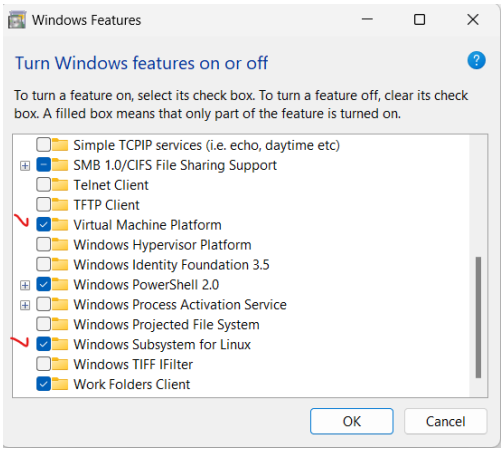
Installing SkyWater PDK Toolchain by OSIC on WSL

INSTALLATION MANUAL FOR WINDOWS 11

1. In order to install the toolchain, start by installing WSL on your window by turning it ON. For this, open the control panel and look for “turn window features on or off”. Check mark the options shown in fig. via red check mark.



This will prompt you to restart your computer.

2. Next download the Linux Karnel package. For this, consider following this link.

   https://learn.microsoft.com/en-us/windows/wsl/install-manual

   After following the instructions shown in this link, you’ll be all done with launching the Linux distribution as well (as ubuntu in our case, Ubuntu vers. 22.04).

3. Now open the terminal on your computer as we are about to update WSL. For this consider entering this command on terminal.
   - wsl --update

You **should** be able to get this result.

```
PS C:\Users\Namra Mazhar> wsl --update
Checking for updates.
The most recent version of Windows Subsystem for Linux is already installed.
PS C:\Users\Namra Mazhar>
```

4. In order to check what’s been installed in your WSL. Enter this command
   - wsl -l

```
PS C:\Users\Namra Mazhar> wsl -l
```

You should get this output:

Windows Subsystem for Linux has no distributions installed.

5. We will now install Ubuntu. For this enter this command
    - wsl --install -d Ubuntu-22.04

```
PS C:\Users\Namra Mazhar> wsl --install -d Ubuntu-22.04
```

It will ask you to enter your “username” and “password” and within a few seconds you’ll have Ubuntu installed.

6. Now, we will;
    Add a new repository containing the apt-fast package.
    Update the package lists to include packages from the newly added repository.
    Install the apt-fast package.

