1 Introduction to GNS3

GNS3 is used by hundreds of thousands of network engineers worldwide to emulate, configure, test and troubleshoot virtual and real networks. GNS3 allows you to run a small topology consisting of just a few devices on your laptop, or many devices hosted on multiple servers or even hosted in the cloud.

GNS3 is open source software, free to download from http://gns3.com

GNS3 can help those looking for a certification like Cisco CCNA, but it will also help you test and verify your Computer Networking knowledge. GNS3 was originally used to virtualize only CISCO devices, using a software called Dynamips. GNS3 has now evolved to support multiple devices from multiple network vendors, including Cisco Virtual Switches, Cisco Asas, Brocade Routers, Cumulus Linux switches, Docker instances, HPE VSRs, multipleLinux devices, and more.

See a list of available appliances: https://gns3.com/marketplace/appliances

GNS3 consists of two pieces of software:

- The GNS3-GUI software. This is the client part of GNS3 and it is a graphicuser interface (GUI).
- The GNS3-server virtual machine. It refers to the server that runs the simulations and can beinstalled locally on your computer or a local/remote virtual machine.

GNS3 does emulation not simulation, it emulates terminal devices and provides the interface(command line) to execute the same commands that would be executed on the real terminal device. To do this, the images of each manufacturer are required, some of which are given by them for free or for a fee. For example you can copy the Cisco IOS image from a real router CISCO and import it into GNS3 as a virtual router.

2 Install GNS3

Follow the instructions here: https://docs.gns3.com/docs/getting-started/installation/windows and install GNS on your local computer depending on your operating system. This way, both GNS3-GUI and gns-server are installed locally on your hard drive. **However, you recommend toinstall gns-server in a virtual machine because there is no full compatibility with windows.**

2.1 Install GNS3 on a virtual machine.

Download the ready-made virtual machine with gns-server installed here. (gns3-gui must already be installed):https://docs.gns3.com/docs/getting-started/installation/download-gns3-vm https://gns3.com/software/down load-vm **Select "VMware Workstation and Fusion"**

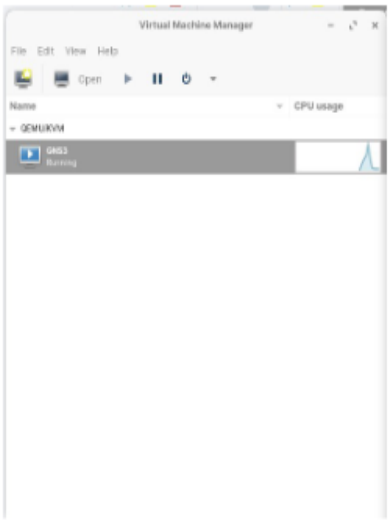
Then download and install vmware. vmware like VirtualBox, Microsoft Hyper-V etc. are programs for creatingand managing virtual machines. The free version is vmware workstation player (NOT the pro edition). https:// www.vmware.com/products/workstation-player/workstation-player-evaluation.html

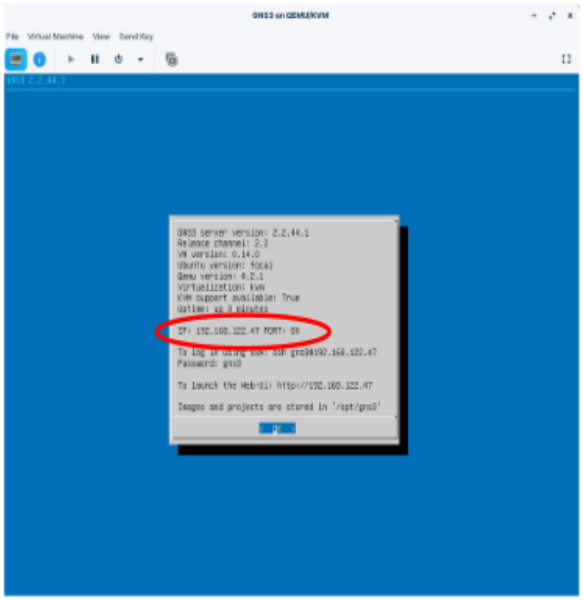
For Linux users use the KVM hypervisor. Instructions here: https://phoenixnap.com/kb/ubuntu-install-kvm (butvmware also has a linux version)

