

OpenLane: Guía de instalación y funcionamiento. Por: **Enrique Damián Aguilar**

Canal youtube: **@Edamian_Ai**

Video de la instalación: <https://www.youtube.com/watch?v=ea8s3qoP15U>

GitHub de este documento guía: <https://github.com/edamian-ai/OpenLane>

email: edamian.ittlalpan@gmail.com

“Se incluye la instalación de Klayout para leer los archivos gds generados por OL”

Plataforma en donde se instaló:

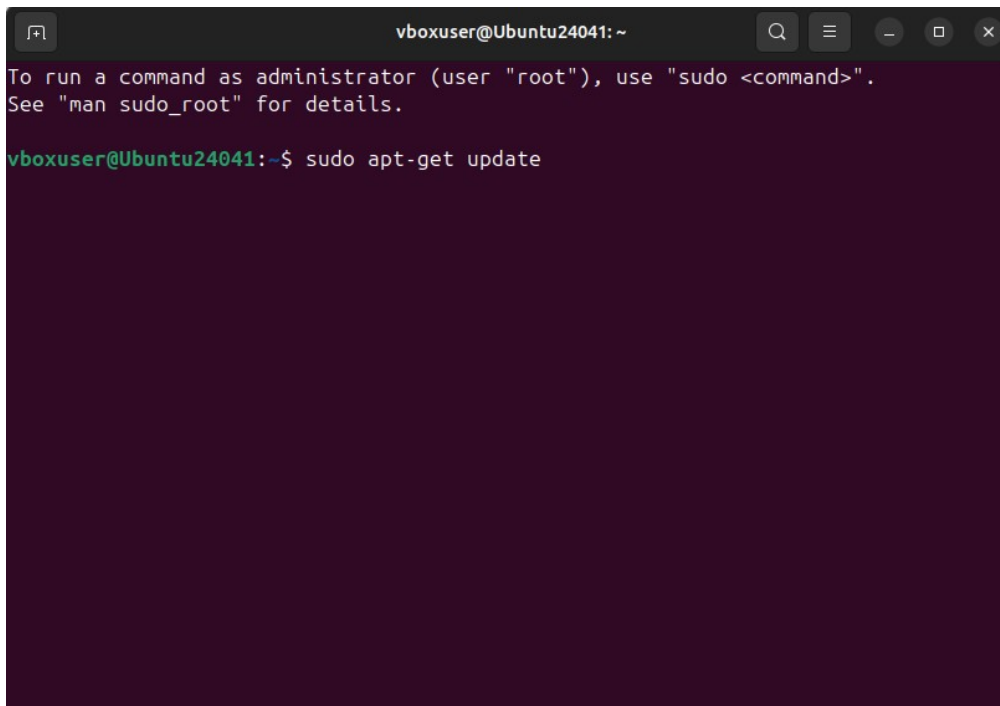
- WorkStation DELL 5820, 32 GB de RAM, Intel(R) Xeon(R) W-2133 CPU @ 3.60GHz,
- Máquina Virtual VirtualBox Ubuntu 24.04.1 (12GB de RAM – 6Cores – 50GB de discoVirtual)
- También se instaló en Máquina Virtual VirtualBox Ubuntu 20.04.6 (12GB de RAM – 6Cores – 50GB de discoVirtual)

Links de conocimiento:

- https://github.com/AnoushkaTripathi/Openlane_Installation_guide repositorio con la mejor guía de instalación de OL
- <https://www.youtube.com/watch?v=gZtvArK3s08> La guía de arriba pero en video
- <https://github.com/efabless/openlane> repositorio de herramientas de efabless
- <https://www.youtube.com/watch?v=d0hPdkYg5QI> muy buen minicurso de OpenLane por efabless
- <https://www.youtube.com/watch?v=jEGq7JVHGvQ> Una buena guía de instalación de varias herramientas incluyendo OpenLane y Klayout

Paso 1: Actualizar la base de datos de los paquetes de Linux

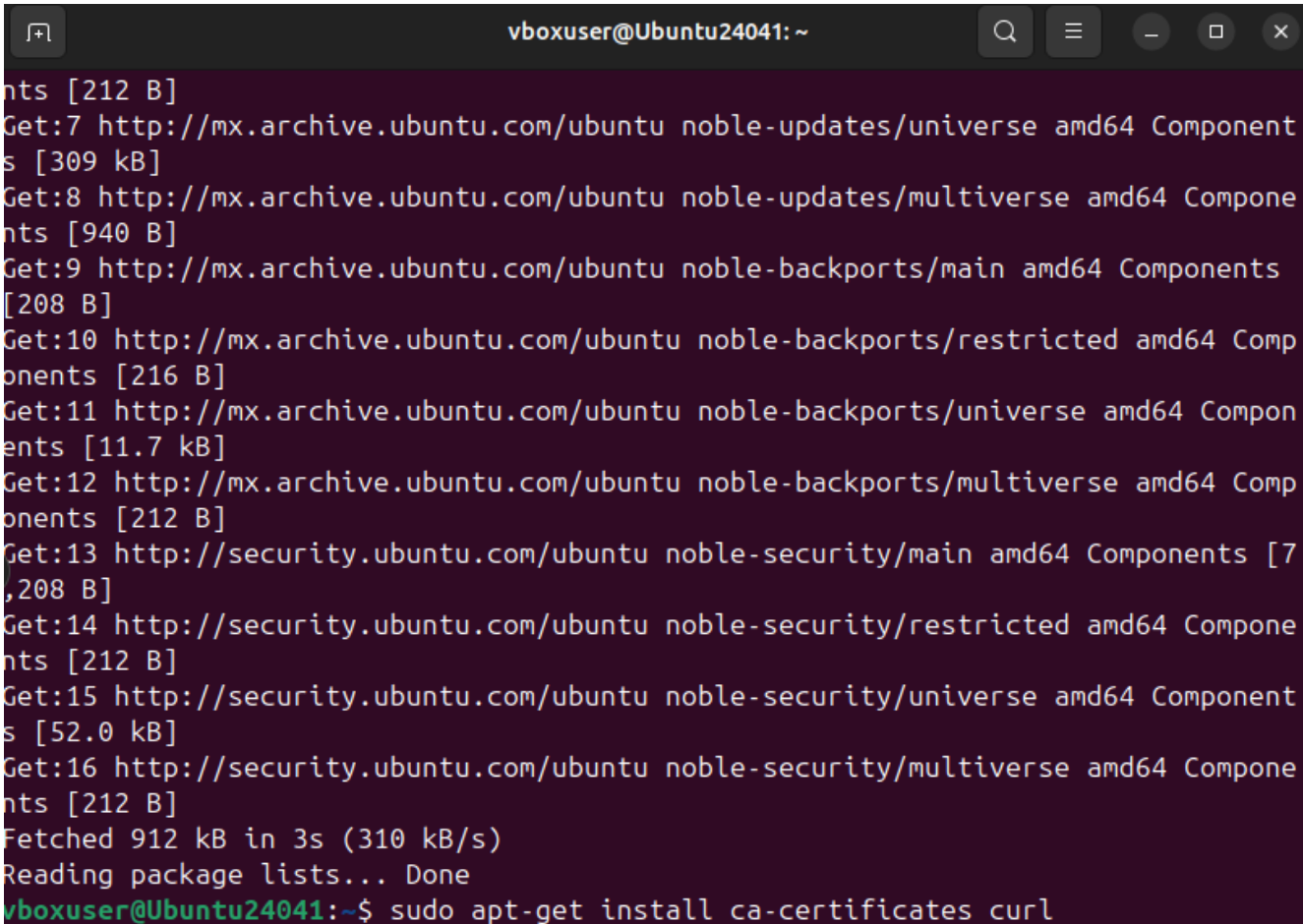
```
sudo apt-get update
```



```
vboxuser@Ubuntu24041: ~  
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.  
  
vboxuser@Ubuntu24041:~$ sudo apt-get update
```