For this, consider following this link

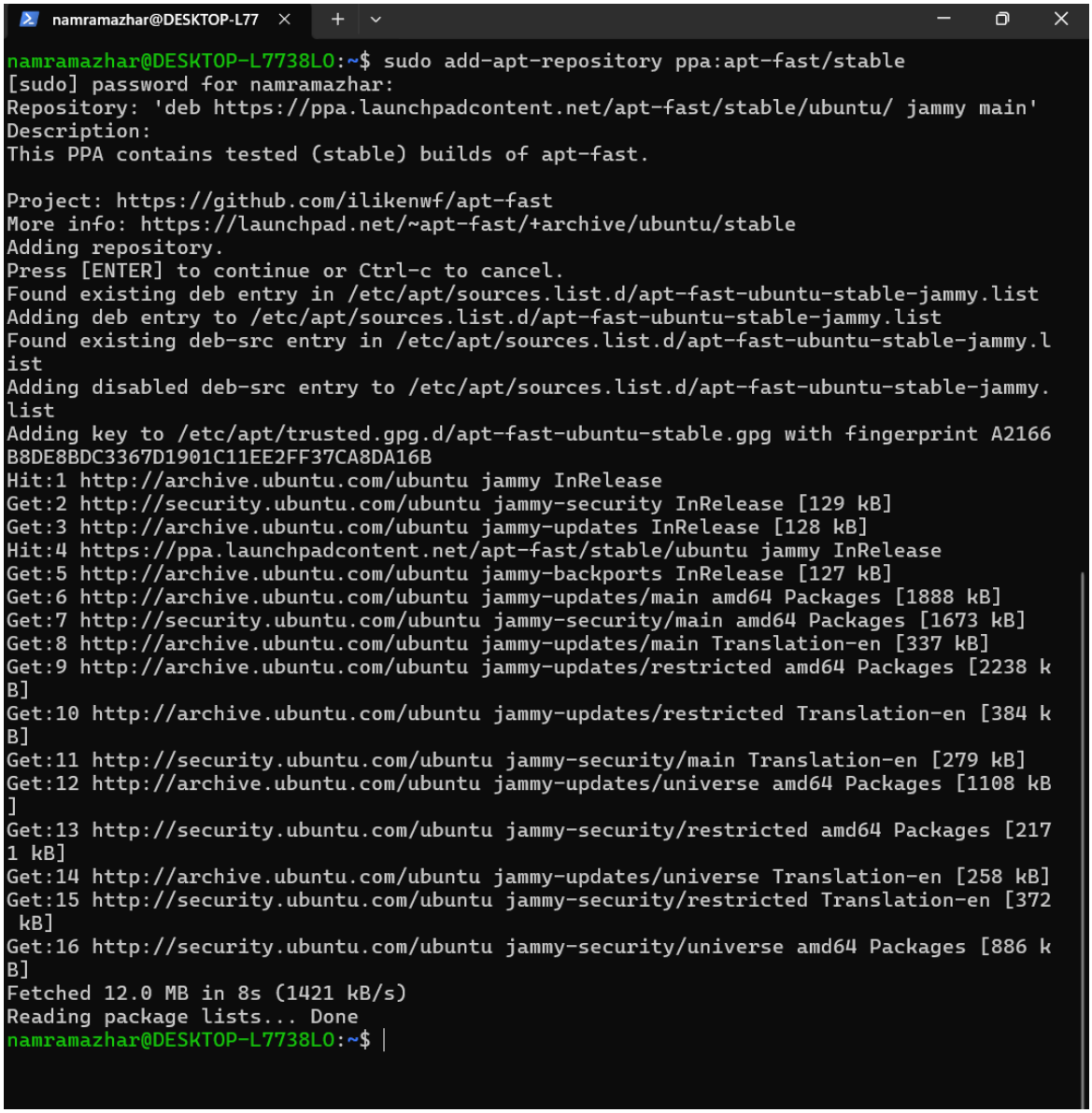
https://github.com/ilikenwf/apt-fast

Scroll down and you’ll able to find the heading **Installation** with 3 commands underneath.

Installation

```
sudo add-apt-repository ppa:apt-fast/stable
sudo apt-get update
sudo apt-get -y install apt-fast
```

Enter the first command and run it.



Similarly run 2nd and 3rd command. While running the 3rd command, you'll see a pop up regarding apt configuration. Select the following;

1. Apt
2. 5
3. No

7. We'll now install make and gedit. For this, enter the following command
   - make

Then enter,

- sudo apt-fast install make

```
namramazhar@DESKTOP-L7738LO:~$ sudo apt-fast install make
```

You'll be able to install "make" with this.

Next comes gedit. To install it, enter

- sudo apt-fast install gedit

```
namramazhar@DESKTOP-L7738LO:~$ sudo apt-fast install gedit
```

In order to check whether you have successfully installed it, simply add these cmds.

```
namramazhar@DESKTOP-L7738LO:~$ make
make: *** No targets specified and no makefile found.  Stop.
```

```
namramazhar@DESKTOP-L7738LO:~$ gedit
```

You'll see a blank doc opening up for gedit output.

8. We will now Install the Python dependencies to avoid potential conflicts during the toolchain installation process. For this, enter
   - pip install cffi cryptography pycparser setuptools pip

```
(base) namramazhar@DESKTOP-L7738LO:~$ pip install cffi cryptography pycparser setuptools pip
```

9. We are now starting software installation, for this start by cloning "OSIC GitHub Repository". For this enter this command
   - git clone https://github.com/iic-jku/osic-multitool.git

```
namramazhar@DESKTOP-L7738LO:~$ git clone https://github.com/iic-jku/osic-multitool.git
```

Afterwards, we'll navigate through this folder by

- cd osic-multitool/

```
namramazhar@DESKTOP-L7738LO:~$ cd osic-multitool/
namramazhar@DESKTOP-L7738LO:~/osic-multitool$
```

