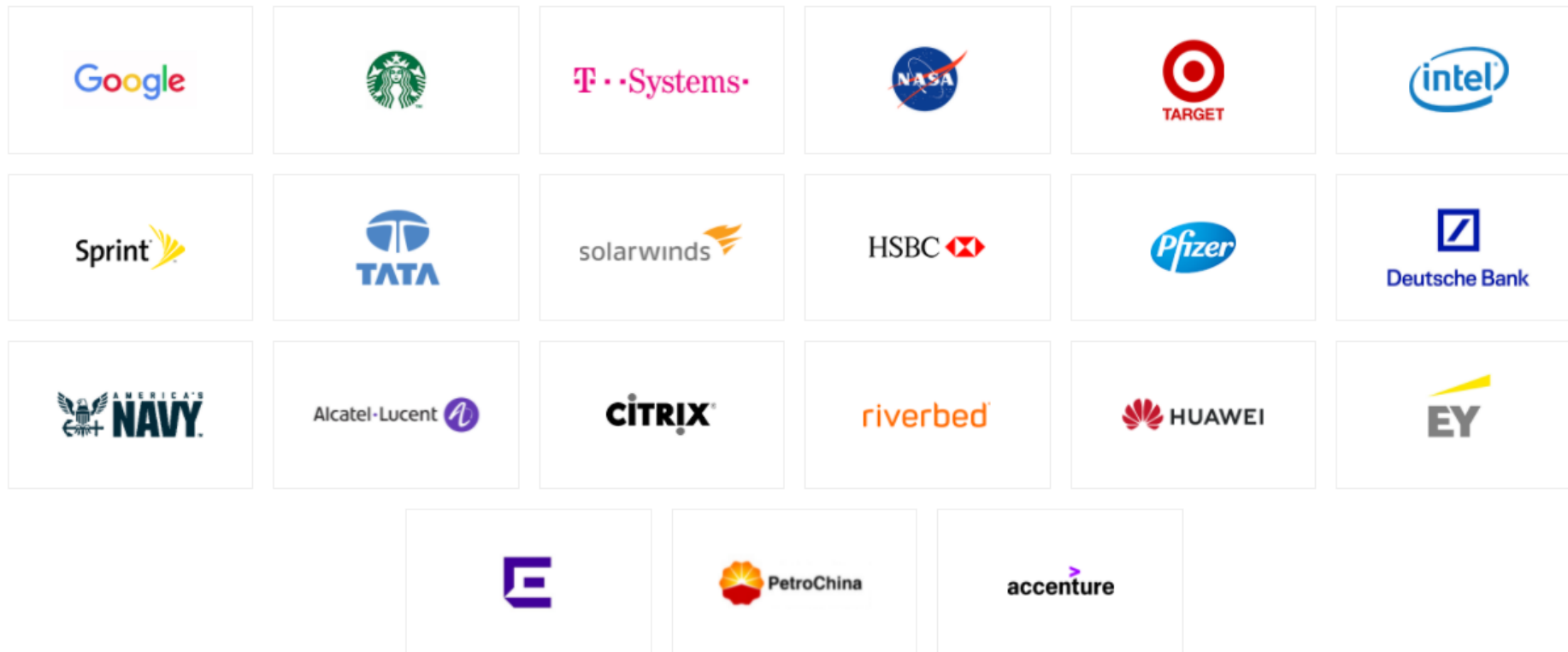




GNS3 (Graphical Network Simulator-3)

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



Classroom Final configuration

Already installed on classroom PCs

- GNS3 version 2.2.21
- VirtualBox

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
```

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

- File > New template
- Install an appliance from the GNS3 server (recommended)
- Guests > Alpine Linux
- Install the appliance on the GNS3 VM (recommended)

IP Configuration

- Before booting up: Right click > Edit config

Emulate PCs (Graphical) webterm dockers

Installation

- File > New template
- Install an appliance from the GNS3 server (recommended)
- Guests > webterm
- 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

- Download and extract [Switch.rar](#)
- File > Import appliance
- Appliances > MultiLayer Switch - Cisco IOU L2
- **License:** Edit > Preferences > IOS on UNIX

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

Emulate Cisco Managed Routers Cisco IOU L3

- Download and extract [Router.rar](#)
- Appliances > Router - Cisco IOU L3
- When imported, right click > Configure template
 - Check `Use default IOU values for memories`. Set RAM size to 512 MB
- **License:** Edit > Preferences > IOS on UNIX

```
[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 igmpsnooping`
- 😡 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