Paso 2: Instalar certificados

```
sudo apt-get install ca-certificates curl
```



```
vboxuser@Ubuntu24041: ~  
nts [212 B]  
Get:7 http://mx.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Component  
s [309 kB]  
Get:8 http://mx.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Compone  
nts [940 B]  
Get:9 http://mx.archive.ubuntu.com/ubuntu noble-backports/main amd64 Components  
[208 B]  
Get:10 http://mx.archive.ubuntu.com/ubuntu noble-backports/restricted amd64 Comp  
onents [216 B]  
Get:11 http://mx.archive.ubuntu.com/ubuntu noble-backports/universe amd64 Compon  
ents [11.7 kB]  
Get:12 http://mx.archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 Comp  
onents [212 B]  
Get:13 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [7  
,208 B]  
Get:14 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Compone  
nts [212 B]  
Get:15 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Component  
s [52.0 kB]  
Get:16 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Compone  
nts [212 B]  
Fetched 912 kB in 3s (310 kB/s)  
Reading package lists... Done  
vboxuser@Ubuntu24041:~$ sudo apt-get install ca-certificates curl
```

Nos indica que se instalará un paquete nuevo y que ocupara 534KB, enseguida nos preguntará si queremos continuar, indicar "Y"

```
vboxuser@Ubuntu24041: ~  
Get:12 http://mx.archive.ubuntu.com/ubuntu noble-backports/multiverse amd64 Components [212 B]  
Get:13 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [7,208 B]  
Get:14 http://security.ubuntu.com/ubuntu noble-security/restricted amd64 Components [212 B]  
Get:15 http://security.ubuntu.com/ubuntu noble-security/universe amd64 Components [52.0 kB]  
Get:16 http://security.ubuntu.com/ubuntu noble-security/multiverse amd64 Components [212 B]  
Fetched 912 kB in 3s (310 kB/s)  
Reading package lists... Done  
vboxuser@Ubuntu24041:~$ sudo apt-get install ca-certificates curl  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
ca-certificates is already the newest version (20240203).  
ca-certificates set to manually installed.  
The following NEW packages will be installed:  
  curl  
0 upgraded, 1 newly installed, 0 to remove and 135 not upgraded.  
Need to get 226 kB of archives.  
After this operation, 534 kB of additional disk space will be used.  
Do you want to continue? [Y/n]
```

Paso 3. Instalar las llaves de acceso

```
sudo install -m 0755 -d /etc/apt/keyrings
```

```
vboxuser@Ubuntu24041:~  
Fetchd 912 kB in 3s (310 kB/s)  
Reading package lists... Done  
vboxuser@Ubuntu24041:~$ sudo apt-get install ca-certificates curl  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
ca-certificates is already the newest version (20240203).  
ca-certificates set to manually installed.  
The following NEW packages will be installed:  
  curl  
0 upgraded, 1 newly installed, 0 to remove and 135 not upgraded.  
Need to get 226 kB of archives.  
After this operation, 534 kB of additional disk space will be used.  
Do you want to continue? [Y/n] Y  
Get:1 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 curl amd64 8.5.0-2ubuntu10.6 [226 kB]  
Fetchd 226 kB in 1s (301 kB/s)  
Selecting previously unselected package curl.  
(Reading database ... 148305 files and directories currently installed.)  
Preparing to unpack .../curl_8.5.0-2ubuntu10.6_amd64.deb ...  
Unpacking curl (8.5.0-2ubuntu10.6) ...  
Setting up curl (8.5.0-2ubuntu10.6) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
vboxuser@Ubuntu24041:~$ sudo install -m 0755 -d /etc/apt/keyrings
```

Paso 4. Habilitar la extracción de docker

```
sudo curl -fsSL https://download.docker.com/linux/ubuntu/gpg -o  
/etc/apt/keyrings/docker.asc
```

```
vboxuser@Ubuntu24041: ~  
vboxuser@Ubuntu24041:~$ sudo apt-get install ca-certificates curl  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
ca-certificates is already the newest version (20240203).  
ca-certificates set to manually installed.  
The following NEW packages will be installed:  
  curl  
0 upgraded, 1 newly installed, 0 to remove and 135 not upgraded.  
Need to get 226 kB of archives.  
After this operation, 534 kB of additional disk space will be used.  
Do you want to continue? [Y/n] Y  
Get:1 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 curl amd64 8.5.0-2ubuntu10.6 [226 kB]  
Fetched 226 kB in 1s (301 kB/s)  
Selecting previously unselected package curl.  
(Reading database ... 148305 files and directories currently installed.)  
Preparing to unpack .../curl_8.5.0-2ubuntu10.6_amd64.deb ...  
Unpacking curl (8.5.0-2ubuntu10.6) ...  
Setting up curl (8.5.0-2ubuntu10.6) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
vboxuser@Ubuntu24041:~$ sudo install -m 0755 -d /etc/apt/keyrings  
vboxuser@Ubuntu24041:~$ sudo curl -fsSL https://download.docker.com/linux/ubuntu  
/gpg -o /etc/apt/keyrings/docker.asc
```

Paso 5: elevar permisos

`sudo chmod a+r /etc/apt/keyrings/docker.asc`

```
vboxuser@Ubuntu24041: ~  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
ca-certificates is already the newest version (20240203).  
ca-certificates set to manually installed.  
The following NEW packages will be installed:  
  curl  
0 upgraded, 1 newly installed, 0 to remove and 135 not upgraded.  
Need to get 226 kB of archives.  
After this operation, 534 kB of additional disk space will be used.  
Do you want to continue? [Y/n] Y  
Get:1 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 curl amd64 8.5.0-2ubuntu10.6 [226 kB]  
Fetched 226 kB in 1s (301 kB/s)  
Selecting previously unselected package curl.  
(Reading database ... 148305 files and directories currently installed.)  
Preparing to unpack .../curl_8.5.0-2ubuntu10.6_amd64.deb ...  
Unpacking curl (8.5.0-2ubuntu10.6) ...  
Setting up curl (8.5.0-2ubuntu10.6) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
vboxuser@Ubuntu24041:~$ sudo install -m 0755 -d /etc/apt/keyrings  
vboxuser@Ubuntu24041:~$ sudo curl -fsSL https://download.docker.com/linux/ubuntu  
/gpg -o /etc/apt/keyrings/docker.asc  
vboxuser@Ubuntu24041:~$ sudo chmod a+r /etc/apt/keyrings/docker.asc
```

