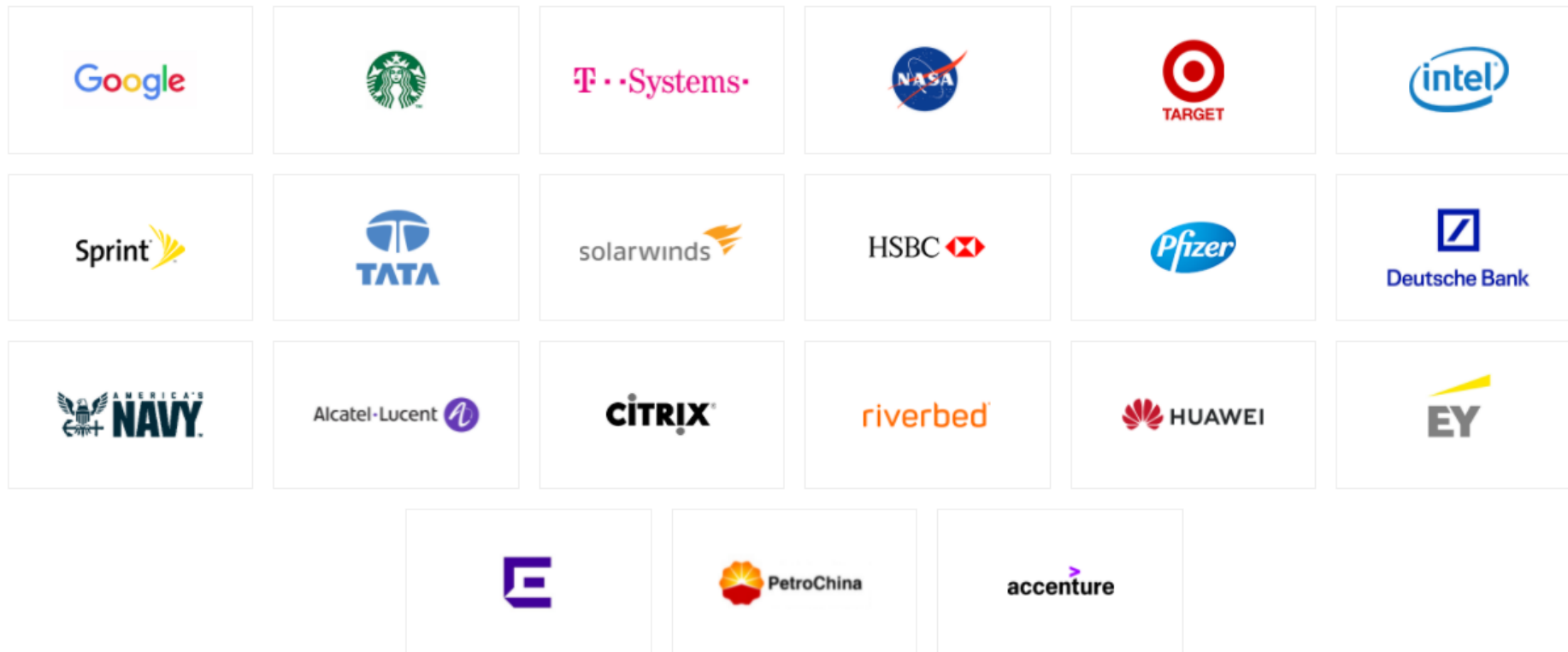




GNS3 (Graphical Network Simulator-3)

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



Classroom GNS3 final configuration

1 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
```

2 Download and import .ova from `GNS3.VM.VirtualBox.2.2.21.zip`
<https://github.com/GNS3/gns3-gui/releases/tag/v2.2.21>

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

Install GNS3 at home

- 1 Download `GNS3-2.2.21-all-in-one.exe` from <https://github.com/GNS3/gns3-gui/releases/tag/v2.2.21>
- 2 Install selecting VirtualBox.
- 3 Download and import .ova from `GNS3.VM.VirtualBox.2.2.21.zip`

Emulate PCs (Terminal) ➡ Alpine Linux dockers

Installation

- 1 File ➡ New template
- 2 Install an appliance from the GNS3 server (recommended)
- 3 Guests ➡ Alpine Linux
- 4 Install the appliance on the GNS3 VM (recommended)

IP Configuration

- Before booting up: Right click ➡ Edit config

Emulate PCs (Graphical) ➡ webterm dockers

Installation

- 1 File ➡ New template
- 2 Install an appliance from the GNS3 server (recommended)
- 3 Guests ➡ webterm
- 4 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

- 1 Download and extract [Switch.rar](#)
- 2 File ➡ Import appliance
- 3 Appliances ➡ MultiLayer Switch - Cisco IOU L2
- 4 **Add License:** Edit ➡ Preferences ➡ IOS on UNIX. Paste the following:

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

Emulate Cisco Managed Routers ➡ Cisco IOU L3

- 1 Download and extract [Router.rar](#)
- 2 Appliances ➡ Router - Cisco IOU L3
- 3 When imported, right click ➡ Configure template
 - Check `Use default IOU values for memories`. Set RAM size to 512 MB
- 4 **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
```

Docker - Configure a fixed MAC address

😡 In every reboot the MAC assigned to eth0 in Docker is restarted.