Because you require the same version of client and server, by updating many times there is incompatibility

between the two. With the commands below you select the version you want to install.
pip3 install gns3-gui==2.2.37 pip3

nstall gns3-server==2.2.37

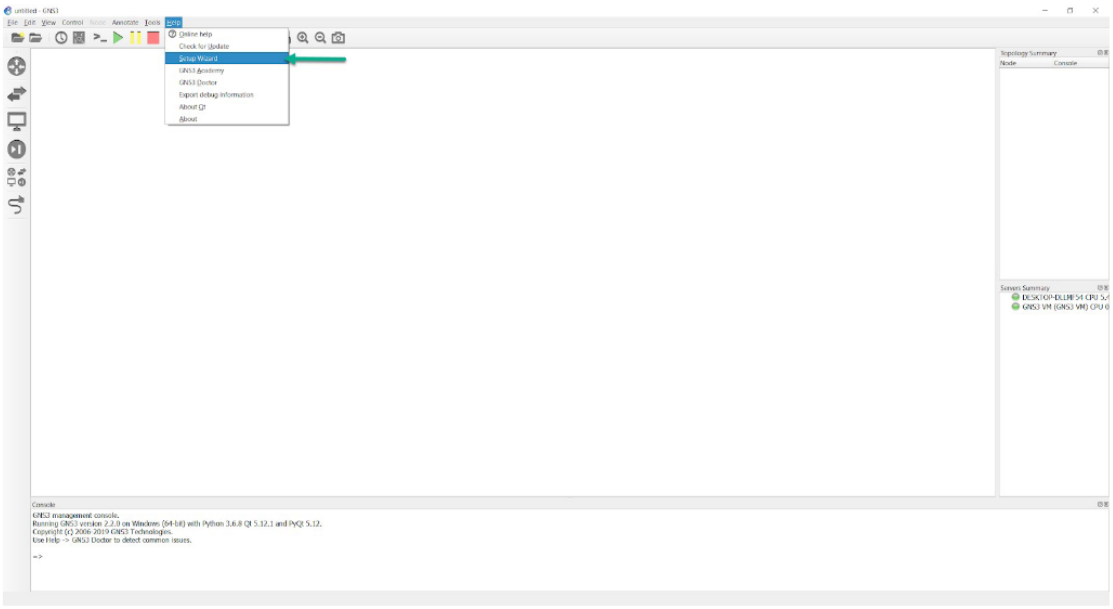




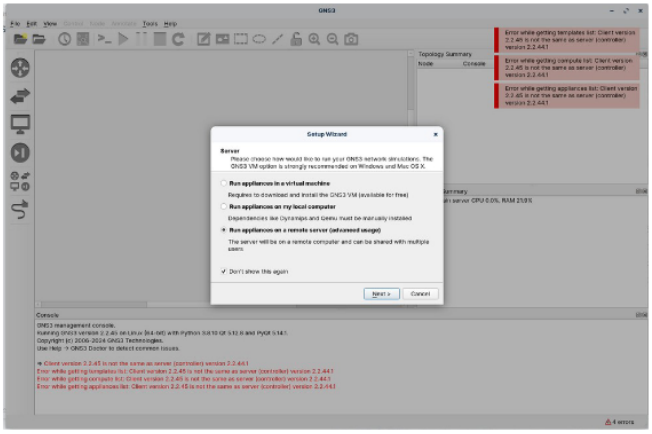
Check the **IP address** your virtual machine is getting.

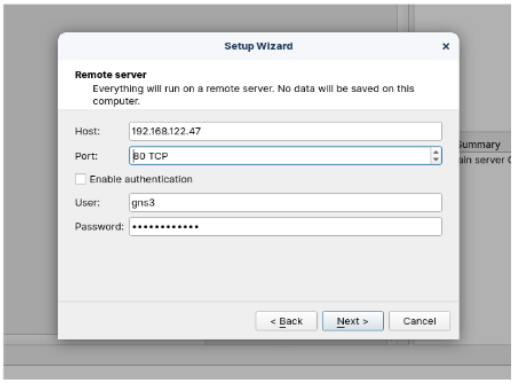
GNS-VM is now operational. GNS-VM runs the gns-server while the client (gns-gui) runs on our computer. Now the two must be connected.