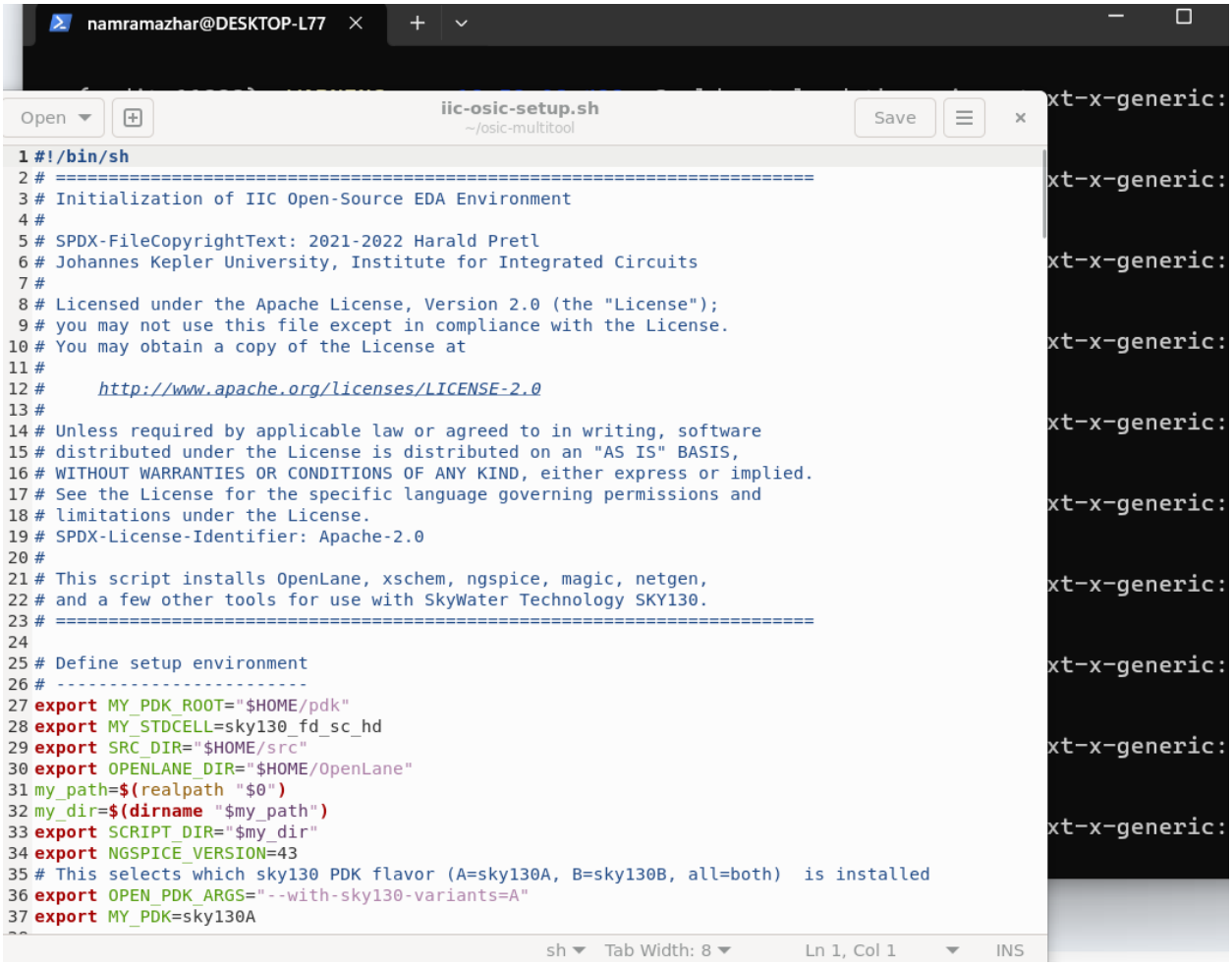
To see what's inside this folder, enter

- ls

```
namramazhar@DESKTOP-L7738LO:~/osic-multitool$ ls
LICENSE                 iic-dffram-install.sh  iic-pex.sh
README.md               iic-dffram.sh          iic-spice-model-red.py
caravel_setup           iic-drc.sh             iic-v2sch.awk
example                 iic-layconv.sh         iic-v2svg.sh
gds3d.sh                iic-lvs.sh             iic-vlint.sh
iic-chipart-install.sh  iic-magic-bindkeys     magic-cheatsheet
iic-chipart.sh          iic-osic-setup.sh      openvaf
iic-clean.sh            iic-pdk-script.sh
namramazhar@DESKTOP-L7738LO:~/osic-multitool$
```

