INR Lab 1 - Networking Basics

Keep your projects and take snapshots: your topologies might be useful for the next labs.

Overview

In this lab, you will set up your initial basic network for INR course. Then you will make a small switched network, get familiar with subnets and configure IPs and then test the connectivity between your machines. Once you have the network running, you will configure a router as a gateway.

Task 1 - Tools

To make it easier to prototype network topologies and troubleshoot them, you will be using GNS3 software to emulate networks.

1. Install the needed dependencies for GNS3: *QEMU/KVM*, *Docker* and *Wireshark*.

   Hint: Check that virtualization is enabled in your bios. Make sure that the user belongs to all the necessary groups after installing the tools.

2. Start a GNS3 project, configure the pre-installed **Ubuntu Cloud Guest** template. Check that you can start it.

3. What are the different ways you can configure internet access in GNS3?

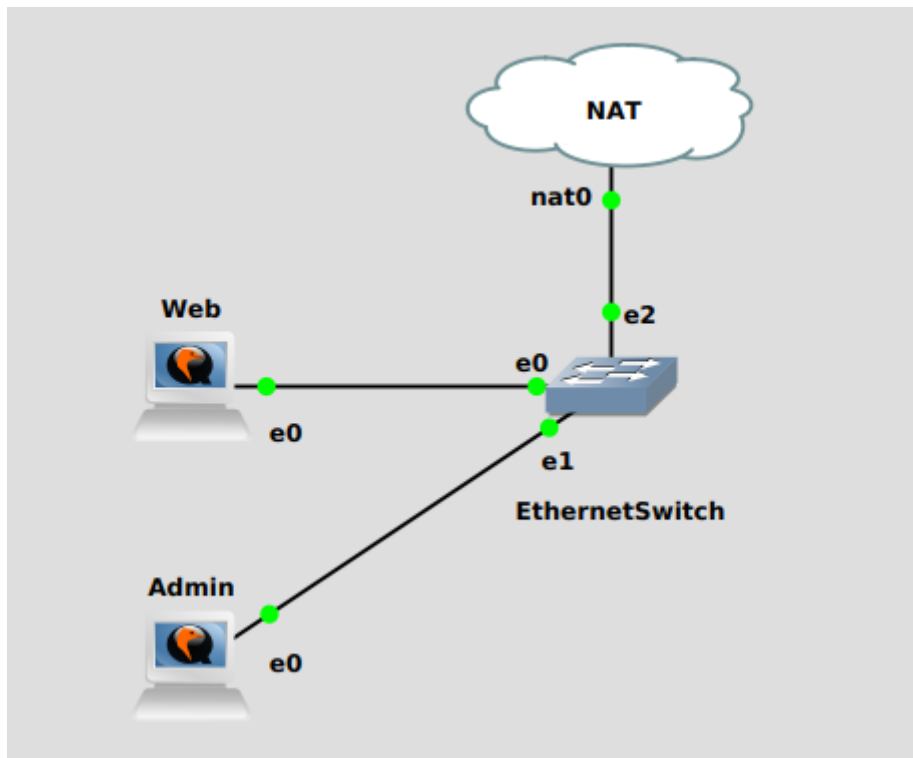   Test them with a single created VM and give a one-line description of each.

   What are the differences between them?

   Bonus: show the difference between them on practice and test the connectivity.

Task 2 - Switching

Now that you have the necessary tools and are familiar with GNS3, you will deploy your first network.

1. Make the following network topology:

2. Install `openssh-server` on both VMs and `nginx` web server on the *Web* VM.

3. What is the IP of the mask corresponding to `/28`?

   How many machines can you configure under this subnet? Explain it.

4. Configure the VMs with private static IPs under a `/28` subnet.

5. Check that you have connectivity between them.

   Hint: use ping, traceroute and mtr.

6. Make sure your web server is accessible from the *Admin* VM.

   Hint: use curl or wget

Task 3 - Routing

Now that you have a small network running, it is time to have it properly routed. Delete the NAT device because you will make your own gateway now.