Follow the instructions here to connect gns-gui to your virtual machine's gns-server. https://docs.gns3.com/docs/getting-started/installation/one-server-multiple-clients



Select Run appliance on a remote node and enter the IP of your virtual machine.





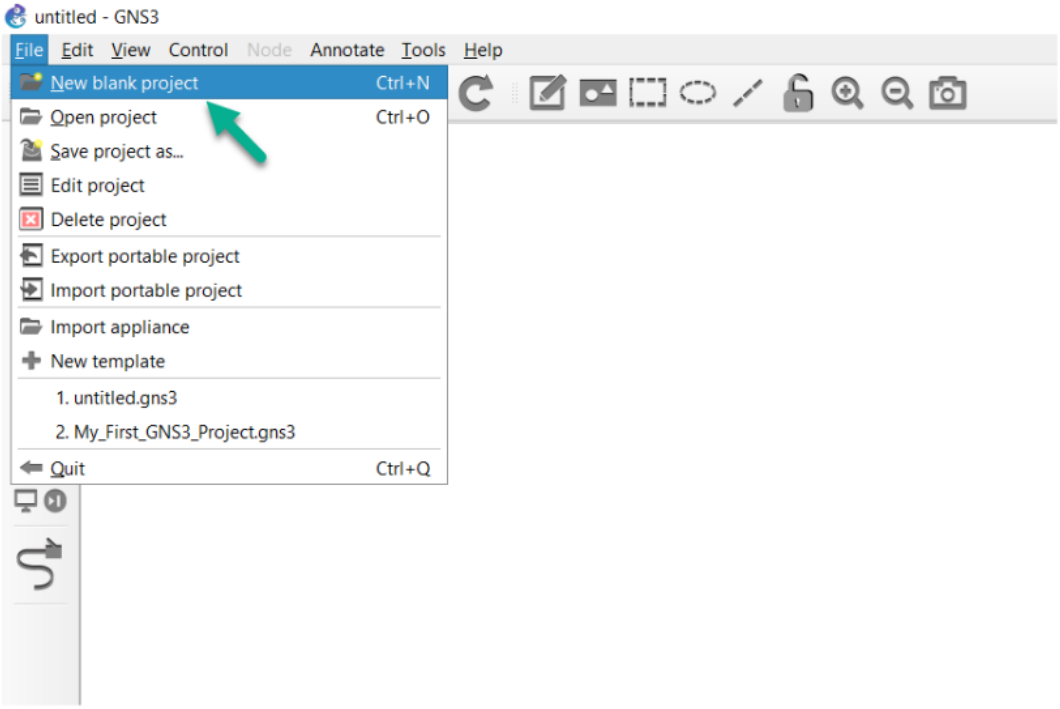
The two software must be on the same version. Fix by updating if needed.

2.2 Basic Instructions for use

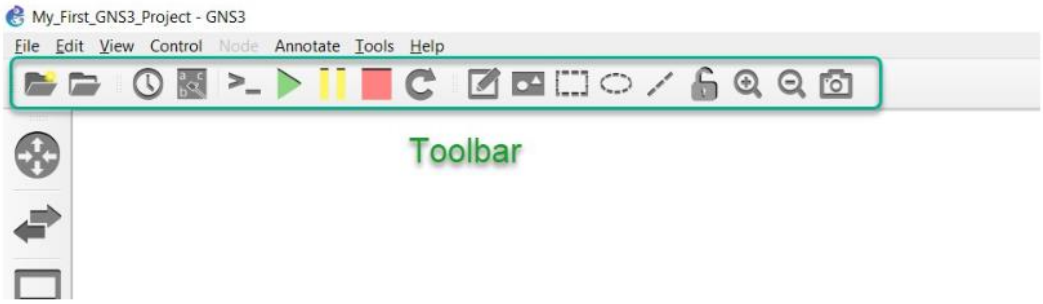
The GNS3 Setup Wizard appears when GNS3 starts for the first time. This provides an easyway to initially set up the GNS3 options. You can also manually start the installation wizard at any time by clicking "Help" and then "Installation Wizard" in the GNS3 GUI. For Windows and Mac OSX users, the current appliances you install on your local computer will limit the functionality of some of them, as will older iOS images that support Dynamips (special software to support Cisco images). This is not the casefor users running GNS3 on Linux or GNS3 on a VM. GNS3 can run iOS, QEMU / KVM VMS and Docker images natively, so local server should be selected as optional unless using GNS3 VM.