10. Now, we'll do some modifications in the script to adjust parameters as per our setup. For this, execute this cmd
    - gedit iic-osic-setup.sh

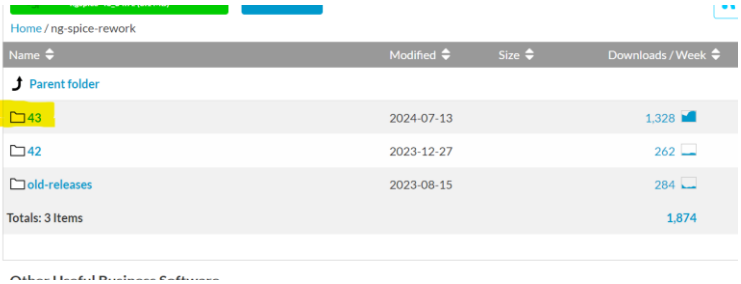
you'll see this as output



Its about "NgSpice". We'll edit the script to the latest version of NgSpice available. You can check this on their website. For this, search for

NgSpice forgesource → **Downloads** → click on **Souceforge.net File** from text

Latest version is shown at the top



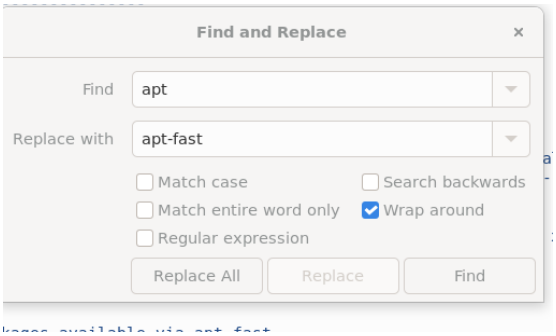
Now edit this in Line 34 of script.

```
33 export SCRIPT_DIR="$my_dir"
34 export NGSPICE_VERSION=43
35 # This selects which sky130 PD
```

11. -qq is a flag that minimizes the amount of information displayed on the terminal. It can also hide potential errors or warnings. Thus, remove -qq written in script on line 48,49 & 65.

12. Now click on the hamburger menu icon shown at top right and select find and replace.

    Replace apt with apt-fast.



    Click on Replace all and then save.

13. Run the command again.
    - ./iic-osic-setup.sh

```
namramazhar@DESKTOP-L7738LO:~/osic-multitool$ ./iic-osic-setup.sh
>>>> Update packages
[sudo] password for namramazhar:
sed: can't read /etc/apt-fast/sources.list: No such file or directory
Get:1 http://security.ubuntu.com/ubuntu jammy-security InRelease [129 kB]
Hit:2 http://archive.ubuntu.com/ubuntu jammy InRelease
Get:3 http://archive.ubuntu.com/ubuntu jammy-updates InRelease [128 kB]
Hit:4 https://ppa.launchpadcontent.net/apt-fast/stable/ubuntu jammy InRelease
Hit:5 http://archive.ubuntu.com/ubuntu jammy-backports InRelease
Fetched 257 kB in 2s (121 kB/s)
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
9 packages can be upgraded. Run 'apt list --upgradable' to see them.


07/26 21:28:27 [NOTICE] Downloading 7 item(s)

07/26 21:28:27 [NOTICE] Verification finished successfully. file=/var/cache/apt/apt-fa
st/libldap-common_2.5.18+dfsg-0ubuntu0.22.04.2_all.deb

07/26 21:28:27 [NOTICE] Download complete: /var/cache/apt/apt-fast/libldap-common_2.5.
18+dfsg-0ubuntu0.22.04.2_all.deb

07/26 21:28:28 [NOTICE] Verification finished successfully. file=/var/cache/apt/apt-fa
st/imagemagick-6-common_8%3a6.9.11.60+dfsg-1.3ubuntu0.22.04.5_all.deb

07/26 21:28:28 [NOTICE] Download complete: /var/cache/apt/apt-fast/imagemagick-6-commo
```

.

.