Paso 6. actualizar la base de datos

```
echo \  
"deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc]  
https://download.docker.com/linux/ubuntu \  
$(. /etc/os-release && echo "$VERSION_CODENAME") stable" | \  
sudo tee /etc/apt/sources.list.d/docker.list > /dev/null  
sudo apt-get update
```

```
vboxuser@Ubuntu24041: ~  
curl  
0 upgraded, 1 newly installed, 0 to remove and 135 not upgraded.  
Need to get 226 kB of archives.  
After this operation, 534 kB of additional disk space will be used.  
Do you want to continue? [Y/n] Y  
Get:1 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 curl amd64 8.  
5.0-2ubuntu10.6 [226 kB]  
Fetched 226 kB in 1s (301 kB/s)  
Selecting previously unselected package curl.  
(Reading database ... 148305 files and directories currently installed.)  
Preparing to unpack .../curl_8.5.0-2ubuntu10.6_amd64.deb ...  
Unpacking curl (8.5.0-2ubuntu10.6) ...  
Setting up curl (8.5.0-2ubuntu10.6) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
vboxuser@Ubuntu24041:~$ sudo install -m 0755 -d /etc/apt/keyrings  
vboxuser@Ubuntu24041:~$ sudo curl -fsSL https://download.docker.com/linux/ubuntu  
/gpg -o /etc/apt/keyrings/docker.asc  
vboxuser@Ubuntu24041:~$ sudo chmod a+r /etc/apt/keyrings/docker.asc  
vboxuser@Ubuntu24041:~$ echo \  
"deb [arch=$(dpkg --print-architecture) signed-by=/etc/apt/keyrings/docker.asc  
] https://download.docker.com/linux/ubuntu \  
$(. /etc/os-release && echo "$VERSION_CODENAME") stable" | \  
sudo tee /etc/apt/sources.list.d/docker.list > /dev/null  
vboxuser@Ubuntu24041:~$ sudo apt-get update
```

Paso 7. Instalar Docker

```
sudo apt-get install docker-ce docker-ce-cli containerd.io
```



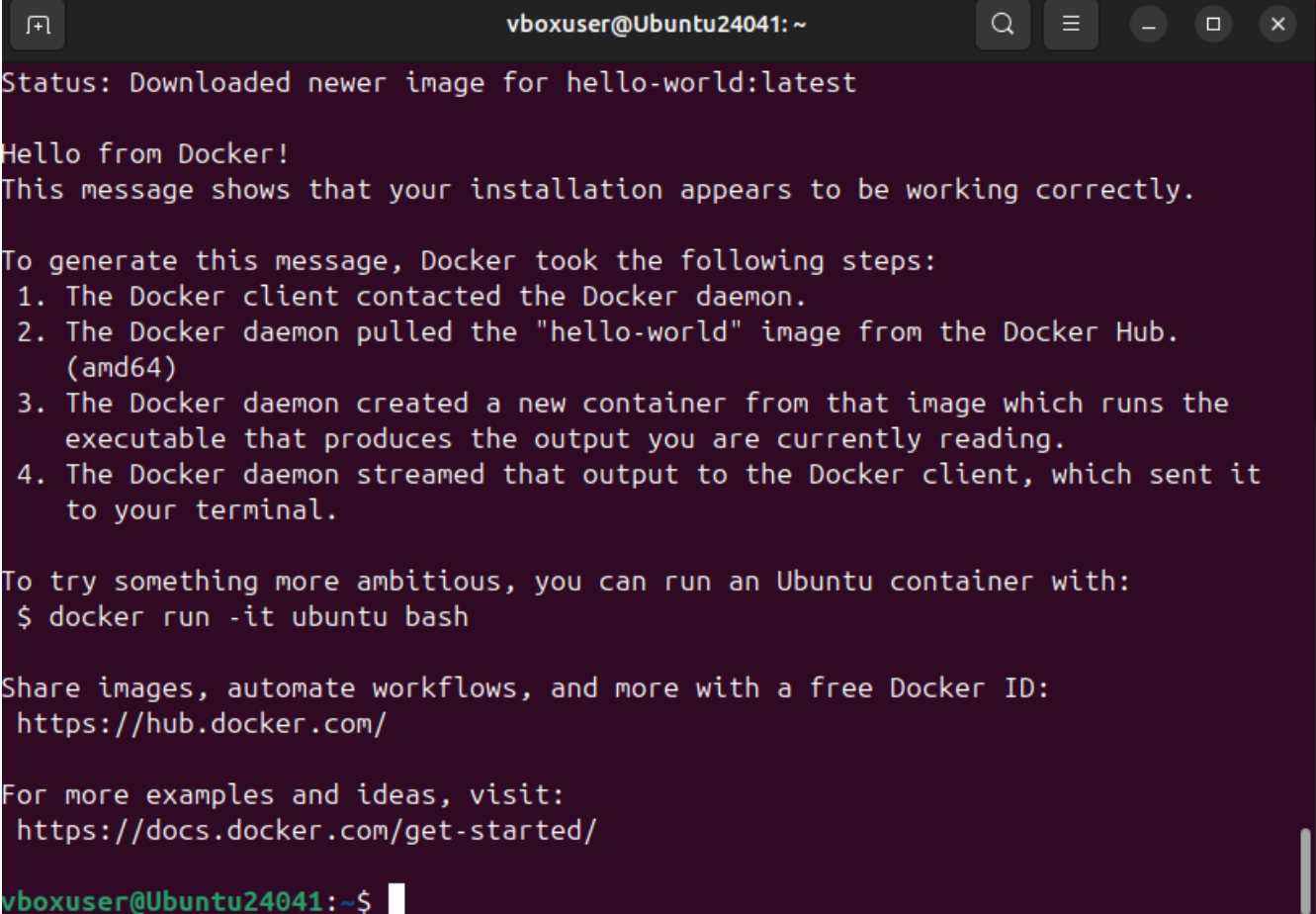
```
vboxuser@Ubuntu24041: ~  
[k]  
Hit:5 http://mx.archive.ubuntu.com/ubuntu noble-updates InRelease  
Hit:6 http://mx.archive.ubuntu.com/ubuntu noble-backports InRelease  
Fetched 67.1 kB in 1s (75.7 kB/s)  
Reading package lists... Done  
vboxuser@Ubuntu24041:~$ sudo apt-get install docker-ce docker-ce-cli containerd.  
io  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
The following additional packages will be installed:  
  docker-buildx-plugin docker-ce-rootless-extras docker-compose-plugin git  
  git-man liberror-perl libslirp0 pigz slirp4netns  
Suggested packages:  
  aufs-tools cgroupfs-mount | cgroup-lite git-daemon-run | git-daemon-sysvinit  
  git-doc git-email git-gui gitk gitweb git-cvs git-mediawiki git-svn  
The following NEW packages will be installed:  
  containerd.io docker-buildx-plugin docker-ce docker-ce-cli  
  docker-ce-rootless-extras docker-compose-plugin git git-man liberror-perl  
  libslirp0 pigz slirp4netns  
0 upgraded, 12 newly installed, 0 to remove and 135 not upgraded.  
Need to get 129 MB of archives.  
After this operation, 472 MB of additional disk space will be used.  
Do you want to continue? [Y/n]
```

