COMP3014 Network Simulation Project
Part A: Experimental Environment Setup

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Introduction

You need to install and Run Network Simulator 2 (NS2) for this project. NS2 can be easily installed on Ubuntu (and some other Linux distributions) but if you prefer you can try to install it using more complicated methods on Mac OSX or Windows. Therefore, if you already have a PC with Ubuntu installed on it you can *jump to Section 2*.

1 Preparing the Ubuntu OS as a virtual machine
(only if you don't have a PC with Ubuntu)

1. Download and Install VirtualBox
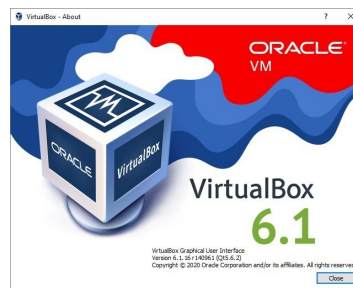
2. Download and Install VirtualBox Extension Pack
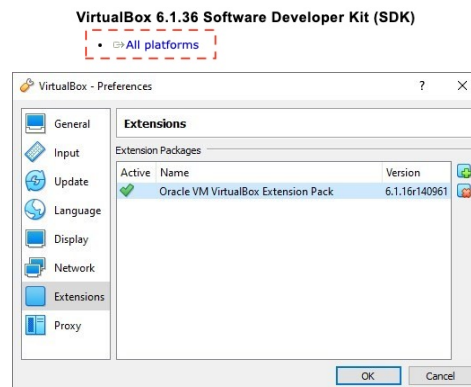
3. Download the Ubuntu 18.04.06-desktop-amd64 ISO image (Download size will be a few giga-bytes).

4. Create a new virtual machine in VirtualBox

5. Set memory size (RAM) to minimum 2048 MB.

6. Create virtual hard disk

7. Select VDI type of hard disk file.
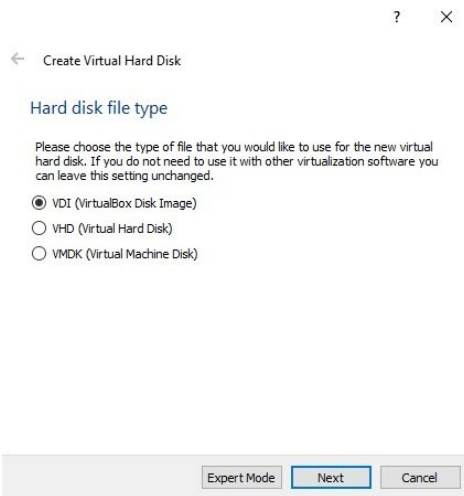
8. Select dynamically allocated hard disk file size.
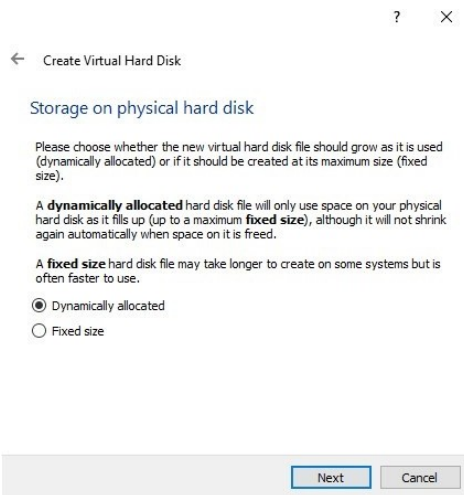
9. Set minimum 20 GB of file size.
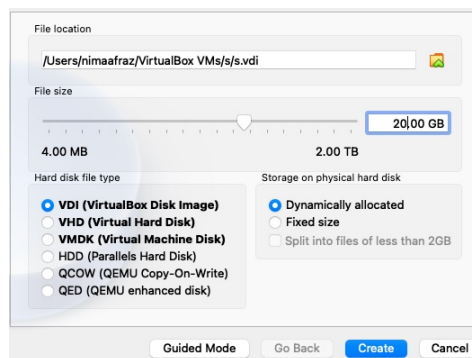
10. When virtual machine is ready - set minimum 2 CPUs
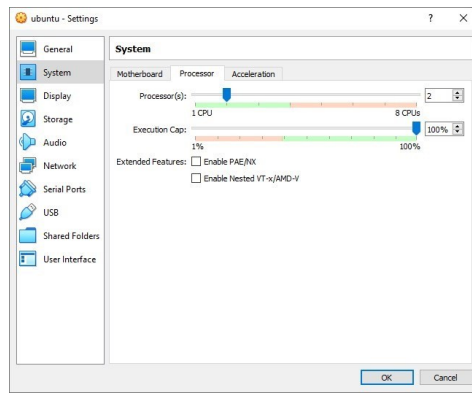
11. Set the video memory to 128MB in the Display tab