😎 To configure a permanent MAC in Docker ➡ Edit Config and add MAC address:

```
...  
  
# DHCP config for eth0  
auto eth0  
iface eth0 inet dhcp  
    hwaddress ether 11:22:33:44:55:66
```

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`)

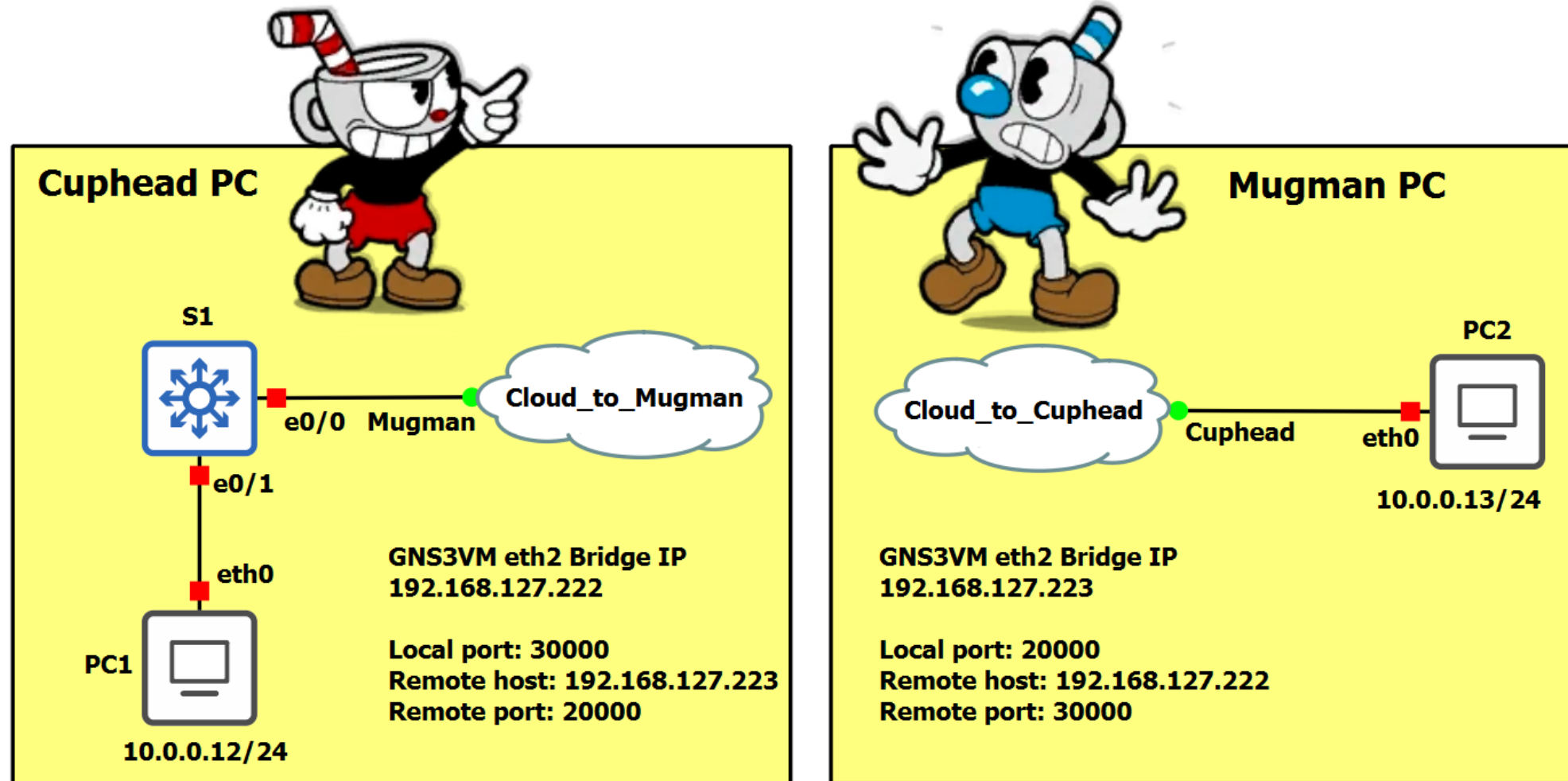
Connect to Internet Cloud with bridged interface

-  Drag **Cloud**, run on **GNS3 VM** 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 any
```

Link GNS3 topologies on 2 different hosts with Cloud UDP tunnels



Link GNS3 topologies on 3 different hosts with Cloud UDP tunnels