Nos indicará que instalará 12 nuevos paquetes y ocupará 472 MB, y pregunta si estamos de acuerdo, tecleamos Y y continuamos

```
vboxuser@Ubuntu24041: ~  
libslirp0 pigz slirp4netns  
0 upgraded, 12 newly installed, 0 to remove and 135 not upgraded.  
Need to get 129 MB of archives.  
After this operation, 472 MB of additional disk space will be used.  
Do you want to continue? [Y/n] Y  
Get:1 http://mx.archive.ubuntu.com/ubuntu noble/universe amd64 pigz amd64 2.8-1  
[65.6 kB]  
Get:2 https://download.docker.com/linux/ubuntu noble/stable amd64 containerd.io  
amd64 1.7.25-1 [29.6 MB]  
Get:3 http://mx.archive.ubuntu.com/ubuntu noble/main amd64 liberror-perl all 0.1  
7029-2 [25.6 kB]  
Get:4 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 git-man all 1  
:2.43.0-1ubuntu7.2 [1,100 kB]  
Get:5 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 git amd64 1:2  
.43.0-1ubuntu7.2 [3,679 kB]  
Get:6 http://mx.archive.ubuntu.com/ubuntu noble/main amd64 libslirp0 amd64 4.7.0  
-1ubuntu3 [63.8 kB]  
Get:7 http://mx.archive.ubuntu.com/ubuntu noble/universe amd64 slirp4netns amd64  
1.2.1-1build2 [34.9 kB]  
Get:8 https://download.docker.com/linux/ubuntu noble/stable amd64 docker-buildx-  
plugin amd64 0.19.3-1-ubuntu.24.04~noble [30.7 MB]  
Get:9 https://download.docker.com/linux/ubuntu noble/stable amd64 docker-ce-cli  
amd64 5:27.5.0-1~ubuntu.24.04~noble [15.2 MB]  
Get:10 https://download.docker.com/linux/ubuntu noble/stable amd64 docker-ce amd
```


Paso 8. Para asegurar que hemos instalado correctamente Docker y que podemos descargar imágenes, procesamos Hello World

`sudo docker run hello-world`



```
vboxuser@Ubuntu24041: ~
Status: Downloaded newer image for hello-world:latest

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
$ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
https://hub.docker.com/

For more examples and ideas, visit:
https://docs.docker.com/get-started/

vboxuser@Ubuntu24041:~$
```

Hello from Docker! nos indicará que está instalado correctamente.

En caso de que nos entregue un error de permiso denegado “permission denied” crear el grupo:

`sudo groupadd docker`

y después darle los permisos adecuados:

`sudo usermod -aG docker $USER`

Paso 9: Instalar OpenLane.

Recargar y actualizar paquetes:

`sudo apt-get update`

`sudo apt-get upgrade`

`sudo apt install -y build-essential python3 python3-venv python3-pip python3-tk curl make git`

```
vboxuser@Ubuntu24041: ~  
Share images, automate workflows, and more with a free Docker ID:  
https://hub.docker.com/  
  
For more examples and ideas, visit:  
https://docs.docker.com/get-started/  
  
vboxuser@Ubuntu24041:~$ sudo apt-get update  
sudo apt-get upgrade  
sudo apt install -y build-essential python3 python3-venv python3-pip python3-tk  
curl make git  
Hit:1 https://download.docker.com/linux/ubuntu noble InRelease  
Hit:2 http://mx.archive.ubuntu.com/ubuntu noble InRelease  
Get:3 http://mx.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]  
Hit:4 http://security.ubuntu.com/ubuntu noble-security InRelease  
Hit:5 http://mx.archive.ubuntu.com/ubuntu noble-backports InRelease  
Fetched 126 kB in 1s (113 kB/s)  
Reading package lists... Done  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
Calculating upgrade... Done  
The following package was automatically installed and is no longer required:  
python3-netifaces  
Use 'sudo apt autoremove' to remove it
```

Indicar Yes, cuando nos solicite actualizar lo que sea necesario.

Paso 10. Descargar OpenLane de Git e instalar:

```
cd $HOME  
git clone https://github.com/The-OpenROAD-Project/OpenLane
```

```
vboxuser@Ubuntu24041:~  
Setting up libjs-sphinxdoc (7.2.6-6) ...  
Setting up libgcc-13-dev:amd64 (13.3.0-6ubuntu2~24.04) ...  
Setting up libstdc++-13-dev:amd64 (13.3.0-6ubuntu2~24.04) ...  
Setting up binutils-x86-64-linux-gnu (2.42-4ubuntu2.3) ...  
Setting up libpython3-dev:amd64 (3.12.3-0ubuntu2) ...  
Setting up gcc-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...  
Setting up binutils (2.42-4ubuntu2.3) ...  
Setting up dpkg-dev (1.22.6ubuntu6.1) ...  
Setting up python3-dev (3.12.3-0ubuntu2) ...  
Setting up gcc-13 (13.3.0-6ubuntu2~24.04) ...  
Setting up g++-13-x86-64-linux-gnu (13.3.0-6ubuntu2~24.04) ...  
Setting up gcc-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...  
Setting up gcc (4:13.2.0-7ubuntu1) ...  
Setting up g++-x86-64-linux-gnu (4:13.2.0-7ubuntu1) ...  
Setting up g++-13 (13.3.0-6ubuntu2~24.04) ...  
Setting up g++ (4:13.2.0-7ubuntu1) ...  
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode  
Setting up build-essential (12.10ubuntu1) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...  
vboxuser@Ubuntu24041:~$ cd $HOME  
vboxuser@Ubuntu24041:~$ git clone https://github.com/The-OpenROAD-Project/OpenLa  
ne
```

En mi caso el proceso tardó aproximadamente 2 min

Paso 11: Verificar versiones

```
git --version  
docker --version  
python3 --version  
python3 -m pip --version  
make --version  
python3 -m venv -h
```

```
vboxuser@Ubuntu24041: ~  
Setting up g++-13 (13.3.0-6ubuntu2~24.04) ...  
Setting up g++ (4:13.2.0-7ubuntu1) ...  
update-alternatives: using /usr/bin/g++ to provide /usr/bin/c++ (c++) in auto mode  
Setting up build-essential (12.10ubuntu1) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...  
vboxuser@Ubuntu24041:~$ cd $HOME  
vboxuser@Ubuntu24041:~$ git clone https://github.com/The-OpenROAD-Project/OpenLane  
Cloning into 'OpenLane'...  
remote: Enumerating objects: 18712, done.  
remote: Counting objects: 100% (280/280), done.  
remote: Compressing objects: 100% (190/190), done.  
remote: Total 18712 (delta 193), reused 94 (delta 90), pack-reused 18432 (from 3)  
Receiving objects: 100% (18712/18712), 855.77 MiB | 9.40 MiB/s, done.  
Resolving deltas: 100% (13482/13482), done.  
vboxuser@Ubuntu24041:~$ git --version  
docker --version  
python3 --version  
python3 -m pip --version  
make --version  
python3 -m venv -h
```