12. Start machine and select downloaded Ubuntu image.
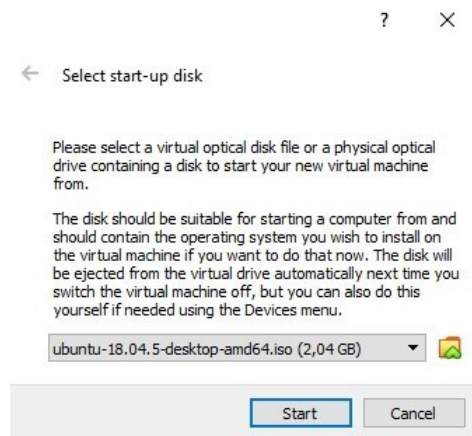
13. Choose try and install Ubuntu and press enter

14. Select language/timezone and install Ubuntu.
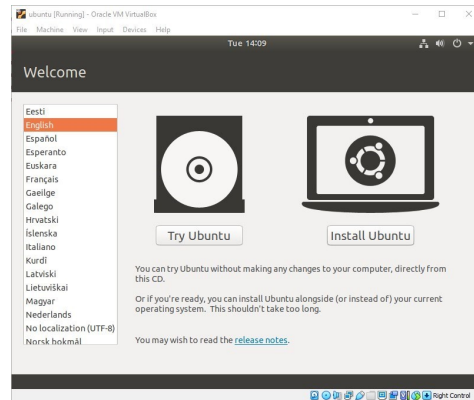
15. Select keyboard layout.
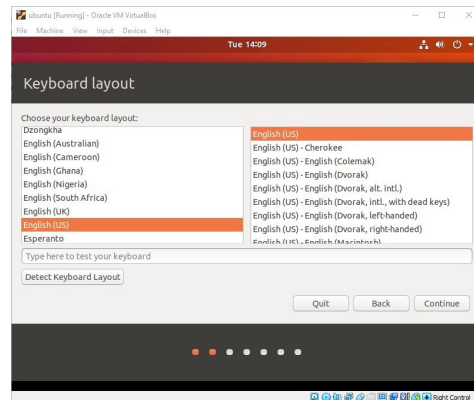
16. Select normal installation (do not make changes).
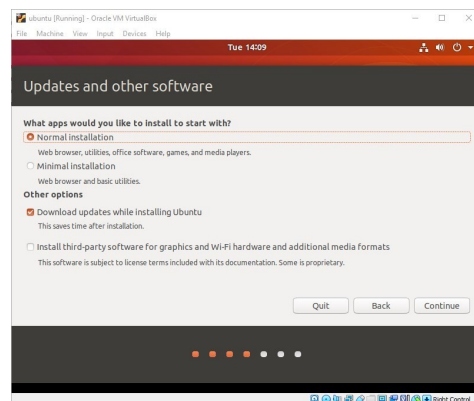
17. Select installation type: "Erase disk and install Ubuntu". (this will take some time)
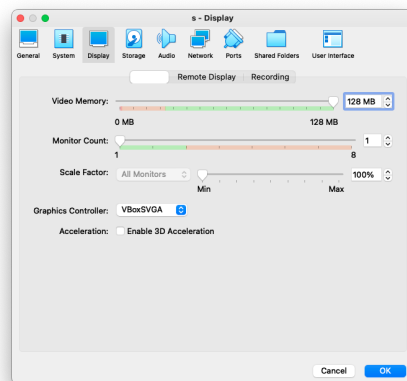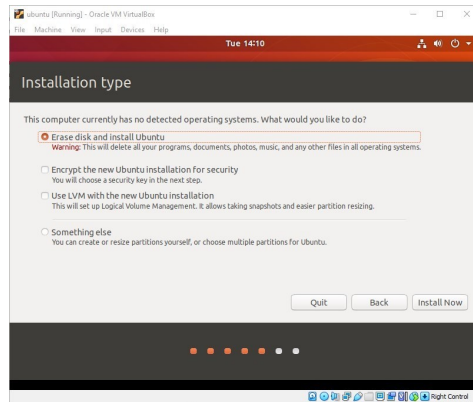

