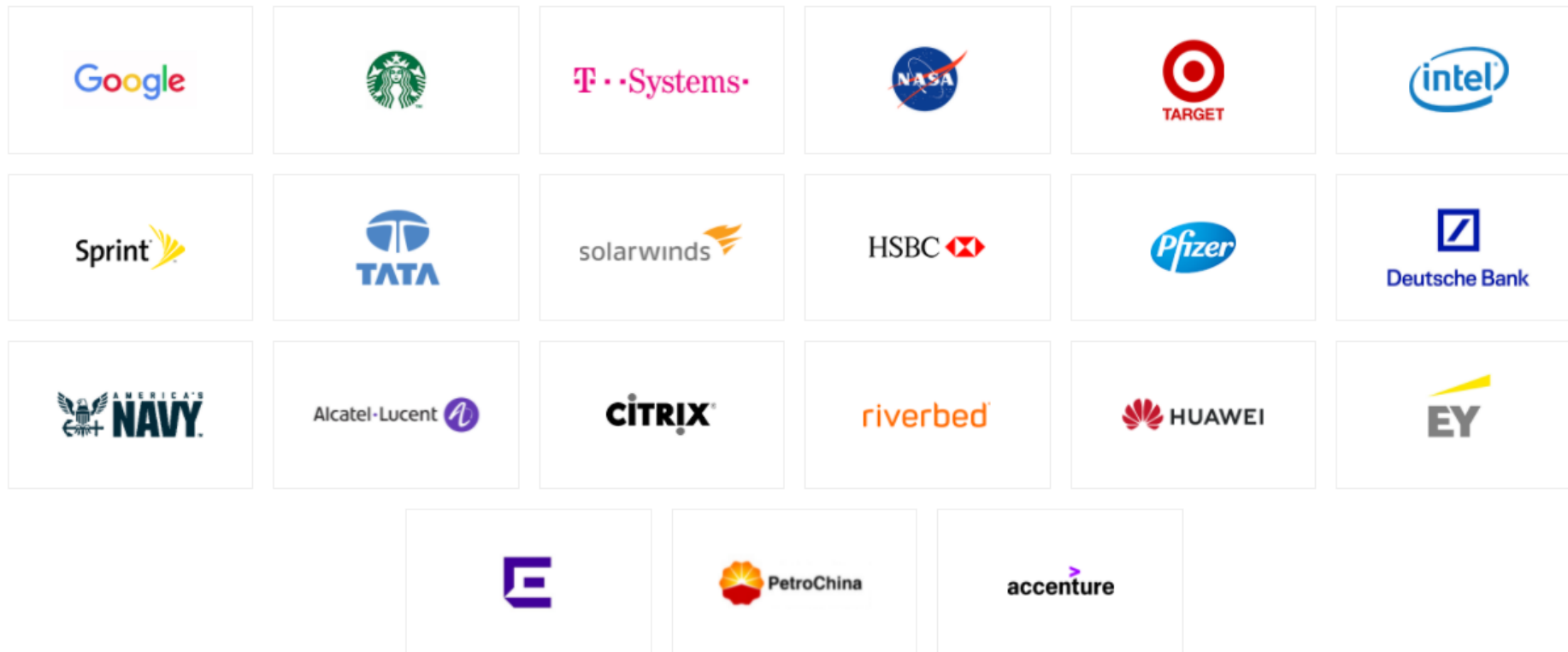




# GNS3 (Graphical Network Simulator-3)

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.2.2.32.zip`  
<https://github.com/GNS3/gns3-gui/releases/tag/v2.2.32>

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

# Classroom GNS3 final configuration

4 Run GNS3 VM, select OK ➡ Network ➡ Yes

5 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]
```

6 Save and exit.

# Install GNS3 at home

- 1 Download `GNS3-2.2.32-all-in-one.exe` from <https://github.com/GNS3/gns3-gui/releases/tag/v2.2.32>
- 2 Install selecting VirtualBox.
- 3 Download and import .ova from `GNS3.VM.VirtualBox.2.2.32.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
```