En mi caso no fue necesario instalar o actualizar versiones:

```
root@boxuser@ubuntu24041:~$ gcc --version
gcc (Ubuntu 14.2.0-1ubuntu1) 14.2.0
Copyright (C) 2024 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

root@boxuser@ubuntu24041:~$ docker --version
Docker version 27.5.0, build a187fa5

root@boxuser@ubuntu24041:~$ python3 --version
Python 3.12.3

root@boxuser@ubuntu24041:~$ python3 -m pip --version
pip 24.0 from /usr/lib/python3/dist-packages/pip (python 3.12)

root@boxuser@ubuntu24041:~$ make --version
GNU Make 4.3
Built for x86_64-pc-linux-gnu
Copyright (C) 1988-2020 Free Software Foundation, Inc.
License GPLv3+: GNU GPL version 3 or later <http://gnu.org/licenses/gpl.html>
This is free software: you are free to change and redistribute it.
There is NO WARRANTY, to the extent permitted by law.
usage: venv [-h] [--system-site-packages] [--symlinks | --copies] [--clear]
            [--upgrade] [--without-pip] [--prompt PROMPT] [--upgrade-deps]
            ENV_DIR [ENV_DIR ...]

Creates virtual Python environments in one or more target directories.

positional arguments:
  ENV_DIR                A directory to create the environment in.
```

pero si alguna hiciera falta se deberán instalar con por ejemplo:

```
sudo apt install python3
```

```
sudo apt install make
```

Paso 12. Ahora ir al directorio de OpenLane

```
cd OpenLane
```

```
vboxuser@Ubuntu24041: ~/OpenLane
--symlinks      Try to use symlinks rather than copies, when symlinks
                are not the default for the platform.
--copies        Try to use copies rather than symlinks, even when
                symlinks are the default for the platform.
--clear         Delete the contents of the environment directory if it
                already exists, before environment creation.
--upgrade       Upgrade the environment directory to use this version
                of Python, assuming Python has been upgraded in-place.
--without-pip   Skips installing or upgrading pip in the virtual
                environment (pip is bootstrapped by default)
--prompt PROMPT Provides an alternative prompt prefix for this
                environment.
--upgrade-deps  Upgrade core dependencies (pip) to the latest version
                in PyPI

Once an environment has been created, you may wish to activate it, e.g. by
sourcing an activate script in its bin directory.
vboxuser@Ubuntu24041:~$ cd OpenLane
bash: cd: OpenLane: No such file or directory
vboxuser@Ubuntu24041:~$ ls
Desktop  Downloads  OpenLane  Public  Templates
Documents Music      Pictures  snap    Videos
vboxuser@Ubuntu24041:~$ cd OpenLane
vboxuser@Ubuntu24041:~/OpenLane$
```

Paso 13. Compilar con make

make

```
vboxuser@Ubuntu24041: ~/OpenLane
vboxuser@Ubuntu24041:~$ ls
Desktop  Downloads  OpenLane  Public  Templates
Documents  Music      Pictures  snap    Videos
vboxuser@Ubuntu24041:~$ cd OpenLane
vboxuser@Ubuntu24041:~/OpenLane$ make
Permission denied while trying to connect to the Docker daemon socket at unix://
/var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.47/info": dial u
nix /var/run/docker.sock: connect: permission denied
'NoneType' object is not iterable
Traceback (most recent call last):
  File "/home/vboxuser/OpenLane/./env.py", line 242, in <module>
    main()
  File "/home/vboxuser/OpenLane/./env.py", line 238, in main
    commands[args[0]]()
  File "/home/vboxuser/OpenLane/./env.py", line 53, in docker_config
    raise Exception("No container engine found.")
Exception: No container engine found.
make[1]: Entering directory '/home/vboxuser/OpenLane'
Permission denied while trying to connect to the Docker daemon socket at unix://
/var/run/docker.sock: Get "http://%2Fvar%2Frun%2Fdocker.sock/v1.47/info": dial u
nix /var/run/docker.sock: connect: permission denied
'NoneType' object is not iterable
Traceback (most recent call last):
  File "/home/vboxuser/OpenLane/./env.py", line 242, in <module>
```

Si nos aparece un error de permiso denegado, agregar un grupo llamado docker

```
sudo groupadd docker
```

después elevar los permisos al superuser con:

```
sudo usermod -aG docker $USER
```



```
vboxuser@Ubuntu24041: ~/OpenLane
commands[args[0]]()
File "/home/vboxuser/OpenLane/./env.py", line 53, in docker_config
    raise Exception("No container engine found.")
Exception: No container engine found.
make[2]: Entering directory '/home/vboxuser/OpenLane/docker'
NIX_SYSTEM=x86_64-linux BUILD_ARCH=amd64 bash build.sh
+ set -e
++ nix build --no-link --print-out-paths --accept-flake-config --option system x
86_64-linux --extra-platforms x86_64-linux ..#packages.x86_64-linux.openlane1-do
cker
build.sh: line 10: nix: command not found
+ TARBALL=
make[2]: *** [Makefile:13: openlane] Error 127
make[2]: Leaving directory '/home/vboxuser/OpenLane/docker'
make[1]: *** [Makefile:117: openlane] Error 2
make[1]: Leaving directory '/home/vboxuser/OpenLane'
make: *** [Makefile:128: get-openlane] Error 2
vboxuser@Ubuntu24041:~/OpenLane$ sudo groupadd docker
[sudo] password for vboxuser:
groupadd: group 'docker' already exists
vboxuser@Ubuntu24041:~/OpenLane$ sudo usermod -aG docker SUSER
usermod: user 'SUSER' does not exist
vboxuser@Ubuntu24041:~/OpenLane$ sudo usermod -aG docker $USER
vboxuser@Ubuntu24041:~/OpenLane$
```

Paso 13. reiniciar la PC o la máquina virtual

Paso 14. ir a la carpeta de OpenLane

```
cd OpenLane
```

Paso 15 procesar de nuevo make para compilar:

```
make
```

```
vboxuser@Ubuntu24041: ~/OpenLane
vboxuser@Ubuntu24041:~$ ls
Desktop  Downloads  OpenLane  Public  Templates
Documents  Music      Pictures  snap    Videos
vboxuser@Ubuntu24041:~$ cd OpenLane
vboxuser@Ubuntu24041:~/OpenLane$ make
make[1]: Entering directory '/home/vboxuser/OpenLane'
e73fb3c57e687a0023fcd4dcfd1566ecd478362a: Pulling from efabless/openlane
179340cb63c1: Downloading 52.12MB/1.082GB
9a74878b22d9: Download complete
```