18. Confirm selected installation type (press continue)

19. Select region and create user account and press continue (this will take a few minuets).

20. Restart the VM (Press Enter if you needed)

21. Open the Terminal and install the "virtualbox-guest-utils" , "guest-x11" , and enable bidirectional clipboard (so you can copy&paste text from and to the VM from your host OS.

```bash
#! /bin/bash
# Run the following lines the terminal and enter the password you setup during installation)
sudo apt-get install virtualbox-guest-utils
sudo apt install virtualbox-guest-x11
sudo VBoxClient --clipboard
```
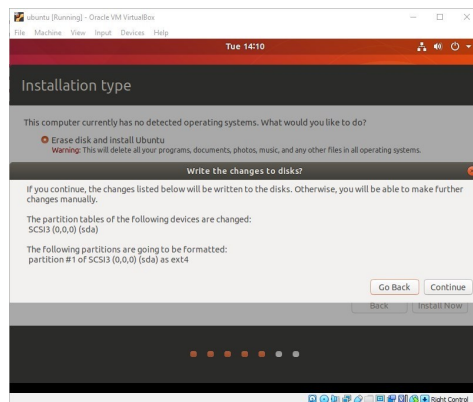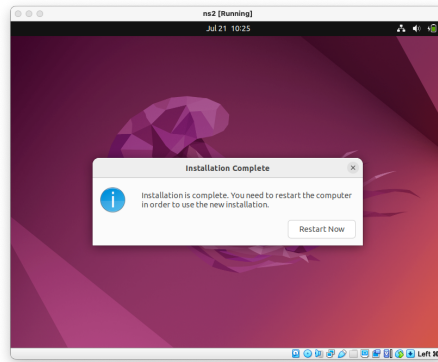
The first line is a shebang. In executable plain-text files on *nix platforms, a shebang tells the system what interpreter to pass that file to for execution. In this case, you're passing the file to the Bash interpreter. This will allow each successive line to be executed as commands, in order.
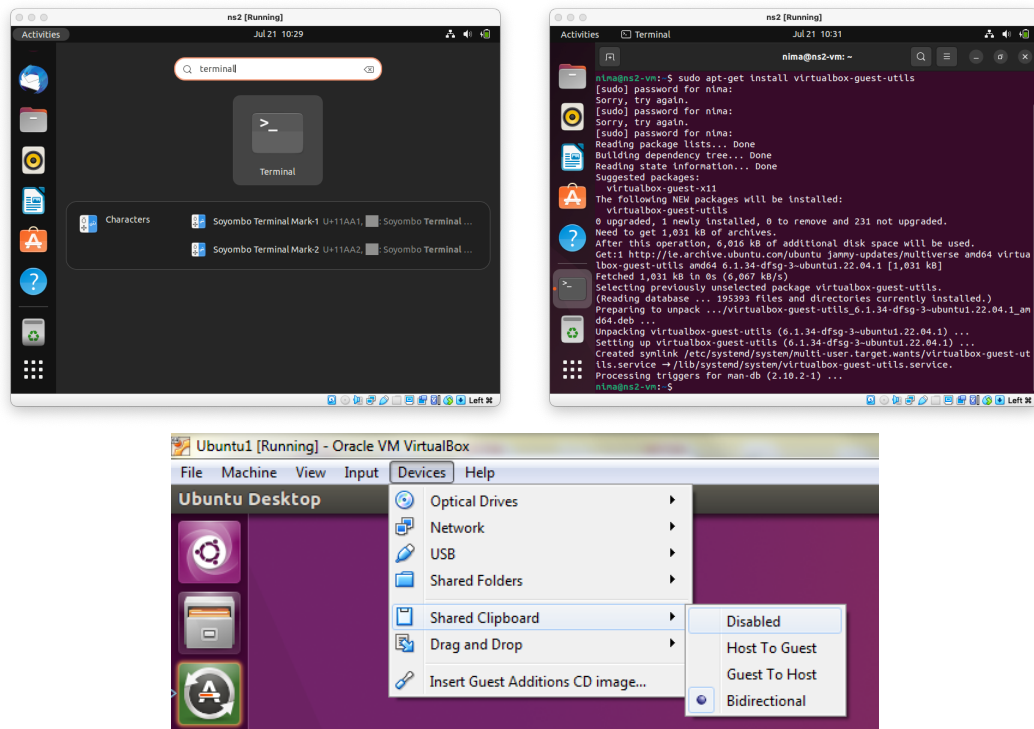
2   NS2 Installation