2.3 Topology creation

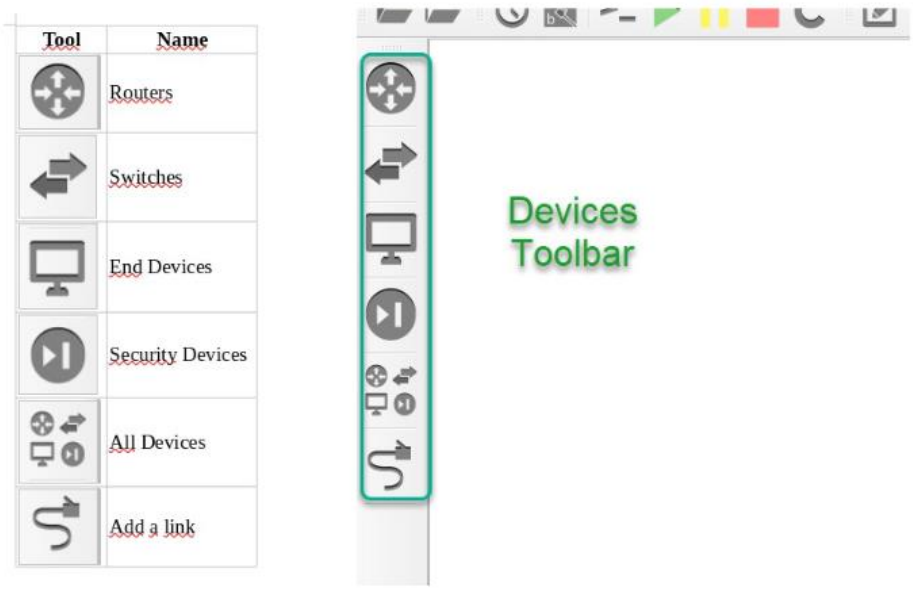
Create a new project by clicking File->New_blank_project



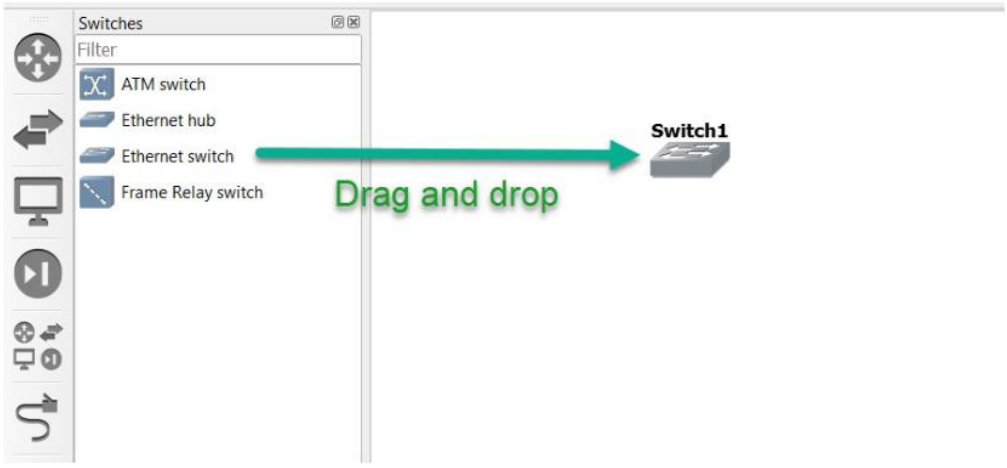
The GNS3 Toolbar is located at the top of the GNS3 GUI and contains groups of icons thatallow you to easily perform common tasks



The device toolbar allows you to add devices to your network topology. You do this by draggingdevices from the toolbar onto the GNS3 workspace

