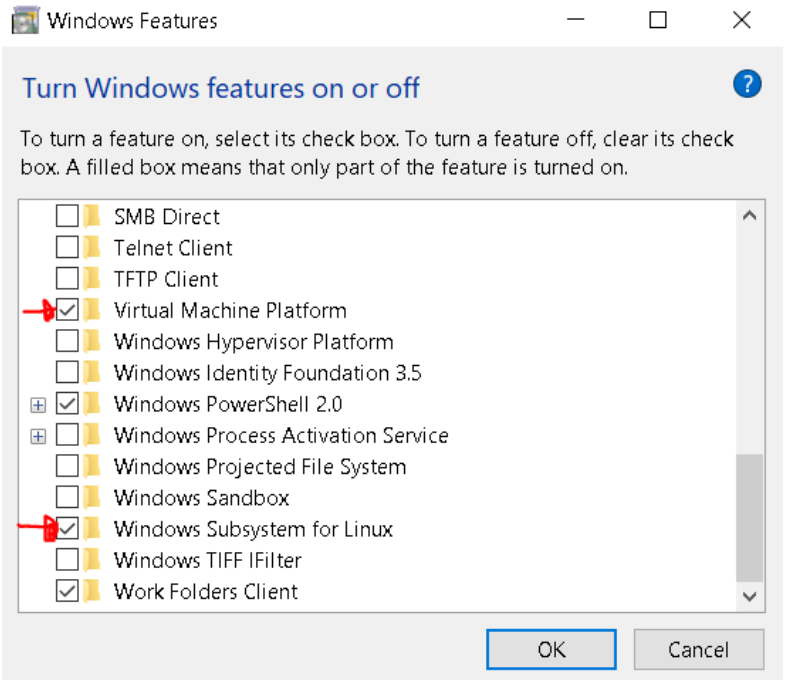
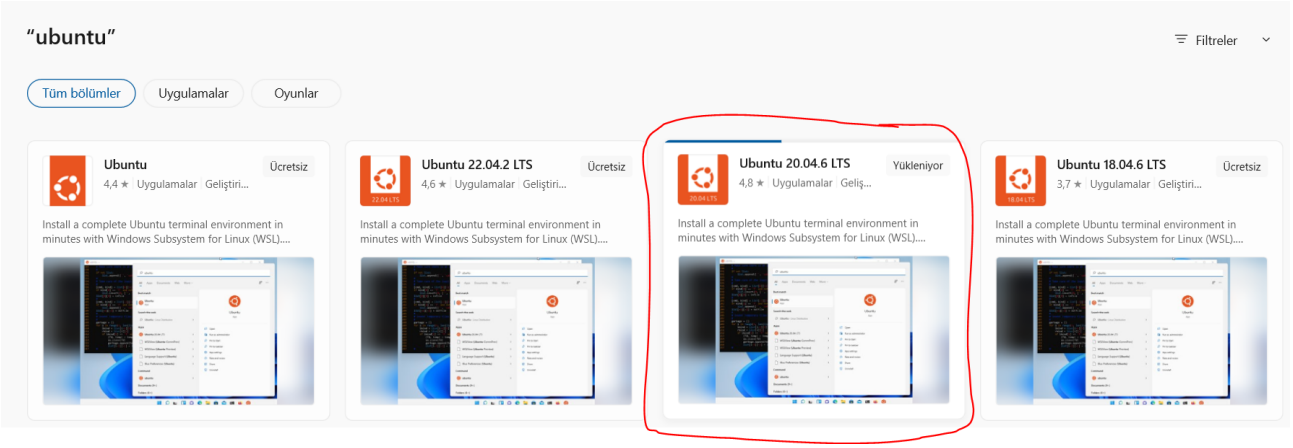
For Windows

1. Enable the Virtual Machine Platform and Windows Subsystem for Linux features.
    - Open Start and search for Turn Windows features on or off.
    - In the Turn Windows features on or off window, scroll down to the Virtual Machine Platform and Windows Subsystem for Linux features and check the boxes next to them.
    - Click OK to install the features.
    - Restart the machine



2. Install a Linux distribution.
    - Open the Microsoft Store and search for Ubuntu.
    - Click on Ubuntu 20.04 and then click on the Get button to install it.