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wait for the installation to complete..

you should be able to see this at the end

```
>>>> All done. Please test the OpenLane install by running
>>>> make test

Remember to run `source ./iic-init.sh` to initialize environment!
namramazhar@DESKTOP-L7738LO:~/osic-multitool$
```

14. Now we will test the OpenLane installation

In order to do this first run the following cmds

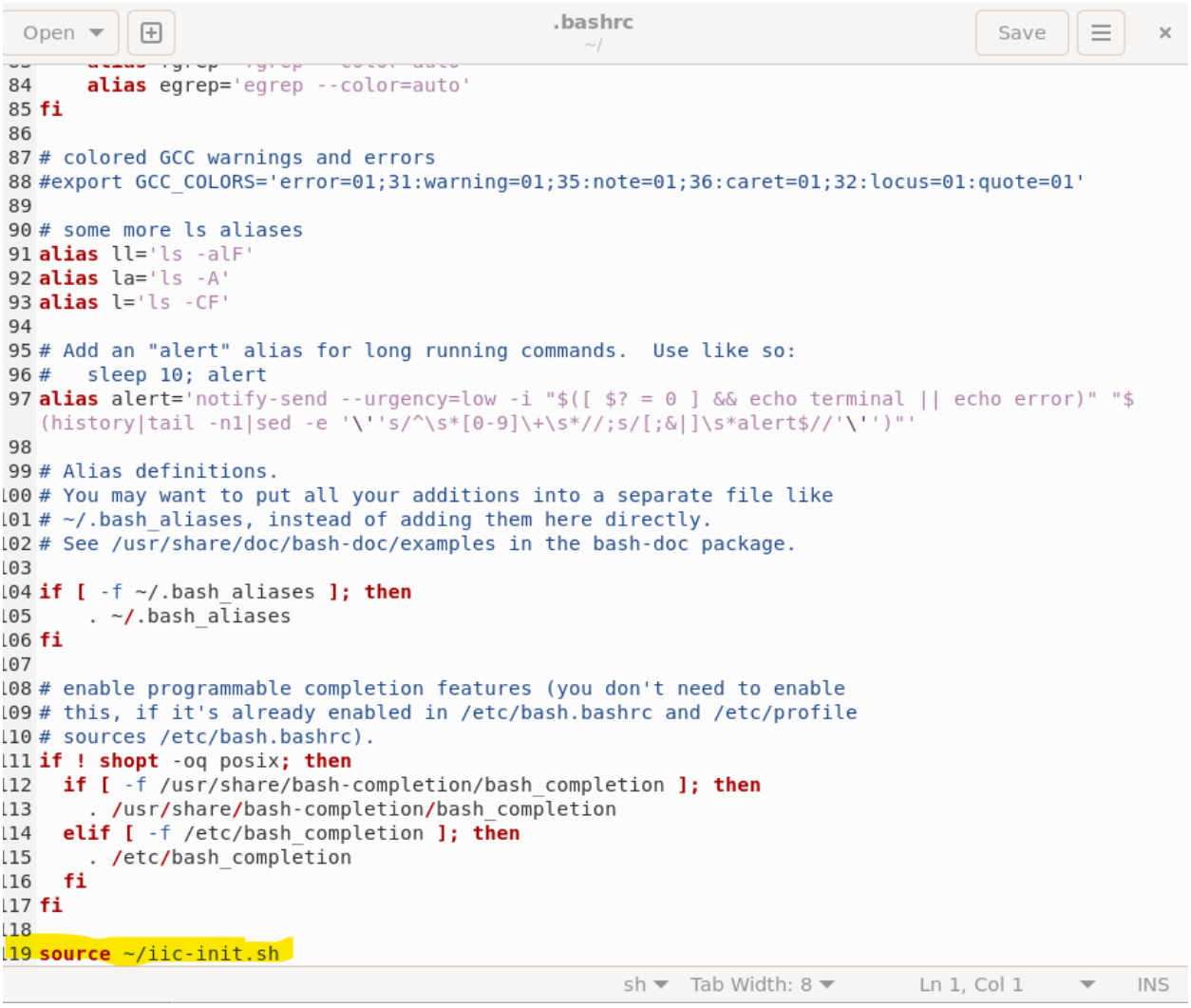
- cd
- source ~/iic-init.sh
- cd OpenLane

