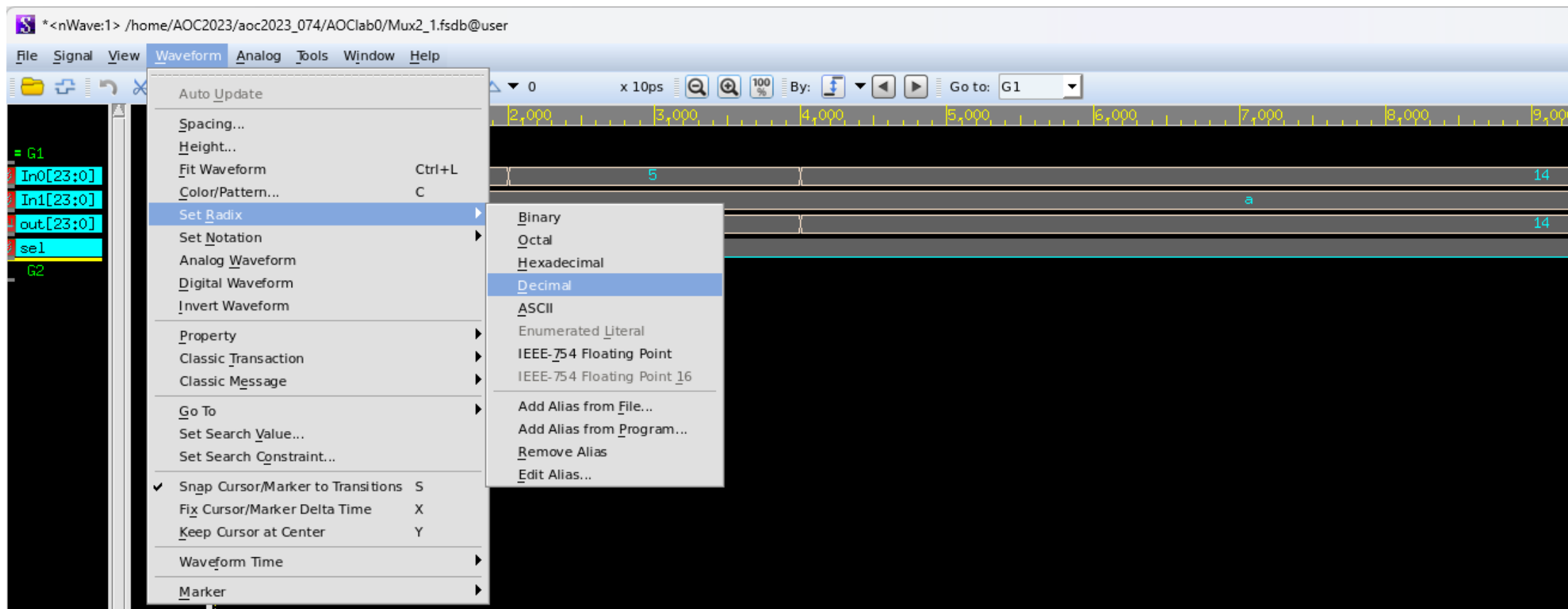
- (iii) Get signals (選擇要觀察的訊號就好)



# 如何看波形



- (iv) wave (調成十進位方便觀察波形)



# 如何看波形



- (v) result

