CN-Lab2 Report

- Describe each step and how to run your program

  1. Run `cp examples/tutorial/first.cc scratch/111550073.cc` to duplicate first.cc to scratch/ called StudentID.cc

```
cn2023-lab1@cn2023lab1-VirtualBox:~/src/workspace/ns-3-allinone/ns-3-dev$ cp examples/tutorial/first.cc scratch/111550073.cc
```

```
cn2023-lab1@cn2023lab1-VirtualBox:~/src/workspace/ns-3-allinone/ns-3-dev$ ls scratch/
111550073.cc  CMakeLists.txt  nested-subdir  scratch-simulator.cc  subdir
```

  2. Modify scratch/111550073.cc

  3. Run `./ns3 build` to build the script

```
cn2023-lab1@cn2023lab1-VirtualBox:~/src/workspace/ns-3-allinone/ns-3-dev$ ./ns3 build

Scanning dependencies of target scratch_111550073
[  0%] Building CXX object scratch/CMakeFiles/scratch_111550073.dir/111550073.cc.o
[  0%] Linking CXX executable ../../build/scratch/ns3-dev-111550073-default
Finished executing the following commands:
/usr/bin/cmake --build /home/cn2023-lab1/src/workspace/ns-3-allinone/ns-3-dev/cmake-cache -j 1
```

  4. Run `./ns3 run scratch/111550073` and we see the following outputs

```
cn2023-lab1@cn2023lab1-VirtualBox:~/src/workspace/ns-3-allinone/ns-3-dev$ ./ns3 run scratch/111550073
At time +2s client sent 1024 bytes to 10.0.1.2 port 99
At time +2s client sent 1024 bytes to 10.0.2.2 port 98
At time +2.00481s server received 1024 bytes from 10.0.2.1 port 49154
At time +2.00481s server sent 1024 bytes to 10.0.2.1 port 49154
At time +2.00622s server received 1024 bytes from 10.0.1.1 port 49153
At time +2.00622s server sent 1024 bytes to 10.0.1.1 port 49153
At time +2.00962s client received 1024 bytes from 10.0.2.2 port 98
At time +2.01243s client received 1024 bytes from 10.0.1.2 port 99
At time +3s client sent 1024 bytes to 10.0.1.2 port 99
At time +3s client sent 1024 bytes to 10.0.2.2 port 98
At time +3.00481s server received 1024 bytes from 10.0.2.1 port 49154
At time +3.00481s server sent 1024 bytes to 10.0.2.1 port 49154
At time +3.00622s server received 1024 bytes from 10.0.1.1 port 49153
At time +3.00622s server sent 1024 bytes to 10.0.1.1 port 49153
At time +3.00962s client received 1024 bytes from 10.0.2.2 port 98
At time +3.01243s client received 1024 bytes from 10.0.1.2 port 99
At time +4s client sent 1024 bytes to 10.0.1.2 port 99
At time +4s client sent 1024 bytes to 10.0.2.2 port 98
At time +4.00481s server received 1024 bytes from 10.0.2.1 port 49154
At time +4.00481s server sent 1024 bytes to 10.0.2.1 port 49154
At time +4.00622s server received 1024 bytes from 10.0.1.1 port 49153
At time +4.00622s server sent 1024 bytes to 10.0.1.1 port 49153
At time +4.00962s client received 1024 bytes from 10.0.2.2 port 98
At time +4.01243s client received 1024 bytes from 10.0.1.2 port 99
At time +5s client sent 1024 bytes to 10.0.1.2 port 99
At time +5s client sent 1024 bytes to 10.0.2.2 port 98
At time +5.00481s server received 1024 bytes from 10.0.2.1 port 49154
At time +5.00481s server sent 1024 bytes to 10.0.2.1 port 49154
At time +5.00622s server received 1024 bytes from 10.0.1.1 port 49153
At time +5.00622s server sent 1024 bytes to 10.0.1.1 port 49153
At time +5.00962s client received 1024 bytes from 10.0.2.2 port 98
At time +5.01243s client received 1024 bytes from 10.0.1.2 port 99
```

- Answer the following question in short:

- What is the different between network simulation and emulation?
  - Network simutation mean to mimic the behavior of network components, applications, and protocols in a virtual environment.
  - Network emulation means to recreate the physical characteristics of a network, including devices, protocols, and operating systems, to closely mimic real-world conditions.
- Generally, in NS-3, if you don’t change the code, the output will be always the same every time you run, even if you set some probabilistic parameter like error rate, why?
  Ans:
  Although NS-3 using ramdom variables to make error rate, the seed for ramdom variable generator does not change. Thus, it makes same sequence and generate same error rate, which lead to same outputs erery time I run.
- Following the previous question, how to deal with this problem?
  Ans:
  We have to ensure that we set the seed for ramdom variable generator at the beginning of the script, which can ensure that it generates with different outcomes.

- Bonus
  - What have you learned from this lab?
    - The use of NS-3
    - The methods of setting up a network simutation
  - What difficulty have you met in this lab?

    Since my computer have poor performance, it takes more than 3 hours for me to build the NS-3.