3. Open the Ubuntu 20.04.
    - Click on the Start menu and type the name of the Ubuntu that you installed.
    - Click on Ubuntu to open it.
4. Create a username and password.
    - When you open the Linux distribution for the first time, you will be prompted to create a username and password.
    - Create a username and password that you will remember.
5. From Ubuntu terminal, update package lists and install pip
    - `sudo apt update`
    - `sudo apt install python3-pip`
6. Check whether they installed correctly
    - `which python3`
    - `which pip`
7. Install necessary libraries respectively
    - `sudo apt install liblapack3`
    - `sudo apt install freeglut3`
    - `sudo apt install libglew-dev`
8. pip-install robotic and dependencies (numpy, scipy)
    - `python3 -m pip install --user robotic numpy scipy`

So we are in a good shape, let's test our installation:

```
python3 -c 'from robotic import ry; print("ry version:", ry.__version__, ry.compiled());'
```

Expected output:

```
berk@DESKTOP-2AAL369:~$ python3 -c 'from robotic import ry; print("ry version:", ry.__version__, ry.compiled());'
ry version: 0.0.17 compile time: Sep  2 2023 17:23:08
```

```
python3 -c 'from robotic import ry; ry.test.RndScene()'
```

Expected output:

When you run the above code, it is normal to get a long output ending with the below error:

```
== ERROR:opengl.cpp:error_callback:353(-2) GLFW error 65544: X11: The DISPLAY environment variable is missing
terminate called after throwing an instance of 'std::runtime_error'
  what():  opengl.cpp:error_callback:353(-2) GLFW error 65544: X11: The DISPLAY environment variable is missing
Aborted (core dumped)
```

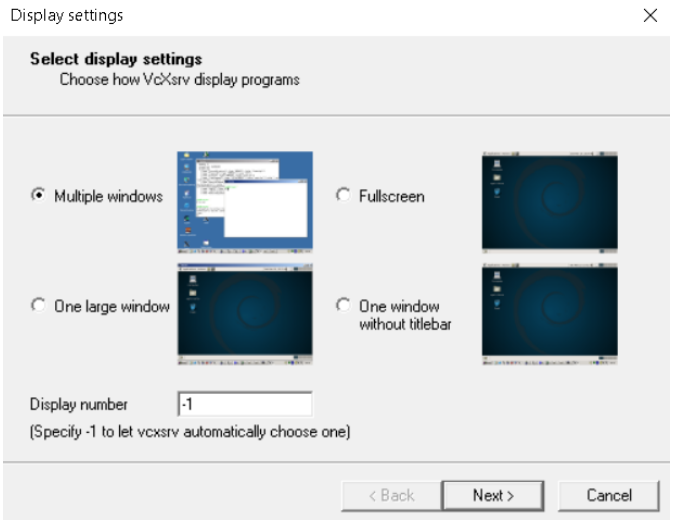
We get this error since we use WSL and it cannot use the graphical interface of local machine by default. Thus, we should adjust the display settings.

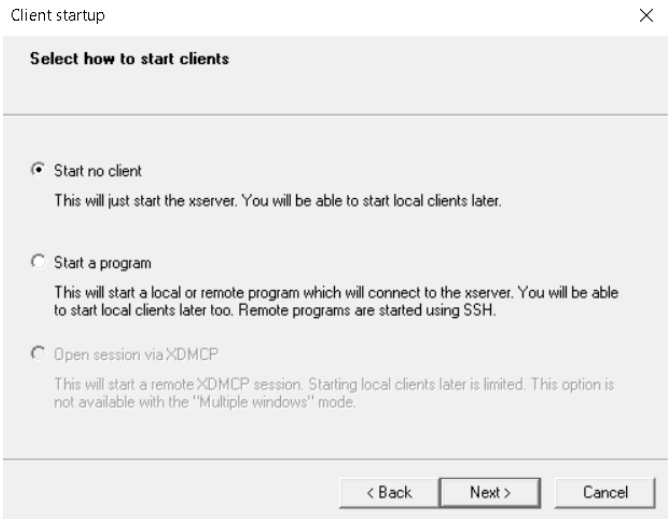
Display settings

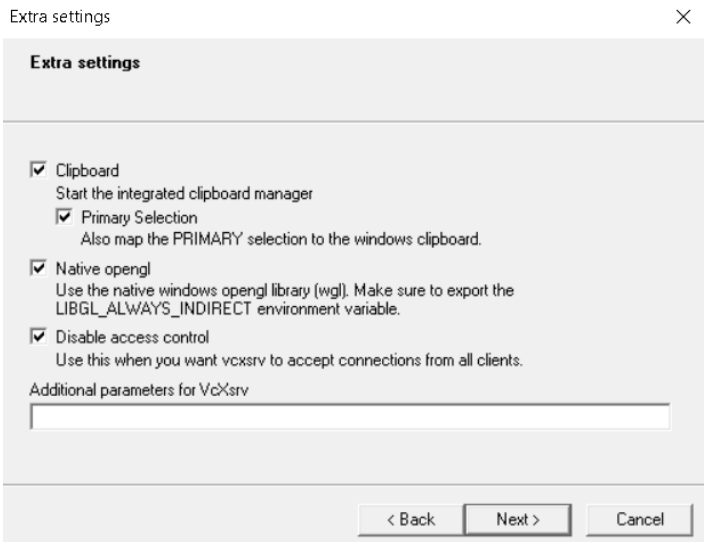
In order to solve the graphical interface problem, we should install X-server.

