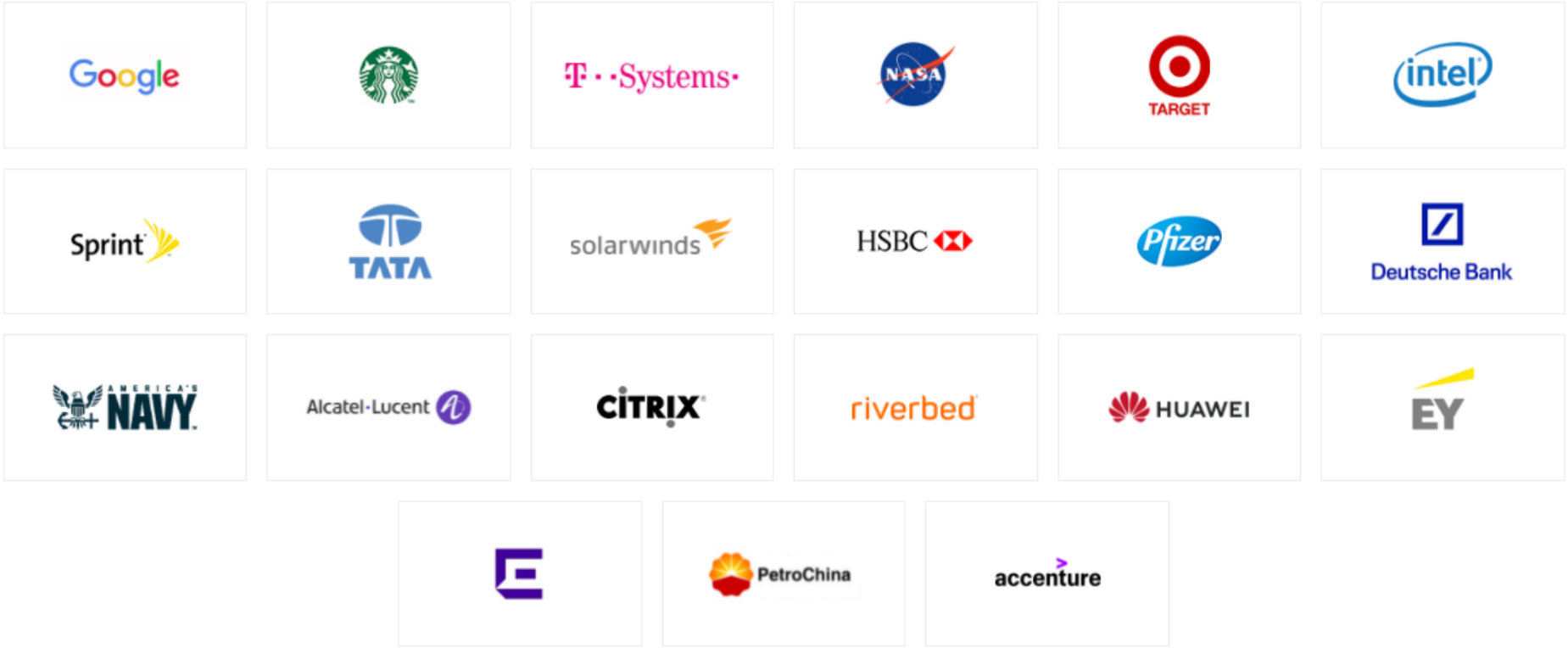
GNS3®

GNS3 (Graphical Network Simulator-3)

Open-source network software emulator that allows the combination of virtual and real devices, used to simulate complex networks.



Classroom GNS3 final configuration

1️⃣ Edit `%APPDATA%\GNS3\2.2\gns3_server.ini` and change `Administrator` to your username (e.g. `alumne`):

```
images_path = C:\Users\alumne\GNS3\images
projects_path = C:\Users\alumne\GNS3\projects
appliances_path = C:\Users\alumne\GNS3\appliances
symbols_path = C:\Users\alumne\GNS3\symbols
configs_path = C:\Users\alumne\GNS3\configs
```

2️⃣ Download and import .ova from `GNS3.VM.VirtualBox.2.2.32.zip`

https://github.com/GNS3/gns3-gui/releases/tag/v2.2.32

3️⃣ In GNS3 VM, add a **3rd Bridged network card**. Check **Promiscous mode: Allow all**.

Classroom GNS3 final configuration

4️⃣ Run GNS3 VM, select OK ➡️ Network ➡️ Yes

5️⃣ Modify netplan to assign a static IP (one classroom IP assigned for each student):

```
network:
  version: 2
  renderer: networkd
  ethernets:
    eth2:
      addresses: [STUDENT_ASSIGNED_IP/24]
      gateway4: CLASSROOM_GATEWAY_IP
      nameservers:
        addresses: [8.8.8.8, 8.8.4.4]
```

6️⃣ Save and exit.