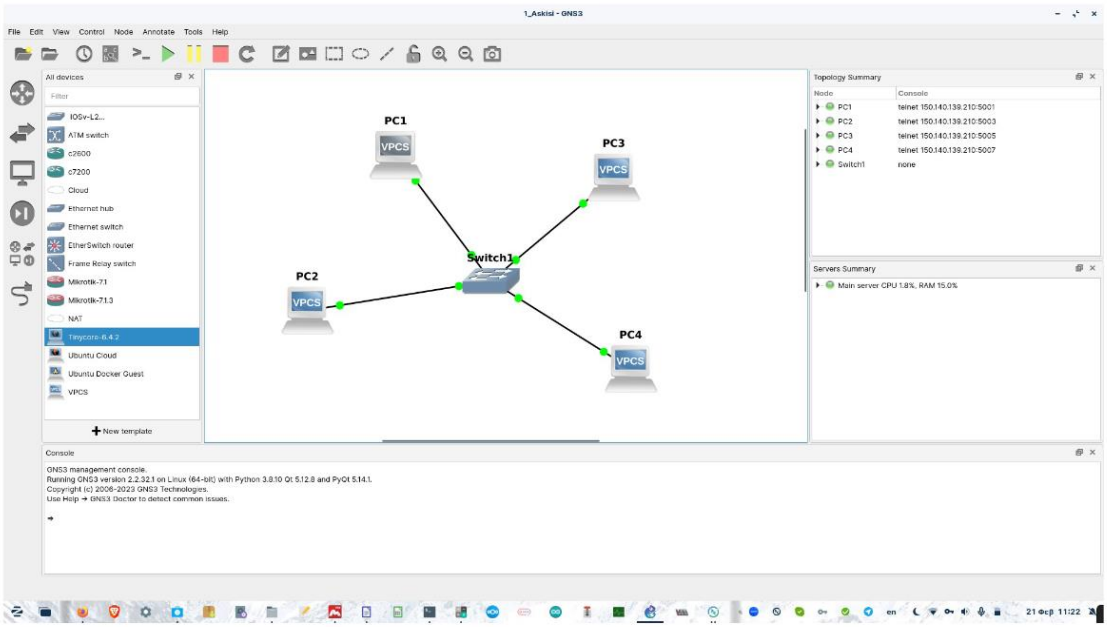


The topology summary window is towards the top right of the GNS3 GUI and will list the nodes thatare in the current topology. To create your first GNS3 topology, first click the switches on the devicetoolbar. Drag and drop the embedded Ethernet switch into the GNS3 workspace as shown below. An instance of the device named Ethernet switch-1 will now be available in the topology.



Exercise 1

Follow all instructions from here : https://docs.gns3.com/docs/getting-started/your-first-gns3-topology and implement the following simple topology



Questions:

1a.1 On one of the PCs run the *help* command and see the entire list ofsupported commands.
1a.2 On one of the PCs run the *ip* command and check what parameters it needs to run.

1a.3 Assign IP addresses in the range 192.168.1.0/24 to each PC. Check it with show ipresult of the assignment.

1a.4 Run the ping command from each PC to the others to check if thecomputers communicate with each other