1. Install NS2, NAM (Network Animator), and Tcl (Tool Command Language)

```
#! /bin/bash
# Run the following lines the terminal and enter the password you setup during installation)
sudo apt-get install -y ns2
sudo apt-get install -y nam
sudo apt install tclsh
```

2. Verify installation of NS2

```
#! /bin/bash
# Run the following and verify the output
nima@ns2-vm:~$ ns
# Output should be:
%
```
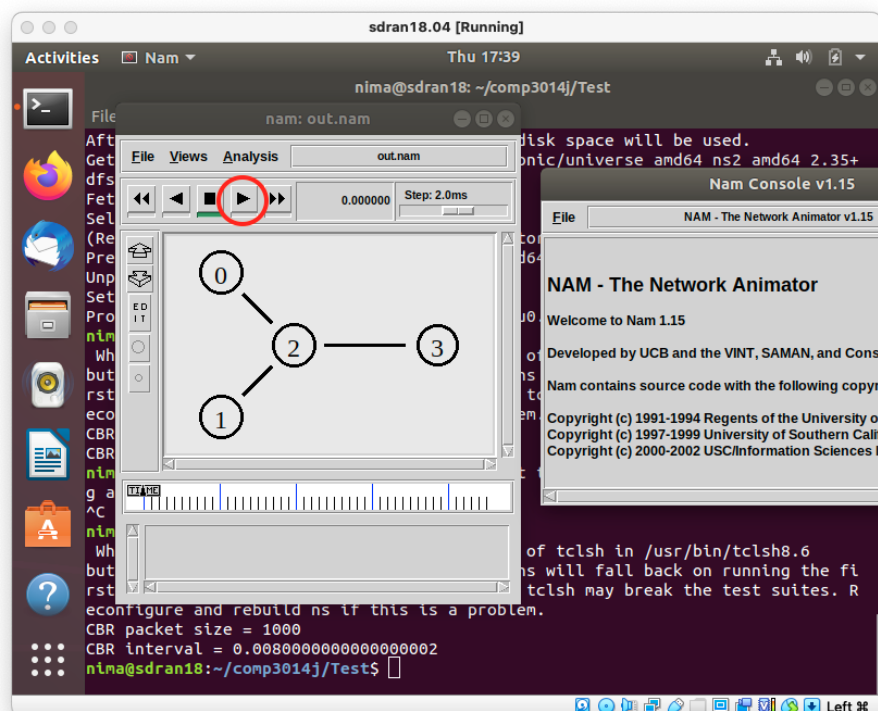
3. Clone the project Git repository

```
#! /bin/bash
# Install Git
sudo apt install git
# Clone the repo
git clone https://csgitlab.ucd.ie/nima/comp3014j.git
```

4. Run the test file

```
#! /bin/bash
# run the test file
ns Test/test.tcl
The output should be:
CBR packet size = 1000
CBR interval = 0.0080000000000000002
```

You should see the following as the output:

Congratulations! You have completed your first Network Performance Simulation. By clicking on the button shown by the red circle you can play the scenario of this simulation and see in action the packets being sent from nodes 0 and 1 to node 3 and you can also see the packets queuing in the node 2 and some of them being dropped.

For more information about the above sample you can visit this link. As you can see in the above example, each NS-2 simulation scenario is designed a script file written in TCL. There are several excellent online resources that will tell you how to write NS-2 scripts:

- NS by example: An excellent tutorial with many examples

- Marc Greis's tutorial

- The NS-2 Manual