## Connect to Internet ➡ NAT

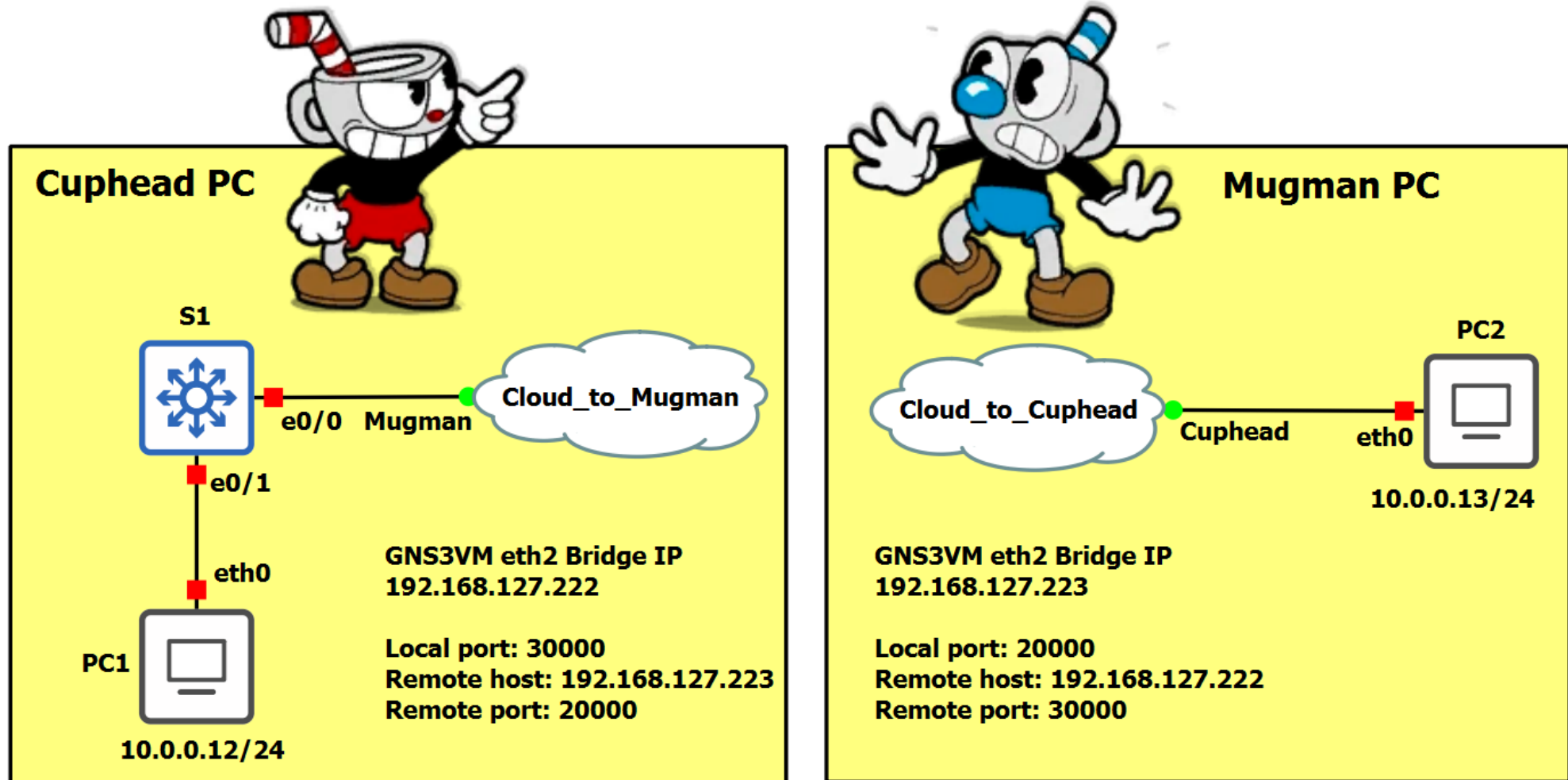
- Fastest
- ⚠ Run NAT on **GNS3 VM**
- ⚠ Cannot access GNS3 topology from external network
- ⚠ **Only in A22:** A22 uses 192.168.122.0/24 that conflicts with NAT default assigned range.
  - When loaded GNS3VM, press Enter (OK) ➡ Shell
  - `virsh net-edit default`
  - Change `122` to another number (e.g.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