Install GNS3 at home

1️⃣ Download `GNS3-2.2.32-all-in-one.exe` from https://github.com/GNS3/gns3-gui/releases/tag/v2.2.32

2️⃣ Install selecting VirtualBox.

3️⃣ Download and import .ova from `GNS3.VM.VirtualBox.2.2.32.zip`

Emulate PCs (Terminal) ➡️ Alpine Linux dockers

Installation

1️⃣ File ➡️ New template

2️⃣ Install an appliance from the GNS3 server (recommended)

3️⃣ Guests ➡️ Alpine Linux

4️⃣ Install the appliance on the GNS3 VM (recommended)

IP Configuration

- Before booting up: Right click ➡️ Edit config

Emulate PCs (Graphical) ➡️ webterm dockers

Installation

1️⃣ File ➡️ New template

2️⃣ Install an appliance from the GNS3 server (recommended)

3️⃣ Guests ➡️ webterm

4️⃣ Install the appliance on the GNS3 VM (recommended)

IP Configuration

- Before booting up: Right click ➡️ Edit config

Emulate Non-Managed Switches ➡️ Ethernet switch

⚠️ Run Ethernet switch on **GNS3 VM**

Emulate Cisco Managed Switches ➡️ Cisco IOU L2

1️⃣ Download and extract Switch.rar

2️⃣ File ➡️ Import appliance

3️⃣ Appliances ➡️ MultiLayer Switch - Cisco IOU L2

4️⃣ **Add License:** Edit ➡️ Preferences ➡️ IOS on UNIX. Paste the following:

```
[license]
gns3vm=73635fd3b0a13ad0;
```

Emulate Cisco Managed Routers ➡️ Cisco IOU L3

1️⃣ Download and extract Router.rar

2️⃣ Appliances ➡️ Router - Cisco IOU L3

3️⃣ When imported, right click ➡️ Configure template

- Check `Use default IOU values for memories`. Set RAM size to 512 MB

4️⃣ **Add License:** Edit ➡️ Preferences ➡️ IOS on UNIX. Paste the following:

```
[license]
gns3vm=73635fd3b0a13ad0;
```

Cisco Router SSH Connection with Linux

```
ssh -oKexAlgorithms=+diffie-hellman-group14-sha1 -oHostKeyAlgorithms=+ssh-rsa -c aes128-cbc -l admin 10.0.1.1
```

Switch Cisco IOU L2 15.2d Bugs

- 😡 Packets do not pass through switch (e.g. implementing InterVLAN Routing)
  - 😎 Disable CEF: `Switch(conf)# no ip cef`
  - 😎 Disable IGMP Snooping: `Switch(conf)# no ip igmp snooping`
- 😡 VTP does not synchronize VLANs
  - 😎 Disable VTP domain password: `Switch(conf)# no vtp password`
- 😡 SSH access not enabled
  - 😎 Use telnet connection on 15.2d or change the switch to version 15.6.0.9S

Cisco Switch SSH Connection with Linux (15.6.0.9S)

```
ssh -oKexAlgorithms=+diffie-hellman-group1-sha1 -oHostKeyAlgorithms=+ssh-rsa -c aes128-cbc -l admin 192.168.99.2
```

Emulate OS via VirtualBox

- ⚠️ In VirtualBox, **disconnect all network cards**
- Edit ➡️ Preferences ➡️ VirtualBox VMs ➡️ New
- Run this VirtualBox VM on my local computer
- Choose a VirtualBox VM from the list

Emulate OS via Docker

- Edit ➡️ Preferences ➡️ Docker container ➡️ New
- Run this Docker container on the GNS3 VM
- New Image: image name from Docker Hub (e.g. nginx)

Docker - Enable data persistence

Add these folders to Configure ➡️ Advanced ➡️ Additional directories...

```
/bin
/boot
/dev
/etc
/gns3
/gns3volumes
/home
/lib
/lib64
/root
/sbin
/var
/usr
```