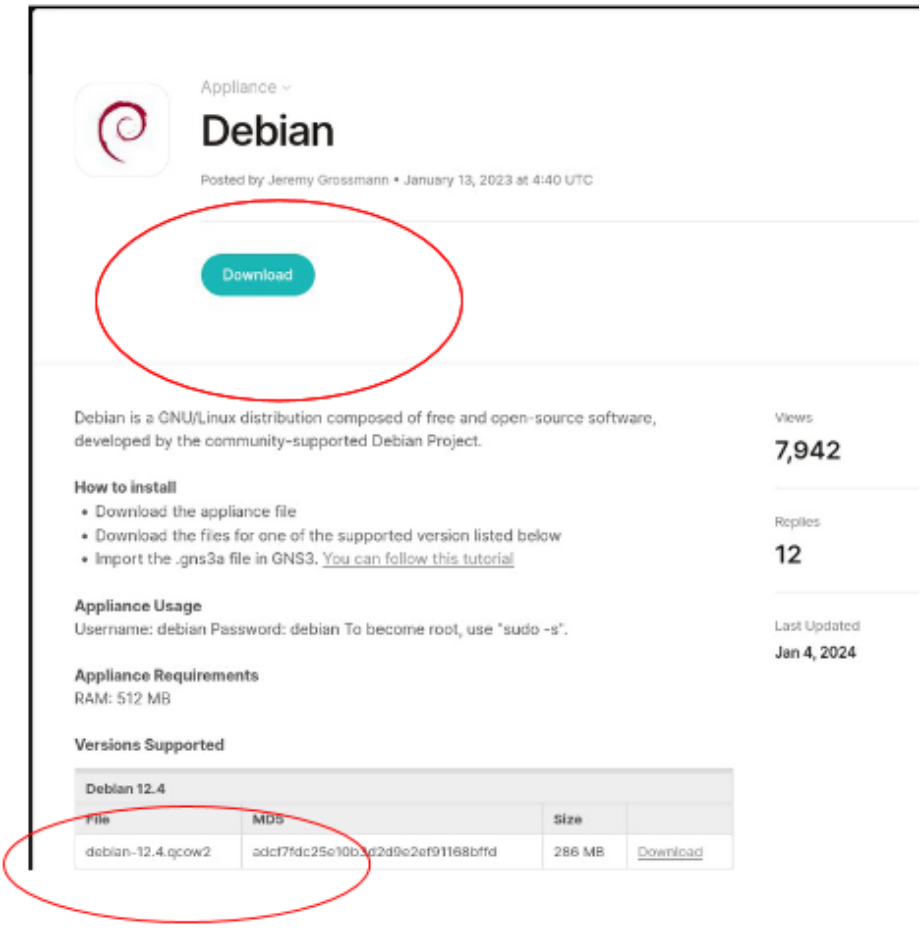
1b Exercise

In the second part of the exercise we will import a new gns3 appliance from here:

https://gns3.com/marketplace/appliances

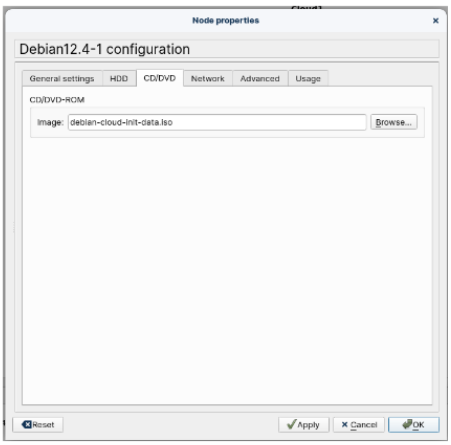
Look for the Debian terminal:

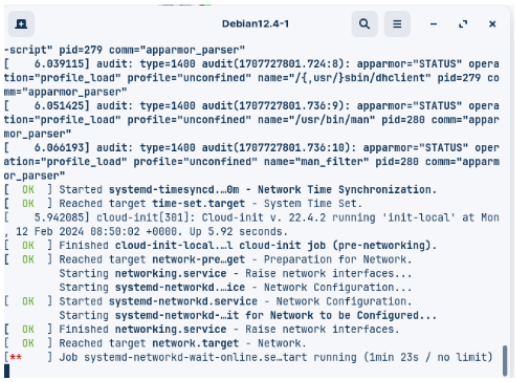
https://gns3.com/marketplace/appliances/debian-2