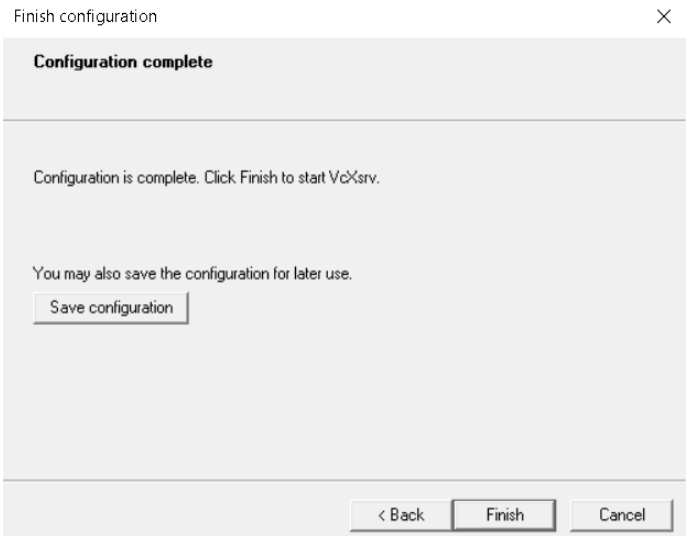
9. Download, “VcXsrv” from this link below (use default settings):
https://sourceforge.net/projects/vcxsrv/

10. Run the xlaunch, follow the below configuration:









11. set DISPLAY environment variable:

    - `export DISPLAY=:0`

Check DISPLAY environment variable (it should be “0”):

```
echo $DISPLAY
```

Once you have set the DISPLAY environment variable, you should be able to run graphical applications in Ubuntu WSL.

**********Note**********
`export DISPLAY=:0`

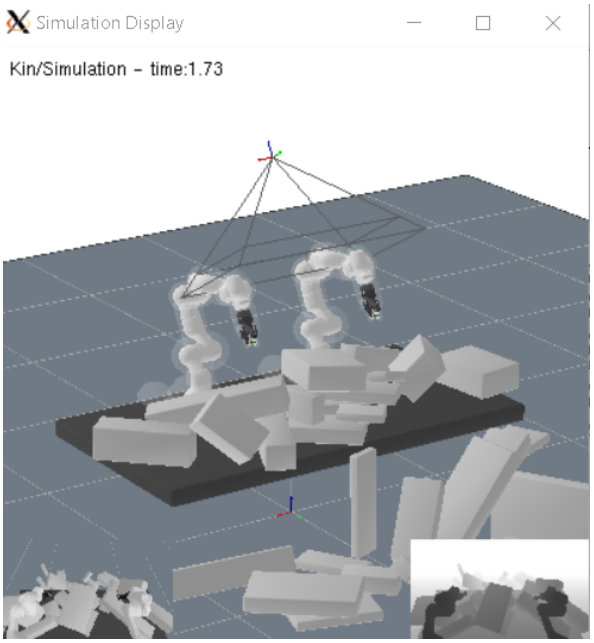
You should do this every time you start new terminal

You should also start X server (VcXsrv) every time you start
****

TEST:

```
python3 -c 'from robotic import ry; ry.test.RndScene()'
```

Now you should see the below window (Then you are finally fine:))



For Ubuntu

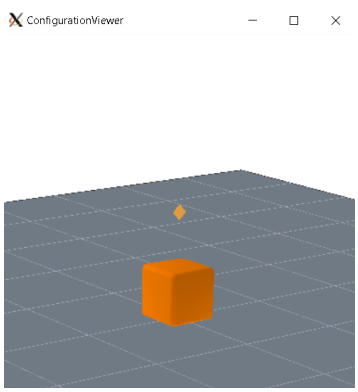
You should just run these two commands 🙂

```
sudo apt install liblapack3 freeglut3 libglew-dev python3 python3-pip

python3 -m pip install --user robotic numpy scipy
```

Test:

```
python3 -c 'from robotic import ry; print("ry version:", ry.__version__, ry.compiled());'

python3 -c 'from robotic import ry; ry.test.RndScene()'
```

Example picture from tutorial:



Source: https://github.com/MarcToussaint/rai-python