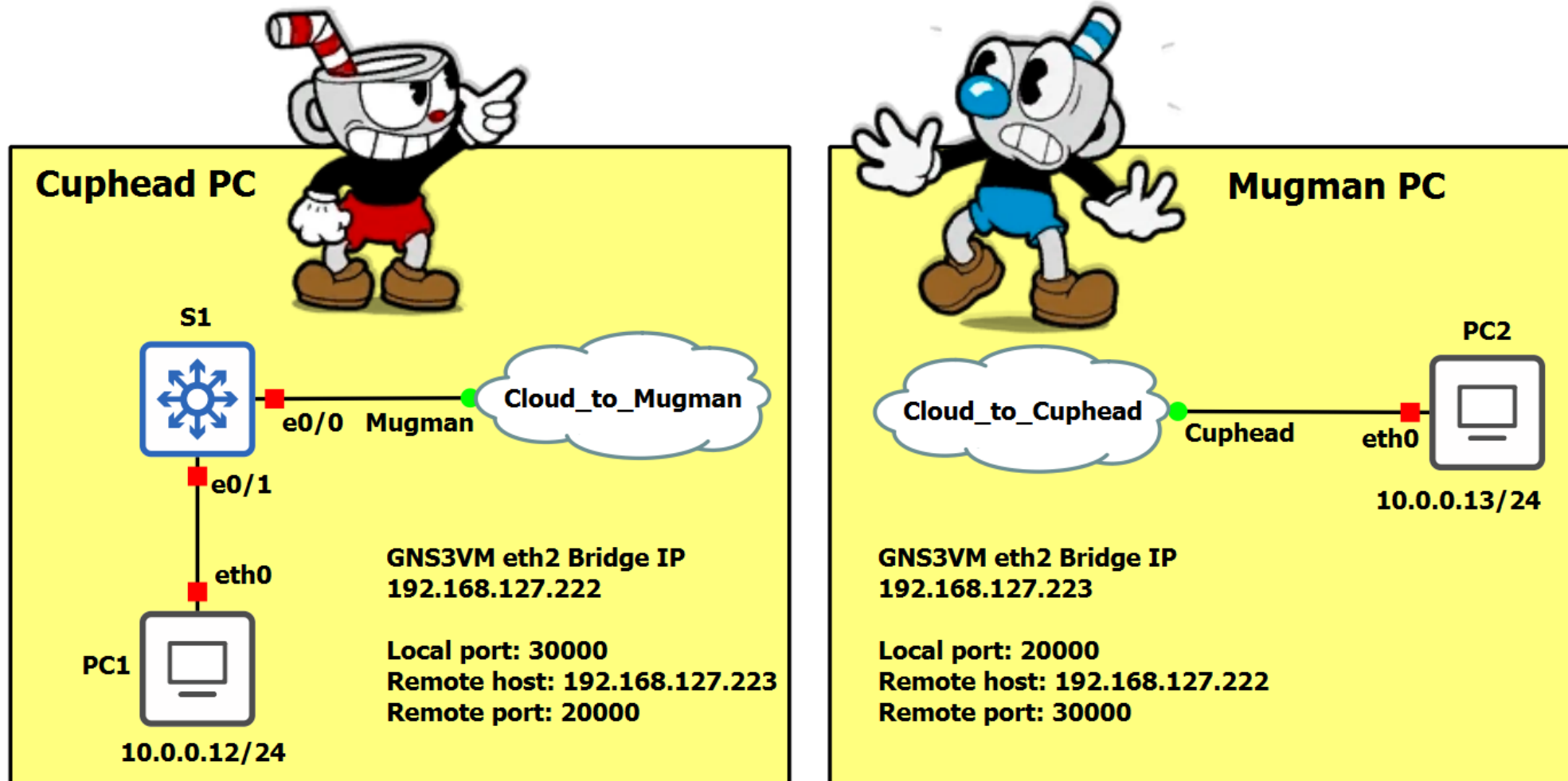
- Fastest
- Run NAT on **GNS3 VM**
- ⚠ Cannot access GNS3 topology from external network
- ⚠ **Only in A22:** A22 uses 192.168.122.0/24 that conflicts with NAT default assigned range.
 - When loaded GNS3VM, press Enter (OK) > Shell
 - `virsh net-edit default`
 - Change `122` to another number (e.g. `112`)

Connect to Internet Cloud with bridged interface

- In GNS3VM, add a 3rd Bridged network card. Check Promiscuous mode: Allow all.
- 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