El proceso tardó aproximadamente 4 minutos

Paso 16, Una vez que OpenLane fué instalado satisfactoriamente, realizar una prueba de la instalación mediante el script test el cual procesará el proyecto spm que viene definido por defecto en OpenLane, para ello:

```
make test
```

```
vboxuser@Ubuntu24041: ~/OpenLane
Downloading certifi-2024.12.14-py3-none-any.whl (164 kB)
Downloading h11-0.14.0-py3-none-any.whl (58 kB)
Downloading mdurl-0.1.2-py3-none-any.whl (10.0 kB)
Downloading sniffio-1.3.1-py3-none-any.whl (10 kB)
Downloading typing_extensions-4.12.2-py3-none-any.whl (37 kB)
Installing collected packages: pcpp, zstandard, typing_extensions, sniffio, pygments, mdurl, idna, h11, certifi, markdown-it-py, httpcore, anyio, rich, httpx, volare
Successfully installed anyio-4.8.0 certifi-2024.12.14 h11-0.14.0 httpcore-1.0.7 httpx-0.28.1 idna-3.10 markdown-it-py-3.0.0 mdurl-0.1.2 pcpp-1.30 pygments-2.19.1 rich-13.9.4 sniffio-1.3.1 typing_extensions-4.12.2 volare-0.20.5 zstandard-0.23.0
./venv/bin/volare enable --pdk sky130
Version bdc9412b3e468c102d01b7cf6337be06ec6e9c9a not found locally, attempting to download...
Downloading common.tar.zst... 100% 0:00:00
Downloading sky130_fd_io.tar.zst... 100% 0:00:00
Downloading sky130_fd_pr.tar.zst... 100% 0:00:00
Downloading sky130_fd_sc_hd.tar.zst... 100% 0:00:00
Downloading sky130_fd_sc_hvl.tar.zst... 100% 0:00:00
Downloading sky130_ml_xx_hd.tar.zst... 100% 0:00:00
Downloading sky130_sram_macros.tar.zst... 100% 0:00:00
Version bdc9412b3e468c102d01b7cf6337be06ec6e9c9a enabled for the sky130 PDK.
vboxuser@Ubuntu24041:~/OpenLane$ make test
```

El proceso tardó aproximadamente 1 min y el resultado debe ser satisfactorio: “Basic test passed”

```
vboxuser@Ubuntu24041: ~/OpenLane
[STEP 41]
[INFO]: Running OpenROAD Antenna Rule Checker (log: designs/spm/runs/openlane_test/logs/signoff/41-arc.log)...
[INFO]: Saving current set of views in 'designs/spm/runs/openlane_test/results/final'...
[INFO]: Saving runtime environment...
[INFO]: Generating final set of reports...
[INFO]: Created manufacturability report at 'designs/spm/runs/openlane_test/reports/manufacturability.rpt'.
[INFO]: Created metrics report at 'designs/spm/runs/openlane_test/reports/metrics.csv'.
[INFO]: There are no max slew, max fanout or max capacitance violations in the design at the Typical corner.
[INFO]: There are no hold violations in the design at the Typical corner.
[INFO]: There are no setup violations in the design at the Typical corner.
[SUCCESS]: Flow complete.
[INFO]: Note that the following warnings have been generated:
[WARNING]: VSRC_LOC_FILES was not given a value, which may make the results of R drop analysis inaccurate. If you are not integrating a top-level chip for manufacture, you may ignore this warning, otherwise, see the documentation for VSRC_LOC_FILES.

Basic test passed
vboxuser@Ubuntu24041: ~/OpenLane$
```

Si todo bien, en este momento podremos procesar algún otro proyecto, para ello:

Paso 17 Montar el ambiente de OpenLane con make mount

make mount

```
vboxuser@Ubuntu24041: ~/OpenLane
while executing
"package require json"
  (file "/home/vboxuser/OpenLane/scripts/tcl_commands/all.tcl" line 15)
  invoked from within
"source $file"
  ("foreach" body line 2)
  invoked from within
"foreach file [glob $scripts_dir/tcl_commands/*.tcl] {
  source $file
}"
  (file "/home/vboxuser/OpenLane/scripts/openlane-1.1.1.tm" line 15)
  invoked from within
"source -encoding utf-8 /home/vboxuser/OpenLane/scripts/openlane-1.1.1.tm"
  ("package ifneeded openlane 1.1.1" script)
  invoked from within
"package require openlane"
  (file "./flow.tcl" line 25)
vboxuser@Ubuntu24041:~/OpenLane$ make mount
cd /home/vboxuser/OpenLane && \
    docker run --rm -v /home/vboxuser:/home/vboxuser -v /home/vboxuser/OpenLane:/openlane -v /home/vboxuser/OpenLane/empty:/openlane/install -v /home/vboxuser/.volare:/home/vboxuser/.volare -e PDK_ROOT=/home/vboxuser/.volare -e PDK=sky130A --user 1000:1000 -e DISPLAY=:0 -v /tmp/.X11-unix:/tmp/.X11-unix -v /home/vb
```

Paso 18. Ahora ya se pueden ingresar diferentes comandos por ejemplo para el proyecto de ejemplo spm:

`./flow.tcl -design spm`

tiempo aproximado 2 minutos

```
vboxuser@Ubuntu24041: ~/OpenLane
"package require openlane"
(file "./flow.tcl" line 25)
vboxuser@Ubuntu24041:~/OpenLane$ make mount
cd /home/vboxuser/OpenLane && \
    docker run --rm -v /home/vboxuser:/home/vboxuser -v /home/vboxuser/OpenLane:/openlane -v /home/vboxuser/OpenLane/empty:/openlane/install -v /home/vboxuser/.volare:/home/vboxuser/.volare -e PDK_ROOT=/home/vboxuser/.volare -e PDK=sky130A --user 1000:1000 -e DISPLAY=:0 -v /tmp/.X11-unix:/tmp/.X11-unix -v /home/vboxuser/.Xauthority:/Xauthority --network host --security-opt seccomp=unconfined -ti efabless/openlane:e73fb3c57e687a0023fcd4dcfd1566ecd478362a-amd64
OpenLane Container (1.1.1):/openlane% ./flow.tcl -design spm
OpenLane v1.1.1 (e73fb3c57e687a0023fcd4dcfd1566ecd478362a)
All rights reserved. (c) 2020-2024 Efabless Corporation and contributors.
Available under the Apache License, version 2.0. See the LICENSE file for more details.

[INFO]: Using configuration in 'designs/spm/config.json'...
[INFO]: Process Design Kit: sky130A
[INFO]: PDK Root: /home/vboxuser/.volare
[INFO]: Standard Cell Library: sky130_fd_sc_hd
[INFO]: Optimization Standard Cell Library: sky130_fd_sc_hd
[INFO]: Run Directory: /openlane/designs/spm/runs/RUN_2025.01.19_03.11.35
[INFO]: Saving runtime environment...
[INFO]: Preparing LEF files for the nom corner...
```

Tiempo 2 min.