1. Select a virtual Routing solution (Gateway) such as Mikrotik **(recommended default choice)**, PfSense, VyOS, Untangle NG, OpenWrt, Cumulus VX.
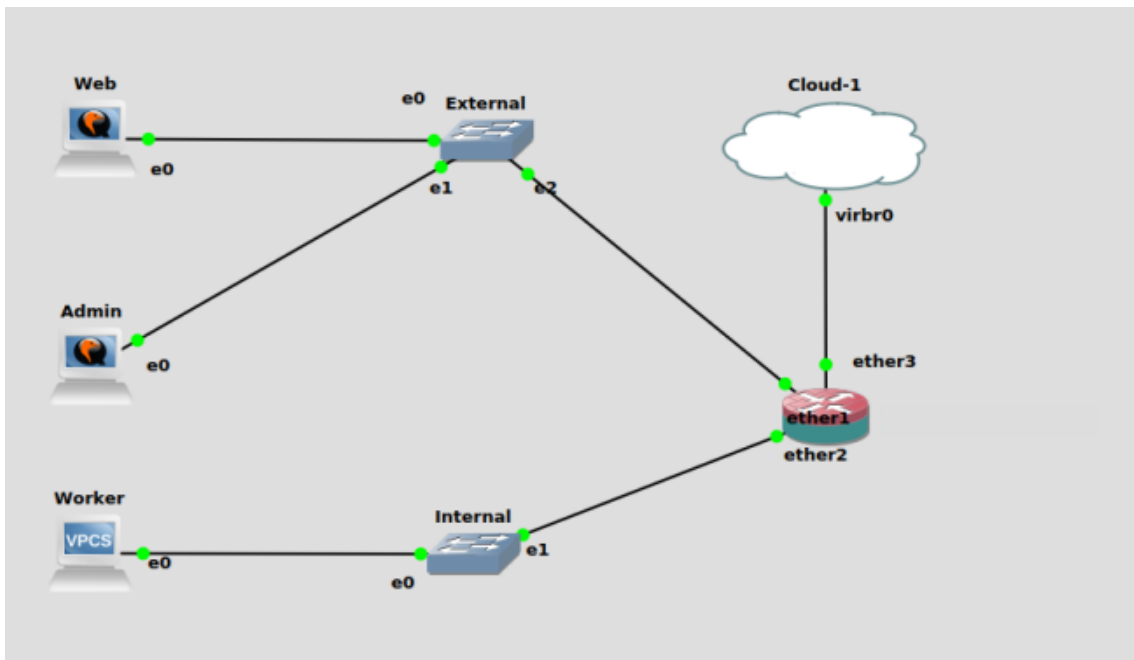
2. Create *Internal* network for *Worker* instance.

3. Connect your Gateway to the internet and to your workstation/host.

4. Setup the gateway for *Admin*, *Web* and *Worker*, then check their connectivity.

5. Configure port forwarding for `http` and `ssh` to *Web* and *Admin* respectively.

6. Check that you can ssh to the Admin and access your web page from your workstation/host.

Bonus

Substitute the Routes OS from Task 3 by the gateway from a standard Unix distribution, e.g. *Ubuntu Server*.
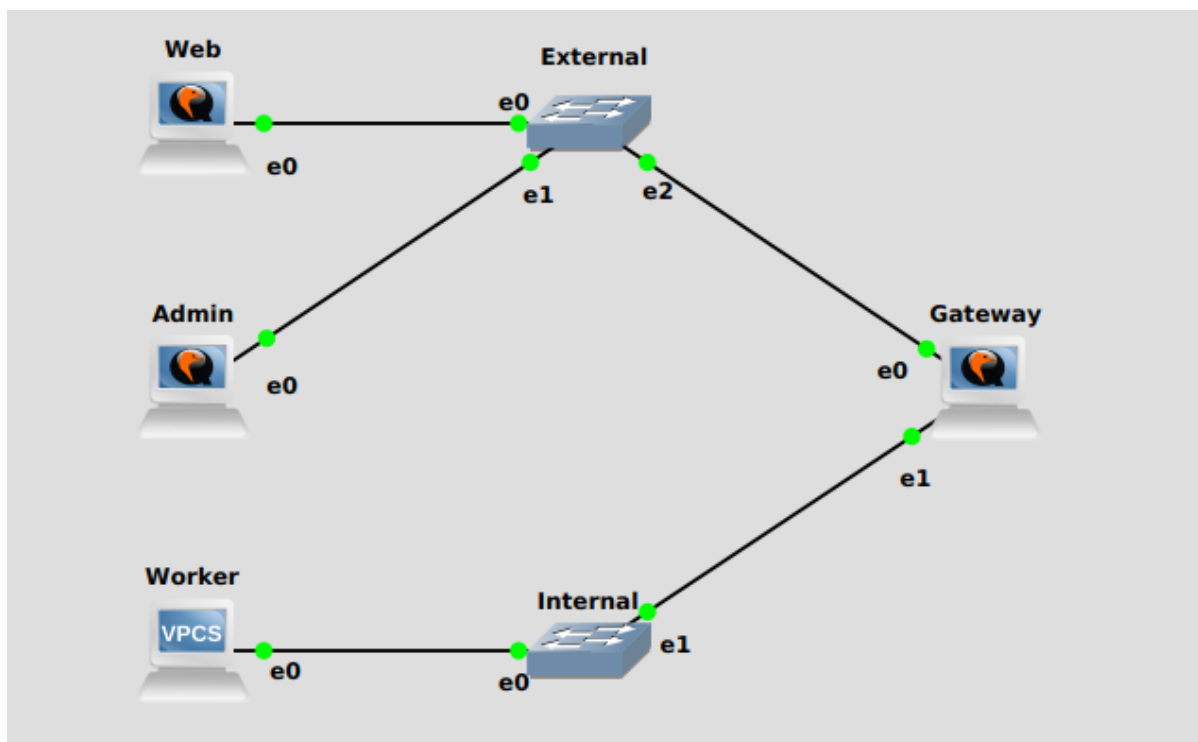
Repeat the settings from Task 3 with the new self-configured "dummy" gateway.