Labwork 1: Running the first script

Subjects	Network Simulation
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Run the program

Explain the scenario

What protocols are implemented in the example?

What are the sender and receiver? How network traffic is generated?

Consider a C++ program ../ns-3.39/example/tutorial/first.cc in the source code of NS-3 (you installed in your computer)

1. Run the program
2. Explain the scenario
3. What protocols are implemented in the example?
4. What are the sender and receiver? How network traffic is generated?

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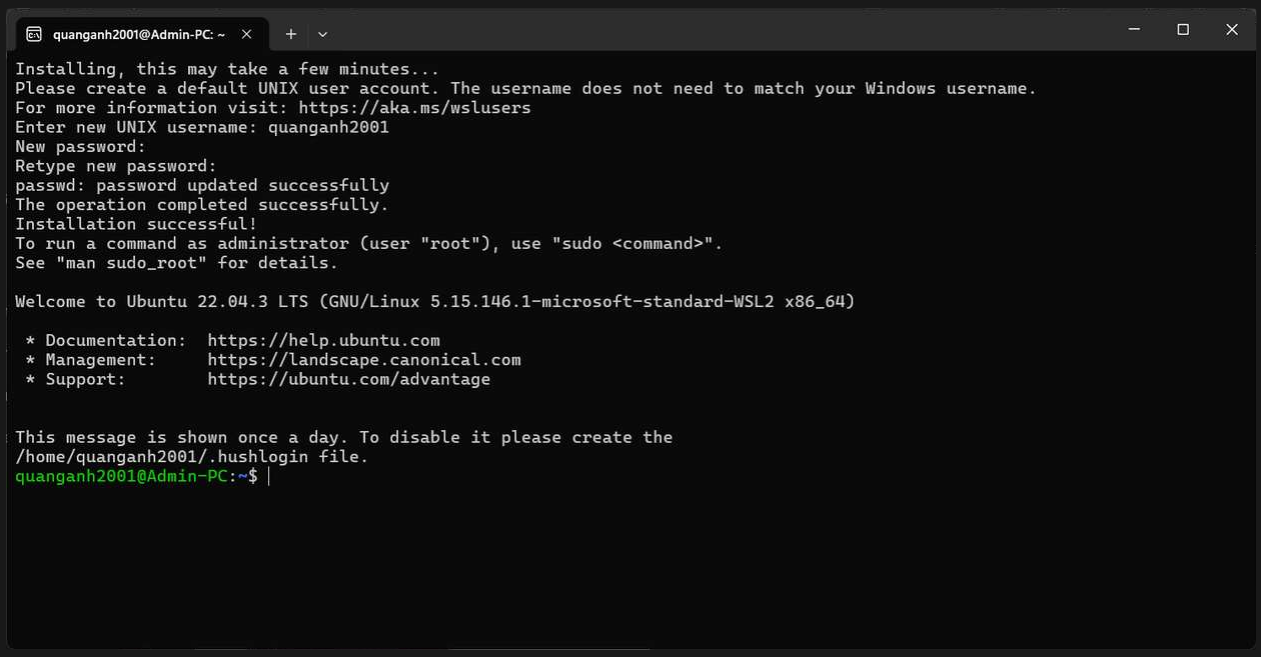
My solution

Run the program

I go to Microsoft Store download Ubuntu 22.04.3 LTS

But before install Ubuntu, you should enable WSL and Virtual Machine Platform. Then go to Windows PowerShell run `wsl.exe --update`. Set default WSL 2: `wsl --set-default-version 2`

Then run Ubuntu again, and the result is:



The first command to do is (You can just copy-paste the following in your terminal window)

`sudo apt update`

```
sudo apt install g++ python3 cmake ninja-build git gir1.2-goocanvas-2.0 python3-gi python3-gi-cairo python3-pygraphviz gir1.2-gtk-3.0 ipython3 tcpdump wireshark sqlite sqlite3 libsqlite3-dev qtbase5-dev qtchooser qt5-qmake qtbase5-dev-tools openmpi-bin openmpi-common openmpi-doc libopenmpi-dev doxygen graphviz imagemagick python3-sphinx dia imagemagick texlive dvipng latexmk texlive-extra-utils texlive-latex-extra texlive-font-utils libeigen3-dev gsl-bin libgsl-dev libgslcblas0 libxml2 libxml2-dev libgtk-3-dev lxc-utils lxc-templates vtun uml-utilities ebtables bridge-utils libxml2 libxml2-dev libboost-all-dev ccache
```

Let the installation run, in the meantime, we will download ns3 from the website nsnam.org. I will choose NS-3 version is 3.39

Type: `wget https://www.nsnam.org/releases/ns-allinone-3.39.tar.bz2`. Then extract file.

Go to:

```
cd ns-allinone-3.39/ ./build.py --enable-examples --enable-tests
```

(This above line will install all the packages for ns3 along with netanim, flow monitor, protocol, applications, etc.)
Depending on your system, the time can be anywhere between 20 minutes to sometimes 1 hour (in the case I use network from USTH networks, so network speed may be slow times)

Installation is completed. To check whether they are working, use the following command:

```
cd ns-allinone-3.39/ns-3.39/ ./ns3 run hello-simulator ./ns3 --run scratch-si
mulator
```

Try C++ program tutorial:

```
./ns3 run example/tutorial/first.cc
```

After running the program, this is the result:

```
At time +2s client sent 1024 bytes to 10.1.1.2 port 9
At time +2.00369s server received 1024 bytes from 10.1.1.1 port 49153
At time +2.00369s server sent 1024 bytes to 10.1.1.1 port 49153
At time +2.00737s client received 1024 bytes from 10.1.1.2 port 9
```

Explain the scenario

IP address of the client is 10.1.1.1

IP address of the server is 10.1.1.2

- Firstly, the client sent a request which is 1024 bytes to the server by port 9
- Then, the server received the request at port 49153
- As soon as possible, the server sent a response back to the client with the same port 49153
- Finally, the server received the response from port 9

What protocols are implemented in the example?

- UDP - User Datagram Protocol and IPv4 - Internet Protocol version 4 are the protocols implemented in the example

What are the sender and receiver? How network traffic is generated?

- The sender is the client and the receiver is the server
- The network traffic is generated by a single point-to-point link between two nodes.
- With two applications are UdpEchoServerHelper and UdpEchoClientHelper, it helps us to generate traffic.