Fin. De Instalacion de OpenLane

Como visualizar los archivos gds. Instalación de iverilog

paso 19. Instalar IveriLog

```
sudo apt install iverilog
```

```
vboxuser@Ubuntu24041:~$ sudo apt install iverilog
[sudo] password for vboxuser:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  python3-netifaces
Use 'sudo apt autoremove' to remove it.
Suggested packages:
  gtkwave
The following NEW packages will be installed:
  iverilog
0 upgraded, 1 newly installed, 0 to remove and 4 not upgraded.
Need to get 2,126 kB of archives.
After this operation, 6,828 kB of additional disk space will be used.
Get:1 http://mx.archive.ubuntu.com/ubuntu noble/universe amd64 iverilog amd64 12.0-2build2 [2,126 kB]
Fetched 2,126 kB in 2s (1,137 kB/s)
Selecting previously unselected package iverilog.
(Reading database ... 153328 files and directories currently installed.)
Preparing to unpack .../iverilog_12.0-2build2_amd64.deb ...
Unpacking iverilog (12.0-2build2) ...
Setting up iverilog (12.0-2build2) ...
Processing triggers for man-db (2.12.0-4build2) ...
```

Paso 2. Actualizar paquetes

`sudo apt-get update`


```
vboxuser@Ubuntu24041: ~  
(Reading database ... 153328 files and directories currently installed.)  
Preparing to unpack .../iverilog_12.0-2build2_amd64.deb ...  
Unpacking iverilog (12.0-2build2) ...  
Setting up iverilog (12.0-2build2) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
vboxuser@Ubuntu24041:~$ sudo apt-get update  
Hit:1 https://download.docker.com/linux/ubuntu noble InRelease  
Hit:2 http://mx.archive.ubuntu.com/ubuntu noble InRelease  
Get:3 http://mx.archive.ubuntu.com/ubuntu noble-updates InRelease [126 kB]  
Get:4 http://security.ubuntu.com/ubuntu noble-security InRelease [126 kB]  
Get:5 http://mx.archive.ubuntu.com/ubuntu noble-backports InRelease [126 kB]  
Get:6 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 Packages [775  
kB]  
Get:7 http://mx.archive.ubuntu.com/ubuntu noble-updates/main amd64 Components [1  
51 kB]  
Get:8 http://mx.archive.ubuntu.com/ubuntu noble-updates/restricted amd64 Compone  
nts [212 B]  
Get:9 http://mx.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Packages  
[974 kB]  
Get:10 http://security.ubuntu.com/ubuntu noble-security/main amd64 Components [7  
,232 B]  
Get:11 http://mx.archive.ubuntu.com/ubuntu noble-updates/universe amd64 Compon  
ts [309 kB]  
Get:12 http://mx.archive.ubuntu.com/ubuntu noble-updates/multiverse amd64 Compon
```

Paso 3, Instalar Klayout

```
sudo apt-get install klayout
```

```
vboxuser@Ubuntu24041:~$ sudo apt-get install klayout
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following package was automatically installed and is no longer required:
  python3-netifaces
Use 'sudo apt autoremove' to remove it.
The following additional packages will be installed:
  fonts-lato libdouble-conversion3 libgit2-1.7 libhttp-parser2.9 libmd4c0
  libpcre2-16-0 libqt5core5t64 libqt5dbus5t64 libqt5designer5 libqt5gui5t64
  libqt5multimedia5 libqt5multimediawidgets5 libqt5network5t64
  libqt5printsupport5t64 libqt5qml5 libqt5qmlmodels5 libqt5quick5
  libqt5sql5-sqlite libqt5sql5t64 libqt5svg5 libqt5waylandclient5
  libqt5waylandcompositor5 libqt5widgets5t64 libqt5xml5t64 libqt5xmlpatterns5
  libruby libruby3.2 libssh2-1t64 libxcb-xinerama0 libxcb-xinput0
  qt5-gtk-platformtheme qttranslations5-l10n qtwayland5 rake ruby
  ruby-net-telnet ruby-rubygems ruby-sdbm ruby-webrick ruby-xmlrpc ruby3.2
  rubygems-integration
Suggested packages:
  qgnomeplatform-qt5 qt5-image-formats-plugins qt5-qmltooling-plugins ri
  ruby-dev bundler
The following NEW packages will be installed:
  fonts-lato klayout libdouble-conversion3 libgit2-1.7 libhttp-parser2.9
  libmd4c0 libpcre2-16-0 libqt5core5t64 libqt5dbus5t64 libqt5designer5
```

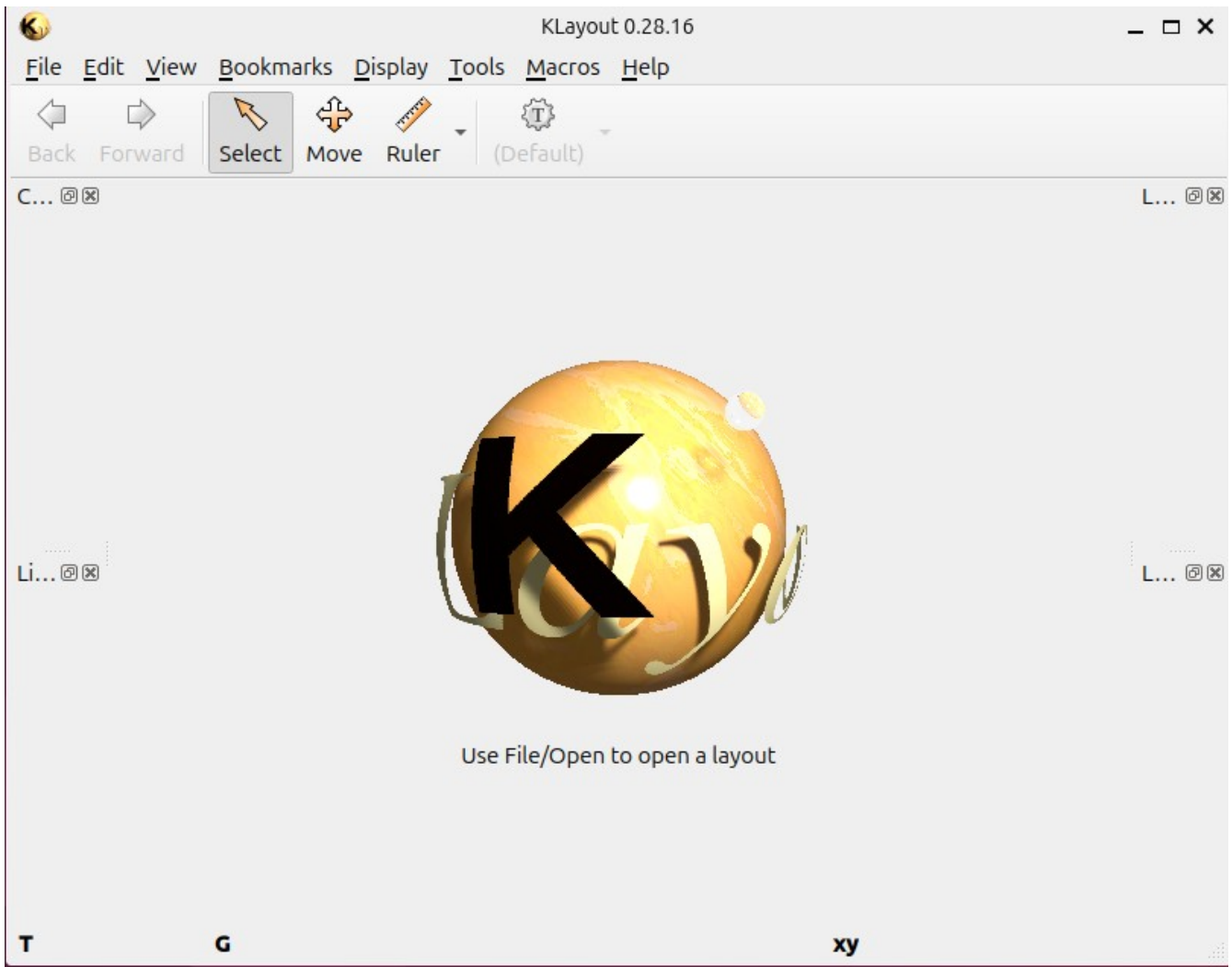
Indicar que si (Y) para autorizar la instalación de 299MB de espacio.