Connect to Internet ➡️ NAT

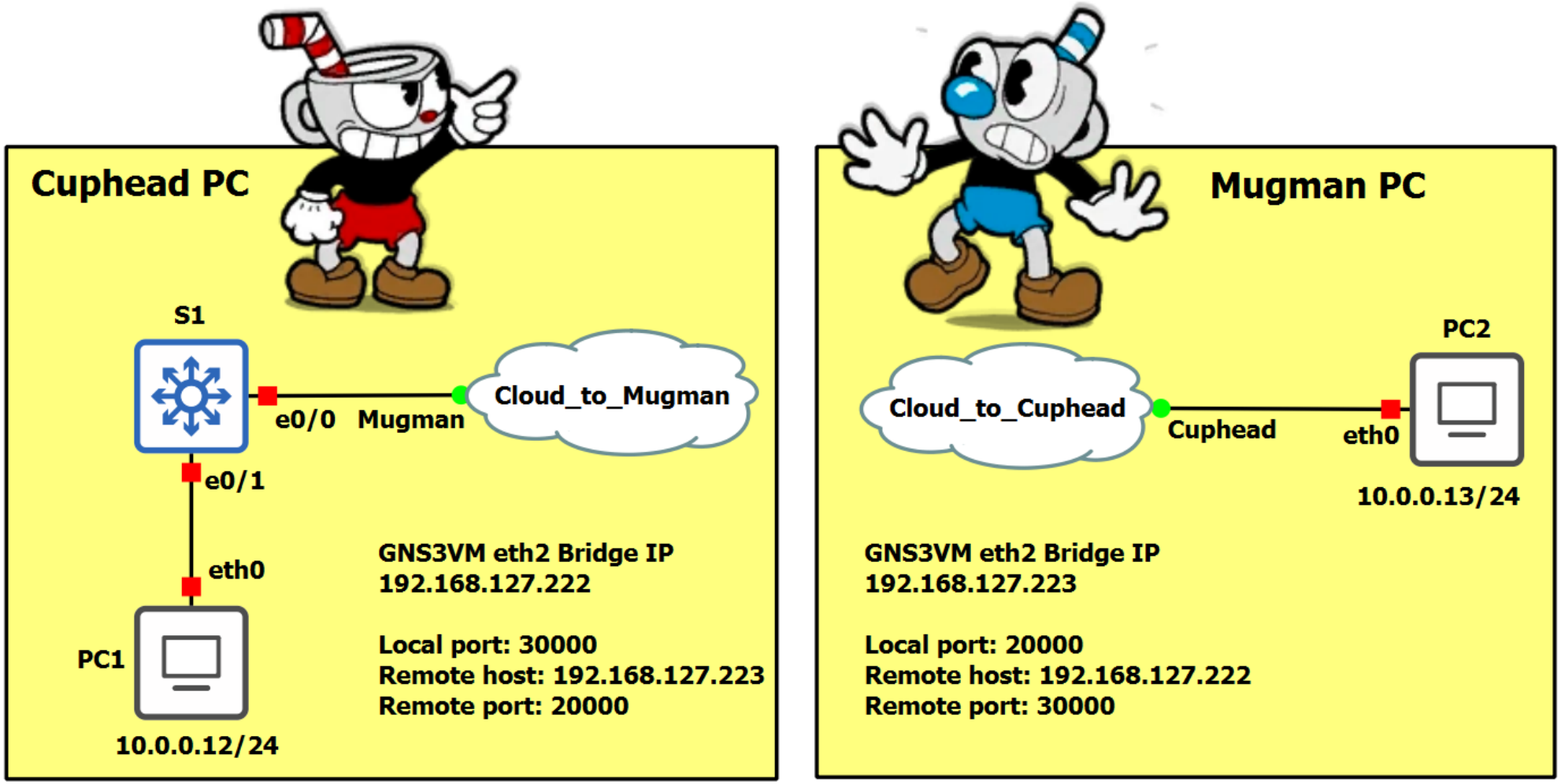
- Fastest
- ⚠️ Run NAT on **GNS3 VM**
- ⚠️ Cannot access GNS3 topology from external network
- ⚠️ **Only in A22**: A22 uses 192.168.122.0/24 that conflicts with NAT default assigned range.
  - When loaded GNS3VM, press Enter (OK) ➡️ Shell
  - `virsh net-edit default`
  - Change `122` to another number (e.g. `112`)

Connect to Internet ➡️ Cloud with bridged interface

- ⚠️ Drag **Cloud**, run on **GNS3VM** and connect to **eth2**
- ⚠️ **When using an Edge router:**
  - a. Change MAC address of the interface connected to Cloud (one MAC assigned to each student): `R1(config-if)# mac-address aabb.cc00.0001`
  - b. NAT overload is needed:

```
R1(config-if)# int e0/0
R1(config-if)# ip nat outside
R1(config-if)# int range e0/1-2
R1(config-if)# ip nat inside
R1(config-if)# exit
R1(config)# ip nat inside source list 1 interface e0/0 overload
R1(config)# access-list 1 permit 172.16.100.0 0.0.0.255
R1(config)# access-list 1 permit 172.16.200.0 0.0.0.255
```

Link GNS3 topologies on 2 different hosts with Cloud UDP tunnels



Link GNS3 topologies on 3 different hosts with Cloud UDP tunnels