Class Activity: Setting Up NS-3.41 in Ubuntu 22.04 (on Virtual Machine)

🎯 Objective:

Students will learn how to:
1. Install a virtual machine.
2. Set up Ubuntu 22.04.
3. Install and build NS-3.41.
4. Run sample simulations and verify the installation.

💻 Part 1 – Install Virtual Machine and Ubuntu 22.04

Step 1: Download Required Software

1. VirtualBox: https://www.virtualbox.org/wiki/Downloads
2. Ubuntu 22.04 ISO: https://releases.ubuntu.com/jammy/

Step 2: Install VirtualBox

Download and install VirtualBox for your operating system (Windows/macOS/Linux).

Step 3: Create a New VM

1. Open VirtualBox → Click 'New'.
2. Name: Ubuntu-22.04
3. Type: Linux | Version: Ubuntu (64-bit)
4. Memory: At least 4096 MB (4 GB)
5. Hard Disk: Create a virtual hard disk now (at least 20 GB)

Step 4: Install Ubuntu 22.04

1. Start the VM → Choose the Ubuntu 22.04 ISO file.
2. Select 'Try or Install Ubuntu' → Follow on-screen instructions.
3. Choose 'Erase disk and install Ubuntu' and complete the installation.
4. Reboot the VM after installation.

⚛️ Part 2 – Prepare Ubuntu 22.04 for NS-3

Step 5: Update System

Open the Terminal and run:

```
$ sudo apt update
```

Step 6: Install Required Packages

Install all dependencies using the command below:

```
$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
```

📦 Part 3 – Download and Build NS-3.41

Step 7: Download NS-3.41

Go to: https://www.nsnam.org/releases/ns-3-41/
Download 'ns-allinone-3.41.tar.bz2' and place it in your home folder.

Step 8: Extract and Build

1. Right-click on ns-allinone-3.41.tar.bz2 → Extract Here
2. In Terminal:

cd ~/ns-allinone-3.41
./build.py --enable-examples --enable-tests

Note: Build time can range from 20 mins to 1 hour depending on system performance.

🚀 Part 4 – Run Test Simulations

Step 9: Run Examples to Verify Installation

In Terminal:

cd ~/ns-allinone-3.41/ns-3.41
./ns3 run hello-simulator
./ns3 run first
./ns3 run second

Each command should produce output in the terminal, confirming that NS-3 is working.

Deliverable:

Take a screenshot showing successful output from one of the simulations (e.g., hello-simulator, first, or second).
Submit the screenshot through the class portal or email.

Notes:

- This exercise must be completed in Ubuntu 22.04.
- Ensure VirtualBox guest additions are installed for easier screen capture (optional).
- If build errors occur, recheck the dependencies or ask for help.