you'll be seeing this

Run cmd

- clear
- cd
- gedit .bashrc

15. We'll now edit the batch file. For this, add this cmd at the very end
    - source ~/iic-init.sh



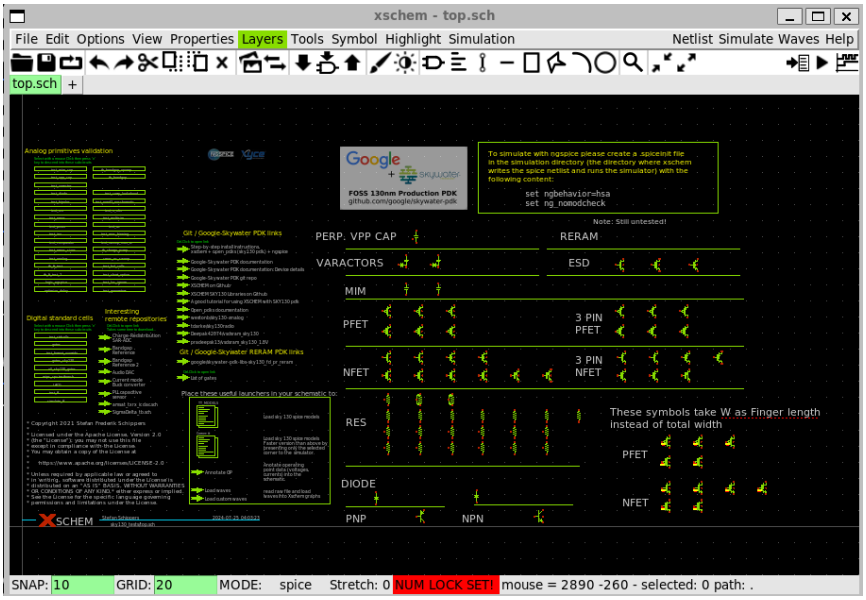
This file will run everytime we'll start the distro.

16. Now we'll make test to see if everything works. For this first enter the following cmds
    - exit
    - wsl
    - cd
    - cd OpenLane/
    - make test

you **should** be able to see this at the very end.

17. Now, we'll check if we have successfully installed xschem. For this, enter
    - xschem

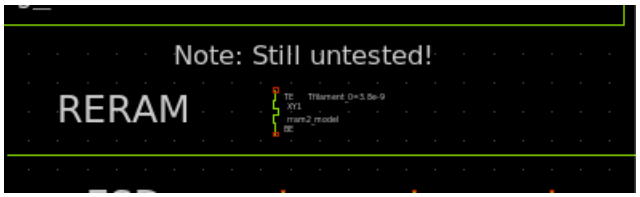
Upon successful installation, you'll be able to see this xschem window



18. Correct the setting of PDK environment variable to effectively use ReRAM on xschem running the following cmds
    - PDK=sky130B
    - Xschem

```
namramazhar@DESKTOP-L7738LO:~/OpenLane$ PDK=sky130B
namramazhar@DESKTOP-L7738LO:~/OpenLane$ xschem
```

And you'll be able to see ReRAM symbol as well on the xschem window



19. We will now be installing GAW. For this, open wsl and activate OpenLane.

```
(base) namramazhar@DESKTOP-L7738LO:~$ cd OpenLane/
(base) namramazhar@DESKTOP-L7738LO:~/OpenLane$
```

20. Update your package list and install the necessary dependencies by entering
    - sudo apt-get update
    - sudo apt-get install libgtk-3-dev xterm

you'd be able to see this

```
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
xterm is already the newest version (372-1ubuntu1).
libgtk-3-dev is already the newest version (3.24.33-1ubuntu2.2).
0 upgraded, 0 newly installed, 0 to remove and 29 not upgraded.
(base) namramazhar@DESKTOP-L7738LO:~/OpenLane$
```

21. Consider the link below to download the latest version:
    https://download.tuxfamily.org/gaw/download/

22. Create Downloads directory under your home directory if you don't already have one by
    - mkdir ~/Downloads

23. Now consider entering the following cmds to download, navigate and extract the targeted file.
    - wget https://download.tuxfamily.org/gaw/download/gaw3-20220315.tar.gz -O ~/Downloads/gaw3-20220315.tar.gz

- cd ~/Downloads
- tar -xvzf gaw3-20220315.tar.gz

24. Now, we will move the extracted folder to the home directory. Enter:
    - mv gaw3-20220315 ~/

25. Next comes Configuring and Building GAW. For that enter:
    - cd ~/gaw3-20220315
    - ./configure
    - Make

26. Install GAW by entering
    - sudo make install

27. Verify installation via following cmd.
    - Gaw

You'll be seeing this upon successful installation