Paso 4. Correr Klayout

klayout

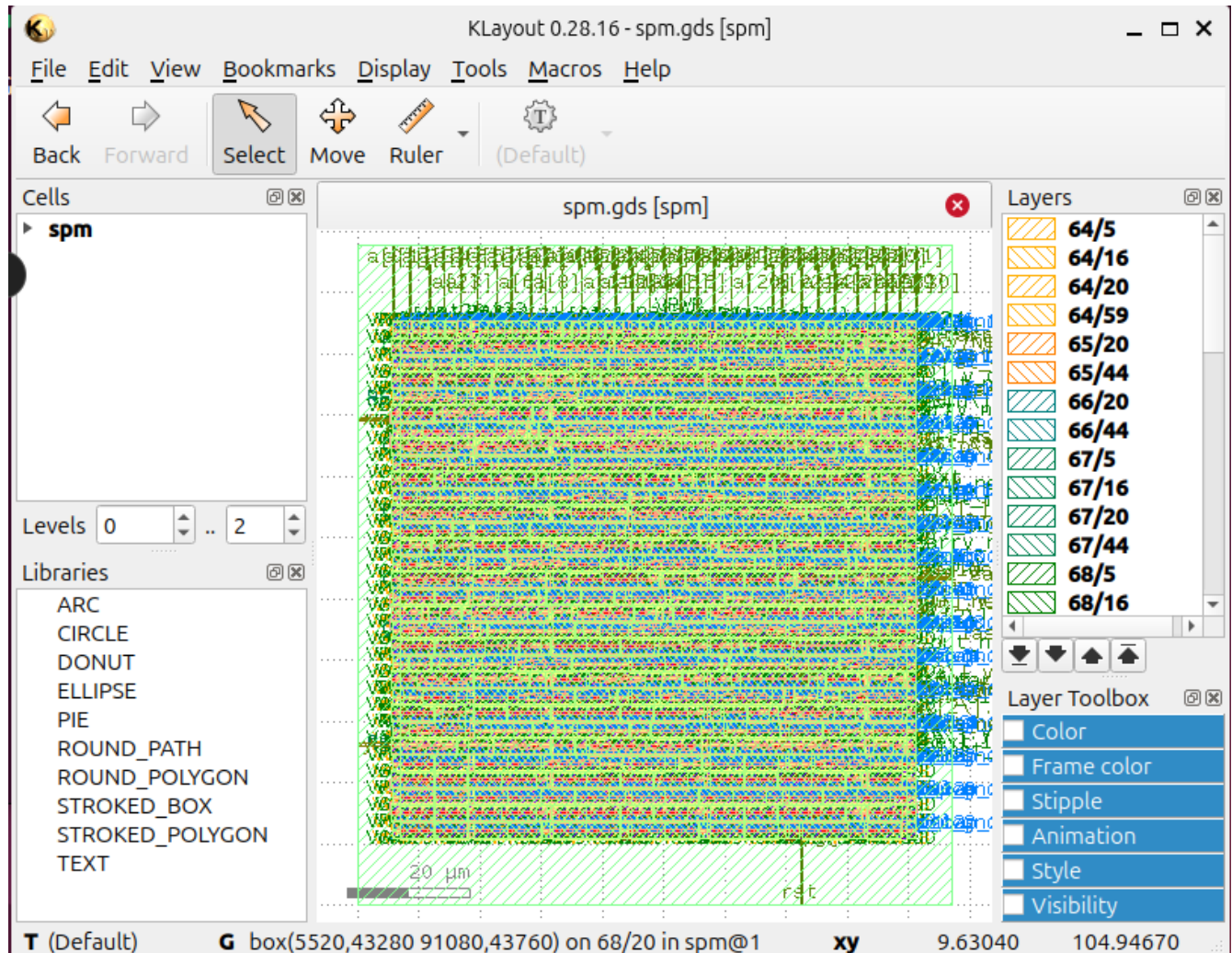
```
vboxuser@Ubuntu24041: ~  
Setting up libqt5svg5:amd64 (5.15.13-1) ...  
Setting up qt5-gtk-platformtheme:amd64 (5.15.13+dfsg-1ubuntu1) ...  
Setting up libqt5waylandclient5:amd64 (5.15.13-1) ...  
Setting up libqt5multimedia5:amd64 (5.15.13-1) ...  
Setting up libqt5multimediawidgets5:amd64 (5.15.13-1) ...  
Setting up libqt5quick5:amd64 (5.15.13+dfsg-1) ...  
Setting up libqt5printsupport5t64:amd64 (5.15.13+dfsg-1ubuntu1) ...  
Setting up libqt5designer5:amd64 (5.15.13-1) ...  
Setting up libqt5waylandcompositor5:amd64 (5.15.13-1) ...  
Setting up qtwayland5:amd64 (5.15.13-1) ...  
Setting up rake (13.0.6-3) ...  
Setting up libruby:amd64 (1:3.2~ubuntu1) ...  
Setting up ruby-sdbm:amd64 (1.0.0-5build4) ...  
Setting up libruby3.2:amd64 (3.2.3-1ubuntu0.24.04.3) ...  
Setting up ruby3.2 (3.2.3-1ubuntu0.24.04.3) ...  
Setting up klayout (0.28.16-0ubuntu0.24.04.1) ...  
Setting up ruby (1:3.2~ubuntu1) ...  
Setting up ruby-rubygems (3.4.20-1) ...  
Processing triggers for man-db (2.12.0-4build2) ...  
Processing triggers for fontconfig (2.15.0-1.1ubuntu2) ...  
Processing triggers for desktop-file-utils (0.27-2build1) ...  
Processing triggers for gnome-menus (3.36.0-1.1ubuntu3) ...  
Processing triggers for libc-bin (2.39-0ubuntu8.3) ...  
vboxuser@Ubuntu24041:~$ klayout
```

Se verá de la siguiente manera:



Ahora, ya estamos listos para abrir un archivo de definición de la geometría gds: Ir al archivo gds que se creó con el test anterior, clic en File → Open y la ruta en mi caso es: OpenLane/designs/spm/runs/openlane_test/results/final/gds/ y escoger el archivo spm.gds dando clic en “open”

inmediatamente se abrirá la geometría:



Con esto aseguran que todo está funcionando correctamente.

Fin.