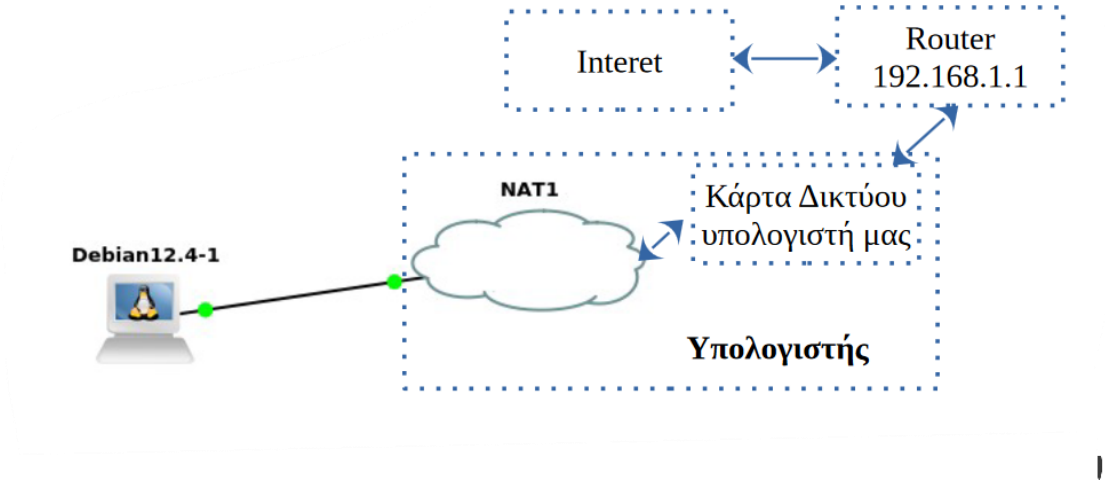
Download the installation file: debian.gns3a (pressing DOWNLOAD) and the disk: debian-12.4.qcow2

To import choose File-> Import Appliance and first import the file: debian.gns3a. Then, it will find theimage by itself, insert it, and follow the instructions. For initialization (username/passwd will not work) download the file: debian-cloud-init-data.iso from eclass and connect it asin the image below on the left. Start debian (picture below right).





Implement the following topology:



Choosing NAT1 creates a subnet inside our computer and allows GNS3 and all the terminals we have addedto communicate with the external network, as shown in the figure above

Configure the network card and DNS parameters so that debian gets an IP address and connects tothe network (via your computer's network card).

command: sudo nano /etc/network/interfaces

#DHCP config for ens4 auto

ens4 iface

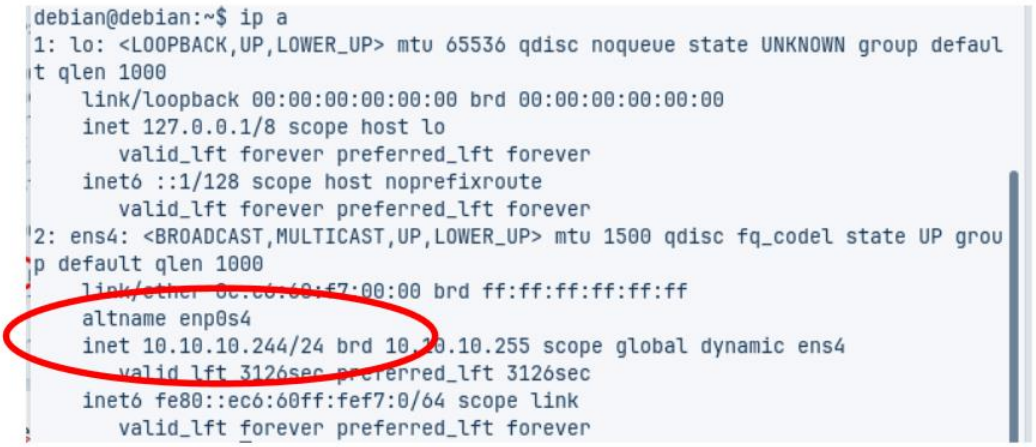
ens4 inet dhcp

(this file configures the network cards in the linux operating system, sudo: super user do, nano is editor,ens4 is the name of the card - check that it is with ip a).

command: sudo nano /etc/resolv.conf

nameserver 10.10.10.1 (or other e.g. 8.8.8.8, 1.1.1.1)

Reboot (sudo reboot) and make sure the **terminal got an IP with the ip a command and kept the settings**



run the command sudo apt-get update to update. The debian terminal is ready to use connected to theexternal public network

Questions:

1b.1. Run the following commands and show the result.

- ping 8.8.8.8.

- traceroute 8.8.8.8 -n

- ping google.com

Search the literature for what the above commands do.

IMPORTANT

You must first update the debian operating system and install telnet and

the gcc compiler

- sudo apt-get update

- sudo apt-get install telnet gcc

(or in a command sudo apt-get update && sudo apt-get install telnet gcc)